

Amateur Radio

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CQ

In This Issue:

● **CQ Reviews:**

Cushcraft 2 Meter Boomer Antennas,
The Ameritron AL-80B HF Amplifier,
The AEA HAMLINK Radio Controller

● **The Ultimate Multimatch UNUN**
by W2FMI . . . page 15

● **The Z-Match Antenna Tuning**
Unit . . . page 50

● **Will This Year's Perseids Meteor**
Shower Be A Storm? . . . page 62

● **Pratus Island . . . A Potential**
New Country . . . page 106



On the cover: Glenn Rattman, K5NA Valley City, TN

THE RADIO AMATEUR'S JOURNAL



KENWOOD

...pacesetter in Amateur Radio

In Gear

Powered up for prime-time
mobile communications

Kenwood's TM-241A (144MHz), TM-331A (220MHz), TM-441A (440MHz), and TM-541A (1200MHz) mobile transceivers offer sports-car performance with family-car convenience.

- **High power**

The TM-241A provides 50W, TM-331A is 25W, TM-441A 35W, and TM-541A 10W. Three power positions: 5, 10 and full. The TM-541A has two power positions: 1 and 10 watts.

- **Wideband receiver coverage**

The TM-241A receives from 118 to 173.995MHz; transmit range is 144-148MHz (modifiable for MARS and CAP operation, permits required). Other ranges are 215-230MHz (TM-331A), 438-449.995MHz (TM-441A), and 1240-1299.995MHz (TM-541A).

- **20 memory channels**

20 multi-function memory channels store frequency, repeater offset, sub-tone frequencies, and repeater reverse data. Repeater offset on 2m is automatically selected. There are 4 channels for "odd split" operation.

- **Multiple scan modes**

Band and memory scan, with selectable scan stops and memory channel lock-out.

- **CTCSS built-in**

Selectable from front panel (optional KQT-8 decoder available).

- **Selective calling & pager option**

The DTU-2 option enables DTSS (Dual-Tone Squelch System) for selective calling and paging using standard DTMF tones. Elapsed time is shown by the tone alert system. (TM-241A/441A/541A)

- **Digital recording system option**

Used in conjunction with the tone alert system, this allows message storage of up to 32 seconds.

- **Large LCD display**

Features 4-step dimmer control.

- **Supplied accessories**

Mounting bracket, DC cable, fuses, multi-function DTMF mic.

- **Choice of accessories**

A full line of mics, speakers, and other accessories is available. See your authorized Kenwood Amateur Radio dealer for details!

Specifications guaranteed for Amateur band use only.



TM-241A

TM-331A



TM-441A

TM-541A

TM-241A/331A/441A/541A

Mobile Transceivers

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
Long Beach, CA 90801-5745

KENWOOD ELECTRONICS CANADA INC.
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

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(expires September 30, 1993)

In Force

A new domain in high-performance HF communications

Experience excellence with Kenwood's TS-450S, a versatile HF transceiver offering compact, DX-pedition convenience plus the benefits of top-flight technology.

- 100 memory channels
- AIP (Advanced Intercept Point) system
- Internal or external automatic antenna tuner (option)
- Ultra-fine (1Hz) tuning
- Optional DSP (digital signal processor)

• 100W power output

RF output is 100W (40W in AM mode).

• Wideband general coverage receiver

The TS-450S covers all Amateur bands from 1.60 to 10 meters. The general coverage receiver covers from 500kHz to 30MHz.

• 100 memory channels with multi-scan functions

Scanning of any or all of the 100 memory channels may be tailored with the programmable memory channel lock-out; group scan, and programmable band scan functions.

• Split-frequency operations

Split-frequency operations are easy with the TF-SET and ΔF display (indicates RX/TX difference).

• Kenwood's AIP system

Clearer reception is assured by AIP (Advanced Intercept Point), an exclusive circuit design that improves intermodulation dynamic range to 108dB.

• Automatic antenna tuner (built-in or option)

The optional antenna tuner can automatically establish the optimum match between 20 and 150 ohms in the 80 to 10 meter band. An external automatic tuner (AT-300) is also available.

• Ultra-fine tuning (SSB, CW and FSK modes)

By engaging the FINE key, the operator can tune precisely in 1Hz steps, thanks to the Direct Digital Synthesizer (DDS).

• Optional digital signal processor

The DSP-100 can be connected to the TS-450S to provide greater signal quality, improved CW operation, and many other benefits.



