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Amateur Radio

CQ

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JULY 1991 $2.95

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

This device has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased until approval of the FCC has been obtained.

Freedom of Choice

TM-741A Modular FM Transceiver

The choice is yours. Kenwood's new FM Multibander allows you to start as a deluxe dual band radio – or add a third band. As a dual band, you'll have access to 144 and 450 MHz operation.

If you decide to add a third band – choose again. Select from the 28, 50, 220, or 1200 MHz bands. Then simply plug this option into the available slot.

Your ultra-compact TM-741A offers a full 50 watts on 10, 6, and 2 meters; 35 watts on 450 MHz; 25 watts on 220 MHz, and 10 watts on 1200 MHz!

On 2 meters, you'll find wide band receiver coverage with RX on 118 - 174 MHz, and TX on the Amateur bands. The 2 meter section is modifiable for MARS and CAP (permits required).

303 memory channels are available, with 101 in any one band. Cross band repeat between bands, or, choose dual band input with cross repeat to the third band. The offset function is active on the output, allowing you to repeat to repeaters.

Other features

Individual volume and squelch controls for each band. Remote mounting of front panel with optional cable kit. Optional selective calling or group calling. Optional DTMF memory stores 15 characters for repeater controlling. Versatile scanning. Auto offset on 2m. Fixed detect output for packet radio.

Multi-function DTMF microphone. Separate antenna and speaker outputs. Auto power off and time-out. 4 step dimmer. 3 step power. Clock, timer and calendar. DC cable, and mobile bracket.

UT-28S: 28MHz, 50 W, RX: 24-36 MHz, TX: 28-29.7 MHz. **UT-50S**: 50MHz, 50 W, RX: 46-57 MHz, TX: 50-54 MHz. **UT-220S**: 220 MHz, 25 W, RX: 215-230 MHz, TX: 220-225 MHz. **UT-1200**: 1200 MHz, 10 W, 1240-1300 MHz. **DTU-2**: digital paging unit. **PG-4K**, **PG-4L**: remote cable kit. **MB-11**: extra mounting bracket. **PG-2N**: extra DC cable. **PG-3B**: DC line noise filter. **TSU-7**: CTCSS encode/decode unit.

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
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KENWOOD ELECTRONICS CANADA INC.
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Mississauga, Ontario, Canada L4T 4C2

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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.

KENWOOD

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

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

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The Radio Amateur's Journal

ON THE COVER: We've all heard it many times before: The effective station need not be elaborate. Richard Newell, AK1A, of Bolton, Mass. operates this neat, efficient contest station. (Photo by Larry Mulvehill, WB2ZPI)

JULY 1991 **VOL. 47, NO. 7**

FEATURES

DEPARTMENTS

ZERO BIAS EDITORIAL

What was the most popular exhibit at Dayton this year? Which marvelous item offered for sale brought an immediate sigh of joy to the purchaser? No, it wasn't something you talked on. Rather, it was something you *walked* on. There was a vendor out in the fleamarket who was selling fluid-filled inserts for shoes, and these made all the walking a veritable pleasure, or so I'm told. By the time I got there the inserts were sold out. Next year I'll have to find him first.

I did meet a truly honest man at Dayton, a gentleman who worked for the church group that ran the food concession near our booth. I don't think he was impressed with my long history of food reviews at hamfests, nor do I think he even knew what amateur radio is. As I approached the counter, I checked out the hot-food specials—other than the usual grease-dogs and mystery burgers—and saw something that looked interesting. I asked the man, "How's the . . . ?" He looked at me and then checked to see who else was looking before he felt safe enough to shake his head from side to side in a negative response. When I got to the ham-and-cheese sandwich, he smiled and nodded a positive response. I took his advice and stuck with the ham-and-cheese sandwiches all weekend. He was right.

Speaking of meritorious honesty at Dayton, John E. Raifsnider, WA8OKA, deserves the prize, and in fact he received one for his honesty. While attending the Hamvention, John found a packet containing over $1700 in cash plus two blank checks. Most of us have fantasies over such temptations and what we would do in such a situation. Here was John, an amateur, at the world's biggest amateur radio toy store where everything is a bargain, and yet he did the right thing. He turned in the money and checks to the Hamvention staff. I'm sure some of John's friends are still kidding him about what he should have or could have done with the money. Obviously, John felt that there was only one right thing to do, and he did it. I'm also sure that the person who got his money back never expected to see it again.

While honesty itself may be the best policy and provide its own rewards, the folks at ICOM America also recognized in John a trait that we all would like to have and demonstrate as easily. Chuck Northcutt, W7SRZ, ICOM's Amateur Division Manager, presented John with an HT of his choice (an IC-2SAT) in recognition of his honesty and for living up to the best traditions of amateur radio. Congratulations, John.

They're Here

On May 11 amongst the mail delivered to my house was a slightly crumpled, brown mailing tube. At first glance it was hard to read my name and address or to see exactly from where it had come. When I removed the contents and saw what it was, I was confident that they had finally arrived. Here at last were the two operating awards from the FRC, the Cuban amateur radio group, for which I had waited almost two years.

The certificates are quite nice and are being framed right now so that I can hang them in my office. I wrote to Rey, CO2HQ, to let him know they had arrived, and now I'm letting you know that this saga is complete. I guess if I were a big-gun paper chaser this wouldn't have seemed so important, but I haven't become that jaded yet, nor do I expect to be.

CQ Awards Program

We've finally finished updating our CQ Awards Program rules, and have included them in this issue. If you would like a separate copy as well as application sheets for our awards, send in an SASE and we'll get it out as soon as possible. If you read through the rules, you might be surprised to learn that you may already be eligible for one or more of our awards. What is required is a bit of patience and perseverance to complete the paperwork and apply.

A lot of us are satisfied just knowing that we have worked such and such or that we have worked x number of countries, prefixes, states, or counties. However, there is something a bit nicer in being able to hang a certificate on the wall to show that fact to all and to occasionally remind ourselves of our own accomplishments. I've been told on a few occasions that amateur radio is a hobby of egos and that some of us (one or two perhaps) even have monumental egos. Like trophies and medals, certificates can massage even the biggest (and smallest) egos around.

In the awards rules you will also note that Norm Koch, K6ZDL, our WPX Award Manager, has moved inland from California. Norm has moved to Clovis, New Mexico, and his new address is 880 CR13, Clovis, NM 88101. By the time you read this, Norm should have everything up and running with the WPX Program, and with a little luck his tower should be installed.

Antenna Weather

Next month we will feature our second Antenna Special issue of the year. However, you don't have to wait until then to improve, install, or just add to your antenna farm. For most of the country the weather is perfect for antenna work, and perhaps it's a good time to check up on what happened to your antenna during the winter. As most of us know, antenna traditionalists generally plan major antenna work for the dead of winter, preferably during a snow or ice storm. If perchance there is an accompanying 90 mph freezing wind, so much the better. While I can accept that in principle and also accept that it builds amateur radio character, it's not my idea of a good time.

Even though the weather is warm and pleasant, force yourself to take a look at your antenna. Check out the cable and hardware and see what needs replacing or touching up. You might want to plant a few ground rods or radials while the ground is soft. It's also a good time to check out the available space for a new antenna. If it bothers you, you can always put on your parka and mukluks to make it seem more like antenna weather, but your neighbors might think you're really stranger than you are.

The point, however, is to make your antenna system more efficient and productive for you. You still have a few months before contest season starts, so there's plenty of time to fine-tune your station.

Speaking of Contests . . .

Please send in early for your contest logs. Your early SASE will help expedite your receipt of logs in time for the contests. We can't always drop everything we're working on to gleefully answer a bushel of log requests received a week or even a few days before a contest. The requests that require us to write envelopes and add postage obviously take more time and so are done last.

Finally, I have to congratulate Steve Bolia, N8BJQ, our WPX Contest Director. I don't know how he does it, but with very rare exception, every entry we receive for the WPX Contest is clearly marked on the outside of the envelope as to contest and mode. We wish they were all like that.

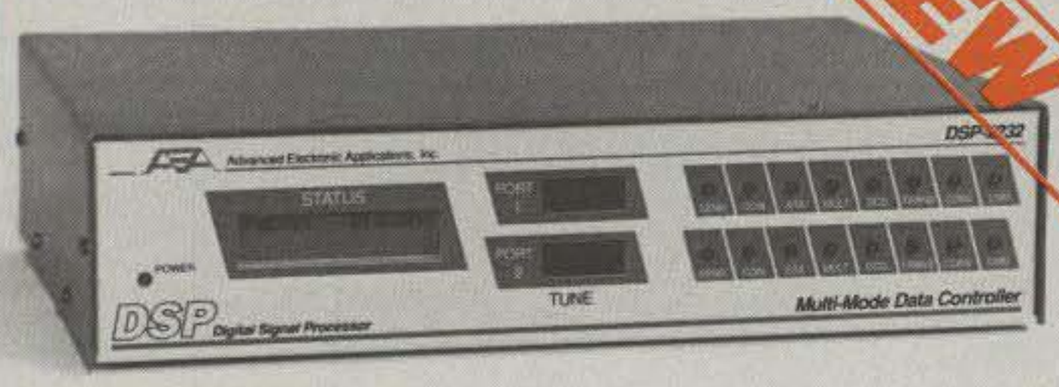
73, Alan, K2EEK

high-quality

high-value

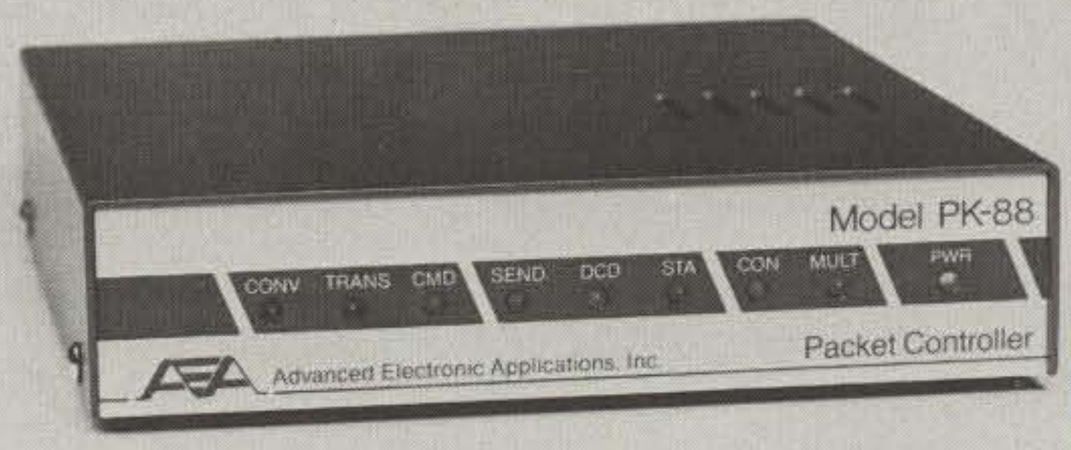
Digital Data Products

① NEW



DSP-2232

③

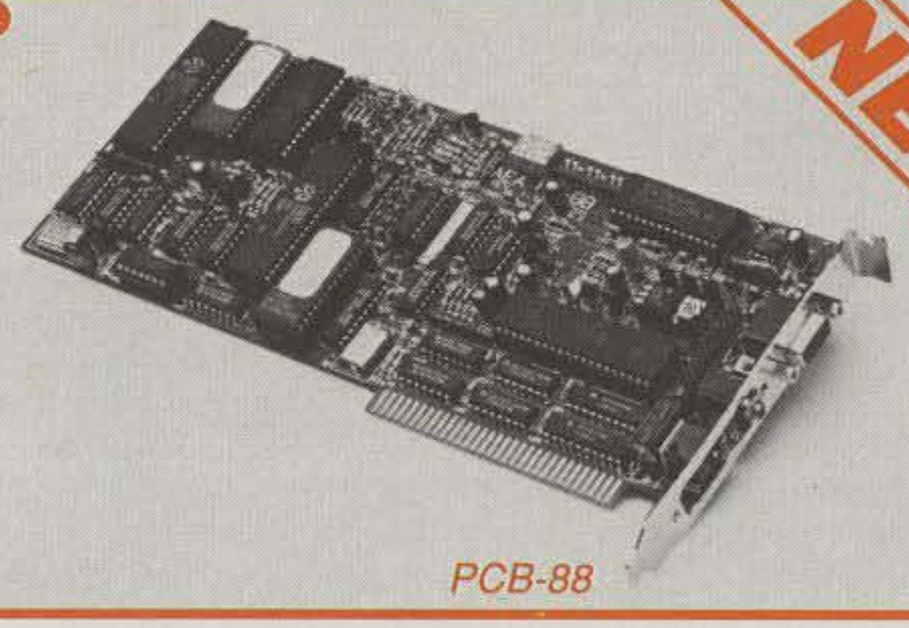


PK-88

② 

PK-232MBX

④ NEW



PCB-88

① ***NEW!*** **DSP-2232 (pictured) and DSP-1232:** *state-of-the-art controllers utilizing digital signal processing technology with the Motorola 56001 processor; built-in software modems include all standard FSK modems, G3RUH/K9NG 9600 bps modem, 400 and 1200 bps PSK telemetry modems for PACSAT and OSCAR 13 & 15 satellites, AEA's V.26b 2400 bps DPSK modem and more; modems for SSTV, multi-level grey scale WEFAX and WEFAX APT coming soon; includes all features of the PK-232 and much more; dedicated parallel printer port; DSP-2232 has two simultaneous radio ports and a front panel LCD display; DSP-1232 has two switchable radio ports (no LCD display) and can be upgraded to the 2232 at any time* **DSP-1232 $789.00**
. . . . . **DSP-2232 $999.95**
. . . . . **DSP-1232 UPGRADE KIT $299.95**

② **PK-232MBX Multi-mode Data Controller:** *most popular multi-mode controller ever made; RS-232 compatible controller for Packet, Baudot and ASCII RTTY, AMTOR/SITOR ARQ and FEC, Morse code and WEFAX; also receives NAVTEX/AMTEX and TDM; superior Chebyshev filter design for better copy; built-in 18K byte PakMail™ personal packet maildrop with auto forwarding; SIAM™ for automatic RTTY signal identification; KISS mode for TCP/IP compatibility; Host Mode for user-friendly software interface; cables and connectors included* **$349.95**

③ **PK-88 Packet Controller:** *the easiest way to get started with amateur digital communications; same packet commands as the PK-232; includes Host Mode and 18K byte Packet maildrop; AX.25/L2/V2 compatible; requires 12 – 16V DC @ 500 mA (not included); advanced features such as KISS mode and NET/ROM compatibility for the advanced user, easy to learn for the new user* **$119.95**

④ ***NEW!*** **PCB-88 IBM Compatible Plug-In Packet Adapter:** *full-featured Packet controller; plugs into 8-bit expansion slot in your IBM PC, XT, AT or compatible; includes all features of PK-88 controller and more; packet-only version of PC-Pakratt II (called PC-Pakratt-88) terminal control software included at no additional charge; external 12V DC input (power supply not included) so your unattended TNC and mailbox can operate with the computer turned off; true packet DCD sensing circuit included; built-in modem disconnect header* **$169.95**

Specifications are subject to change without notice or obligation. Prices listed are suggested Amateur Net through participating AEA authorized dealers (DSP upgrade kit available through the factory).

Technical support may be obtained through CompuServe's Hamnet forum. Messages should be addressed to user ID #76702,1013.

Advanced Electronic Applications, Inc.

P.O. Box C2160/2006 196th St. S.W. Lynnwood, WA 98036-0918
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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.

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, ft² (m²)	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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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 backlighted 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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ANNOUNCEMENTS

• **SEANET 91** - The Radio Amateur Society of Thailand (RAST) will host SEANET 1991 from November 8–10 in Chiang Mai at the Chaing Mai Plaza Hotel. For more information and reservation details, write to the Radio Amateur Society of Thailand, P.O. Box 2008, Bangkok 10501, Thailand, or check into the SEANET net which meets daily on 14.320 MHz from 1200Z (contact any HS station that checks in).

• **Suffolk County Radio Club Meetings** - The radio club meets on the third Tuesday of every month (except July) at 7:30 PM at the Bohemia Recreation Center, Bohemia, Long Island, New York. All welcome (handicapped accessible). For more information, contact Jim Heacock, KA2LCC, at 516-473-7529.

• **Scouting Amateur Radio** - If you have combined amateur radio operation with Boy Scout and/or Explorer activities, share your experiences with others by sending information and photos about communications events and Ham Radio Explorer Post Program Management. The data will be used in a future Scouting and Exploring Ham Radio Manual (credit will be given for your ideas and suggestions). Send info to Hal Camlin, W3QLP, The Bay Area ARS, P.O. Box 805, Pasadena, MD 21122-0805.

• The following special events will take place during the month of July:

One-land, from Vermont State Capitol building, Montpelier, Vermont; Vermont amateurs; July 10–11 from 10 AM to 3 PM; 25 kHz up from bottom of Novice and general bands, RTTY/AMTOR in digital subbands. For certificate and special gift from state of Vermont, send $1.00 and SASE to Amateur Radio Bicentennial Project, P.O. Box 200, Graniteville, VT 05654 (foreign stations SAE and IRCs).

N2IFG, from East Aurora "Racing Day," East Aurora, NY; Pioneer Radio Operators Society; 1600–2200Z July 28 on 3853, 7244, 14244, 21344 kHz. For QSL send SASE to N2IFG, 42 North Willow St., East Aurora, NY 14052.

KY2F, from Central New York International Air Show, Oswego County Airport, Oswego, NY; Oswego County ARES; 1300–1900Z July 13–14; General 20, 15, 10, 2 meters and Novice 10 meters. For certificate send QSL and large SASE to Fred Swiatlowski, KY2F, P.O. Box 5227, Oswego, NY 13126.

W2DMC, from Crystal Radio Club 60th anniversary; 1200–2400Z July 27–28; phone 7.250, 14.300, 28.450 MHz, CW 7.050, 14.050 MHz. For certificate send QSL and SASE to W2DMC, P.O. Box 482, Valley Cottage, NY 10989.

WB2ELW, from 106th "Birth of the Hamburger" birthday, Hamburg, NY; South Towns ARS; July 20–21 (no times given); 80–15 meters lower portion of General phone and 28.415. For QSL and certificate send SASE to WB2ELW, 6120 McKinley Ave., Hamburg, NY 14075.

4-land, from Bel Plaine, Minnesota BBQ Days; Southwest Metro ARTS; 1400–2200Z July 20; lower General voice portion of 40, 20, 15, and 28.325. For certificate send SASE to SMARTS Radio Club, Box 144, Chaska, MN 55318.

W4CN, from International Barbershop Singing Convention, Louisville, KY; from 1200–0300Z July 4–6; SSB 14.225–14.245, 21.3–21.32, 28.3–28.32 MHz, plus FM on Louisville 147.18 MHz repeater and 147.58 MHz simplex. For QSL send QSL to Amateur Radio Transmitting Society, P.O. Box 7391, Louisville, KY 40257-0391.

KA5BAT, from 110th anniversary of demise of Billy the Kidd, Old Fort Sumner, NM; Eastern New Mexico ARC; 1500–0100Z July 13; General phone bands on 15, 20, 40 meters and on or about 28.400 on 10 meters. For certificate send QSL and 9 × 12 SASE to Leroy Thomas, KA1ULG, 1479A Mindoro Ct., Clovis, NM 88101.

NH6ES, from "Eclipse Station," Puako, Hawaii; Big Island ARC; 1630–1837Z July 11; Novice part of 10 meters and General segments of other HF bands. For QSL send QSL to BIARC, P.O. Box 1938, Hilo, HI 96721-1938.

K8EPV, from 66th Port Huron to Mackinac Island Yacht Race, Michigan; Eastern Michigan ARC; 1400–0200Z July 27–28; phone 3.910, 7.235, 14.235, 21.335, 28.335, CW 3.710, 7.110, 21.110. For certificate send #10 SASE and QSL to K8EPV (Callbook) or 801 Range Rd., Port Huron, MI 48060.

K8ZAS, from 20th anniversary Delta County ARS, Escanaba, MI; 1400Z July 6 to 0100Z July 7, and 1400Z July 7 to 0100Z July 8; on 3.930, 7.280, 14.280, 21.357, 28.357, 147.15/75. For QSL send SASE and QSL to DCARS, P.O. Box 923, Escanaba, MI 49829.

N8FIP, from X-mas in July Celebration, Weston, WV; Central ARA of West Virginia; 1600–0400Z July 13; SSB 10, 15, 20, 40, 80 meters, and 20 meter packet. For certificate send QSL and 9 × 12 SASE to CARA, 303 Spring St., Weston, WV 26452.

W8AL, from Pro Football Hall of Fame Greatest Weekend, Canton, OH; Canton ARC; 1300–2300Z July 27–28; SSB 28.350, 21.350, 14.270, 7.270 plus or minus QRM (SWLs welcome). For certificate send QSL and 9 × 12 SASE with 2 units first-class postage to Randy Phelps, KD8JN, 1226 Delverne Ave. SW, Canton, OH 44710-1306.

K8QYL, from commemoration of 22nd anniversary of first walk on moon by Neil Armstrong, Wapakoneta, OH; Reservoir ARA; July 20; 40 meter phone and CW and 10 meter SSB. For certificate send 9 × 12 SASE and QSL to K8QYL, 240 Lincoln Dr., Celina, OH 45822.

W9ZL, from Confederate Air Force Ju 52 Junkers Tri-Motor, Experimental Aircraft Assn. Fly-in and Convention, Oshkosh, WI; Fox Cities ARC; daylight hours July 26–29; General portion of 10, 15, 20, 40 meters and VHF packet. For certificate send QSL (must use contact number) and SASE to Wayne Pennings, WD9FLJ, 913 N. Mason St., Appleton, WI 54914.

WB0HWP, from North American Christian Convention, Denver, CO; Christian Amateur Radio Fellowship; July 9–12; on 14.293, 21.393, 28.393. For QSL send QSL and SASE to CARF, 780 Mary Ave., Holland, MI 49424-1631.

0-land, from Centennial of Itasca State Park, Lake Itasca, MN; Paul Bunyan ARC; 0000–0000Z July 20-*n*-21; SSB in lower part of General range 80–10 meters (excl. WARC). For certificate send QSL, SASE, and contact number to KE0RR, R1 Box 152, Winger, MN 56592.

N0GFK, to honor W0LSC, teacher of first high school radio theory class in Minnesota, Laporte, MN; Cass-Hubbard County ARC; 1500Z July 6 to 0300Z July 7; SSB in General portion of 75, 40, 20, 15, 10 meters. For certificate send QSL and SASE to W6AAQ, Box 595, Esparto, CA 95627-0595.

EJ7FRL, from expedition to Fastnet Rock Lighthouse, off south coast of Ireland; July 9–19; SSB 3.775, 7.075, 14.140, 14.240, 21.275, 28.450, plus 160 meters and WARC bands, 144.260; CW 10 up on 80 and 40 meters, 10 and 30 up on 10, 15, 20 meters, 144.040. For information, contact EI3GU, 31 Seaview Park, Shankill, Co. Dublin, Ireland.

GX6HH/P, from amateur radio demonstration at Helenswood School, Hastings, East Sussex, England; Hastings Electronics & Radio Club; July 13–14. Interested in arranging skeds. Contacts would count as 2 points toward 1066 Award. QSL to G0GRK. For more info or to arrange a sked, contact Gail P. Stevens, G0GRK, 33 Langham Road, Hastings, East Sussex, TN34 2JE, England.

VE3CRC, from Sertoma Highland Games, Chatham, Ontario, Canada; Chatham Kent ARC; 10 AM to 5 PM EDST July 13; near bottom of General 15, 20, 40 meters. For certificate send QSL *only* to Chatham

Kent ARC, P.O. Box 284, Chatham, Ontario N7M 5K4 Canada.

VE4IHF/Ø, from International Peace Garden, North Dakota and Manitoba border; 9 AM to 6 PM CST July 12–13; phone and digital modes. For certificate send 2 IRCs and SAE or for QSL 1 IRC and SAE to Dave Snydal, VE4XN, 25 Queens Crescent, Brandon, Manitoba, R7B 1G1 Canada.

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

July 4, **Harrisburg RAC Hamfest,** Bressler Picnic Grounds, Harrisburg, PA. Contact Dave Dormer, KC3MG, 1-717-939-4957.

July 6, **Firecracker Hamfest,** Civic Center, Salisbury, NC. Contact Walter Bastow, N4KVF, 3045 Highrock Rd., Gold Hill, NC 28071. (VE exams at 1:30, preregistration required: Isabell Ledford, POB 826, Collamee, NC 27014, form 610, copy license, $5.25 fee.)

July 6, **South Milwaukee ARC Swapfest,** American Legion Post 434, Oak Creek, WI. Contact South Milwaukee ARC, P.O. Box 102, South Milwaukee, WI 53172-0102.

July 6–7, **West Virginia State ARRL Convention,** Jackson's Mill State 4-H Camp, near Weston, WV. Contact Chuck McClain, K8UQY, 304-366-5401. (VE exams 8 AM July 6, preregistration by June 30 required, contact Bob Robinson, KU8C, 304-366-0132).

July 7, **North Hills ARC Hamfest,** Northland Public Library, north of Pittsburgh, PA. Contact N3DOK 412-367-2393.

July 12–13, **Amateur Fair 91,** Aldrich Arena, Maplewood, MN. Contact Amateur Fair, P.O. Box 26331, St. Paul, MN 55126, or call 612-653-9999 (computer users can call HAM-LINK at 612-426-0000 [300–2400 baud]).

July 12–14, **North Dakota-Manitoba Hamfest,** Peace Garden, North Dakota and Manitoba border. Contact John A. Swanke, KAØSLI, Box 304, Lakota, ND 58344.

July 13, **Straits Area ARC Swap Shop,** Emmet County Fairgrounds, Petosky, MI. Contact Clark Rouse, KA8TIL, 616-582-6455. (VE exams, contact Tom Romanauski, N8KHE, 616-436-5033.)

July 13–14, **Indianapolis Hamfest & Computer Show,** Marion County Fair Grounds, Indianapolis, IN. Contact Indianapolis ARA, P.O. Box 11776, Indianapolis, IN 46201, or call 317-326-2146.

July 13–14, **Mountain ARC Hamfest,** Red Rocks Campground, Woodland Park, CO. Contact MARC, Box 1012, Woodland Park, CO 80866, or call Joe Tafoya, NØCMD, 719-687-3641.

July 14, **Wood County ARC Ham-A-Rama,** Wood County Fairgrounds, Bowling Green, OH. Contact Bob Fyfe, KA8YWQ, 419-352-3260.

July 14, **DuPage ARC Hamfest,** American Legion Post 80, 4000 Saratoga, Downers Grove, IL. Contact Ed Weinstein, 708-985-9256. (Exams, walk-ins welcome.)

July 14, **Sussex County ARC Hamfest,** Sussex County Fairgrounds, Augusta, NJ. Contact Don Stickle, K2OX, 185 Weldon Rd., Lake Hopatcong, NJ 07849 (201-663-0677).

July 17, **OMIK Amateur Electronic Communications Assn. Convention and International Amateur Radio Symposium,** Charleston Marriot Hotel, Charleston, SC. Contact WB5SJL, 7725 Lew Hoad Ave., Baton Rouge, LA 70810 (504-769-4578). (VE exams.)

July 20, **Ausable Valley ARC Hamfest,** M-72, Mio, MI. Call 517-826-5549.

July 20, **Northern Vermont Mid-Summer Hamfest,** South Burlington Middle School, South Burlington, VT. Contact Joe Tymecki, N1DMP, 802-893-6458. (VE exams 2 PM.)

July 20, **Union Hamfest & Computer Fair,** Union Fairgrounds, Union, ME. Contact Rod Scribner, KA1RFD, 19 South Grove St., Augusta, ME 04330 (207-622-9197). (VE exams.)

July 21, **Flint Ham Radio & Computer Swap & Shop,** Flint City Market, Flint, MI. Contact Genesee County Radio Club, P.O. Box 485, Flint, MI 48501.

July 21, **Ashtabula County Hamfest & Computer Show,** Ashtabula Branch of Kent State University, Ashtabula, OH. Contact Ken Stenback, AI8S, 722 Lyndon Ave., Ashtabula, OH 44004 (216-964-7316 from 9 AM to 9 PM).

July 21, **Zero Beaters Hamfest,** Bernie H. Hillerman Park (Washington Fairgrounds), Washington, MO. Contact Ed Southall, WDØELL, Rt. 1 Box 105, New Haven, MO 63068 (314-459-6581). (VE exams walk-in starting 10 AM.)

July 21, **MIT/Harvard Wireless Tailgate Fleamarket,** Albany and Main St., Cambridge, MA. Contact W1GSL, MIT Radio Society, P.O. Box 82, MIT Branch, Cambridge, MA 02139.

July 21, **Van Wert ARC Hamfest & Computer Show,** Van Wert County Fairgrounds Commercial Bldg., Van Wert, OH. Contact Bob, WD8LPY, 419-238-1877 (evenings). (VE exams, call for info.)

July 22–31, **First International Conference of Radio Amateurs, Algeria.** For more information, contact ANCSE, 16 Rue Valentin, Algiers 16000, Algeria.

July 27, **Coos County Radio Club Swapfest,** North Bend/Coos Bay, OR. Contact Coos County Radio Club, P.O. Box 3494, 1005 Augustine St., Coos Bay, OR 97420. (VE exams.)

July 27–28, **18th Annual Ham Holiday & ARRL Convention,** Hobbies, Arts & Crafts Bldg., Oklahoma State Fair Park, Oklahoma City, OK. Contact Central Oklahoma RA Ham Holiday 1991, P.O. Box 95942, Oklahoma City, OK 73143-5942. (VE exams.)

July 27–28, **Western Carolina ARS Hamfest,** Fireman's Training Center, west of Ashville, NC. Contact Maurice, KB4YWN, 704-253-0269. (VE exams, preregistration only.)

July 28, **BRATS Maryland Hamfest & Computerfest,** Maryland State Fairgrounds, Timonium, MD. Contact BRATS Hamfest, P.O. Box 5915, Baltimore, MD 21208, or call Franz, N3HFS, at 301-583-9147. (VE exams, preregistration required, write to BARC, P.O. Box 120, Reisterstown, MD 21136.)

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This DXpedition is a bit out of the ordinary in that it features no tropical islands nor exotic animals. The setting itself lends insecurity to the operation, and only through hard work and perseverance did it come as well as it did.

The XU0AA Story
A DXpedition To Cambodia

BY JAMES BROOKS*, 9V1YC (KB1CM)

The remarks ranged between ridicule and disbelief. In fact, the comments became sort of an ongoing joke once my colleagues learned of the intended destination for my December vacation. "But why Cambodia?" was the usual response. "What are you going to do in such a place?" One even suggested I try Kuwait as an alternative, just in case these plans fell through. Another told me that just the thought of taking a vacation in a place without tour buses, prepaid meals, and one of those "all-inclusive" sightseeing packages was downright shocking.

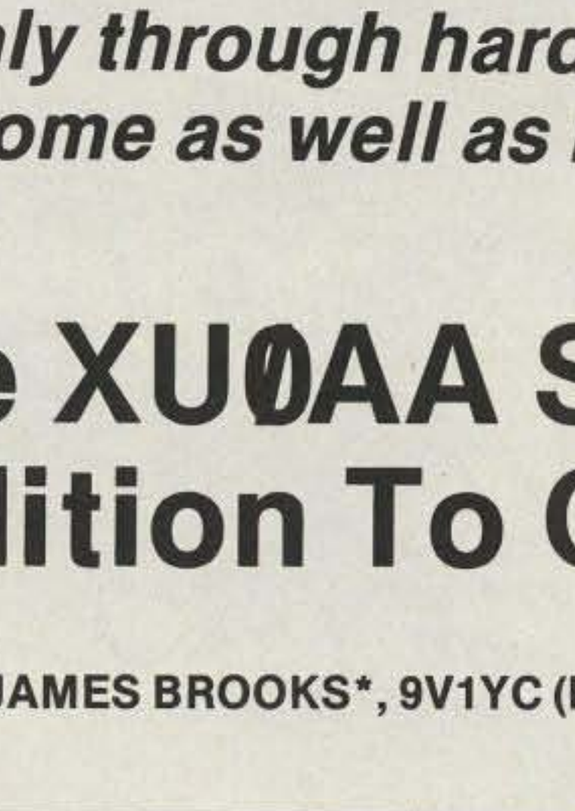
Practically no one seemed to grasp the concept of a DXpedition, or amateur radio in general for that matter, since it's a rather unknown hobby here in Singapore. The repeated attempts to explain my purpose in visiting Cambodia were hopeless, and I left behind a rather befuddled bunch, all wondering what the crazy American was up to this time.

Admittedly, the recent tragic events that took place in Cambodia and the ongoing civil war made this trip a little out of the normal vacation routine. Nevertheless, I wasn't about to waste my vacation roasting on a beach when I had the opportunity to visit and operate from this highly inaccessible and mysterious place. Besides, in addition to DXing, I was anxious to learn something about a country that is literally in my own backyard, yet light-years away in terms of politics and history.

The expedition was thought up and organized in August 1990 by Sin, JA1NUT, and Sokun, who is currently the only operator at the club station, XU8DX. Sin planned the trip as a way to bring in new equipment while at the same time activate Cambodia as much as possible, especially on CW (as Sokun had not yet mastered the code). He also wanted the operation to take place during a time of the year when there were good low-band conditions. Though Sin insisted he couldn't make the trip himself, he asked Atsushi, JF3NRI (N9KAU), and myself to be the operators.

It was agreed upon to aim for mid-December, and the following four months were spent arranging all the details such as equipment, transport, and permission to enter Cambodia. We chose December partly because we wanted to get in before the rumored U.N.-administered elections in January 1991. There would be no guarantee of stability (or amateur radio) beyond that date since all the factions currently fighting were reported to be stashing large amounts of arms, just in case the elections didn't turn out in their favor. Sokun told us that most Cambodians were nevertheless anxiously awaiting the U.N.'s arrival, as it was their only hope for a solution to the war. Sin assured me that we would be allowed inside, but that it would take a long time and much persistence.

He was right. As with most socialist countries in Southeast Asia, just securing the required papers and visas to enter was a painful task. To be allowed entry permission and the use of amateur radio gear inside Cambodia required an official invitation by the Post & Telegraph Department (DPT). Obtaining this wasn't just a matter of asking, but instead meant having a relevant qualification in the telecommunications field, thereby justifying

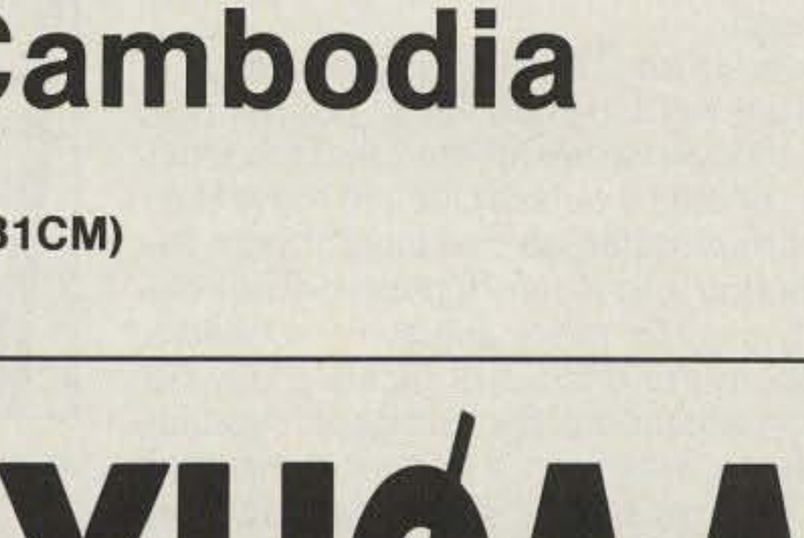


Davada at an ancient temple, Banteisry, built in the 10th century

XUØAA

CAMBODIA

Atsushi Sokun James



This is the QSL that made a lot of amateurs happy.

*Box 1265, Singapore 9117, Singapore

our trip to the higher authorities as something more official than amateur radio.

Being in such close proximity here in Singapore made it a little easier (and much cheaper) to send the repeated requests by telegram to Pnom Penh for all of our information. Most of the work on the Cambodian side was done by Sokun, who bravely haggled for months with her superiors at DPT (not to mention countless others) in order to get us the required papers and convince them of our intentions. It wasn't until just two days before we were scheduled to leave that Sokun phoned to inform me that we had been very lucky, and our papers had come through.

Atsushi and I met in Bangkok a day before our flight to Pnom Penh, and much to our annoyance we learned that the small charter airline had decided to move their departure dates up one day for both the outbound and return flights. It was relatively easy for me to adjust my schedule, as there are dozens of flights a day between Singapore and Bangkok. Atsushi, however, was forced to book himself on the next available seat returning from Pnom Penh (three days earlier) in order to make his connection out of Bangkok back to the States. Unfortunately, this meant he would only have four days to spend in Cambodia, which wasn't much time considering he had flown halfway around the world.

As if that wasn't enough, we were informed at Bangkok airport only an hour before we were to leave that our return seats out of Pnom Penh had been "bumped" and we would be taking the risk of not getting back at all. The representative from the airline company apologized and told me he would do his best to secure us a seat, but there were no guarantees. Since we'd come so far, Atsushi and I decided to proceed with our plans and go on to Pnom Penh, but felt a little queasy at the thought of being stuck in Cambodia indefinitely.

Our small turbo-prop with its handful of passengers left Bangkok precisely at sunrise for the short hour and a half flight. Most of the flight I sat there with my nose pressed against the window, peering down at the Cambodian countryside and wondering what life must be like for these people with such an unbelievable past. The horrific accounts of mass genocide which had occurred down there only twelve years ago were almost impossible to imagine or understand from my perspective, and I wondered what I would find in a nation recovering from that nightmare.

Upon landing at Pochentong airport the scene was surprisingly similar to what I had expected—soldiers scattered alongside the plane (all wearing the standard "red star" on their caps and collars), a few Soviet-built military helicopters off to one side, and one very cracked runway, all overgrown with weeds. Among the soldiers were various unidentified men all of whom seemed to be trying to project some sort of authority. One of these "authoritative men" approached me as we were walking away from the plane and in heavily accented English said my name and introduced himself as Sopat, an official translator from DPT.

In downtown Pnom Penh the favored methods of travel include bicycles and motor scooters.

To his left was a quiet and very nervous looking girl, obviously dressed in her best outfit. Atsushi recognized her right away to be Sokun, and politely introduced himself. Looking at her all spiffed up I suddenly felt very pathetic meeting her in person for the first time, clad only in a T-shirt and faded jeans.

Both of them told us to push our way past the group of soldiers (who also serve as immigration officers) and into a small crumbling building to wait while our passports were sorted out. A lot of talking then took place between Sopat and the sol-

Atsushi, JF3NRI (N9KAU), works his way through the pile-ups.

diers in what looked like attempts to clear us through all the airport formalities without the usual hassle. Barely ten minutes later we were allowed to leave with all customs procedures mysteriously overlooked and ignored. We didn't ask any questions as to why we were waived through without so much as a sniff inside our bags, but I could only guess the obvious.

Pnom Penh is a relatively poor and rundown city with very few cars, but like most Asian cities of its class, it has hundreds of scooters and bicycles moving in every direction. As I had heard before, Sokun told us that Pnom Penh was completely emptied of every living being for over three-and-a-half years when the Khmer Rouge expelled the population in April 1975. It seemed that everyone I met in Cambodia that week voluntarily brought up this point when I asked questions, and all seemed to know the exact duration. Like school children in a history class, they recited to me the exact time period in years, months, and days. Looking at the morning rush-hour in downtown Pnom Penh, I could hardly picture this city without any movement or life for such a long time.

Following some breakfast at a quiet restaurant, we then proceeded into the center of town, where Sokun had booked us into a small French-style hotel. Not surprisingly, despite the poverty and dilapidation from all the years of civil war, the French influence on Pnom Penh is still clearly evident in all the street planning and architecture.

After a few hours to look around the city on our own, we were taken to meet with Sokun's boss in order to square away the specifics of our operation and the question of a callsign. Our discussion took about an hour, and we agreed on XU0AA (Atsushi was very keen on the number "0" in the callsign for some reason). He assured us that all the documentation would be in writing and available for us before we returned to Bangkok, and that now it was legal for us to commence operating.

Atsushi also informed us that several strict rules were to be adhered to, without exception. First, all operation was to be carried out on the DPT grounds and we were not allowed to set up a station anywhere else in the city. We were to be given a van and a driver, but were forbidden to go beyond the city limits, as the situation was still very unstable in the countryside (contrary to what I had heard before), and DPT couldn't guarantee our safety.

Later on that day someone quietly told me the reason for the rule. Apparently, the Vietnamese-installed government (the one that issued our licenses and visas) doesn't fully control Cambodia, and the Khmer Rouge and two other groups are still active, some as close as

The author handling the morning pile-ups to North America.

40 km from the city. Also, to our disappointment, we were told that we could not be on the air or use the station after 9 PM, since the war had forced the government to impose a city-wide curfew. (Everyone said we were lucky to be able to go until 9 PM, since not long ago the curfew was strictly dawn to dusk.)

The club had one FT-757GX, an FL-2100Z amplifier, a tribander, and two dipoles for 40 and 80 meters. Among other things, we had brought along an additional FT-757GX (donated by Sin), a new rotator, a memory keyer, assorted cables, and various small accessories, all of which were to be left at the club after our visit.

Since Atsushi was to leave in a few days, I let him do all of the afternoon/evening JA and European pile-ups, while I preferred to stick to the short North American opening from sunrise to about 10 AM. The conditions were tremendous, and some signals, especially from the East Coast, were just fantastic. We agreed to keep to a normal schedule, which meant waking up at 5 AM, getting to the station by sunrise, and leaving at 8:45 PM before the curfew, thus maximizing our operating time.

After the morning pile-ups the next day, we installed the new rotator (with the assistance of a few DPT employees) and built some antennas for 12, 17, and 30 meters, since none existed at all, and Atsushi was very anxious to give out XU on some new bands. I also spent several hours that morning making general repairs to the existing cables that had been in bad shape for many months and had forced the station off 40 and 80 meters. I even found that a PL-259 at the end of the 40 meter coax had been stolen. Sokun told me that certain parts are so hard to come by in Cambodia that people will snitch these if they're left unattended.

I quickly realized after the first two days of operation that the last time XU was activated in this style was during a month when the East Coast of North America doesn't have nearly as good an opening to Southeast Asia. Consequently, they produced the biggest pile-ups, far exceeding the size of the JA, European, or West Coast ones. Twenty meters turned out to be the strongest band in the morning, while 10 meters peaked to Europe at about 1000Z.

From about 10 AM to 3 PM local time there are practically no signals to be heard on any band in this part of Asia, so we had much of the day to see the city and spend time with Sokun. The three of us became quite good friends (partly because we are all about the same age—Atsushi 27, Sokun 25, and myself 24), and much of our "off-air" time was spent wandering through Pnom Penh's markets and streets.

On the third day of the trip we went to see an infamous spot about which I had heard rumors from various people in Singapore, but wasn't sure existed. Fortunately (or unfortunately, depending on how one looks at it), the rumors were true and the place did indeed exist. It turned out to be an old school that Pol Pot, the leader of the Khmer Rouge, had turned into a torture chamber while he ruled form 1975 to 1979

It was left standing in its original state as a reminder of the murders committed during the period when this ultra-Marxist group controlled Cambodia and forced the entire population into labor camps. Every Cambodian we met, including So-

kun, had lost several family members to the "killing fields"—the mass execution grounds scattered throughout the country of those whom the Khmer Rouge considered undesirable to their cause. Sokun described to us where her family was sent during that time, and the type of conditions she endured as a small girl before being allowed to return to Pnom Penh in 1979.

What we saw in this building was indescribable, and it made the DXpedition side of our trip seem insignificant. Room after room had the photos taken prior to execution of thousands of emaciated victims, and other rooms, specifically those used for detention and torture, were left with their "stained" floors untouched. We spent only about an hour looking through this building, but it felt like much longer.

One other amateur radio goal of our trip was to try to give out that coveted 80 meter zone 26 to many desperate 5-Band WAZ chasers. Several obstacles were encountered in our attempts. The first and most frustrating was the frequent loss of commercial power, which occurred two nights in a row, exactly at our sunset. Power didn't return until long after the window to the States had closed. The first night it happened just as I told a huge pile-up of Stateside stations on 40 CW that I was going to QSY to 3505 Hz. (I think they must have heard my screams of anguish all the way to Thailand when the lights went out).

A second obstacle was the curfew, which forced us to pack up at 1345Z and not return until sunrise, thus making the West Coast and Europe a much tougher catch. As this was impossible to overcome (and we weren't too keen on explaining to a bunch of angry Cambodian soldiers about the joys of amateur radio), we apologized on the air beforehand to those areas affected, and said that we'd try our best to get special permission to stay at DPT overnight (which was refused).

The last, and most unavoidable, reason for our 80 meter failure was due to Sokun and her girlfriend, who insisted we take them to the local disco one evening, as they had never been to one before, and especially not with men their own age. Our initial response was "forget it," and we told them that we didn't spend all this time and money on a trip to Cambodia just to go dancing. After all, this was a DXpedition, not the senior prom, and wasting our precious on-the-air time before curfew was definitely out of the question.

Unfortunately, that just didn't cut it with them, and our repeated attempts to explain how there would be a multitude of amateurs in North America getting up before dawn to hear us on 80 meters were to no avail. I even tried to make them feel guilty by saying that "poor Atsushi" would be torn away from his last few hours on a DXpedition (since he would only have one more day in Cambodia before returning to Bangkok). They stood firm, however, and eventually we had no choice but to give in and shut down the station at the obscene hour of 1130Z (6:30 PM local). Admittedly, however, dancing the "Lambada" with Sokun that night turned out to be a lot of fun, and I quickly forgot the guilt I felt for neglecting all those sleepy-eyed zone 26 chasers.

Sokun proudly displays her new motorbike with which we toured the city.

Throughout the trip we kept in regular contact with Sin back in Japan so as to keep him informed of our progress. We were also desperate to find out if we had been allotted seats on our flights back out of Pnom Penh, and Sin was our only reliable way of finding this out. Finally, 12 hours before Atsushi was to depart, Sin broke into a pile-up to tell us that both of our seats had been confirmed, and we were on the passenger list. Atsushi was close to panic before that, and the news was a very welcome relief.

Sokun and I saw Atsushi off to the airport the next morning, and the rest of the trip I was on my own. I was slightly apprehensive about staying alone that week, but I figured it couldn't be too bad as nothing had gone wrong so far, and from my view things in Pnom Penh seemed quite stable. Following the usual morning pile-up I asked the driver if he could take me to a spot in the country not far outside Pnom Penh where I had heard one of the "killing-fields" had been located. He refused at first, citing various reasons which neither Sokun nor myself understood, but after a little monetary persuasion, he happily agreed.

After a short half-hour ride into the countryside we came to a fenced-in area that had a tall Bhuddist monument in its center. A man, the caretaker I suppose, greeted us and proceeded to tell to me (with Sokun interpreting) what had been found on this side only a few years ago. He explained that in the area about 30 meters by 50 meters in size (on which I was standing) 20,000 bodies were found. About 8,000 of the bones from these mass graves were placed inside the monument on display, again for all Cambodians to see as a reminder.

I spent the rest of the week in the same routine of operating from dawn to 10 AM,

From left to right: Sokun (XU8DX); James, 9V1YC; Atsushi, JF3NRI; and one of Sokun's friends.

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The AL-811 covers all HF bands (10/12 meters with easy user mod). There's no compromise on WARC and most MARS bands — you get a 100% rated output.

You can operate the AL-811 on all modes. You get 600 watts output PEP SSB and 500 watts output CW. You even get 400 watts on demanding continuous carrier modes like RTTY, SSTV, FM and AM.

How the low cost 811A tube resists premature failure - even when your amplifier is mistuned

811A tubes resist premature failure in two ways.

First, they're constructed with widely spaced elements that minimize the chance of elements touching and causing a short — even if the plate gets hot enough to melt.

Second, they use a directly heated thoriated tungsten filament cathode that prevents the electron emitting layer from instantly stripping off — even if mistuning causes a sudden, severe current overload.

Indirectly heated oxide cathode tubes (like the $400 3CX800A7) can be rendered instantly useless if their electron emitting layer is stripped off because of a severe current overload due to mistuning.

The Ameritron AL-811 is excellent for the newcomer because it's tough enough to withstand momentary mistuning. And the tubes are so inexpensive that you can replace one for mere pocket change.

The Ameritron advantage: extra heavy duty power supply that gives you peak performance year after year

The heart of the AL-811 power supply is its heavy duty power transformer with a high silicone steel core weighing a hefty 17 pounds.

A full wave bridge using 52.5 ufd of total capacitance (four 210 ufd, 470 volt capacitors) produces 1500 volts under full load and 1700 volts no load. That's excellent high voltage regulation!

Full height computer grade filter capacitors with screw terminals are used — not short stubby, light duty soldered-in "high technology" capacitors that can't dissipate the heat generated by high current.

The rectifier diodes are rated for a massive surge current of 200 amps. They won't blow even if you accidentally short the high voltage supply.

Wire wound, 7 watt, 50 K ohm equalizing resistors safely protect each filter capacitor — not 2 watt, 100 K ohm carbon composition resistors that can open and cause your filter capacitors to explode or fail.

The Ameritron AL-811 power supply is built tough so you get peak performance year after year.

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A Pi-Network *tuned input* provides a 50 ohm load for your rig. Even fussy solid state rigs can deliver their full drive to AL-811.

Low loss slug tuned coils — tunable from the rear panel — let you optimize performance. High quality low drift silver mica capacitors maintain proper tuning.

Output tank: optimum Q on each band

The low loss pi-network output tank of the AL-811 has been carefully designed for optimum Q on each band and built with quality RF components.

The result is peak performance over each band, wide impedance matching range and exceptionally smooth tuning with efficiencies close to 70%. Even a 3:1 SWR load won't damage the tubes or tank components.

A ball bearing vernier reduction drive makes plate tuning precise and easy.

Quiet pressurized ventilation keeps your tubes safely cooled

A quiet fan pressurizes the cabinet with over 20 cubic feet per minute of cool air.

This large volume of air flow keeps the 811A tube temperature safely below the tube manufacturer's rating — even with a key down carrier at 500 watts output.

Two illuminated meters

Two illuminated meters give you a clear picture of your AL-811 operating conditions so you can tell right away if something is wrong.

The Grid Current meter continuously checks for improper loading. The other meter switches between high voltage and plate current to warn of abnormal conditions.

Ameritron exclusive Adapt-A-Volt™ power transformer

Too high line voltage stresses components and causes them to wear out and fail. Too low line voltage causes a "soft-tube" effect — low output and signal distortion.

Ameritron's exclusive Adapt-A-Volt™ power transformer has a special buck-boost winding that lets you compensate for stressful high line voltage and performance robbing low line voltage.

This makes your components last longer and gives you peak performance — regardless of your line voltage.

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An Operate/Standby switch lets you run barefoot, but you can instantly switch to full power if you need it.

A transmit LED tells you when your rig is keying your AL-811.

A 12 VDC keying relay makes it compatible with all solid state and tube rigs. A built-in back-pulse cancelling diode protects your rig's keying circuit.

Shielded RF compartment. One year limited warranty. Compact 16" D x 13¾" W X 8" H. 30 pounds. UPS shippable. Shipped with transformer installed and wired for 120 VAC. Draws 8 amps at 120 VAC. Export model Al-811X wired for 240 VAC and includes 10 and 12 meters.

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then spending most of the day running about the city until the bands opened again at around 3 or 4 PM. Sokun and I made little use of the DPT van that week, and preferred instead to zip around town on her new motorbike. Riding through the chaotic Pnom Penh traffic on one of these scooters (with a terrified Sokun clinging and shouting inaudible directions) was far more fun that being driven in the company van, and much to the delight of the driver, it quickly became our transport of choice.

The power outages became more frequent the day before I left and were a persistent nuisance. I knew they would only last an hour at most, but a few times I seriously considered scrounging a 12 volt battery from somewhere to compensate. The frustration quickly disappeared, however, when the lights came on again and I got back on the air.

On my last night in Cambodia, Sokun and her friend again "suggested" we go dancing. Not wanting to again appear insensitive to all the early-risers in North America still waiting for zone 26, I made up a convenient story to cover myself. I informed Sin later that we had lost power that evening and that it hadn't returned until well after the curfew. Unfortunately, he was smarter than I estimated and wasn't fooled in the least. To get even, he informed all the patient 80 meter DXers back in North America just what I was doing with my evening. Needless to say, the teasing has yet to cease.

The next morning I made about 200 QSOs before catching my flight back to Singapore. As with our arrival, Sokun managed to talk her way past the soldiers at the airport and see me directly to the plane. To my surprise, she informed me just before leaving that it would be easy for me to return to Cambodia, since we had been given renewable visas, and I would no longer need to wait and go through all the hassle for permission next time. This was fantastic news, and I promised to scrounge some more vacation time from work and make it back.

I reached home a few hours later, and after a quick QSO to both Sin and Sokun, I decided that we had been extremely fortunate to have the DXpedition work out without any major disasters.

Despite the low-band problems, the trip had fulfilled its purpose in allowing us to practice our hobby, improve the club station, and briefly see Cambodia from the inside. But on my part it also provided the "education" I was looking for, as harsh as that might have been.

At the time of writing this neither the U.N. nor the Cambodians themselves had settled the civil war, and it seemeed certain that the Khmer Rouge would soon return to power. It can only be hoped that Cambodia will not see a repeat of the past. CQ

CQ REVIEWS:

The Japan Radio Corp. JST-135HP HF Transceiver

BY LEW McCOY*, W1ICP

The JST-135HP is manufactured by Japan Radio Corporation, and while the company is not too well known in the amateur market, they make extremely fine equipment for the entire communications field. The JST-135HP is an HF amateur transceiver that is exceptionally well designed and has proven to be an outstanding performer. I had a chance to use the unit for several months and gave it a thorough workout. I was very impressed by its performance.

I really don't like the cliche "bells and whistles," but this unit has them all, as you will see. The receiver provides complete coverage from 100 kHz through 30 MHz continuously and operates all modes, LSB, USB, CW, AM, AFSK, and FM. It employs a variable tuning system, the same as used in their commercial equipment. The receiver provides microprocessor-controlled preselection of the receiver front end, which reduces undesired out-of-band signals. I found that any "birdies" present were not worth mentioning.

Going to the transmit side for a moment, the unit employs a special, heavy-duty heat sink which provides continuous full-power transmission on all bands 160 through 10, including the WARC bands. This means exactly what it says: AMTOR, RTTY, and other key-down continuous-duty modes can be used at full power (150 watts out).

The frequency synthesizer is composed of two phase-locked loops (PLLs) plus two direct-digital-synthesizer (DDS) circuits. These provide true full break-in capabilities (high-speed transmit/receive switching).

The transmitter uses a low-distortion power amplifier which features a large combiner transformer. Its Class A driver stage uses the same transistor as the final stage in order to reduce any third- or higher-order intermodulation products. The low-pass filter in the output uses Chebyshev-type filters to suppress harmonics.

The JST-135HP transceiver from Japan Radio Corp.

The JST-135 CPU offers various methods of frequency control for the user. Dual VFOs are available, as are 200 (!!) memory channels plus advanced scan and frequency sweep functions. Remote control by personal computer is available with an optional RS-232C interface.

I am a firm believer in good selectivity. There is plenty of crowding on the bands these days, and it is going to get worse—no doubt about that. The one item that impressed me the most was the advanced interfering signal rejection techniques used in this transceiver. First, there is a **Bandwidth Control** (BWC) available (front panel) whereby the passband of any selected IF filter can be narrowed by up to 800 Hz in 10 kHz steps. Also, another control is the PBS (**Pass Band Shift**), where the apparent center frequency of the IF filter can be adjusted up or down in frequency. Also, we have a **Notch Filter** and **Notch Filter Follower**, which is an IF that eliminates beat interference adjacent to a desired signal. The notch filter can also remain locked on an interfering signal during VFO tuning when the notch-filter function is selected via a keypad. When you put all of the above together, there isn't much one can ask for in the way of additional selectivity.

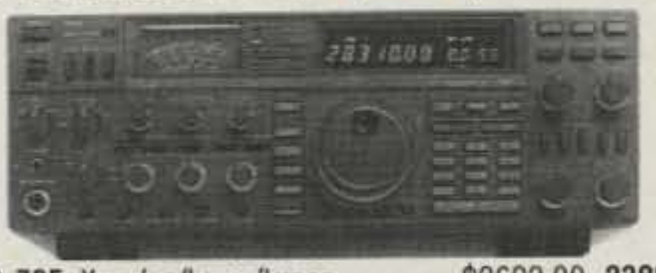
The **Noise Blanker** is designed to eliminate ignition-type noise. It also works well on over-the-horizon radar. I used it extensively for 10 meter operation, and it proved very effective on neighborhood automotive noise.

Another feature is the ECSS (**Exalted Carrier Selectable Sideband**) mode, whereby reception of AM broadcast signals is enhanced. Carrier relation distortion is eliminated or reduced, and selection of either upper or lower sideband of

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

HF Equipment

	Regular	SALE
IC-781 Xcvr/ps/tuner/scope • *Special*	$6149.00	**4999**



IC-765 Xcvr/ps/keyer/tuner	$2692.00	**2399**

IC-751A 9-band xcvr/.1-30 MHz rx	$1699.00	**1399**
PS-35 Internal power supply	219.00	**199.95**
FL-63A 250 Hz CW filter (Ist IF)	59.00	
FL-52A 500 Hz CW filter (2nd IF)	115.00	**109.95**
FL-53A 250 Hz CW filter (2nd IF)	115.00	**109.95**
FL-70 2.8 kHz wide SSB filter	59.00	
IC-735 HF xcvr/SW rcvr/mic	1149.00	**969.95**
PS-55 External power supply	219.00	**199.95**
AT-150 Automatic antenna tuner	445.00	**389.95**
FL-32A 500 Hz CW filter	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	

IC-725 HF xcvr/SW rcvr	$949.00	**799.95**
AH-3 Automatic antenna tuner	489.00	**429.95**
IC-726 10-band xcvr w/6m	1299.00	**1089**

HF Accessories:

	Regular	SALE
IC-2KL HF solid state amp w/ps	$1999.00	**1699**
IC-4KL HF 1 kw amp w/ps • *Special*	6995.00	**5795**
EX-627 Auto ant selector • *Special*	315.00	**269.95**
PS-15 20A external power supply	175.00	**159.95**
PS-30 Systems p/s w/cord, 6 pin plug	349.00	**319.95**
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	**519.95**
AH-2 8-band tuner w/mount & whip	758.00	**689.95**

Call for Prices on accessories for IC-781/765/726/725

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VHF/UHF Base Transceivers

	Regular	SALE
IC-275A 25w 2m FM/SSB/CW w/ps	$1299.00	**1129**
IC-275H 100w 2m FM/SSB/CW	1399.00	**1199**
IC-475A 25w 440 FM/SSB/CW w/ps	1399.00	**1199**
IC-475H 100w 440 FM/SSB/CW	1599.00	**1399**
IC-575A 25w 6/10m xcvr/ps	1399.00	**1199**
IC-575H 25w 100w 6/10m xcvr	699.00	**1469**
IC-1275A 10w 1.2GHz FM/SSB/CW	1849.00	**1599**

VHF/UHF FM Transceivers

	Regular	SALE
IC-229A 25w 2m FM/TTP mic • *Special*	$423.00	**319.95**
IC-229H 50w 2m FM/TTP mic • *Special*	462.00	**379.95**
IC-448A 25w 440 FM/TTP • *Closeout*	599.00	**469.95**
IC-1201 10W 1.2GHz FM xcvr	799.00	**699.95**

Dual band FM Transceivers

	Regular	SALE
IC-3220A 25w 2m/440 FM/TTP mic	$659.00	**569.95**
IC-3220H 45w 2m/35w 440 FM/TTP	699.00	**599.95**
IC-2400A 2m/440 FM/TTP • *Special*	899.00	**639.95**
IC-2500A 440/1.2GHz FM • *Special*	999.00	**849.95**

Multi-band FM Transceivers

	Regular	SALE
IC-901 2m/440 xcvr • *Special*	$999.00	**839.95**
UX-R91A Broad band receiver unit	389.00	**349.95**
UX-19A 10w 10m unit	299.00	**269.95**
UX-59A 10w 6m unit.	349.00	**319.95**
UX-S92A 2m SSB/CW module.	599.00	**529.95**
UX-39A 25w 220MHz unit	349.00	**319.95**
UX-S94A 430MHz SSB/CW module	TBA	
UX-129A 10w 1.2GHz unit	549.00	**499.95**
IC-970A 25w 2m/430MHz transceiver	2895.00	**2499**
IC-970H 45w 2m/430 MHz transceiver	3149.00	**2699**
UX-R96 50-905 MHz receive unit	389.00	**349.95**
UX-97 1.2GHz band unit	999.00	**869.95**

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 rptr • *Special*	1649.00	**1399**
RP-4020 440MHz 25w repeater.	2299.00	**1999**
RP-1220 1.2GHz 10w repeater	2599.00	**2249**

Handhelds

	Regular	SALE
IC-02AT/High Power 2m	$409.00	**349.95**
IC-04AT 440 HT • *Closeout*	449.00	**329.95**
IC-2SA 2m HT • *Special*	419.00	**289.95**
IC-2SAT 2m/TTP • *Special*	439.00	**319.95**
IC-3SAT 220MHz HT/TTP	449.00	**369.95**
IC-4SAT 440MHz HT/TTP	449.00	**369.95**
IC-2GAT 2m HT/TTP	429.00	**379.95**
IC-4GAT 440MHz/TTP	449.00	**369.95**
IC-12GAT 1.2GHz/TTP	529.00	**469.95**
IC-W2A 2m/440 HT	629.00	**529.95**
IC-24AT 2m/440 HT	565.00	**419.95**

Handhelds for Aircraft band

	Regular	SALE
A-2 5W PEP synth aircraft HT	525.00	**479.95**
A-20 Synth. aircraft w/VOR • *Special*	625.00	**499.95**

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	**129.95**
R-71A 100kHz-30MHz rcvr	999.00	**869.95**
RC-11 Infrared remote controller	70.99	
FL-32A 500 Hz CW filter	59.00	
FL-63A 250 Hz CW filter (Ist IF)	59.00	
FL-44A SSB filter (2nd IF)	178.00	**159.95**
EX-257 FM unit	49.00	
EX-310 Voice synthesizer	59.00	
CR-64 High stablity oscillator xtal	79.00	
SP-3 External speaker	65.00	
CK-70 (EX-299) 12V DC option	12.99	
MB-12 Mobile mount	25.99	

R-9000 100kHz-2GHz all mode rec	$5459.00	**4699**

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ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
1-800-621-5802

General

Transmitter Frequency Range:

1.8	to	2.0	MHz	(160m)
3.5	to	4.0	MHz	(80m)
7.0	to	7.3	MHz	(40m)
10.1	to	10.15	MHz	(30m)
14.0	to	14.35	MHz	(20m)
18.068	to	18.168	MHz	(17m)
21.0	to	21.45	MHz	(15m)
24.89	to	24.99	MHz	(12m)
28.0	to	29.7	MHz	(10m)

Receiver Frequency Range: 100 kHz to 30 MHz
Modes of Operation: LSB, USB, AM, FM, CW, and AFSK
Frequency Stability: Less than ±0.5 ppm (−20°C to +50°C)
Tuning Increments:
SSB, CW and AFSK: 10 Hz, 20 Hz or 100 Hz
AM: 10 Hz, 100 Hz, 1 kHz, 5 kHz, 9 kHz, or 10 kHz
FM: 10 Hz, 100 Hz, 1 kHz, 5 kHz, 10 kHz, 12.5 kHz, 20 kHz or 40 kHz
Memory Capacity: 200 Channels
Antenna Impedance: 50Ω (unbalanced)
Input Voltage: 13.8 VDC ± 10%, negative ground
Power Consumption:
Receive: 1.5A
Transmit: 33A (at 150W output)
Dimensions: 330mm W × 130mm H × 280mm D (330mm × 142mm × 391mm, including projections)
Weight: Approx. 8.5 kg

Transmitter

Power output: 10 to 150W, continuously adjustable
Carrier Suppression: 50 dB or more
Undesired Sideband Suppression: 60 dB or more (at 1.5 kHz modulation)
Intermodulation: 3rd order: −38 dB or less
Frequency Response: 400 to 2600 Hz (within 6 dB, SSB)
Microphone Impedance: 600Ω
Modulation System:
SSB, AM, AFSK: Balanced modulation
FM: Reactance modulation
Maximum Frequency Deviation (FM): ±5 kHz

Receiver

Receiving System:
SSB, CW, AM, AFSK: Triple superheterodyne
Intermediate Frequencies:
1st IF: 70.455 MHz
2nd IF: 455 kHz
3rd IF: 98 kHz
Sensitivity:
SSB/CW/AFSK (at 10 dB S/N):
0.1 to 0.5 MHz: 14 dBμ
0.5 to 1.6 MHz: 6 dBμ
1.6 to 30 MHz: −10 dBμ
AM (at 10 dB S/N):
0.1 to 0.5 MHz: 24 dBμ
0.5 to 1.6 MHz: 16 dBμ
1.6 to 30 MHz: 6 dBμ
FM (at 12 dB SINAD):
1.6 to 30 MHz: −6 dBμ
Image Rejection: 70 dB or more
IF Rejection: 70 dB or more
Selectivity:
SSB (INT)/CW, AFSK (WIDE)/AM, FM (NAR):
− 6 dB: 2 kHz or more
−60 dB: 6 kHz or less
CW, AFSK (NAR):
− 6 dB: 1 kHz or more
−60 dB: 3 kHz or less
AM, FM (INT):
− 6 dB: 6 kHz or more
−40 dB: 18 kHz or less
AM, FM (WIDE):
−6 dB: 12 kHz or more
RIT Range: ± 10 kHz
PBS Range: ± 1 kHz
BWC Minimum Bandwidth: Approximately 800 Hz
Notch Filter Attenuation: Approximately 40 dB
AF Output: 1W or more (at 4Ω load, less than 10% distortion)

NBD-520 Power Supply

NBD-520U: 120 VAC ± 10%, 50/60 Hz single phase
NBD-520G: 220 VAC ± 10%, 50/60 Hz single phase
Output: 13.8 VDC, 30A (intermittent)
Dimensions: 180mm W × 130mm H × 273mm D
Weight: Approx. 9 kg

Table I– Specifications of the JST-135HP.

the double sideband AM signal is possible, allowing the user to choose the sideband with the least amount of interference.

Table I shows the specifications for the transceiver, and as one can see from studying the specs, this is strictly a high-performance transceiver. In my lab tests the unit met or exceeded all of the manufactured specifications. One point worth mentioning: I have noticed in the past with some transceivers that their power output ratings for 10 meters sometimes fall a bit short of what they state. The ratings on this transceiver are for 150 watts output on all bands. My careful tests actually showed slightly more out than rated on 10 meters and the lower bands. However, the company rating is for 150 watts out—continuous, key down, condition.

In actual use it takes considerable time to get used to all the controls. The instruction manual is well written and very extensive, including many pages of circuit diagrams, parts layouts, and block diagrams (not that anyone in his right mind would attempt to service such a unit). I might add here that plug-in boards are used extensively throughout the transceiver, making service much simpler. The manual takes the user through careful step-by-step instructions for tuning the receiver and particularly the selectivity functions.

The receiver is triple superheterodyne with IFs at 70.455 MHz, 455 kHz, and 98 kHz for the third IF. The sensitivity figures given in the specs (Table I) were equalled or exceeded in my tests. I carefully checked the receiver through all its

ranges for birdies and found a few, but they were so insignificant that when an antenna was attached, they were difficult to find.

There are three tuning steps available particularly for use with SSB, CW, and AFSK. These are not actually steps, but rather the rate at which the tuning can be set. They are 10 Hz, 20 Hz, and 100 Hz. With the excellent selectivity that is available, the 10 Hz tuning rate is quickly appreciated. Likewise with the 100 Hz rate when you want to move quickly from one end to another. Keep in mind that this is a general-coverage receiver, so additional rates can be set for AM or FM. These include rates 10 Hz through 10 kHz for AM and 10 Hz through 40 kHz for FM. More on this feature in a moment.