TS-450S
HF Transceiver

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
Long Beach, CA 90801-5745

KENWOOD ELECTRONICS CANADA INC.

Simple Operation Advanced Technology

**200 ch Memory Unit
Available as Option**



New DJ-180T

Simple Operation Advanced Technology

Just when you thought great audio and tough as nails construction were luxury features available only on the most expensive models, and just when you thought simple, intuitive operation was a thing of the past, along comes the Alinco VHF-FM HT, DJ-180T.

A different offset can be stored in each memory channel, and most other functions can also be stored independently in each memory channel. CTCSS encode and decode comes standard. As most QSO's on 2-meter are done through repeaters, these special features make the DJ-180T the most practical HT to own. Alinco has once again combined high-technology with low-cost.

*Check out the affordable
technology of the 90's.
Check out ALINCO.*

Also Available
DJ-580T Dual Bander



Incredibly Tough!

Photo for Demonstration only- Abuse to the transceiver will void the warranty.

- Receive 130.0- 173.9 MHz
- CTCSS encode/decode built-in
- 2 watts standard, 5 watts with optional EBP- 28N battery pack
- High/Low power selection
- Selectable frequency step for quick QSY
- Standard DTMF keyboard
- Low battery indicator
- "Busy" channel LCD indicator
- Key Lock/ PTT Lock functions
- Auto Power Off
- Instant QSY to Call channel
- Monitor button
- Scan Modes
- Battery Saver design
- Supplied with Ni-Cd battery pack EBP-26N for 2 watts output, wall charger, belthook, and strap.
- Optional accessories: EBP'28N Battery pack for 5 watts output, EDH-11 Drycell case, EDC-45 Quick charger, EMS-9 Speaker-microphone, EME-12/13 Headset with VOX/PTT, EME-15 Tie-pin microphone, EDH-12 DC Jack adaptor .EBC-6 Mobile bracket, ESC-18/19 Soft case, EJ-14U 50ch Memory unit, EJ-15U 200ch Memory unit.



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ELECTRONICS INC.


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

REMOTE CONTROL JUST GOT EASIER



Full remote control
by a transceiver.

DR-600T New

The DR-600T offers the convenience of a remote-mount head, for installation in even the smallest of vehicles. This road-ready rig can also be remote controlled from any radio that transmits DTMF tones. This remarkable feature allows the DR-600T to act as a full-featured Cross-Band Repeater, with or without a security code.

Some of the other outstanding features of the DR-600T include Wide Frequency coverage, with AM Aircraft receive after simple modification. Direct frequency entry from the microphone is also possible, and the CTCSS Encoder is built in.

There are three Output power selections, and other features such as Dual Band Receive, ABX (Automatic Band Exchange), DSQ, Private Paging, Autopatch, memories, Full Duplex Operation, and Six Scanning Modes are included.

The DR-600T has the rugged construction that you have come to expect from ALINCO, for reliability even under the worst conditions. Housed in a steel chassis, complete with a thermally controlled fan, this radio can run hard, and run long.

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DJ-F1 T Coupon value \$20.00
DR-600T Coupon value \$25.00



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ANNOUNCEMENTS

•The following Special Events will take place during August:

N1JIF, from commemoration of Battle of Bennington and third anniversary of SOVARC, Bennington, Vermont; Southern VT ARC; 1400-0500Z Aug. 14-16; 80-15 meter General phone subbands, Novice 10 meter phone subband. For certificate send QSL, contact number, and 9x12 SASE to Mickey Corrow, N1JIF, RR2 Box 48, Bennington, VT 05201-9537.

W1ACT, from the *HMS Bounty*, Fall River, Massachusetts; Fall River ARC; 1400Z Aug. 14 through 1400Z Aug. 15; 80-10 meters CW and SSB, 2 meter FM. QSL to WV1L via the *Callbook* (no SASE).

2-land, from 1993 New York State Fair, Syracuse, New York; Liverpool ARC; Aug. 27 through Sept. 6, 10 AM to 9 PM on packet, HF, and HF in bottom 25 kHz of General phone and CW portions of 80-10 meters. For certificate send QSL to Liverpool ARC, P.O. Box 103, N. Syracuse, NY 13212.

2-land, from 50th anniversary of Farmer's Museum,

Telegraph Rally, Cooperstown, New York; Otsego County ARA; 1400-2130Z Aug. 21-22; all frequencies, including 2 meters. Send QSL and SASE to Fred St. John, KA2EOP, 13 Eagle St., Cooperstown, NY 13326.

K2BSA/4, from National Boy Scout Jamboree, Fort A.P. Hill, near Fredericksburg, Virginia; 1300-2100Z and 2300-0230Z, Aug. 2-9; HF SSB on or near 3.990, 7.290, 14.290, 21.360, 28.350, 28.990 MHz, plus VHF, satellite, CW, and digital modes. QSL via K2BSA *Callbook* address (enclose SASE for US, for foreign use the bureau of enclose and IRC with your QSL).

WA2QWM, from the *USS Ling* WW II submarine, Hackensack, New Jersey; Bergen ARA; 1400Z Aug. 21 to 1600Z Aug. 22; General phone 75-15 meters, Novice/Tech 10 meter phone, packet on 145.09 local. For certificate send QSL and 9 x 12 SASE to Mike Surmick, WA2QWM, 511 Van Binsberger Blvd., Paramus, NJ 07652.

KE3CN, N3IOP, W3MBD, KA3WJJ, from Horse Thief Days

Festival, Knox, Pennsylvania; Aug. 14-22 (no times given); 40, 20, 17, 15 meters and 28.350 Novice. For certificate send QSL and SASE to Gloria Barlett, N3IOP, Box 12, Knox, PA 16232.

NA5N, from dedication of National Radio Astronomy Observatory's Very Long Baseline Array, Socorro, New Mexico; 1800Z Aug. 20 to 0200Z Aug. 21 and 1800Z Aug. 21 to 0200Z Aug. 22 on 80, 40, 20, 15, or 10 meters (depending on propagation) in lower portion of General phone and CW. For QSL send QSL and SASE to NRAO ARC, P.O. Box O, Socorro, NM 87801.

W7AIA, from Northwest Antique Aircraft Club fly-in, Evergreen flying field, east of Vancouver, Washington; Clark County ARC; Aug. 21-22 (no times given); lower portion of General phone bands, 40, 20, 15, with possible 10 meters Novice and 75 meters at night. For certificate send SASE to CCARC, P.O. Box 1424, Vancouver, WA 98668.

K7QQP, from Three Island Crossing of Oregon Trail, Glenns Ferry, Idaho; southern Idaho hams; 1800Z Aug. 12 to 0600Z Aug. 15; General portion of SSB 75, 40, 20, 15, 10 meters Novice/Tech. For QSL send QSL and SASE to Paul, KB7QHH, 5107 Grover, Boise, ID 83705.

W8AL, from Pro Football Hall of Fame Greatest Weekend, Canton, Ohio; Canton ARC; 100-0200Z July 26 through Aug. 1; SSB 28.350, 24.950, 21.350, 18.150, 14.270, 7.270, 3.870; CW 28.125, 24.910, 21.125, 18.080, 14.050, 10.120, 7.125, 3.700 plus/minus QRM; plus RTTY, packet, AMTOR, satellite, 2 meter FM/SSB (SWLs welcome). For certificate send QSL, contact number, and 9 x 12 SASE with 2 units first-class postage to Randy Phelps, KD8JN, 1226 Delverne Ave. SW, Canton, OH 4710-1306 (for QSL or folded certificate send #10 SASE).

K8AR, from 203rd anniversary of US Coast Guard, Grand Haven, Michigan; North Ottawa ARC; 1200-2100Z Aug. 2-8; bottom portion of General phone subbands. For certificate send QSL and 9 x 12 SASE to NOARC, P.O. Box 44, Ferrysburg, MI 49049.

W8BBIJ, from 175th anniversary of Mt. Clemens, Michigan; L'Anse Creuse ARC; 1300Z Aug. 28 to 2100Z Aug. 29; lower portion of General bands 80-10 meters, on or about 28.425 MHz Novice band. For certificate send QSL and SASE to Allan Koch, KA8JJN, 23682 Kim Dr., Clinton Twp., MI 48035.

W8DYY, from 175th anniversary of Miamisburg, Ohio; Mound ARA; 1200-2200Z Aug. 14; phone portion of Novice 10 meters, General portion of 20 and 40 meters. For QSL send SASE to MARA, c/o Jeem Newland, WB8RXI, 240 Carlwood Dr., Miamisburg, OH 45342.