The built-in computer and one set of controls do bear describing in some detail. At the upper right-hand corner of the transceiver are three switches: **Freq** (frequency), **Channel**, and **Func/Ham**. These are used in conjunction with the keypad immediately below plus the tuning dial. For example, to set the various tuning rates, first set the Func/Ham switch to **ON**, and then press **8/Step** on the keypad. Next set the desired mode. The current step rate will be displayed on the LED display panel. The rate can then be changed by turning the tuning knob. Once selected, it is entered via the keypad and will remain that way until changed.

These same three switches and keypad are used to set a multitude of functions. For example, there are 200 memory channels that can be entered and set via the keypad—not only entered, but recalled. The keypad and switches are used to set up the various scan operations such as channel start and end numbers. The front-panel **P.Level** control is used to set the pause level of the scan operation. The transceiver can be set to stop on the desired level of signal strength.

The display also includes the meter, which has a straight-line fluorescent scale and can check six different functions. In the **FM** mode, the meter is of the center type, deflecting to the right when the center frequency of the received signal is higher, and to the left when it is lower. As an S-meter it is scaled from S1 to S9 + 50 dB. When desired, the meter can be switched to show the collector current of the final power amplifier transistors. In the **SWR** mode it shows relative reflected power, and in the **PO** mode it shows relative power output. Last, in the **ALC** position it shows ALC voltage during output.

The display also indicates **Mode, Bandwidth (Narr, Inter,** or **Wide), Scan Start** and **End, Sweep Start** and **Sweep End, AGC** (indicating current AGC setting), and **TR1** and **TR2** (indicating split transceive operation). Also shown are **TSQ** (tone squelch in operations), **Shift** (indicating the transceiver is in the shift mode for repeater operation), and **Remote** (showing the transceiver is being controlled by a computer). Still more are **F1** and **F2** (indicates which of the dual VFOs is in operation), **R.F1** and **R.F2** (indicates the frequency of either VFO in operation), **MR** (memory channel in operation), **ATT** (indicating 20 dB attenuator in use), and last, **XMIT** (showing transmission).

The power supply, NBD-520, is a separate unit (but included with the basic transceiver package). As with the transceiver, it is extremely well constructed, best described as top commercial grade.

It would also be pointless to show the circuit diagrams, simply because they are so extensive. The one conclusion or recommendation I would make here is that anyone seriously interested in this transceiver should call the company and purchase one of the instruction manuals to study. The transceiver represents an appreciable investment. Don't misunderstand. I feel it is well worth the money, and then some, but it is impossible here to do justice to the equipment in a couple of pages.

There are many options available with the JST-135HP. (I did not test any of these, but I feel the reader would be interested in the specs.)

First is the automatic antenna tuner NFG-230, which handles 200 watts and will match from any load from 5 to 1000 ohms to an SWR of less than 1.5 to 1. It will do this in 2 to 4 seconds (1.8 to 30 MHz).

Another item that might interest many amateurs is their HF linear amplifier, the JRL-1000. This has a frequency range of 1.8 through 30 MHz, rated input is 2000 watts DC, and it uses three RCA 8122s.

On the receiving side, four additional crystal filters are available. They are listed as 300 Hz, 500 Hz, 1.8 kHz, and 2.4 kHz (6 dB bandwidth).

I mentioned computer use with an RS-232 interface. They show an RS-232C, the CMH-74, which can be used to interface your personal computer.

The transceiver power requirements are 1.5 amps receiver, 33 amps transmit at 13.8 VDC. The dimensions of the transceiver are 350 mm wide by 130 mm high by 280 mm deep.

I used the transceiver extensively on every mode, including SSB, CW, RTTY, AMTOR FM (10 meters), and even AM (on 10). I even went to another amateur's house while a friend operated my station so I could check the actual audio quality and speech compression mode for myself. I was much impressed by the speech quality and the compression action. It is obvious that I like the transceiver. (I must admit I miss it after returning it to the company.)

List price of the transceiver is $3500. The unit is manufactured by Japan Radio Company, Ltd., 430 Park Avenue, New York, NY 10022 (212-355-1180). CQ

In Part III of this series on getting started in amateur radio, we conclude our project and get it on the air. We also review some of the technical details that went into its design.

Getting Started In Amateur Radio In The 1990s

Part III—Conclusion

BY DANIEL BASILETTI, VY2DB, AND COP MACDONALD*, VY2CM

This month we wrap up this three-part series with the last two circuit boards and some of the criteria used for parts selection. Both Cop and Dan gained quite a bit from the experience and obviously enjoyed the project. I checked with Cop, who told me that he and Dan received a lot of mail from CQ readers of Part I, and that Dan was especially pleased with your letters and his very positive entry into amateur radio. —K2EEK

In Part I of this article we mentioned two other ICs that played a major role in this project: the LM373N IF/AGC/Product Detector chip and the LM1496N double balanced modulator. The LM373N does a lot; when coupled to an 8-pin LM386N audio amplifier chip, you actually have half a receiver. I referred to National Semiconductor's LM373 data sheets and application notes, followed their recommendations for SSB operation, and experienced no problems. The 373's IF amplifiers are not particularly low noise, so your front end should have some gain. We used a one-stage IF preamp—a MOSFET and a bipolar transistor in a cascade arrangement.

The circuit of fig. 6 is the no-frills, generic, LM1496N circuit that we used for most frequency conversion jobs in this rig. We made slight changes here and there: an RF choke instead of a 1K resistor in some output circuits, and transformer coupling to pins 1 and 4 in a couple of places. Just as it stands, however, the circuit of fig. 6 will do a host of frequency conversion jobs. Feed the main audio or RF signal to pin 1. Feed the carrier you want to beat it with into pin 8. Presto, you get the sum and difference frequencies at pin 12. Because of the double-balanced nature of the IC, the two input signals appear at relatively low levels in the output. (With a perfectly balanced mixer they wouldn't be there at all.)

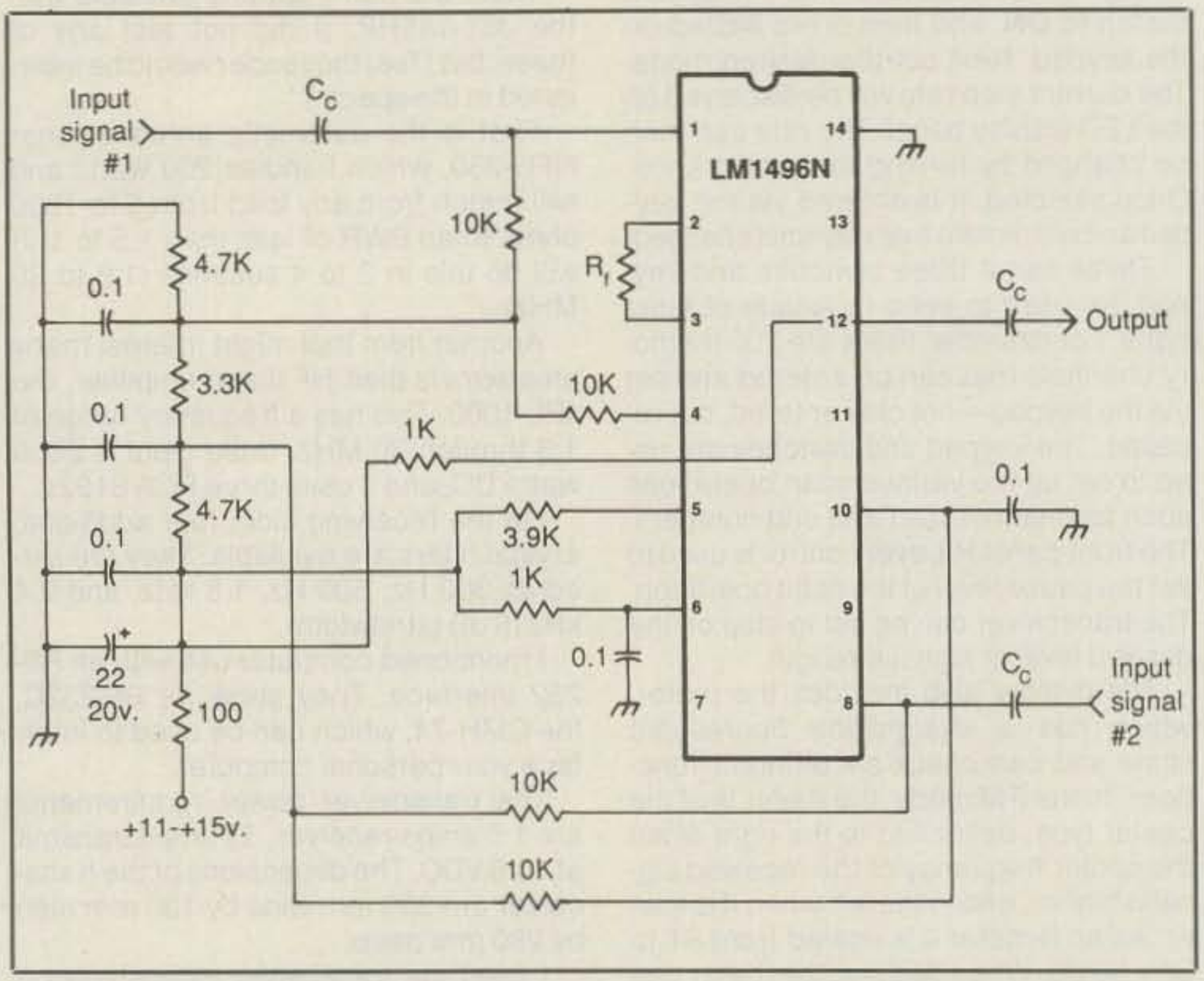
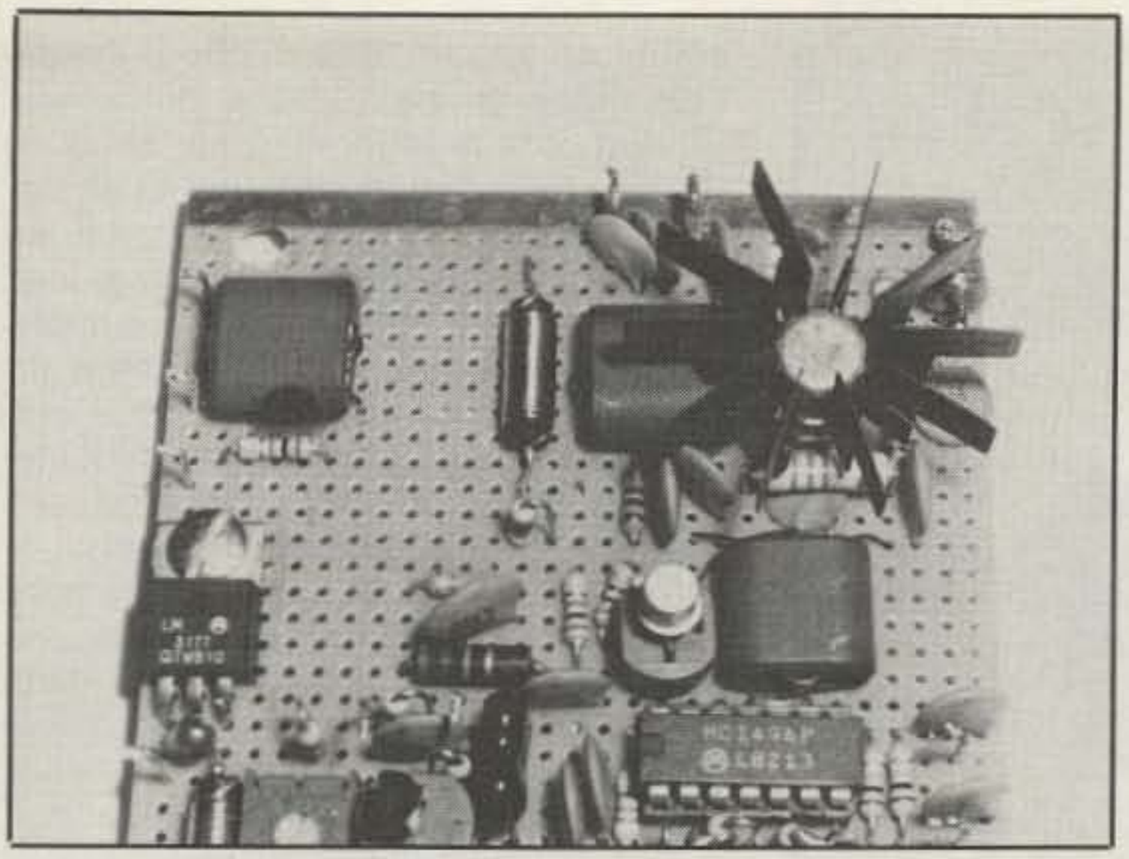


Fig. 6– A no-frills double-balanced modulator circuit useful at both audio and RF frequencies.

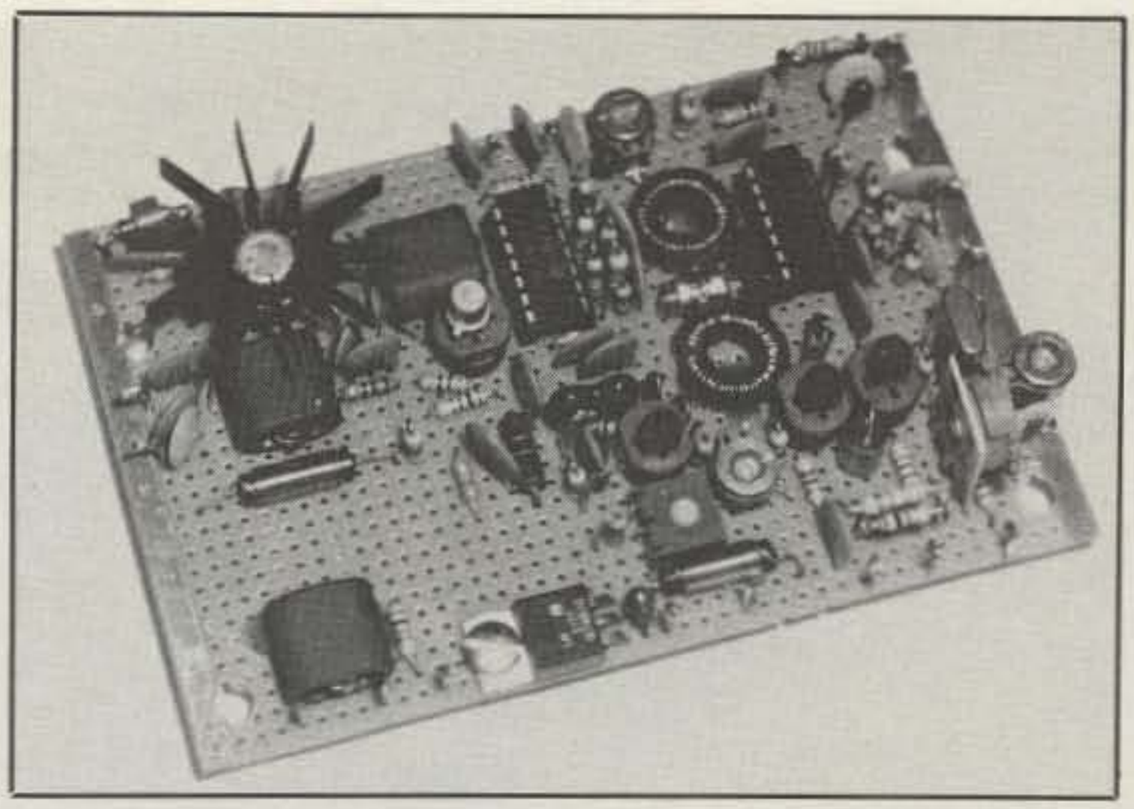
If you're the rough and ready experimenter type, try the circuit of fig. 6 as is. R_f is the Input 1 feedback resistor. If that signal is very weak, make R_f zero. If its amplitude is in the 50 millivolts to 1 volt range, try 220 ohms. Also, choose an appropriate value for C_c. For RF .01 uF should work fine; for audio try 1 or 2 uF.

If you'd like to get into the subtleties of designing with these little beasties, refer to National Semiconductor's published

*P.O. Box 2941, Charlottetown, P.E.I., Canada C1A 8C5



A close-up view of the 3.5–30 MHz BW, 35 dB gain output amplifier. Note the 1:1 transformers wound on "binocular" balun cores.



The Transmit Mixer and Amplifier Board. The two ICs at the right are LM1496N double-balanced mixers. The two transistors and voltage regulator at the left are part of the wideband output amplifier shown in fig. 7.

info on the device. Contact National Semiconductor Corporation, 2900 Semiconductor Drive, Santa Clara, CA 95051. All of the LM-series devices mentioned in this article are made by them. Where can you buy them? RF Parts (1320-16 Grand Avenue, San Marcos, CA 92069, phone 619-744-0728) carries the LM373. Jameco carries the LM1496N, LM3914N, LM3915N, and LM2931CT. Jameco also carries 10-Segment Bargraph Display modules that have 3914 and 3915 chips built in—Jameco part numbers TSM3914 and TSM3915.

Broadband Amplifiers

For several jobs in the Transceive Unit we used broadband amplifiers, similar versions of the same basic design used in cable TV amplifiers. One version was a single-stage unit having 50 ohm input and 50 ohm output impedances and a gain of about 17 dB. We used this design to amplify the VFO and HFO signals to the level required by the diode mixers in the receiver front-end board.

In addition, we used a two-stage version to develop the 0.15 to 0.7 watt RF drive for the DX-60B. This circuit, shown in fig. 7, also has an input and output impedance of 50 ohms. It has an overall gain of about 35 dB in the lower HF bands. The limited bandwidth of my scope prevented me from taking measurements above 7 MHz, but the gain was

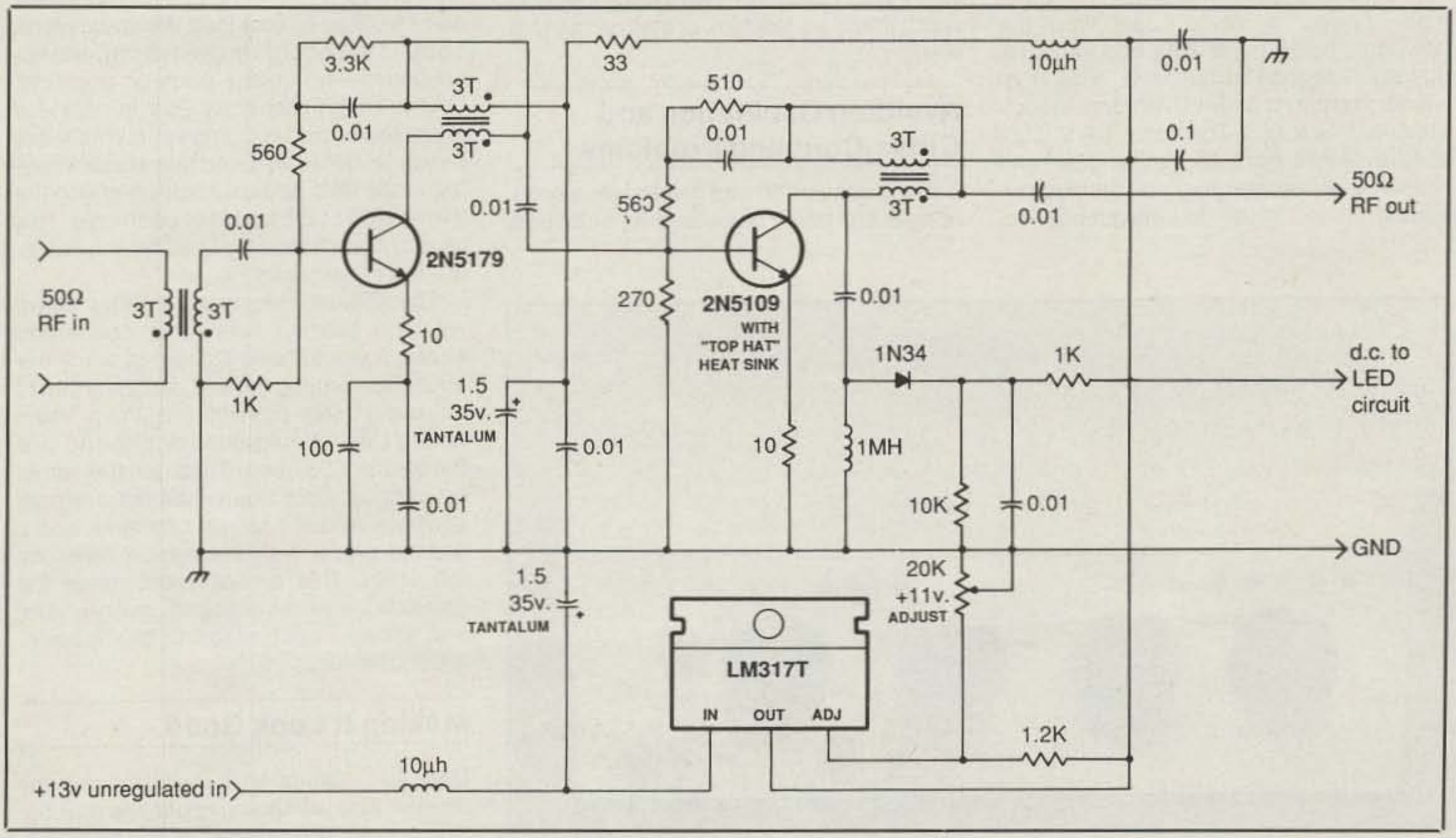
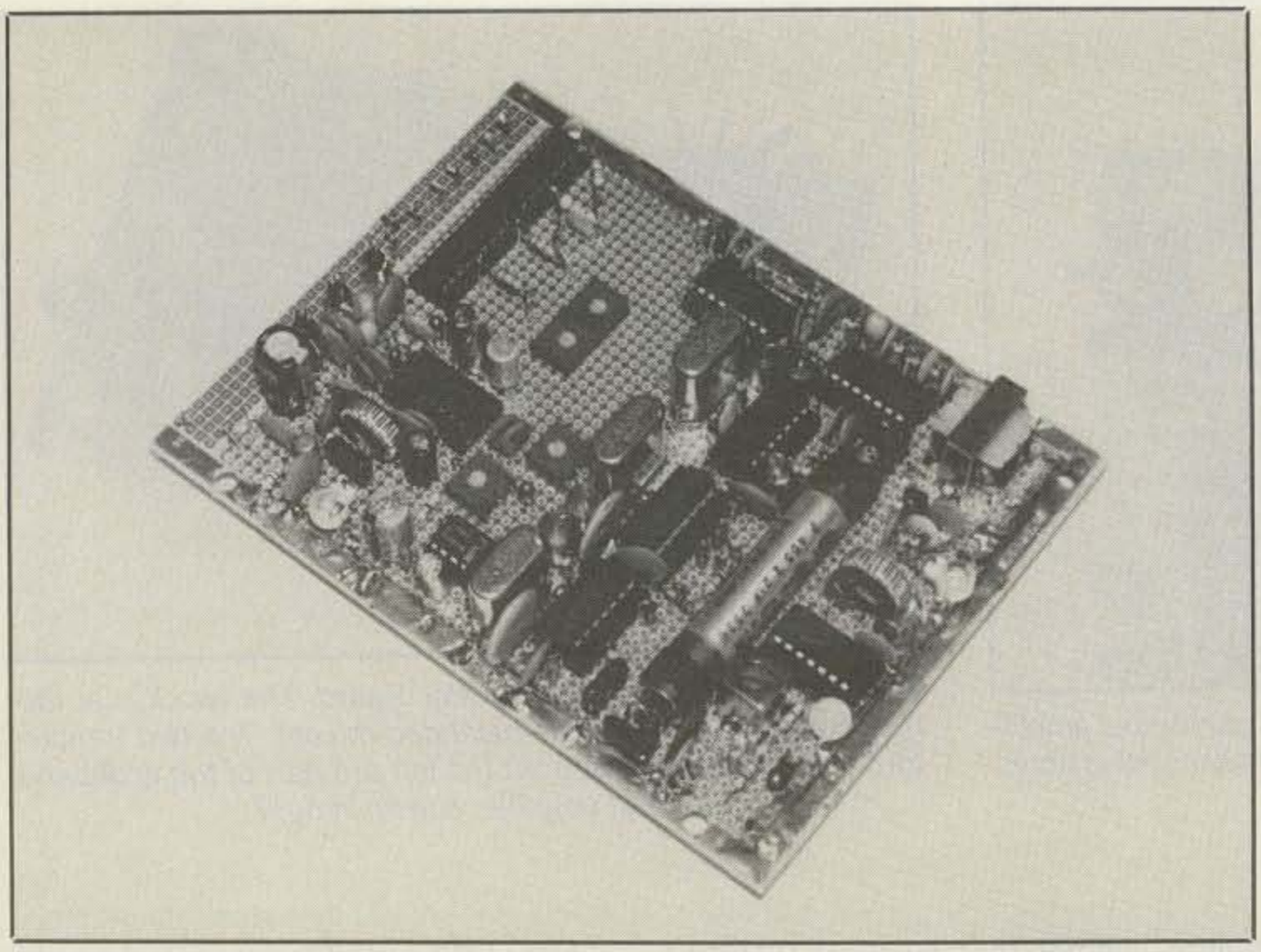


Fig. 7– The Transceive Unit's 35 dB gain wideband output amplifier. It delivers between 0.15 and 0.7 watts to the DX-60B.



The IF/Mixer/Mechanical-Filter board. It contains the receiver IF and audio circuitry, the LED driver circuitry, the 455 kHz mechanical filter, the 455 kHz and sideband-select crystal oscillators, and the transmit-mode balanced modulators associated with the filter.

still substantial at 28 MHz—and adequate for our purposes.

The transformers used in these amplifiers can be seen in the close-up photo of this amplifier. They are wound on "binocular" balun cores—the type used for TV balun transformers in the days of tube-type TV sets. The cores I used were the powdered iron type, and for adequate frequency response at 3.5 MHz, a 50 ohm winding required 3 turns. Amidon Associates (P.O. Box 956, Torrance, CA 90508) sells a *ferrite* core of similar size and shape that, according to their data, should give similar low-frequency response with only a one-turn winding. It is their BN-43-202. With these "binocular" cores you feed the wire up through one hole and down through the other. One round trip is counted as one turn. My cores had some sharp edges, so I used #30 Kynar-insulated "wirewrap" wire to wind them instead of ordinary magnet wire.

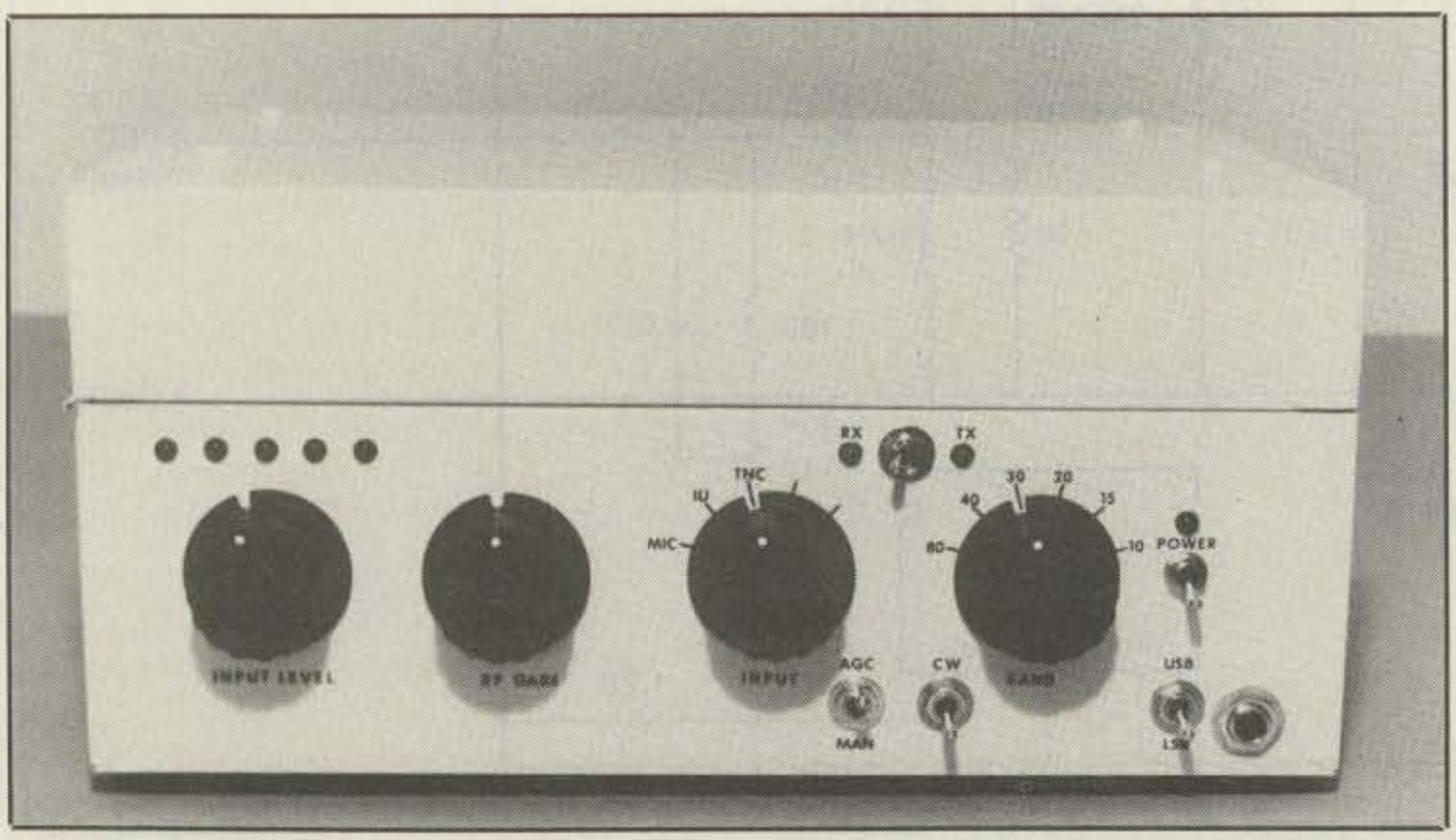
Avoiding Oscillation and Cross-Coupling Problems

Solving oscillation and ground-loop problems is one of my least favorite activities, and I took special precautions at the design stage to avoid these difficulties. Strategy one was to eliminate coupling through the power supply and its wiring. This was done by putting a resistor, inductor, or ferrite bead in the voltage lead feeding each individual circuit and applying capacitive bypassing right at the circuit itself. In most cases .01 and .1 uF ceramic capacitors were deemed adequate, with 1.5 and 10 uF tantalums being used where lower frequencies were also involved. RF chokes or ferrite beads were used where the DC voltage drop caused by resistors could not be tolerated. In the RF output amplifier just described, power supply isolation was obtained another way; I gave it its own voltage regulator.

That amplifier also illustrates strategy two: the use of an input or output transformer to eliminate the possibility of unwanted coupling via common ground circuits. This 35 dB gain wideband amplifier got its input signal from another board, and there was less chance of output-to-input coupling if the grounds on the two boards could be kept entirely separate. A 1:1 turns ratio broadband transformer at the amplifier input allowed them to remain that way—the transformer secondary being connected to the amplifier board ground, the primary to the ground of the other board.

Strategy three involves good layout and grounding practice on the boards themselves. On the Power Regulator and X/R Control Board layout and grounding were not critical, and oscillations were unlikely no matter where the components were located or how long the leads were. To build this board we used plain perforated board—no solder pads or anything. On the High Frequency Oscillator Board short leads and a compact layout were essential. Here we used board stock having those little square solder pads on the wiring side of the board at each hole. This type of board was also used for the Transmit Mixer/Amplifier Board.

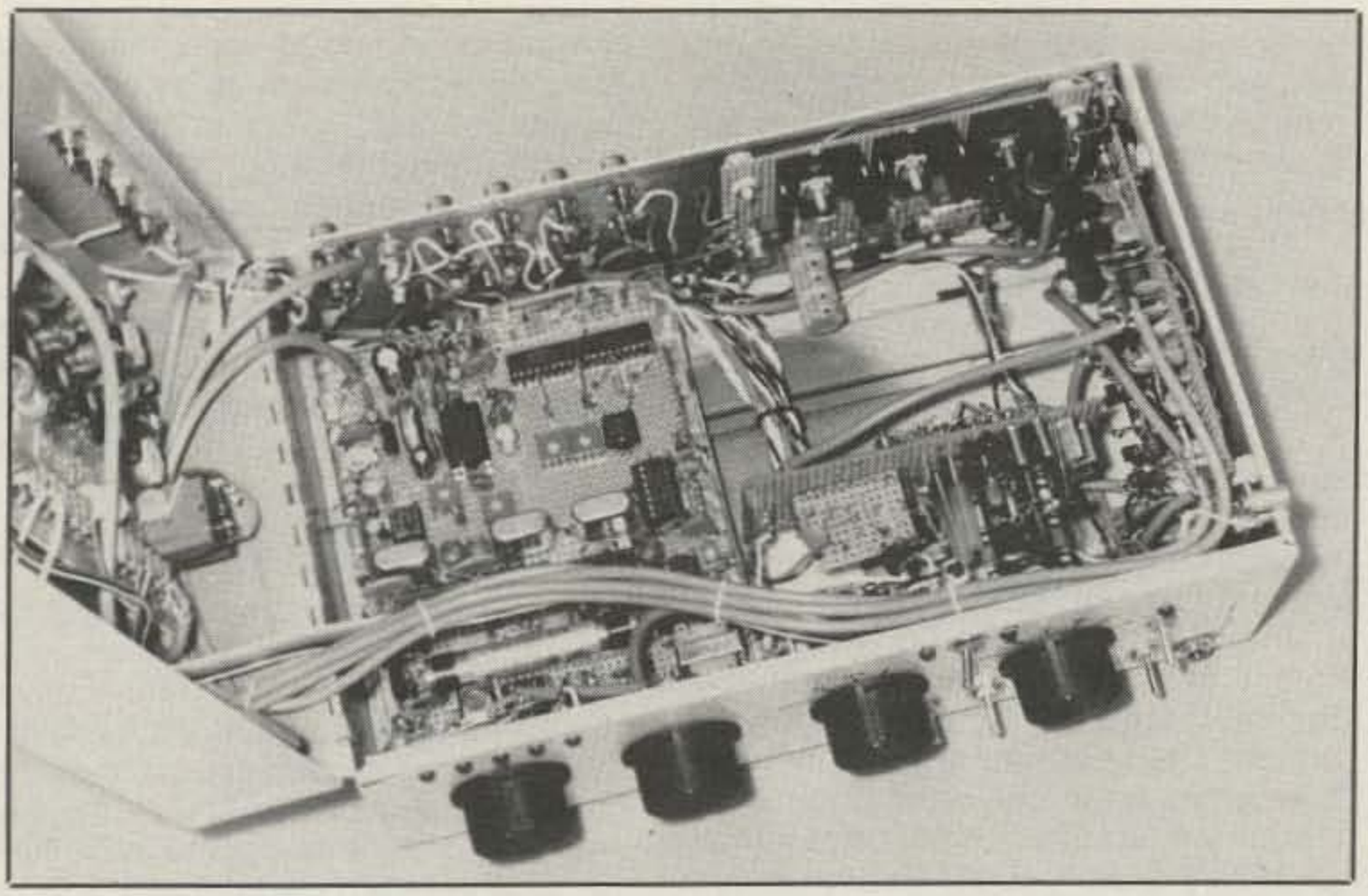
The IF/Mixer/Mechanical-Filter board was the board I was most concerned about. It would have signals of many frequencies running around, and I wanted to do everything possible to keep them where they should be. I decided to use the Vector 8007 board listed in the Jameco catalog. This board has square pad-per-hole solder pads on one side, and a ground plane with clearance holes on the other. This arrangement made the ground plane accessible everywhere, and allowed each stage to be "locally" grounded.



Daniel's front-panel layout of the Transceive Unit pleased both him and Cop.

Making It Look Good

Dan: As I mentioned in Part I, since I was the one who was going to use the new rig, Cop suggested that I design the front panel and put on the finishing touches. I

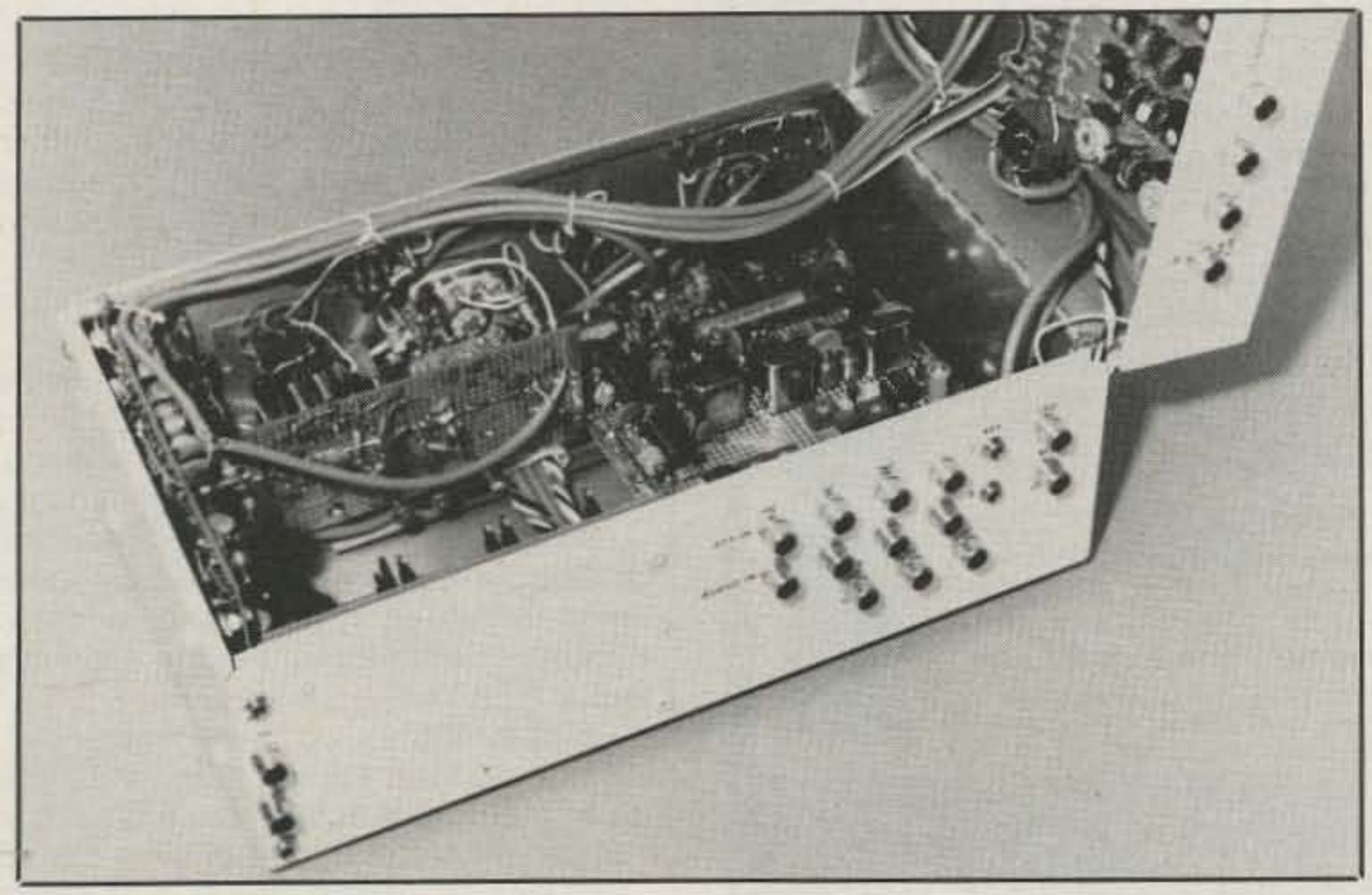


A view down into the Transceive Unit. The board mounted on the bottom of the unit is the IF/Mixer/Mechanical-Filter board.

agreed and began a 1:1 scale drawing on graph paper. The band switch and its attached circuit board had to be placed so it wouldn't interfere with the other boards inside the file-box case. I picked a height that was almost in the middle, and put the other four knobs along that same horizontal line. The knobs were spaced far enough apart to allow room for lettering and to give the panel an uncrowded look. The five toggle switches were placed where they could be reached, my main concern being the transmit/receive switch which I wanted out in the open, easily accessible from anywhere on my desk. I then decided where to place the LEDs—five for the S meter, two TX/RX mode indicators, and the power ON LED.

The front-panel photo of the Transceive Unit shows the final result of this decision-making process.

After all the hole sizes had been determined, I covered their locations on the metal file box with masking tape. Then using a ruler I made a dot where the exact center of each hole should be and center-punched each one with a spring-loaded punch of Cop's. Next, with a small drill bit and Cop's coaching, I drilled pilot holes. I then used larger drill bits to enlarge the holes to their correct size. Where we didn't have the proper bit, I drilled a smaller hole and enlarged it with a hand reamer. All the burrs and sharp edges sticking out after drilling were filed away with a rat-tail file. Soon all of the 49 holes on the



A rear view of the Transceive Unit.

front and the back had been drilled, and both the file box and VFO cabinet were ready for painting.

Painting these two units was something of a production. The first thing we did was to lay down a thin sheet of plastic on the balcony of Cop's house. Next we sanded the bare aluminum VFO case to provide better paint adherence, and cleaned the two metal boxes with camp fuel. It was windy that day, which is not ideal for spray painting, but we decided to go ahead anyway.

We used alkyd enamel paint in a spray can, painting the bottom of the file box first, then tipping it over and setting it on temporary "feet" (6-32 screws) that we had attached. We didn't want to wait for the bottom to dry before we did the top and the sides. All went fine, and after everything was painted, we brought the painted cases into Cop's kitchen on cookie trays and put them in the oven to bake dry. It surprised me when I heard we were going to bake these things of beauty. But Cop said he had done this before, and as long as you keep the oven at a low temperature (225° F) everything should go okay.

After all was dry, I set to work applying the rub-on transfer lettering, making sure that none of it would be covered by the knobs. Spacing is, of course, very important when you apply this kind of lettering, and I tried to get everything even and symmetrical. Cop seemed pleased with the work I had done and made only a few suggestions. (I had forgotten to include the rotary switch markings.)

The next step was to apply a coat of clear urethane to the entire unit, primarily to protect the lettering so it wouldn't rub off. We used satin-finish urethane, and this produced a low-luster finish even though we had used glossy paint for the underlying color coat. The important thing about applying urethane (or any other spray-can paint) is not to hold the can too close and to apply many light coats rather than a few heavy ones. The object is to build up the paint thickness very gradually. Checking the way light reflects off the surface can help you get a uniform job. A glossy wet look means too much paint in that spot, but you don't usually have to start all over again. Allow the surface to get fairly dry, then produce the desired satin finish by applying additional light, dusting coats.

DX-60B Modifications

We close with a few comments about the DX-60B and its modifications. That unit's 6146B final amplifier and 6CL6 driver stage remain much as they were originally, except for bias changes and the addition of switched mica padders in the driver circuit to allow its output tank to tune 10, 18, and 24 MHz as well as 3.5, 7, 14, 21, and 28 MHz. Both the crystal oscillator and screen grid AM modulator circuitry were removed, and the original crystal switch was moved up into the Driver compartment to switch those mica padders.

RF drive reaches the 6CL6 grid circuit through a wide-band step-up transformer—another of those handy little transformers wound on a balun form. The first one we tried met our needs, so we didn't optimize the design. It had a 3-turn primary to which the 50 ohm drive is connected, and a 12-turn secondary grounded at one end and capacity-coupled at the other to the grid. It would be interesting to see if the Amidon BN-43-202 ferrite core would allow higher than a 4-to-1 turns ratio; as mentioned, that core appears to need only 1 turn on the 50 ohm side.

The DX-60B has a −150 volt bias supply to power its grid-block keying system. This made biasing each stage for linear operation simply a matter of changing/adding a few resistors. The 6146B grid voltage was set to give a no-signal plate current of 25 ma, and the 6CL6 no-signal grid voltage was set at −5 volts. The 6146B screen grid voltage regulation was improved by obtaining the needed +200 volts from the +300 volt supply through a series 100 volt power zener instead of through the original resistance divider.

Since Dan is interested primarily in the digital modes, not SSB, we didn't add SSB-mode niceties such as ALC and negative feedback. I used a scope to determine the combination of control settings and meter readings that gave most linear operation in each band, and recorded this information for future reference in a setup checklist.

It was certainly worth the time and effort involved in the project. Dan's entry into amateur radio and his obvious pride in his station are examples of what can be done with a little help, direction, and most of all a sharing of experience. CQ

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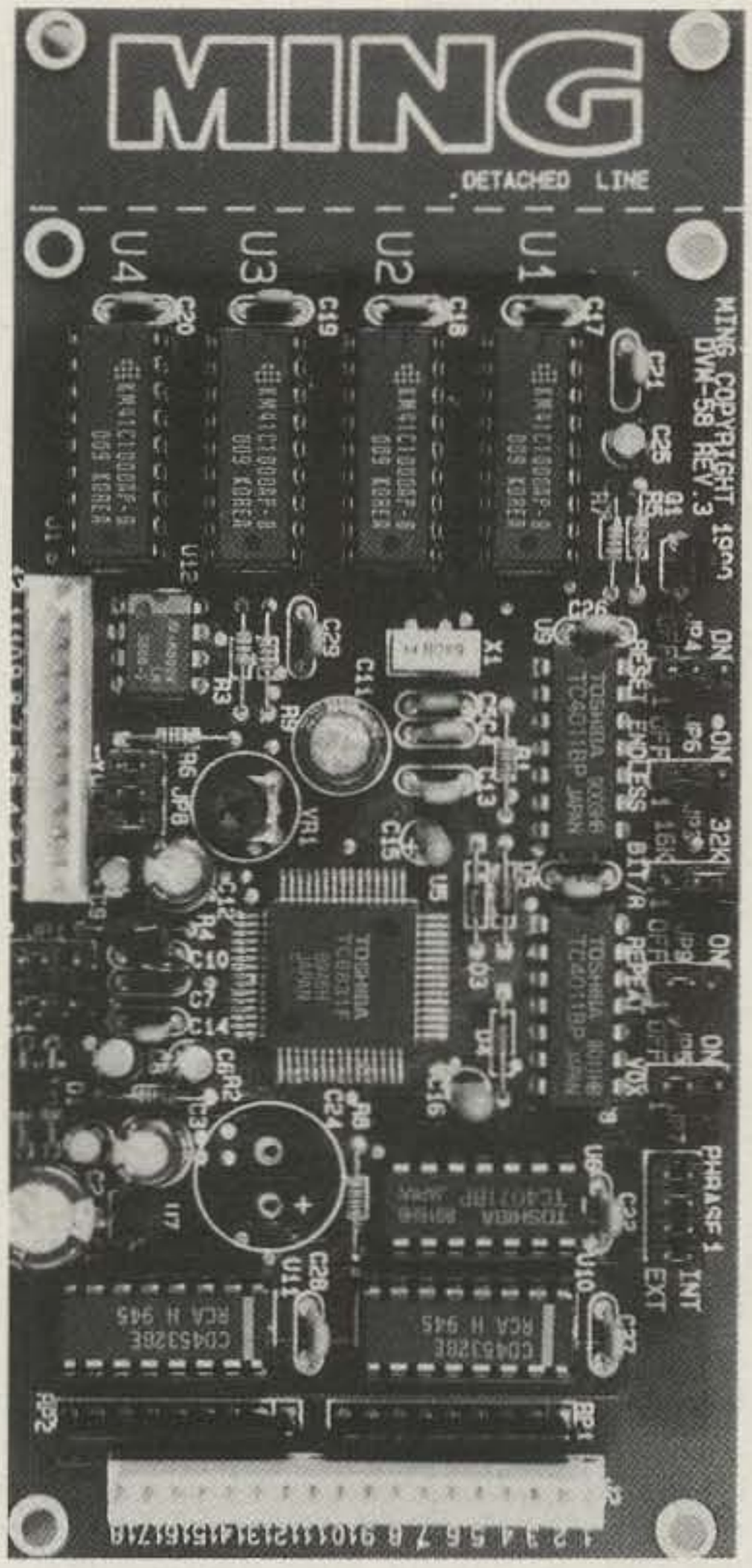

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QRP operation has a way of rekindling some of the skills we once took for granted but seldom think about today. For some this article will bring back fond memories. For others it will be a new way of expanding their operating fun.

Techniques For Grinding Crystals

BY MICHAEL SIMMONS*, WB9CWE

New FT-243 crystals have become more expensive in the last few years, so learning to grind some old ones is well worth the effort in case you want to move your QRP transmitter to a new net frequency or whatever. Grinding crystals is an easy and inexpensive way to increase the frequency of an FT-243 crystal a few kHz using only household items.

The physical properties of a crystal—thickness, length, width, and type of cut—all determine its frequency. This process will, of course, finely grind away a little bit of the quartz matrix thickness to raise its frequency.

All you need is a piece of glass large enough to work on (say 6 by 6 inches), some mildly abrasive cleaning powder such as Comet, clean water in a washbottle (the kind that squirts), a small Phillips screwdriver, a pair of tweezers, and isopropyl (rubbing) alcohol. I prefer to use distilled water, as tap water sometimes contains tiny bits of grit or sand which can really scratch up the crystal matrix. If you don't have a suitable piece of glass lying about the workshop, an old mirror borrowed from the XYL will work well and won't be damaged in the process.

You will, of course, need the oscillator in which the crystal is to be used and a calibrated receiver or frequency counter to check your progress.

Choose a clean table or desk for your workplace. Disassemble the FT-243 crystal holder carefully, taking note of how all the pieces fit together. There is a compression spring in there which ensures proper electrode contact to the crystal, so keep a firm grip on the holder while removing the screws so it doesn't pop apart. Place the parts, especially the screws and the spring, in a safe place, as they are easy to lose and hard to replace! I know from experience!

Next pour about one-half teaspoon or so of the Comet onto the glass and add enough water to form a smooth paste. Use your fingers to spread out the paste while feeling for any large pieces of grit, which have to be removed.

Place the crystal onto the paste and begin moving it in a figure-8 pattern while applying even pressure. This technique will help ensure a uniform grinding of the crystal's surface. I personally use both hands to hold the crystal while grinding for best technique, although that isn't strictly necessary. Be sure to avoid using too much pressure to prevent fracturing the matrix. This isn't really a major threat; just don't bear down on it to speed up the polishing process.

If the crystal gets a little hard to push around while grinding, just squirt a little water onto the paste to counter any drying.

If you want to change the crystal's frequency, say about 5 kHz, do about 40 or 50 figure-8's at first. (Make sure you keep track of how many!) Then rinse off the crystal with the washbottle, pat it dry with a clean paper towel, rinse again with a little alcohol to remove any traces of remaining water, dry again, and replace in the crystal enclosure. If the crystal is hard to grasp, gently use the tweezers to pull it out.

Plug the crystal into the oscillator to check its new frequency and determine the number of Hertz it was moved. Divide this number by the number of figure-8's you did to determine the number of Hertz per revolution ratio. Divide this number into the number of Hertz remaining to your goal frequency to determine how many revolutions should be needed to reach the intended frequency.

For example, let's say you increased the crystal's frequency by 1000 Hertz with 50 revolutions of grinding. The number of Hertz per revolution would be 20 (1000/50). If you had 4000 Hertz left to go, simply divide this by 20 to determine that you have about 200 revolutions to go.

Don't try to rush up to your goal frequency all in one shot; you may overshoot it beyond repair. The number of Hertz added per figure-8 will vary because of changing paste consistency and varying hand pressure. Since the math above indicates 200 more figure-8's are needed to reach your goal frequency, your next round of grinding should consist of 150 to 160 revolutions followed by another frequency check. Then do another 20 or less, depending on how well you did during the last round of grinding. In other words, ease up to your goal frequency.

If you do accidentally overshoot your intended frequency by a slight amount, don't panic! There is an old trick available to lower the crystal's frequency as well. Simply remove the quartz matrix again and use a soft lead pencil to carefully place a few marks on one side. Recheck the crystal's frequency as before. Add more marks as needed. Again, don't overdo it, as too many marks will prevent the crystal from oscillating at all. Five or six are the most I usually make. If you go a little too far with the pencil lead, simply polish off a little until it is right where you want it.

If the crystal becomes sluggish in starting or stops altogether after grinding, remove the matrix and reclean very thoroughly with the water and alcohol. Look it over with a good light and magnifier to check for any specks of paste still stuck to the surface. Also check for any tiny fractures, chipped edges, etc. Return it to its holder, making sure the electrodes are contacting it correctly and the spring is in its proper position. I rarely ruin a crystal by polishing it, but it is a risk, although a slight one. It's just one of the chances you have to take.

How much of a frequency change can you effect? Well, to be very honest, I don't know! I've never pushed a crystal to the point where it stopped working, just to see how far I could go. I usually change one around 5 to 10 kHz, although I did polish one once out of desperation from 7.1 MHz to about 8 MHz so I could use it in an old Heathkit Twoer 2 meter transmitter.

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That might have been sheer luck, so I won't guarantee you will have the same kind of results if you try something similar. You'll just have to learn from experience to see how far you can go.

If you ever suspect you have somehow fractured the crystal matrix by the way it felt while polishing, you should probably pitch it and chalk it up to experience. If it is used, the crystal may generate spurious frequencies a number of MHz away from the fundamental frequency. If you can scan a very wide range of frequencies while testing a suspect crystal to make sure it's clean, fine. But if not, it's better not to take chances and to throw the thing away, since the damage is permanent.

To illustrate, a friend of mine once unknowingly had a fractured crystal in his 2 meter rig which caused him to simultaneously interfere with different repeaters every time he keyed the microphone. A spectrum analyzer showed he was transmitting on several different frequencies simultaneously, a few of which were outside of the 2 meter band!

Once you have had a little practice grinding crystals, you'll be a real pro at it, and you'll have learned a bit of homebrewing that very few amateurs try at all!

As far as grinding mediums go, Comet or other mildly abrasive detergents are okay to use, but there's a better, albeit costlier, way. If you can ever get your hands on some diamond polishing compound, go for it, as this is really the greatest for polishing crystals. The best size of diamond paste is one micron, followed by 6 micron. Ten micron and larger sizes are less suitable, as they are more like 600 grit sandpaper in grinding characteristics. Very high grade kerosene can be used for lubrication. You can use the diamond polishing compound just as you did with the Comet, just no water. Cotton swabs loaded with alcohol can be used to wash off the crystals, followed by an alcohol rinsing with a wash bottle to remove any strands of cotton.

If you are a little reluctant to begin learning on a needed crystal, practice on an old military surplus crystal you know you won't ever be using. Good luck and 73!

WA9EZY comes up with a novel solution to a problem that faces many homebrew amplifier builders.

How To Build A High-Quality, High-Power, Multi-Wafer Bandswitch For Your Next Linear Amplifier Project

BY WADE A. CALVERT*, WA9EZY

Most homebrew enthusiasts will agree that it is getting more difficult all the time to collect parts at reasonable prices for our homebrew projects. Fewer of us do a lot of building these days, and electronic parts sales in the small quantities that we now require have dictated the present supply (or lack of supply) we now face. Indeed, many catalog parts supply houses require a minimum order of up to $50, often more than we want to spend on our entire project. Another factor has been the slow disappearance of the WW II surplus equipment which had provided us with a wealth of homebrew parts for many years.

Homebrew linear amplifiers and tuners are still popular projects for many of us. These items represent two of the few remaining pieces of more complex gear that amateurs still feel qualified to attempt to construct.

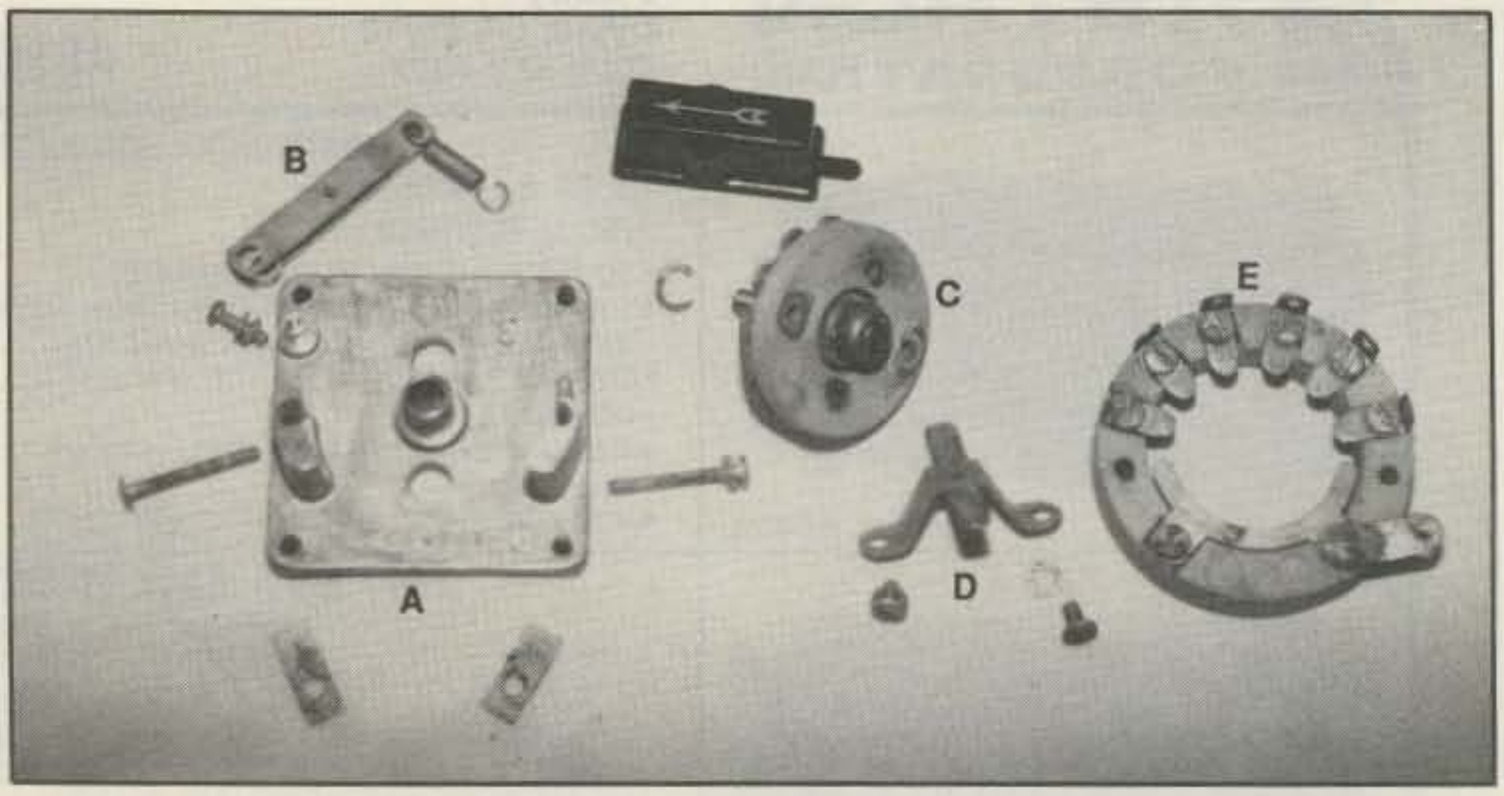

Fig. 1–One "stock" RF switch deck completely disassembled. Shows all the component parts and is roughly an assembly guide. The components labeled are: (A) Front plate, (B) Detent mechanism, (C) Ceramic disc to which V-shaped bracket is attached, (D) V-shaped bracket with two-piece rotary contact attached, (E) Ceramic wafer with six stationary contacts across the top and "C"-shaped contact on which rotary contact slides across the bottom.

The Problem

A problem for me has always been obtaining a good quality, suitable bandswitch for my homebrew linear amplifier projects. For years I have examined surplus equipment with an eye for this particular part. Many times I noticed the heavy-duty, six-position ceramic, single-deck switches recovered from tuning units and other WW II equipment. It's a safe bet that many junk boxes contain at least one of these switches. They have been around on the surplus market for many years, and quite literally by the tens-of-thousands.

A good supply of these switches is still available from Fair Radio Sales in Lima, Ohio for $3.95 each, or 10 switches for $32.00. Fair Radio calls them "RF Tap Switches." I received 10 identical, brand-new switches on my order, manufactured by both General Electric and James Millen. Each switch consists of six heavy-duty, widely spaced stationary contacts along with a bifurcated (two-leaf) rotary contact. The problem with them is that as they are received, they cannot be "stacked" or "ganged" for use in switching tuned input circuits (or Pi-L coils) simultaneously with the Pi-Net coil bandswitch. Another peculiarity with the switch is that it has an indexing arc of about 25.7 degrees, making it incompatible with almost all commercially available switches. (Indexing arc is the number of degrees of arc that the tip of the rotary contact travels between contact positions.) Examination of the rotary contact reveals that it is riveted to a moving V-shaped, tinned bracket, and hence there is no provision for a shaft extension from the rear of the switch. Also included is a very stiff, positive detent mechanism. In our project the detent mechanism will be removed from the second (or any subsequent) switch in the gang. Fig. 1 shows one of these switches disassembled, with its component parts labeled.

Construction

Select two switch decks and label them "1" and "2" (see fig. 2). On the second deck remove only the detent mechanism by removing the single screw that holds it to the front plate. Disassemble the first deck completely, except for the detent mechanism. Disassembly is begun by first removing the soft metal C-clip from the switch shaft near the mounting plate. The clip can be saved for later reuse. Remove the two long screws that hold the ceramic wafer to the switch plate. There are shims placed between the aluminum

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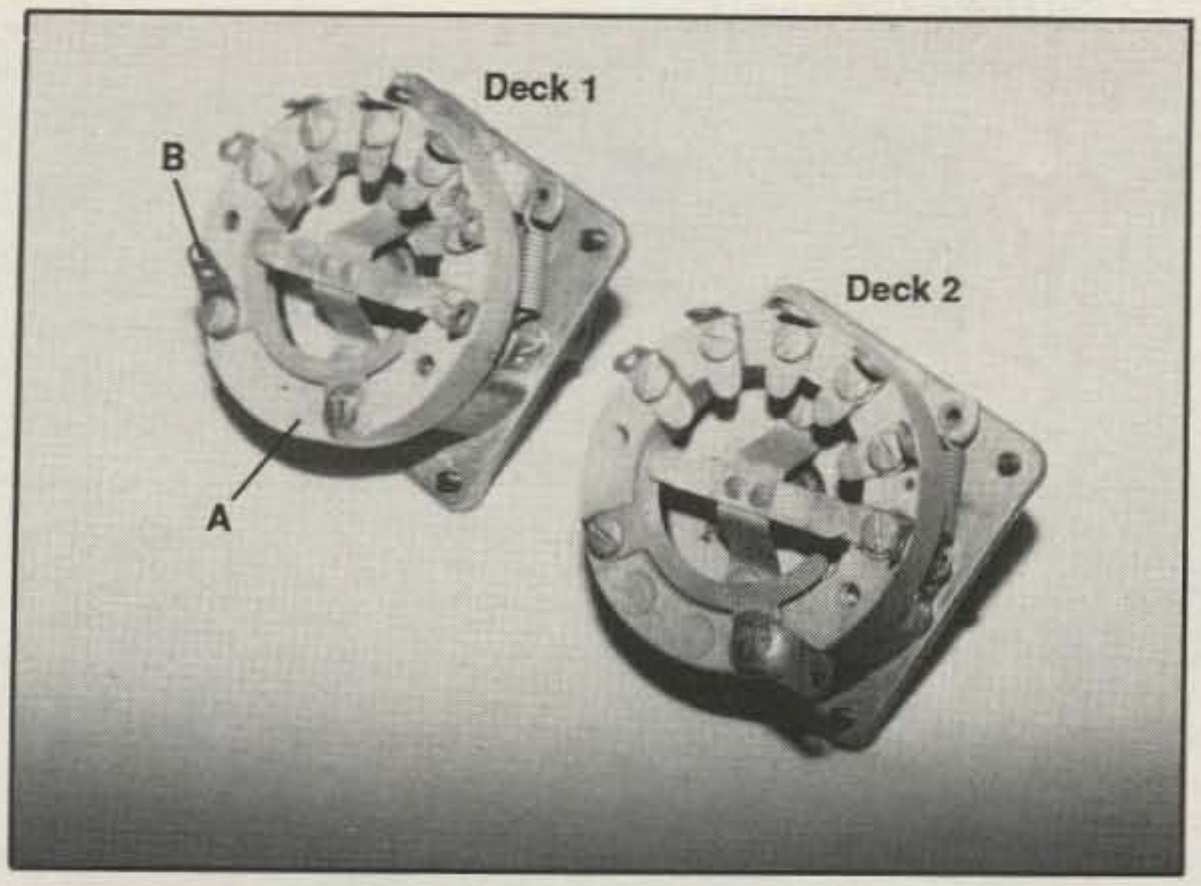

Fig. 2– Shows rear views of decks 1 and 2 used in the multi-wafer bandswitch. Deck on the left (deck 1) modified to provide clearance as described in the text. Lug removed at "A" and ground lug installed under screw at "B."

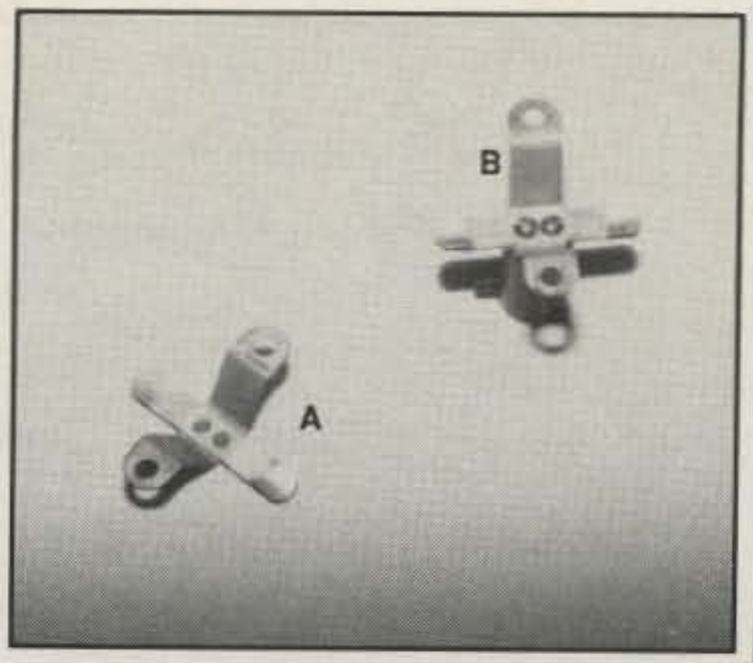

Fig. 3– Shows two individual "V" brackets, before and after. Bracket "A" is shown in unmodified form. This bracket is soldered at the center to the cross-mounted rotary contact and the rivets are then drilled out. Modified bracket at "B" shows Delrin coupling mounted to bracket with two brass screws.

plate and the ceramic, so be careful not to lose them. Hold the detent arm away from the notched, metal detent disc, and carefully work the rotating contact assembly out through the rear. Remove the rotating contact and bracket from the ceramic disc to which it is attached (see fig. 3).

Note that the two-piece contact is fastened to the V-shaped bracket with two small rivets. Before removing the rivets, carefully solder the two parts of the rotary contact to the V-shaped bracket using a soldering gun or iron of suitable heat. Be careful not to solder the rivets in place or they will be more difficult to drill out. When cooled, place the assembly upside down, with the bracket legs up, to expose the crimped ends of the rivets. Drill out the rivets, being careful not to enlarge the two small holes. Place the bracket aside for the moment.

An insulated coupling must be constructed to connect the two switches mechanically. Although this piece must be constructed very carefully, it can be done fairly easily using common tools and a little ingenuity. I used ½ inch Delrin rod for my coupling since it is relatively inexpensive, machines and holds threads very well, and functions as an effective insulator, at least through 30 MHz.

Carefully cut a piece of Delrin rod to 1¼ inches (⅝ inch diameter Delrin rod would possibly be an even better choice, since it would allow more wall thickness for the shaft setscrew, although the coupling described here has so far performed as expected). Make sure that the cut ends of the rod are as square and flat as you can get them.

The success of the project depends a great deal on construction and measurement accuracy. The straighter and more true your work, the better the switch will work. For this reason it is recommended that the rod be cut on a lathe or other tool that will guarantee a perpendicular, fairly smooth cut.