N9HEL, from Orchard Village Radio Club, Skokie, Illinois; 1600-2300Z Aug. 1; lower 25 kHz of General 20, 15 and Novice 10 meter phone subbands. For QSL send QSL and SASE to Gloria Beverly, c/o Orchard Village, 7670 Marmora, Skokie, IL 60076.

W9WK, from "Picnic Ham," Lannon, Wisconsin; 0200Z Aug. 7 to 2000Z Aug. 8; General phone and CW bands on 75, 40, 20, 15, 10 meters. For certificate send QSL and 9 x 12 SASE (2 units postage) to W9WK, c/o John Leekly, 757 N. Broadway, Suite 306, Milwaukee, WI 53202.

N0AEU, from Hollenberg Pony Express Station, Marysville, Kansas; Marshall County ARC; 1700- 2100Z Aug. 29; lower 25 kHz of 20 and 40 meter General subbands. For certificate send QSL and 9 x 12 SASE to Dave Crawford, N0PGE, 604 Chestnut, Blue Rapids, KS 66411.

B-land, from 9th annual Trainfest, Milbank, South Dakota; 1400-0200Z Aug. 14 and 15; 20, 40, 80 meter General phone bands, Novice 10 meter subband. For certificate send QSL and 9 x 12 SASE to N0JUO, P.O. Box 189, Wilmot, SD 57279-0189.

B-land Mountaintoppers, from 1993 Colorado 14er Radio Event, summits of various Colorado 14,000 foot mountains; 9 AM to 12 noon Aug. 29; do not use high power (more than 30 watts) and do not call for 14er stations unless you hear them. For more info or to participate, contact Bob, KB0CY, 18070 Sunburst Dr., Monument, CO 80132 (719-488-0859).

VE3CNE, from Canadian National Exhibition, Toronto, Canada; 1400-0200Z Aug. 18 to Sept. 6. Even hours: 14.015 MHz CW listening first half hour, CW CQ second half hour, SSB CQ first half hour, 14.150 SSB listening second half hour. Odd hours: 7.020 MHz CW listening first half hour, CW CQ second half hour, SSB CQ first half hour, 7.075 SSB listening second half hour. QSL to VE3CNE, P.O. Box 307 Stn H, Toronto, Canada M4C 5J2.

•The following hamfests, etc., are slated for Aug.:
Aug. 1, **Eastern Michigan ARC Swap 93**, St. Clair County Community College Student Center, Port Huron, MI. Contact Hank Kohl, K8DD, 1640 Henry St., Port Huron, MI 48060 (313-982-7088). (VE exams walk in.)

Aug. 1, **Fox River Radio League Hamfest**, Waubesa Community College, Sugar Grove, Illinois. Contact Bill Schaben, WA9AUW, 708-208-4870. (VE exams 10 AM.)

Aug. 1, **Queen City Hamfest & Computer Fair**, Roll-A-Round Skate Center, Charlotte, North Carolina. Contact Wray Ware, WB4BQG, Charlotte ARC, P.O. Box 33582, Charlotte, NC 28233 (704-535-8126).

Aug. 7, **TARA Hamfest & Computer Show**, Civic Center,

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- Jerry Pournelle, Ph.D., Byte Magazine