A ¼ inch hole to accommodate the switch shaft is drilled into the exact center of one end of the coupling to a depth of ½ inch. At the other end of the coupling scribe a line extending through the center and across the end of the rod. Lay the rotary contact assembly containing the two small holes across the scribed end of the coupling. Mark the end of the coupling with the location of the two holes such that the holes will fall on the scribed line and be spaced symmetrically on the end of the coupling. Drill and tap holes into the end of the coupling to accommodate two 3-48 × ⅜ inch length brass screws. Extend the scribed line up the side of the coupling from the line scribed on the end in order to locate the hole for the setscrew.

The hole for the setscrew must lie in the same plane as the two brass screws. This will ensure that the setscrew will engage the flat part of the shaft on the second switch deck. The setscrew is located at a point ¼ inch down from the end of the coupling that contains the ¼ inch centered hole. Drill and tap for an 8-32 setscrew exactly perpendicular to the ¼ inch shaft hole and extending into the ¼ inch hole. Start an 8-32 setscrew into the side hole.

Attach the coupling to the rotary contact assembly with two 3-48 × ⅜ inch brass screws. Do not overtighten at this point, as the switch will once again be disassembled when final alignment is satisfactory, and epoxy glue will be used to solidify the assembly (see fig. 4).

Look at the rear or ceramic-wafer end of the first switch deck. Note that there

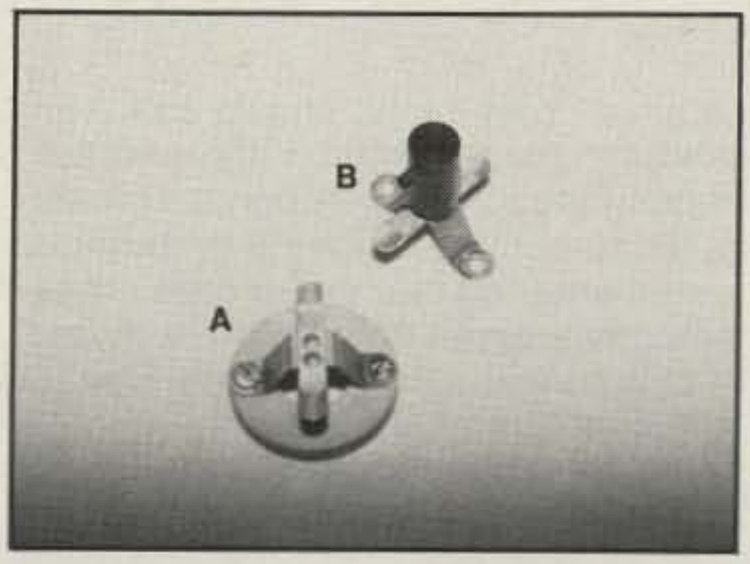

Fig. 4– Shows at "A" the "V"-shaped bracket attached to its ceramic mounting disc as it was installed originally. At "B" the "V" bracket has been removed, soldered, drilled, and the Delrin coupling attached with two brass screws. This subassembly is then reinstalled on the ceramic disc.

are two rotary contact terminals connected to the "C"-shaped contact on which the rotary contact slides. Place the "C"-shaped contact at the bottom with the six individual stationary contacts across the top in your view. Viewing the deck from the rear, the terminal that connects to the "C"-shaped contact on the bottom right in your view probably has a lug soldered to it. This contact must be removed at this time, as it will cause a clearance problem when the two decks are assembled together.

Using a fine-toothed hacksaw blade removed from the saw frame, carefully saw through the lug as close to the screw as possible. Do not try to unsolder the lug, as the heat may cause the ceramic to crack. File the remaining lug points with a small file until they are below the edge of the

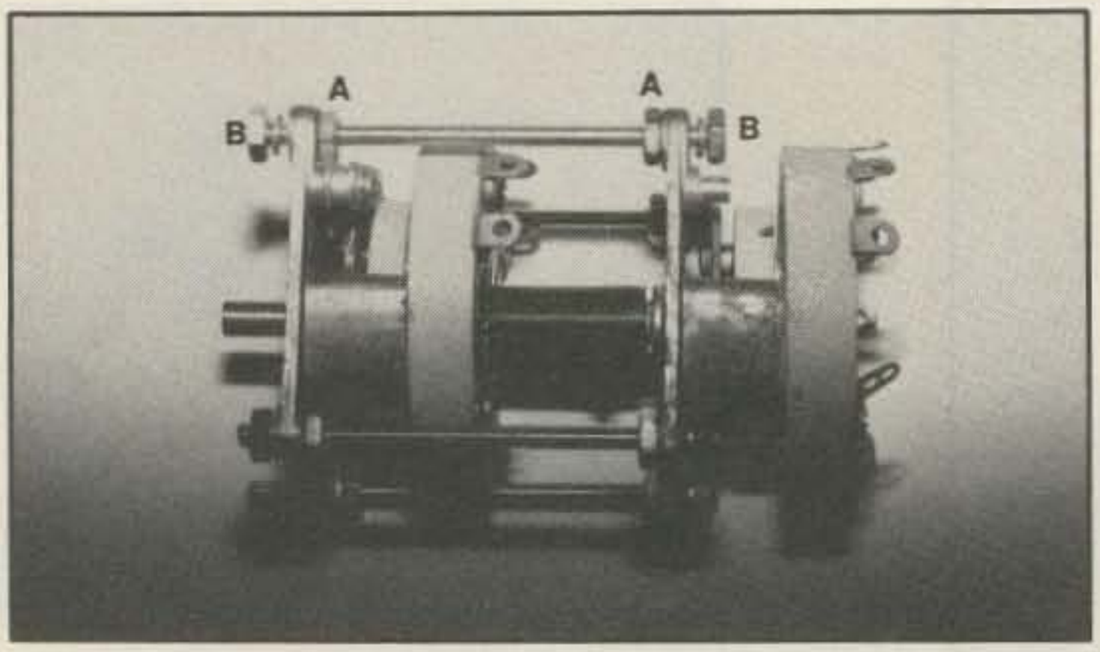

Fig. 5– Shows two-deck assembly joined by Delrin coupling at center and four threaded rods at corners. Note nuts "A" (between deck front plates) are tight. These are adjusted first in order to get measurements that are exactly the same on all four rods. Outside nuts "B" are then tightened.

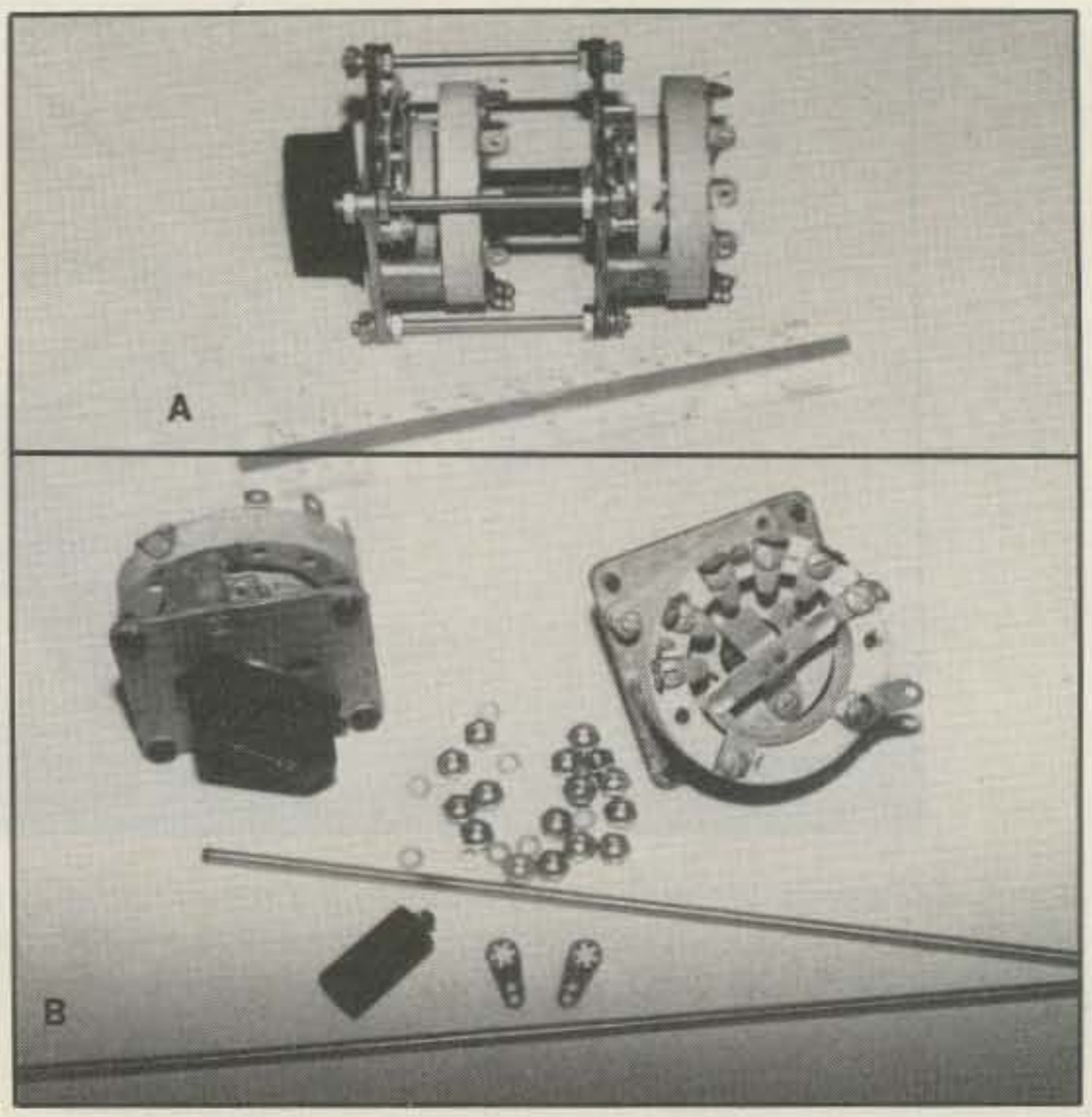

Fig. 6– Shows all parts necessary (bottom half—B) to complete the construction of the two-deck bandswitch. Finished switch is shown in upper half of photo (A).

ceramic. Your result should look very similar to the terminal on the lower left, which is the other rotary contact terminal. Install a solder lug on the left terminal screw, orienting it so that is does not extend outward past the edge of the ceramic switch wafer. This will be the new rotary contact terminal.

The threaded mounting holes at the corners of each switch mounting plate must be drilled out to 11/64 inch in order to accept the 8-32 threaded rod, which will be used to fasten the two decks together. It is recommended that 8-32 be the minimum size for this rod, as 6-32 was tried and found to be not sturdy enough. Due to the forces involved in changing positions on these switch decks, the decks must be fastened together very solidly in order to remain in alignment (see fig. 5).

Assembly and Alignment

Fig. 6 shows the completed switch at A and all of the parts needed to complete the switch at B.

Reassemble the first deck. Place the two decks on a flat surface, the second deck (the deck with no detent) behind the first. Using the switch knobs, "switch" each deck to the same position. Note that the Delrin coupling may be installed 180° out from the position intended. Carefully check to see that the setscrew in the coupling will engage the flat on the shaft of the second deck. If it will not, then it will be necessary to rotate the shaft on the second deck through 180° before assembly.

Slide the shaft on the second deck into the coupling. Tighten the setscrew in the coupling onto the shaft flat, being careful not to overtighten and strip the threads in the coupling. Lay the two decks, connected together by the coupling, on a flat surface. The bottom faceplate edges of both decks should be perfectly flat on the surface. Carefully check that both decks are switched to the same contact position and that the contact alignment is satisfactory. Assemble the two decks together using pieces of 8-32 threaded rod, approximately 3½ inch in length, at each corner. Use an 8-32 nut inside and out on each surface as well as #8 lockwashers on the outside of each. Allow about ¼ inch of threaded rod to extend at the shaft end of switch deck 1. This will provide a means for 8-32 spacers to be installed in order to mount the bandswitch to a panel.

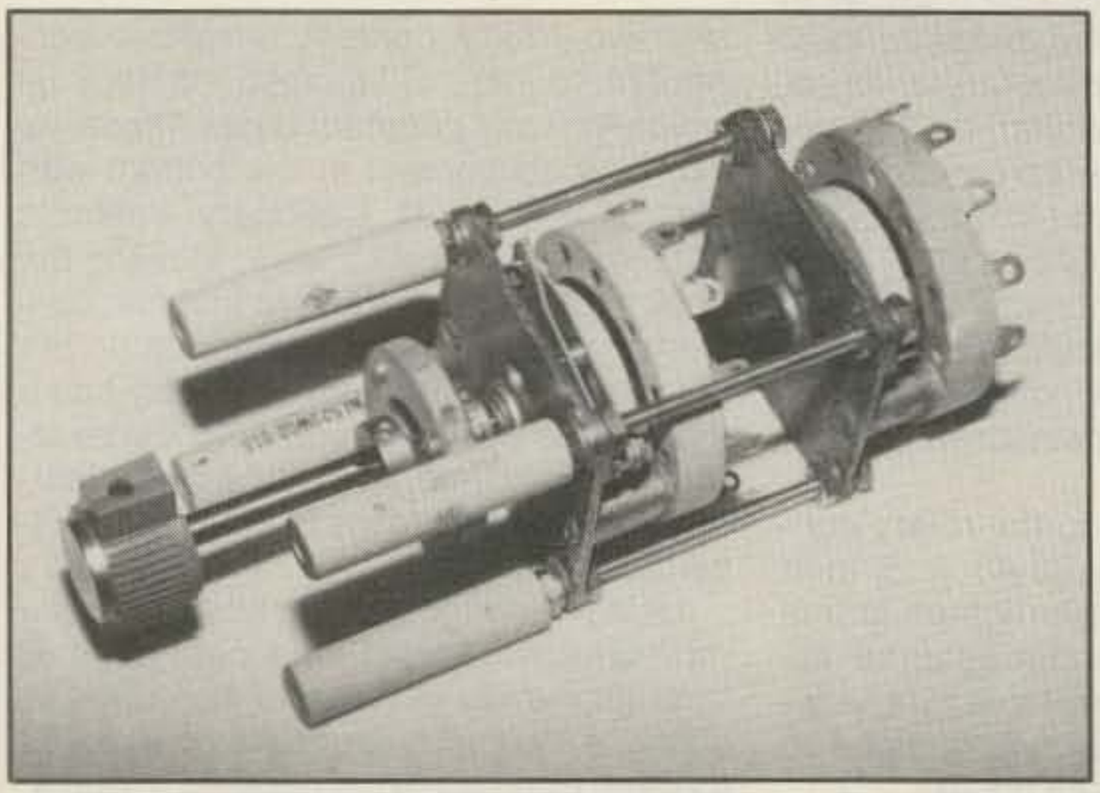

Fig. 7– Finished product, front view. Note four ceramic standoffs, insulated coupling, and shaft extension, as at this QTH.

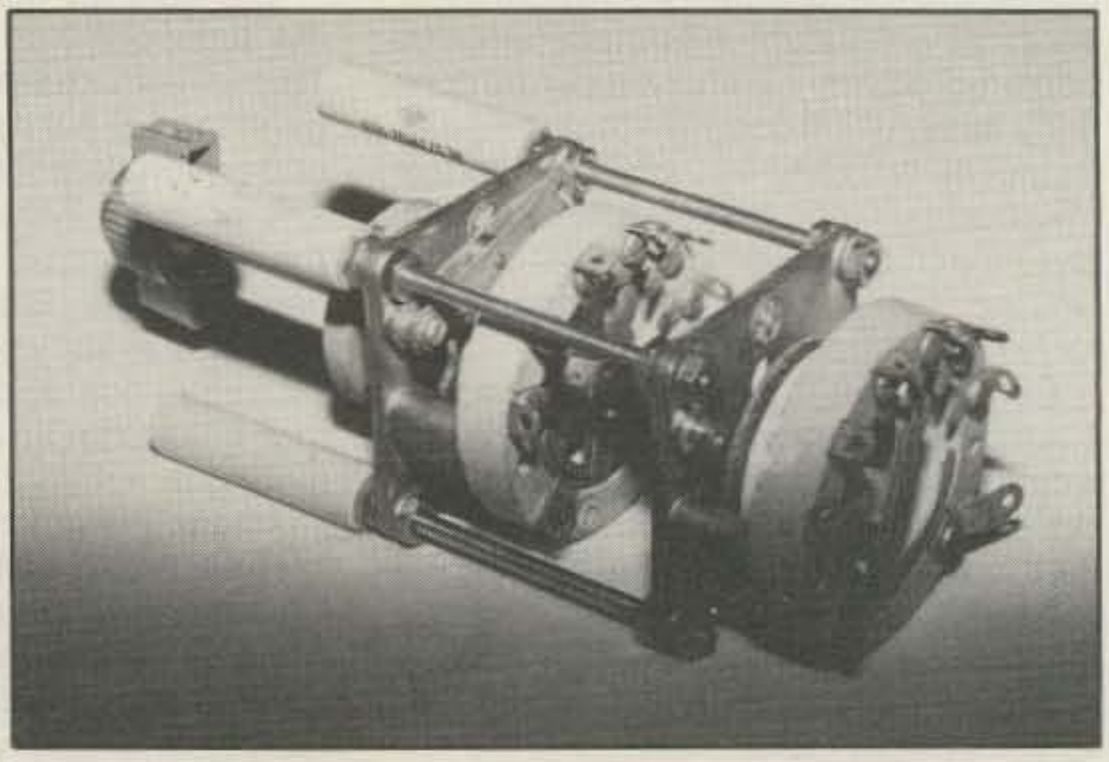

Fig. 8– Finished product, rear view. Note detent arm on front deck only. Arm removed from rear deck to provide for much easier operation of switch.

The distance between the two decks should be about 2½ inches, although this distance may vary. What is very critical, however, is that the dimension between switch plates at each corner be as close to identical as you can make it. This will ensure that the two decks are in perfect alignment with each other. Perfect alignment can be achieved by adjusting the four 8-32 nuts on each threaded rod until all four dimensions are equal (see figs. 7 and 8).

This completes the construction phase of the project. After checking that everything is tight and solid, slowly rotate the switch knob and watch the contact position changes on each deck to see that the switch remains in alignment. When you are satisfied with the operation of your bandswitch, it is a good idea to disassemble the switch once more and use a good epoxy glue to help hold the Delrin coupling solidly to the rotary contact on the first switch deck. This is the weak point of the entire assembly and the one which will be most likely to slip because it is next to impossible to not have at least some "slop" between the brass screws and the holes in the rotary contact. A good, solid connection here, together with careful alignment, will result in a switch that will last for years.

Additional Info

Although it should never be necessary to rotate the switch through 360°, this should be done carefully, because rotational forces are increased during this process. This is because the rotating contact must leave and reacquire the "C"-shaped contact. Further, the switch can be made to operate more easily by carefully filing the notched detent disc. Material should be removed from the raised areas between the notches and not from the notches themselves.

You can also use 8-32 threaded ceramic standoff spacers to mount the bandswitch to a panel. If you choose to insulate the switch body from ground potential this way, remember to insulate the shaft as well by using an insulated shaft coupling. Although I did not high-voltage test the switch, I have found that it is capable of handling the legal power limit with plate voltages of at least 3000 VDC.

When used as a two-deck bandswitch with pi-network input circuitry, use the rear deck to switch taps on the tank coil and the front deck to select 12 VDC DPDT relays which are used to actually switch the input circuit. As you can probably guess, it is possible to add additional switch decks in the above described manner. The problems of increased rotational force and critical alignment are also magnified and must be dealt with accordingly. These obstacles can be overcome, though, with a little patience and care.

It wasn't that many years ago, historically speaking, when the term "radio relay" formed the basis for the ARRL. W9CNY explains how amateurs of that day shaped a whole new system and technology for global communications.

Amateurs Led The Way

The Story of The Domestic Radiotelegraph System

BY LEWIS COE*, W9CNY

Amateurs with their radio relay networks in the early part of the 20th century were probably the first to call attention to the possibility that radio might some day compete with traditional land wire telegraphy. Although the telephone had been invented in 1876, the business and personal communications of the nation still relied on the telegraph. Telephone service was primarily a local proposition. Toll circuits were limited and frequently transmission was poor. There was no transcontinental line at all until 1915, when Lee deForest's audion tube made repeaters possible.

In 1909 the Federal Telegraph Company of California acquired the patent rights to the Poulsen arc invented in Denmark. Arc transmitters generated a pure CW signal and were much more efficient than the spark gap sets which were then the only known way to generate an RF signal.

In 1911 Federal established the first domestic radio network to compete with the land wire telegraph. The stations were surprisingly modern. Transmission speeds up to 80 WPM were achieved. High-speed receiving was made possible by another Poulsen invention, the magnetic wire recorder. Messages could be recorded at maximum speed and then the playback slowed down to permit manual copying by the operator. Stations were established in Chicago, El Paso, Fort Worth, Kansas City, Los Angeles, Portland, San Diego, San Francisco, and Seattle.

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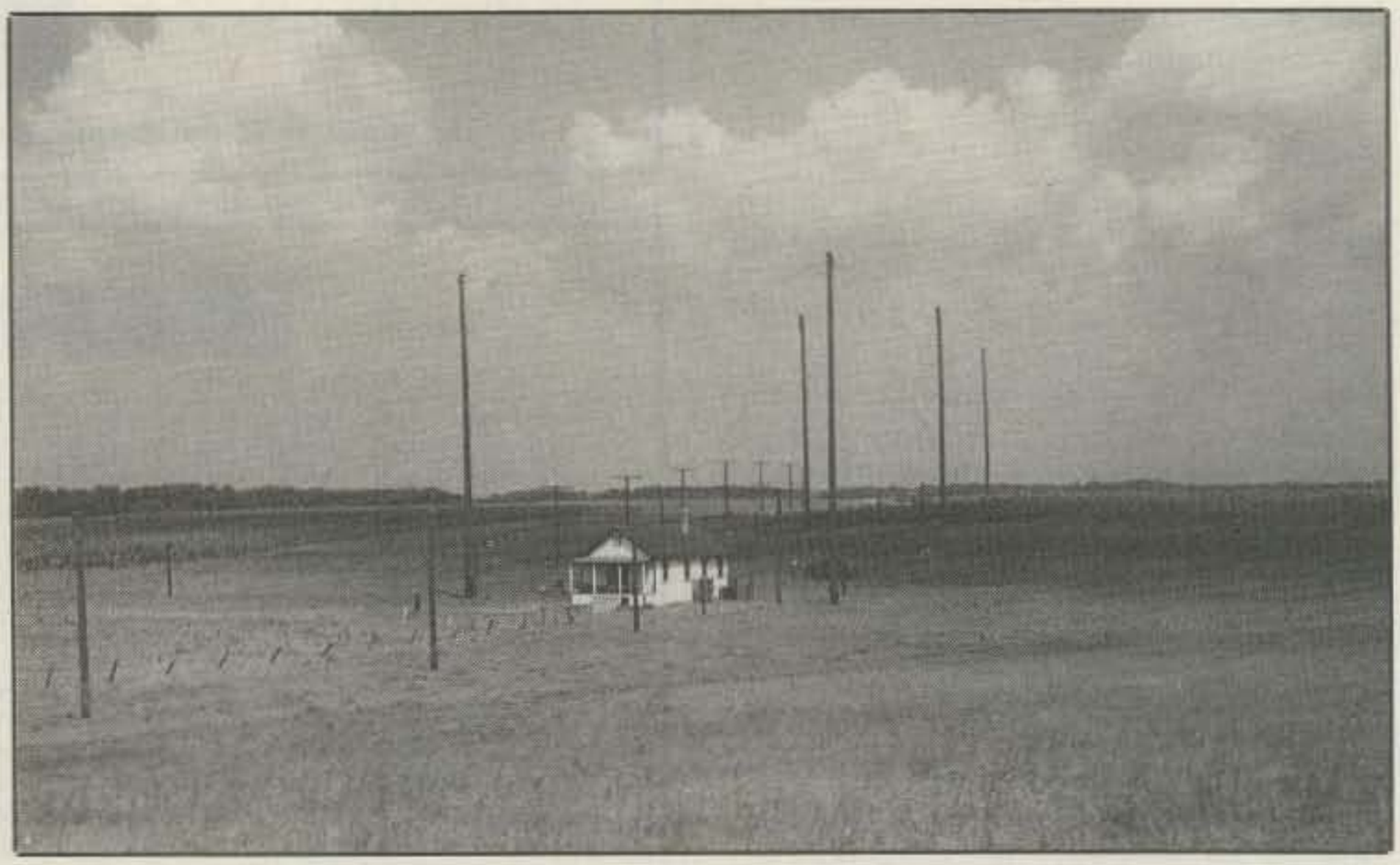
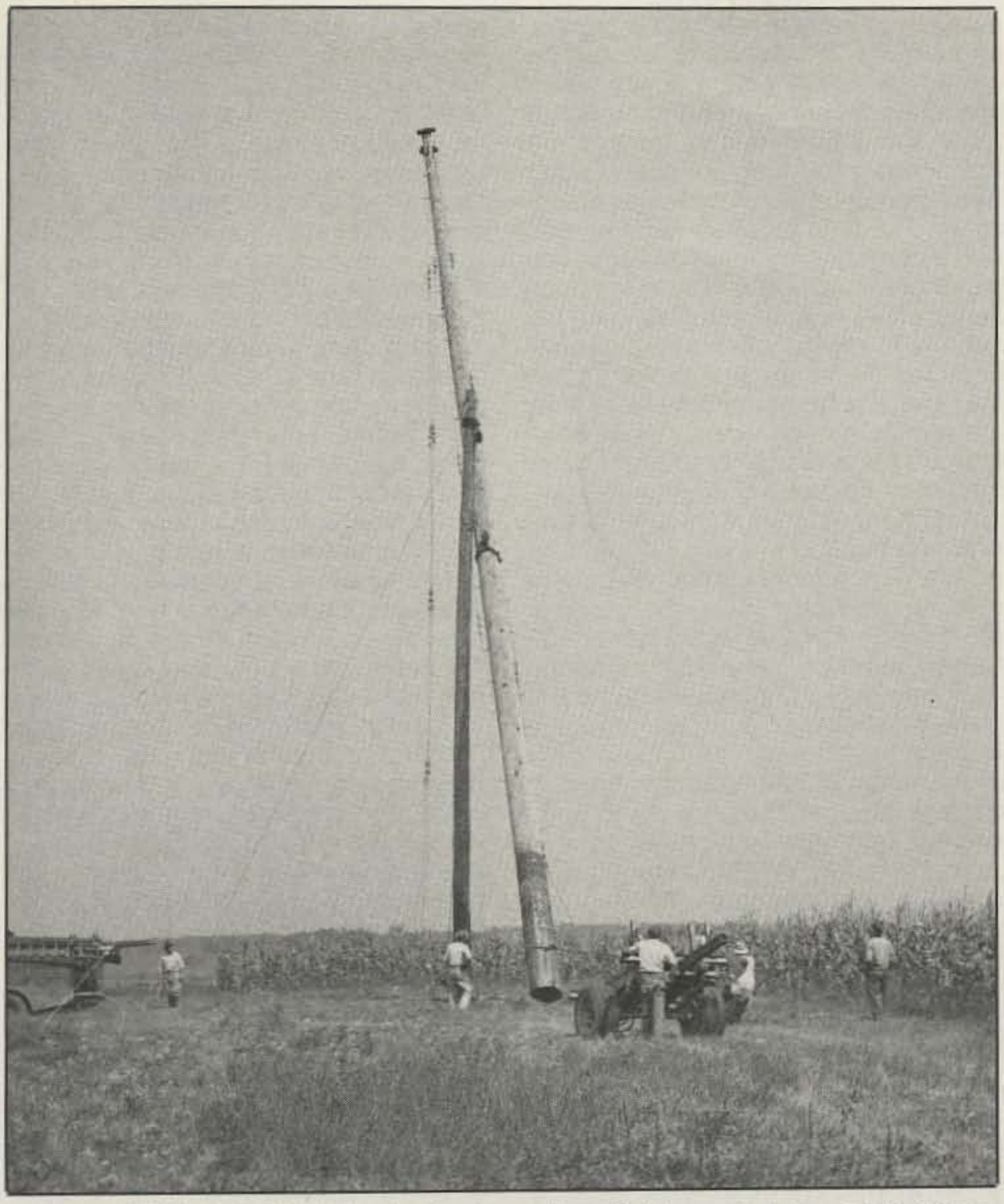


Mackay Radio transmitting station near St. John, Indiana. Here telegraph traffic was handled between Chicago, New York, and San Francisco.

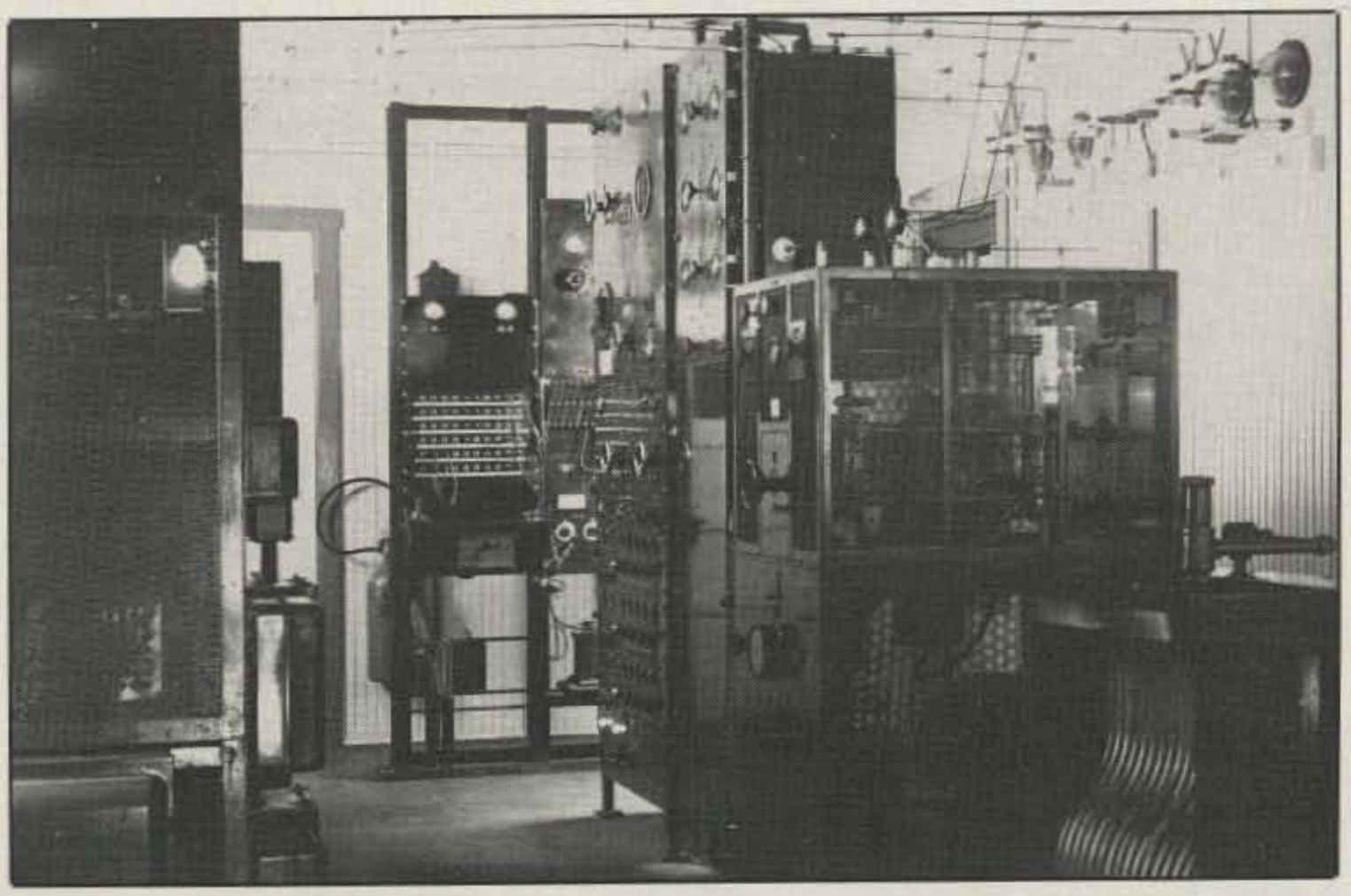
Using frequencies in the range of 39 kHz to 92 kHz, the system was capable of good communication under optimum nighttime conditions. Over the longer routes, signals were only marginal during daylight hours, and summer static was a real problem on the low frequencies being used. As a result, service to the inland points was discontinued by the time of World War I. The Pacific coast net, with shorter distances and more uniform weather, continued in successful operation until all domestic public service radio stations were shut down by government order at the beginning of World War II.

By the 1920s amateurs were again leading the way with spectacular results on high frequencies above 1500 kHz. During this period the midwest section of the USA was plagued by a series of winter storms that paralyzed wire communications. Emergency circuits provided by amateurs called attention to the capabilities of radio to replace wire communication.

Commercial interests were quick to see the possibilities of using relatively low-cost radio stations to replace expensive wire lines. At this time there were several instances of powerful "amateur



Heavy work! Moving a 90 foot pole at a domestic radiotelegraph station 1942. (Photo by Lewis Coe)



Interior of Mackay Radio transmitting station near St. John, Indiana, showing 10 KW transmitter used for Chicago-San Francisco traffic. (Photo by Lewis Coe)

stations" handling commercial traffic on amateur frequencies.

Meanwhile, in England the Marconi company was conducting exhaustive research on shortwave radiotelegraphy. The end result was the "beam system" to link the far-flung British empire. Marconi engineers had learned how to design directive antennas with extremely narrow beamwidths. It had been assumed that radio waves followed the great circle path from the transmitter to the distant station. During field investigation at receiving points it was found that received signals did not always arrive on the great circle bearing. For this reason, extremely sharp beams turned out to be self-defeating, and better results were obtained with broader patterns.

In America, Mackay Radio, RCA, and others started international radio circuits based on the Marconi beam system. Radio promoters were again attracted to the idea of competing with the wire telegraph companies for traffic. The Department of Commerce, strongly committed to the doctrine of "public interest, convenience, and necessity," turned down many of the early proposals for domestic radio licenses. It was obvious that the radio companies were only interested in skimming off the profitable traffic between metropolitan areas. This was considered to be unfair to the land line telegraph companies who were furnishing service to the smallest hamlet.

The first exception to the rule came in 1928, when a domestic network license was granted to Universal Wireless Telegraph Co. Universal actually got some stations in operation in the midwest area before it was forced out of business by financial problems.

In 1933 Mackay Radio and RCA were granted licenses for nationwide radio telegraph networks. RCA was affiliated with Western Union for the local pick up and delivery of messages. Mackay Radio had a similar arrangement with its I.T.&T. affiliate Postal Telegraph. Service was available to Chicago, Los Angeles, New Orleans, New York, Portland, San Francisco, Seattle, and Washington. Service to other cities was in the planning stage when World Was II brought an end to operations.

Both companies used long-wire directive antennas similar to those used in the international service. Vees, with or without reflectors, and rhombics were the favored types. Frequencies ranged from 4 MHz to 13 MHz. A given circuit was usually assigned three channels—a day, a night, and a transitional frequency. Often only two frequencies, a day and a night, gave good results. Most of the transmitters at inland points were around 1 KW power, although Mackay used a 10 KW unit for the Chicago-San Francisco circuit.

Amateurs of that era found the Mackay transmitters rather curious because

every stage was operated in the grounded grid mode. This was a means of getting around the "RCA patent pool," which controlled the circuits for grid drive of a tube. The grounded grid transmitters functioned well, and operators didn't have to contend with neutralizing procedures. The final amplifier had two 500 watt triode tubes in parallel. Construction was more complicated due to the additional driver stages required and the large RF filament chokes in the high-power stages. The patent pool also controlled the use of direct crystal control of a transmitter. Mackay used a small triode oscillator in a temperature-controlled oven for frequency control. For all practical purposes the frequency was as stable as crystal control.

RCA, having access to many important patents, had transmitters of more modern design, ending up with a pair of 500 watt screen grid tubes in push-pull for the final amplifier. Using screen grid finals made the excitation requirements much less and made for a more compact unit. (For a detailed description of the RCA transmitters, see Terman's *Radio Engineering*, 2nd edition, page 509.)

The domestic transmitters of both companies were more or less standard units that were also used as exciters for the large 30 to 50 KW amplifier units used in the international service. Receivers were specially built for the point-to-point service and were extremely stable and sensitive. Some were tuned radio frequency types, but these were replaced by superheterodyne sets as adjacent channel QRM started to be a problem in the late 30s. Most receivers were arranged for individual tuning of each stage. This maximized receiver performance even though it made band changing a slow process. Except when copying manually, the audio output of the receivers was run through a rectifier and converted to DC for operation of the siphon recorders.

Transmitting and receiving sites were located in rural areas and connected by wire lines to the city operating centers. With transmitters and receivers separated by several miles, full duplex operation was possible. Operation was done by the Wheatstone automatic system. Punched tape was used for transmitting, and received signals were recorded on a siphon recorder. Speeds up to 200 WPM were possible under ideal circuit conditions. The radio circuits were quite reliable, and only rarely did conditions require slowing to manual speed. Since the tape was punched in Continental code, it could readily be copied by sound when slowed down. Receiving station monitor operators, spending their days listening to high-speed code, could follow the contents of messages up to 50 WPM or so, even though they couldn't possibly make solid copy at that speed!

The domestic radio service was successful right from the start and was welcomed by the business community that needed faster and faster telegraph service.

With the advent of World War II it became necessary to impose strict censorship on all radiotelegraph transmissions. The domestic transmitters could be heard throughout the world, and it would have been easy for enemy agents to file dummy messages containing intelligence information. The volume of traffic on the domestic networks was too high to permit censorship of each message as was done in the international service. All of the domestic public service radiotelegraph stations were shut down by government order in June 1942.

The domestic circuits were never resumed after World War II. The merger of Postal Telegraph and Western Union in 1943 had pretty well ended the possibility of competition in the domestic telegraph field. Also, at that time there was an actual shortage of high-frequency channels to meet postwar needs. Time has brought great changes. Radio, at first only a competitor with the land line telegraph, is now almost the sole means of communication. About the only circuits still using an actual physical line are the connections between a customer's premises and the nearest telephone switching center. In their wildest dreams the amateur "trunk line" operators of 1915 couldn't have visualized anything like today's packet radio operators! CQ

PSSST!

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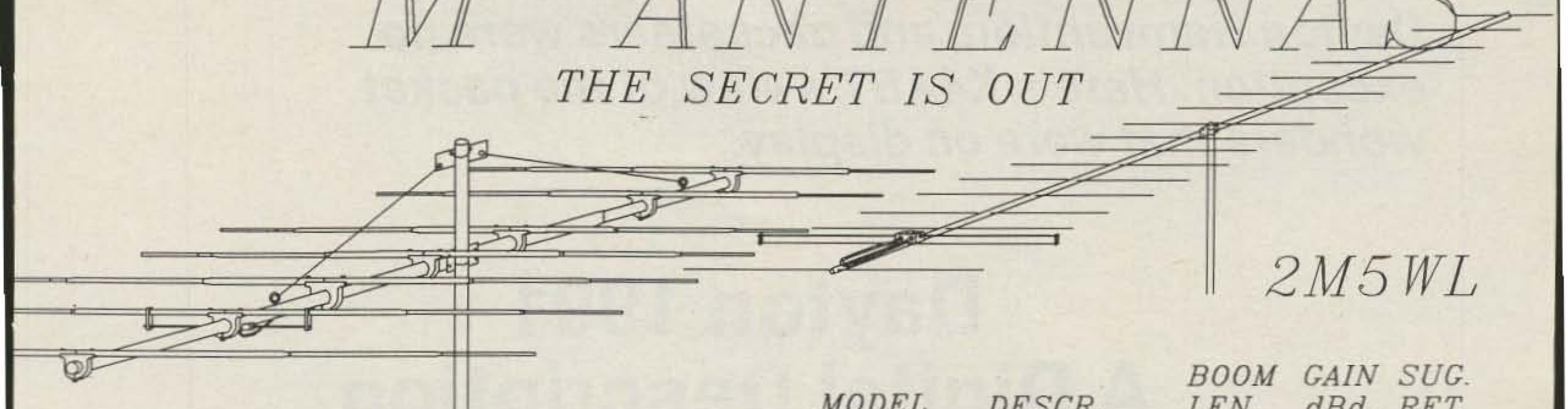
THE SECRET IS OUT



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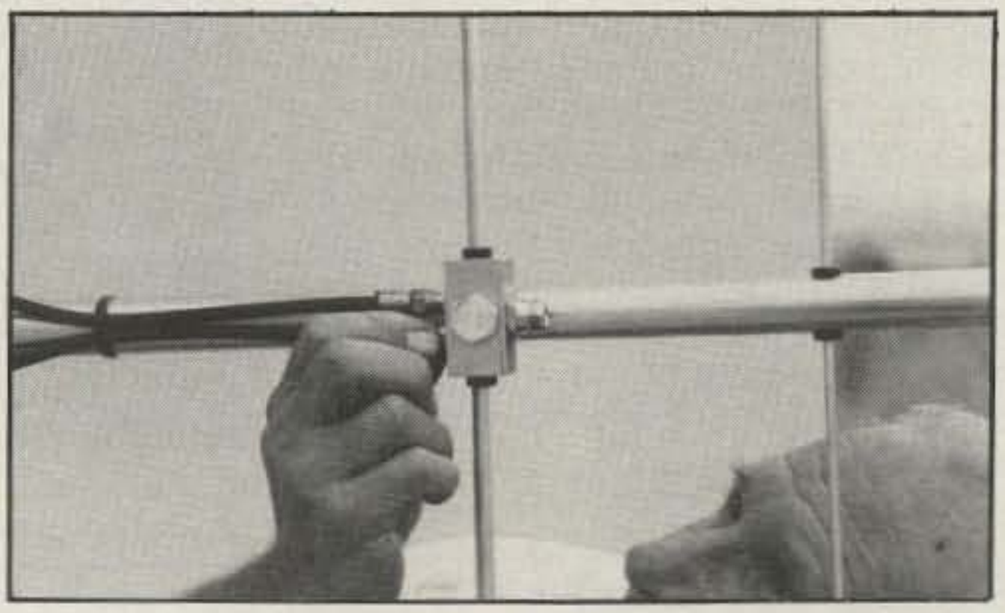
But listen... All of this is just talk and ego trips if something else doesn't happen when you put up a new M^2 antenna. We're talkin' about FUN...M^2 removes the frustration and puts the FUN back in the HAM RADIO EQUATION!!! That's what it's all about. Just ask the guys who have them up!

WHO'S BEHIND ALL THIS?
Mike Staal, K6MYC, former co-founder and antenna designer for KLM till '86 is at it again! This time with a strong family effort behind him. M^2 is about to become a force in the antenna market.

XYL Myrna, WA6GXF and sons Matt and Ken form the nucleus of this good old fashioned hard working company. But while the WORK ETHICS are old fashioned, the METHODS are not. CNC mills turn out machined parts like you HAMS have never seen. Mike's skilled touch on high speed computers generates gains and patterns not possible till now. M^2 creates antennas that are UNIQUE in the industry. Mechanically, machined driven element housings are potted with space age silicon gel. All connectors have 'O'rings. Well, it must cost a bloody fortune right? NOPE, You will find M^2 products priced about the same as you are paying now for NONE OF THE ABOVE! Check it out....

MODEL	DESCR.	BOOM LEN.	GAIN dBd.	SUG. RET.
10-30LPY	10-30 mHz log	36'	6.0	$899
20M4	20 mtr 4 ele	45' 3"	9.0	649
18M3	17 mtr 3 ele	18'	6.3	249
15M4	15 mtr 4 ele	33' 8"	9.0	369
10M4	10 mtr 4 ele	23'	9.0	169
10M7	10 mtr 7 ele.	45'	10.5	499
6M5	6 mtr 5 ele	15' 10"	9.3	149
6M7	6 mtr 7 ele	25' 6"	10.5	229
6M2WL	6 mtr 9 ele	39' 6"	12.4	379
6M2.5WL	6 mtr 11 ele.	50' 2"	13.0	449
EB-144	2 mtr horiz omni		1.0	119
2M7	2 mtr 7 ele	8' 10"	10.5	105
2M12	2 mtr 12 ele	19' 6"	13.0	129
2M5WL	2 mtr 17 ele	33'	15.0	169
2M18XXX	2 mtr 18 ele	36' 3"	15.3	219
18XXX KIT	Cvts KLM 2M16LBX to 2M18XXX	36' 3"	15.3	69
2MCP14	2 mtr 14 el cir	10' 6"	10.3	149
2MCP22	2 mtr 22 el cir	18' 7"	12.5	225
2M6WLHD	2 mtr 19 ele HD	41' 8"	15.8	379
2M5-440XP	2mtr 5 el with 10 el on 440	5'	9/12	149
220-7WL	1-1/4 mtr 23 el	32' 6"	16.5	189
EB-432	70 cm horiz omni		1.0	109
440-18	70 cm multi-use	11' 4"	14.5	109
436-30CP	30 ele OSCAR	9' 9"	14.5	229
432-9WL	70 cm 28 ele	21' 2"	17.3	149
432-13WL	70 cm 39 ele	30' 8"	18.0	229
MT3000	Elevation rotor HD			669

DEALERS			
MISSOURI RADIO	IN	MISSOURI	1-800-821-7323
RF ENTERPRISES	IN	MINNESOTA	1-800-233-2482
OKLAHOMA COMM CNTR	IN	OKLAHOMA	1-800-765-4267
THE HAM STORE	IN	TEXAS	1-800-344-3144
MADISON	IN	TEXAS	1-800-231-3057
HAM RADIO OUTLET	IN	CA. CALL	1-800-854-6046



M^2 ENTERPRISES
7560 N. DEL MAR
FRESNO CA. 93711
209-432-8873 FAX 209-432-3059

CIRCLE 164 ON READER SERVICE CARD

There was something for everyone at the 1991 Dayton Hamvention, and packeteers were no exception. Here's K4ABT's view of the packet wonders that were on display.

Dayton 1991
A Digital Description

BY BUCK ROGERS*, K4ABT

Dayton 1991 revealed a revival of interest in our hobby. I'm not at all surprised that such a large gathering was marshalled at Dayton. I've seen the same activity at other hamfests this season, indicating that interest is building. Not all the attendance can be attributed to the idea that "folks are not traveling abroad; they are traveling near home."

Without question, a large number of those in attendance at Dayton this year were new to amateur radio. While helping at the *CQ* and *CQ* Book Shop booths, it was fully apparent that no one had brought enough study guides. I hope that we are seeing a resurgence of amateur radio, because I was beginning to feel as though it was an "old man's" hobby. At the *CQ* Book Shop booth I saw plenty of indication that some young blood is about to enter into our ranks. I also noticed that an abundance of the newcomers are expressing high interest in packet radio.

While helping at the *CQ* Book Shop, I spoke with many non-amateurs who were purchasing the No-Code license manuals. In a delicate manner I asked a few questions of these future hams to try to get an idea of the reason(s) for their desire to become amateurs. Even I was a little surprised to discover that many of them were targeting the digital modes as their primary goal for entering our ranks. I noticed that most of the newcomers to our hobby are generally the "high-tech" and engineering types . . . and relatively young.

Surprise! Surprise!

Already we are seeing a contingent of the No-Code licensees upgrading to the higher class amateur licenses. No-Code license manuals were outselling other books at a surprising rate. The speed at which the manuals were selling made me believe someone had somehow underestimated the interest now being generated in our hobby. I don't believe the vendors and suppliers are ready for the upcoming demand. As one vendor put it, "We'll wait and see." I have a hunch that vendor is already too late.

All That Asphalt and No Parking

It is evident that Dayton has reached its maximum for attendance and parking, unless they gain access to more property across the street from the arena for more (paved) parking. This is my only (snobbish) grumble about the Hamvention—the parking problem. At one point I had to park a quarter of a mile away and trek this 270 pound 6 foot 2 inch body that is beyond a half century of age to the hamfest site from a parking area that was shoetop deep in gooey gumbo (mud).

Someone reported that the Friday (April 26th) crowd numbers were in excess of 31,000 people. If that is true, then the crowd on Saturday may have reached well over 40,000. The way to move in the Saturday morning crowd when entering at the Hara Arena entrance was to find a slot and slither in. You then quickly learned to "Go with the Flow."

An Upswing in Technology

There was a time not so many years ago when I was in a minority when I tried to sell the idea that digital technology was the wave of the future. Now that idea is well entrenched in our modern-day society, and largely because amateurs have helped propel it into widespread use. Sure I'm boasting, but if we think about it for a moment, we find that many of the trend-setters in the digital engineering fields are indeed hams. We are at the forefront of technology in almost every aspect of electronics from audio and video reproduction to space travel and telecommunications.

The Dayton Hamvention is a showplace for the toys we develop and use. But even more, it is a glimpse into the future of how mankind will make use of the airwaves. If we stop for a moment and examine the history of communications, we suddenly become aware of our contemporary contributions.

EZ-Matrix Makes It EZ

Since last fall when I wrote the article about how we interface several ROSE switches into gateways and clusters, I've received a large number of letters from SYSOPs who told me the "OCTOPUS" was no longer available from the vendor I mentioned in that article. As it turns out, Gwyn Reedy at PacComm had a few left from a batch that he had run. They too went the way of the needy users. Now we have an even EZ-er way to build the matrix without having to stuff a "piece of perf" with almost fifty 1N914 diodes, only to discover after you've finished that some of them are bad or the polarity is reversed.

Bill Slack, NX2P, has developed an ingenious means to circumvent the assembly defect problem. The total system that supports five ports for either the ROSE Switches, TheNet, or NETROM™ is mounted on a 3½" × 4½" double-sided PC board. The ease of assembly is due to the use of DIP (Dual Inline Package) diode arrays. The PC board and the necessary components, including the five

*c/o CQ magazine
K4ABT @ W4HHY TN.USA.NA

16-pin DIP diode arrays, are included in the kit for $32.95.

Special socketing permits configuring the NX2P "EZ-Matrix" for either the ROSE or node connections. This timely item is ready for delivery from NX2P Electronics, 321 East Shore Trail, Sparta, NJ 07871 (phone orders 201-729-6927). *(Thanks, Bill. This will save us all a lot of time and trouble, not to mention saving my hide from all the SYSOPs who were unhappy after they found the other boards were no longer available from the former supplier.—ed.)*

Sitt'n in "Clover" Two, Too, or II?

There were numerous new ideas, protocols, and devices for the digital amateur to be seen at Dayton. Specifically, there is a new mode called "Clover" being offered to the digital amateur. I had a few moments to speak with Bill Henry of HAL Communications Corporation, and he gave me a brief description of Clover.

I've read the early information about Clover, but this was my first opportunity to experience a hands-on session. Without having more time to use the Clover, I'll briefly cover it until I have the chance to use it in "the real world" environment. As some of us know, the Hamvention floor is not the best place to really examine a product for its reliability and usefulness.

In substance, the Clover, or as HAL (Bill Henry) puts it "Clover II," is the brainchild of Ray Petit, W7GHM. It uses the now combat-proven method called "Phase Shift-Keying" (FSK/AFSK). The Clover II connects to the radio and computer in much the same manner as the packet controller does. This is as far as the similarity of the two systems goes. From here the Clover takes a radical turn in both protocol and the manner in which it implements error correction. The error-correction method is based on the Reed-Solomon coding system.

The best part of the Clover mode is that it is purported to provide better than 600 bauds on HF with a passband usage of only 500 Hz. That's correct: The amount of spectrum used for Clover is one-half kilohertz. Moreover, Bill says, "The Clover II will permit *four* QSOs to be active, adjacent to one another in 2 kilohertz . . . *without mutual interference!*" For the record, two kilohertz is the amount of spectrum now used by just one FSK mode at HF. For more information about the Clover II system, contact HAL Communications Corporation at P.O. Box 365, Urbana, IL 61801.

Kantronics Kan and Did!

If you haven't tried a KAM lately, there is a new treat in store for you. I've now upgraded my KAM to the new firmware level 4.0, which also supports the new "Host Master II" software from Kantronics. Host Master II runs on the IBM PC and compatibles and is usable from hard disks or floppy. The KAM now performs some very special functions that some of us might refer to as "tricks." As an example, the Host Master II permits the user to operate HF modes such as AMTOR, ASCII, RTTY, and CW while simultaneously operating multiple packet connections.

Notice that I said, *multiple* packet connections. In addition to the simultaneous connects of different modes between HF and VHF, the software enables the user to move between channels and streams very easily through the use of the PgUp and PgDn keys. There is an on-screen indicator in the STATUS line that lets us know which stream we are using. We are given another useful tool in the program that lets us execute a pop-up window to display all the channels in use and the stations that are connected on each channel.

With our VGA monitors we're able to display the screen text in several different text levels and colors, from 25 lines by 80 columns, to 50 lines by 80 columns.

Wow! I'll lay a wager that the DXers who are reading this text just went into "ear mode" one! Sure, the use of this system can allow you to use the DX PacketCluster™, and while using other HF modes for *CQ* contesting—at the same time. The software is usable on the other Kantronics Packet Controllers (KPC), although it shines brightest when used with the KAM.

Space does not permit me to detail all the many features that are available in Host Master II. There is a two-page flyer available from Kantronics that gives a brief picture of the features in the Host Master II and the KAM firmware version 4.0. You may call or write for this information: Kantronics Inc., 1202 East 23rd Street, Lawrence, KS 66046 (phone 913-842-7745).

As A Matter of "FAX"

MFJ Enterprises Inc. had a new FAX system on display at Dayton, and the color pictures displayed were nothing short of amazing. Steven Pan gave me a tour of the new FAX/WeFAX system called the MFJ-1214. It displays 16-level Fax photos, which can be viewed in color. This system is a part of a stand-alone device that also permits the use of RTTY and CW. It boasts the super VGA display capabilities that are 1024 × 768, and in 4096 colors. There are no packet provisions in the new FAX controller. This new controller is the MFJ-1214, and it is priced at $149.95.

MFJ has added to the MFJ-1278 a color format that enables the user to view

the SSTV pictures normally received as black and white as a color picture. MFJ Multicom stores the black-and-white pictures with the color information intact. Thus, the viewing program allows you to view the picture in the color format. For more information write to MFJ Enterprises Inc., 921 Louisville Road, Mississippi State, MS 39759, (phone 1-800-647-1800).

Whatever "PMS" Means To You, Forget It!

The Personal Mail System (PMS) is the center of attraction in mailboxes nowadays (see "The Packet User's Notebook" this month). PacComm had the new TINY-2 with the super-sized PMS in it. The new TINY-2 supports 512,000 bytes of usable RAM. That is enough to provide mail service to some LANs. In addition, the TINY-2 can be made into the ROSE or TheNet, as it has TNC2 compatibility.

I had a chance to talk with Gwyn Reedy, W1BEL, PacComm CEO, and Carlos Solergibert, TI2CES, PacComm Latin America/SA, about the 19,200 baud network in that part of the hemisphere. Those of us who operate 1200 bps on 10 meters may recall using the TI3DJT ROSE switches in Costa Rica. Chuck and Carlos are the SYSOPs of these ROSES, with much of the "sopping" done by Chuck. We will have more information on the 19,200 baud network in Costa Rica and Latin America soon.

My HandiPacket™ TNC got "trashed" recently in a mishap on one of the airlines, so I had to purchase another to replace the one I used in my MicroPacket© station. It's good that I made it to the PacComm booth when I did, or I may have been waiting a few days for my HandiPacket. Seems Linda was about sold out of TINY-2's when I got to the PacComm booth, and the HandiPacket controllers were already on the endangered list.

PacComm's information package about their packet products is available by writing to them: PacComm Inc., 3652 W. Cypress Street, Tampa, FL 33607 (phone 813-874-2980). Latin American readers may wish to contact Carlos or Chuck at 506-408312 or FAX at 506-40-6048.

It's Been a Long Time Coming

Finally, the digital amateur has an ally in the transceiver industry. With more and more converts to packet radio and other digital modes, there is a need for more frequency coverage, and a real need for implementation of UHF high-speed backbones and trunks to ease the congestion on the already crowded packet frequencies. The wait is over, because Alinco is developing a family of radios with the digital amateur in mind. For openers, Alinco now utilizes true FM (variable reactance, frequency modulation), and they are designing the data radio(s) to use fast (short) transmit/receive transient periods.

DataRadio 1200

The Alinco DataRadio 1200 is one of the transceivers that I've been using in my beta test-bed. The DataRadio 1200 is different from its voice-version counterpart in many ways. I'm told that it will be at the dealers soon, and at a price that could justify the purchase of a dedicated VHF packet transceiver. On two occasions I've used the DataRadio 1200 at remote sites where there are other strong RF signals. The 25 watt DataRadio 1200 has performed well alongside some tough competitors.

I mentioned the MicroPacket station earlier, but I failed to mention what it is. I've written a complete article about what it is and how it is put together, along with a list of the major components that comprise its makeup. The heart of the MicroPacket station is the new kid on the block, and I mean *very* new. It is the Alinco DJ-F1 "palm-sized" transceiver. This transceiver is ultra small, but it has the punch to propel us into the local area network (LAN) packet switches.

For information about the Alinco DataRadio line, write to or call Greg Pearson or Matt Fisher at Alinco Electronics, Suite 130, 438 Amapola Avenue, Torrance, CA 90501 (phone 213-618-8616).

There Are More Hamfests To Come

In early July I hope to be enjoying the Atlanta Hamfest, and in early September I look forward to the Shelby, North Carolina Labor Day weekend hamfest. It is good to see all the support for the hamfests this year. This is what it takes to make the hobby grow, supporting the amateur radio fraternity through membership, attendance, and promotion of our local ARCs and their annual hamfests.

Have fun digitally! CQ

MFJ TUNERS

MFJ-949D Deluxe 300 Watt Tuner

Covers 1.8-30 MHz . . . plus you get dummy load, peak reading meter, antenna switch, balun and one full year unconditional guarantee . . . for only $149.95

MFJ-949D **$149.95**

More hams use the MFJ- 949D than any other tuner in ham radio.

Why? Because no other 300 watt tuner gives you this combination of features and value

The MFJ-949D gives you a highly developed product with years of proven reliability and a reputation for being able to match just about anything.

A lighted peak reading cross-needle meter that shows you SWR, forward and reflected power. A 6-position antenna switch lets you select 2 coax lines (direct or thru tuner), random wire or balanced line and built-in dummy load. You also get a balun and 1.8-30 MHz coverage.

Special Inductor Switch

The inductor switch is the most likely tuner component to burn up.

The MFJ-949D gives you an inductor switch that's specially designed to withstand the extreme voltages and currents that are developed in your tuner.

You get a solid feel and positive click action -- not a spongy unsure feeling like some others have.

1 full year unconditional guarantee

You get MFJ's famous one full year unconditional guarantee. That means we will repair or replace your MFJ-949D or other MFJ tuner (at our option) **no matter what** happens to it for a full year.

Others give you a 90 day limited warranty. But what do you do after 90 days if it burns up? Or before 90 days if they say, "Sorry, your limited warranty does not cover that?"

Why take chances when MFJ gives you the world's leading tuner with no matter what protection for a full year?

Hard-earned reputation

There's just no shortcut. MFJ is the most trusted name in the business. More hams trust the MFJ-949D and MFJ tuners than all other tuners combined.

Proven Reliability

MFJ has made more tuners for more years than anyone else. With the MFJ-949D, you get a highly devloped product with proven reliability.

Continuing Service

MFJ Customer Service Technicians will help you keep your MFJ tuner performing flawlessly -- no matter how long you own it. Just call (601) 323-5869.

Made in USA

The MFJ-949D is made in USA. We're not an importer adding profits and sending your money to a foreign country.

Your Very Best Value

The MFJ-949D gives you your very best value -- first-rate performace, proven reliability and the best guarantee in ham radio -- all from the most trusted name in antenna tuners. Don't settle for a copy-cat when you can own an MFJ original. Get yours today!

MFJ's New 300 Watt Tuner

MFJ-948 **$129.95**

If you don't need a dummy load but want all the other features of the MFJ-949D, choose the MFJ-948 for $129.95.

The MFJ-948 features a **peak** reading **lighted** meter with a built-in lamp switch, one year **unconditional** guarantee and is made here in the USA.

MFJ's Very Best 3 KW Tuner

MFJ-989C **$349.95**

The MFJ-989C is not for everyone. And not everyone can afford it.

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

The MFJ-989C is a compact 3KW PEP roller inductor tuner that covers 1.8-30 MHz. Exceptionally hefty tuning components include 2 massive capacitors that can withstand 6000 RF volts with ease and a big roller inductor. You can run high power without fear. A 3-digits turns counter lets you quickly re-tune to your favorite frequency. A giant 2-core balun lets you operate balanced feedlines without core saturation and voltage breakdown. Dummy load.

Peak and average cross-needle meter shows you forward/reflected power in two ranges (2000/500 and 200/50) and SWR. Lamp uses 12 VDC or 110 VAC with MFJ- 1312, $12.95. Flip stand, 6-position antenna switch. 10¾'' x 4½' x 15''. Add $10 s/h.

MFJ's smallest Versa Tuner

MFJ-901B **$59.95**

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

MFJ'S Super Value Tuner

MFJ-941E **$109.95**

The new MFJ-941E gives you a 300 watt PEP tuner that covers everything from 1.8-30 MHz -- plus you get a cross-needle meter, antenna switch and balun . . . for an incredible $109.95. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

Antenna switch selects 2 coax lines (direct or through tuner), random wire, balanced line or external dummy load. 4:1 balun. 1000 volt capacitors. Measures 10-5/8'' x 2-7/8'' x 7''.

2-Knob Differential-T™ Tuner

MFJ-986 **$289.95**

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

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

MFJ's peak and average reading cross-needle meter reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95. Current balun reduces feedline radiation and forces equal currents into antenna halves that are not perfectly balanced. It covers 1.8-30 MHz. Get yours today! Add $10s/h.

MFJ's Random Wire Tuner

MFJ-16010 **$39.95**

Operate all bands anywhere with any transceiver with the MFJ-16010. It lets you turn a random wire into a transmitting antenna. 1.8-30 MHz. 200 watts PEP. Ultra small 2''x3''x4''.

MFJ's Mobile Tuner

MFJ-945C **$89.95**

Don't leave home without this **mobile** tuner! Have an uninterrupted trip as the MFJ-945C extends your antenna bandwidth so you don't have to stop, go outside and adjust your mobile whip.

Small 8 x 2 x 6 inches uses little room. SWR/Wattmeter and convenient placement of controls makes tuning easy in motion. Balun. Covers 1.8-30 MHz. 300 watts PEP. Mobile Mount, MFJ-20, $3.00.

MFJ's 1.5 KW Versa Tuner

MFJ-962C **$229.95**

MFJ-962C lets you use your barefoot rig **now** and have the capacity to **add** a 1.5 KW PEP amplifier **later.** It covers 1.8-30 MHz.

You get MFJ's **peak** and average reading Cross-needle SWR/Wattmeter. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

Plus . . . 6-position antenna switch and teflon wound balun with ceramic feedthru insulators for balanced lines. 10¾ x 4½ x 14-7/87 in. $10 s/h.

MFJ's VHF or UHF Tuners

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

MFJ-921 VHF tuner covers both 2 Meters and the 220 MHz bands. **MFJ-924** covers **440** MHz. Built-in **SWR/Wattmeter.** 8'' x 2½'' x 3''. 2-knob tuning convenient for mobile or base.

Nearest Dealer/Orders: 800-647-1800

MFJ ENTERPRISES, INC.
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FAX: (601) 323-6551; Add $5 s/h.

MFJ . . . making quality affordable

CIRCLE 157 ON READER SERVICE CARD

Complete Rules For The CQ Awards Programs

The DX Hall of Fame

DX Hall of Fame membership is only accorded those DXers who have made major contributions to the hobby. Such contributions involve considerable personal sacrifice and can usually be described by the phrase "above and beyond the call of duty." Nominations for the DX Hall of Fame are made through the CQ DX Awards Advisory Committee by DX clubs or individuals, and require the positive vote of 75% of the committee for acceptance.

The CQ WAZ Awards Program

The CQ Worked All Zones (WAZ) Award and its variations are issued to any licensed amateur station presenting proof of contact with the appropriate number of CQ zones of the world. This proof consists of proper QSL cards which in many cases may be checked by any of the authorized check points or sent directly to the WAZ Award Manager. Many of the major DX clubs in the USA and Canada and most national amateur radio societies are authorized CQ check points. If in doubt, consult the WAZ Award Manager. Any legal type of emission may be used, providing communication was established after November 14, 1945.

1. The Official CQ WAZ Zone Map and the printed zone list which follows these rules are used to determine the zone in which a station is located.

2. Confirmations must be accompanied by a list of claimed zones, using CQ form 1479 or a facsimile, showing the callsign of the station contacted within each zone, with the date, time, band, and mode of each contact. The list must also clearly show the applicant's name, callsign, and complete mailing address. The applicant must show the type of award for which he or she is applying, such as Mixed Mode, All SSB, or All CW (see #7 below). A hand-written list may be submitted and will be accepted for processing, provided that the above information is shown.

3. All contacts must be made with licensed, land-based, amateur service stations operating in authorized (on the date of contact) amateur bands. Contacts with non-land-based stations, such as ships at sea, aeronautical mobile, or polar ice stations are not acceptable. Awards obtained by any mobile station will be endorsed as such, as will awards obtained by QRP stations, providing that the QSL cards submitted specify these modifiers.

4. All contacts submitted by the applicant must be made from within the same DXCC country. It is recommended that each submitted QSL clearly show the contacted station's zone number, if possible. When the applicant submits cards made out to different callsigns, evidence should be provided to show that he or she also holds or has held those callsigns at the time of the contact.

5. Any altered or forged confirmations submitted by an applicant for WAZ credit may result in permanent disqualification. The WAZ Manager may request the resubmission of certain confirmations as required. While a QSL card is normally accepted as proof of a contact, the final proof is an entry in the DX station's logbook for the listed QSO. Failure to resubmit QSLs in a timely manner when requested by the WAZ Manager may result in the recall of the award in question. Submission of an application for any WAZ award acknowledges consent to abide by the decisions of the CQ WAZ Manager and the CQ Awards Committee.

6. An application must be accompanied by the processing fee (subscribers must include a recent *CQ* mailing label with the application fee of $4.00; nonsubscribers $10.00) and a self-addressed envelope with sufficient postage or International Reply Coupons (IRCs) to return the QSL cards by the class of mail desired and indicated. International Reply Coupons equal in redemption value to the processing fee are acceptable. The 1991 redemption value of IRCs is $.50 each. Checks should be made out to the name of the WAZ Award Manager.

7. In addition to the basic certificate for which any and all HF bands may be used, specially endorsed and numbered certificates are available for Phone (including AM), Single Sideband, and CW operation. The Phone certificate requires that all contacts be Two-Way Phone, the SSB certificate requires that all contacts be Two-Way SSB, and the CW certificate requires that all contacts be Two-Way CW.[1]

8. If at the time of the original application a note is made stating the possibility of a subsequent application for an endorsement or special certificate, only the missing confirmations required for that endorsement need be submitted with the later application, providing a copy of the original authorization signed by the WAZ Manager is enclosed.

9. Decisions of the CQ DX Advisory Committee on any matter pertaining to the administration of this award are final.

10. All applications should be sent to the WAZ Award Manager after the QSL cards have been checked by an authorized CQ check point. If the application is for 160 meters or 5 Band WAZ, all QSL cards must be checked by the WAZ Award Manager.

11. Zone maps, printed rules, and application forms are available from the WAZ Award Manager. Send a 6" × 9" self-addressed envelope with $.75 postage, or $1.00 and an address label. For DX stations, send an address label and 3 IRCs.

The following list of zones is presented as a guide. Any questions will be decided by the CQ Zone Map. For rulings on borderline areas, consult the WAZ Award Manager.

Zone 1. Northwestern Zone of North America: KL7, VY1/VE8 Yukon, the Northwest Territories west of 102 degrees. (Includes the islands of Victoria, Banks, Melville, and Prince Patrick.)

Zone 2. Northeastern Zone of North America: VO2 Labrador, the portion of VE2 Quebec north of the 50th parallel, the VE8 Northwest Territories east of 102 degrees. (Includes the islands of King Christian, King William, Prince of Wales, Somerset, Bathurst, Devon, Ellesmere, Baffin, and the Melville and Boothia Peninsulas.)

Zone 3. Western Zone of North America: VE7, W6, and the W7 states of Arizona, Idaho, Nevada, Oregon, Utah, and Washington.