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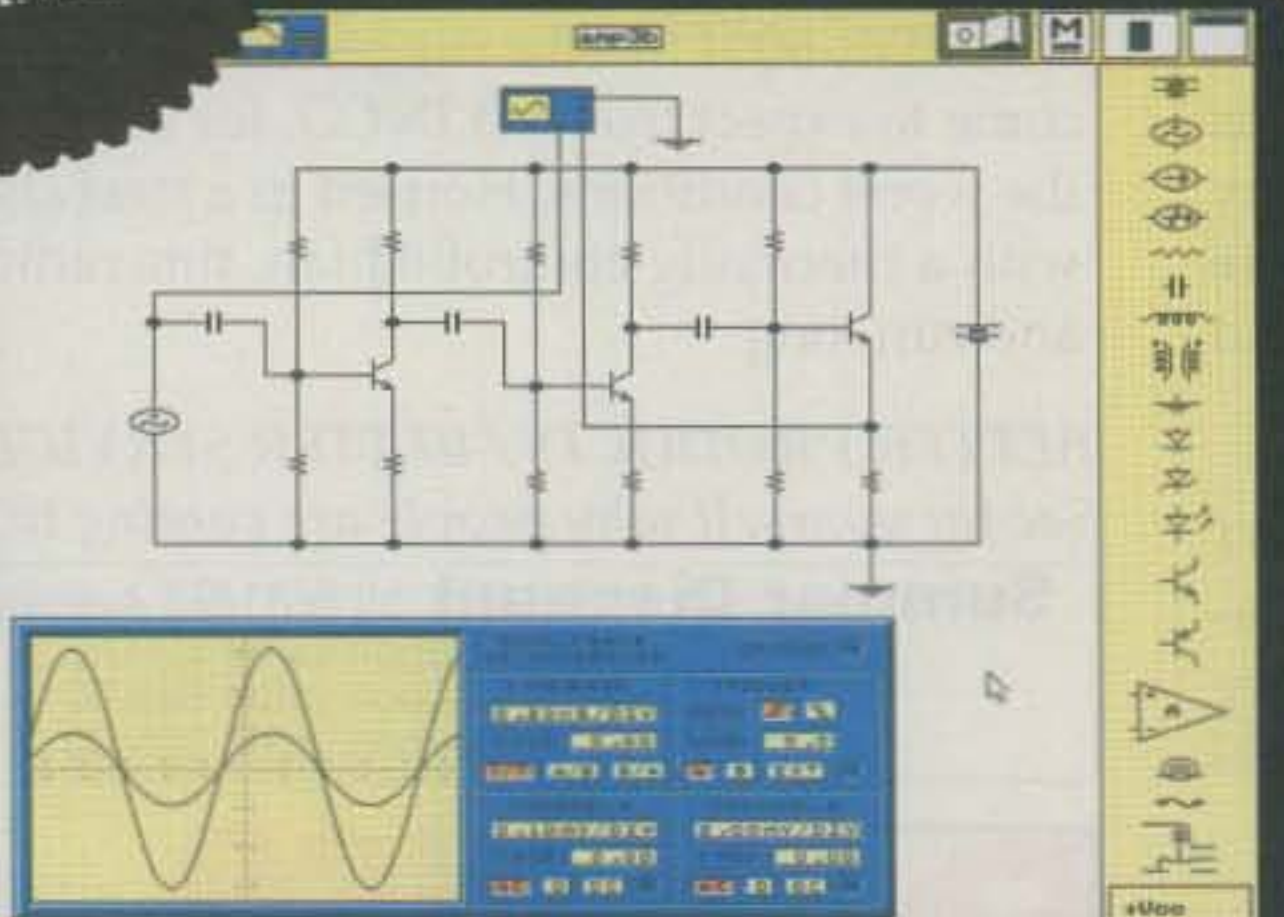
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rfconcepts VHF1-60

HighPower for 2m HTs

The rfconcepts VHF1-60 provides added power for both mobile and ham shack use for your 2 meter handie talkie (HT). The amp's sensing circuit detects the HT's output power on 2 meters and automatically switches the amp in-line for a full 60 watts output. For dual band HTs, 70cm signals are sent automatically to the antenna without amplification.

The VHF1-60 SineSink™ heat sink and flow soldered assembly assure reliable performance and low maintenance. Additional features include a 2 meter discriminator to eliminate false keying by out-of-band signals, a high VSWR LED indicator, ALC output power control to protect against antenna mismatches, thermal shutdown with thermal LED, and transmit LED. The amp measures a compact 5x9x3 inches, uses 13.8 VDC at less than 14A, and accepts a maximum RF input of 8 watts.

For high RF environments, such as crowded cities, an optional three-resonator Helical filter is available for 2 meter only operation. This helical front end reduces out-of-band interference that can often overload HTs.

The rfconcepts VHF1-60, one watt in, 60 watts out. Added power for today's 2 meter HTs, automatically.

DX TO THE MAX

The five band TH11DX gives you superior DX performance on all five bands, and has a power handling capability 2½ times maximum legal power. Featuring a lossless log-periodic driven array for all five bands and separate monoband reflectors for maximum front to back. Includes new corrosion-resistant boom support system, hot-dipped galvanized and stainless steel parts and new BN4000B current balun. For detailed information on this new HyGain beam call or write today.

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TH11DX
Five Band Beam for
10, 12, 15, 17 and 20 Meters.

Huntington, West Virginia. Contact Alan, N8LNS, 304-7369303. (VE exams; handicapped accessible.)

Aug. 8, **Mid-Ohio Valley ARC Hamfest**, 4-H Campgrounds, Mineral Wells, West Virginia. Contact Ron Ferrell, WD8RGZ, 614-423-5482.