Zone 4. Central Zone of North America: VE3, VE4, VE5, VE6, and W7 states of Montana and Wyoming. W0, W9, W8 (except West Virginia), W5, and the W4 states of Alabama, Tennessee, and Kentucky.

Zone 5. Eastern Zone of North America: 4U1UN, CY9, CY0, FP, VE1/VY2, VO1, the portion of VE2 Quebec south of the 50th parallel, VP9, W1, W2, W3, and the W4 states of Florida, Georgia, South Carolina, North Carolina, Virginia, and the W8 state of West Virginia.

Zone 6. Southern Zone of North America: XE/XF, XF4 (Revilla Gigedo).

Zone 7. Central American Zone: FO (Clipperton), HK0 (San Andres), HP, HR, TG, TI, TI9, V3, YN, and YS.

Zone 8. West Indies Zone: C6, CO, FG, FJ, FM, FS, HH, HI, J3, J6, J7, J8, KG4 (Guantanamo), KP1, KP2, KP4, KP5, PJ (Saba, St. Maarten, St. Eustatius), V2, V4, VP2, VP5, YV0 (Aves Is.), ZF, 6Y, and 8P.

Zone 9. Northern Zone of South America: FY, HK, HK0 (Malpelo), P4, PJ (Bonaire, Curacao), PZ, YV, 8R, and 9Y.

Zone 10. Western Zone of South America: CP, HC, HC8, and OA.

Zone 11. Central Zone of South America: PY, PY0, and ZP.

Zone 12. Southwest Zone of South America: 3Y (Peter I), CE, CE0 (Easter Is., Juan Fernandez Is., San Felix Is.), and some Antarctic stations.[2]

Zone 13. Southeast Zone of South America: CX, LU, VP8 Islands, and some Antarctic stations.[2]

Zone 14. Western Zone of Europe: C3, CT, CU, DL, EA, EA6, EI, F, G, GD, GI, GJ, GM, GU, GW, HB, HB0, LA, LX, ON, OY, OZ, PA, SM, Y2, ZB, 3A, and 4U1ITU.

Zone 15. Central European Zone: ES (UR), HA, HV, I, IS0, LY (UP), OE, OH, OH0, OJ0, OK, SP, T7, TK, UA2, YL (UQ), YU, ZA, 1A0, 9H.

Zone 16. Eastern Zone of Europe: UA1, UA3, UA4, UA6, UA9(S,W), UB, UC, UO, and 4J1 (M.V. Island).

Zone 17. Western Zone of Siberia: UA9(A,C,F,G,J,K,L,M,Q,X) and UH, UI, UJ, UL, and UM.

Zone 18. Central Siberian Zone: UA8(T,V), UA9(H,O,U,V,Y,Z), and UA0(A,B,H,S,U,W).

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[1] *The Two-Way CW Award is a new addition to the WAZ Program. Previously all Mixed WAZ Awards were numbered consecutively, with ALL CW noted. This practice will continue for mixed mode applications. In addition, a new WAZ Award is being announced. Beginning January 1, 1991, the ALL CW WAZ Award will be issued. This is a new award, and certificate numbers will start with number 1. To qualify, the QSL card from each zone must indicate a contact on two-way CW and must be dated after January 1, 1991.*

Revolutionary NEW . . .

MFJ SWR Analyzer

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 sooooo 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 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.

You can check the SWR of the input to your linear amplifier.

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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Super Value: Several Instruments in One

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'' x2¼''.

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

$89.95 NEW

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.

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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.

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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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CIRCLE 158 ON READER SERVICE CARD

Zone 19. Eastern Siberian Zone: UA0 (C,D,F,I,J,K,L,Q,X,Z).

Zone 20. Balkan Zone: JY, LZ, OD, SV, TA, YK, YO, ZC4, 4X and 5B.

Zone 21. Southwestern Zone of Asia: A4, A6, A7, A9, AP, EP, HZ, UD, UF, UG, YA, YI, 4W, 7O, 9K, and J2/A (Abu Ail).

Zone 22. Southern Zone of Asia: A5, S2, VU, VU (Laccadive Is.), 4S, 8Q and 9N.

Zone 23. Central Zone of Asia: JT, UA0Y, BY3G-L, BY9A-L, BY9T-Z, and BY0.

Zone 24. Eastern Zone of Asia: BV, BY1, BY2, BY3A-F, BY3M-S, BY3T-Z, BY4, BY5, BY6, BY7, BY8, BY9M-S, VS6, and XX.

Zone 25. Japanese Zone: HL and JA.

Zone 26. Southeastern Zone of Asia: HS, VU (Andaman and Nicobar Islands), XV, XU, XW, XZ, and 1S (Spratly Islands).

Zone 27. Philippine Zone: DU (Philippines), JD1 (Minami Torishima), JD1 (Ogasawara), KC6 (Republic of Belau), KH2 (Guam), KH0 (Marianas Is.), V6 (Fed. States of Micronesia).

Zone 28. Indonesian Zone: H4, P2, V8, YB, 9M, and 9V.

Zone 29. Western Zone of Australia: VK6, VK8, VK9X (Christmas Is.), VK9Y (Cocos-Keeling Is.), and some Antarctic stations.[2]

Zone 30. Eastern Zone of Australia: VK1–VK5, VK7, VK9L (Lord Howe Is.), VK9 (Willis Is.), VK9 (Mellish Reef), VK0 (Macquarie Is.) and some Antarctic stations.[2]

Zone 31. Central Pacific Zone: C2, FO (Marquises), KH1, KH3, KH4, KH5, KH6, KH7, KH9, T2, T3, V7, and ZK3.

Zone 32. New Zealand Zone: A3, FK, FO (except Marquises and Clipperton), FW, KH8, VK9 (Norfolk Is.), VR6, YJ, ZK1, ZK2, ZL, 3D2, 5W, and some Antarctic stations.[2]

Zone 33. Northwestern Zone of Africa: CN, CT3, EA8, EA9, IG9, IH9 (Pantelleria Is.), S0, 3V, and 7X.

Zone 34. Northeastern Zone of Africa: ST, ST0, SU, and 5A.

Zone 35. Central Zone of Africa: C5, D4, EL, J5, TU, TY, TZ, XT, 3X, 5N, 5T, 5U, 5V, 6W, 9G, and 9L.

Zone 36. Equatorial Zone of Africa: D2, TJ, TL, TN, S9, TR, TT, ZD7, ZD8, 3C, 9J, 9Q, 9U, and 9X.

Zone 37. Eastern Zone of Africa: C9, ET, J2, T5, 5H, 5X, 5Z, and 7Q.

Zone 38. South African Zone: A2, ZD9, Z2, ZS1-9, 3DA0, 3Y (Bouvet Is.), 7P, and some Antarctic stations.[2]

Zone 39. Madagascar Zone: D6, FT-W, FT-X, FT-Z, FH, FR, S7, VQ9, 3B6/7, 3B8, 3B9, 5R8, and some Antartic stations.[2]

Zone 40. North Atlantic Zone: JW, JX, OX, TF, and 4K2 (Franz Josef Land.)

Single Band WAZ

Special WAZ Awards will be issued to amateur radio stations presenting proof of contact with the 40 zones of the world on *one* of the bands: 80, 40, 20, 15, 10. Contacts for a single band WAZ must have been made after January 1, 1973. Single band certificates will be awarded for ALL SSB or for ALL CW only.

5 Band WAZ

Applicants who succeed in presenting proof of contact with the 40 zones of the world on the 80, 40, 20, 15, and 10 meter bands (for a total of 200) receive a special certificate in recognition of this achievement. A prerequisite for 5 Band WAZ is that the applicant must already be a holder of any 40-zone WAZ.

The 5 Band WAZ Award is offered for any combination of CW, SSB, RTTY, or other mode contact, mixed mode only. Separate awards will not be offered for the different modes. Contacts must have been made after 0000Z January 1, 1979. Proof of contact shall consist only of QSL cards checked by the WAZ Manager, and all provisions of Rule 5 of the WAZ rules are strictly enforced. The first plateau is a total of 150 zones on a combination of 5 bands. Applicants should use a separate sheet for each band, using CQ form 1479 or a facsimile.

After the 150 zone point, each 10 zones requires the submission of the QSL cards and a $1.00 fee. At the 200 zone point the applicant will be awarded a gold sticker for the certificate and the opportunity to purchase a hand-engraved plaque to commemorate the achievement.

All applications should be sent to the WAZ Award Manager. The 5 Band Award is governed by the same rules as the regular WAZ Award and uses the same boundaries.

WARC Bands WAZ

Effective January 1, 1991 single band WAZ Awards will be issued to amateur radio stations presenting proof of contact with the 40 zones of the world on any *one* of the WARC bands: 30, 17, or 12 meters. (Each band constitutes a separate award, and each may be applied for separately.) This award is available for MIXED MODE, ALL SSB, ALL CW, or ALL RTTY. Contacts for each one of these WARC WAZ Awards must have been made after each station involved in the contact had permission from its licensing authority to operate on the band and mode.

RTTY WAZ

Special WAZ Awards are issued to amateur radio stations presenting proof of contact with the 40 zones of the world using RTTY. For the mixed band award QSL cards must show a date of November 15, 1945 or later. The RTTY WAZ is also available with a single band endorsement. For a single band endorsement for 80, 40, 20, 15, or 10 meters the QSL cards must show a date of January 1, 1973 or later.

WNZ

WNZ stands for "Worked Novice Zones" and is available *only* to holders of a U.S. Novice or Technician class license. Proof of contact with at least 25 of the 40 CQ zones as defined by the WAZ rules is required. All contacts must be made using the 80, 40, 15, and 10 meter Novice bands. All contacts must be made while holding a Novice or Technician class license, although the application may be submitted at a later date. Contacts must be made prior to receiving authorization to operate with higher class privileges. The WNZ is available as a MIXED MODE, CW ONLY, or SSB ONLY award. It may also be endorsed for a single band. The WNZ Award may be used to fulfill part of the application requirement for the WAZ Award when all 40 zones are confirmed.

1. The basic award may be secured by submitting QSL cards for 25 zones. The processing fee is *$5.00* for all applicants.
2. All QSL cards must show a date of January 1, 1952 or later.
3. Use CQ Form 1479 or a facsimile to make application for this award.

160 Meter WAZ

The WAZ Award for 160 Meters requires that the applicant submit directly to the WAZ Manager QSL cards from at least 30 zones. All QSL cards must be dated January 1, 1975 or later, and a *$5.00* application fee must accompany all applications. The 160 WAZ is a mixed mode award only. The basic 160 WAZ Award may be secured by submitting QSL cards from 30 zones. Stickers for 35, 36, 37, 38, 39, and 40 zones may be secured from the WAZ Manager upon the submission of the QSL cards and $2.00 for each sticker.

Satellite WAZ

The Satellite WAZ Award is issued to amateur radio stations submitting proof of contact with all 40 CQ zones through any amateur radio satellite. The award is available for MIXED MODE only. All QSL cards must show a date of January 1, 1989 or later.

The WPX Awards Program

The CQ WPX Award recognizes the accomplishments of confirmed QSOs with the many prefixes used by amateurs throughout the world. Separate, distinctively marked certificates are available for 2× SSB, CW, and Mixed modes, as well as the VPX Award for shortwave listeners and the WPNX Award for Novices.

1. Applications

A. All applications for WPX certificates (and endorsements) must be submitted on the official application form (CQ 1051A). This form can be obtained by sending a self-addressed, stamped, business-size (4 × 9 inch) envelope to the WPX Award Manager, Norm Koch, K6ZDL, 880, CR13, Clovis, NM 88101.

B. All QSOs must be made from the same country.

C. All call letters must be in strict alphabetical order and the entire call letters must be shown.

D. All entries must be clearly legible.

E. Certificates are issued for the following modes and number of prefixes. Cross-mode QSOs are not valid for the CW or 2× SSB certificates. Mixed (any mode): 400 prefixes confirmed. CW: 300 prefixes confirmed. 2× SSB: 300 prefixes confirmed. Separate applications are required for each mode.

F. Cards need not be sent, but they must be in the possession of the applicant. Any and all cards may be requested by the WPX Award Manager or by the CQ DX Committee.

G. The application fee for each certificate is $4.00 for *CQ* subscribers (subscribers must include a recent *CQ* mailing label) and $10.00 for nonsubscribers, or the equivalent in IRCs.

H. All applications and endorsement requests should be sent to the WPX Award Manager.

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[2]Antarctic notes. The boundaries of CQ zones 12, 13, 29, 30, 32, 38, and 39 converge at the South Pole. Stations KC4AAA and KC4USN are at the South Pole, and will count for any one of the listed zones. Most Antarctic stations indicate their zone on the QSL card. A few stations and their zones are: 4K1A 39, 4K1B 29, 4K1C 29, 4K1D 38, 4K1E 29, 4K1F 13, 4K1G 30, 4K1H 32, 4K1J 13, 8J1RL 39, CE9 13, DP0 38, FT-Y 30, HF0POL 13, HL5BDS 13, KC4AAC 13, KC4AAD 13, KC4AAE 29, KC4USB 32, KC4USV 30, LU-Z 13, VK0GM 29, VP8ME 38, Y38ANT 38, and ZL5AA 30. This list changes frequently. Questions regarding the zone location of a particular Antarctic station should be directed to the WAZ Award Manager.

2. Endorsements

A. Prefix endorsements are issued for each 50 additional prefixes submitted.

B. Band endorsements are available for working the following numbers of prefixes on the various bands: 1.8 MHz—50, 3.5 MHz—175, 7 MHz—250, 14 MHz—300, 21 MHz—300, 28 MHz—300.

C. Continental endorsements are given for working the following numbers of prefixes in the respective continents: North America 160, South America 95, Europe 160, Africa 90, Asia 75, and Oceania 60.

D. Endorsement applications must be submitted on CQ form 1051A. Use separate applications for each mode and be sure to specify the mode of your endorsement application.

E. For prefix endorsements list only additional call letters confirmed since the last endorsement application.

F. A self-addressed, stamped envelope or proper IRCs for surface or airmail return is required, and $1.00 or 5 IRCs for *each* endorsement sticker.

3. Prefixes

A. The letter/numeral combinations which form the first part of the amateur call will be considered the prefix. Examples: K6, N6, Y22, Y23, WD4, HG1, HG19, WB2, WB200, KC2, KC200, OE2, OE25, U3, GB75, ZS66, NG84, etc. Any difference in the numbering, lettering, or order of same shall constitute a separate prefix.

B. Any prefix will be considered legitimate if its use was licensed or permitted by the governing authority in the country of operation after November 15, 1945.

C. In cases of portable operation in another country or call area, the portable designator would then become the prefix. Example: K6ZDL/7 would count as K7, J6/K6ZDL would count as J6, KH6/K6ZDL would count as KH6, etc. Portable designators without numbers will be assigned a zero (Ø) at the end of the designator to form the prefix. Example: LX/K6ZDL would count as LXØ. When claiming a prefix which has been sent as K6ZDL/XV5, for example, and you are claiming the XV5 for credit, it is requested that the *claimed prefix* be listed in the proper alphabetical position, such as XV5/K6ZDL, if for XV5; or K6ZDL/XV5 if for K6. The portable prefix must be an authorized prefix of the country/area of operation. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes.

D. All calls without numbers will be assigned a zero (Ø) plus the first two letters to form a prefix. Examples: XEFTJW would count as XEØ, RAEM would count as RAØ, AIR as AIØ, etc.

VPX

The VPX (Verified Prefixes) Award can be earned by shortwave listeners (SWLs) who possess QSL cards confirming reception of at least 300 different amateur prefixes. No mode endorsements are available. Applications must be submitted to the WPX Award Manager in accordance with the WPX rules.

WPNX

The WPNX Award can be earned by USA Novices who work 100 different prefixes prior to receiving a higher class license. The application may be submitted after receiving the higher license, providing the actual contacts were made as a Novice. Prefixes worked for the WPNX Award may be used later for credit toward the WPX Award.

The rules for the WPNX Award are the same as for the WPX Award except that only 100 prefixes must be confirmed. Applications are to be sent to the WPX Award Manager.

WPX Honor Roll

The WPX Honor Roll recognizes the operators and stations that maintain a high standing in confirmed, current prefixes. The rules, therefore, reflect the belief that Honor Roll membership should be accessible to all active radio amateurs and not be unduly advantageous to the "old timers." With the exceptions listed below, all general rules for WPX apply toward Honor Roll credit.

A minimum of 600 prefixes is required to be eligible for the WPX Honor Roll. No certificates are issued, but a listing of members appears in *CQ* every other month.

A. Only current prefixes will be counted toward the WPX Honor Roll standings. A list of prefixes to be deleted from the Honor Roll is published annually in *CQ* and is available from the WPX Award Manager. Prefixes will be deleted from the Honor Roll listing two years after they are no longer authorized for use by the governing authority or by the ITU.

B. Special-issue prefixes (i.e., OF, OS, 4A, etc.) will be considered current for as long as they are assigned to a particular country and deducted as credit for Honor Roll standings after cessation of their use or assignment.

C. Honor Roll applicants must submit their list of current prefixes (entire call required) separate from their regular WPX applications. Use regular form 1051 and indicate "Honor Roll" at the top of the form. Forms may be obtained by sending a business-size, self-addressed, stamped envelope or 1 IRC (foreign stations send extra postage or IRC if airmail desired) to the WPX Award Manager. A separate application must be made for each mode. Lifetime Honor Roll fee *for each mode* is $4.00. A computer printout of your individual Honor Roll file may be obtained from the WPX Award Manager for $5.00.

D. Endorsements for the Honor Roll may be made for 10 or more prefixes. An SASE or IRC should be included. For prefixes by countries see the Callbook listings.

WPX Award of Excellence

This is the ultimate award for the prefix DXer. The requirements are 1000 prefixes Mixed mode, 600 prefixes SSB, 600 prefixes CW, all 6 continental endorsements, and the 5 band endorsements 80–10 meters. A special 160 meter endorsement bar is also available.

The WPX Award of Excellence plaque fee is $60.00. The 160 meter bar is $5.25.

The CQ DX Awards Program

1. The CQ DX Award is issued in three categories. The CQ DX CW Award is issued to an amateur radio station submitting proof of contact with 100 or more countries. The CQ DX SSB Award is issued to an amateur radio station submitting proof of contact with 100 or more countries. The CQ DX RTTY Award is issued to an amateur radio station submitting proof of contact with 100 countries using two-way RTTY. Applications should be submitted on the official CQ DX Award application (form 1067B). Reasonable facsimiles or computer printouts are also acceptable.

2. All contacts must be two-way in the mode for which the application is made. Cross-mode or one-way contacts are not valid. QSLs must be listed in alphanumeric order (A to Z and 1 to Ø) by prefix. All contacts must have been made after November 15, 1945. Deleted countries do not count. Only currently active countries are acceptable.

3. QSL cards must be verified by one of the authorized check points for the CQ DX Awards, or must be included with the application. Return postage must be included.

4. Country endorsement stickers are issued for 150, 200, 250, 275, 300, 310, and 320 active countries. A fee of $1.00 per application (where stickers are issued) is charged.

5. Special endorsements, as follows, are available for a fee of $1.00 each:

(a) 28 MHz endorsement—for 100 or more countries confirmed in the 10 meter band.

(b) 3.5/7 MHz endorsement—for 100 or more countries confirmed using any combination of the 40 and 80 meter bands.

(c) 1.8 MHz endorsement—for 50 or more countries confirmed using the 160 meter band.

(d) QRPp endorsement—for 50 or more countries confirmed using 5 watts output or less.

(e) Mobile endorsement—for 50 or more countries confirmed with the applicant operating mobile.

(f) Slow Scan TV endorsement—for 50 or more countries confirmed using two-way SSTV.

(g) OSCAR endorsement—for 50 or more countries confirmed via amateur satellite.

6. Any altered or forged confirmations will result in permanent disqualification of the applicant.

7. Fair play and good sportsmanship in operating are required for all amateurs working toward CQ DX Awards. Continued use of poor ethics will result in disqualification of the applicant.

8. A fee of $4.00 is required for *CQ* subscribers applying for a CQ DX Award certificate. The latest *CQ* mailing label must be attached for the subscriber discount. For nonsubscribers the certificate fee is $10.00. IRCs are acceptable in lieu of check or cash.

9. The ARRL DXCC country list constitutes the basis for CQ DX Award country status. Deleted countries *are not* valid for the CQ DX Award. As a country is deleted, country totals of applicants are automatically adjusted accordingly.

10. All contacts must be with land-based amateur stations working within authorized amateur bands. Contacts with ships and aircraft are not acceptable.

11. Decisions of the CQ DX Awards Manager shall be final.

CQ DX Honor Roll

12. The CQ DX Honor Roll lists all stations with a total of 275 or more active countries.

13. Separate Honor Rolls are maintained for SSB and CW. To remain on the Honor Roll, a station must update his or her totals at least once per year. Updates indicating "no change" are acceptable to meet this requirement.

14. Short-form country checklists are available for 50 cents plus an SASE. These may be ordered only from the CQ DX Award Manager.

15. An audit sheet showing countries needed by an Honor Roll member is available for

$2.00 plus an SASE for each mode. These are available from the CQ DX Award Manager.

16. All checks must be made payable to B. F. Williams. Applications should be sent to Billy Williams, N4UF, CQ DX Awards Manager, P.O. Box 9673, Jacksonville, FL 32208.

USA-CA Award Program

The United States of America Counties Award sponsored by *CQ* is issued for confirmed two-way radio contacts with specified numbers of U.S. counties under rules and conditions hereafter stated.

A. Award Classes

The USA-CA Award is issued in seven different classes, each a separate achievement as endorsed on the basic certificate by use of special seals for higher class. Also, special endorsements are made for all one band or mode operations subject to the rules.

Class	Counties Required	States Required
USA-500	500	any
USA-1000	1000	25
USA-1500	1500	45
USA-2000	2000	50
USA-2500	2500	50
USA-3000	3000	50

USA 3076-CA for ALL counties and Special Honors Plaque $40.00

B. Conditions

1. USA-CA is available to all licensed amateurs everywhere in the world and is issued to them as individuals for all county contacts made, regardless of calls held, operating QTHs, or dates.

Special USA-CA Awards are also available to SWLs on a heard basis.

2. All contacts must be confirmed by QSL, and such QSLs must be in the applicant's possession for identification by certification officials.

3. Any QSL card found to be altered in any way disqualifies the applicant.

4. QSOs via repeaters, satellites, moon bounce, and phone patches are **not** valid for USA-CA.

5. So-called "team" contacts, wherein one person acknowledges a signal report and another returns a signal report, while both amateur callsigns are logged, are **not** valid for USA-CA. Acceptable contact can be made with only one station at a time.

C. County Identity

1. Unless otherwise indicated on QSL cards, the QTH printed on cards will determine county identity.

2. The National Zip Code & Directory of Post Offices will be helpful in some cases in determining identity of counties of contact as ascertained by name or nearest municipality. Publication No. 65 is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 039-000-00264-7, shipped one, to U.S.A. or Canada.

3. For mobile and portable operations the postmark shall identify the county unless information stated on QSL cards makes other positive identity.

4. In the case of cities, parks, or reservations not within counties proper, applicants may claim any one of the adjoining counties for credit (once).

5. QSOs via repeaters, satellites, moon bounce, and phone patches are *not* valid for USA-CA.

D. Administration of USA-CA Program

1. The USA-CA program is administered by a *CQ* staff member acting as USA-CA Custodian, and all applications and related correspondence should be sent directly to this person's QTH.

2. Decisions of the Custodian in administering these rules and their interpretation, including future amendments, are final.

E. Record Book and Bookkeeping

1. The scope of the USA-CA Award makes it mandatory that special Record Books be used for application. For this purpose, *CQ* has provided a 64-page 4¼" × 11" Record Book which contains application and certification forms and provides record-log space meeting the conditions of any class award and/or endorsement requested.

2. A completed USA-CA Record Book constitutes the medium of basic application and becomes the property of *CQ* for record purposes. On subsequent applications for either higher classes or for special endorsements, the applicant may use additional Record Books to list required data, or he or she may make up alphabetical lists conforming to requirements.

3. Record Books are to be obtained directly from CQ, 76 North Broadway, Hicksville, NY 11801, for $1.25 each. We recommend that two be obtained—one for application use and one for a personal file copy.

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1. Make Record Book entries necessary for county identity and enter other log data necessary to satisfy any special endorsements (band/mode) requested.

2. Have the certification form provided signed by two licensed amateurs (General Class or higher) or an official of a national-level radio organization or affiliated club verifying that QSL cards for all contacts as listed have been seen. The USA-CA Custodian reserves the right to request any specific cards to satisfy any doubt whatsoever. In such cases the applicant should send sufficient postage for the return of cards by registered mail.

3. Send the *original* completed Record Book (*not* a copy) and certification forms and handling fee. Fee for *CQ* subscribers is $4.00 or 12 IRCs (subscribers must include a recent *CQ* mailing label), and for nonsubscribers it is $10.00 or 40 IRCs. Send to Dorothy Johnson, WB9RCY, 333 South Lincoln Avenue, Mundelein, IL 60060. For later applications for higher class seals, send Record Book or self-prepared list per rules and $1.25 or 6 IRCs handling charge. For application for later special endorsements (band/mode) where certificates must be returned for endorsement, send certificate and $1.50 or 8 IRCs for handling charges. *Note:* At the time any USA-CA Award certificate is being processed, there are no charges other than the basic fee, regardless of the number of endorsements or seals; likewise, one may skip lower classes of USA-CA and get higher classes without losing any lower awards credits or paying any fee for them. *Also note:* IRCs are *not* accepted from U.S. stations.

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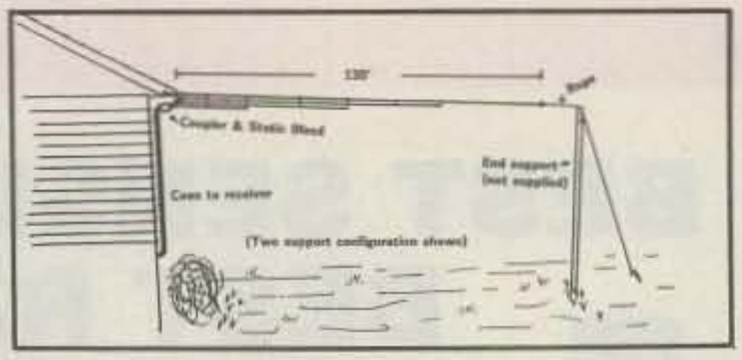


Electron Processing Optimized Wire Antenna

Electron Processing has announced a short-wave wire antenna, the MULTIWIRE-4, at 130 feet long. The MULTIWIRE-4 covers all SWL bands from 0.5 MHz to 30 MHz and is comprised primarily of four wire elements of different lengths joined together at the feed point in a compact coupling box. The antenna can be installed in numerous configurations requiring from two to five supports. It is supplied with all hardware required for most installations, including 50 feet of coax feedline, 100 feet of support rope, and a static bleed built into the coupling box. (Specify connector desired for cable end or receiver type. End supports are not included.)

The MULTIWIRE-4 is priced at $100 (plus $5 shipping/handling). For additional information, contact Electron Processing, Inc., P.O. Box 68, Cedar, MI 49621 (616-228-7020), or circle number 106 on the reader service card.

Henry Radio 3K Ultra Communications Amplifier

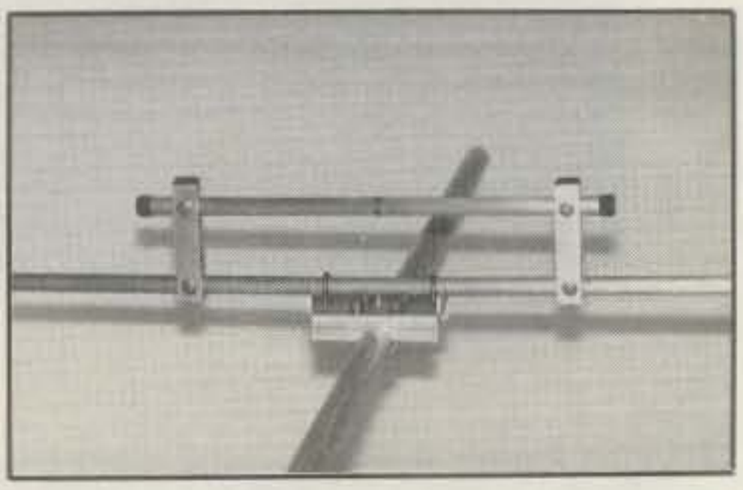
The 3K Ultra begins a new line of amplifiers from Henry Radio offering a console power amplifier with a remote, desk-top control cabinet. The noise of the amplifier can be moved away from the operating position, with just the silent control cabinet next to the transceiver. An option with the Ultra line is five programmable memory positions for five commonly used frequencies. The amplifier offers general-coverage operation from 1.8 to 30 MHz with a nominal output power of 1500 watts PEP.

Other features include Bird power measuring equipment, a heavy-duty variable inductor in the tank circuit, broad toroid tuned input network, and more. For more information, contact Henry Radio, Inc., 2050 South Bundy Drive, Los Angeles, CA 90025 (213-820-1234), or circle number 103 on the reader service card.

Yaesu 2 Meter Mobile Transceiver

Yaesu has introduced the FT-2400 heavy-duty 2 meter mobile transceiver. The one-piece die-cast chassis and extra large heat sink contribute to the unit's durable construction. Three-step user-selectable power output provides up to 50 watts without forced-air cooling. Thirty-one freely tunable memories can each be programmed with four-character channel names, then displayed in place of frequency and toggled, as desired. Each memory offers complete programmability and scanning functions.

Optional accessories available include CTCSS decode unit (FTS-17A), paging unit (FRC-6), and external speaker (SP-7). Suggested retail price of the FT-2400 is $419 and includes built-in CTCSS encode and backlit DTMF microphone with modular design plug. For more information, contact Yaesu U.S.A., 17210 Edwards Road, Cerritos, CA 90701, or circle number 101 on the reader service card.



New Yagi Feed System From Ham-Pro Antennas

The Balanced Double Gamma Feed from Ham-Pro produces high gain, a perfect radiation pattern, and excellent impedance matching, manufacturer says. The mechanism is used in the firm's HF and VHF monobanders. The new balanced double gamma radiates only the classic cosine figure-8 pattern, according to range measurements. The natural balun supplies both sides of a grounded driven element, through a rectangular loop, at its mechanical and electrical center, with equal power, regardless of the frequency. Extremely quiet reception is assured and RFI and TVI are greatly reduced, Ham-Pro says.

Complete data sheets on Ham-Pro's monobander beams utilizing this new feed system are available. For more information, contact Ham-Pro Antennas, div. of Kopps Corp., 1236 40th Ave., Sacramento, CA 95822 (1-800-879-7569), or circle number 105 on the reader service card.

Does it work? How strong is it? These questions can be theoretical, and how strong something is rarely gets tested. KC4KLS tells us about one idea that got action-tested in a big hurry.

A Useful Mast Design That Really Works

BY TRIP NEISLER*, KC4KLS

September 22, 1989 is a date etched into my memory. It's a day I'll never forget, and neither will millions of others who live in the southeastern United States—especially those in the Piedmont and coastal areas of South and North Carolina. That was the day hurricane *Hugo* came ashore at Charleston, South Carolina after agonizingly pausing over the warm Atlantic rebuilding strength lost during its destructive Caribbean passage. *Hugo* wrecked Charleston and then stomped inland, knocking down everything that was weak and plenty of things that weren't.

I have no trouble remembering the exact time *Hugo* visited the small town of Kings Mountain near Charlotte, North Carolina. It was 0350 EDT, ten to four in the morning, when electric power blinked a few times and then went out to stay. Whenever I glanced at an electric clock for the next few days, that was the time displayed. Hard to forget, right?

Hugo was still classified as a hurricane when it passed through the Charlotte area, more than 200 miles from the coast, packing winds of 88 miles per hour. My somewhat old-fashioned swinging garage doors, secured with a hasp and padlock, somehow opened to flap wildly in the wind and rain. During a brief lull in the storm I examined the hasp. Its screws had pulled out. Everywhere huge old oaks and other trees fell, knocking down utility poles and power lines. Shingles, whole roofs, garbage cans, and even metal outbuildings blew away. Verticals, dipoles, longwires, and normally sturdy towers with well-mounted antennas tumbled down.

I was lucky. After the storm passed I found that my home was okay and the three lonely trees at the back of my lot had been stronger than *Hugo*. And unbelievably, my two wire HF antennas—strung across the backyard with one end tied off in the trees and the center and other end supported by homebrew masts—were virtually undisturbed. The ends tied in the trees had gotten a bit loose, but the elements were intact. A minute or two spent taking up the slack and I was ready to tune in the nets forming on 80, 40, and 20 meters using a recently charged spare boat battery to power my Kenwood TS-140S.

At the height of the storm I'd watched in amazement while my masts swayed in the violent wind gusts. More than once I was certain the masts would break as they approached and perhaps passed a 45 degree angle, only to snap back easily.

I'll bet you're thinking, "What's all this about 45 degree angles and snapping back?" You might even think, "Huh? No mast I've ever heard of can do that!" Until I read Edward M. Noll's book *Easy-Up Antennas for Radio Listeners and Hams*, first edition published by Howard W. Sams & Company in 1988, I'd have had the same thoughts.

In his easy-to-read and understand book, Mr. Noll suggests assembling lightweight masts from standard PVC drain pipe. The mast is nothing more than a 10 foot section of 1½ inch ID PVC pipe telescoped and bolted into a 10 foot section of 2 inch ID PVC pipe. Lowering this almost 20 foot tall mast over a standard steel fence post, or even a length of steel pipe driven securely into the ground, completes the job. A through bolt a couple of feet or so from the bottom of the mast can give some additional height by preventing the mast from sliding all the way down to the ground. An eyebolt or two at the top supplies a means to raise and lower the antenna with a light line, plus a place to guy from if needed. One person can, with some difficulty, erect and lower one of these masts, making antenna work much easier, if not exactly a pleasure.

With a single guy for each mast, just to keep everything vertical, my antennas survived *Hugo*. The PVC pipe's ability to flex without permanently bending or breaking is remarkable. It seems to me that the cost of PVC pipe should be much less than that of many prefabricated metallic masts.

Mast ideas that work are only part of the practical information I found in the book. A hurricane-resistant mast? Who ever would have thought it possible? CQ

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WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

WARC Bands Revisited

How would you rate your on-the-air enjoyment of our great hobby at the present time? If it is less than 11 on a scale of 1 to 10, now is the perfect time for a refreshing change of pace. No, I am not suggesting going for a new multi-kilobuck station (although the idea is always appealing!), but I am suggesting joining the fun on our WARC bands with your existing setup or an alternate rig. The WARCs have come up beautifully during recent months, and they are blowing wide open with good DX today. In fact, most WARC band operators are having such fun they seldom pause to share their enthusiasm with others. That is why we are revisiting the WARCs this month: to give you an inside view of these relatively new and fascinating bands and discuss WARCing with older rigs as a special treat.

What are the WARCs' special attractions? They are located in optimum areas of the HF spectrum, and good "getaways" from big weekend contests, and they are ideal for recapturing the romance of your first days in amateur radio. Remember when basic-style rigs and simple antennas were the rule rather than the exception, and meaningful QSOs rather than signal report exchanges were common? Remember when building and using unique antennas, mobiling, and operating QRP were impressive personal achievements? Those same basic thrills (and more!) continue to be alive and well on today's WARC bands!

Say you have briefly tuned across the 30, 17, or 12 meter WARC bands, but noticed only miniscule activity? That is understandable, especially if you were in a hurry and used a triband beam antenna. The bands are often open but quiet. A single CQ and QSO start a chain reaction, and activities flourish within a few minutes. Hearing one or two stations, you may try loading your triband beam on a WARC band (and a low SWR may be achieved with a good tuner), but it is little more than an outdoor attenuator on the WARCs. I have realized better results using the metal frame on my bed as an antenna. Honest! Use a decent antenna, vary your operating times, and you will soon be having a ball on the WARCs.

4941 Scenic View Drive, Birmingham, AL 35210

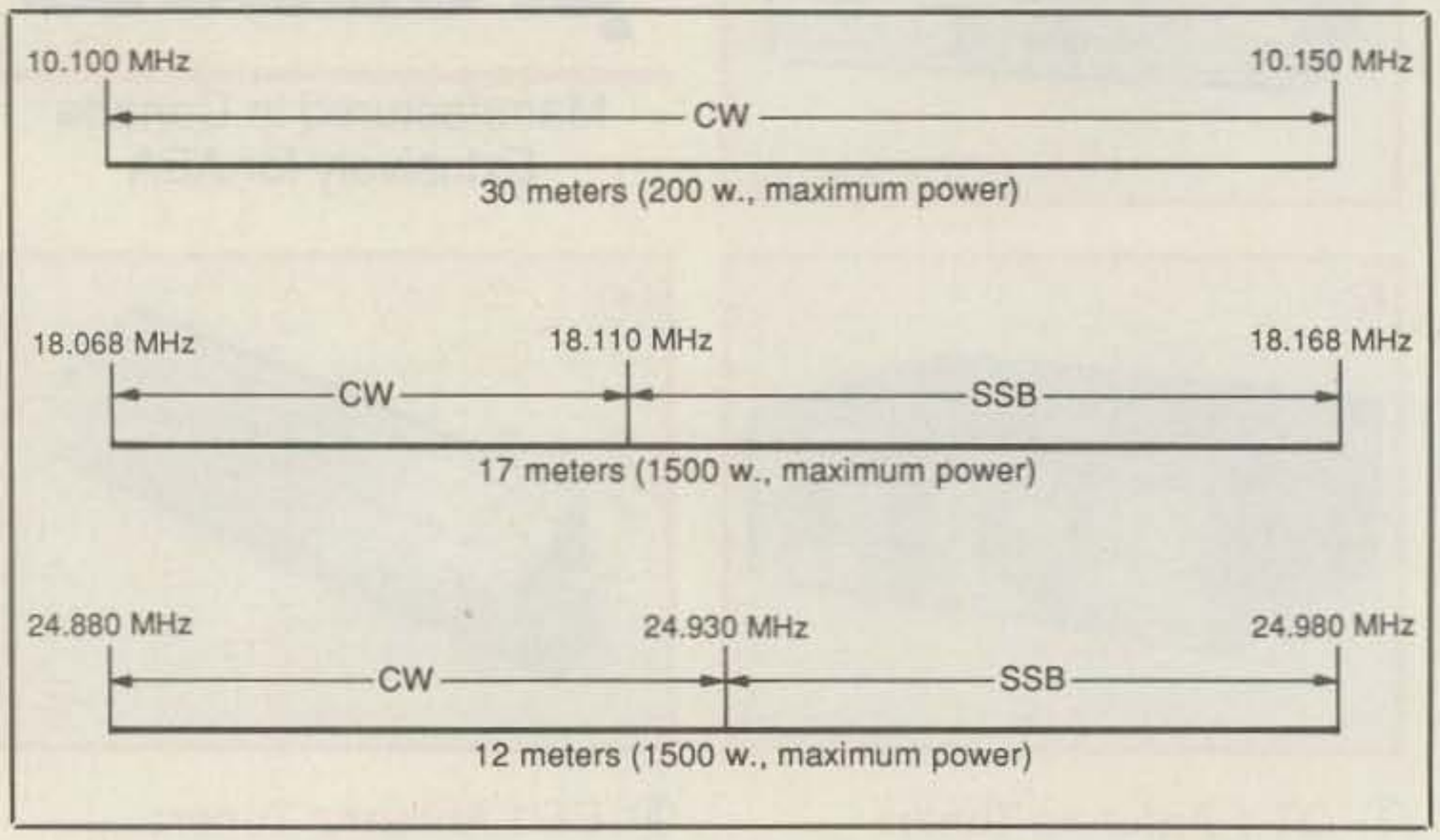


Fig. 1– Frequency and mode allocations for the HF WARC bands.

The Bands

Let's now expand those thoughts with a brief overview of each WARC band and some thought-whetting ideas on rigs and antennas to add extra enjoyment.

Sunspot Cycle 22 is really favoring the WARCs, and relatively mild US activity (compared to 40, 20, or 10 meters) makes DXing a blast. The key to working this DX is using earphones, increasing your receiver gain, and concentrating on signals below the S5 level. If a band seems flat, divert your attention to household chores and recheck it an hour later. Use that approach for a couple of weeks and you too will become a genuine "Wild WARCer."

Although 30 meters is our "oldest" WARC band, it continues to be the most exciting. Thirty is open for stateside QSOs almost continuously, but you will notice propagation lulls around noon and between 1 and 3 AM your local time. You may also need to dodge commercial QRM by operating in the upper half of 30 meters during early evening hours. European and South American areas usually roll into the US on 30 between 0000 and 0600 GMT, South Pacific and Far East areas come through between 1000 and 1300 GMT, and surprise DX openings often occur around 2000 GMT. What are surprise openings? Europe comes through unexpectedly after noon, then during spring and fall equinox long-path openings into VK, ZL, etc., occur at that same time. How long has it been since you enjoyed long-path contacts while using a 50 watt rig and dipole? Is that not a good incentive to check out 30 meters?

Seventeen meters is another outstanding band for both local and DX contacts. Since it is located between 20 and 15 meters, propagation is a "cross" of those two bands. Stateside QSOs on both SSB and CW flourish from mid-morning until late evening, European areas come in between 1300 and 1600 GMT, and Pacific areas come through from 2000 until 0300 GMT—or later! Casual conversations and mobile operations on both SSB and CW are prime interests on 17 meters. Although 1500 watts is the power limit on this band, most operators use barefoot transceivers. An increasing number of amateurs are using 17 meter beams, but the usual antennas are verticals, G5RVs, and random wires.

If you like 10 meters, you will love our 12 meter WARC band. Low-power signals "get out" like gangbusters, and 100 watt transceivers with vertical antennas work the world. The general atmosphere on 12

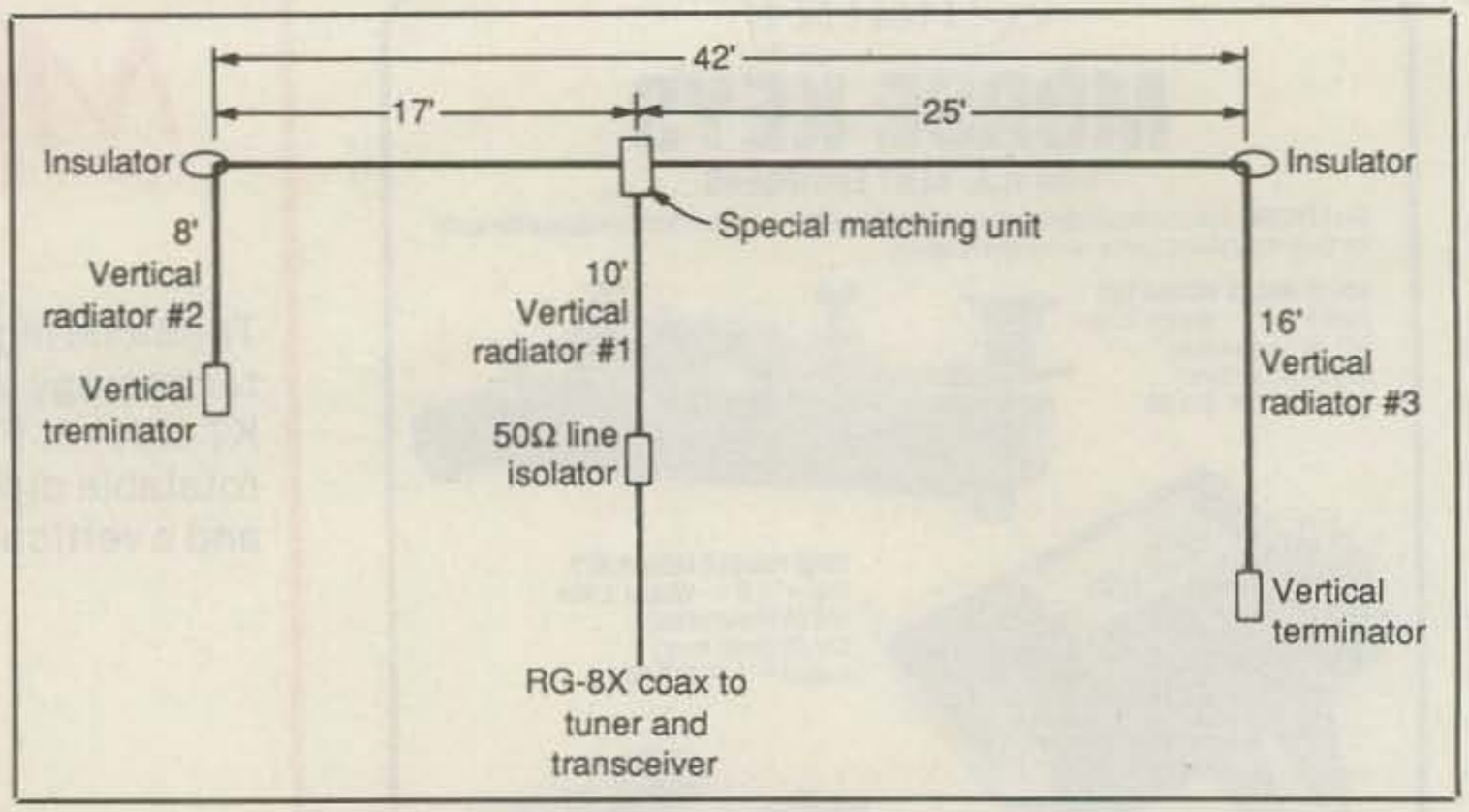


Fig. 2– Outline of The Radio Works new "Carolina Beam" wire antenna. Discussion of this modified Carolina Windom is in the text.

meters is friendly and relaxed, with plenty of good DXing from band edge to band edge. Twelve meter propagation resembles that of 10 meters, with eastern/European areas coming through during morning hours and western/Pacific areas taking their place until the band folds at night.

I recently ran some WARC band tests to ensure this column's description was accurate. Here are the (very) condensed results. While running 20 watts to a dipole on 30 meters, every CQ was answered, and every DX call was successful. That included YBØ, FO8, YJ8, UAØ, ZS5, and more. Using 100 watts and a vertical on 17 and 12 produced equally impressive results such as 3B8, VU2, UQ1, 7K1, several VKs and ZLs via long path, etc. Similar results were also obtained while mobiling with a 100 watt transceiver and 4 foot Outbacker whip. The WARCs are wonderful!

The Rigs

This open-ended area adds tremendous fun to working the WARCs, especially if you modify an older style rig for covering the new bands. Visualize, for example, hearing the beautiful vacuum-tube-type audio from a Collins KWM-2 transceiver on 12 or 17 meters where solid-state rigs

W9WHM's restored SP-600 receiver truly exemplifies how to enjoy the WARC bands in style. Visualize those soft amber dials at night. Beautiful indeed!

are dominant. Wow! Conversion of my own KWM-1 was a breeze: I simply added a new oscillator crystal, retuned the driver with its front-panel control (which also retuned the receiver), and reloaded the final. Other classic rigs such as Drake's TR-4 or National's NCX-5 also require "front end" changes such as moving 40, 15, and 10 meter coil taps for 30, 17, and 12 meters. However, you emerge with a unique and delightful piece of equipment. Add a little Johnson Courier linear amplifier, and you have a glamorous WARC band rig indeed!

Time sequence keying is another beautiful sound that has faded in the annals of time and deserves resurrection. Imagine operating 30 meters today with a famous T.S.-keyed Johnson Navigator transmitter. Your Morse would stand out like a Rolls Royce in a McDonald's drive-through! Add a classic Hammarlund receiver such as John Leary, W9WHM's restored Super Pro (shown in the photo), an authentic Johnson T/R switch and Speed-X bug, and you have an admirable station indeed.

If your interests lean more toward real nostalgia (bless you!), seek out and rework a Harvey Wells transmitter and National NC-98 receiver or Johnson Ranger and Hallicrafter SX-100 for the WARCs. Look at those red jeweled pilot lamps, big analog dials, and warm vacuum tubes glow. Isn't that romantic! Talk about a trip down memory lane!

Prefer QRP? Good idea, and 3 or 4 watts on the WARCs yields results comparable to running 100 watts on the other HF bands. Ninety-nine percent of the homebrew QRP rigs discussed in magazines are easily shifted from 40 meters to 30 meters by changing crystals and removing a few turns from their coils.

I recently worked AA4LL/QRP on 30 meters, and his modified Argonaut sounded great. Henry explained he modified this classic rig by changing 10 meter coverage to 30 meters as follows. First, 91 pFd capacitors were paralleled across each existing 10 pFd capacitor (C17 and C18) on each side of T7 on the 80262 board. T7 was then repeaked for maximum RF output. Next, C1 (10 pFd) connected between the 28 MHz tap of S3B (which goes to terminal S3B and T1 on the 80262 board) and ground was also paralleled with another 91 pFd capacitor. Finally, C7 (24 pFd) from the 28 MHz tap on S3D was shorted with a jumper and C8 (a 5–60 pFd variable between C7 and ground) was paralleled with a 47 pFd capacitor. The Argonaut's bandswitch was then placed in its 10 meter position to work 30 meters. This simple AA4LL mod works on both 509 and 515 series Argonauts.

The Antennas

This is another area of unlimited possibili-

ties, as any antenna performing comparable to a dipole radiates a good signal on the WARCs. Two high-performance wire antennas that work like champs on the WARCs are The Radio Works "Big Sig" (⅝ wave), Delta Loops, and new "Carolina beam." The Carolina Beam, illustrated in fig. 2, is a combination of The Radio Works' popular Carolina Windom and the famous Bobtail Array with an interesting twist. The off-center-fed Windom's balun-isolated feedline performs like an inverted vertical with its ground in the air, so the horizontal wires are dropped down to make a phased three-vertical system. Clever!

One version of the Carolina Beam is 84 feet long and works 80–10 meters. Another version is 42 feet long and works 40–10 meters. I used the automatic antenna tuner in my ICOM IC-761 with the "short Windom." A low SWR was achieved on all bands, and my first contact was BY4RB in China. Fantastic! Ready-to-install Carolina Windoms and beams are available from The Radio Works, Box 6159, Portsmouth, VA 23703.

Another unique WARC band antenna

AEA's brand-new version of the popular Isoloop antenna. This model is 43 inches in diameter and works all the WARC bands, plus 20, 15, and 10 meters. (Details in text.)

that is perfect for limited-space situations or portable operations is AEA's Isoloop 10–30 shown in the photo. This brand new model is 43 inches in diameter and works all WARCs: 30, 17, and 12, plus 20, 15, and 10 meters. Band selection is accomplished by a tuner built into the Isoloop's supporting black shroud. The tuner is adjusted by a small remote-control box that sits by your transceiver. AEA's new Isoloop is small enough to set up in an attic and/or slip into a car's trunk for WARCing from a weekend cottage. Hmmm . . . add suction cups, and it might even WARC from a car's roof for mobiling. The classic Squalo returns! Give a cheer if you remember Squalos, L'il Lulu transmitters, and Corvair cars!

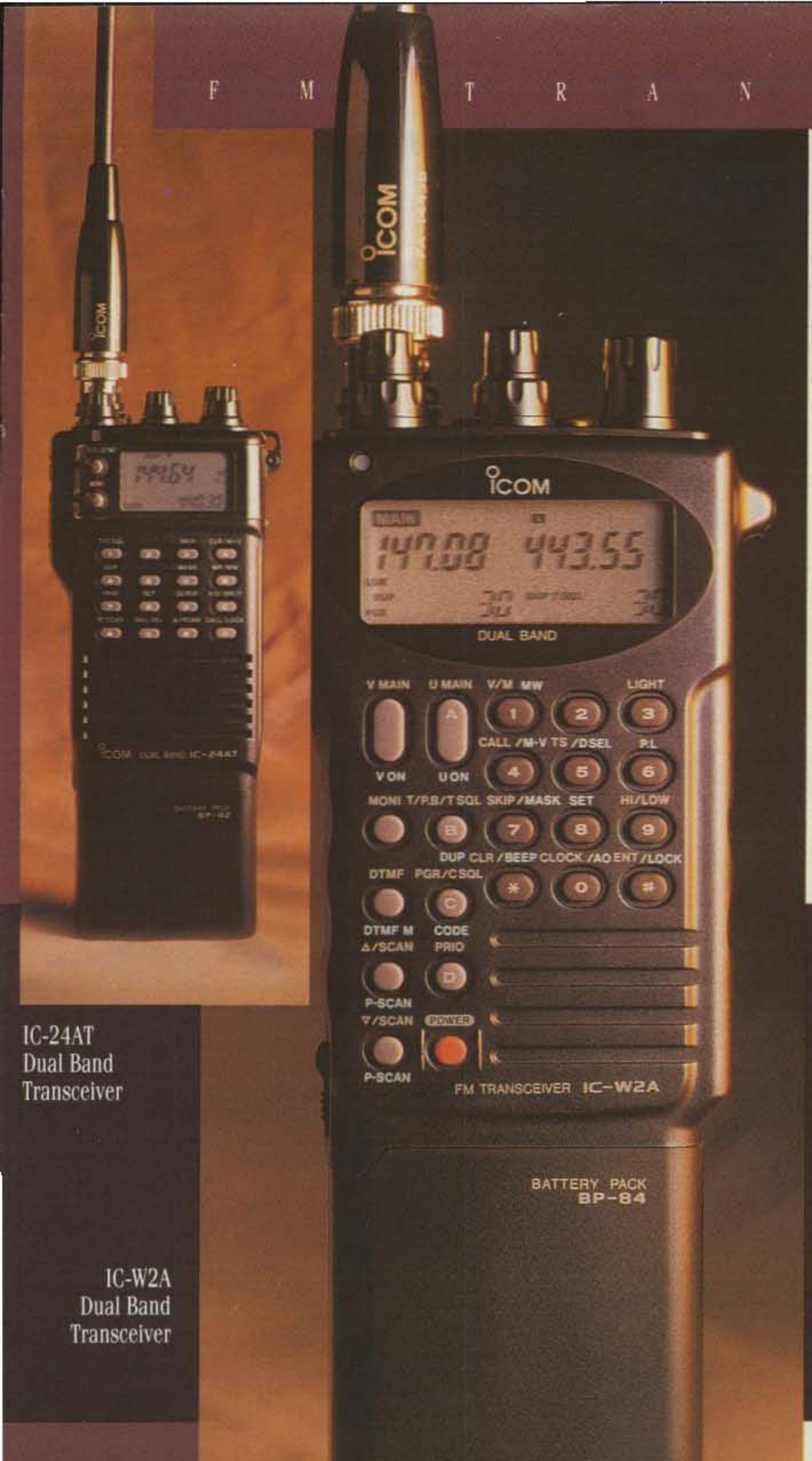
I must admit I was skeptical of the small Isoloop's performance until a week ago when I worked a VK on 17 meters using one. His signal did not blow the knobs off my rig, but he was coming through long path and competing with a UA0 and 3B8. A radiator of this calibre truly deserves favorable recognition!

Conclusion

Our encouragement for working the WARCs could continue indefinitely, but column space is limited, and I am anxious to get back on 30 meters. We thus wish you good luck on the WARCs and hope to contact you in the near future. I still have some Wild Woody WARC Keys looking for appreciative homes, so ask about them when we QSO.

73, Dave, K4TWJ

F M T R A N S C E I V E R



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Radio FUNdamentals

BY BILL ORR, W6SAI

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

Controlled Feeder Radiation

As every amateur knows, connecting a balanced, center-fed antenna to an unbalanced feedline results in some degree of feeder radiation. A good example is a coax line feeding a dipole (fig. 1[A]). And as every amateur also knows, this hookup will work okay, so why worry about it?

As far as the dipole goes, there's no big problem. One outcome of feeder radiation is that the classic figure-8 radiation pattern of the dipole is filled in by feedline radiation so that the result is a nearly omnidirectional pattern. That can be a big help for general all-around operation.

Since the coax outer shield is coupled to the antenna (directly at the feedpoint and indirectly by means of coupling between the coax and the antenna field), loading problems may develop. A modern, solid-state transmitter may not load properly unless the feedline is trimmed to a critical length. Moving the feedline about with respect to the antenna may help, too.

When the unbalanced coax is attached to a balanced beam (a Yagi, for example) the indirect feedline-to-antenna inductive coupling will tend to ruin the otherwise good front-to-back ratio of the beam on transmit and receive. This is all due to radiation and pickup from the outer shield of the line.

What to do? One solution is to use a balun between the feedline and the antenna (fig. 1[B]). Another solution is to make the coax line act as a sort of balun by grounding the shield of the line a quarter-wavelength below the antenna feedpoint (fig. 1[C]).

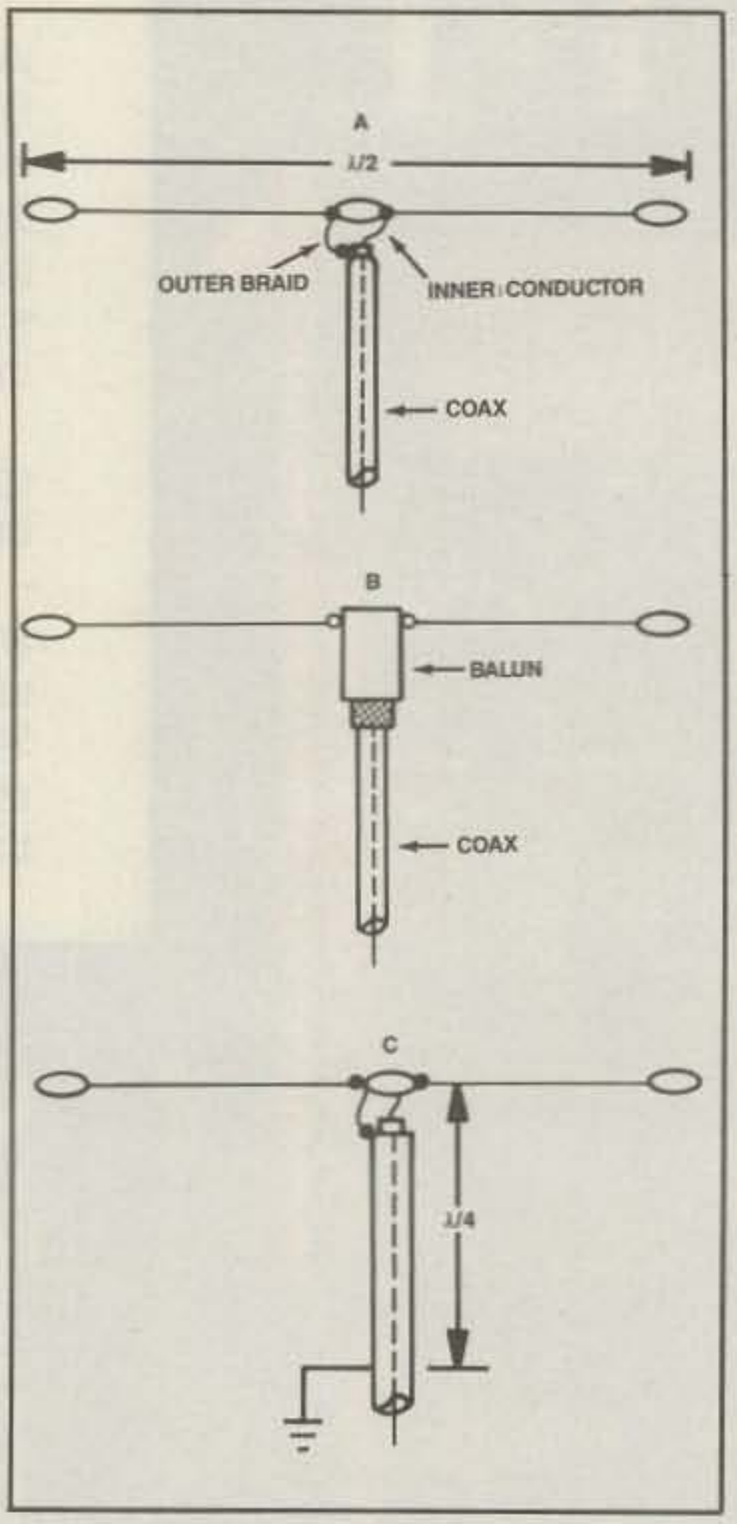

Fig 1– (A) Direct coax feed, (B) balun feed, and (C) quarter-wave grounding.

Use Feedline Radiation To Your Advantage

It is possible to make use of feedline radiation, as pointed out by B. Sykes, G2HGC, in the May 1990 issue of *Radio Communication,* an RSGB publication. He notes that using feedline radiation to fill in antenna pattern nulls can easily be achieved by moving the balun down the feeder a quarter-wave from the antenna feedpoint. This permits radiation from the top part of the feedline, while the balun stops the radiation from the rest of the line (fig. 2). He calls this technique "Controlled Feeder Radiation" (CFR) and notes that it depends upon radiation from the outer shield of the coax, which does not occur with balanced feeders or from a feeder-balun combo such as shown in fig. 1(B).

G2HGC's antenna is shown in fig. 2. It is a dipole with the balun placed 0.275 wavelength below the feedpoint. This provides an omnidirectional, vertical polarized pattern radiator combined with the standard figure-8 pattern of the dipole. The low-angle, vertical radiation is a considerable bonus, being achieved without the need for an expensive and complicated system of ground radials.

A simple variation of this idea is shown in fig. 3(A). This consists of a horizontal, end-fed quarter-wave element combined with a vertical CFR section. The antenna radiates vertically and horizontally polarized energy to produce a virtually omnidirectional signal. Straightening out this antenna results in a very useful low-impedance end-fed dipole which may be strung conveniently from the upstairs window of your station to a nearby tree (fig. 3[B]).

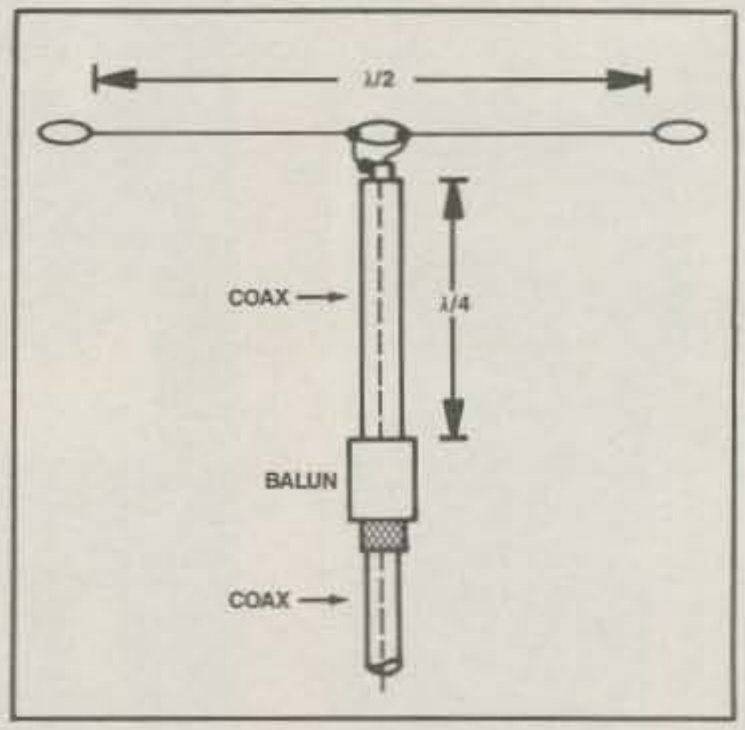

Fig. 2– The G2HCG adaptation of fig. 1(C) for controlled feeder radiation. Use 1-to-1 balun.

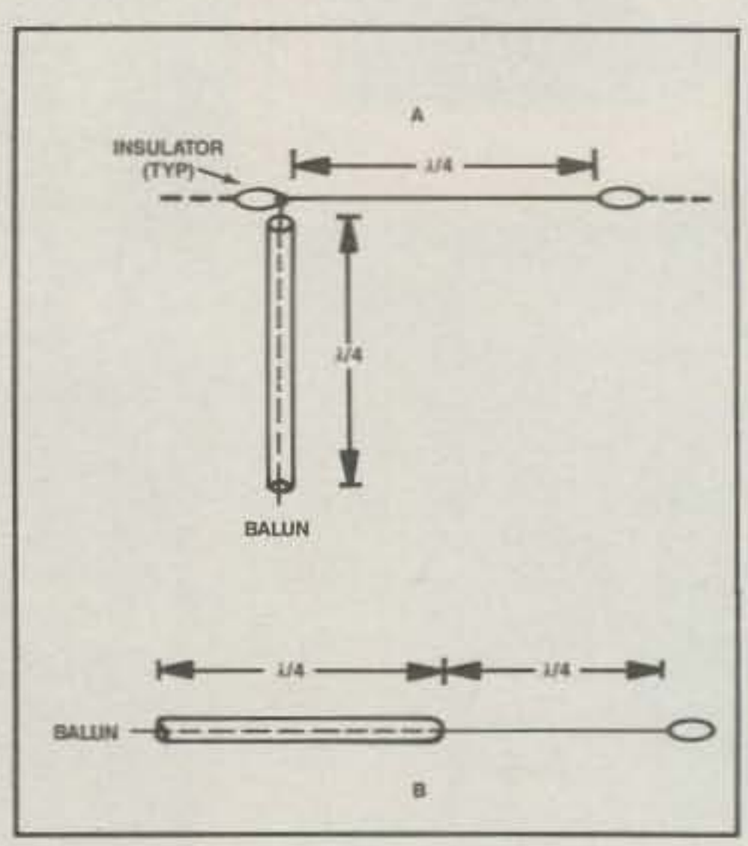

Fig. 3– (A) End-fed quarter-wave wire plus controlled radiation feeder. (B) End-fed half-wave dipole antenna.

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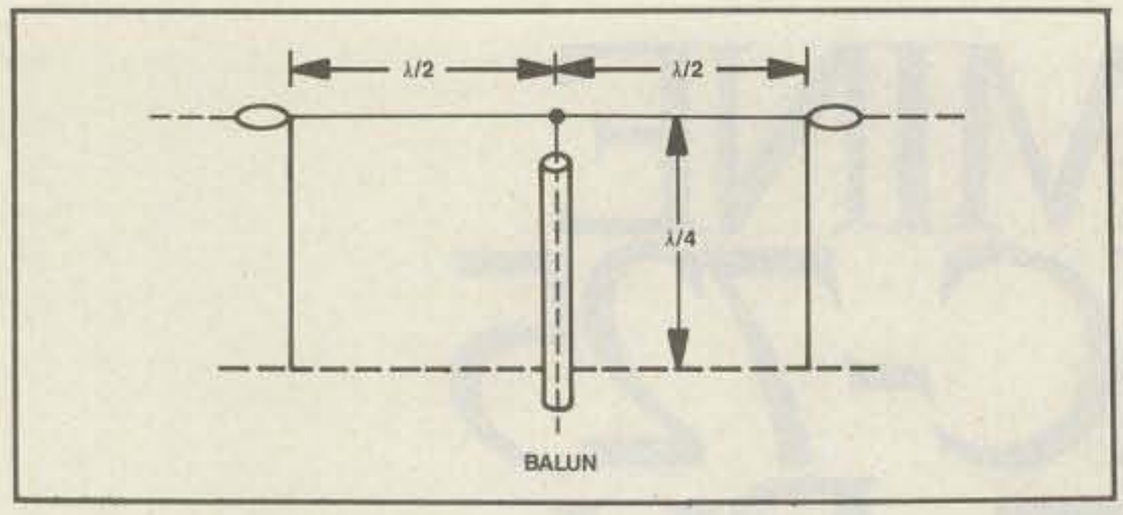


Fig. 4– The W6BCX Bobtail Beam with CFR feed system.

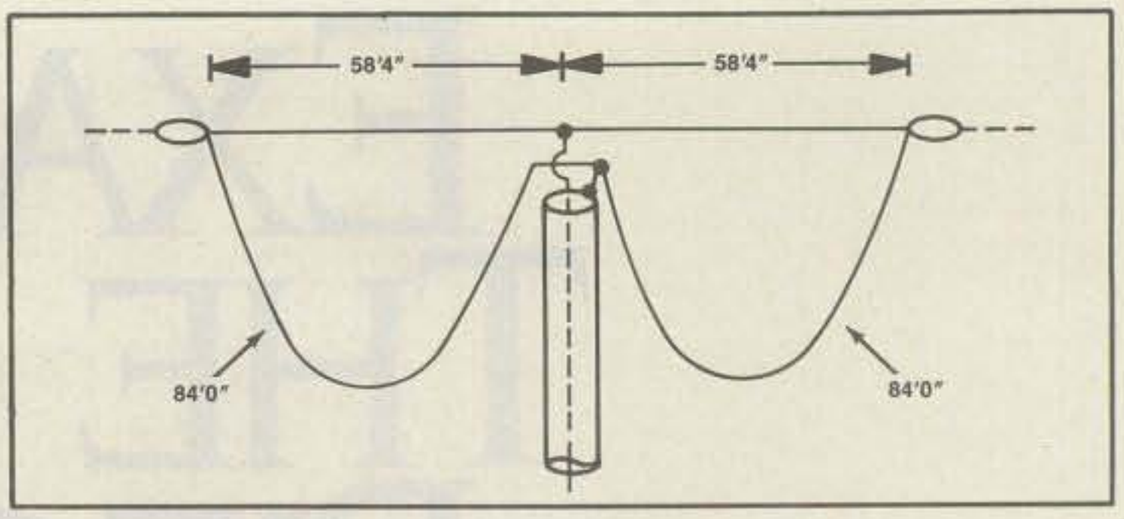


Fig. 5– Catenary double-loop quad for 40 meters.

can be modified for CFR feed (fig. 4). The standard Bobtail is end-fed at the high-impedance point at the bottom of the central radiator. This calls for a resonant, link-coupled tuner. The tuner is eliminated in the CFR design, the coax section taking the place of the tuner.

If the operator is willing to use a Transmatch at the station, he or she might consider the "Carolina Windom" design of Jim Thompson, W4THU. Jim combines a multiband Windom with a controlled radiation feeder to produce an antenna that has a generally omnidirectional pattern on all the HF bands. (More info on this can be obtained from him at Box 6159, Portsmouth, VA 23703.)

The Catenary Double-Quad Loop Antenna

A few years ago Ron MacDonald, W3GKZ/ZS5AAU, publicized an interesting 40 meter wire antenna (fig. 5). It consists of two loops in phase with their adjacent corners touching. The common top of the loops is a single horizontal wire about the length of an 80 meter dipole. The loops are suspended from this wire. They are not tied down, as the free-hanging catenary shape results in maximum area within the loop, which is directly related to the gain.

Ron has tried a balun at the feedpoint, but has not noted any change in performance when it is removed. Since the weight of the wires and coax is considerable, the balun was omitted.

The radiation pattern of this antenna is bidirectional, at right angles to the plane of the loops. As an added bonus, the an-

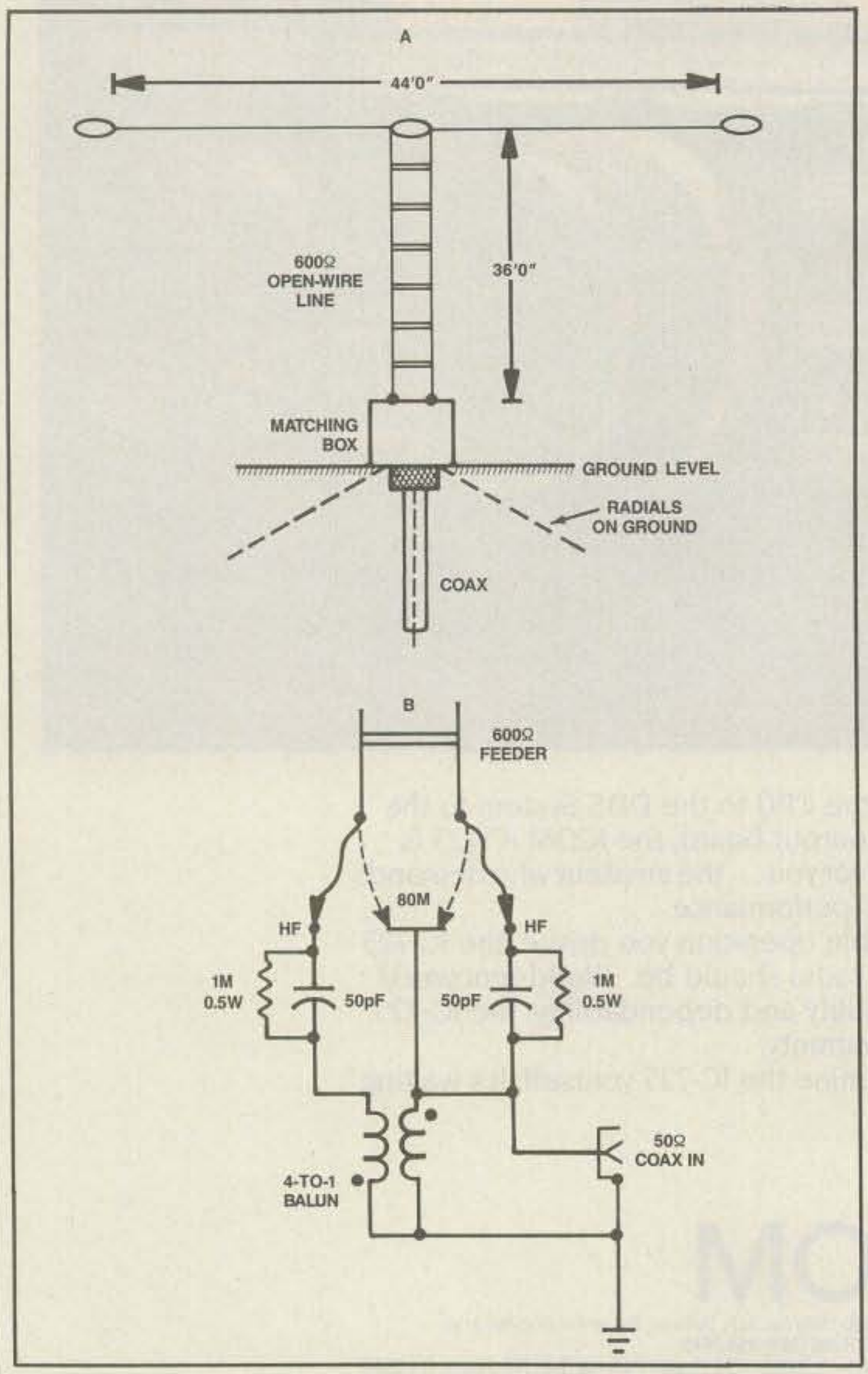
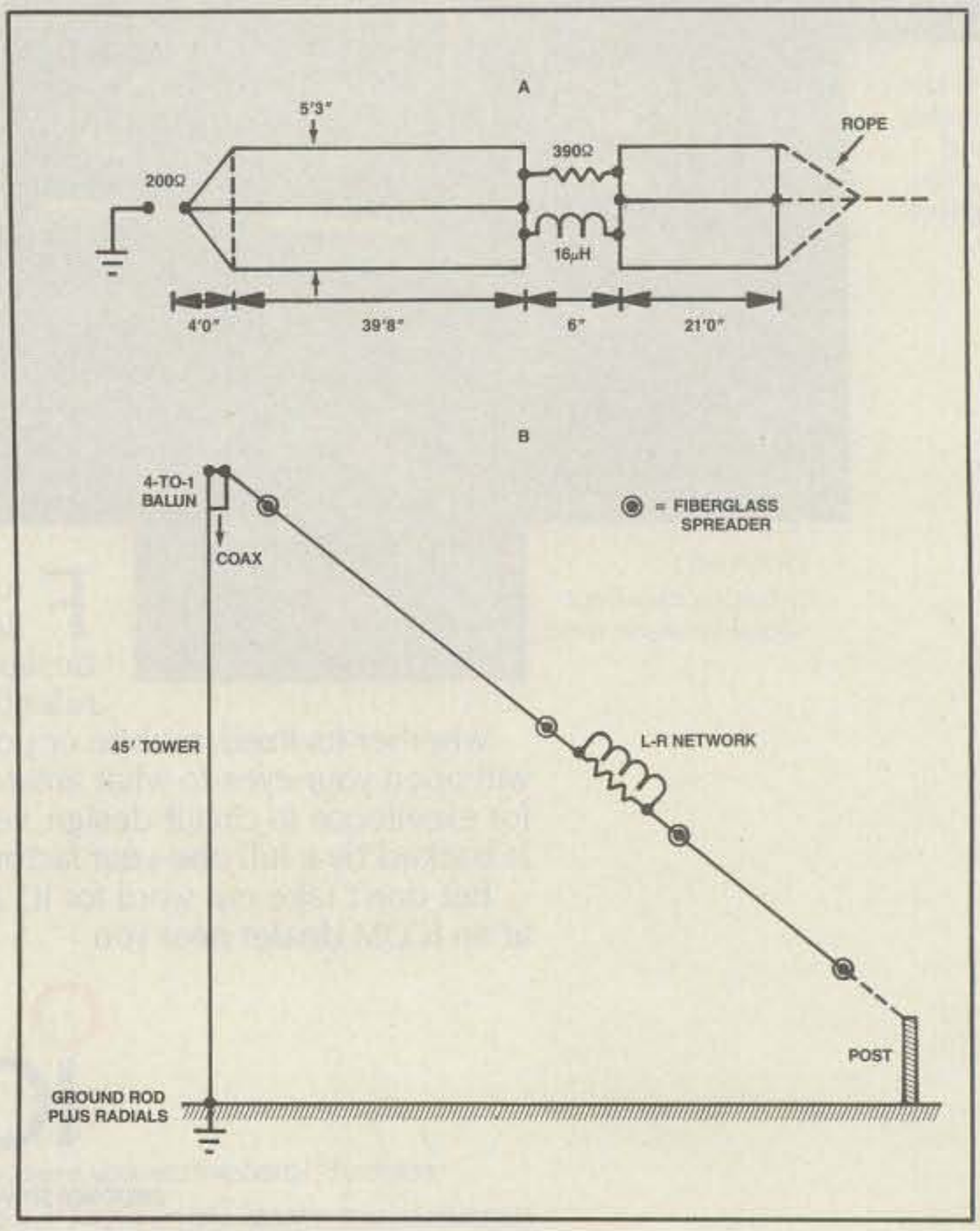


Fig. 6– (A) Multiband HF antenna of G3LNP. (B) Matching box for changing between 80 meters and the HF bands.

Fig. 7– (A) Electrical configuration of a sloper. (B) Plan view—L is 16 uH, 35 turns, 10 turns per inch, 2½ inch diameter.



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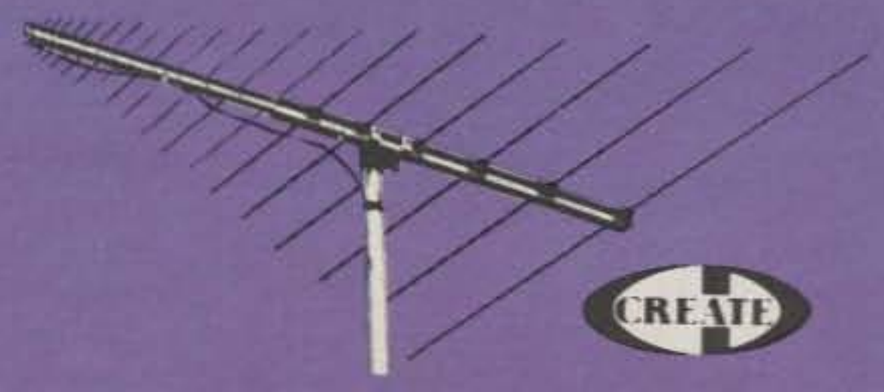

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1105MSAX	27.3	57	717	P.S.
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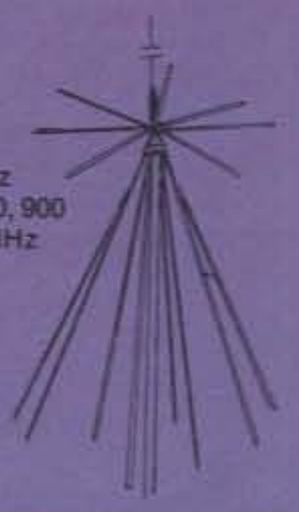

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tenna also works very well on 20 meters. SWR is below 1.5-to-1 on both bands, according to Ron. For optimum results he suggests that the antenna supports should be at least 35 feet high.

The G3LNP Multiband Antenna

Tony Preedy, G3LNP, has developed an interesting center-fed antenna that works well on the 80, 40, 20, 15, and 10 meter bands (fig. 6). This antenna was described in the March 1989 issue of *Radio Communication* (RSGB).

On 80 meters the feeders are strapped together and the antenna becomes a T-loaded quarter-wave vertical working against ground radials. Performance in this mode is dependent upon ground conductivity and the radial system. In Tony's case going from two copper ground rods and four 45 foot radials to 16 radials boosted his signal 3 dB at a point about a half-mile from the antenna.

The matching box at the base of the two-wire feeder contains a 4-to-1 ferrite balun and two 50 pF series capacitors. One megohm resistor is placed across the capacitors in order to prevent the buildup of static charges. Copper "crocodile clips" are used to manually switch between 80 meter and HF operation. The capacitors are adjusted for lowest SWR in the 40 meter band.

A Broadband HF Sloper Antenna

The "Australian Dipole" is a commercial antenna developed and sold in VK-land. It is a center-fed affair and covers 3 to 30 MHz. It is fed with coax and a 4-to-1 balun and provides less than 2.5-to-1 SWR across the operating range. (It is described in my *Antenna Handbook*, pp. 153–154, available from the *CQ* Bookstore.)

The antenna is a rather largish affair and takes up a lot of space. Rick Hill, ZL1BKR, has adapted this design into a half-length sloper that can be hung from a 45 foot tower (fig. 7).

He uses this antenna on 80, 40, 30, and 20 meters without a tuner. The SWR is less than 1.5-to-1 on all bands. The antenna is fed through a 4-to-1 balun, the opposite side of the balun being grounded to the tower.

The antenna is made of three wires held in position by four fiberglass spreader rods about 5½ feet long. The wires are connected together at the feedpoint and by jumper wires at the three lower spreaders. Insulators between the middle spreaders take the strain off the coil assembly. The coil is enclosed in a plastic container with the resistor through the center of the coil.

Rich notes there is a peak in SWR around 17.5 MHz, and a tuner is required for operation on the 18 and 15 meter bands, as his solid-state transceiver will not develop full output on those bands due to excessive SWR. He also says the antenna is great for DX, as he has worked into the US on 3.8 MHz barefoot. He uses a ground rod at the base of the tower and feels that an improvement on 80 meters may be gained if more radials are added.

Shop Talk

From time to time I hope to include topics of general interest to the equipment builder and experimenter. Sometimes nifty little devices will be discussed. Other times we will publish questions raised by readers that I can't answer. Perhaps others can answer these little problems. Okay? Here we go!

Weatherproofing Coaxial Connec-

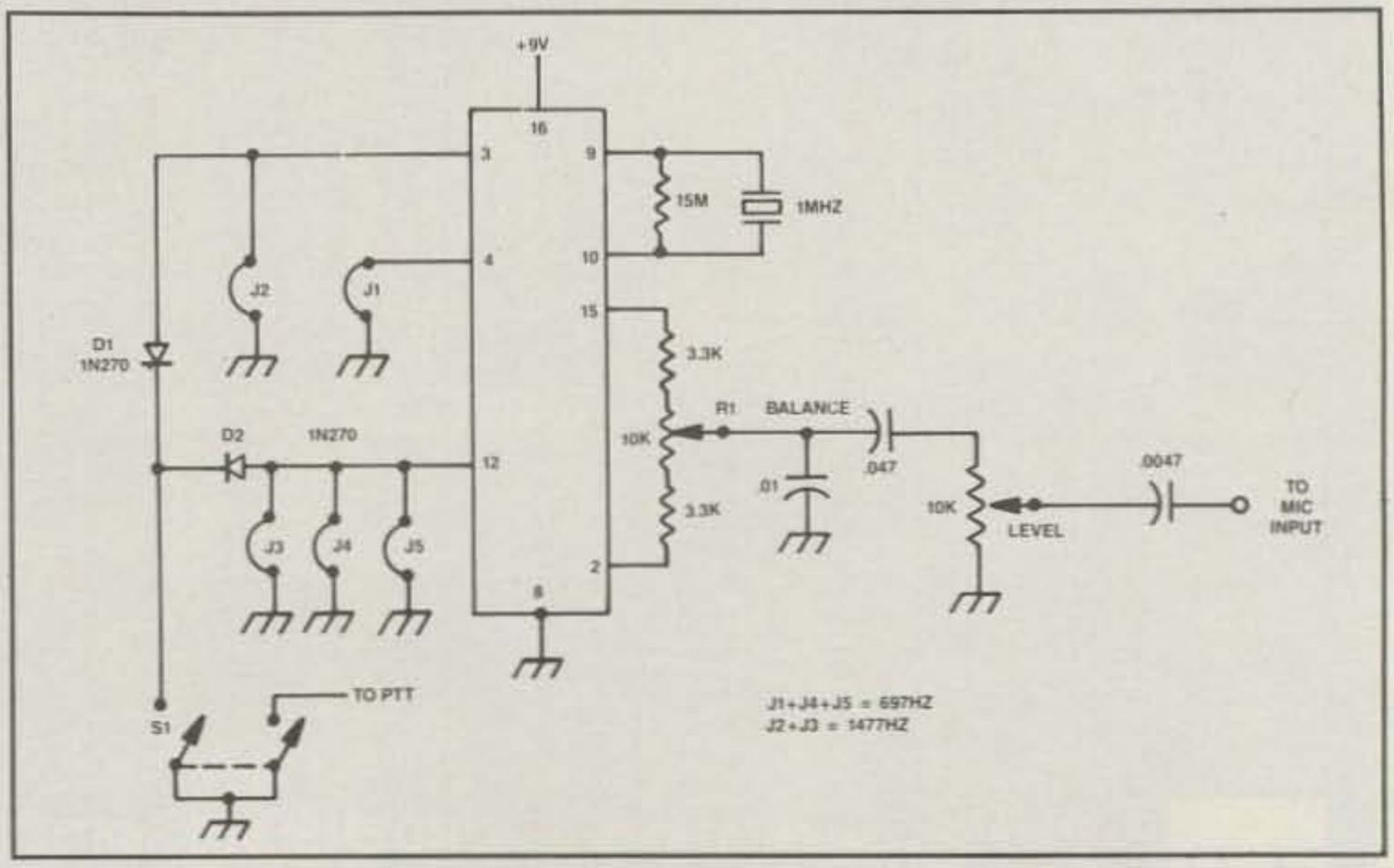

Fig. 8– Two-tone audio generator. J1–5 are jumpers. Adjust R1 for equal tone balance (equal transmitter power output).

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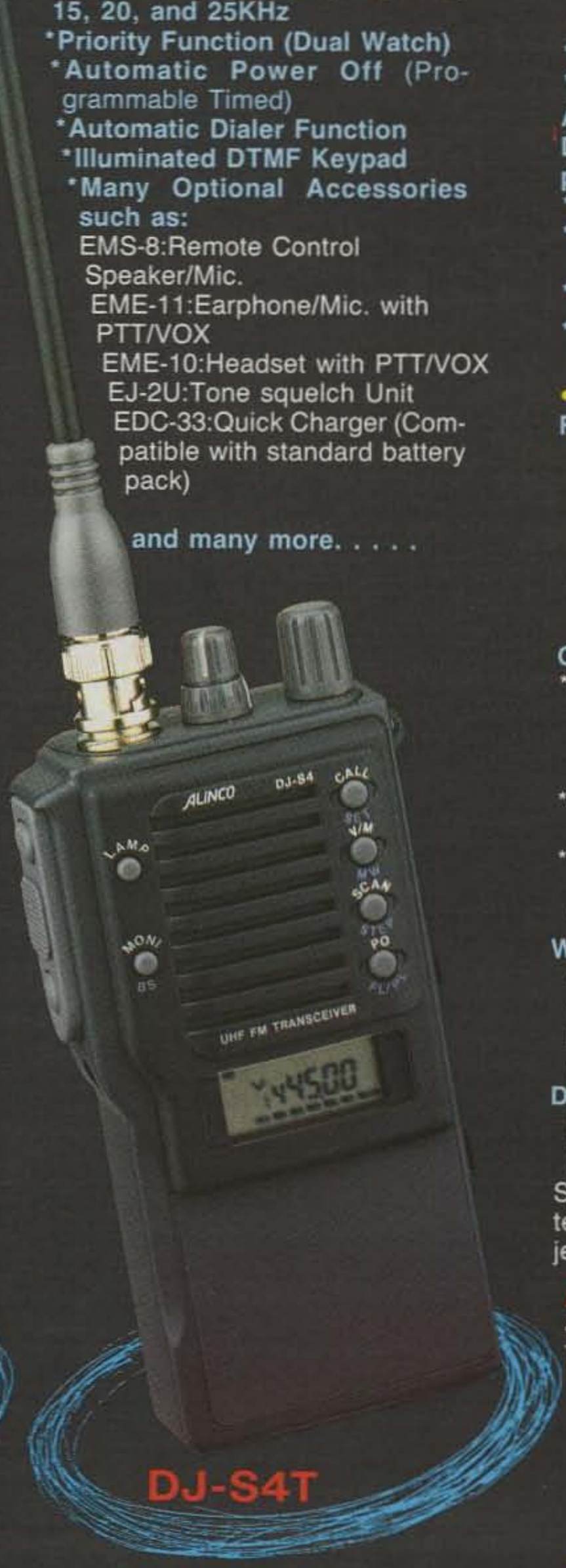

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Hi:2W(F1T/S1T) 1.5W(F4T/S4T)
Mid:1W Low:0.1W
* with Optional Battery Pack EBP-18N
Hi:5W Mid:1W Low:0.1W
* at 9V
Hi:2.5W(F1T/S1T) 2W(F4T/S4T)
Mid:1W Low:0.1W

Weight:
DJ-F1T/F4T Approx.:13.2 oz.: with Standard Battery Pack
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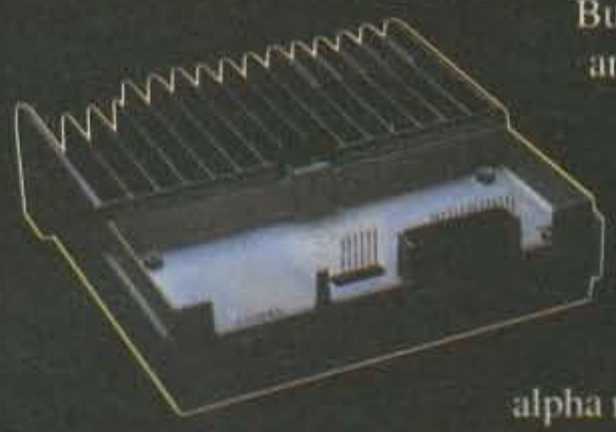

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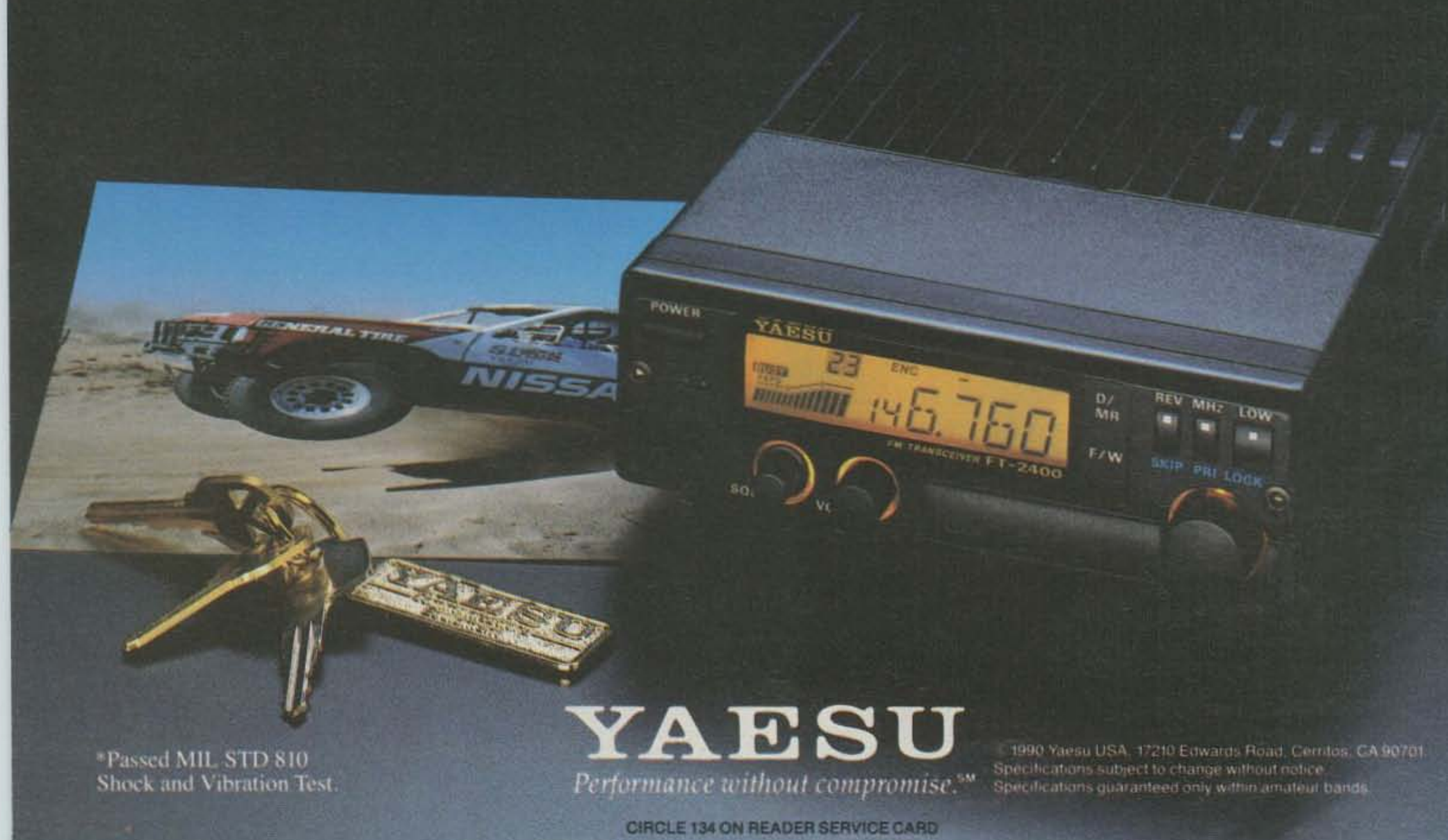

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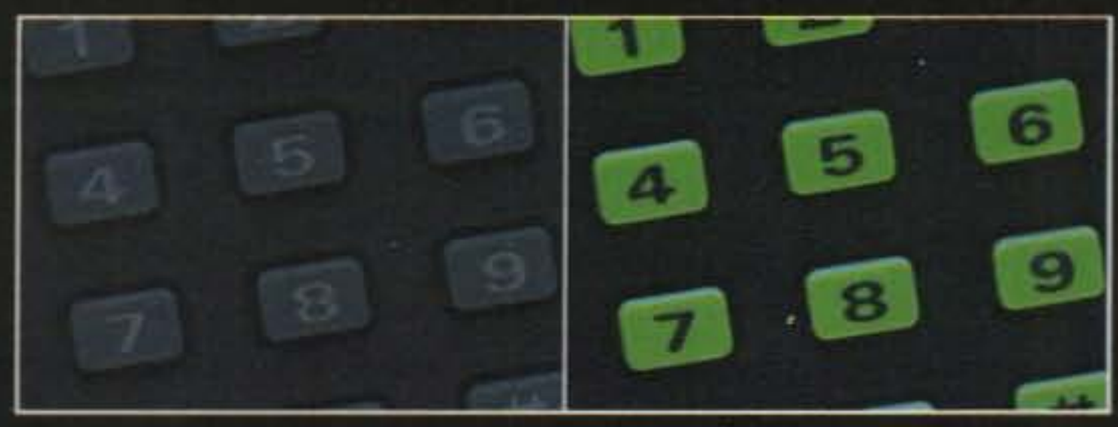

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tions. It is difficult to waterproof cable-to-cable splices, even when the recommended coax plugs and splice adapter are used. Many operators wrap the joint with electrical tape and hope for the best. Unhappily, electrical tape doesn't seal against water for a prolonged time, especially if air pockets are trapped in the wrapping. Widely used in the broadcast industry is the "football wrap," a version of which is described here.

The splice is wrapped with a layer of ½ inch plastic tape, overlapped half its width. The tape is extended 2 inches beyond the splice at each end. Next butyl rubber tape is cut into three lengths, long enough to reach from one end to the other, completely covering the joint. The plastic tape underlay prevents the butyl tape from sticking to the coax.

Finally, the longitudinal butyl tape is overwrapped with ½ inch plastic, wrapped in the normal manner, extending the wrapping beyond the butyl tape. The result is a largish, football-shaped wrapping. Hence the name.

Help! How to Remove Masking Tape From a Panel. I and others have had trouble removing old masking tape from a panel without damaging the panel surface. The tape (especially if exposed to sunlight) resembles concrete! Paint solvent won't do the job. Neither will Trisodium Phosphate (TSP) cleaner. It is risky to use a razor blade, as it might dam-

age the panel finish. Any ideas on this subject?

A Simple Two-Tone Generator for SSB. Jack Hollingworth, ZF1HJ, has come up with a simple two-tone audio generator for SSB transmitter testing (fig. 8). It is built around a "touch-tone" IC generator (MC-14410). With the connections shown, the frequencies are 697 and 1477 Hz. The unit is helpful for tune-up purposes, especially when a linear amplifier is used.

His note states that the waveform of this unit is not as clean as a more complex design, but it is adequate for most purposes and the component count is very low! The tone levels are adjusted by the potentiometer.

Help! Manual Needed! I picked up a nifty Hickok model 1605 solid-state volt-ohmmeter with VHF probe. Can any reader provide me with a copy of the instruction and alignment manual? It would be appreciated!

Telephone Filters. I've gotten a lot of queries about availability of capacitors and inductors required to build the telephone line filters discussed in an earlier column. Alas, the friendly corner radio parts store has long gone into oblivion! (Cortlandt Street, where are you now that we need you? Radio Shack?)

Inductors are available from RadioKit, Box 973, Pelham, NH 03076. (Part number of the inductor is J. W. Miller Co., 73F47AF, or equivalent.)

Inductors and capacitors are available from Digi-Key, 701 Brooks Ave. South., Box 677, Thief River Falls, MN 56701. Send for their huge catalog of components.

Box with female modular plug to spade leads: Radio Shack 279-391.

Filter kit (inductors and capacitors) is available from Richard Measures, AG6K, 6455 LaCumbre Rd., Somis, CA 93066.

To wind your own inductor: 25 turns #22 solid enamel wire (Radio Shack 279-1295) on Amidon FT-50A-75 ferrite core.

The Dead Band Quiz

My readers certainly know all about Joseph Cotten, Orson Wells, and Valli starring in the super-movie *The Third Man*. And the star of the picture who never appeared in the film was Anton Karas, who played the zither music! And thanks to the sharp-eyed readers who corrected me on the release date of the picture. The latest readers who solved this little quiz are: WA2JGE, W9GPC, KB0HVY, KC9SKR, WM9X, WDX9JUG, N9FFN, W6HVB, K9BGU, WB9HGS, KB6MIR, KW0V, KF4CR, KF7XD, W4OEL, W7DHD, and VE3GNF.

I see I am going to have to work a lot harder to stump you knowledgeable readers. Congratulations and many thanks. See you on the low end. 73, Bill, W6SAI

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

International Agreements Applicable To Amateurs

Our government has two sets of international agreements which are particularly important in regard to operation by United States amateur radio operators. The current reciprocal operating and third-party traffic agreement lists were updated 1 February 1991 and 31 January 1990, respectively, by the Federal Communications Commission (FCC). We have reciprocal operating agreements with 74 countries. We have third-party traffic agreements with 43 countries. We have both reciprocal operating and third-party traffic agreements with 36 countries.

One set of agreements (reciprocal operating) permits USA amateurs to operate in foreign countries, and it permits amateurs of those countries to operate in this country. This is called *reciprocal operating*. In neither case are amateurs required to pass tests to operate in the other country; all nations' licenses are accepted as proof of operating qualification. This reciprocal operating system is greatly appreciated by active amateurs who visit other countries.

The other set of agreements (third-party traffic) concerns the exchange of noncommercial (personal) traffic between people in different countries (via amateur radio), which is greatly appreciated as a person-to-person service.

Table I shows the countries with which we have reciprocal operating (R) and/or third-party traffic (T) agreements. The most commonly used callsign prefixes are included, but many other callsign prefixes are also used on the air.

Reciprocal Operating and Licensing

The FCC only issues reciprocal operating permits to visiting alien amateur radio operators who are licensed by (and are citizens of) the indicated countries. Alien amateurs may apply for a permit to operate from any area where amateur radio is controlled by the FCC. USA citizens are not eligible to receive an FCC-issued reciprocal operating permit. Similarly, an alien holding a USA amateur radio license is not eligible to receive an FCC-issued reciprocal operating permit. If an alien amateur holds an FCC-issued reciprocal operating permit, it is superseded by whatever FCC-issued USA amateur radio license she/he obtains. In this case, the alien's operating privileges are no longer related to her/his home country's privileges; they are the privileges which are related to the class of FCC-issued amateur license she/he earned. Foreign amateurs are encouraged to obtain USA licenses, if they are going to be in this country a long time. Except for representatives of foreign governments, anyone may apply for a USA amateur radio license, as issued by the FCC. Such applicants simply have to pass the same examination elements that are administered to Americans.

Alien amateurs may apply for a permit by completing an FCC form 610-A, attaching a copy of her/his (foreign) valid amateur license, and mailing these items to the Federal Communications Commission, P.O. Box 1020, Gettysburg, Pennsylvania 17326 USA. Some USA missions (in foreign countries) have the FCC form 610-A, and it can be obtained by writing to the FCC, 1919 M Street NW, Washington, DC 20554 USA. An FCC-issued permit is valid for one year, until the alien's home country amateur license expires, or until the alien obtains a USA amateur license, depending on which occurs first.

Operating privileges of a permit holder are detailed in the FCC Rules and Regulations. Part 97 governs the USA Amateur Radio Service. Basically, the permit holder is limited to the operating privileges that apply to her/his class of license in her/his home country. However, FCC regulations must be obeyed and USA Extra class operating privileges may not be exceeded by reciprocal licensees, regardless of the privileges existing in their home countries. As an example of this, reciprocal licensees are not allowed to transmit (on voice) in the 14,100 to 14,150 kHz portion of the 20 meter DX voice segment. Reciprocal permit holders do not all have Extra class privileges. As an example, a permit holder who has a home country license equivalent to the USA General class license is restricted to the operating privileges of a USA General class licensee. Violations should be reported to the FCC.

This is nine-year-old Brian Sunderman, KB8LCO, of Cincinnati, Ohio. Brian shares this station with his dad (Butch, KA8QFK) and his brother (Tim, KB8ENN). He has already worked all continents.

Here is 21-year-old Juan Carlos Munoz, TG9AJR, of Guatemala. He likes building equipment (homebrewing) and operating foreign (DX) contacts. He holds a Novice license with only 40 meter HF privileges. He worked 35 USA states and 60 countries during his first few months on the air. Juan is a second-year university student. His station includes a Swan 350 transceiver with a matching Swan 117-XC speaker/AC power supply, plus a 40 meter inverted Vee antenna.

The exact callsign shown on the permit must be used by the reciprocal licensee when identifying her/his station. The appropriate USA letter-numeral prefix precedes the reciprocal licensee's home callsign. As an example, if CP5WDX is operating in California, his identification is W6/CP5WDX (code) or "W6 stroke" (or "slash") "CP5WDX" (voice). The entire callsign must be used when identifying a station. In this example do not shorten it

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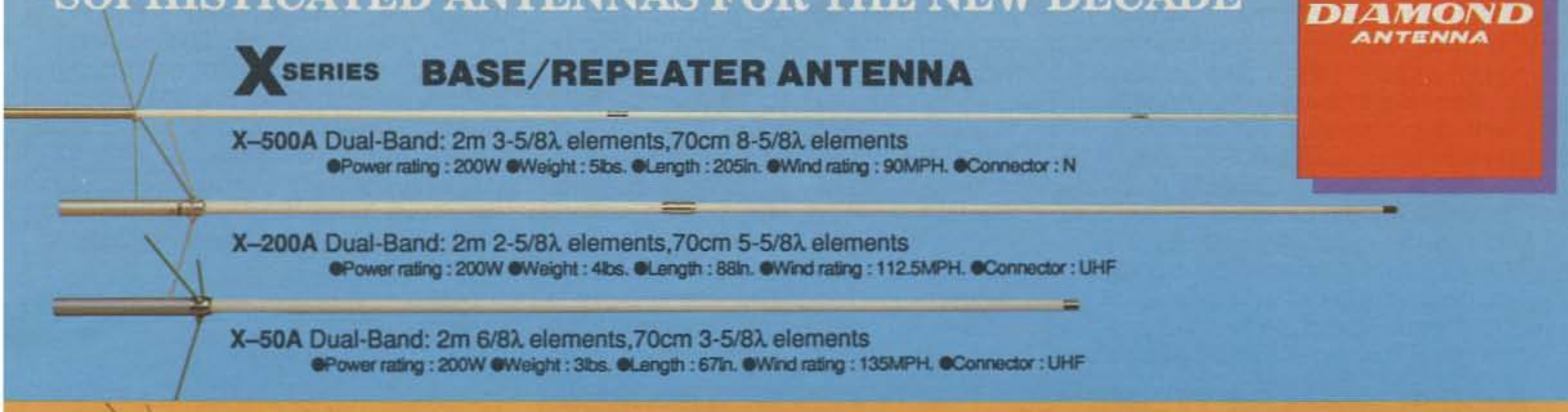
DIAMOND ANTENNA

X SERIES BASE/REPEATER ANTENNA

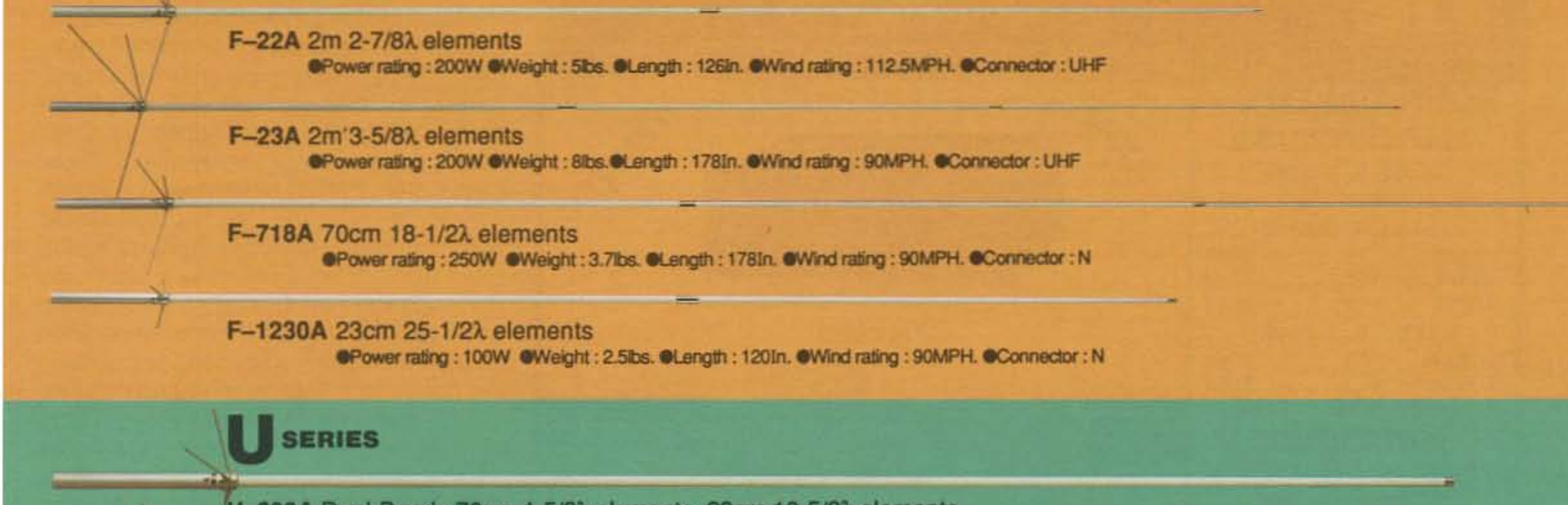


X–500A Dual-Band: 2m 3-5/8λ elements,70cm 8-5/8λ elements
●Power rating : 200W ●Weight : 5lbs. ●Length : 205In. ●Wind rating : 90MPH. ●Connector : N

X–200A Dual-Band: 2m 2-5/8λ elements,70cm 5-5/8λ elements
●Power rating : 200W ●Weight : 4lbs. ●Length : 88In. ●Wind rating : 112.5MPH. ●Connector : UHF

X–50A Dual-Band: 2m 6/8λ elements,70cm 3-5/8λ elements
●Power rating : 200W ●Weight : 3lbs. ●Length : 67In. ●Wind rating : 135MPH. ●Connector : UHF

F SERIES



F–22A 2m 2-7/8λ elements
●Power rating : 200W ●Weight : 5lbs. ●Length : 126In. ●Wind rating : 112.5MPH. ●Connector : UHF

F–23A 2m'3-5/8λ elements
●Power rating : 200W ●Weight : 8lbs.●Length : 178In. ●Wind rating : 90MPH. ●Connector : UHF

F–718A 70cm 18-1/2λ elements
●Power rating : 250W ●Weight : 3.7lbs. ●Length : 178In. ●Wind rating : 90MPH. ●Connector : N

F–1230A 23cm 25-1/2λ elements
●Power rating : 100W ●Weight : 2.5lbs. ●Length : 120In. ●Wind rating : 90MPH. ●Connector : N

U SERIES

U–300A Dual-Band : 70cm 4-5/8λ elements, 23cm 10-5/8λ elements
●Power rating : 100W ●Weight : 2.4lbs. ●Length : 98In. ●Wind rating : 112.5MPH. ●Connector : N

U–5000A Tri-Band : 2m 6/8λ, 70cm 3-5/8λ elements, 23cm 7-5/8λ elements
●Power rating : 100W ●Weight : 2lbs. ●Length : 71In. ●Wind rating : 135MPH. ●Connector : N

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MX SERIES DUPLEXERS AND TRIPLEXERS

MX-72N Duplexer with PL-259 for HF-2m and 70cm bands. Type N for 70cm.
●Coaxial cable : 5D2VS 35cm.

MX-72D Direct connection type Duplexer with PL-259 connectors for HF-2m and 70cm bands.
●Coaxial cable : None

MX-72H Duplexer with PL-259 for HF-2m and 70cm bands.
●Coaxial cable : 5D2VS 35cm.

MX-72DN Direct connection type Duplexer with PL-259 for HF-2m, N connector for 70cm bands.
●Coaxial cable : None

MX-3000N Triplexer with PL-259 for HF-2m, N connectors for 70cm and 23cm. Input is N connector.
●Coaxial cable : 5D2VS 35cm.

MX-3000DN Direct connection type Triplexer with PL-259 for HF-2m, N connectors 70cm and 23cm. Input is N connector.
●Coaxial cable : None

MX-3000 Triplexer with PL-259 for HF-2m and 70cm, and N connector for 23cm. Input is N connector.
●Coaxial cable : 5D2VS 35cm.

MX-3000D Direct connection type Triplexer with PL-259 for HF-2m and 70cm, N connector for 23cm. Input is N connector.
●Coaxial cable : None

For additional information, or the name of nearest Authorized Diamond Dealer, call:
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to W6/CP5WD. The reciprocal licensee is required to indicate (in English) the approximate geographic location (city and state, etc.) from which she/he is operating. This information is required at least one time during each contact. Canadian amateurs still identify the original way with the American indicator following their callsign, such as VE7SR/W6.

USA amateurs who want to obtain reciprocal operating permits from the countries with which we have such agreements should request the appropriate forms from officials of those countries. USA-based foreign embassies and legations may have the required forms; if not, they should be able to provide information about where such forms can be obtained. Forms may also be obtained by requesting them from the amateur radio licensing authority of the country you intend to visit. Information on this subject is available from the FCC, Personal Radio Branch SSD/PRB, Room 5322, 1919 M Street NW, Washington, DC 20554 (telephone 202-632-4964). The ARRL has a reciprocal licensing expert who provides names, callsigns, addresses, telephone numbers, and related data in response to requests for reciprocal licensing information received from American amateurs. The ARRL's address is 225 Main Street, Newington, CT 06111.

When USA amateurs operate (as reciprocal licensees) in other countries, they must abide by the regulations which apply to those countries. ITU Region II (North, Central, and South Americas) regulations do not go with you when operating in ITU Region I (Europe and Africa) or ITU Region III (Australasia and the rest of the Southern Hemisphere). All licensees must abide by the radio regulations of the International Telecommunications Union (ITU).

Third-Party Traffic

Third-party traffic involves at least one person in addition to the operators who are handling the traffic. Third-party traffic includes message traffic handled directly between amateurs, plus telephone (fone) patch traffic, in which people (not just amateurs) speak to each other directly (normally using the telephones in their homes) via amateur radio. International third-party traffic must be in English (voice), or using the International Morse code for code traffic. Third-party traffic must be of a personal nature. Business messages are prohibited, except during emergencies. Amateurs are not allowed to accept money, services, or goods in exchange for handling third-party traffic.

Only personal messages may be handled by amateur radio operators under normal circumstances. These messages must be such that they would not normally be sent by any existing means of electrical communications, or would not be sent except for an amateur radio station being available.

The callsigns of both (foreign and American) stations must be transmitted to identify stations handling third-party traffic. Your own callsign (alone) does not suffice in this case.

If you have a question about the status of a country (in regard to these lists), you could call the Personal Radio Branch (Room 5322) of the FCC at 202-632-4964 to obtain the latest information. Also, a recorded listing of releases and texts can be obtained by calling 202-632-0002.

Expanding The Opportunities

The US Government is willing to establish reciprocal operating and/or third-party traffic agreements with other countries. Such agreements are negotiated through the US Department of State. The support of the other country's amateurs is necessary to initiate meaningful negotiations. It is best to have action initiated by the country seeking to reach an agreement with the USA, since their cooperation is essential in getting the task completed. Our government is receptive to providing draft notes, which could form the basis of such agreements, to any interested

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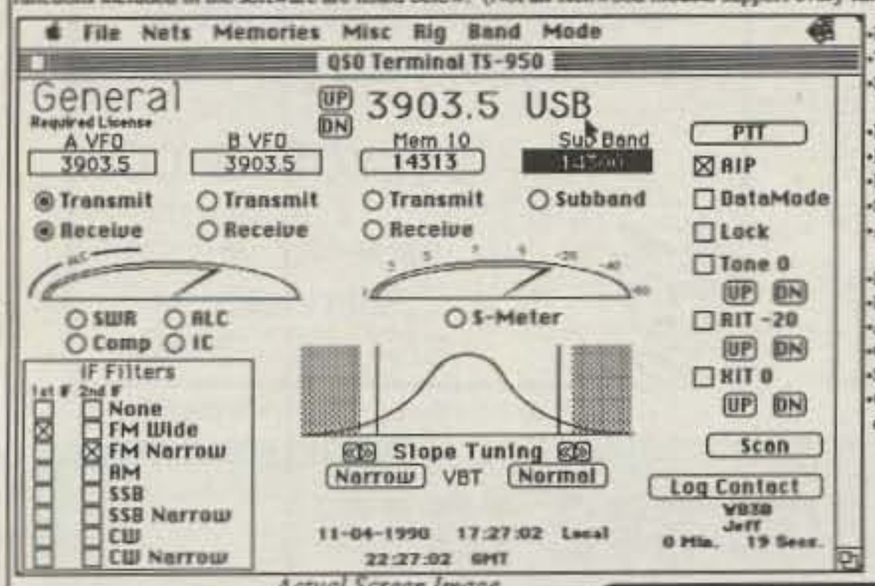

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ST144-28 model shown

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Model	Description	Price
ST144-28	2 m Transverter	$259.00
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Other Products		
WJ-100	2 water cooling jackets with rubber gaskets for 7289 and 7815R tubes	$20.00
2-way Coaxial Power Dividers (N-connectors)		
SPD2-144/432N	2 m/70cm	$49.00
SPD2-220N	220 MHz	$49.00
SPD2-902N	33 cm (902-928 MHz)	$49.00
SPD2-432/1296N	70 cm/23 cm	$49.00
6 foot Coaxial (RG213) Jumper Cables		
SJU-NM-NM	N-Male : N-Male	$30.00
SJU-NM-NF	N-Male : N-Female	$30.00
SJU-NM-UM	N-Male : UHF-Male	$30.00
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Model	PS120M	PS140II	PS304	RS3080	RS40X
Voltage (VDC)	3–15	13.8	1–15	1–15	1–15
Current (ICS)	12	14	30	33	40
Current (Cont.)	9.2	12	24	30	32
Ripple (Max)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	1%
Cooling Fan	NO	NO	NO	YES	YES
Size (inches)	5×4×9	5×4×9	7×6×9	7×6×9.5	11×5.5×9
Weight (lbs)	11	11	18	21	22

Cross Needle SWR/Power Meters for All Bands


NS-660PA

Model	Freq. Range Int. Sensor	Forward Power	Connectors
NS-660A/PA	1.8-150 MHz	30/300 W/3 kW	SO-239
NS-663BM/BN*	140-525 MHz	30/300 W	SO-239/N type
DP-810	1.8-150 MHz	0-1.5 kW	SO-239
DP-820/N	140-525 MHz	0-150 W	SO-239/N type
DP-830	1.8-525 MHz	0-1.5 kW/0-15 W	SO239/N type
CN-101	1.8-150 MHz	15/150 W/1.5 kW	SO-239
CN-103	140-525 MHz	20/200 W	SO-239/N

MOBILE/BASE CROSS NEEDLE SWR/POWER METERS


CN-460M


CN-520

Model	Freq. Range Int. Sensor	Forward Power	Connectors
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
CN-520**	1.8-60 MHz	200 W/2 Kw	SO-239

*Back lit with mobile bracket **Optional mobile bracket available

DAIWA Coaxial Switches

	CS-201 2 Position	CS-201G II 2 Position	CS-401 4 Position	CS-401G 4 Position
Frequency:	500 MHz	1.3 GHz	800 MHz	800 MHz
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	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW

Insertion Loss: All models less than 0.2 dB

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For more information contact your local dealer

country. Notes can be requested from the US Department of State or from the Federal Communications Commission. The FCC's address is Washington, DC 20554, and requests should be directed to the Chief of the Spectrum Engineering Division. DX amateurs are urged to initiate appropriate action in their countries, if they do not presently have both agreements with the USA. American amateurs could help expand these lists by discussing these agreements with foreign amateurs, particularly when visiting their countries.

Banned Countries

The October 1988 issue of *CQ* contains information about international agreements of interest to American amateurs. That article evoked comments from several Canadian amateurs. They believe I should have listed the banned countries, those countries whose amateurs we are not allowed to contact.

Canadian Radiocommunication Information Circular number three (RIC-3) of 1 February 1988 states that nine countries have notified the International Telecommunication Union (ITU) that they forbid (foreign) radiocommunications with amateurs under their jurisdiction. Those countries are Angola, Burma, Ethiopia, Ghana, Iraq, Saudi Arabia, Suriname, Thailand, and Zaire.

FCC Public Notice 3174 (6 June 1988) contains the following information:

Banned Countries: Radiocommunication is forbidden between amateur stations in the following countries and amateur stations in areas where the amateur service is regulated by the FCC because the administration of the country has notified the FCC that it objects to such radiocommunications: None.

The Chief of the FCC Spectrum Engineering Division (Will A. McGibbon) advised that official inquiries have been directed to certain countries, but no country has bilaterally confirmed that it objects to international radiocommunications by their amateurs.

In summary, no banned countries list applies to USA amateurs. However, this difference between Canadian and American amateur radio regulations is interesting.

1991 Antenna Buyer's Guide

The 128-page *1991 Antenna Buyer's Guide* (number six) is available from *CQ* for $4.95, plus postage cost. The subjects covered include accessories, dealers, DX/contest antennas, HF antennas (directional, mobile, non-directional, portable, and wire), invisible antennas, manufacturers, rotators, test equipment, towers, tower regulations, tuners, and VHF/UHF antennas (directional, handheld, mobile, non-directional, and portable). Twenty-four pages of tables make it easy to compare the characteristics of most of the currently available antennas. If you are in the market for an antenna, this publication should help you decide which one to erect.

W6MEO QSL

Allan Chapman, W6MEO, is searching for a good copy of the W6MEO QSL John Lawson used during the 1940–50 era. It shows a cat motif. Allan is willing to pay all costs related to obtaining the card. His address is 5602 Raters Drive, Santa Rosa, CA 95409. If you have one of these cards, please contact Allan. You may call him collect (7 AM to 9 PM) at 707-538-4935.

Printed Aids

My previous columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, sta-

Country	Prefix	R	T	Country	Prefix	R	T
Antigua and Barbuda	VP2A	*	*	Mexico	XE		*
Argentina	LU	*	*	Monaco	3A	*	
Australia	VK	*	*	Netherlands	PA	*	
Austria	OE	*		Netherlands Antilles	PJ2-9	*	
The Bahamas	C5A	*		New Zealand	ZL	*	
Barbados	8P5	*		Nicaragua	YN	*	*
Belgium	ON	*		Norway	LA	*	
Belize	VP1	*	*	Panama	HP	*	*
Bolivia	CP	*	*	Paraguay	ZP	*	*
Botswana	A22	*		Peru	OA	*	*
Brazil	PY	*	*	Philippines	DU	*	
Canada	VE	(1)	*	Portugal	CT1/CT4	*	
Chile	CE	*	*	St. Kitts & Nevis Islands	VP2K		*
Columbia	HK	*	*	St. Lucia	J6	*	*
Costa Rica	TI	*	*	St. Vincent & The Grenadines	VP2S	*	*
Cuba	CO		*	Republic of Seychelles	S79	*	
Cyprus	5B	*		Sierra Leone	9L1	*	*
Denmark	OZ	(2)		Solomon Islands	H44	*	
Dominica	J73	*	*	Republic of South Africa	ZS	*	
Dominican Republic	HI	*	*	Spain	EA1-EA5//EA7	*	
Ecuador	HC	*	*	Suriname	PZ	*	
El Salvador	YS	*	*	Swaziland	3D5		*
Federal Islamic Republic of Comoros	D6		*	Sweden	SM	*	
Federated States of Micronesia	V63	*	*	Switzerland	HB9	*	(4)
Fiji Islands	3D2	*		Thailand	HS	*	
Finland	OH	*		Trinidad & Tobago	9Y4	*	*
France	F	(3)		Tuvalu Islands	T2	*	
The Gambia	C53		*	United Kingdom	G/GA/GI/GM/GW	(5)	(6)
Germany	DL	*		Uraguay	CX	*	*
Ghana	9G1		*	Venezuela	YV	*	*
Greece	SV	*		Yugoslavia	YU	*	
Grenada & Dependencies	J3	*	*				
Guatemala	TG	*	*				
Guyana	8R1	*	*				
Haiti	HH	*	*				
Honduras	HR	*	*				
Hong Kong	VS6	*					
Iceland	TF	*					
India	VU	*					
Indonesia	YB	*					
Republic of Ireland	EI	*					
Israel	4X	*	*				
Italy	I	*					
Jamaica	6Y5	*	*				
Japan	JA	*					
Jordan	JY	*	*				
Kiribati	T3	*					
Kuwait	9K2	*					
Liberia	EL	*	*				
Luxembourg	LX	*					

Notes

(1) No reciprocal operating permits are required between Canada and the United States.

(2) Also applies to Greenland.

(3) Also applies to French Guiana, French Polynesia (Gambier, Marquesas, Society, and Tubuai Islands, plus Tuamotu Archipelago), Guadeloupe, Ile Amsterdam, Ile Saint-Paul, Iles Crozet, Iles Kerguelan, Martinique, New Caledonia, Reunion, Saint Pierre and Miquelon, plus Wallis and Futuna Islands.

(4) USA/ITU agreement authorizes third-party traffic to be exchanged between the USA and 4U1ITU (Geneva, Switzerland) and 4U1VIC (Vienna, Austria).

(5) Reciprocal licensing also applies to Bermuda, British Virgin Islands, Cayman Islands, Falkland Islands, Gibraltar, Montserrat, Saint Helena, plus Turks and Caicos Islands.

(6) Third-party traffic my be exchanged with United Kingdom special events stations (GB prefixes), except stations with the GB3 prefix.

Table I– Countries with which we have reciprocal operating (R) and/or third-party (T) agreements.

tion, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business-size (#10) self-addressed and stamped envelope to my California address. Any single item is available at no charge to anyone who supplies a self-addressed and stamped envelope. When a single item is being requested, it is advisable to supply a large (at least 9 by 12 inch) envelope and to include a couple of extra stamps (loose in your envelope) in case extra postage is required. Some items are long. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Antenna Potpourri—Part II

Last time we got together on the antennas side of the house we discussed the Palomar Engineers High SWR Balun, Heath IntelliRotor, and Antenna Specialists antennas, among other products, plus we covered some thoughts on tower safety and discussed software of interest. This month we'll continue in the same vein. Let's get started!

Antenna Notes de W8FX

N4EDQ's Mishap. On October 10, 1990 a twister decided to pay N4EDQ's home in Eustis, Florida a windy visit. This unwelcome visitor made a very quick entrance and exit, but his 70 mph winds left a loud and clear message that he had been there.

Henry Fehrmann, N4EDQ, arrived home to see his neighbor's boat house in his cypress trees, crowding out his folded dipole. His tower was folded in half and twisted (see photo), and his tribander and rotor ended up in Lake Eustis. Fortunately, only minor damage was done to homes in the area and no injuries were reported from the twister. Let's hope that Henry doesn't receive any more unexpected visitors!

Gainesville Antenna Ban. We've followed with considerable interest municipal anti-tower ordinances, along with condominium, apartment, and deed restrictions, for some time. A few months ago an *ad hoc* amateur group outside the Gainesville, Florida area that was trying to drum up national amateur support for locals there sent us a rather dated (May 6, 1990) clipping from the *Gainesville Sun* newspaper.

The clipping told of the Gainesville city commissioners' plan to declare a 90-day moratorium on the construction of antenna towers in the city. During that three-month period the city planned to draft tighter restrictions on the building of "tall antennas" in residential districts.

Amateurs embroiled in the city's action believed that the moratorium would lead to more than just a requirement to require permits to erect a tower. They felt it would end up becoming a blanket ban on towers, and thus an intrusion into the FCC's regulation of amateur activities. On the other side of the issue, many residents asserted that tower-studded neighborhoods give such neighborhoods the look of industrial parks rather than pleasant residential zones.

Apparently, noted the anonymous group that sent me the clipping, the city council ultimately passed an ordinance that limited towers to 10 feet. Can anyone tell us the outcome of the Gainesville tower situation?

317 Poplar Drive, Millbrook, AL 36054

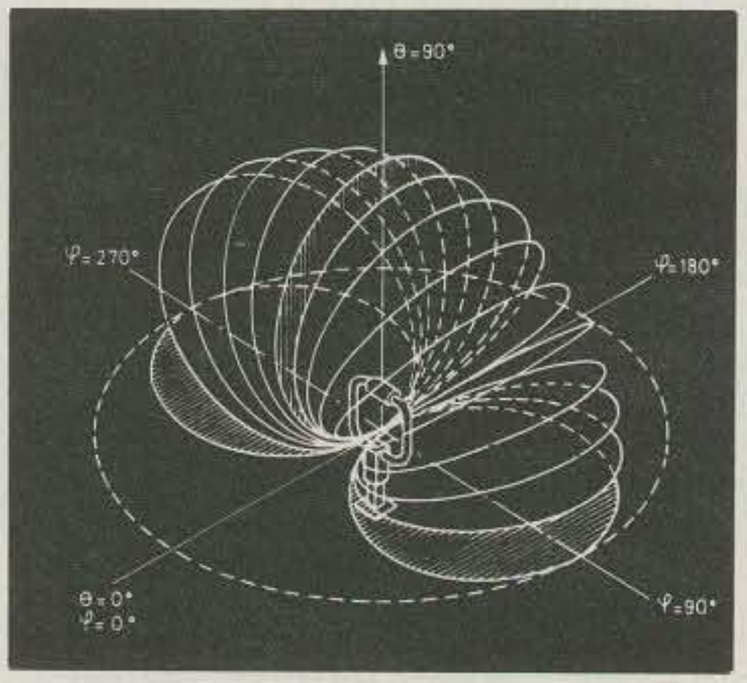


Fig. 1– An example of the semitoroidal radiation pattern of the Sabre Communications HF loop antenna. With military applications in mind, the loop's angle of radiation is designed to project a signal in the 50–250 mile "blind zone" often encountered when using whips or vertical monopoles over those distances.

Sabre Communications Loop Antennas. The antennas that Sabre Communications develops are, for the most part, designed for heavy-duty military and commercial communications rather than for the amateur market. I'm always impressed by the ruggedness and technical sophistication of the antennas described in their product literature. While such skyhooks generally carry price tags that effectively price them out of the amateur market, their technical characteristics are fascinating, and there's always the chance that a rugged commercial or military product will best fill some amateur's needs if price is not a consideration.

One of Sabre's recent announcements concerned their loop antenna systems, which are designed for short- and medium-haul communications circuits in areas of confined real estate or where co-location of antennas is a prime consideration. In addition to fixed station loops, Sabre also makes several tactical and half loop models. The tactical loops come in a knocked-down version with reusable transit cases. The half loop systems are especially designed for mounting on communications sheds and vans.

Small HF loops operate with physically small tuned frames, which typically range from 1/7 to 1/90 wavelength. The loops provide some advantages when compared with traditional HF antennas such as whips, monopoles, dipoles, and log periodics. One such advantage is high frequency selectivity, which reduces reception of off-frequency signals. Also, the semi-toroidal radiation pattern, with its slant polarization, tends to lay down a stronger signal in the 50–250 mile "blind zone" often encountered when using vertical antennas. The loops do not require a counterpoise, though its use may slightly increase antenna effectiveness.

The Sabre HF loops are designed to handle 1 KW PEP and are available in four frequency ranges of 3–28, 3–13, 2–22, and 2–12 MHz for fixed and mobile operation. They are of a small, easy-to-handle design with 5 to 7 foot sides, depending on model. The loops are microprocessor tuned in under 0.5 seconds at nearby frequencies, or in 10 seconds between extreme frequency ranges. Up to 99 frequencies may be memorized.

For more information and pricing, contact Sabre Communications Corporation, 3400 Hwy. 75 North, P.O. Box 536, Sioux City, IA 51102.

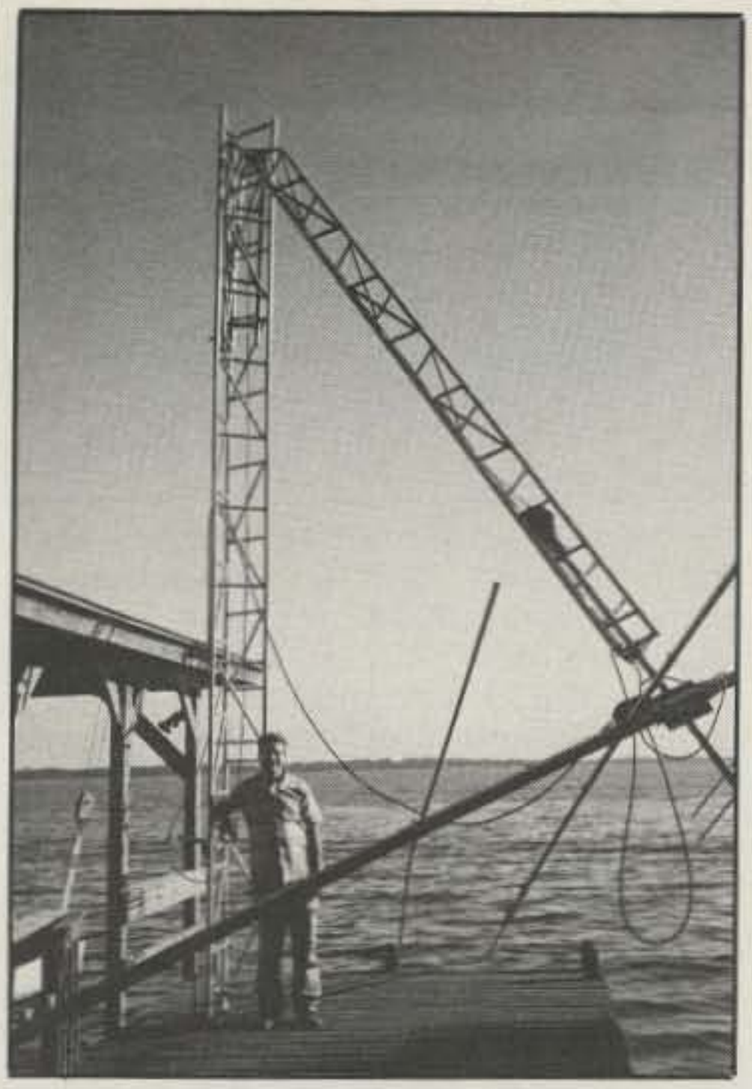
Fig. 1 shows the typical radiation pattern of one of the Sabre HF loops.

Lightning Bolt Antennas. Recently, we received some technical literature on the "Lightning Bolt" quads. Several single, dual, and multiband versions of these quads are available which cover various combinations of 6, 10, 12, 15, 17, and 20 meters. The antennas feature reinforced fiberglass spreader construction (solid or filament wound, depending on model); stainless steel hardware; aluminum boom, boom-to-mast bracket, and spiders; low wind load design; direct or multi-impedance transformer feed; nylon support lines; and an optional 2:1 balun. A triband (10/15/20 meter) boomless design is also available. Prices range from well under $100 to $675, depending on model.

Seven other models are available for 2 meters and 440 MHz, including two models that have combined coverage of the two bands. The antennas range in size from two to eight elements. They feature quarter-wave stub or direct feed, and each provides full band coverage. Models range in price from $29.95 to $189.95.

The firm also offers custom construction of Yagis, verticals, and dipoles from 2 through 80 meters. For more information, contact Lightning Bolt Antennas, RD 2, Route 19, Volant, PA 16156.

Ireland Tune-Tenna Systems. Frank Ireland, K4UUO, has introduced a series of two voltage fed antennas, one for 144 MHz and the other for 440 MHz. The Ireland antennas are designated Mini Tune-Tennas™ and are for hand-held transceivers. The idea behind the antennas is to improve the efficiency of your hand-held transceiver over and above that typically offered by the radio's standard rubber ducky or quarter-wave whip. A key feature of the antennas is that they reduce or eliminate



Here's one unlucky amateur, Henry Fehrmann, N4EDQ. Henry arrived home to see his tower was folded in half and twisted, with his tribander and rotor ending up in Lake Eustis. Fortunately, little damage was done to the homes in the area and no injuries were reported from the twister that visited its wrath around the lake. (Photo courtesy N4EDQ)

the case and human body as an integral part of the radiating system.

The heart of the antennas is the adjustable, patented "reactance cancellator," approximately 3 inches long, that enables the use of a voltage-fed halfwave antenna element with the hand-held unit. The FI-144A (144 MHz) model's whip is 39 inches when extended and 8 inches when collapsed; the FI-440A (440 MHz) model's whip is 16½ inches extended and also is 8 inches when collapsed. Both units have a claimed gain of 4.5 dBd and are priced at $59.95 each.

The same firm also offers voltage-fed antenna systems for Loran reception and cellular telephone communications, as well as 4 and 8 foot "polyphased arrays" for marine applications.

For more information, contact Tune-Tenna Systems, Inc., 5101 B N.W. 36th Avenue, Miami, FL 33142.

Heights Tower Systems. Drake Dimitry, the firm's president, sent us some literature on this Michigan company's comprehensive line of freestanding, tapered aluminum towers.

Heights towers are constructed of high tensile strength aluminum, engineered and tested to withstand a 20 lb. per sq. ft. or 80 MPH windload. Though guy wires are not required, they may be used; if installed, greater windloads and higher heights can safely be achieved. The towers feature lightweight materials and structural efficiency for easy erection and lowering. The 8 foot sections can be completely assembled on the ground, and no climbing is necessary. Foldover kits and other accessories (hinged bases, rotor shelves, bearings, aluminum masts and top sections, replacement parts, etc.) are available. Sections can be added to existing towers at any time to increase height.

In addition, the firm offers 34 variations of crank-up telescoping towers, and custom tower configurations and designs can also be created. In addition to amateur, CB, and TV use, the towers are adaptable to mount various lighting equipment, speaker/dispatch equipment, and wind-power generators.

For more information, contact Heights Tower Systems, 1721 Indian Rd., Lapeer, MI 48446.

MFJ-817 144/440 MHz Wattmeter. The "accessory kings" at MFJ are at it again with still another peak-reading cross-needle SWR/wattmeter. This latest introduction is the MFJ-817 for 144/440 MHz, priced at $79.95.

The new meter shows forward power, reflected power, and SWR at a single glance. Two power scales are provided, covering 200 or 20 watts forward power and 50 or 5 watts reflected power. The meter is illuminated and a large, two-color meter face makes across-the-room reading easy. A one-year unconditional guarantee is provided by MFJ.

For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762.

Soft Topix

YAGIMAX 2.20. There's yet another antenna design and analysis program on the market, gang. Lew Gordon, K4VX, author of the popular YAGINEC for the IBM PC and compatibles, has retired that program. In its place he now offers a new program for the same purposes.

Called YAGIMAX, Lew's newest programming effort is said to run about 50 times as fast as YAGINEC. The new program allows element-by-element optimization and generates patterns for Yagis stacked in free space in either the E or H plane. The program supports CGA, EGA, and VGA displays. On computers with EGA and VGA displays, the program can handle up to 45 elements, while on machines with CGA displays, the program can handle Yagis having up to 20 elements.

YAGIMAX, notes Lew, is not derived from the popular MININEC as was the case with his YAGINEC, but is instead based upon the premise that correctly designed Yagis have a sinusoidal current distribution that is "well behaved." For correct results, this assumption does require that the user input realistic dimensions when using YAGIMAX.

Lew admits that the YAGIMAX maximizing feature isn't perfect, but can be used on an element-by-element basis to maximize either forward gain or front-to-back (F/B) ratio. Each element change is cycled through the algorithm three times to provide a glimpse of what the VSWR is doing at preselected low and high frequencies. Each change is displayed on the screen for the user to observe. Nevertheless, the program's claimed results appear to be within 0.3 percent of those obtained with NEC2 when using ten segments or more for calculation.

Linear plotting of the results of gain, F/B ratio, and VSWR vs. frequency is provided, as is E- and H-plane plotting in both free space and over perfect ground. The algorithm used does not calculate the effect of mutual coupling between stacked antennas, but assumes they are stacked sufficiently far apart to have minimal aperture overlap and mutual interaction.

For additional information and pricing, contact Lew Gordon, K4VX, P.O. Box 105, Hannibal, MO 63401.

Two from MiniLab. MiniLab Books provides antenna design and analysis software for various computers in the form of a double-barreled offering.

MiniLab offers what it calls the Practical Antenna Design and Analysis series of 32 original computer programs. These programs are for the design of various practical antennas such as the dipole, vertical, loop, helix, horn, dish, discone, Yagi, quad, and multiband types. The programs' author is Robert P. Haviland, PE, W4MB.

This program package sports at least two antenna types for each band from MF to SHF (2 MHz through 10 GHz). The programs are said to be usable either for the design of new antennas or for detailed analysis of the performance of existing antennas. All of the programs are designed for simple input of basic design data. A companion paper volume is also available. The disk program set is priced at $39.95 and the paper copy is also $39.95; both are available for $59.95. Versions are available for the Amiga, C-64 and C-128, Apple series, and IBM PC.

MiniLab also offers MININEC for Amateurs, a three-disk set that consists of the popular MININEC 3 program plus several variations, various design programs, several ASCII support programs, instructions in the form of ASCII document files, and several datafiles for use with MININEC. The programs are in IBM PC format, and they are also available as a two-disk set for the Commodore Amiga computer. The price of either set is $39.95.

Also on tap for release this year is Volume Two of the Practical Antenna Design and Analysis package and D-PLOT. The latter is a software package to assemble, import, manipulate, analyze, and store data, and to prepare engineering summary analyses and dataplots.

For more details Contact MiniLab Books, P.O.B. 21086, Daytona Beach, FL 32019-1086.

SEEKER-PC. The new SEEKER-PC™ computer-aided communications monitoring program is designed to be an easy-to-use but extremely powerful integrated database and control program for modern communications receivers, recording equipment, and logging peripherals.

About three years ago the manufacturer, AF Systems, developed the first SEEKER for use with the Commodore 64 computer and the ICOM R-71 receiver, effectively coining the term "Computer-Aided Communications Monitoring" (CACM). The new IBM PC version of SEEKER offers a large number of enhancements over the C-64 design.

Some of the new program's key features include total manual and automated (unattended) receiver control using a pull-down menu-driven program; direct PC keyboard entry of VFO or memory channel frequencies; full mouse support; a complete database system for managing the receiver's memory channels; extended hardware compatibility through the use of receiver "driver files" that allow support of multiple receivers and the sharing of databases between receivers; and signal strength information.

Other features include automated logging of communications activities to the program's database files, tape recorder, and/or printer based on actual signal strength criteria; four operational modes; a data export/import feature for the exchange of data with popular spreadsheet and database programs; and considerably more features than we could describe here.

The current version of SEEKER-PC is intended for use with the Kenwood R-5000 receiver in conjunction with an IBM PC computer having at least 512K RAM, DOS 3.1 or higher, one available serial port, and a game port. The program is priced at $492.50 and is available from AF Systems, P.O. Box 9145, Waukegan, IL 60079-9145.

CBBS for the Amiga. Sometimes you'd never know it from looking at the range of programs we discuss in this column, but there *are* PCs other than IBM PC compatibles being used in the hamshack. The Amiga is one, and Pete Hardie, VE5VA, has done a great deal of work with the Amiga for packet operation.

Pete corresponded with us about the CBBS V6.71a Mailbox System for the Amiga, which he converted from the IBM version of CBBS, a WØRLI-like packet Bulletin Board System (BBS). The program is based on code originally written by Hank Oredson, WØRLI, who no longer supports the CBBS code, but allows it to be developed by others.

According to Pete, it's possible to run CBBS on an Amiga with as little as 512 KB of memory and one floppy drive, though with a small amount of disk space you would be limited to forwarding only mail, and not much of that. A system with a hard drive can run a full-fledged BBS with mail and bulletin forwarding and also have many file areas.

The mail limitation of the Amiga version of CBBS, notes Pete, is that it can use only one serial port and can accept only one connection at a time. He owns a Kantronics KAM "All Mode Communicator," and since it can handle HF and VHF simultaneously, CBBS can handle a connect from either VHF or HF when the KAM is used. It can also forward on VHF and HF with the KAM.

Despite some multi-tasking limitations in the Amiga, Pete finds the CBBS useful as a personal mailbox because he can use the Amiga's editor to create messages (in another window) and then "mail" the file using a CBBS command. When his BBS has outgoing mail, it calls the local BBS (which is also a CBBS system, but run on an IBM clone) and forwards it. The local BBS calls Pete and sends his mail to him if there is any. That way he doesn't tie up the local BBS while typing a message. On the local BBS or on the KAM, making a mistake means he has to terminate and kill the current message and start all over. On the Amiga, he says he can take as much time as he needs to get the message right.

Pete notes that the Amiga is much more popular in Europe than in North America, with hundreds of copies of the program being distributed on that continent. To date, he has received few North American requests for information on CBBS, and fewer still requests for the program disk. But he makes the Amiga CBBS program disk available for a very reasonable $3 in U.S. funds (no IRCs, please). For a copy, contact Pete Hardie, 567 Delaronde Rd., Saskatoon, Saskatchewan, Canada S7J 4A7. (Remember, we're talking *Amiga* here; the *IBM* version of CBBS is available from several sources, including TAPR and on Compuserve's HamNet.)

K4HAV 10-10 Contest Logging Program (1010). James D. Hardy, K4HAV, wrote to us noting that as a dedicated 10X enthusiast (10X-17605), he worked *CQ*'s Editor, Alan Dorhoffer, K2EEK (10X-48356), in the August 1990 Summer Phone 10-10 Contest. Jim also noticed that I had a 10X number, 24157, though I must confess that the press of other business has made me rather inactive in 10-10 doings. Anyway, Jim sent us a copy of his K4HAV 10-10 Contest Logging Program, also known as 1010, for the IBM PC.

We found that 1010 is a very comprehensive, specialized contest logging program that's similar in operation to the popular NA and CT contest programs, but designed for the 10-10 contest, which those programs don't cover. Jim notes that after using the program in the summer 1990 contest, and after working 805 stations, he was able to print the log and dupe sheet in less than 5 minutes!

Jim's 1010 program was designed so that CT and NA users could use 1010 without having to learn all new keystrokes. Thus, 1010 uses many of the same commands and keystrokes as the NA and CT programs. In some cases, because the contest rules are different, a function key, for example, may have a different purpose.

Some of 1010's many features include capacity for 2500 QSOs, with all information in memory and each QSO written to disk as logged; provisions for partial call checking against a built-in 10-10 database and the current log; a pop-up window for checking on whether a station has been worked or can be identified from the database; choice of online editing for the last 9 QSOs or full log editing from a window displaying 46 QSOs per screen; on-screen help; and online duping. There's also automatic DX country recognition; display for requested DX prefix or country and states need for contest WAS; update of current score, overall contest rate, and operating time; and printer support for IBM and Epson compatible printers and the HP Laserjet Series II printer.

I was quite impressed with two of the program's many features. The first of these is 1010's ability to convert the stations worked in the first contest to a database that is available for subsequent 10-10 contests. If a station has been worked in an earlier contest, then that station's information is displayed on the log screen for correction and/or confirmation. This feature saves typing and also amazes the operator at the other station when you may be able to say something like "Thanks, Bob, for the call, and nice to work you again."

As you work more contests, your personal database will grow as the new stations worked are added to the existing database, which—depending on computer memory—can contain more than 13,000 callsigns with information. There's an option to consolidate several operator's logs and databases into a larger one that should contain most of the active 10-10 contesters.

The second feature I especially liked is one that allows you to check a master list of all 10-10 numbers. To do this, the program includes a version of Gerry Gross, WA6POZ's database of all assigned 10-10 numbers. The database includes all 10X callsigns, flagged for silent keys. Also included is a fast and compact search program for efficiently accessing this database, which can be speeded up even further if you have a disk cache program or a RAM disk drive installed on your PC. Very nice, indeed, to be able to tell if a station has a 10-10 number before you work and ask him!

The 1010 program is priced at $20 and is available either on 5¼ or 3½ inch diskettes (regular or high density). A demo is available for $5 that has a limited capacity but which is creditable toward purchase. Contact Hardy Data Systems, 306 Frances St., Sylvester, GA 31791, for more information.

The MFJ-817 is a dual 144/440 MHz peak-reading, cross-needle SWR/wattmeter designed to conveniently show reflected power and SWR at a single glance. The unit offers two power scales with a two-color meter for easy viewing. (Photo courtesy MFJ Enterprises, Inc.)

Jim also tells us that he has a specialized hardcopy listing of all DX stations holding 10-10 numbers, including VE amateurs, arranged alphabetically by callsign. The 14-page list contains over 6,800 callsigns and is $5 postpaid, or $8 for DX airmail.

GEOCLOCK. In the February column we passed on a reader's tip on a very useful shareware program of interest to DXers. The program was GEOCLOCK® , similar to the commercial programs DX EDGE and TERMINATOR, both of which we have discussed in previous columns. We now have more information on GEOCLOCK that we'd like to share with you.

To briefly review, GEOCLOCK shows the current time, based on the computer's system clock, on a high-quality map of the earth. The sun's position is displayed, and the parts of the earth in sunlight and twilight are highlighted. This display is automatically updated every few seconds. A variety of map backgrounds and other options are available.

I think the maps are particularly interesting. They are said to be among the highest quality available without special hardware, being produced by a custom database and software system. The database contains approximately 5.7 million vectors covering coastlines, islands, lakes, rivers, and similar geologic features, along with political boundaries. The maps cover the entire earth, and included features are said to be accurate to approximately 600 meters. A supplemental map disk is also offered as an option.

A "Ham Package" add-in is now available to provide special functions for amateur radio use that enhance GEOCLOCK's use as a DX and contest grayline software package. The add-in software provides geographical display of remote station location, propagation path, and D- and F-layer illumination, together with key location, pointing, distance, and time data. The package includes a custom azimuthal-equidistant map centered on your station's QTH, a callsign database, and utility programs. Developed by Eric Scace, K3NA, amateur functions include the ability for the user to maintain the callsign database; short and long great circle path, azimuth, and range; remote station location and reciprocal azimuth; UTC, local, and remote station local time; DXCC, CQ, ITU, and other designations; and continent, area, and location names.

While GEOCLOCK supports many different video display adapters (including CGA, Hercules, and several others), it's primarily intend-

ed for EGA, VGA, Super VGA displays. The Ham Package add-in requires one of these three displays on your PC, which needs 512K RAM and a hard disk for proper operation.

The basic GEOCLOCK program is $30 on 360K 5¼ inch diskettes, with an additional $5 charge for 720K 3½ inch diskettes. The ham package is $30 and requires that you provide your callsign and QTH. Details on the programs, options, computer requirements, and pricing are available from GEOCLOCK, P.O. Box 5112, Arlington, VA 22205. (A free BBS provides support for all GEOCLOCK users, with higher levels of access provided for registered users. The BBS also has the latest shareware version of the program available for downloading. You can reach it at 703-241-7980.)

GGTE Morse Tutor. For several years we've noticed that the GGTE Morse Tutor has been heavily advertised in the amateur press and has been the subject of several good reviews in *QST, 73 Amateur Radio, World Radio,* and the *W5YI Report.* We understand, too, that the $19.95 program has more than 6,000 users. Warren Hoffnung, KF6VV, has come out with an upgraded IBM PC product, Morse Tutor—Advanced Edition, which offers Morse instruction from beginner to Extra Class in easy, self-paced lessons.

Some of the features of the new version include code speeds from 1 to over 100 WPM; standard or Farnsworth mode; adjustable tone frequency; on-screen flashcards; random character review for each lesson, including previous lessons; random words for each lesson; over 1 billion random conversations (QSOs); ability to create custom drills and exams; exam conformance to FCC requirements; and on-screen display of character usage and message duration at the selected code speed. Other features include importation and conversion of test files to Morse Code; on-screen analysis of drills and computer generated QSOs; and much more.

The Advanced Edition is designed for use with the IBM PC and compatibles, including laptops having plasma and LCD screens, having at least 235K free RAM. The program is available from dealers, the ARRL, the Heath Company, or directly from GGTE. The price is $29.95 plus shipping and handling (the original Morse Tutor is still available for $19.95).

For more information, contact GGTE, P.O. Box 3405, Newport Beach, CA 92659.

Short Bursts

Disk Tips. Those little but high-capacity 3½ inch, "not-so-floppy," semi-rigid diskettes are rapidly taking the place of the easy-to-damage 5¼ inch floppies. Thus, the following tips for properly handling disks mostly apply to the older 5¼ inch floppies, but some of them apply to all disks.

1. Take care when transporting your disks, especially the 5¼ inch floppies. Don't flatten the disks, which can grind the outer cover into the disk's delicate magnetic surface. Take care to protect them in a special cardboard disk mailer when entrusting them to the post office.

2. Carefully insert disks into your floppy drive. Why? You can easily bend the 5¼ inch floppies if you're in too much of a hurry to insert them.

3. Don't subject your disks to excessively high or low temperatures. Be especially careful about leaving disks in a vehicle on a hot day, since the disks can warp.

4. Don't write on a disk with a ballpoint pen or pencil. Instead, use a soft felt-tip pen, or better yet, write on the label before placing it on the disk.

5. Keep your fingers off the magnetic recording surface, since a fingerprint or scratch can easily make the data unreadable.

6. Keep your disks well out of the way of magnetic fields, such as those produced by your video monitor, telephone, radio and TV speakers, and magnets in general. Be especially careful around airport and library security devices, which have the capability of instantly zapping the magnetic data on disks.

7. Store your disks carefully, keeping them well away from hazards such as coffee spills, cigarette ash, and curious pets.

8. Use write-protect tabs on disks when you don't want your computer to alter the disk's contents, such as when checking out new programs. (On 3½ inch floppies, a little slide tab performs the same function as paper write-protect tabs on 5¼ inch disks. When your view through the little rectangular hole is blacked out, you can write to the disk; if you can see through the hole, you're prevented from writing to the disk.)

Wrapping It Up

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

Overheard: The most expensive component in any circuit is always the one that breaks.

73, Karl, W8FX

WASHINGTON READOUT

BY FREDERICK O. MAIA, W5YI

REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

WARC-92 Could Impact Amateur Spectrum 150 Nations To Meet February 3rd in Spain

In about six months the International Telecommunication Union (ITU) will be convening the 1992 World Administrative Radio Conference. It starts on February 3rd and is scheduled to last a month in Barcelona, Spain. The results could have a big impact on amateur radio in the United States.

International Radio Regulation

Radio can be used for so many different things at the same time—even in the same place. This is because radio waves have a property known as *wavelength*. The entire range of different wavelengths are called the *radio spectrum*. While many stations on different frequencies can operate in the same geographical area at the same time, as a general rule only one station can operate without interference on any one frequency in a given area. (There are a few exceptions, such as "spread spectrum" modulation, which can effectively utilize wavelengths already in use without interference.)

Different radio wavelengths offer various propagation—or distance characteristics. Some radio frequencies hug the ground and their range is basically local in scope, while others offer worldwide communications capability since they can be returned from the heavens.

High-frequency signals can be bounced off of the ionosphere, the electrified layers in the earth's outer atmosphere, and returned thousands of miles away—even in another country. The high-frequency band is the range of frequencies extending from 3 to 30 MHz. Not only high-frequency signals have worldwide communications capability; very short radio wavelengths can pierce these layers and be captured and "downlinked" back to earth from orbiting satellites.

Since radio waves do not respect international boundaries, it became apparent decades ago that international control of the radio spectrum was a necessity. Otherwise, transmissions of one nation would jam those of another. The purpose of this global organization would be to set the standards for acceptable international radio operation.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101

The ITU

National governments enact and enforce radio laws within a framework of international agreements, both regional and worldwide in scope. The governing body over worldwide frequency allocations is the International Telecommunications Union (ITU) headquartered in Switzerland. ITU membership numbers more than 150 nations.

The ITU was formed in 1865 by some 20 European nations in order to expedite delivery of telegrams across international boundaries. The system in use at that time was simply to hand messages to other telegraph operators at their borders. Telephone regulation was added to ITU (then the International Telegraph Union) responsibilities in 1885, and radio communication was added in 1906. The ITU made their first radio frequency allocations in 1927.

In 1932 the name "International Telecommunication Union" was adopted to reflect the expanded responsibilities of the organization. In 1947 the ITU became a specialized agency of the United Nations. Its headquarters were moved from Berne to Geneva, Switzerland in 1948. The most important function of the ITU is the registration and allocation of radio frequencies to eliminate harmful interference between stations in different countries.

The FCC

In the United States the *Communications Act of 1934* controls telecommunications. This act established the *Federal Communications Commission (FCC)*, an independent governmental agency, responsible for regulation of all wire and radio communication. The FCC is required to govern within the confines of international telecommunication agreements to which our country is a party. The FCC primarily regulates transmitting stations, although there are a few restrictions on the reception of signals. You aren't allowed to listen to and divulge certain private communications, for example.

The FCC allocates frequency bands for the various radio services, determines frequencies to be used by individual stations, and licenses individual stations. Government radio stations are handled by a different agency, the *National Telecommunications and Information Administration (NTIA)*.

Operation of the FCC is conducted in accordance with the *Communications Act*, the *Administrative Procedures Act*, which specifies how statutes are changed, and other laws of Congress. The FCC is directed by five Commissioners who are appointed by the President and approved by the Senate for a term of five years. No more than three Commissioners may be members of the same political party. The President designates one Commissioner as chairman.

The FCC staff is organized into administrative bureaus, each having a different function. The amateur service is regulated by the Personal Radio Branch, a section of the FCC's Special Service Division which falls under the Private Radio Bureau.

Frequency Allocations

Allocation of radio frequencies consists of dividing the spectrum into a number of segments or bands. Each band is reserved for a specific use. The band assignments are influenced by the behavior of radio waves at different levels. Long-distance HF frequencies, for example, are allocated to services requiring international communications potential. The ITU's allocation plan divides the globe into three geographical areas. North and South America fall into ITU Region 2.

Callsigns

To assist in the enforcement of radio regulations, transmitting stations are generally required to identify themselves with a radio callsign—a series of letters and numbers. The callsign prefix identifies

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General Coverage HF XCVR, 110W. Available Without The Autotuner. Available All Mode DSP ..... **Call!!**

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AT-440	TS-440 Autotuner	**Call**	R-5000	HF Receiver	**Call**	TM-941	Triband Mobile	**Call**
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HS-5	Headphones	**Call**	SP-31	External Spkr	**Call**	TM-731	2m/440 Mobile	**Call**
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DSP-100	Digital Signal Unit	**Call**	SP-940	External Spkr	**Call**	TR-751	2m All Mode	**Call**
PC-1A	Phone Patch	**Call**	TH-26	2m Small HT	**Call**	TS-140S	HF Mobile	**Call**
PS-50	Power Supply	**Call**	TH-27	2m Tiny HT	**Call**	TS-680S	HF & 6m Mobile	**Call**
PS-430	Power Supply	**Call**	TH-77	2m/440 Tiny HT	**Call**	TS-790	Dual Band Base	**Call**

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Digital, 200W, Dual RX, Deluxe and Standard Models Are Available. A Top Performer. ..... **Call!**

FT-990	HF XCVR	**Call**
FT-767	HF XCVR	**Call**
FT-757	FX Mobile Rig	**Call**
FT-747	HF Mobile Rig	**Call**
FT-736	V/UHF Xcvr	**Call!**
FT-5400	2m Mobl Xcvr	**Call!**
FT-290	2m All Mode	**Call!**
FT-470	V/UHF HT	**Call!**
FT-411	2m HT	**Call!**

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Call For AEA Items Not Listed

ALINCO

DR-590T	2m/440 Mobile	**Call!**
DR-570T	2m/440 Mobile	**Call!**
DR-112T	2m 45W Mobile	**Call!**
DJ-120T	2m Tiny HT	**Call!**
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DJ-560T	2m/440 HT	**Call!**

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AL-1200	1500W HF Linear Amp	
AL-82	1500W HF Linear Amp	
AL-80	1000W HF Linear Amp	
AL-811	600W HF Linear Amp	
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RCS-8	Remote Coax Switch	

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FREE SHIPPING

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RS7A	5	7	59.00
RS12A	9	12	79.00
RS20A	16	20	99.00
RS20M	16	20	119.00
RS35A	27	35	159.00
RS35M	27	35	179.00
VS-35M	27	35	179.00

M Models w/ Amp & Volt Meter, V Models Have Variable Output.

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IC-765	HF Xcvr	**Call!**
IC-751A	HF Xcvr	**Call!**
IC-735	HF Xcvr	**Call!**
IC-726	HF Xcvr (w/ 6m)	**Call!**
IC-725	HF Xcvr	**Call!**
IC-970	All Mode Base	**Call!**
IC-2400	2m/440 Mobile	**Call!**
IC-229A	2m 25W Mobile	**Call!**
IC-229H	2m 45W Mobile	**Call!**
IC-32AT	2m/440 5W HT	**Call!**
IC-24AT	2m/440 Tiny HT	**Call!**
IC-2GAT	2m 7W HT	**Call!**
IC-2SAT	2m Tiny HT	**Call!**

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407/401B	CW Keyers	69/49
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DX-SWL	Shortwave dipole	69.95
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HG52SS	52'	9 Sq.'
HG54HD	54'	16 Sq.'
HG70HD	70'	16 Sq.'

DX-88	8 Band Vertical	**Call!**
EX-14	Triband Beam	**Call!**
TH7DX	7 El. Triband	**Call!**
18HT	80-10 Vertical	**Call!**
64BS	4 El 6m Beam	**Call!**
105BAS	5 El 10m Beam	**Call!**
155BAS	5 El 15m Beam	**Call!**
204BAS	4 El 20m Beam	**Call!**
205BAS	5 El 20m Beam	**Call!**

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AP8	8 Band Vertical
ARX2B	2m Vertical
AR270	2m/440 Vertical
A3S	3 Element Triband Beam
A3WS	WARC Triband Beam
A449-6	6 El. 450 ATV Beam
A4S	4 Element Triband Beam
R5	5 Band No Radial Vertical
215WB	15 El. 2m Beam
230WB	30 El. 2m Beam
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TX-455	21'0"	55 FT	18 SQ. FT	1385
TX-472	23'8"	72 FT	18 SQ. FT	2279
TX-489	24'4"	89 FT	18 SQ. FT	3959
HDX-538	22'6"	38 FT	30 SQ. FT	1179
HDX-555	22'0"	55 FT	30 SQ. FT	2079
HDX-572	23'8"	72 FT	30 SQ. FT	3559
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PHILLYSTRAN

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2100 END KIT	4.00
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.18	49	75	89	109	149
.25	n/a	n/a	129	n/a	249

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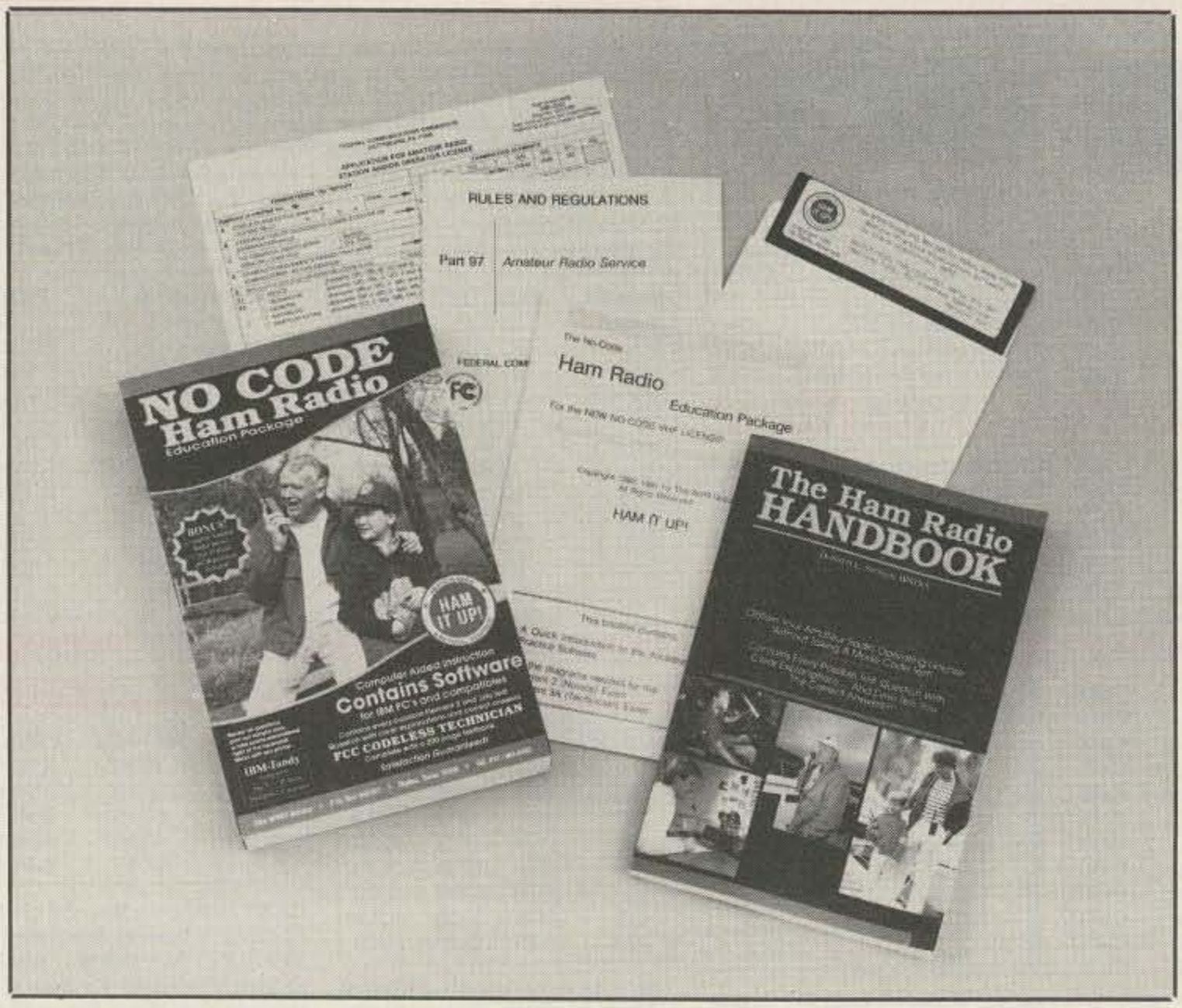


"No-Code Ham Radio Education Package" available from the W5YI Group.

the country in which the station is authorized to operate. The United States is authorized callsigns starting with K, N, W, and certain "A" prefixes.

Amateur Radio Allocations

The amateur service is the oldest radio service, since there were radio experimenters long before there were professionals. Basically, amateurs are hobbyists who enjoy communicating by radio. As a general rule, the amateur radio bands of every nation are on the same frequencies, which permits communication with others of similar interest around the world. Amateurs are just that: They may not receive material compensation for the use of their stations.

Amateur licenses are issued in several classes, and this is known as the incentive system. The idea is to encourage amateurs to learn more about telecommunications so that they may progress to the next license class which yields more privileges. Amateur licenses are obtained on the basis of increasingly difficult examinations. The license term is ten years.

WARC

Every 20 years or so the ITU convenes a major conference to revise the radio regulations. The last general conference was held in 1979 and resulted in new amateur allocations at 10, 18, and 24 MHz. Conferences with limited agendas are held more often. The next is scheduled for early next year.

The 1992 World Administrative Radio Conference (WARC-92) will look at international broadcasting allocations at 40 meters. The amateur service has a worldwide exclusive allocation between 7000–7100 kHz. Only Region 2, North and South America, has an amateur spectrum allocation between 7100 and 7300 kHz. The rest of the world uses this segment for international broadcasting. Therein lies the problem—incompatibility.

Amateur radio and international broadcasting do not make good sharing partners—particularly at night when propagation improves. One gets in the way of the other. And international broadcasting supporters also say they are crowded and need more spectrum. Some want our Region Two 7000–7100 kHz segment. It will all be resolved early next year.

The FCC has suggested that perhaps the 40 meter amateur band could be shifted from 7000–7300 down 100 kHz to 6900–7200 kHz. International broadcasting could start at 7200 kHz and extend to 7525 kHz. This would give broadcasting a 325 kHz allocation instead of the present 200 kHz. That appears acceptable to US amateurs, since it would mean no loss of spectrum. We would still have 300 kHz. But nations in the rest of the world may not agree—especially when only amateurs in our hemisphere have more than 100 kHz at 40 meters.

We also understand there is potential danger to our other high-frequency allocations between 3.5 and 28 MHz. The ITU nations will also be looking for a home for low-earth-orbiting (LEO) satellites—probably between 137 and 150 MHz. We also heard that some consideration is being given to a 420–421 MHz downlink for LEO satellites—another amateur band.

Satellite Bands

One of the agenda items of WARC-92 is to consider defining new space radio services. The American Radio Relay League (ARRL) and the Radio Amateur Satellite Corporation (AMSAT) are gravely concerned about possible changes to the 2.4 GHz amateur spectrum, especially 2400–2450 MHz used by OSCAR satellite downlinks. Amateur radio operators use the 2300–2310 and 2390–2450 MHz segments only on a secondary basis (2300–2450 MHz is internationally allocated to the Fixed, Mobile, and Radiolocation Services on a primary basis).

The FCC has been trying to find frequency space for digital audio broadcasting (DAB), especially audio via satellite. The three bands the Commission is looking at as the home for digital audio broad-

		Element				
	Topics	**2**	**3A**	**3B**	**4A**	**4B**
A:	FCC Rules	10	5	4	6	8
B:	Operating Procedures	2	3	3	1	4
C:	Radio Wave Propagation	1	3	3	2	2
D:	Electrical Principles	4	2	2	10	6
E:	Amateur Radio Practices	4	4	5	4	4
F:	Amateur Station Equipment	2	2	1	6	4
G:	Practical Circuits	2	1	1	10	4
H:	Signals and Emissions	2	2	2	6	4
I:	Antennas and Feedlines	3	3	4	5	4
Total Questions on Test		**30**	**25**	**25**	**50**	**40**
Passing Mark on Test		**22**	**19**	**19**	**37**	**30**

Table I– Topics and number of questions required in each question set for the appropriate written exam element.

casting are 728–788, 1493–1525, and 2390–2450 MHz.

We will keep you posted on progress toward a US position at WARC-92. But even then, there could be a campaign by the rest of the world that could lead to reduced amateur spectrum.

From the Mail Bag

Let's answer a few of your questions. . . .

I recently purchased a Technician Class study guide, but it did not contain all the questions I was asked in the test.

The new Codeless Technician Class amateur examination actually consists of all questions from the both the Novice (Element 2) and Technician (Element 3A) question pools—a total of nearly 700 questions. You probably just got the study manual for Element 3(A) and not Element 2. Some of the newer manuals for the Codeless Technician have all questions.

By the way, if you have an IBM-compatible personal computer, we have a *No-Code Ham Radio Education Package* that not only contains a 200-page handbook covering all 694 actual questions with clear, concise explanations of the answers, but also has software (5¼ inch disk) that allows you to study for the exam right at your PC keyboard. You can take sample tests which are graded by the computer, or print out tests. A complete Part 97 FCC Rules and Regulations, software documentation, and Form 610 Application for Amateur Radio License are also included. Cost is $21.95 postpaid from: The W5YI Group, P.O. Box 565101, Dallas, TX 75356. VISA/MasterCard orders go to 1-800-669-9594 (toll free). If you just want the *Ham Radio Handbook,* which covers all questions, multiple choices, answers, and explanations for the Codeless Technician without the software and Part 97, the cost is $11.95 postpaid.

How do I get the new Communicator amateur license and what are the privileges?

The FCC originally proposed a Communicator code-free amateur class that would yield all amateur bands above 222 MHz, but did not adopt their proposal. Instead they merely eliminated the 5 words-per-minute Morse Code exam from the Technician Class. There are now two entry classes into amateur radio: the Novice and the Codeless Technician. The privileges of the Codeless Technician include all bands at 6 meters and higher frequencies, including the popular 2 meter amateur band.

The only difference between the old Technician (now called Tech Plus, for Technician plus code) and the new Codeless Technician is HF privileges. Novices and Tech Plus licensees obtain certain high-frequency telegraphy bands and a portion of 10 meters for voice operation. Codeless Technicians are restricted to operation above 30 MHz. They can, however, use all modes at full amateur power.

Is it legal for a Codeless Technician to practice telegraphy on the air even though he/she has not passed a Morse code test?

Yes, it is. An amateur may transmit telegraphy on any frequency authorized to the control operator (§97.305). That means the CW (Morse code) must be transmitted on amateur spectrum at the 6 meter and higher frequency bands. Tone-modulated Morse code (MCW) may also be used. There is no requirement that a Codeless Technician must pass a telegraphy examination to operate CW.

May two General Class examiners administer the Novice written portion of the Codeless Technician Class?

Two volunteer examiners (VEs), General or higher class who need not be accredited by a VEC, may administer Element 2 and/or the 5 words-per-minute code test. This examination is administered under the Novice testing program. If you do not pass both elements, they will give the application Form 610 back to you certifying that you passed one portion. You may use this as evidence that you have already completed one exam element.

If you apply for the Codeless Technician at a three VE, VEC coordinated testing session, you will only be administered the 30-question Element 3(A) if you have already passed the Novice written (Element 2) exam at a two VE Novice program test session. The Form 610 from the previous two VE test session will serve as your Certificate of Successful Completion of Examination (CSCE).

A word of caution, however. Once you have passed the Codeless Technician requirements—that is, Novice Element 2 and Technician 3(A)—you must also pass the 5 words-per-minute telegraphy examination at a three VE/VEC test session. You cannot go back and take the 5 wpm code test under the two VE Novice testing program once you complete the Codeless Technician requirements. Section §97.511(a) specifically requires examinations for the Technician (and a Tech Plus is still a Technician) to be coordinated by a VEC.

By the way, it appears that the new Codeless Technician Class is doing very well! The FCC released preliminary April 1991 licensing information showing that the number of new Novices has pretty much stayed the same, while the number of new Technicians has more than doubled. Total amount of new licensees has also substantially increased.

What do the amateur radio examination questions cover? Who makes up the tests?

The various examinations consist of questions selected from various question pools. Each question pool contains about ten times as many questions as will be selected for your test. Your volunteer examiner will select a certain number of questions from each of the nine topics, or sub-elements.

There are 25 questions on the Novice/Element 2 written exam, 30 on the Technician/Element 3A, 25 General/3B, 50 Advanced/4A, and 40 Extra Class/4B. Codeless Technicians must pass the 30-question Novice written Element 2 and 25-question Technician written Element 3(A). If both sections are not passed, the applicant receives a credit slip good for one year and only will be administered the portion he/she did not pass.

The topics and number of questions required in each question set are listed in Table I for the appropriate written examination element.

There are three different Morse code tests—5, 13, and 20 words per minute, which are required for the Novice, General, and Extra Class levels, respectively. These tests generally consist of transcribing typical amateur radio telegraphy communications. You will probably not be given a hand sending test, only a code receiving test. There are many ways to pass depending upon the scoring mechanism employed by the VE team. Some require one minute solid copy, others answering 7 out of 10 questions, filling in blanks, etc. All tests may be obtained by the VE from their coordinating VEC, a qualified supplier or prepared by the examiner.

PACKET USER'S NOTEBOOK

BY BUCK ROGERS, K4ABT

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

From The Mailbox

It's as if someone had broadcast my address to all points of the globe. The mail is arriving from every country around the world. I don't mind receiving mail. As a matter of fact, I love it. I enjoy the many QSLs and picture postcards that portray the beautiful sights in other countries.

More and more, SASEs make up a large portion of my mail. Although most of the SASEs are just that—self-adressed and stamped with the correct postage—a lot of mail has envelopes addressed for return, but the sender forgot to include postage. Others ask for return information, but do not include an envelope or postage. There are a few that don't supply even a return address. As I've stated in the past, I cannot furnish postage and provide envelopes to answer all the mail that requests return information.

The amount of mail I'm receiving now offers strong evidence that this column is indeed read by more packeteers than any other packet publication. We plan to keep the information about packet flowing from as many sources as possible on as many topics as possible.

Simple arithmetic will confirm that it doesn't take many 29 cent stamps to dent one's "cookie jar." This is the reason why I ask for your help with the SASEs. I handle the SASE requests personally. Each weekend on Sunday afternoon (and nowadays into the evening) I close the door to the study, switch off the telephone, and proceed with reading and answering your letters. Believe me, the mail has reached such a proportion that I have purchased an automatic letter opener.

I love the hamfest season, and even more I enjoy the warm and courteous receptions at the packet forums and lectures we conduct at hamfests, users groups, and club meetings. These meetings provide me with a base for a question pool and the items which need addressing in this column. In addition, the letters I receive from readers also contribute to the topic base. From here I conduct a mini-survey that gives me an idea of the kind of information I need to address in this column.

c/o CQ magazine

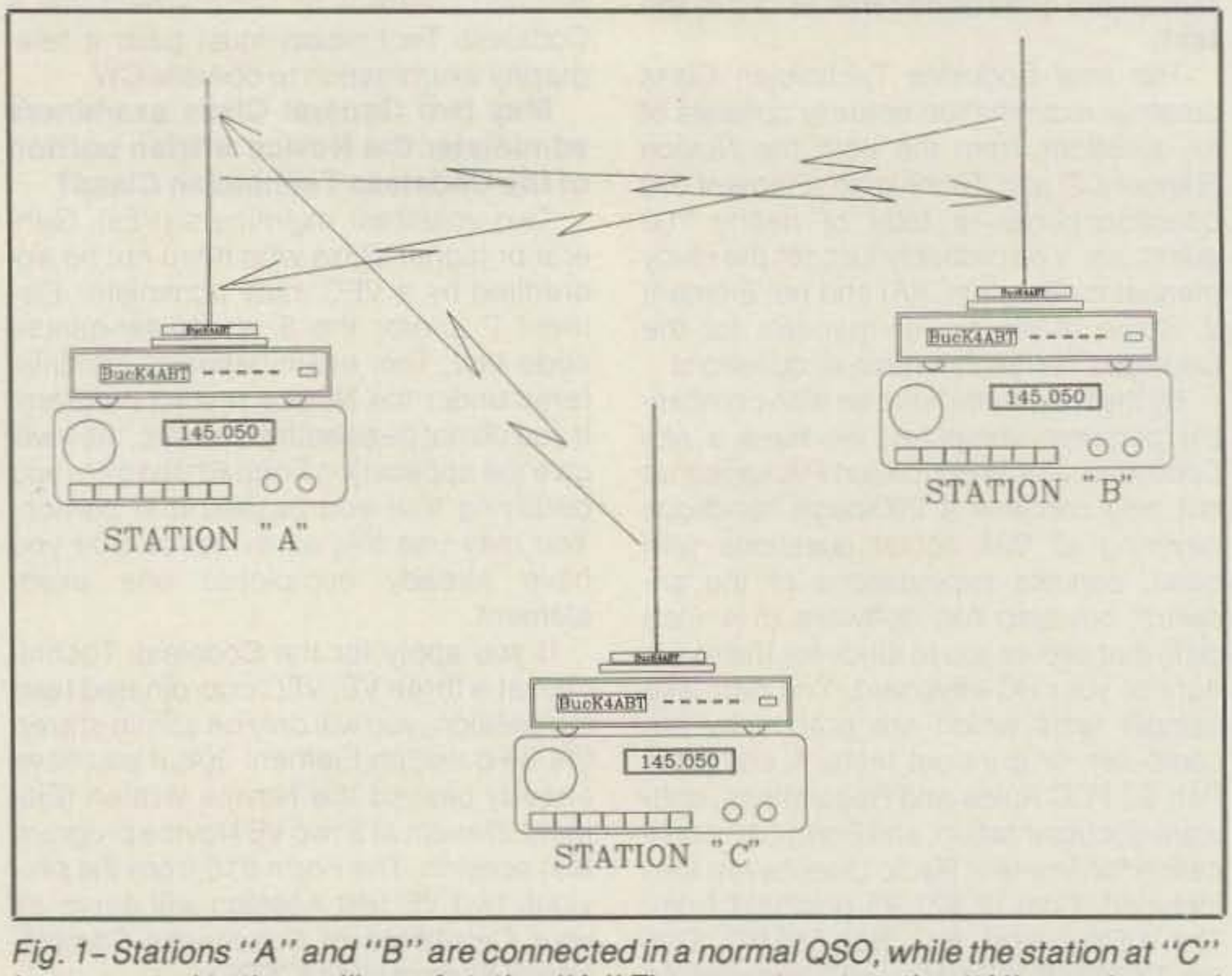


Fig. 1–Stations "A" and "B" are connected in a normal QSO, while the station at "C" is connected to the mailbox of station "A." The operator at station "A" can also read the mail left in the mailbox while connected to station "B."

From The Mailbox

Paul Zukin, W6OVW, of Piedmont, California wrote a letter to tell about one of his recent encounters. It concerns a problem he and several other readers have written about recently.

Seems Paul's problem was centered around the MAC SE and the Kantronics KAM. He had some difficulty returning to the COMMAND (**CMD:**) mode after using AMTOR. He tried the approach that was recommended in the KAM manual using the **Ctrl-C** followed by the letter **X**, but nothing happened.

Paul called Kantronics Technical Support and was unable to resolve the problem at that level. Kantronics Tech Support did mention that the problem appeared to be related to timing.

Paul's friend Mike Shumacher, KF6YL, who also uses a MAC, the KAM, and "White Knight" terminal software uses macros as if they are second nature, according to Paul. Mike has set up a gaggle of macros to perform multiple functions. (A macro is several keyboard functions that are chained together in a batch that can be executed with a single or double keystroke.) After talking with Mike about the AMTOR exit problem, Paul discovered that Mike was using a macro to exit AMTOR into the command mode and had not experienced the problems that Paul had.

At Mike's suggestion, Paul set up a macro similar to the one used by Mike. Next he entered the AMTOR mode and executed the macro that he had built and saved. He executed the AMTOR mode and operated for a short time. Next he invoked the macro which should take the KAM from the AMTOR mode to the command mode. Bingo, it worked! And it worked not just once, but each time the macro was executed.

It is obvious that the macro is so precise in the execution process that no timing differences can occur. In any case,

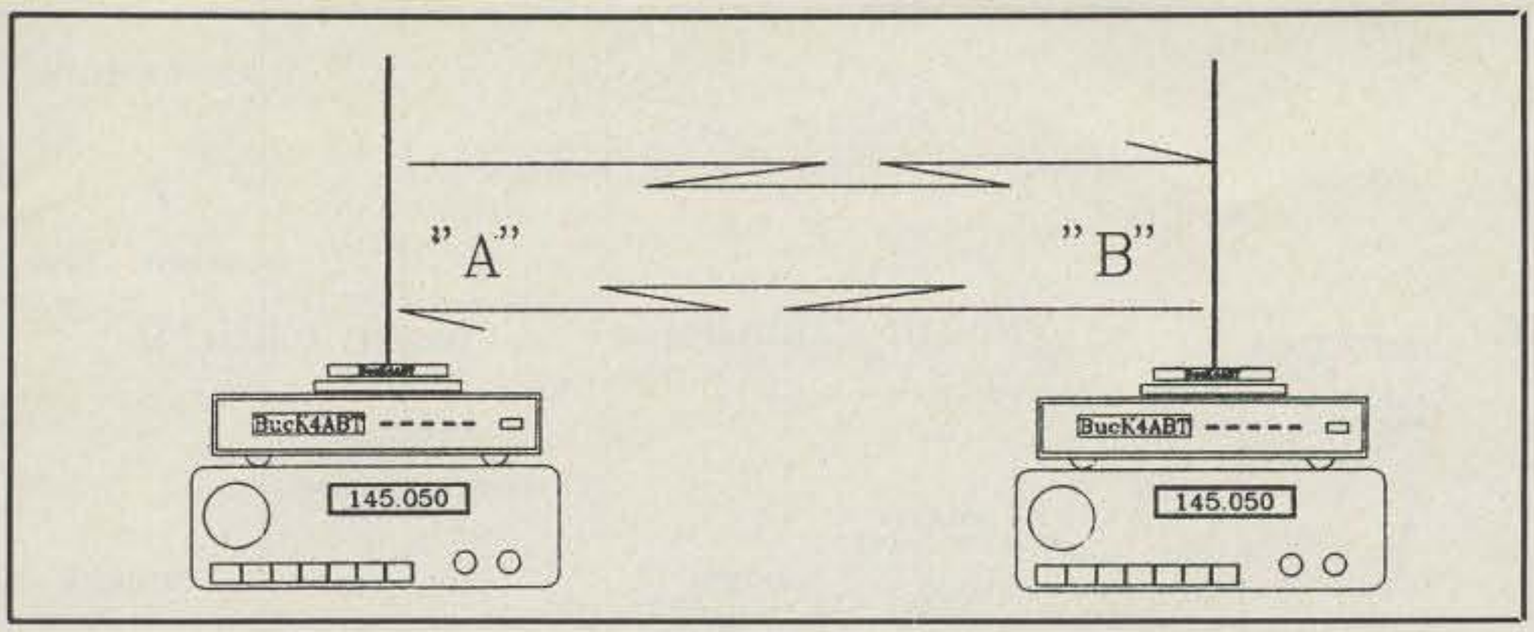


Fig. 2– It is not uncommon for two stations to connect to the mailbox of each other's station. With the mailbox or PBMonitor command ON, the operator is aware that another station is connected to the PBBS/mailbox.

the exit from any mode to the command mode is now done by macros at the W6OVW digital station. Thanks, Paul, for a timely solution to a problem that has been experienced by several readers of this column.

Need More Audio From The PK232 To The TS-440?

Bill, near Aiken, South Carolina, told me about a problem he had run into while trying to mate the PK-232 to the Kenwood TS-440. Seems the output from the PK-232 was not of sufficient level to drive the TS-440.

I remember a message that was posted on Dan's (WA4BRO) BBS here in Atlanta. It covered that very same subject. I'm not sure who is to receive credit for coming up with this solution, but I will say that the unnamed message was graciously relayed by Jim, KB3PU @ N3LA in Pennsylvania. In response to Bill's letter, and other TS-440/PK232 owners, the following text could solve your low audio problem.

Audio from the TNC is on the order of 170 mV at maximum. Assuming you use port two of the PK-232 to feed the TS-440, clip one end of **R152** in the TNC. This removes the resistor from the circuit. Clip only one end of the resistor so that it may be soldered at a later date should the need arise. Place a jumper across **R160**, effectively shorting it. A small piece (No. 20 or 22) of tinned bare wire soldered parallel to the resistor will do nicely.

When soldering near traces that are close, use extreme care not to "bridge" any connections or lands. Beneath the circuit board locate the *ungrounded* end of **R151**. Cut or detach the land from the "TX Audio" port of the PK-232 Radio Port one (1). Solder a resistor of the same value as **R160** across the break or cut. The TS-440 requires approximately 500 mV of audio. This modification will provide almost twice that amount, or around 1000 mV peak (1 volt). This mod is harmless, yet this caution applies: *Proceed at your own risk.*

If you prefer, a similar application can be facilitated without these mods by using the AFSK I/O and **Remote** connectors of the TS-440. This tip is supplied by Tom, KE2KQ.

First he says the PK 232MBX is connected to the AFSK I/O, and the **Remote** connectors. In this connection the drive from the PK-232MBX is more than adequate. He reports that it may be necessary to back off the AFSK level by about a quarter of a turn. This makes the adjustment of the **Mic Gain** easier to handle on the TS-440. Then setting the **Mic Gain** control to about 25%, he is able to achieve full power when the data is sent (transmitted).

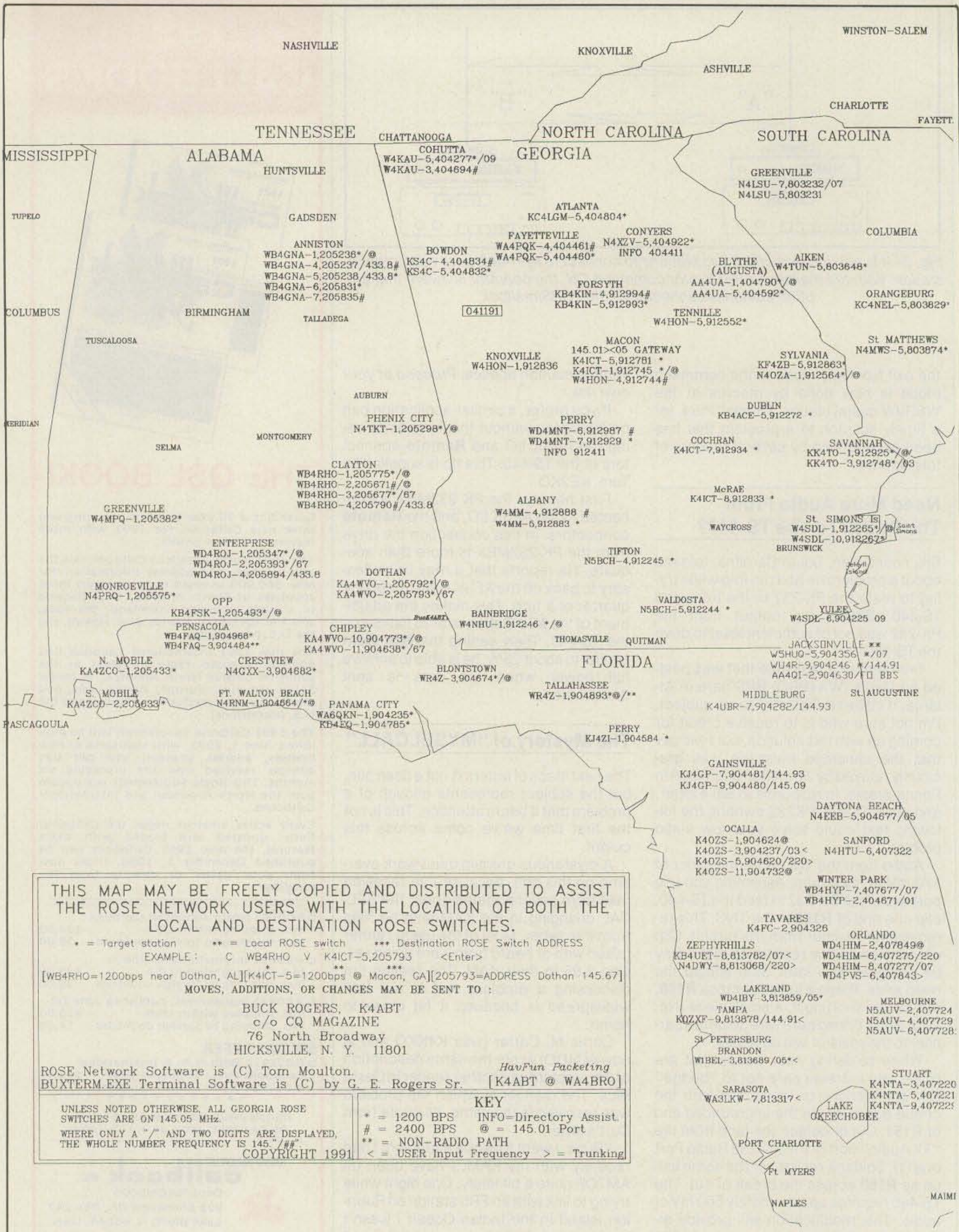
The Mystery of "MYSELCALL"

The next stack of letters is not a deep pile, but the subject represents enough of a problem that it bears attention. This is not the first time we've come across this culprit.

A mysterious gremlin must work overtime on this one, because I've received mail from several states about the SELCAL changing in the KAM with no help from the owner. Most of the users I either talked with or heard from were using version 2.85 in their KAM. The reason I'm discussing a problem that is not that widespread is because it hit close to home.

Curtis M. Carter (was K4KKQ and is now AC4DO) wrote the same description of the problem as another reader in Costa Rica. The manner in which the problem was resolved is the same. I'll quote from Curt's letter:

"Buck, I want to relate a problem I had recently with my KAM. I have been on AMTOR quite a bit lately. One night while trying to link with an FR5 station on Reunion Island in the Indian Ocean I wasn't having much luck. It was sporadic, and according to what I understand about



THIS MAP MAY BE FREELY COPIED AND DISTRIBUTED TO ASSIST THE ROSE NETWORK USERS WITH THE LOCATION OF BOTH THE LOCAL AND DESTINATION ROSE SWITCHES.

* = Target station ** = Local ROSE switch *** Destination ROSE Switch ADDRESS

EXAMPLE: C WB4RHO V K4ICT-5,205793 <Enter>

* ** ***

[WB4RHO=1200bps near Dothan, AL][K4ICT-5=1200bps @ Macon, GA][205793=ADDRESS Dothan 145.67]

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KEY

* = 1200 BPS INFO=Directory Assist.
\# = 2400 BPS @ = 145.01 Port
** = NON-RADIO PATH
< = USER Input Frequency > = Trunking

Fig. 3– The SouthNet ROSE network map.

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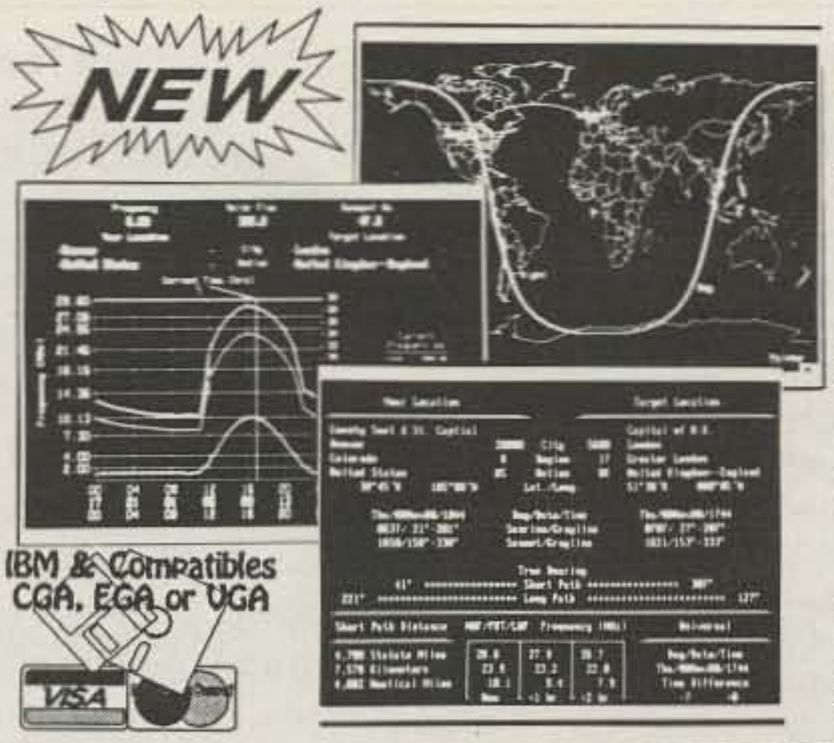

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AMTOR, impossible, I thought. We would begin the link and then it would break. We tried FEC, and again not any luck to speak of. I finally gave up, thinking it might be the band conditions. As an afterthought I decided to look at my parameters to see if there might be any reason there why I had failed to keep or make a link. As soon as I saw the 'MYSELCALL' I knew I had discovered the problem. The SELCAL which was 'KKKQ' had somehow been changed to 'KCKQ.' I reset the MYSEL command to reflect the original KKKQ SELCAL. I RE-PERMED, and began to make good links again. About a week later I experienced the same problem as before. Nope, I hadn't been into the heavy coffee pot, but my first inclination was to check the MYSELCALL. Sure enough, there was the culprit . . . changed from KKKQ to even a different SELCAL than before; this time I was 'CKKQ.' I quickly reset the MYSEL to KKKQ and back to the good links it went. The next morning I called Kantronics to tell them about my problem and ask what could be done to correct it. I talked to their engineer, who told me what I had experienced was impossible.

"After fighting this problem and re-entering the SELCAL many times, I decided to bite the bullet and pull the KAM out of the case and do a 'hard reset.' Buck, this KAM has been a model of satisfaction ever since. The 'hard reset' somehow corrected the problem."

Curt, thanks for the tip, and this is not the first and only problem that has been cured by doing a hard reset. In addition, the Kantronics product is not the only TNC that has had this kind of problem. Many times I've experienced strange problems with other TNCs, and as a final fling—well, just before the final fling (out the window)—I do a hard reset, and it returns to normal and performs as if new.

More Mailbox Talk

In 1986 I wrote about the CALL/SSID format which Glynn, WB4RHO; Edward, KB4KIN; George, N4AGO; Curt, K4KKQ (now AC4DO); Bob, WD4MNT; Jim, W4HON; and other area packeteers were using in our Personal Bulletin Board Systems (PBBS) in our (Kantronics) TNCs. Specifically, I was using the Kantronics All Mode (KAM). Because the KAM allows for separate callsign SSIDs to be applied to each of the port connect features of the KAM and other Kantronics TNCs, we began using the dash ten (-10) as a designate for the internal TNC mailboxes.

Using this same format, I installed my Mailbox CALL/SSID as K4ABT-10. Many of you already know the scenario with regard to the setup of the CMSG/CTEXT, or the CMSG use—and abuse. CMSG means "connect message," and it refers to the ON/OFF or PBBS/DISConnect functions and features. CTEXT is the Connect Text that is contained in the connect message. These two features are designed to work in concert. You may often connect to a station and receive something similar to the following message: "If no response, re-connect to K4ABT-10 and leave a message."

Mailbox Callsign and SSID Standards

In the Kantronics KAM and KPC-4 the mailbox can be set to handle up to 20,000 bytes of mail/messages. If the added RAM is installed, this amount can be more than doubled.

With the TINY-2 and other PacComm TNC2 compatible firmware that has the Personal Message System (PMS), we have a similar capability. It is now possible to use a callsign/SSID for the packet mailbox that is different from that of the MYCALL. This "dash ten" (-10) idea has become so widespread that the packeteers in the east and southeast who are trying to make contact with other stations automatically use the dash-ten (-10) call as an attempt to leave mail in another packeteer's mailbox.

True, the MFJ TNCs do support a mailbox feature, such as it is, but the RAM is limited in space to around 7,000 bytes. The MFJ TNCs do not allow the user to install a separate CALL/SSID to that of the MYCALL assignment. The MFJ TNCs do not allow simultaneous mailbox and keyboard connections. The AEA PK-232MBX, Kantronics, and PacComm do allow the above features, and the mail memory storage capability is as much as four to six times the capacity of the MFJ TNCs.

Users who own the MFJ-1270B, MFJ-1274, and other exact TAPR TNC2 clones are finding that the PacComm TINY-2 EPROM will work nicely in their TNCs. The TINY-2 EPROM is compatible, and it is available from PacComm. The MFJ users will lose the WEFAX feature of the MFJ TNC, but this mailbox feature may be more desirable than the WEFAX receive feature.

Replacing the TNC2 EPROM with the PacComm TINY-2 EPROM which has the Personal Mailbox System (PMS) expands the mailbox storage to almost 15,000 bytes. This more than doubles the mail storage capacity.

In addition to the features already mentioned, the AEA PK-232MBX, Kantronics, and the PacComm enable the TNC to be used for QSO connects, while at the same time the Personal Mailbox/PBBS is being accessed and mail stored for the owner to read at a later time.

As a matter of fact, the mail can be read as soon as it is posted, even if the user is in a QSO with a third station. The PBBS/Personal Mailbox can be accessed and in use by station number one while we are communicating with still another packet station (station number two). Our station is station number three. (See fig. 1.)

Yes, I heard that thought and it is true. There are times when I've actually observed two stations connected to one another's Personal Mailbox (see fig. 2). Sort of reminds me of the time I was trying to figure what the end result would be if a snake could swallow itself. Heavens, don't dwell on that too long! That's almost as horrid as the time I decided to disagree with my high school science teacher who said, "There is an end to space." I made the mistake of asking, "What is on the other side of the *end* of space?" I never found out.

With the dash ten (-10) being used as a nationwide standard for mailbox addressing, it has become easy for us to leave the VHF station on to receive mail while we are asleep, away at a meeting, or at the office.

With many packet clubs and users groups giving the stamp of approval to this CALL/SSID format, we are now able to pass traffic, messages, and greetings from station to station with ease. If you have yet to define your PBBS/Mailbox callsign, you may find the dash ten will bring you messages from stations you never knew were active.

Another advantage of the dash-ten SSID is that this method removes the "funny calls" such as "BUXBOX" or ABT10, etc. These aliases left the distant packet friends without a trace of what callsign you might be using for your mailbox, unless of course you had informed them previously. With the widespread use of systems such as the ROSE network, we are able to connect over longer distances. Thus, we are able to make use of these mailbox callsigns.

Some Mailboxes May Even Forward To and From One Another

As the features of the new TNCs become more sophisticated, so do the mailbox functions. The AEA PK232MBX, Kantronics, and PacComm mailboxes send and receive messages to and from the full-blown, area BBSes. I personally feel that this feature is not in the best interest of the keyboard-to-keyboard packet users, as it tends to invite additional forwarding across the LAN frequencies and at all times without regard for any QSOs that are already in progress. The additional forwarding of mail might occur at any time on an already congested channel, causing collisions, loss of connects, and ill feelings.

One alternative would be for the user and the local BBS SYSOP to execute mail forwarding during the early morning hours or in the quiet time. It may be ne-

cessary to tune your station to the frequency of the area BBS during the forwarding hours, usually 12 midnight to 7 AM local time. This way, your mail is there the following morning. There are enough problems already being created by a few unscrupulous BBS operators who, for no good reason, feel they own the keyboard-to-keyboard frequencies, so they forward "poop" traffic anytime they please, even during heavy keyboard traffic hours. I am happy that only a few renegade BBS SYSOPs exist and that most of the BBS SYSOPs are true devoted BBS managers who give the keyboard users the same respect as the SYSOP receives, or at best they too understand the plight of trying to carry on a QSO against the onslaught of umpteen zillion bytes of data from a BBS with the MAXFrame set to 7, PACLen 255, FRack 2, DWait 1, and RETRY 0 (zero). I've watched (because I couldn't use the frequency) as BBSes took over the keyboard frequency, forwarding messages that had BID lists longer than the text of the message being forwarded.

Author's comment to the BBS software writers: It appears as if the BBS software writers are afraid to write code that differs from that of another BBS software writer. I am talking about a system that would strip or otherwise remove all but the most recent or local BIDS. There is room for new and better ways to build the BBS code. Why do we continue on the same trek as the one that was built ten years ago? I admit you guys are great BBS software writers, but for some reason we seem to have become stuck in a rut just because someone said, "If it ain't broke, don't fix it." Well, it "ain't broke," but it is beginning to break the system around it.

The True BBS SYSOP

There is much to be said for the *true* BBS SYSOP, as he and she are usually working a full-time job and later the same day clearing, or as we SYSOPs know it, "doing the BBS housekeeping." Housekeeping is not an easy task, and with "big brother" looking over our shoulder nowadays, that chore has become even more meaningful.

We've truly learned to appreciate the devoted and sincere BBS SYSOPs for their efforts, while at the same time we've learned who the few SYSOPs are who are there strictly for the bolstering of their egos.

Back To The "Feature"

Please bear in mind that I offer the dash ten as a protocol, and not a "rule." I know there are those who have had their mailbox, node, or gateway set to one, two, and three, etc., for eons and don't wish to change. Whatever you like is fine. This format or "standard" has served us well, and enables a distant user who has no notion of your mailbox SSID to connect with your message system and leave messages for you.

Speeding Up Things A "Bit"

This little play on words is more in the frame of "speeding up the bytes" than speeding up the bits. 9600 bauds has come of age, and I can affirm that it is much faster. The Kantronics Data Engine can send almost a page file at 9600 bps while my 1200 bps system is sending an **ACK** to a connected station.

Running the Data Engine into the Kantronics DVR 2-2 two-watt, two-channel Data Transceiver is the medium means that we are using at the moment. However, I've interfaced the DataEngine to another COTS (Commercial Off The Shelf) 45-watt transceiver and received favorable results. Without trying the radio at the mic connector, I fed the transmit audio to the reactance modulator, and utilized the input (wiper) of the volume control for the receive audio pick-off point.

I've discovered in at least one other (COTS) transceiver that I did not have to make any internal connections to the radio to make it work with 9600 bauds. I do leave the squelch open (shot noise), and the radio with which I'm experimenting utilizes pin-diode switching. If you wish to run a test with your transceiver, proceed at your own risk.

As a note of interest, I did have to turn the transmit audio up and increase the amount of deviation. NO! They are not the same! As a matter of fact, most transceivers that have been developed in the last 12 years have both a mic or audio gain and a deviation control. As for the receiver section, the "skirts" of the IF should also be at least 7½ kHz each side of center frequency with a passband roll-off no worse than 10 dB wall to wall. I'll have more on the COTS transceiver interfacing in another article soon.

Searching For A Leak

That is exactly what 9600 sounds like—an air leak. If you were to remove the valve-core from the valve stem of a fully inflated tire and use your thumb to open and close the orifice, the resulting sound would be similar to the sound of 9600 bauds. Listening to 9600 bauds as it is being sent and received is a treat, but actually using it is a greater thrill.

I learned early on that there is no place for 9600 bps on a 1200 baud frequency. First, the users of the 1200 bauds are not familiar with the hissing sound of 9600, so they tend to make a call to the local power company to let them know there is bad (copper oxidized connection) interference coming from nearby power lines. Second, the users of the 1200 bps frequencies discover that 9600 is a new kid on the block, and it must be disciplined. Therefore, all the power that can be mustered must go "key-down" to overcome the signal of the 9600. Some will even call via the telephone to ask if you are able to hear that strange noise on the frequency. I tell them that it is a test of the 9600 baud DataEngine, and the next question is "Well, how can we copy it?" When I tell them they must also have 9600 bps capabilities to receive it, I sometimes get a response such as, "But I just got upgraded to 2400 bps." That did it. Time to move to another frequency.

The real truth I tell the caller is that this is a new mode, and the 1200 and 2400 bps will continue for some time to come. For now the 9600 bauds will be used mainly as trunking and backbone high-speed facilities.

With DFSK we have a means that is within the reach of many pocketbooks and checkbooks. Oh, DFSK . . . That is how we describe the **Direct Frequency Shift Keyed** modem that is used inside the Kantronics DataEngine to develop the 9600 bauds.

Absolute vs Relative

To draw an analogy relating the change from 1200 bps to 9600 bps is to say it is like the days when we moved from CW to 1200 baud packet. In substance we have increased our speed eight times when we move from 1200 bauds to 9600 bauds.

Oh sure. Here come the critics. *Please note:* I said, "in substance." No, I did not forget the fact that we still have the headers in each frame that contain the origination and destination codes along with the boolean bit count that makes the error-free data transmission of X.25 (AX.25) possible. There is also the turnabout time of the frames and the acknowledgements between the two connected stations.

The manner in which we measure AX.25 baud rates is based on the speed and flow of the data as if it were in one steady, contiguous stream.

For our interpretation of AX.25 packet radio data rates, we will base the speed of the 9600 bauds on the same format that is used for measuring 1200 bauds.

Who Has The Standard?

The company that propelled 2400 bps into wide use in the early days of packet (less than ten years ago, Hi) is the same company that is devoting much time and development to the 9600 baud arena. Recently I spoke with Phil Anderson, CEO of Kantronics, about where we were headed with 9600 and which "standard" we eventually would use. Instead of relating what he said, I will quote his response directly.

"Buck, while there has been no *official* standard for Direct FSK *DFSK* modulation and demodulation, there does exist a defacto standard, following the original work by Steve Goode, K9NG, for 9600 baud. An adaptation of that standard, with improvements, is the G3RUH modem—essentially, the installed base or defacto standard now in place. The Kantronics DE 9600 Modem card that plugs into the DataEngine is G3RUH compatible.

"The essence of DFSK is its direct nature—that is, the frequency of the FM signal follows the data directly. There is no 'copy of a copy,' no tones added to the carrier and then removed later. Think of it as though looking at an original and not a photo copy of a photo copy! If we swing a packet NRZI signal back and forth, with pulse shaping, the received signal is true FSK—that is, shifting the frequency back and forth to follow the data. However, if I convert a data tone to some audio sine wave and then shift to a different audio sine wave for data zero, I have then modulated these tones onto the FM carrier. This is called AFSK (Audio Frequency Shift Keying). That's a copy of a copy.

"With DFSK I can simply slice the audio I receive into a high, or a low, a one or zero. No peak detectors are needed. The FM radio has done the discriminating for me! . . ."

Phil also mentioned another area of interest that concerns the high-speed packet user. There is a band plan which calls for 100 kHz channels around the 430.550 MHz region. The ARRL band plan calls for this wide channel because the data rates may go as high as 56,000 kB. For now, the transition is to 9600 bps because it is the easiest to achieve, and it can be used at lower RF frequencies because it can operate in a narrow bandwidth.

The Old Gray Mare . . .

In my youth (almost a half century ago), I remember traveling to town in a John Deere wagon, being pulled by an old mule we had named "Bud." That was a long time ago in the coal mining country around Altoona, Alabama. In later years we moved to Gadsden, Alabama, and my father went to work for Republic Steel Corporation. We moved from the John Deere wagon to a real, live, red 1947 Studebaker truck. It travelled much faster and went much farther than old Bud, and we didn't have to feed it twice a day. In 1957 we moved from the truck level to a Ford Fairlane 500 with an "Interceptor" engine in it. Now that automobile really moved across the real estate.

The analogy that I've drawn here relates to what has happened in a much shorter time in the packet world. In as few as ten years we have moved from 300 and 1200 bps to 2400 bps (the mule and wagon), to 2400 bps modems (the Studebaker truck), to the DataEngine at 9600 bps (the Ford Fairlane with the "Interceptor" engine).

It doesn't matter how we plan our future. The future seems to unfold with an almost predetermined behavior. We do contribute to the speed and manner in which this time/space continuum occurs. In other words, to the packet user who asks me at the packet lecture, "How long will my present TNC be compatible?" I can only reply with this analogy: The mule and wagon continue to be compatible with travel; it just depends on how fast and how far it is that you wish to go.

A Mention of The ROSE

I mentioned the ROSE network earlier. I have included the SouthNet ROSE Network map in this month's column (see fig. 3). It is interesting to notice how rapidly the system has spread in less than two years. If you have a ROSE map for your area, I will be happy to include it in this column as space allows. With the growth of the ROSE Network, it is now possible for the areas involved to link to each other, providing more coverage with the same easy telephone topology.

Another Service For The Packet User

To assist the packet users groups that are growing in numbers around the nation, I will be happy to announce the dates and times of your packet meetings. You should send me the announcements of your packet club's meeting place, date, and time. Please use the club's letterhead if possible. The announcement must include the name, return address, callsign, and phone number of the packeteer or person sending the announcement. Please include the name and fee for any newsletter or club packet bulletin that is provided by the packet users group. And remember, we need a three-month lead time (for example, this July column was written in mid-April).

Happy Packeting, de BucK4ABT.

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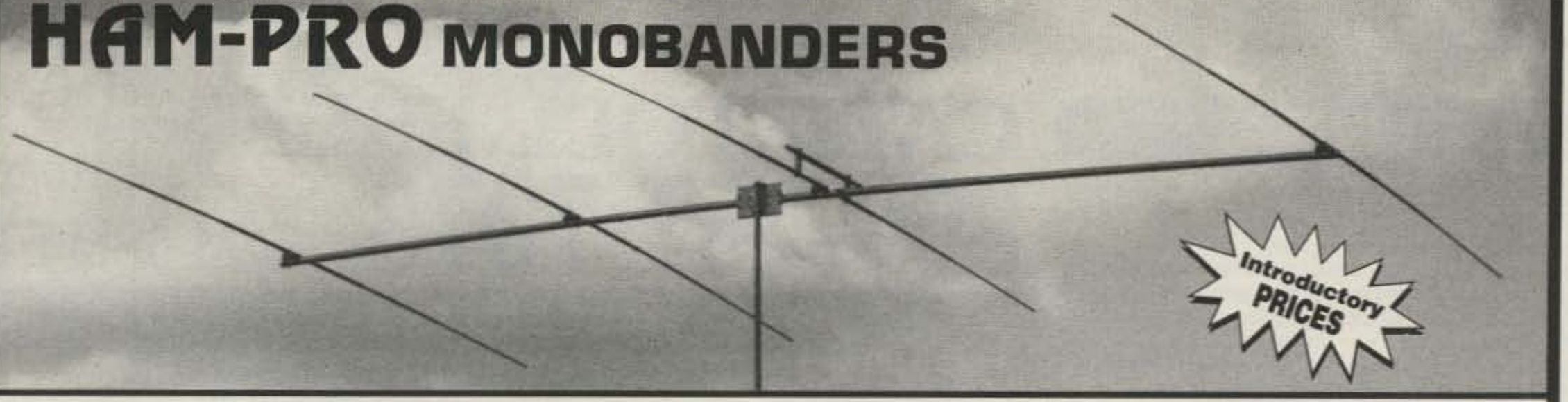

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PRACTICAL ANTENNA HANDBOOK BY Joe Carr, K4IPV

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CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Sleeping and Contesting—Do They Mix?

What do college students, doctors, truck drivers, and contesters have in common? You guessed it—they all suffer from sleep deprivation. While hardly an expert on the topic, I did do some quick reading on the subject for this month's column.

Defining Sleep

Sleep is defined as the healthy state of reduced inertia and temporary loss of consciousness from which one can be easily aroused. In spite of all of the dedicated research on the subject over the years, there remains no single consensus that describes the function of sleep or its root physiological cause. In reality, the features of sleep are better understood than its functional use for the body.

There are two primary sleep categories; rapid eye movement (REM) and non-rapid eye movement (NREM). These sleep types alternate during each sleep period, usually in 90 minute intervals beginning with drowsiness and then passing into the NREM and REM phases, respectively. REM sleep is characterized by flaccid muscle groups and loss of reflexes. It is also the period of sleep in which brain activity best approximates its awake state and where the vast majority of dream activity occurs. Our NREM intervals, however, consist of periods of deep and intense sleep where brain activity is at a minimum. Lack of recall is often experienced in this state, particularly when someone is abruptly woken during this period.

Adults generally require 7 or more hours of sleep per night. There are rare instances where only 3 or 4 hours suffice. The proper amount tends to be defined by an individual's specific biological needs. In general, the need for sleep is determined by many factors. The time of day is a key contributor, as we become trained to sleep at certain times of the day. Of course, lack of sleep favors the need for sleep as do other elements such as comfort, boredom, and satisfaction. Stress, unusual environments, and excitement are all contributors to a reduced need for sleep.

2 Baldwin Street, Windham, NH 03087

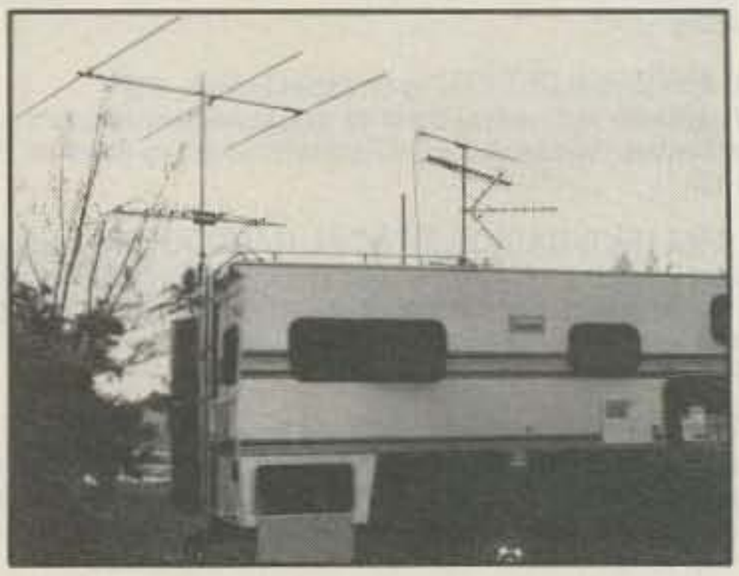
Calendar of Events

July	1	Canada Day Contest
July	6-7	Venezuela SSB DX Contest
July	13-14	IARU Championship Contest
July	20	Colombia Independence Day
July	20-21	SEANET CW Contest
July	27-28	Venezuela CW DX Contest
Aug.	3-4	YO DX Contest
Aug.	10-11	Worked All Europe CW
Aug.	17-18	SARTG RTTY Contest
Aug.	17-18	Maryland–D.C. QSO Party
Aug.	17-18	New Jersey QSO Party
Aug.	17-18	SEANET SSB Contest
Sept.	7-8	Bulgarian DX Contest
Sept.	8	North American CW Sprint
Sept.	14-15	WAE SSB Contest
Sept.	14-15	All Asian SSB Contest
Sept.	15	North American SSB Sprint
Sept.	**28-29**	**CQ WW RTTY Contest**
Oct.	**26-27**	**CQ WW SSB DX Contest**
Nov.	**23-24**	**CQ WW CW DX Contest**

Sleep Deprivation

An issue for all contest operators is our ability to manage the lack of sleep. Scientists have been studying the effects of sleep deprivation since the late 19th century. In 1935 a subject was deprived of sleep for over 230 hours, resulting in hallucinations and extreme paranoia. Perhaps you can relate to this phenomenon as an occasional "sleep-starved" contester. Modern advances in sleep research have shown that it is nearly impossible to totally deprive subjects from sleep for extended periods of time. In reality, the human body will engage in "micro-sleeping" episodes that can last as little as a few seconds.

Sleep deprivation studies have shown a specific characteristic that is of great importance to contesters. In addition to the expected fatigue are properties of increased appetite, difficulty in focusing one's eyes, and poor performance/attention span. This lack of attention can often be a critical factor against maintaining the intensity level required for a full 48 hours of contest operating. Another sleep deprivation characteristic I've often heard discussed is the occasional time lapses (perhaps 30 to 60 seconds) that seem to occur on Sunday afternoon while you are "working" someone. Have you ever experienced that one?



The QTH of WZ8D/VE3 in the 1990 CQ VHF WPX Contest on 6 meters.

For those of us who feel like pounding our chests after accomplishing 45-plus hours of operating time in a weekend, take note of the current record for sleeplessness as documented by the *Guiness Book of World Records*: Mrs. Maureen Weston of Peterborough, England. Mrs. Weston is reported to have accomplished 449 continuous sleepless hours (18 days, 17 hours) during a rocking chair marathon in 1977.

Some Sleeping Tips Before the Contest

What follows will help make the transition from scientific reporting to practical experience as a contester. I have always viewed a 48 hour contest as a marathon. And just like marathon runners, the serious contester must prepare both mentally and physically. Perhaps the most important area of preparation is before the contest even begins.

I usually begin physically preparing for a contest one to two weeks before it starts. This means I consciously attempt to sleep for longer periods. Normal sleep habits for me are six to seven hours a night, which become extended to seven to eight hours a night. Second, one to two nights immediately before the contest are set aside as special nights for sleep periods approaching ten to eleven hours (e.g., 9:30 PM to 7:30 AM). Although many of us do not necessarily have total flexibility with our jobs, it is a significant advantage to avoid long work hours and stressful situations during the week leading up to a major contest.

1990 CQ VHF WPX CONTEST RESULTS

Single Operator 50 MHz

Call	Band	Score	QSOs	Prefixes
N0BSH/9	50	30,634	289	106
WA0TKJ	50	21,792	227	96
WD5K	50	15,642	198	79
K0CS	50	13,104	182	72
WB0CQO	50	6,944	112	62
KG6DX	50	3,458	91	38
N0IGZ	50	2,706	66	41
KA1CDZ	50	1,632	51	32
N4MM	50	1,320	44	30
N2FXE	50	924	33	28
WA2AXJ	50	884	34	26
WA8LLY/6	50	693	33	21
W3ILG	50	660	30	22
OH2AVP	50	630	30	23
KS4S	50	306	18	17
W7IDZ	50	196	14	14
N0ALG	50	4	2	2

50 MHz Low Power

KY5N	50	5,353	101	53
NY1E	50	4,257	99	43
WA0X	50	1,271	41	31

50 MHz Portable

VY2QST	50	6,200	124	50
			(Op: W1IAM)	
WZ8D/VE3	50	4,800	100	48
VY2QST	50	1,512	56	27
			(Op: W1IAM)	

144 MHz

4NE3	144	57,706	473	122
KA0TLJ	144	7,003	149	47
FC1PBL	144	299	23	13
K9OSH	144	132	12	11
N8IOH	144	20	4	4
JP1DMX/HI8	144	1	1	1
HI8A	144	1	1	1
WA5JWU	144	1	1	1
VE3VET	144	12	4	3
ON8WN	144	1	1	1

144 Low Power

1296 MHz

JA1FO	1296	96	12	2
JF3XMX	1296	16	2	2

All Band

K5UR	A	57,168	334	144
N2BJ	A	32,034	234	114
NM1K	A	10,556	115	52
W3ZZ	A	9,882	109	81
K3ZO	A	8,591	121	71
IV3VFP	A	6,741	107	63
N0LL	A	5,100	91	51
JI3BFG	A	3,306	62	38
WA2BAH	A	2,160	50	36
N8AXA	A	1,785	47	35
N4HB	A	1,624	40	28
YB2OK	A	742	48	14
IW2CEG	A	650	38	29
AB4SF	A	330	16	15
WB9GKA	A	195	14	13
KA2MCU	A	180	12	12
KB7IOG	A	150	15	10
NJ7A	A	33	8	3

Multi-Operator All Band

F6IFR	249,466	1442	173
OK1CA	241,440	1006	157
4N2Y	39,480	376	105
NW7O	11,109	148	69
WM2C	3,999	80	43
KR3W	3,708	86	36

Multi-Operator Single Band

OK1KKD	144	11,616	176	66
KJ4VH	144	2,535	65	39
HG5KHC/3	144	578	38	34
HG8KAX	144	620	32	20

The Friday preceding a contest weekend is the most pivotal day in contest preparation. Most contesters recommend that you take this day as a holiday. There are a variety of other techniques for "contest eve" that I've used or heard over the years, and these include include a multi-hour nap during the afternoon. Others prefer an early Friday morning wakeup time as a means of short-term physical training for the Friday evening run. Despite our best intentions, a stressful day on Friday culminating with your arriving home and sitting in the operating chair at 2330Z is a sure cure for insomnia on Sunday morning.

Some Sleeping Tips During the Contest

During the contest operating times often become specific to a person's physiological makeup as much as they are the result of planning around a recommended strategy. In my case, I easily benefit from short naps (45 to 60 minutes) and have little trouble waking up and heading for the operating chair in about 2 or 3 minutes. And for reasons that mystify me, there are many operators who set their alarm clocks for a specific time and possess the amazing ability to wake up a few minutes before the alarm sounds!

The relationship between eating and sleeping is another consideration for the contest operator. Imagine the feeling you experience after a large and filling meal. How many of us head directly for the family room couch as we eagerly await an unconscious session in front of the television? Needless to say, this is hardly the physical state we should be experiencing before or during a contest. Small, high-energy meals are the order of the day for contesters lacking sleep.

While there are no hard and fast rules for maximizing your physical potential in contesting, common sense seems to prevail. Even as I personally crack through the 35-year-old physical barrier this summer, I am still a proponent of 48-hour DX contests (subject for a future column). No matter which side of the fence you sit on with that issue, the 48-hour DX contest lives on for the moment. Its existence requires deliberate and concentrated preparation to be a serious competitor whether you are trying to win it all or satisfy personal goals.

CQ WW Rules Update

In addition to the other excitement at Dayton this year, the CQ WW Contest Committee had its usual good representation at the Hamvention to discuss committee business. The meetings were ex-

Multi-op all-band station F6IFR placed first in the VHF Contest in this category. From left to right are F6GWV and his XYL, F6CWN and F6IFR, F6HMQ at the mike, and in front Aurelie, QPP.

tremely productive and resulted in the several rule changes and clarifications that will be described in more detail in the official 1991 rules to be published in the September issue. In summary, however, the following will be implemented:

1. In response to numerous requests on and off the air, a new low-power category will be created for the 1991 CQ WW Contest. Eligible entrants must run 100W or less output power. This new category will allow low-power entrants to compete more fairly among themselves and provide more excitement for the bulk of CQ WW competitors who have competed against the "big guns" for years to no avail.

2. In order to help eliminate some administrative confusion, the 1991 CQ WW rules will explicitly require the submission of hard-copy logs with your entry. This rule will also apply to entries submitted on disk.

3. A more detailed description of the information and process available to diskette entrants has been defined. Those participants submitting diskette entries in or after the 1990 CQ WW contest will be able, on request, to obtain the following information:

- Letter explaining the philosophy of uniques and their potential origination
- Unique rates for their own log entry
- List of unique callsigns
- List of unique + 1 callsigns
- Comparison of logs received against unique +1 callsign list
- Unique rates and averages for top scorers (Note: only rates/categories. Specific callsigns will NOT be disclosed)

This information will be distributed provided a self-addressed, stamped diskette mailer with an MS-DOS formatted disk is included with the request. This particular policy was developed to significantly reduce the administrative burden and render more timely responses. Requests for this information should be directed to Bob Cox, K3EST/6.

Station WM2C, multi-op all-band in the 1990 VHF Contest. On the left is N2FH at the 50 and 144 MHz stations. On the right is WB2VVV manning the 432 MHz station.

CQ WW VHF WPX Contest Status

The CQ WW VHF WPX Contest has been temporarily suspended for 1991. This suspension resulted from the transition of management for the contest and the lead time required to publicize the contest for this calendar year. *CQ* magazine intends to resume the contest in July 1992. You can look forward to reading future announcements as the final details become available.

Dayton Hamvention And Closing Remarks

The Dayton Hamvention is always a great opportunity to meet old and new friends. As with most years, the Dayton experience can usually be summarized into one or two topics of discussion.

For starters, I was pleased to observe a larger number of younger hams than in previous years as well as meet some hams who were also new contesters. In particular, I had a nice chat with Rick Blevens, WV9Q, who is an enthusiastic new ham and new contester. Barely entering his 13th month of contesting, I was impressed with Rick's 1991 ARRL DX Contest score of 800 QSOs/109-plus countries on 10 meters. Good work for the first time out from Illinois!

Second, there seemed to be a significant percentage of conversations characterized by comments such as "I am buried at work," or "It's become harder for me to balance work and contesting," etc. Has the economic recession finally impacted our rates? And of course, I appreciated your comments and input which will be the source of future reading in the months ahead.

As always, the deadline for the October issue is August 1st.

73's, John, K1AR

Venezuelan Contest

SSB: July 6–7 CW: July 27–28
0000Z Sat to 2400Z Sun.

This is the 30th annual contest celebrating Venezuela's independence. It's a world-wide-type contest. Therefore, do not confine your activity to working YVs only. Working other DX is encouraged.

Use all bands, 80–10 meters (no WARC bands).

There are four classes: single operator, single and all band, and multi-operator, single and multi-transmitter. (No limit to transmitters, but only one signal per band.)

Exchange: RS(T) and QSO number (i.e., 59-035).

Points: Contacts between stations in the same country, 1 point. Between stations in different countries but the same continent, 3 points. Between stations on different continents, 5 points.

Multiplier: One for each YV call area, and one for each different country worked on each band (including own).

Final Score: Total QSO points from all bands multiplied by the sum of the multiplier from each band.

Awards: A plaque to the highest scorer in each class and certificates to stations making more than 10% of the next highest score.

Use a separate log sheet for each band. Each YV call area (9), and each country (DXCC list) should be indicated in a separate column only the first time they are worked on each band.

Include a summary sheet showing the scoring, your name and address in block letters, and the usual signed declaration that all contest rules and regulations for amateur radio in the country of the contestant have been observed.

Include 2 IRCs or the equivalent to cover cost of mailing and processing of any awards.

Mailing deadline is September 30th for SSB entries and October 30th for CW. They go to: Radio Club Venezolano, Concurso Independencia, P.O. Box 2285, Caracas 1010-A, Venezuela.

IARU HF Championship

1200Z Sat. to 1200Z Sun., July 13–14

This is the sixth annual IARU World HF Championship. All six bands, 10 through 160 meters, and the full 24 hours may be used by both single and multi-operator stations. (No WARC bands.)

Categories: Single operator, CW only, phone only and mixed modes. Multi-operator, single transmitter, mixed mode only. Must remain on a band for at least 10 minutes at a time. (Exception: Only IARU member-society HQ stations may operate simultaneously on more than one band with one transmitter on each band/mode.)

Exchange: RS(T) and ITU zone. HQ stations: RS(T), and official society abbreviation.

Points: Contacts within own zone or with an HQ station, 1 point. Contacts within own continent but different zone, 3 points. Contacts with different continents, 5 points.

Multiplier: Total number of ITU zones plus IARU HQ stations worked on each band. (Note: HQ stations do not also count for zone multipliers.)

Final Score: Total QSO points from all bands times the sum of the multiplier from each band.

Awards: Certificates to the top scorers in each category, in each state, each ITU zone, and each DXCC country. In addition, achievement awards will be issued to those making at least 250 QSOs or having a multiplier of 50 or more.

Entries with more than 500 QSOs are required to include a dupe sheet with their log. A three QSO reduction will be assessed for each duplicate QSO for which credit has been taken. Disqualification may occur if the overall score is reduced by 2% or more.

It is recommended that you check *QST* (April 1991 issue) for more detailed information. A large SASE with 2 units of first-class postage or 2 IRCs will get you official forms and an ITU zone/prefix/continent map.

Mailing deadline for entries is August 10th to: IARU Secretariat, Box AAA, Newington, CT 06111 USA.

Colombian Independence Contest

0000Z to 2400Z July 20

This is a world-wide-type contest. Use all bands, 3.5–28 MHz, phone or CW.

Classes: Single operator, single and all band; multi-operator, single transmitter; multi-operator, multi-transmitter.

Exchange: RS(T) plus serial no. (e.g., 59001).

Scoring: *For non-HKs*—QSOs with HKs 5 points; with other countries 3 points, with own country 1 point.

For HKs—QSOs with other continents 5 points; 3 points in same continent; HKs 1 point. QSOs with official L.C.R.A. stations are worth 10 points for all entrants.

Multiplier: Number of different countries and HK call areas worked on each band.

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

Awards: Certificates to each station showing a minimum of 100 contacts. Plaques to the overall winning HK and non-HK in each class and each mode; for HKs in each call area; and continental winners.

Use a separate log sheet for each band. Indicate the multiplier in a separate column only the first time it is worked on each band. A summary sheet showing the scoring and other essential information, and the usual signed declaration, is also requested.

Disqualification rules regarding taking credit for duplicate contacts, violation of rules and regulations, etc., will be strictly enforced.

Mailing deadline is August 31st to: Liga Colombiana de Radioaficionados, Colombian Independence Day Contest, Apartado 584, Bogota, Colombia.

SEANET Contest

CW: 0000Z Sat. to 2400Z Sun., July 20-21
SSB: 0000Z Sat. to 2400Z Sun., Aug. 17-18

This is an annual event sponsored by the Radio Amateur Society of Thailand (RAST). The objective is for amateurs worldwide to work stations in Southeast Asia.

Bands: 160-10 meters (no WARC bands).

Classes: Single operator (single band and all bands) and multi-single.

Exchange: RS(T) and serial number (e.g., 59001).

Multipliers: Multipliers are SEANET country prefixes: A4, A5, A6, A7, A9, AP, BV, BY/BZ, DU/DV/DX, EP, HL, HS, JA, JD1, JY, KH2, P29, S79, VK1-9, VQ9, VS6, VU, V85, XU, XV, XW, XX9, YB/YC/YE, ZK, ZL, ZM1-4, ZL6/ZM6, ZM9, 3B6/3B7, 3B8, 3B9, 4S7, 4X/4Z, 8Q7, 9K2, 9M2, 9M6/9M8, 9N1, 9V. Multipliers are calculated by total number of SEANET countries times three (times 2 for SEANET-SEANET contacts).

Scoring: QSOs with SEANET countries count 2 points on 20/15/10 meters; 5 points on 40/80 meters; 10 points on 160 meters. (SEANET-SEANET QSOs count 1, 3, 6 points, respectively.) Double the QSO points for contact in: DU, HS, YB, 9M2, 9M6/9M8, 9V, and V85. QSO in your own SEANET country do not count. Final score is total multiplier times QSO points.

Entries must be received by October 31, 1991 and sent to: SEANET '91, Eshee Razak, 9M2FK, P.O. Box 13, 10700 Penang, Malaysia. Include 3 IRCs for a copy of the final results.

AWARDS

BY DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for July is:

Tom Ross, K9GTQ
USA-CA All Counties #250
All SSB, 9-20-79

"The year is 1954, and a young lad who built an induction tuned pocket receiver to listen to the 'Top 40 Tunes' on the local AM radio station during study hall has graduated from high school with an avid interest in all types of *radio!* By January of '55, enrollment in DeVry Technical Institute was accomplished, and residency on the northeast side of Chicago established. March of '56 found this 19-year-old in the possession of an FCC Radiotelephone Operator's License and trained by one of the best electronic schools in the USA. Returning to northern Wisconsin, a new job was in the offing to test his abilities in the trade of choice. It was soon obvious that the accepted routine of the times was to complete military service, so it would not be a deterrent when seeking other employment. With some military experience from over two years in active reserves, joining the active Army seemed the right thing to do. Basic training at Fort Leonard Wood, Missouri completed, the Army's Southeastern Signal School at Fort Gordon, Georgia continued my electronics training, and the first *ARRL Handbook* was purchased at the MARS station, K4WAR, in 1957.

"My first airplane ride was the Army's choice, and we landed in Douglas, Arizona at about 0300 and rode the bus to Fort Huachuca, the Army Electronic Proving Ground. After about two weeks the base commander 'found' us, and I was assigned to the 56th Signal Company (Repair), where I had a part in evaluating a new Army Area Communications System. Other assignments were checking out new systems from the Lexington Signal Depot before issue to field troops. Interest in amateur radio was sustained by visits to the MARS station on base, but my spare time was spent building antennas, radios, hi-fi amplifiers, and control-line model aircraft.

"The Army reorganized base units and the 56th Signal Company was demobilized. Its troops, then assigned the 16th Signal Bn., were shipped out with the 16th to Fort Ord, California, except for special job titles. I had two weeks to visit home enroute to Fort Lewis, Washington, where I embarked for Korea on the *USS Wm. Mitchell* and on to the Commo Section, 7th Military Police, 7th Infantry Division, Camp Casey. Along with 24 hour per day radio and eventual promotion to Commo Chief of the 7th MP Co., the MARS station at Casey kept my interest in amateur radio active, and it was there I found some time to study the Morse code between the repairs.

"A pay change upon arrival in Korea resulted in my getting $4.00 to live on for a month. I went to the MARS station and sent home a MARS Gram saying I'd been paid only $4.00 and asked that some money be sent. The message that arrived via ARS had lost the decimal point, and said that I had been paid $400! The $10 bill I got from home also brought the query 'if you got $400, why do you need more?' I resolved then to attempt greater accuracy in radio traffic so the same would not happen to others at my hand. I shipped my *ARRL Handbook* home 'hold baggage' by mistake, but during my 14 day 'vacation cruise' back to the States, I was afforded a short tour of the Comm Center of the *USS Wm. Mitchell*.

Tom, K9GTQ, USA-CA All Counties #250, and Jolene, KA9YWC, USA-CA 500 #2503 with their mobile, K9GTQ.

"Arriving at Oakland, California four days before Christmas, the Army decided to give me an early discharge rather than keep me around for 45 more days. I flew home and was greeted by a typical northern Wisconsin Christmas snowfall that caused flight delays and rerouting. The warmth of home and family quickly dispelled the wind chill and wet feet from walking in ankle-deep snow in oxfords. I enjoyed the holidays and a brief respite gave way to full time work at a local TV shop.

"I renewed the old friendship I had had with Ray, W9RHT, announcer at the local AM radio station. He was still an active ham and persuaded me to get my license. After all, he said, I had one FCC license, so why not get the one that would let me on the ham bands as well. He would be willing to be proctor for my Novice test and if necessary, my Conditional test as well. I bought a Hallicrafters Sky Buddy S-19 receiver and began to tune bands for code practice. In a few months Ray gave me the Novice test and I received the callsign of KN9GTQ in June 1961. That month K6BX announced in *CQ* magazine that a special USA-CA Award would be detailed in the July issue. Thus, both ARS KN9GTQ and the USA-CA were born into ham radio the same month.

"My radio activities in those early days consisted of trying to operate CW through QRN of 3200 volt power transmission lines that bordered my parents' home on the north and east lot lines. An antenna at 45 degrees with these lines helped a bit, but there were very few QSO/QSL exchanges made.

"In April of '61 I began work with the State of Wisconsin Highway Commission, District 7 highway marking crew. By the end of the painting season our crew had painted over 2300 miles, which set a new record; and we had worked one man short of a full crew for a few months of the season. One of our crew was a teacher and returned to classes in September. The crew worked until cold weather prevented operations one morning in Shawano county. We returned to the shop and began the end of season clean up of the marking equipment. That done, I was kept on to do storage maintenance of a Bailey bridge used while a new structure was built across the Bad River near Odanah in Ashland County. Being a seasonal worker required me to be 'off the payroll' for one month, so the front office opted for February.

"Back to work March first, I stayed with the crew through July and began my present career as a Communications Tech with the Wisconsin Department of Natural Resources in August of '62. An old friend, Charlie, W9YYL, from the AM radio station had preceded me, but left to be the Comm Tech for an electric company in Sturdevant, Racine County, Wisconsin. My co-worker, Henry, W9FHU, was the electrician and built most of our switchboards for a statewide, state-owned phone system.

February 1990 Henry became a Silent Key, and his XYL called me to say that it was Henry's instruction that I dispose of ARS W9FHU. My last task was to return his license to the FCC, closing out a station that had been active for more than a half century.

"Looking through his QSLs, I found several County Hunter callsigns which I too have had the privilege of working. One callsign in particular has been intertwined with my life now a third time. I first met Clete, W1DIT, USA-CA All Counties #127, via the County Hunters, and found out that he had worked for a time with my wife's brother in Connecticut. I found out Clete has an extensive knowledge of Wisconsin! But when he asked me if the red barn was still atop the hill northeast of the road intersection where I was mobile one day, I was able to reply that it was not! I was teasing, of course, and then told Clete that the barn was now painted white! Clete's challenge was met by my getting a full set of detailed county maps that were used to make *sure* of my location before I announced the county I was in or the line I was on to make contacts. I eventually came to know that it was Clete's love of the Northwoods that brought him to recall and ask me about them, and not his distrust of my claimed QTH.

"I wondered who else had been giving Lincoln County contacts, so when I found Clete's QSL in the archives of ARS W9FHU, I knew of one station that did! I never did work Henry via amateur radio. For many years we traded RCC about stations worked, but he was a CW nut just as I was a CH nut. Both of us thought the other was kind of weird, but we did enjoy work-

333 South Lincoln Ave., Mundelein, IL 60060

ing together, and the bond of amateur radio made work easier for both of us. We built things the state simply did not have funds to buy, and were quite proud of our accomplishments even though it didn't make our pay envelopes any thicker!

The first six months of my tenure was mostly spent removing the old low-band radios and installing new high-band units. Some of the vehicles were still 6 volt battery types, and mechanics put complete 12 volt systems on them just to run the new radios. Crawler tractors with positive ground were changed to negative ground to facilitate the radio installations. One watt single channel portables weighed in at 23 pounds, as compared to the kinds available today! My 5 watt unit today weighs 23 ounces, has 14 channels, is programmable, and has CTCSS Rx and Tx, scan, priority, Tx Time Out Timer, and several other functions we don't need in our system! Soon we'll have new mobile units capable of 1,024 channels, three preset levels of Tx power, and so many other bells and whistles that it is impossible to list them all.

"Indeed the computer age has come to two-way radio, and amateurs can be proud of their involvement in bringing it about. No, we don't always 'design' these things, but there are surely a *lot* of us out there keeping them running, and in some cases making them better than they were out of the box. Show me an engineer, and I'll show you a technical support team that gets all the bugs out of the engineers' designs. Different mind sets here are a great team!

"Finding the County Hunters on 3943 MHz was a turning point in my ham radio fun. I had spent over two years working eight hours a day followed by another eight hours, plus weekends, putting together the 'shack' we now call home. I had a DX-60 AM Tx, and an SX-111 Rx set up in the basement with a 75 meter dipole antenna. A few evenings of checking in brought comments from Tip, W4QBM, to come visit him. I was soon the proud owner of an HW-12 transceiver and AC power supply, and then later was able to find a DC supply. I was in 'hog heaven,' as they say, for I could go mobile *and* operate fixed with the same rig! Later I bought an HT-37 that worked just fine with an SX-111 receiver, so I was able to leave the HW-12 in the mobile all the time.

"That was nice until one 20 below zero night a KH6 showed up. I asked if he'd let me call from my mobile. He said he could only stay a minute or so and I dashed for my coat. In the car things were real frosty, and when I turned on the rig, the DC choppers wouldn't work, so I had no high voltage! I clamped my hands on the chopper transisters to heat them to working temps, and when they came on, I gave the KH6 a call. He said he'd given me up for lost, but when I explained what happened, he said anyone that nuts must want the contact real bad, and *sure* he'd send me his QSL! It took me two days to warm up again, but when his QSL arrived I was real pleased to see his confirmation of the 5×6 he had given to K9GTQ/Mobile!

"I had a 'dream' of putting up a *good* antenna, which was modified about 2 minutes before the 14-man crew got it standing upright. My plan was to put 80 and 40 at right angles to each other on the same feedline. It was Tip's suggestion that I try two 80 dipoles instead. It worked—flat from 3.5 to 4.0 MHz. I was having fun all over the band. I worked several ZLs without any real trouble, and was able to take NCS on the CHC-FHC 75 Meter Service Net in the midwest and help a lot of folks make contacts with the mobiles west of the Rockies. I often heard KLs when others couldn't.

"I added an HT-45 Loudenboomer RF amplifier to my setup which allowed me to be heard as well as hear on my 'double inverted V' antenna. I logged over 1600 hours as an NCS and was third to get a 1000 hour trophy from the K6BX Program (first to an OM). I got into one contest and was the only entrant, winning first place, worldwide! It wasn't my fault that I happened to be the only ham who took time to submit a log entry. I learned that it pays to enter your logs, for you never know what you'll win without that last effort in a contest. And don't ponder QSO points when multiple points can apply. Use all of them! I had my score all set up and ready to submit, but was told by another old timer that I should count only one part. As a non-member of the CHC, I would have had a worldwide 'clean sweep' had I not reduced my total score on that person's advice. Oh well, the OE-land YL enjoyed her first-place world, while I gloated over first state, first country, and first continent wins. Three out of four isn't all that bad for a beginner!

"I had many good times on 75 meters even though that band still isn't as 'done' as I want it to be. I still have one or two QSOs to get before I can call it 'done'! I went through the fun of being a Master Net Control station on the CHC-FHC net, and there were the conventions we were able to attend. Milwaukee and Niagara Falls were great trips with first time eyeballs with many who are still heard from today. There must be something about this County Hunting that nice folks just can't seem to resist! Tripping around Wisconsin with W4QBM running counties, I had my first DX as a mobile. Come to think of it, it was my first DX any mode, and I1RCD was later given other counties as well!

"Dick, WAØDCQ, and I spent a weekend running in Minnesota using his call on 20 and mine on 75. That trip wasn't free of incidents either, as we had a 'late arrival' problem at a state campground, and as we were heading for home after running the last county of the trip, the chopper transistors in the power supply decided they had had enough fun and went south! The second trip with WAØDCQ was to Knoxville, Tennessee, where we had eyeball QSOs with people at the Independent County Hunters Convention. That weekend I joined as one of the first 100 'Charter Members' of the Mobile Amateur Radio Awards Club. I made a $10 investment that has paid off immeasurably. There was no way I could tell what the future would bring, but friends I met that weekend are still returning to annual conventions now, 20 years later!

"I have been in all 48 states running counties, and I cannot imagine a better kind of geography lesson for our girls than they got traveling with Jolene and me. We've been on back roads and the I-System, and it's our opinion that if you want to *see* America, you can't see it from the superslabs! We've hammed our way through seven vehicles, and the eighth is now being 'outfitted' for the next trips. This is a lifestyle, and you don't think about keeping track of mileage accumulated doing something you enjoy. I could try to 'guestimate' a figure from memory of odometer readings, but 400,000 isn't very impressive when you think of truckers like Tim, Ralph, Bob, Roby, and June, and others who have been around the country a lot!

"With my first contact with Roby, WD9ITQ, I had no idea that we might develop some kind of record setting operation. I had an idea that I would pick up a lot of counties with him, but could not be on net during the day when I had to work for a living. We had 47 states done for quite a while until I heard June in Utah one day. I asked if Roby was with her, and was able to get the 48th state with him that day. We talked about that as I followed June for YL contacts, and decided to try for other goals we figured *might* just be 'do-able.' We met on the CH nets and got on the Century Club net as well. I was the first station to work June and Roby as a OM/YL combo in all 48 states on the Century Club. I was not a member of the CC, and there wasn't amy kind of award to celebrate the occasion. That is until Barb, N3DRO, got them worked in all 48, and then got the CC to make an award! She got first, and I never did join the CC, so I will never get any award for the achievement.

My reward was the opportunity to help other CC net operators work June and Roby in western states, where a relay was a necessity to making *any* contact with them. That double inverted Vee on 75 meters did the trick for us lots of times! One had to consider we had some super human watching over us, for there were times we QSYed to another band for a contact, only to find we had a momentary opening to make a contact. Often we had to go back to the band we started from and confirm what had taken place on that alternate band. There were a few times that we *didn't* have a good one and had to try again.

I eventually got them into the last state, and some helpful ham out east became our reluctant relay station and helped us make that contact! When we explained what we were doing, the guy figured we had lost our minds for sure! Roby was digging through his logs and came up with the realization that he and I had also worked each other in all 48 states, three times—chronologically—while we were doing the Three Bands, All 48 States achievement. That was a surprise to both of us, but the logs from both stations weren't to be denied and our logs proved it true.

"I have followed other mobiles, too, but none were as successful in the overall awards category. I may have made the same or even more total contacts, but they aren't as broad-range coverage. To name a few would be to leave out as many, so to all those mobiles I extend my thanks for helping me to be the first amateur to finish All Counties on Two Bands, All SSB.

"I have not been able to invest as much time in CHing as I did in past years. That is about the most important factor to making, or breaking, the records of past endeavors. If you pause, you can hear the memories of past county hunting fun drift through your mind. Like the time I asked if WB9RCY would be able to get into my last county for the first time. She checked the map and I soon had Wayne, Nebraska worked; not from Dorothy, however, as she gave the honor to CT1BY. Carlos's trip in America was made that much more enjoyable by the thoughtfulness of Dorothy and Wayne, who made a moment that will live in the minds of a few of us forever.

"I also remember the trip CT1TZ and I made through upper Michigan and Wisconsin to get Matero into his 15th state as a mobile. Mat asked if we could go all the way north to Lake Superior. I said yes, and when we arrived, Mat

thought we were on the shore of another ocean. He hadn't seen so large a fresh water lake in his life and believed it to be salt water, until I scooped up a glass of the cool lake water and drank it. I offered him a drink and smiled as he hesitated before drinking some. It was another wonderment for Mat when I told him the lake was more than 1300 feet deep! We found out that Sawyer, Wisconsin was a last county for someone, and I drove Mat to the Sawyer-Price county line and took some pictures while waiting to make the contact that would give Mateiro a last county along with his being mobile in the 15 states needed for the mobile award. An impromptu mini-convention was held in Mat's honor at Larson, Wisconsin, and he again enjoyed the friendship of several other county hunters who made the trip to visit him. I had 2 meters in the car, and we worked Joyce, WB9NUL/M, in each county enroute to Dorothy and Wayne's QTH in Mundelein, Illinois. We stayed overnight and then Jolene and I left for home. Mat stayed with Wayne and Dorothy to catch his flight back to Portugal from Chicago.

"Joyce and Barry came to visit in 1982 and left Jennifer with us to make the trip to the convention in San Diego, California. They left a short time ahead of us and went west before heading south, to get into new counties enroute
home. I worked them in some, but found Joyce's signal just wasn't up to snuff. I made contacts when she wasn't even being heard. Upon checking, they found that their resonator had fallen off. We gave a quick call to Jack, KC9A, asking to borrow one. With only a short drive out of the way, Barry and Joyce were on their way with a working station, and we departed in another direction for San Diego, California.

"We stopped in the Black Hills and saw Devils Tower. An overnight with Bud, N7SU, was fun, and he took me out to Gem County so I could give it to CT1TZ, among others. We rested for a week as we visited my cousins in Washington state for their 25th wedding anniversary, and we stopped to see Vic, W7VSE, who happens to live on Ross Avenue!

"The first time I saw the Golden Gate Bridge was from the bottom, aboard the *USS Mitchell* returning from Korea in 1959. In 1982 the topside was just as impressive. Driving the coast through Malibu and finally to Ventura made for a very long day. The tour through the *Queen Mary* was highlighted by a chance to operate the ARS aboard her. I guess I shook up the control ops just a bit when I began to work mobiles on 14,336 instead of calling CQ! John, N8GBF/M, told me later he'd been looking for a contact with the *Queen Mary* but hadn't been able to find her station on the air. It seems the *Queen* found him instead.

"In San Diego the trip would not have been complete without a visit to the San Diego Zoo. The Balboa Lighthouse affords one a beautiful view of the bay area, and later we were entertained by the multi-colored kites being flown at ocean's edge, where we got our toes wet in the salt water. We had to do that to be able to say we'd been in both oceans! Back in 1977 we swam at Jax Beach, hunted for shark teeth along the St. Johns river, and checked out the fort at St. Augustine, Florida. We mixed this convention with visiting Jolene's family.

"Back on the road east we saw Las Vegas at 114 degrees but cooled down through St. George, Utah. Zion National Park was as beautiful in the bright moonlight as we figured it would be in the heat of the day. Kanab, Utah was our next stop, and a trip to the North Rim of the Grand Canyon that morning began our day. We had to hurry along to get into Cibola County, New Mexico for Mateiro's last one in the state while we had good band conditions. The lights of Albuquerque twinkled like stars when we first could see them, but we had no idea they were more than ten miles away! Two days later we visited my aunt and uncle in Plano, Texas.

"Of all the trips we've taken, no one stands out as being the 'best.' They were all great, and if it weren't for CHing, I do believe most of them would not have happened. Now our girls are married and every so often our travels are talked about or commented upon as the 'education' that made us able to make other ventures with more confidence. With more time to invest in her own wants, Jolene got into a local amateur radio class and got her Novice license. She later got her upgrade to Technician, and is now working toward General Class. We are looking ahead to that, and when I asked her, Jolene replied that she plans to run all the counties I already ran. It looks like I'll be the designated driver for some 1300 or so counties in 48 states while she catches up to me. Our plans are to run all the counties some day, and with my retirement only a few years off, I hope we remain able to travel and attain our dream.

"Having recently sent applications for USA-CA, Jolene is now an official number holder with #2503 at the 500 level, and I added two more endorsements to my All Counties #250. Two days ago I got the card confirming the last county needed to enable the paperwork for Second Time Award. Will I do this all again? You can bet I will, as it will help fill time while Jolene is running counties! I still have the Bingo Award to get organized on paper so I know what I have left to do for that award. Plans for a PC may help us with our paperwork in the future, and I am practicing with a borrowed unit now. I am learning to key in data which is a new experience, and have a friend who is working on a program just for Jolene and me to store our radio log contact data and enable us to get it sorted to meet our needs for awards.

"Three weeks ago we got our eighth mobile, a 1991 Suburban. I am now getting it set up to operate with six-band capability and hope to get on the road with its shakedown run in the near future. Spring fire season begins in northern Wisconsin most any time now, so it will be a while before K9GTQ and KA9YWC are mobile. We do plan to be at the County Hunters convention in St. Paul, Minnesota, and hope to see you there. We can talk about old times and plan for the future as well.

"In these few pages I have tried to recall the good times of my experiences in County Hunting. I know I have forgotten to mention some of the other highlights of our lives in amateur radio. Those callsigns I didn't mention aren't forgotten. They're just lying in the precious memory file in the brain-box awaiting time to recall and tell others about the time that we . . .

"County Hunters. Now there's a group of people like none other. We pass more traffic than several nets. Taking care of emergency-type problems has total cooperation of net stations, and having the support of the net is an asset to any amateur radio traveler. I have traveled in places where the hair on the back of my neck has stood up, but knowing the net is there if I need help gets me through the tight spots and on to the next county for more contacts. There is only one word that seems to fit this occasion. It's 'thanks.' Without the fine cooperation found on the AR nets, I would not have been able to amass the 'credits' for the over 200 awards and trophies that have come my way via amateur radio. To the op who seeks confirmation from a mobile, I say make sure UR QSL is made out to that '/mobile' operator! CUL, 73! Tom"

USA-CA Special Honor Roll

Hugh E. Clark, K8GPC
USA-CA All Counties #700
Mixed, 3-6-91

Larry J. McMurry, KW3H
USA-CA All Counties #701
All SSB Mobile, 3-7-91

Greg Kleinsasser, KC0ZU
USA-CA All Counties #702
Mixed, 3-12-91

Tom Ross, K9GTQ
USA-CA All Counties #250
All SSB, 9-20-79
Endorsed All 20M SSB, 8-23-84
Endorsed All 75M SSB, 9-20-86
Endorsed USA-CA 500 #1144—
All 40M SSB Mobile, 3-14-91
Endorsed USA-CA 500 #1144—
All 2M FM Mobile, 3-14-91

USA-CA Honor Roll

3000		2500		2000		1500		1000		500	
K8GPC	727	ND1H	805	ND1H	877	ND1H	968	ND1H	1162	N4SMH	2495
KW3H	728	K8GPC	806	K8GPC	878	K8GPC	969	K8GPC	1163	ND1H	2496
W4HSA	729	KW3H	807	KW3H	879	KW3H	970	KW3H	1164	K8GPC	2497
KC0ZU	730	W4HSA	808	W4HSA	880	W4HSA	971	W4HSA	1165	KW3H	2498
VE1GU	731	KC0ZU	809	WB8RFN	881	K2MF	972	KC0ZU	1166	W4HSA	2499
		PT2TF	810	KC0ZU	882	KC0ZU	973	WA1FNS	1167	JA7AB	2500
		WA1FNS	811	K1CLN	883	PT2TF	974			W8EAO	2501
				KB1AF	884	WA1FNS	975			KC0ZU	2502
				PT2TF	885					KA9YWC	2503
				WA1FNS	886					WA1FNS	2504

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 non-subscribers, 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 the 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.

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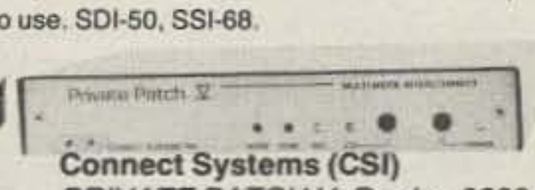

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Awards Issued

Hugh E. Clark, K8GPC, made a clean sweep of it by claiming USA-CA All Counties #700, USA-CA 3000 #727, USA-CA 2500 #806, USA-CA 2000 #878, USA-CA 1500 #969, USA-CA 1000 #1163, and USA-CA 500 #2497, Mixed, dated 3-6-91.

Larry J. McMurry, KW3H, filed all of his confirmations and qualified for USA-CA All Counties #701, USA-CA 3000 #728, USA-CA 2500 #807, USA-CA 2000 #879, USA-CA 1500 #970, USA-CA 1000 #1164, and USA-CA 500 #2498, All SSB Mobile, dated 3-7-91.

Greg Kleinsasser, KC0ZU, submitted his complete collection of County Contacts and received USA-CA All Counties #702, USA-CA 3000 #730, USA-CA 2500 #809, USA-CA 2000 #882, USA-CA 1500 #973, USA-CA 1000 #1166, and USA-CA 500 #2502, Mixed, dated 3-12-91.

James G. Sanders, W4HSA, took a big step toward his goal by claiming USA-CA 3000 #729, USA-CA 2500 #808, USA-CA 2000 #880, USA-CA 1500 #971, USA-CA 1000 #1165, and USA-CA 500 #2499, Mixed, dated 3-7-91.

Ronald P. Smith, VE1GU, filed another good application and received USA-CA 3000 #731, Mixed, dated 3-14-91.

Robert M. Smith, ND1H, submitted his good collection of certified contacts and was awarded USA-CA 2500 #805, USA-CA 2000 #877, USA-CA 1500 #968, USA-CA 1000 #1162, and USA-CA 500 #2496, All SSB Mobile, dated 3-5-91.

Jerold A. Goetsch, KF7RU, extended his good record by claiming USA-CA 2500 #810, All 20M SSB Mobile, dated 3-12-91.

Ira G. Deutsch, WA1FNS, made an impressive first filing by claiming USA-CA 2500 #811, USA-CA 2000 #886, USA-CA 1500 #975, USA-CA 1000 #1167, and USA-CA 500 #2504, All 20M SSB Mobile, dated 3-21-91.

Lawrence E. Mitchell, WB8RFN, received USA-CA 2000 #881, All SSB, dated 3-11-91.

William R. Welch, MD, K1CLN, received USA-CA 2000 #883, Mixed, dated 3-14-91.

Wendy D. Kincaid, KB1AF, qualified for USA-CA 2000 #884, Mixed, dated 3-16-91.

Therezinha Cardoso, PT2TF, submitted her good application for USA-CA 2000 #885 and USA-CA 1500 #974, All SSB, dated 3-16-91.

Barry G. Siegfried, K2MF, updated his record by claiming USA-CA 1500 #972, Mixed, dated 3-11-91.

Tom Ross, K9GTQ, enhanced his richly endorsed USA-CA Award by adding 40M SSB All Mobile, and 2M FM All Mobile endorsements, Class USA-CA 500, dated 3-14-91. Tom is #3 to have earned these endorsements, and #2 to have earned four band endorsements to USA-CA Class 500. Tom also was the first to achieve All Counties on two bands.

USA-CA 500 certificates went to:

Roger W. Parks, N4SMH, USA-CA 500 #2495, All SSB, 3-4-91.

Robert M. Smith, ND1H, USA-CA 500 #2496, All SSB Mobile, 3-5-91.

Hugh E. Clark, K8GPC, USA-CA 500 #2497, Mixed, 3-6-91.

Larry J. McMurry, KW3H, USA-CA 500 #2498, All SSB Mobile, 3-7-91.

James G. Sanders, W4HSA, USA-CA 500 #2499, Mixed, 3-7-91.

Tsunehiro Miura, JA7AB, USA-CA 500 #2500, Mixed, 3-11-91.

Corker A. Rhines, W8EAO, USA-CA 500 #2501, Mixed, 3-11-91.

Greg Kleinsasser, KC0ZU, USA-CA 500 #2502, Mixed, 3-12-91.

Jolene K. Ross, KA9YWC, USA-CA 500 #2503, All 2M FM Mobile, 3-14-91.

Ira G. Deutsch, WA1FNS, USA-CA 500 #2504, All 20M SSB Mobile, 3-21-91.

Awards Available

Garden City Award. The Garden City Award is offered by The National Institute of Amateur Radio (NIAR), Bangalore Club Station (VU2NRJ), India.

The first to claim the award will get

$500 in cash, a medal, and an attractive certificate. The second and subsequent claimants will get a medal and certificate. DX operators will get a certificate only.

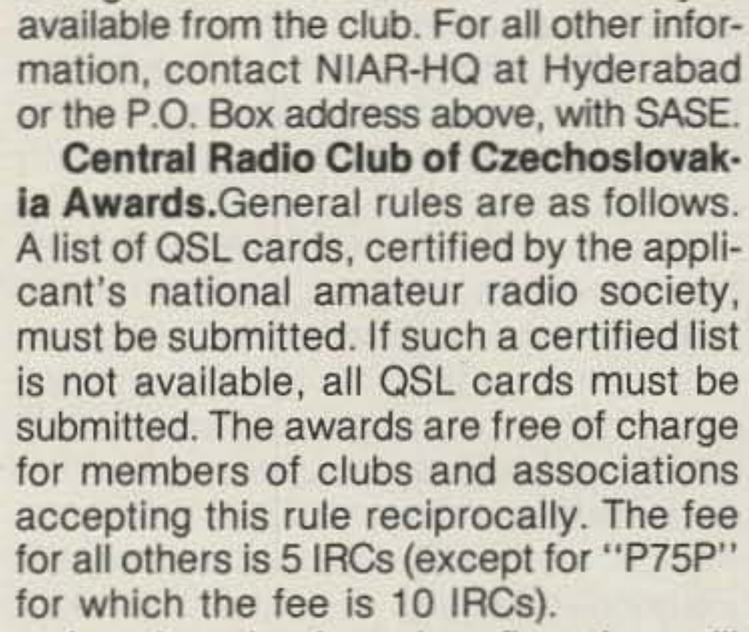
To earn the award make two-way amateur contacts with 100 different stations in Bangalore, in any mode, on any band. However, on VHF terrestrial mode, two contacts are counted as one. Send the log extract to NAGESH (VU2NUD), P.O. Box 5624, Bangalore-560010, India.

This award is open to all VU and DX amateur stations with permanent locations outside the city of Bangalore. Contacts made after March 1, 1991 are valid. The award can be claimed any time after making 100 contacts.

A Bangalore radio amateur callbook listing all the ham stations in the city is available from the club. For all other information, contact NIAR-HQ at Hyderabad or the P.O. Box address above, with SASE.

Central Radio Club of Czechoslovakia Awards. General rules are as follows. A list of QSL cards, certified by the applicant's national amateur radio society, must be submitted. If such a certified list is not available, all QSL cards must be submitted. The awards are free of charge for members of clubs and associations accepting this rule reciprocally. The fee for all others is 5 IRCs (except for "P75P" for which the fee is 10 IRCs).

Any altered or forged confirmations will result in disqualification of the applicant. All applications must be sent to Central Radio Club, Awards Manager, P.O. Box 69, 113 27 Praha 1, Czechoslovakia.



The OK-SSB Award offered by the Central Radio Club of Czechoslovakia.

OK SSB Award. This award is available to licensed radio amateurs. There are no time limitations. The award is given for two-way SSB QSOs with Czechoslovak stations totalling 25 points. Each QSO with a Czechoslovak station on 28, 21, or 14 MHz counts one point, and each QSO on 7 or 3.5 MHz counts two points.

P-ZMT. This award is available to shortwave listeners. All contacts heard after 26 April 1949 are valid. There are no band or mode limitations. The award is given for verified reception of stations located in each of the following 25 areas: OK, DM, HA, LZ, SP, UA1, UA2, UA3, UA4, UA6, UA9, UA0, UB, UC, UD or UF, UG, UH or UI, UL or UM, UN, UO, UP, UQ, UR, YO, YU. A special certificate, "P-ZM 24," is issued for the reception according to the P-ZMT rules realized in a 24-hour period.

P75P Award. This award is available to licensed radio amateurs and SWLs. All contacts after 1 January 1960 are valid. There are no band or mode limitations. The award is given for QSOs with at least one station located in each of the geographical broadcasting zones defined by ITU Geneva Conference 1959 (ITU Zones). The award is available in three classes: first class—70 zones, second class—60 zones, third class—50 zones. The zones should be determined in accordance with a special map and list available from the Central Radio Club of Czechoslovakia for 3 IRCs.

73, Dorothy, WB9RCY

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

"Mining" Old Logs

Solar activity, sunspots, and high-frequency propagation rise and fall in roughly 11-year cycles. DX, DXing, and DXers follow a similar pattern. As the number of sunspots rises and propagation on the higher bands improves, it becomes easier for an average station to work more countries. As more bands are open, there is less competition on a given band for the available DX. Longer band openings provide more opportunities to work rare and far-off countries. Also, 10 meters opens for hours a day. Since ionospheric absorption decreases with rising frequency, the higher the band that is open, the stronger the signals, and the better the DX. Even the most modestly equipped station can work the world on 10 meters, but this same station might never be able to break a pile-up on 20 meters.

At sunspot-cycle peaks (and for a period after the peak) there may be as much as five times as many amateurs actively chasing DX as there are at sunspot minimums. As propagation starts to decline, many of the DXers who came out of the woodwork at the sunspot peak become increasingly frustrated at their lack of DX success. The fewer, weaker openings crowd available DX, and all remaining DXers, into shorter openings of fewer bands. Eventually, only the best-equipped stations, or the most persistent, are able to work enough DX to call themselves DXers.

Many DXers will tire of this frustration and turn to another aspect of the wide world of amateur radio for a few years. They will not rejoin the active hunt for New Ones until the sunspot cycle again turns upward.

There are many other reasons for a gap in DXing: a change in location to one less suited for DXing, or a change in personal life such as going to college, starting a family, a new job. Any of these reasons or countless others may cause an amateur to take a break from active DXing. In fact, far more of today's DXers are the on-again, off-again type of DXer rather than that relatively rare DXer who has never paused in the DX hunt.

This cycle of DXing leads to an interesting situation. At the peak of the sunspot cycle many thousands of part-time DXers returned to the DX fold. The political and other changes of the years since they were last active have dramatically altered amateur activity levels in some countries. Some DXCC countries that were too common to generate significant pile-ups ten years ago are now among the rarest of countries. Conversely, some countries with no activity at all ten years ago are now too common to spot on PacketCluster™.

A good catch for RTTY DXers is Sergio Gonzalez, EA8ATE, who operates out of this neat corner of his home in Las Palmas, Canary islands. (EA8AOH photo)

A couple of examples of the former are Iran, Libya, and Ghana, all easy pickings in the 1970s and impossible today. A good example of the latter is China. Once at or near the top of the Most Wanted Countries list, it now ranks near 150th.

The amateur who has grown from a casual DXer into an active DX hound will soon realize that some of his or her more common contacts of 10 to 30 years ago are now rare DX. It is far easier to search old log books for unconfirmed contacts with Libya, Tunisia, and Ghana than it is to work a station today from those countries. There are nuggets of pure DX gold in older log books; the only problem is confirming contacts made years or decades ago. Let's look at some of the resources available to get QSLs from some of these long-ago contacts.

Three Steps to the QSL

A DXer must complete three steps to turn the information in old log books into confirmed countries. The first step is obvious: You have to locate your old logs and carefully review them for contacts with countries you presently need. You didn't throw out your old log books the last time you moved, did you? Of course not! Most amateurs treasure their old logs, and may even occasionally turn to them to remember particular contacts or operating thrills. So with your list of confirmed DXCC countries in your hand, start at the beginning and carefully review each contact.

Note that prefixes, and even countries, have changed over the past 20 years. Use the international prefix allocation chart in the back of the DXCC Countries list to identify the country. (Even that aid might not be enough, however. My first DX contact was with a 3C3 station, a prefix allocated to Canada at the time, not Equatorial Guinea.)

Stop at every unusual entry in the log and determine if it is a contact worth confirming. Using a highlighter pen to mark the contact and a stickum note to mark the page in the log will help you locate the contact in the future.

Once you have your list of unconfirmed contacts, the next step is to locate a QSL route. Perhaps you noted the then-current QSL route in your log. If the station had a QSL manager in the US or Europe, it might still be valid. More likely you didn't note a QSL route, as you weren't that interested in confirming that contact at the time.

If that is the case, you will need to turn to one of the comprehensive QSL reference lists. I know of three. By far the most complete is "The Most Complete QSL Manager List Ever Printed," which is available from Lars Bohm, SM5CAK, Karsby Kvarn S-591 96 Motala, Sweden. Check with Lars for current prices. This list provides QSL information from stations back at least 25 years, through the last two complete sunspot cycles. In addition to QSL managers, the list includes home calls of operators, and subsequent callsigns if known. My experience has shown that this reference is the single best place to start your quest for old QSL information.

Another source of similar information is the "WB4KCL QSL Manager Directory" published by Fred Smith, 27 Princess Gillian Court, Fredericksburg, VA 22405. This neatly printed list includes

P.O. Box 50, Fulton, CA 95439

The WPX Program

Mixed

1503 ..... YV7QP
1504 ..... I1YST
1505 ..... WM9H

SSB

2236 ..... YV7QP
2237 ..... WG0O
2238 ..... W4/HK3GZB

CW

2684 ..... G4ASL
2685 ..... YV7QP
2686 ..... WA4FTM
2687 ..... KU0J
2688 ..... JT1CS
2689 ..... DL1GPG
2690 ..... JP1PCK

Endorsements

Mixed: 450 YV7QP, K9BLY, W3KH, OH3MIG. 500 YV7QP, K9BLY, W3KH, OH3MIG. 550 KB3WN, YV7QP, WA4SFN, K9BLY, W3KH, OH3MIG. 600 YV7QP, K9BLY, W3KH, OH3MIG. 650 YV7QP, KA1NCN, W3KH, OH3MIG. 700 YV7QP, W3KH, OH3MIG. 750 YV7QP, W3KH, OH3MIG. 800 YV7QP, AA9F, W3KH, OH3MIG. 850 YV7QP, AA9F, W3KH, OH3MIG, TF5BW. 900 YV7QP, AA9F, W3KH, TF5BW. 950 YV7QP, W3KH, TF5BW. 1000 YV7QP, TF5BW. 1050 YV7QP. 1300 AI6Z. 1350 HA5NK. 1400 HA5NK, DF6EX. 1450 WB2YQH, DF6EX. 1550 KB0G. 1850 I8RFD. 2050 W2FXA. 2100 W2FXA. 2550 SM3EVR.

SSB: 350 YV7QP, W4/HK3GZB. 400 YV7QP, W4/HK3GZB, PA-2164. 450 OE6CLD, YV7QP, W4/HK3GZB. 500 OE6CLD, YV7QP, W4/HK3GZB. 550 OE6CLD, YV7QP. 600 OE6CLD, YV7QP. 650 OE6CLD, JH6WMJ, YV7QP, WD5KBB. 700 JH6WMJ. 750 JH6WMJ. 850 IK2AEQ, AI6Z, TF5BW. 900 KB0G, TF5BW. 950 KF7RU, TF5BW, WB6SRK. 1000 TF5BW, WB6SRK. 1050 K3ZPG. 1250 KS3F.

CW: 350 G4ASL, YV7QP, JT1CS, JP1PCK. 400 G4ASL, YV7QP, JP1PCK. 450 G4ASL, YV7QP. 500 G4ASL, YV7QP. 550 G3JTO, YV7QP. 600 YV7QP. 650 YV7QP. 700 YV7QP. 750 YV7QP, NN7A, IK2ECP. 800 NN7A, IK2ECP. 850 IS0FIC, W9IAL. 900 IS0FIC. 1000 LU8DY, VS6UW. 1050 LU8DY, AI6Z. 1250 KB0G, LA9XG. 1300 I7PXV. 1350 I7PXV. 1400 G4SSH.

10 Meters: KA1NCN, KC8YM
15 Meters: LU8DY, WB6SRK, KC8YM
20 Meters: G4ASL, OE6CLD, LU8DY, WG0O, KC8YM
40 Meters: G4ASL, WG0O, KC8YM
80 Meters: WG0O, KC8YM

Asia: OE6CLD, KB8DAE, WG0O, KC8YM
Africa: LU8DY, KB8DAE, KC8YM
No. Amer.: LU8DY, WG0O, KC8YM
So. Amer.: WB6SRK, KC8YM
Europe: G4ASL, KA1NCN, TY2FG, WG0O, KC8YM
Oceania: VE3FXR, KC8YM

Award of Excellence Plaque Holders: N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2**, AB9O, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, VED7WJ, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VE3FXR.

Award of Excellence Plaque Holders with 160 Meter Endorsement: AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, 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, K9QFR, NN4Q, W4UW, K9QFR, NN4Q, W4UW, NX0I, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW.

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: Norm Koch, K6ZDL, CQ WPX Awards, Rt. 4 Box 218 CR13, Clovis, NM 88101.

Camel mobile! Eric, WZ6C/ST4, got a skeptical response to his claims of operating Camel Mobile, but here is proof, complete with his travelling bi-square antenna farm. Eric is now in Bangladesh, and will be operating Elephant Mobile as S2/WZ6C.

QSL information for contacts made from 1979 on, with only scattered information before that time. Within this time period it is reasonably accurate, and it provides far more detailed information than Lars' list. In addition to the QSL manager, the WB4KCL list includes direct addresses, dates of valid operation, and date of many entries, which allows you to determine how up-to-date the listing is.

A newcomer to the field of archival QSL information is "PC-GO," a computer program for IBM-compatible machines. PC-GO is available only to current subscribers of the "W6GO/K6HHD QSL Manager List" and consists of the QSL information from the current issue of the list (above 5,000 recent entries), and an additional 10,000 inactive QSL routes from the past 11 years. Thanks to high standards of accuracy, and extensive cross-checking, the W6GO/K6HHD list is the most comprehensive and accurate source of such information available anywhere, and the ease of accessing this information on your own computer makes the program well worth the modest cost. Contact the O'Briens at P.O. Box 700, Rio Linda, CA 95673.

Once you've located a QSL route, you're now ready for the third, and often most difficult, step: locating a current address. Amateurs tend to be a mobile lot. The ARRL says that more than 15% of its members change address every year. DXers are a little more stable, but a large percentage will have changed addresses since the long-ago contact. In addition, many US amateurs will have changed callsigns since then.

First try the current issue of the *Radio Amateur Callbook*. You might be lucky and the QSL manager is still listed. Try a QSL to that address, including a note apologizing for trying to confirm such an old contact, but explaining how much you need the card and thanking the manager for the extra trouble to dig out the old logs. (I store my old DXpedition logs and cards in a remote storage locker; it requires a special trip and then sifting through several moldy boxes to look up 10-year-old contacts.) You'll either get a response from the manager, probably in the form of a QSL card, or an indication that the amateur has moved and forwarding time has expired.

Should you not be able to locate the QSL manager in the current *Callbook*, it's time to break out more resources. A *Radio Amateur Callbook* from the appropriate year will provide the complete name of the supposed QSL manager. The *Amateur Radio Call Directory, Name Index* is a form of "reserve callbook." It lists current amateurs by name and includes their current FCC callsign, state, and year of birth. From this list you might be able to determine a new callsign. Then back to the current *Callbook* and the pleading letter. The *Name Index* is available on microfiche from Buckmaster Publishing, Mineral, VA 23117. (Microfiche readers can be found at local libraries and some auto-parts stores. You might even be able to get one cheap for your local radio club, as they are being phased out in favor of computer terminals.)

This trick works only with US QSL managers. Fortunately, few other countries change the callsigns of amateurs as much as the FCC does. Many changes are limited to the prefix. Thus, FD1MUF is the same person as F1MUF or FE1MUF, depending on license class. In Great Britain a station retains the same number and suffix even when operating from another part of the country. Thus, GW3KFE, GJ3KFE, G3KFE, and GM3KFE are one and the same person.

Another trick to locating long-ago operators works in former colonies in Africa. When the country became independent, many of the ex-patriots living in that country returned to the colonial base. Thus, most CR7 amateurs from Mozambique returned to Portugal and are now CT1 operators. A somewhat tedious task of locating the exact name of the CR7 operator in a then-current *Callbook* and then scanning the 1991 *Callbook* for the same name might help locate a Mozambique QSL.

Still stumped? Try asking your fellow DXers. QSL Help Wanted columns in *QRZ DX* and *The DX Magazine* are amaz-

The WAZ Program

Single Band WAZ

15 Meter SSB

373 ..... W7HHP

20 Meter SSB

837 ..... W8JRK 838 ..... IK2MLY

10 Meter CW

109 ..... JG1NBD 110 ..... W2FV

15 Meter CW

203 ..... WB2GOK 204 ..... JH5PLN

RTTY WAZ

62 ..... JG1NBD

All Band WAZ SSB

3723	N4RU	3729	N6RQ
3724	IK6CNM	3730	UA9FAR
3725	WA2SPG	3731	IK8ERL
3726	KE9QL	3732	KA0ZFX
3727	DL2ZBJ	3733	PA0ZH
3728	VE2FSU		

CW/Phone

6981	JA0BPY	6992	WB4BMM
6982	LA9FFA (CW)	6993	KA1CLV (CW)
6983	N4RU (CW)	6994	VE7BL
6984	K2MYR (CW)	6995	OE2LCM
6985	WA2MZX	6996	DJ3CB
6986	K7ZM	6997	I4HJ
6987	JA2KKA (CW)	6998	JI2KXK
6988	KO2Q	6999	HA0NAR
6989	N9EXN (CW)	7000	W6WVK
6990	AC5K (CW)	7001	OZ5EDR
6991	IK4GLV	7002	LZ2JE (CW)

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4½ × 9½ 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).

ingly successful in locating QSL routes and in getting cards from DX operations years ago. *The DX Bulletin* even offers a free service to its subscribers to do the above research. Office Manager Amy Ste Marie is quite proficient at this task, as dozens of DXers can acknowledge. Send all QSO information, including operator name, mode, etc., and a self-addressed, stamped envelope to P.O. Box 50, Fulton, CA 95439. (Non-subscribers may also use this service. Please include US$1 along with your SASE and be patient. Obviously, Amy will tackle requests from subscribers first.)

Good luck in your efforts to add to your DXCC country count by "mining" your old logs!

July DX Events

Soviet and US amateurs have arranged a floating DXpedition down the Yennisey River in western USSR. Amateurs from club station UZ0AXX, including Willy, UW9AR, will host US amateurs on the luxury liner *Alexander Chekov*. The group meets in Leningrad on July 29 and moves on to Krasnoyarsk, where they board ship on August 2 for the 12-day cruise down the river. An amateur station is set up on board, and hams can work the world from the ship. Side trips include visits to the Tungus meteor site, helicopter rides, and deer hunting. Prices range from $1500 to $2400, plus airfare to Leningrad. For more details, contact Gene Walsh, N2AA, at 201-382-7525, or John Kiesel, KE7V, at 206-321-5671.

The strong winds at 65°N in Zone 2 limit VE8PW to easily repaired wire antennas, but Peter remains active despite the limited antennas. Try the SSB net at 14222 kHz around 0200Z.

Meanwhile, a team of Irish amateurs will operate from the isolated Fastnet Rock, off the southern coast of Ireland, for a ten-day period this month. Operators include Bill, EI9FK; Tony, EI3GU; Frank, EI2GS; Sean, EI4GK; Sean, EI5CZB; and Jim, EI2BB. Fastnet is one of the westernmost parts of Europe and features a 150 foot high lighthouse that is one of the most important in Europe. The reason the lighthouse is so important is that the weather in the area is notoriously poor. A direct landing on Fastnet is possible only a few days a year, even in the summer. The Irish amateurs will have their work cut out for them to land, erect antennas, and operate without being swept off the rock. Don't miss this DXpedition.

A little farther east is another special-event station in Scotland, as part of the Scottish Tourist Board's annual activity. **GB60NTS** will be active July 20–21 from the Pollock House, in Glasgow, Scotland. For more details on the Scottish awards, special-event stations, and other activities, send a dollar to Paddy McGill, GM3MTH, 9 Ramsey Place, Old Monkland, Coatbridge, Lanarkshire ML5 5RE England.

Still farther east (a great deal farther) is the Montana Touring and Climbing Club's Mt. Everest expedition, set for this month. YO3CD is the radio communications officer for the group, and he will lead the amateur group's operation from Nepal this month. Following the Nepal 9N operation, the team moves on to Bhutan A5, and Tibet (now BY) in October. They promise RTTY as well as CW and SSB operation.

Another prolonged DXpedition/expedition will be a two-month operation from Greenland by Dr. Laurent Beugnet, F6GOX. He will operate as **OX/F6GOX**, unless he is able to secure one of the special callsigns he has requested: **OX9F** or **OX91REF**. On CW try 10 kHz up from the bottom of the bands on 80–10 meters, and 1830 and 50210 kHz. On SSB try 3790, 7042, 14120, 14195, 21295, 28495, and 51150 kHz. He'll also run a beacon on 50025 kHz, signing OX3BCN. QSL any contact via F6AJA, or via the French REF bureau.

Finally, while not a DX event in the operating sense, an important DX activity takes place in July: The Most Wanted

5 Band WAZ

As of March 31, 1991, 313 stations have attained the 200 zone level.

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

SP3IBS
PA0LVB
DK7PE

The top contenders for 5 Band WAZ are:

N4WW, 199	RT5UY, 199
SP9PT, 199	K7UR, 199
K6YRA, 199	K9EL, 199
PY7ZZ, 199	NA0Y, 199
DL9WW, 199	VE7DX, 199
K0CS, 199	I8IGS, 198
KB0G, 199	W0PGI, 198
ZS6BCR, 199	VE7AHA, 198
HA8XX, 199	SM6AHS, 198
UA4RZ, 199	K1ST, 198
AA4KT, 199	W1JR, 198

709 Stations have attained the 150 zone level as of March 31, 1991.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4½ × 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).

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 322. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

W9DWQ	322	K6LEB	320	W6PT	315	WA4JTI	312	W6DN	308	I8EAT	302	DJ7CX	296	KB0G	290	AG9S	282
K2FL	322	N6AV	319	K4XO	315	W9WAQ	311	W9RY	307	K9TI	302	K8LJG	296	KU0S	290	JH1VRQ	281
K2TQC	322	N4MM	319	K9IW	315	K6EC	311	W4OEL	307	NY5L	302	WA4DAN	296	W1WLW	288	K7ZR	279
N4JF	322	SM3EVR	319	N4PN	314	K9BWQ	311	SM6CTQ	305	WA8DXA	301	WA8YTM	296	W4BV	288	W2LZX	279
K4CEB	322	K1MEM	318	KQ9W	314	IT9TQH	311	K4CXY	304	YU2TW	300	WD9IIX	295	K1VHS	288	KB9XG	279
K9MM	322	W4BQY	318	DL7AA	314	DJ1XP	310	W2UE	304	I3OBO	300	KD8V	295	G2GM	288	W9NUF	279
SM6CST	322	N6CW	318	I5XIM	314	W6ID	310	IT9QDS	304	W0JLC	300	W6YQ	295	K2JF	288	KB8DB	279
ON4QX	322	DL3RK	317	W1NG	314	K9QVB	310	I8WY	304	DL9QW	299	K9DDO	294	K8NA	287	HB9AFI	278
DL1PM	321	W0IZ	317	EA2IA	314	W7CNL	310	AA5NK	304	NN4Q	299	N5FW	293	G2FFO	286	KA2DIV	278
K6JG	321	K3UA	317	DL8CM	313	WD9IIC	310	N7RO	304	F3TH	299	IT9VDQ	293	W9SC	286	KA3R	277
W2FXA	321	W7ULC	317	W1WAI	313	W0HZ	310	KZ4V	304	DJ2PJ	299	W3BBL	293	G3KMQ	286	KA7T	277
K9AB	321	AA4KT	317	IT9ZGY	313	K8PYD	309	WA4IUM	304	I2QMU	299	VE7DX	292	K4JLD	286	DL1QT	276
YU1HA	321	W0SR	317	WA2HZR	312	WB4RUA	309	AB4H	303	N4AH	299	PA0XPQ	292	K2JLA	285	YV5ANT	276
N4KG	320	N6AR	316	K2OWE	312	AA6AA	308	N8MC	303	K3FN	297	N5DX	290	KP4P	283	K4SE	275
OK1MP	320	N2KW	316														

SSB

K2FL	322	CT1FL	321	K2JLA	318	W9RY	314	G4ADD	310	EA1QF	304	I2ZGC	299	W9NUF	292	AI9R	281
W6EUF	322	OA4OS	320	KS0Z	318	NJ2C	314	WD8PUG	310	K4RIG	304	NW5K	299	KD5ZM	292	TG9EP	281
VE1YX	322	KS2I	321	KQ9W	318	K8CSG	314	XE1OX	310	I4WZK	304	WB6GFJ	299	VE6PW	292	VE3NUP	281
F9RM	322	I0AMU	320	WA4IUM	318	KU9Z	314	WE2L	310	K4JLD	304	JH1VRQ	299	TI2LTA	292	N1ALR	281
N4JF	322	WA4ECA	320	YV5AIP	317	W6BCQ	314	W6MFC	310	KD5ZM	304	K1VHS	299	YV1CLM	292	EA8TE	281
VE3MR	322	OE3WWB	320	W8ILC	317	PY4OY	314	KA5RNH	310	KB1JU	304	I8IGS	299	WA4LOF	291	VU2DVP	281
DJ9ZB	322	VE3MRS	320	N6AR	317	AA5NK	314	K9TI	310	KD8V	303	ZL1BOQ	299	AC0A	291	PY2DBU	280
4Z4DX	322	VE7DX	320	KM2P	317	IK8CNT	314	KZ4V	310	KC8YM	303	K8YVI	299	VE3FEA	291	NX0I	280
W4EEE	322	SV1ADG	320	VE7WJ	317	HR1KAS	314	W0ULU	310	KB0SY	303	K5DUT	299	VP9CP	291	YU1TR	280
W9DWQ	322	WD8MGQ	320	WA4DAN	317	KB3OQ	314	DK2BL	309	KB7VD	303	WA0TKJ	298	W8LKG	291	G4FAM	279
W4DPS	322	IT9TGO	320	W9JT	317	I2LLD	313	AA6AA	309	W7ULC	303	I6PLN	298	SV1JG	291	W9VA	279
W0YDB	322	W3GG	320	YV5CWO	317	W1NG	313	AB9O	309	KA9TNZ	303	KA8T	298	KE7UL	291	WB8TLI	279
EA4DO	322	N4KG	320	K4CXY	317	W1LQQ	313	KU9I	309	WA2FKF	303	KB2FC	298	VE2GHZ	291	W8URM	279
DL9OH	322	W4UW	320	YV1AJ	317	SM4CTT	313	N6AHV	309	IK1GPG	303	DJ7CX	298	VE3IPR	290	W5XO	279
VE3XN	322	W6DN	320	N4CRU	317	KE4VU	313	KB9OC	309	WA8YTM	302	KB9LN	298	W4JFE	290	K5AOL	279
W3AZD	322	AA4KT	320	I8KCI	317	EA4LH	313	K1MIZ	309	XE1KS	302	WD0BNC	298	XE1CI	290	KB5DN	278
YV1KZ	322	WB4UBD	320	I8XTX	317	WB6OKK	313	IV3YRN	309	W2LZX	302	K9SM	297	K1HDO	290	EA6DE	278
OK1MP	322	TI2CC	320	WA4WTG	317	WB6PSY	313	I5EFO	309	KB0U	302	JH4PRU	297	VE3CKP	289	JH8NYK	278
VE3GMT	322	I4EAT	320	KA9ABC	317	WB4PUD	313	I1POR	309	WD5P	302	EA9IE	297	I4UFH	289	KX5V	278
ZL1AGO	322	N6AHU	320	DJ1XP	316	W8PCA	312	G4GED	309	W4BQY	302	XE1HI	297	W9TA	288	WN5K	278
ZL3NS	322	W0SR	320	KD8VM	316	N2SS	312	KP4P	309	XE1XM	302	KF5DX	297	JA5PUL	288	VU2CVP	278
K6WR	322	WA4JTI	320	N4WF	316	OE2EGL	312	WA9RCQ	309	K7EHI	302	TI2JJP	297	AI9U	288	K4BYK	277
I4LCK	322	NY5L	320	K4POV	316	K0GT	312	N4PN	308	K1MEM	301	N4KEL/M	297	YV2EJU	288	VE3IUE	277
K2TQC	322	I8AA	319	KR9O	316	W2FGY	312	WD9IIX	308	N5FG	301	NP4CC	297	I4CSP	288	DF6EX	277
W2SUA	322	OZ3SK	319	I8LEL	316	G3VOF	312	K9QVB	308	I3OBO	301	HP1JC	296	LU7HJM	288	KG9N	277
K8LJG	322	DL6KG	319	KC8EU	316	K8CMO	312	N3ARK	308	K9UAA	301	YU7KV	296	OK1AWZ	287	I8WYD	277
W9OKL	322	K9IW	319	K9HQM	316	KI3L	312	W4BQY	308	KP4EQF	301	XE1OW	296	EA3KW	286	CE7ZK	277
EA2IA	322	KB8DB	319	W6SN	316	TI2KD	312	OA4ED	308	N5FW	301	WD9GQV	296	AB9E	286	KA9I	277
K9MM	322	IT9TQH	319	K3UA	316	K8NWD	312	K4LR	308	VE2PJ	301	F6BFI	296	W9SC	286	WA9BDX	277
K4MQG	322	YS1GMV	319	AG9S	316	F2MO	311	VK4VC	307	IK8GCS	301	NC9T	296	PA0XPQ	286	WA5HWB	277
OZ5EV	322	W7OM	319	K8ZZU	316	W0SD	311	N6AV	307	VE3DLR	301	WB3GPR	295	N8BJQ	285	WB0UFL	276
K4MZU	322	K1UO	319	K2JF	316	K9RF	311	AI8M	307	VE6PW	301	KB3KV	295	N9CPW	285	W4PTT	276
W9SS	321	KB5FU	319	DU9RG	316	K9HDZ	311	KC2FC	307	IK7DBB	301	I0SGF	295	K9MNT	285	WD0DMN	276
YU1HA	321	W2CC	319	OE2EGL	316	LA7JO	311	I0MBX	306	WA3HUP	300	KB0G	295	KB5RF	284	HK6BER	276
I0ZV	321	VK4LC	319	9H4G	316	LU3YL	311	KV2S	306	VE3FJE	300	EA4KK	295	KF5AR	284	I8IYW	276
I8YRK	321	KB4HU	319	K8PYD	315	N6OC	311	VK3JF	306	WB4NDX	300	W0IYR	294	IK8BMW	284	XE1DU	276
VE2WY	321	WB3DNA	319	K4XO	315	NA5W	311	VE4SK	306	YU2TW	300	KK0C	294	G4SZD	284	WB4TGB	276
K9BWQ	321	I4ZSQ	318	AI8S	315	W8ILC/QRPp	311	KA9ABC	306	N4CRU	300	G3XTT	294	NZ7D	284	N0AMI	275
K6JG	321	W2FXA	318	WB1DQC	315	I2MQP	311	WA2MID	306	KZ0C	300	VE3XO	294	KC7EM	283	N7ASL	275
K6YRA	321	IT9ZGY	318	IK8BQE	315	NN4Q	311	XE1MDX	306	N8BKF	300	I7UNX	294	KR9F	283	WA4OPW	275
N7RO	321	ZS6LW	318	W6NLG	315	IK2GNW	311	WB5TED	306	WT4T	300	K3NEE	294	WB3HAZ	282	KC2RS	275
ON5KL	321	W0SFU	318	WZ4I	315	KA6V	311	N6CGB	306	KB2HK	300	I5BDE	293	VE3MV	282	NO4J	275
YU1AB	321	PY1APS	318	KE4HX	315	AA6BB	311	N4KE	305	K7LAY	300	WB3CQN	293	ZP5JCY	282	KC4MJ	275
K5OVC	321	G4CHP	318	XE1AE	315	SM6CST	311	KE3A	305	KB9KD	300	KB8O	293	I8DVJ	282	KA5YCM	275
TI2HP	321	W7FP	318	KA3HXO	315	AA4AH	311	K3LUE	305	KB2MY	300	VE5FX	293	YB3CEV	282	KI4FW	275
W4NKI	321	KR9O	318	I8KDB	314	K0HQW	311	CX4HS	305	IN3ANE	300	IT9VDQ	293	K3NEE	282	NX4Y	275
N4MM	321	N2KW	318	K9LKA	314	W4SSU	310	W5LLU	305	KF7SH	300	WD9IIC	293	W3SOH	282	WA4PGM	275
I8ACB	321	I2QMU	318	OH5KL	314	K6EC	310	WA6DTG	305	I2EOW	300	K4SE	292	WA9BXB	282	KE5PO	275
K9AB	321	W4UNP	318	OZ8BZ	314	K8NA	310	KZ8Y	304	VE4AT	299	KC8JH	292	YV5IVB	282		
KZ2P	321	ZL1BIL	318	YV5DFI	314	NJ0C	310	K8VFV	304	SV8CS	299	AI5I	292	AE2B	281		

Countries Survey. DXers who wish to participate in the survey and who have not already received their survey forms can obtain same by sending a business-size, self-addressed, stamped envelope with postage for one ounce to Most Wanted Countries Survey, P.O. Box 50, Fulton, CA 95439.

DX Gatherings

The Northwest DX Convention will be held July 27–28 at the Richmond Inn, adjacent to the Vancouver, British Columbia, airport. DXers are encouraged to make their room reservations by calling 604-273-7878 and mentioning the DX convention. The sponsoring British Columbia DX Association will mail registration information to DXers who have attended previous conventions.

QSL Notes

Joanie, KA6V, reports that she handles QSLs for **V31A, RA0CWA,** and **VQ9CQ**, all active in the ARRL DX tests. Also, Jerry, AA6BB, now has all logs for **BV2FB**; if you tried a direct QSL to Yang without success, send an SASE to Jerry.

Al Kahn, K4FW, and W9VW operated from Grenada in February under the calls **J37J** and **J37M**. QSL both calls to W9VW.

Tony Miller, W5BWA, reports that he was still waiting for the copies of **UH8EA**'s log as of mid-March. Please don't send second requests. Tony says the delay in logs is due to the scarcity of copying machines in Turkmenistan.

Paul, **VP2EXX**, has a new QSL man-

CQ DX Awards Program

SSB

1859	VK2ETM	1862	K4MZU
1860	K6GCF	1863	IK2ECN
1861	WA4APM		

CW

822	YU2WG	823	PA0XPQ

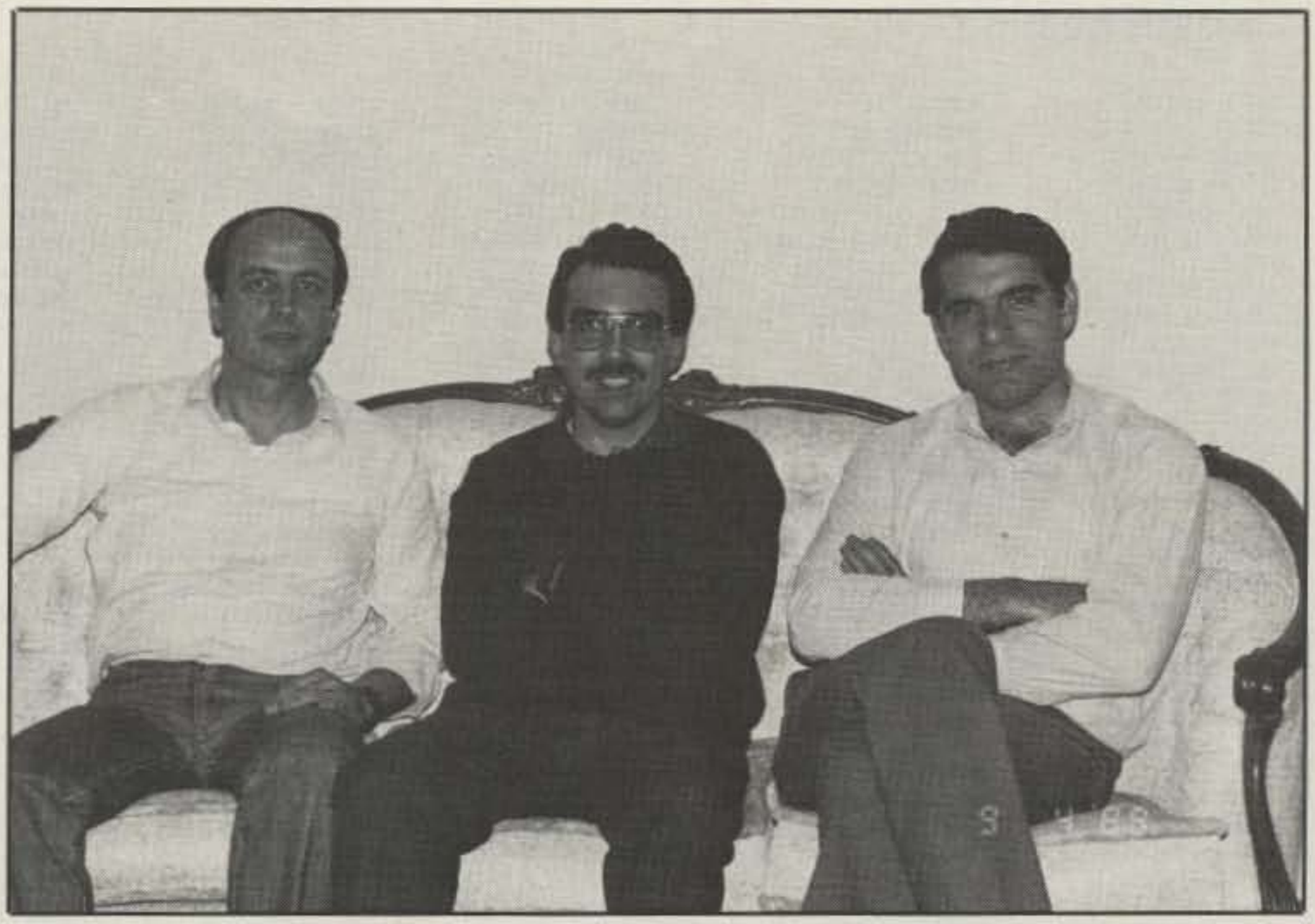
SSB Endorsements

320	DL9OH/322	310	WB3DNA/319
320	K4MZU/322	310	KS0Z/318
320	W6EUF/322	310	KQ9W/318
320	OA4OS/321	310	9H4G/316
320	W4NKI/321	310	KB3OO/314
320	K6JG/321	310	WB4PUD/313
320	N7RO/321	310	K0HQW/311
320	KS2I/321	300	K4LR/308
320	NY5L/320	300	N6CGB/306
320	WA4JTI/320	275	NP4CC/297
320	SV1ADG/320	275	NC9T/296
320	W6DN/320	250	IK2ECN/261
28 MHz	WA4APM	200	WB4UHN/231
28 MHz	IK2ECN	200	DL2SCA/218
28 MHz	KE6KT	200	AB4UF/216
3.5/7 MHz	YC0MCA	200	KE6KT/201

CW Endorsements

320	K6JG/321	300	N7RO/304
310	KQ9W/314	300	NY5L/302
310	W1WAI/313	275	PA0XPQ/292
300	W6DN/308	275	KU0S/290
300	W4OEL/307		

Total number of active countries is 322. 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.



Much of the active amateur population of Izmir, Turkey: from the left are TA3F, TA3C, and TA3D. (Thanks to W8ZNH for the photo.)

QSL cards for recent Silent Key **ZS5BK**, including his operations as **ZS5BK/7P8** and **7P8EN/p**, will be handled by Diane Cardell, ZS5DC.

Carlos, **WP4U**, reports that an unscheduled trip to Saudi Arabia and Kuwait has delayed his QSLing chores for his operations from Coffin, Vieques, and Culebra Islands. He'll answer the cards as soon as he returns to Puerto Rico.

ager: Joe McCormick, KC8JE, 6023 State Route 141, Gallipolis, OH 45631. Cards sent to his previous manager of KC8JH will be forwarded automatically, so there is no reason to re-QSL. Joe will handle all of Pual's operations, including **FG/FS/FG/VP2EXX, V47NXX, V45NXX, KB0AQB/WP4, KB0AQB/WP5, VP2EQ** (after 1988), and **VP2E** (after 1988).

Peter, WB2WOW, recently passed away. However, WA2NHA will handle Peter's QSL chores, including **ET2A, ST0DX,** and **7Z1AB**. Again, no need to re-QSL.

Yasuyuki Inoue, JR1AIB, has the **YI1BGD** logs from Operator Ali **only**, and only for the following dates: February 12, 1987 to February 27, 1987; May 12, 1989 to August 14, 1989; and September 25, 1989 to October 7, 1990. Yas's address is Box 39, Musashino, Tokyo 180, Japan.

Take Yokoyama, JL1BLW, says he handles the QSLs for his operations as **6Y0I** in the WPX SSB, and **JY6ZZ** in the ARRL SSB DX test. His address: 2-22-1 Tateishi, Katsushika-ku, Tokyo 124, Japan.

Dave Novoa, KP4AM/W4, says he recently came across the logs and cards from the 1979 **KP4AM/D** Desecheo Island DXpedition. His address is not correct in the 1991 *Callbook*. QSL to 1994 SW 142 Ave., Miami, FL 33175-7034.

QSL Information

3D2QB to SM3CER
3D2WZ to G3WZ
3DA0BJ to AA4RL
3X1SG to ON6BV
4J1FT to OH2BN
4K1A to UZ1PWA
4K1ADQ to UA1ADQ
4K1F to UA1AFM
4K2BDU to UA9MA
4K2OIL to UA9MA
4K4/UA0KBZ to UA0KBZ
4K4QQ to RA1QQ
4S7EF to N1HBF
4U/OH7XE to OH7XE
4U1UN to NA2K
4U6ITU to OE2XEL
4Z4DX to WA4WTG
5B4ABH to OE4KHB
5V7DP to KA1DE
5W1IU to JA1WHG
5Z4FO to KB4EKY
6I2A to XE2KB
6W1QC to JA8KJH
6Y5DA to VE4JK
7Q7LA to G0IAS
7Q7RM to K6KII
7S3OWG to SM3CVM
7X2CR to IS0LYN
7Z1AB to WA2NHA
8P6NX to W0SA
9H0DX to 9H1FG
9H3JR to DJ0QJ
9J2BO to W6ORD
9J2WS to 9L1WS
9L/DF3ZJ to DF3ZJ
9L/DJ1RL to DJ1RL
9L/HB9AU to HB9AU
9L1US to WA8JOC
9M2HB to AA6BB
9M2NA to VE3CHZ
9M6HF to WE2K
9M6OI to DJ4OI
9M6UY to DK7UY
9M8AJ to AA5AZ
9M8FH to N5FTR
9M8GB to DJ1UJ
9M8WB to DK7UY
9N1MM to N7EB
9Q5TE to SM0BFJ
9Q5UN to OH3GZ
9Q5US to DL3KBH
9U5QL to YASME
9V1YQ to K2QBV
9X5NH to DJ6EA
A22GH to G3KMQ
A61AD to WB2DND
A7/VE7DGM to DA2CF
A7/VE7GCK to VE7GCK
A71AL to OE6EEG
A71AM to DJ9ZB
A71CD to WA4JTK
A92FL to WD4DCY
A92FN to KI3V
AH0K to JE2JCV
AH9AC to N3FDL
BV2AL to OZ1LGF
BV2DA to DL7FT
C30CAG to F6GIN
C3ØERA to F6GIN
C31SD to CT1AMK
C4ØR to 5B4ES
C53GB to F1MXH
C56/G3YJH to G3YJH
CO1HJ to KA2YEG
CQ4DX to CT4DX
CR8CQK to CT1CQK
CU2DX to CU2AA
D44BC to W6NV
D68JM to WV4F
D68KN to JL3UIX
D68TS to JL3UIX
D68YD to JL3UIX
D68YH to JL3UIX
DU7/N7ET to N7ET
EA8/G0HRC to G4VIX
EA8/PA0VAJ to PA0VAJ
EL2CX to N2AU
EL2SM to SM3HLL
ET2A to WA2HNA
FH5EJ to F6EBA
FI9R to F9RM
FK8FU to NA5U
FM/F6HMQ to F6HMQ
FM5WD to W3HNK
FO0IGS to F6EEM
FO4NR to F6ELE
FO4NS to FD1PLR
FP/KH2I to JK1KRS
FT4WC to F6GVH
FY5FP to ON4ZD
FZ5A to FB1MUX
H61T to SM0KCR
HB0/HE7BFN to HE7BFN
HC8K to HC5K
HF0POL to KB6GCX
HG73DX to HA6KNB
HK0/N3JT to W2GHK
HK0BKY to WB9NUL
HK0EHM to WD9DZV
HL9EN to N5PYG
HS0AC to NY2E
HU0WDX to I0WDX
HZ1HZ to N7RO
II3B to IN3BHR
IJ4R to I4USC
J28NU to F6FNU
J28P to F6FNU
J37M to W9VW
J39BS to WB2LCH
J6LTA to NI4M
JA9AG/V85 to JA9AG
JH0BBE/JD1 to JH0BBE
JW0GB to WB4ZBI
JW1MFA to LA1MFA
JW9VDA to LA9VDA
K1RH/1H0 to K1RH
K8MFO/6Y5 to W8TPS
KC4USV to W6RPD
KG4CL to KC3CL
KH0AC to K7ZA
KH2L/V01 to JK1KRS
LU7FJD to LU9FHF
LW1DQK to JU7DID
LX2KQ to F6FNU
LX2PA to PA3DK
OD5MM to HB9CYH
OD5SK to KB5RA
OD5YU to KC4DWI
OD5ZN to LZ1BB
OH0BBF to OH2BBF
OH7XE/4U to OH7XE
OX1CW to TF3CW
OX3EW to KB5LRO
OX3XR to OZ3PZ
P29AC to VK8AC
P29CG to N9FIV
P29DK to KE4EW
P29SC to WB1GWB
P40V to AI6V
PJ0MM to K1MM
PY0RC to PY5MM
R06/RB5FF to UO5WU
RB5FF to UO5WU
RB5LUK to UB4LWA
RF6FP to UF6DZ
RH0E to W5BWA
RH0Y to UH8EA
RH1E/RC2AR to RC2AR
RH1E/RC2AR to DL5EG
RI6B to UA3TT
RJ0J to UJ8JMM
RK9C to UZ9CWA
ST0DX to WB2WOW
ST2/PA0GAM to PA0GIN
SV0DV/9 to WB4TDB
SV0HW/9 to KA5EJX
SV2ASP/A to SV2UA
SV9X to SV1BLX
T20AA to N4FJL
T22YL to DL5UF
T2ICE to DJ9ZB
T30A to K7EHI
T30CT to DL9JQ
T30DQ to DL5UF
T30DR to DL2GBT
T30DS to DJ9ZB
T30DT to DL9MFU
T30NAD to JO1CRA
T31AF to DL2MDZ
TA2/FR6FO to WA2NHA
TA5/N0FYR to N0FYR
TG9TSS to K3BYV
TH7X to FF1NZH
TH8X to F6IMS
TJ1BJ to K4UTE
TJ1CW to F6EEM
TJ1MR to F6FNU
TK/DL7HZ to DL7HZ
TK5XN to YU1FW
TL8MB to F6FNU
TL8SC to K4UTE
TM1K to F1MXH
TR8JWH to G4TWT
TY1DX to IK6FHG
TY2AB to I8QLS
TY2LS to IK8DOI
TZ6VV to N0BLD
UB6Q to RB5QW
UD85ØAI to UD6AI
UD85ØDFF to UD6DFF
UF0FWW to UF6FFF
UF6DZ to UB5PS
UF6VBZ to WF2S
UG6CAW to F6GIN
UH1E/RA3QK to RA3QK
UH8EA to W5BWA
UI8QU to K9FD
UI8ZAA to K9FD
UI9BWF to UA3TT
UL7CM to UL7CBO
UL7EZ to KE9RY
UW0CW to KA6V
V31DX to KA6V
V31GM to K8CMO
V47RF to WA2SPL
V51E to K8EFS
V63JC to KC6JC
V73BY to KX6BU
VA8A to VE3CDX
VE2SNS/A7 to DA2CF
VK0ML to VK5AHI
VK9LM to DJ5CQ
VO5AW to VO1AW
VP2EXX to KC8JE
VP2EY to HB9SL
VP2MDB to W2WSE
VP2V/VE5RA to VE5RA
VP2VI to AB1U
VP2VM to KU2Q
VP5VAA to WS4E
VP5VDI to K1RIF
VP5VDY to WB9HRO
VP8CDJ to GM4KLO
VP8CEM to GM4KLO
VP8GAN to GM0LVI
VP8GAV to GM0LVI
VQ9AB to WB4ECR
VQ9MW to K7IOO
VQ9WM to K7IOO
VS6CT to KA6V
VS6WW to K6KQN
VU2GI to N2HOS
VU2N8T to WA4FVT
WE6C/BV2 to WU6X
XF0C to XE1BEF
XQ0X to CE3ESS
XT2BW to WB2YQH
XU0DX to JA1NUT
Y88POL to Y32WN
Y90ANT to Y21RO
YB0ASC to KC9XN
YB3ARU to KA1BFC
YJ0RN to N9DRU
YN/SM0OIG to SM0KCR
YY5P to YV5ARV
Z21HQ to DF2RQ
ZD7CW to N4CID
ZD8DX to WB2K
ZD8VJ to G4ZVJ
ZI0ME to PY5TT
ZK1XO to VE3CPU
ZK1XX to HA8XX
ZK2XA to DJ1ND
ZL0ADN to DJ1ND
ZP5ØY to ZP5JCY
ZS8MI to ZS5AEN
ZW0MI to PY5TT
ZX0RN to PY2MXK
ZX7TR to PS7AB
3DA0BX to P.O. Box 57 Big End, Swaziland, Africa
4J0Q to Box 50, Riga 226010 Latvia
4K1J to Box 496, Leningrad, 196244
4K2/UV3CC to Box 24, 127349 Moscow
5H3RJ to Rod Jones, Box 1751, Mbeya, Tanzania
5N6ZHM to P.O. Box 66 Jos, Plateau, Nigeria
6W6JX to P.O. Box 200, Kaolack, Senegal, West Africa
7X2DG to Box 2 Algiers, Algeria
9L9DXG to Box 10, Freetown, Sierra Leone
9Q5SK/AM to Bruce, P.O. Box 1384, Travis Air Force Base, CA 94535
A22JP to John Peterson, Box 1022, Gabarone, Botswana, Africa
A41KV to Box 5816 Muscat Oman
BV2TA to Tony, Box 112/16 Taipei Taiwan
BV2WA to Box 61-77, Taipei Taiwan
BV4OB to Box 146, Taichung, Taiwan 40099
BY1BJ to Box 6111, Beijing China
BY1QH to Box 2654, Beijing P.R.C.
BY4RB to Box 413, Zhen Jiang P.R.C.
BZ4SAB to Box 51, Suzhou, PRC
BZ4WAB to Box 413, Zhenjiang, China
C21JM to P.O. Box 359, Republic of Nauru
C53GH to Harm Brinkman, PMB 92, Banjul, The Gambia
CE0FFD to P.O. Box 4, Easter Island
CE0ZCD to Box 1972, Valparaiso, Chile
CE0ZTY to P.O. Box 1972, Valparaiso, Chile
CN8NY to Box 6557, Rabat Morocco
EK0KBZ to P.O. Box 485, Cape Schmidt USSR 686830
EP2HZ to Box 16765-3133 Tehran, Iran
FS/OH6XY/P to Box 1 Kordo, Finland
HR2JEP to Box 200, WL Progreso Yoro Honduras
J28RQ to CTA 811 SP85012 France
JT7ABJ to Box 112, Muren City, Mongolia
KD4JB/TF to Box 40 American Embassy #121 Reyjkavik FPO NY 09571
KH4AE to Box 19, Midway Island 96614
KH4AF to Box 43, FPO San Francisco, CA 96614
NH6YG/KH3 to P.O. Box 976, APO San Francisco 96305
OD5QX to Box 597, Tripoli, Lebonon
PY0FT to Box 63003, Sao Paulo, Brazil 02699
RC80/UB4MEU to Box 356, 349318 Kransy Luch USSR
S79KMB to Keith Berke, Island Resort Anse-la-Mouche, Rep of Schechelles
S79WJK to Box 253 APO NY 09030
T30DP to Beiaiti Box 560 c/o Marine Dept Betio Tarawa Kiribati
T32LN to T. Kaitele, c/o Min of Line & Phoenix Group, Rep of Kiribati
TA5C to P.O. Box 73, Gar, Adana
TA8C to Erol, Box 13, Gaziantep
TI2LAK/P/HP4 to P.O. Box 61690 San Jose, Costa Rica
UD6AI to Box 73, Baku 370091
UF6QBA to Box 63, Batumi Georgia 384500
UH9BWD to Box 3, Kransnovodk 745003
UM8MEV to Box 25, Frunze 720051
UNSC/8R1 to P.O. Box 10960, Georgetown, Guyana
US0UT to Box 812, Sofia, Bulgaria 1000
V31SW to P.O. Box 1522, Belize City, Belize
V51MA to Box 17, Kombat 9000 Namibia
V85FC to P.O. Box 1311, BSB 1913 Sult. of Brunei
VG1JA to 16 Ninth Ave., Whitehorse, Yukon Y1A 4H1, Canada
VP8CEO to P.O. Box 260, MPA Pt. Stanley, Falkland Islands
VQ9TB to Box 55, FPO San Francisco, CA 96635
VR6BX to Box 21, Pitcairn Isl.
XF3RGS to Box 1, Cancun Isl. Yucatan 77505 Mexico
YB9ARN to Box 54, Jayapura Irian Jaya, Indonesia
ZC4MT to Box 413, Larnaca Cyprus
ZK1KH to Box 56099, Wellington NZ
ZL1HS to Box 274, Motueka, NZ

Buzz, N5FTR, has the **9M8FH** logs from December 21, 1989 to September 13, 1990. Buzz also handles cards for the wife of 9M8FH: **9M8LL**.

Elmer Steingass, WD8LLD, says as of early March he still hadn't received the **VP5VMA** logs from the CQ WW SSB test. He'll QSL as soon as he gets the logs; please don't send duplicate requests.

Carl Ikaheimo, OH6XY, says he will handle cards from his **FS/OH6XY/P** and **PJ2/OH6XY** operations. His address is P.O. Box 1, SF-21711 Korppoo, Finland.

Touko Kapanen, OH6RM, will QSL his ARRL SSB operation as **PJ9M**: SF-77980 Istunmaki, Finland.

Sin Onisawa, JA1NUT, reports that he can confirm contacts with **XU8DX** April 19, 1990 to February 28, 1991 only. However, logs are missing for 15–1800Z on April 19–23 and April 2–4, 1990. After March 1, 1991 Sin will handle cards for operator Sokun only. Also, please don't send cards for **XU8DX** and **XU0AA** in the same envelope.

Kiyoko says she is working on her backlog of more than 20,000 cards from her operations as **ZK1BY, ZK1XY, ZK2KY, ZK3KY, C21NI, YJ0AKY, T22KY, T30KY,** and **T31KY**. Please be patient, and don't send duplicate requests.

Elaine Rinkert, N6ZJM, says she will handle cards for **VP5M, VP5E, VP5VDR,** and **VP5VDS** via the 1991 *Callbook* address.

Marcelo O. Flammini, LU6DTS, operated as **L3D** in the Japan CW test and the WPX SSB test. QSL to Box 361, La Plata 1900, Buenos Aires, Argentina.

Bob Keenan, KD8IW, handles cards for **XE3AAF**; his address is 3083 6th St. DB, Monroe, MI 48161.

IU4K QSLs via Paolo Peggi, I4ABF, Via Molino di Pescarola 64, 40131 Mologna, Italy.

Jarmo Jaakola, OH2BN, has completed the QSLing for the 1990 **AH3C/KH5J** Jarvis Island DXpedition, and has turned the logs and cards over to Martti Laine, OH2BH. Anyone still needing a Jarvis card, or a card from the 1989 **XF4L** Revillagigedo operation, should try Martti at Nuottaniementie 10-D-20, 02230 Espoo, Finland.

CIRCLE 76 ON READER SERVICE CARD

CIRCLE 68 ON READER SERVICE CARD

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot Cycle Progress

There is now more evidence that the sunspot cycle has entered a plateau stage and is stalled near the 140 level!

The Royal Observatory of Belgium reports a mean sunspot number of 141 for March 1991. This results in a 12-month running smoothed sunspot number of 142 centered on September 1990. This is two points higher than the August level. While it may be too early to be sure, it is beginning to look more and more as if Cycle 22 is at another plateau. A smoothed sunspot number of at least 125 is predicted for July 1991, but it could be higher.

A corresponding increase was reported in the 10.7 cm solar flux level. The Algonquin Radio Observatory, Ottawa, Canada, reports a monthly mean of 229 for March 1991. This results in a smoothed value of 198 centered on September 1990, an increase of four points over August's value.

July Propagation

With long hours of daylight and the sun high in the northern sky, HF propagation conditions are generally more stable during July than at any other time of the year.

Twenty and 17 meters are expected to be the optimum bands for long-distance propagation during the month. They are expected to remain open practically around-the-clock to one area of the world or another, with peak conditions forecast for several hours after local sunrise, and again during the late afternoon and early evening hours. Fifteen meters is forecast to open frequently during the late afternoon hours, especially on more or less north-south paths. Ten and 12 meter openings should also be possible during the afternoon hours, mainly to southern and tropical areas.

During the hours of darkness *20*, *30*, and *40* meters are expected to open to many areas of the world, but seasonally high static levels may often make DX reception difficult on *40* meters. High static levels are also expected to result in somewhat poorer DX conditions on *80* meters, although some long-distance openings are forecast during the hours of darkness. Not many DX openings are predicted for *160* meters during July because of seasonally high levels of static and solar absorption.

For shorter distance openings try either *80* or *40* meters for daytime openings up to 250 miles, and *80* and *160* meters at night over this distance. For openings up to 750 miles, *30* and *40* meters should be best by day with *30*, *40*, and *80* meters sharing the nighttime honors. Check *20* and *17* meters for daytime openings up to 1300 miles, with *30*, *40*, and *80* meters being best during the hours of darkness. *Seventeen*, *15*, and *20* meters should be used for daytime openings up to 2300 miles, while *20*, *30*, and *40* meters should do the trick at night.

This month's column contains detailed Short-Skip Propagation Charts valid for July and August 1991, as well as charts centered on Hawaii and Alaska. The Short-Skip Charts contain forecasts for openings between 50 and 2300 miles. For detailed DX forecasts over greater distances refer to the DX Propagation Charts for July, which appeared in last month's column. For an assessment of day-to-day conditions expected during the month, see the Last Minute Forecast, which appears at the beginning of this column.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for July 1991

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 3, 7, 19, 30	**A**	**A**	**B**	**C**
High Normal: 2, 4-6, 8-9, 17, 26-27, 29, 31	**A**	**B**	**C**	**C-D**
Low Normal: 1, 10-12, 15-16, 18, 21, 23-25, 28	**B**	**C**	**D**	**D-E**
Below Normal: 13, 20, 22	**C**	**C-D**	**D-E**	**E**
Disturbed: 14	**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 July 1, good (B) on the 2nd, excellent (A) on the 3rd, good (B) from the 4th to the 6th, etc.**

Sporadic-*E* Ionization

One of nature's strange phenomena, of considerable interest to radio amateurs, is expected to peak in its occurrence during July. This is the formation of sporadic areas of intense ionization in the earth's atmosphere capable of reflecting frequencies as high as 150 MHz over distances as great as 1400 miles.

Frequently within the normal *E*-layer region of the ionosphere there form "clouds" or "patches" of abnormally intense ionization which are capable of reflecting radio waves of frequencies much higher than those reflected by the regular *E* or *F* layers. These clouds usually take the form of thinly ionized areas covering a rather small geographical region approximately 50 to 100 miles in diameter. They occur more or less at random and are relatively short lived, usually dissipating within a few hours. This sporadic ionization usually occurs about 60 miles above the earth's surface at about the same height as the regular *E* layer. For this reason it is called *sporadic-E*, or Es.

The height at which sporadic-*E* ionization usually occurs limits one-hop propagation to a maximum distance of about 1400 miles. Propagation beyond this distance does not occur often by way of sporadic-*E* because of the remote possibility of clouds being present over such a large area necessary for multi-hop propagation. For this reason, band openings due to sporadic-*E* propagation are often referred to as *short-skip* openings.

Reflection from sporadic-*E* clouds takes place with very little signal loss, since ionization is generally so intense. This results in exceptionally strong signal levels during most short-skip openings, even when very low power is used. Quite

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distances column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 40 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occurr on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. On the Short-Skip Chart appropriate *daylight time* is used at the *path midpoint.* For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are HST. To convert to daylight time in other USA time zones *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to covert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone, 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave length above ground on 40 and 20 meters, and a wave-length 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.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Department of Commerce, Boulder, Colorado, 80302.

CQ Short-Skip Propagation Chart
July & August 1991
Local Daylight Savings Time
At Path Mid-Point

Band Meter	Distance Between Stations (Miles)			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	08-10 (0-1)* 10-14 (0-3)* 14-18 (0-1)* 18-22 (0-2)* 22-08 (0-1)*	08-10 (1)* 10-14 (3)* 14-18 (1-2)* 18-22 (2-3)* 22-08 (1)*	08-10 (1-0)* 10-14 (3-1)* 14-18 (2-1)* 18-20 (3-2) 20-22 (3-1)* 22-08 (1-0)*
15	*Nil*	08-10 (0-2)* 10-14 (0-3)* 14-18 (0-2)* 18-20 (0-3)* 20-22 (0-2)* 22-08 (0-1)*	08-10 (2)* 10-14 (3)* 14-18 (2)* 18-20 (3)* 20-22 (2)* 22-00 (1-2)* 00-08 (1)*	08-10 (2)* 10-14 (3)* 14-18 (2-3) 18-20 (3-4) 20-22 (2-3) 22-00 (2) 00-08 (1-0)
20	10-01 (0-1)*	07-10 (0-2)* 10-18 (1-4)* 18-22 (1-3)* 22-00 (1-2)* 00-07 (0-1)*	07-10 (2-4) 10-18 (4) 18-22 (3-4)* 22-00 (2-4)* 00-02 (1-3)* 02-07 (1-2)*	08-10 (4) 10-16 (4-3) 16-00 (4) 00-02 (3) 02-07 (2) 07-08 (4-3)
40	08-10 (2-4)* 10-15 (3-4) 15-20 (4) 20-22 (2-4) 22-00 (1-3) 00-08 (1-2)*	08-10 (4) 10-12 (4-3) 12-17 (4-2) 17-18 (4-3) 18-22 (4) 22-02 (3-4) 02-05 (2-4) 05-08 (2-3)	09-10 (4-1) 10-12 (3-1) 12-17 (2-1) 17-18 (3-1) 18-21 (4-3) 21-05 (4) 05-06 (3-4) 06-08 (3) 08-09 (4-2)	09-18 (1-0) 18-19 (3-0) 19-20 (3-1) 20-21 (3-2) 21-22 (4-3) 22-06 (4) 06-07 (3-2) 07-08 (3-1) 08-09 (2-0)
80	06-12 (4) 12-16 (4-3) 16-00 (4) 00-06 (3-4)	07-08 (4-2) 08-10 (4-1) 10-12 (4-0) 12-16 (3-0) 16-18 (4-1) 18-20 (4-2) 20-22 (4-3) 22-07 (4)	07-08 (2-1) 08-10 (1-0) 10-16 (0) 16-18 (1-0) 18-19 (2-0) 19-20 (2-1) 20-21 (3-1) 21-22 (3-2) 22-05 (4) 05-06 (4-3) 06-07 (4-2)	07-19 (0) 19-20 (1-0) 20-21 (1-0) 21-22 (2-1) 22-04 (4-3) 04-05 (4-2) 05-06 (3-1) 06-07 (1-0)
160	18-19 (0-1) 19-20 (1) 20-22 (3-2) 22-00 (4-3) 00-06 (4) 06-08 (3-2) 08-09 (1) 09-10 (1-0) 10-18 (0)	19-20 (1-0) 20-21 (2-0) 21-22 (2-1) 22-00 (3-2) 00-04 (4-2) 04-06 (4-3) 06-08 (2-1) 08-09 (0-1) 09-19 (0)	21-22 (1) 22-01 (2-1) 01-04 (2) 04-06 (3-2) 06-07 (1) 07-08 (1-0) 08-21 (0)	21-23 (1-0) 23-01 (1) 01-06 (2-1) 06-07 (1-0) 07-21 (0)

*Predominantly Sporadic-E Openings

HAWAII
July & August 1991
Openings Given in Hawaiian Standard Time

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	13-16 (1)	06-09 (1) 09-12 (2) 12-16 (3) 16-18 (2) 18-20 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-22 (4) 22-00 (3) 00-02 (2) 02-04 (3) 04-06 (2) 06-08 (1)	18-20 (1) 20-00 (2) 00-02 (1) 21-00 (1)**
Central USA	12-14 (1) 14-16 (2) 16-17 (1)	05-06 (1) 06-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-21 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (4) 04-06 (3)	20-21 (1) 21-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 20-22 (1)** 22-00 (2)** 00-02 (1)**
Western USA	10-12 (1) 12-14 (2) 14-18 (3) 18-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	05-08 (4) 08-10 (3) 10-13 (2) 13-15 (3) 15-22 (4) 22-00 (3) 00-05 (2)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 19-20 (1)** 20-22 (2)** 22-02 (3)** 02-03 (2)** 03-04 (1)**

ALASKA
July & August 1991
Openings Given in GMT

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	*NIL*	21-00 (1) 00-02 (2) 02-03 (1)	12-15 (1) 22-00 (1) 00-02 (2) 02-04 (3) 04-05 (2) 05-06 (1)	07-10 (1)
Central USA	*NIL*	20-00 (1) 00-03 (2) 03-05 (1)	13-16 (1) 22-00 (1) 00-03 (2) 03-06 (3) 06-07 (2) 07-09 (1)	08-12 (1)
Western USA	01-04 (1)	17-22 (1) 22-00 (2) 00-02 (3) 02-04 (4) 04-05 (2) 05-06 (1)	13-14 (1) 14-15 (2) 15-19 (3) 19-01 (2) 01-03 (3) 03-06 (4) 06-08 (3) 08-09 (2) 09-11 (1)	07-09 (1) 09-12 (2) 12-13 (1) 09-12 (1)**

**Indicates best time for 80 meter openings. Openings on 160 meters are most likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

See explanation in "How To Use Short-Skip Charts" which appears in the box at the beginning of this column.

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter openings, use the preceding Short-Skip Propagation Chart.

For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

often it is possible to maintain communications between two stations considerably off the great-circle path by means of back and side scatter from areas of intense sporadic-*E* ionization. For example, stations in eastern and western New York state can work each other on *10* meters by pointing their antennas toward a common sporadic-*E* cloud located over North Carolina

What is Sporadic-*E*?

Although sporadic-*E* ionization has been studied by scientists and engineers for more than 40 years, its nature and origin still remain largely a mystery. However, some general characteristics about sporadic-*E* behavior are known.

Sporadic-*E* ionization varies geographically. It occurs most frequently, and with greatest intensity, in extreme latitudes in the vicinity of the earth's auroral zones and in equatorial regions. In mid-latitudes, for example in the United States and Europe, it occurs most often during the late spring and summer months and during December, but hardly at all during other periods. In mid-latitudes sporadic-*E* has a tendency to peak during the late morning hours and again around sunset.

Sporadic-*E* ionization is subject to erratic and often rapid variation. The ionized clouds are known to drift generally in a westerly or northwesterly direction at rates of approximately 150 to 250 miles per hour. The drift appears to be due to winds believed to exist in the ionosphere. Radio amateurs were responsible for first detecting this curious behavior of sporadic-*E* clouds during a research program (Project RASO) conducted by *CQ* for the U.S. Air Force during 1949 and 1950. Because of drift, reception areas can change within a relatively short period of time, and it is not uncommon for a spo-

radic-*E* opening to fade out completely from an S9-plus level in a matter of a few minutes.

What Causes Sporadic-*E*?

Scientists and communications engineers have been baffled by sporadic-*E* propagation ever since it was first observed more than 40 years ago. While it has been studied for some time, its cause is still unknown. Since it occurs more often during the hours of daylight, it appears that ultraviolet radiation might play a part in its formation. Its general behavior, however, does not coincide closely with the known pattern of ultraviolet radiation from the sun. Since sporadic-*E* also occurs quite often at night, especially in polar regions, some other source of ionization must also be responsible for its formation. Recent suggestions point towards ionization from meteor trails and from auroral displays as other possible sources. Another school of thought attributes sporadic-*E* formation to thunderstorms, changes in barametric pressure, and movements of air masses.

Predicting Sporadic-*E* Openings

Since little is known about the source of energy responsible for producing sporadic-*E* ionization, its behavior cannot be predicted by positive means at the present time. Statistical studies show, however, that a sharp increase in sporadic-*E* propagation takes place at mid-latitudes during the late spring and summer months. During July and August short-skip propagation over distances as great as 1400 miles should be possible in the northern hemisphere for approximately 65% of the time on *15* meters, 35% of the time on *10* meters, and about 10% of the time on *6* meters. Two meter openings may also be possible during periods of intense sporadic-*E* ionization. While sporadic-*E* propagation can occur at any time of the day or night, it appears to peak between 8 and 11 AM and 6 and 8 PM Local Standard Time.

Here's a tip that has worked out very well during past years for determining when *10* and *6* meters would open for short-skip sporadic-*E* propagation. The geometry of skywave propagation is such that as the skip distance *decreases* on *15* (or*10*) meters, the highest frequency (MUF) that will be reflected by the sporadic-*E* cloud *increases*. By observing the minimum skip distance on 15 (or *10*) meters, the MUF in the direction of the skip can be determined from fig. 1 with fairly good accuracy, as can whether or not *10* (or *6*) meters is open and what the minimum skip distances are on these bands.

As an example (example B in fig. 1), the minimum skip heard on *10* meters in a southwesterly direction is observed to be 400 miles (it is the distance to the *nearest* skip station heard that counts in this case, not the farthest station heard). The intersection between 400 miles observed minimum skip distance and the *10* meter curve corresponds to a critical frequency of 12 MHz, or an MUF of 60 MHz, since the MUF is approximately equal to the critical frequency multiplied by a factor of 5. This means that the MUF is high enough for *6* meter (50 MHz) short-skip openings in a southwesterly direction. The minimum skip distance on *6* meters can be found from fig. 1 by locating the intersection between the 12 MHz critical frequency and the *6* meter curve. The resulting value of minimum skip distance is found to be 900 miles. A useful rule of thumb to remember is that when skip stations are heard less than *500 miles* away on *10* meters, or less than *350 miles* on *15* meters, the chances are very good that *6* meters will open in the same general direction as the minimum skip heard on these bands.

From most locations in the continental United States, 1400 mile openings should extend into both Canada and Mexico. From the southern third of the country it should also be possible to work a rather large number of countries in Central America and the West Indies during *15, 10,* and *6* meter sporadic-*E* openings. DX television reception also increases considerably during the summer months as a result of sporadic-*E* ionization. Signals from low-band VHF TV stations (Channels 2–5), which normally cannot be received more than 75 or 100 miles away, suddenly are propagated up to 1400 miles, often with very strong levels. While freak DX television reception via sporadic-*E* may prove interesting, it will often cause interference to local stations on the same channels.

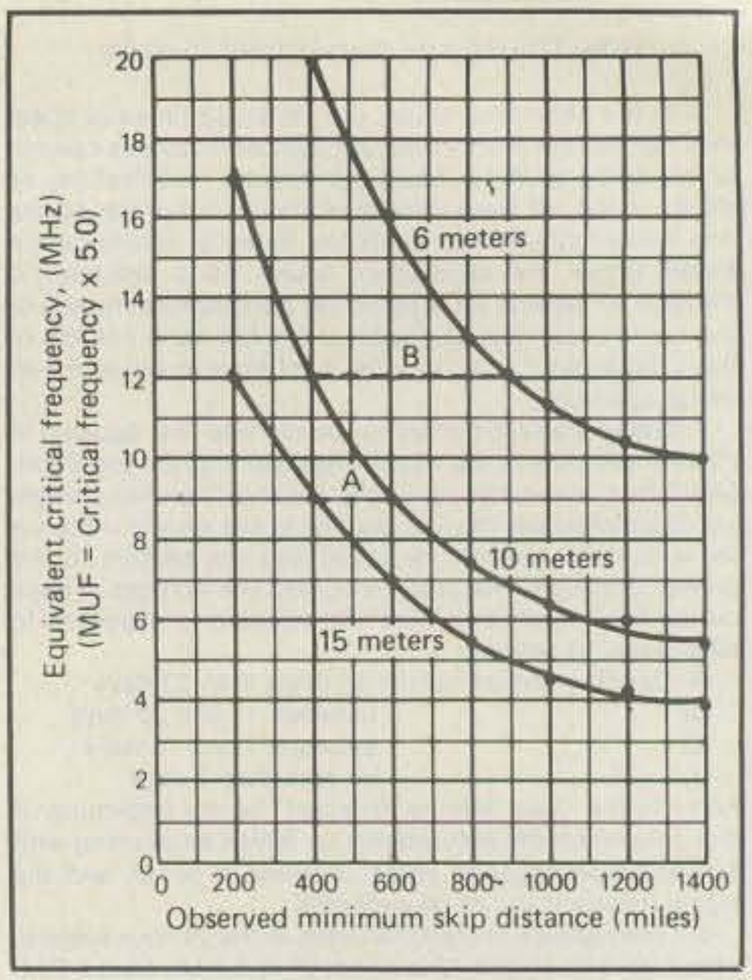


Fig. 1– Observed minimum skip distance versus equivalent critical frequency. (A) and (B) are examples. (A) Minimum skip distance of 400 miles observed on 15 meters; 10 meters should be open with skip greater than 600 miles; no 6 meter opening. (B) Minimum skip distance of 400 miles observed on 10 meters; 6 meters should be open with skip greater than 900 miles.

VHF Ionospheric Openings

We have already discussed that seasonally peak short-skip sporadic-*E* openings are expected on *6* and *2* meters during July.

Check during the last few days of July for the possibility of meteor-scatter openings on the VHF bands. The *Delta Aquarids* shower is expected to take place then, with a predicted maximum meteor count on the order of 20 an hour.

July is a very poor month for Trans-Equatorial (TE) propagation, and few, if any, openings are expected by this mode.

Some VHF short-skip openings are likely to occur during auroral activity. Check the Last Minute Forecast for periods that are predicted to be Disturbed or Below Normal during July. These are the dates on which auroral VHF openings may occur.

73, George, W3ASK

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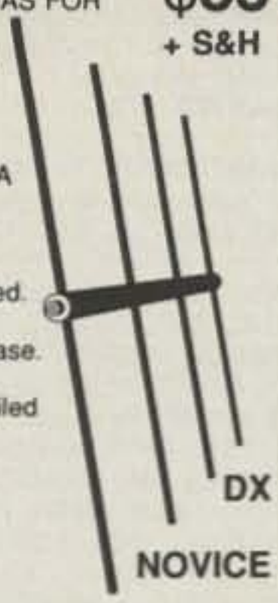

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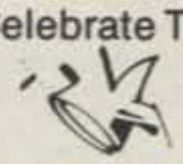

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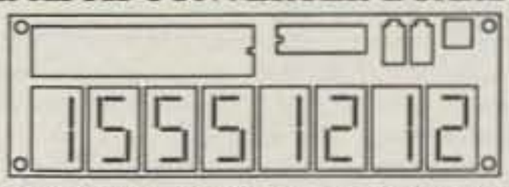

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CLANDESTINE CONFIDENTIAL NEWSLETTER: Latest info on secret broadcasters. Six issues $10 US, $13 foreign, US funds. RR4 Box 110, Lake Geneva, WI 53147.

CHASSIS, CABINET KITS: SASE. K3IWK, 5120 Harmony Grove Road, Dover, PA 17315.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

WANTED: Older model bugs, unusual bugs, and miniature hand keys. State price, condition. Dave Ingram, K4TWJ, 4941 Scenic View Drive, Birmingham, AL 35210.

HAM RADIO REPAIR! Tube through solid state. Robert Hall Electronics, Box 8363, San Francisco, CA 94128 (408-729-8200).

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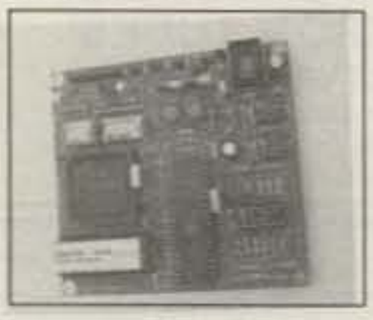

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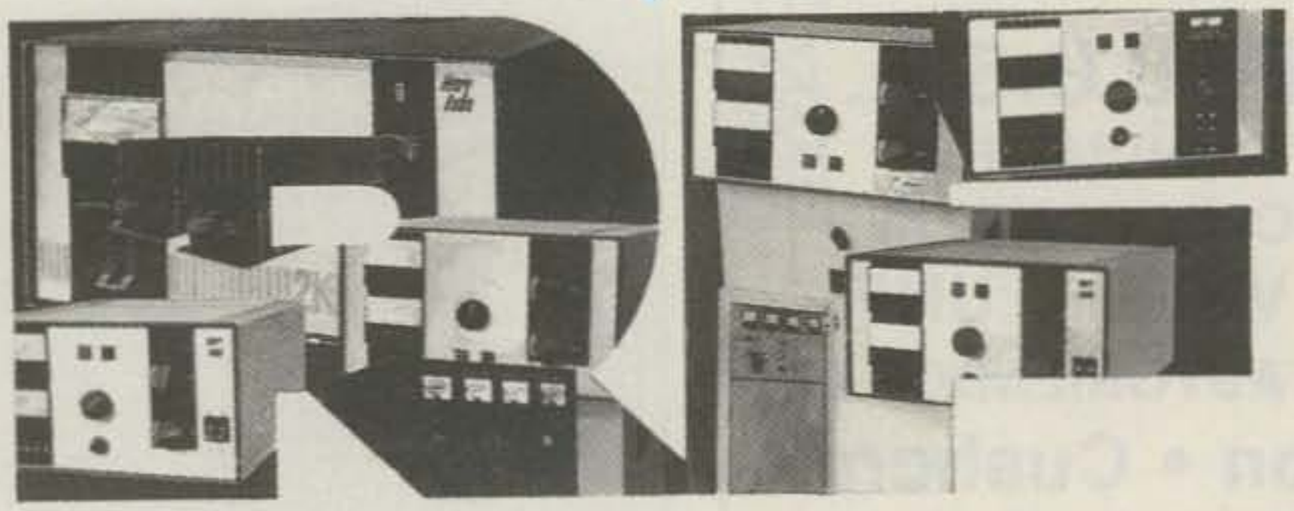

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Advertiser's Index

(continued on page 129)

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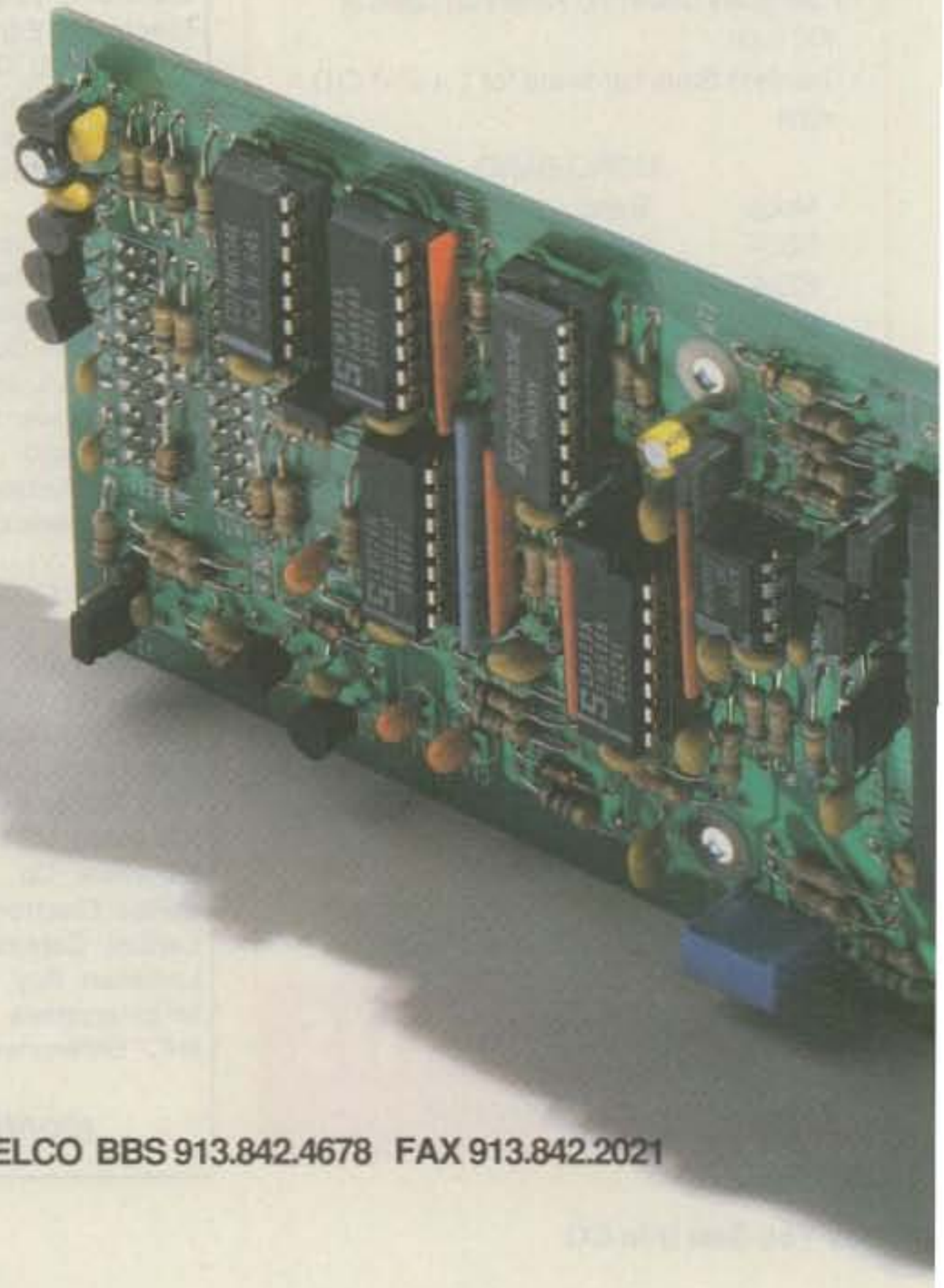

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Advertiser's Index (cont'd)

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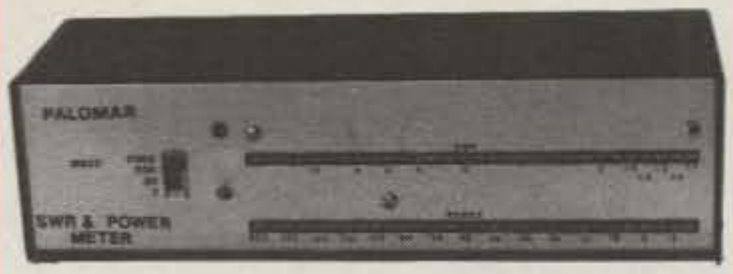

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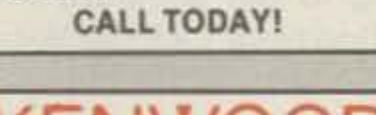

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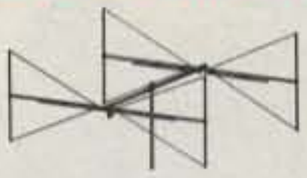

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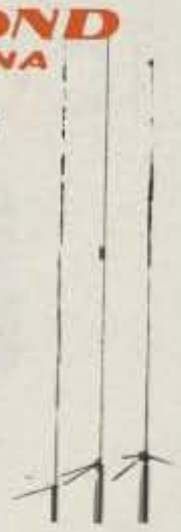

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