Aug. 8, **Central Kentucky ARRL Hamfest**, Western Hills High School, Frankfort, Kentucky. Contact Bill De Vore, N4DIT, 112 Brigadoon Pkwy., Lexington, KY 40517 (606-257-3343 or 606-273-8345). (VE exams.)

Aug. 8, **Hamfesters RC Hamfest**, Will County Fairgrounds, Peotone, Illinois. Contact David Brasel, NF9N, 7528 W. 109th Place, Wort, IL 60482 (708-448-9432).

Aug. 8, **Paulding County Hamfest**, Paulding Co. Fairgrounds, Paulding, Ohio 45879. Contact PCARG Inc., KB8MAF, 14043 CR 111, Paulding, OH 45879 (419-399-3641/4507). (Exams contact Bob High, 12838 Tomlinson Rd., Rockford, OH 45882 (419-795-5763).)

Aug. 8, **Mid-Atlantic ARC Hamfest**, Bucks County Drive-In, Warrington, Pennsylvania. Contact Al Maslin, W3DZI, 215-446-4936.

Aug. 14, **Burlington ARC International Hamfest**, Old Lantern Campground (camping info 802-425-2120), Charlotte, Vermont. Contact David Berteau, 802-893-7660. (Exams.)

Aug. 14, **Northwoods ARC Swapfest**, Sugarcamp Town Hall, north of Rhinelander, Wisconsin. Contact Glenn Woods, N9GRF, 6569 Hillcrest Dr., Rhinelander, WI 54501. (Exams 8:30 AM.)

Aug. 14-15, **1993 ARRL National Convention**, Von Braun Civic Center, Huntsville, Alabama. Contact Huntsville Hamfest, P.O. Box 12534, Huntsville, AL 35815, or call 205-534-7175.

Aug. 14-15, **19th Eastern VHF/UHF Conference**, Quality Inn, Vernon, Connecticut. Contact Ron Klimas, WZ1V, 203-768-4758.

Aug. 15, **Original Delmarva Hamfest**, Delaware Technical & Community College, Georgetown, Delaware. Contact Bill Hammond, N3IOD, 302-539-5780.

Aug. 15, **Warren, Ohio ARA Hamfest**, Trumbull Branch Campus, Kent State University, Warren, Ohio. Contact Al VanSlyke, N8IKX, Warren ARA Hamfest, P.O. Box 809, Warren, OH 44482 (216-889-3378). (Exams 10 AM.)

Aug. 15, **Delaware-Lehigh ARC Hamfest & Computer Fair**, Career Institute of Technology, Easton, Pennsylvania. Contact Bill Goodman, K3ANS, office 215-253-2745, or home 215-258-5063. (Exams.)

Aug. 15, **MIT/Harvard Wireless Electronics, Amateur Radio, Computer Fleamarket**, Albany & Main St., Cambridge, Massachusetts. Contact W1GSL, P.O. Box 82 MIT BR., Cambridge, MA 02139.

Aug. 15, **Western Illinois ARC Swapfest**, Eagles Alps Lodge, Quincy, Illinois. Contact Rod Simon, N9MCX, c/o WIARC, P.O. Box 3132, Quincy, IL 62305. (Exams.)

Aug. 21, **Finger Lakes Hamfest**, Armory Bldg., Ithaca, New York. Contact TCARC, P.O. Box 4144, Ithaca, NY 14852-4144, or call Ross, N2ISU, 607-257-3511. (Exams.)

Aug. 21-22, **Duke City Hamfest**, New Mexico Army National Guard Armory, Albuquerque, New Mexico. Contact Duke City Hamfest, P.O. Box 6552, Albuquerque, NM 87197-6552.

Aug. 22, **Moose ARC Ham & Computerfest**, Loyal Order of Moose Towson Lodge 562, Towson, Maryland. Contact Nick Nickles, WZ3J, 410-668-2363.

Aug. 22, **St. Charles ARC Hamfest 93**, Blanchette Park, St. Charles, Missouri. Contact Scott Schultz, N0UVM, 241 Burning Leaf Dr., St. Charles, MO 63376 (314-928-7267). (Handicapped accessible; exams, preregistration 314-524-3254.)

Aug. 22, **Marysville Hamfest/Computer Show**, Fairgrounds, Marysville, Ohio. Contact Don Sabins, N8MGJ, 15704 Jolly Rd., Marysville, OH 43040 (513-642-0475). (Exams walk-in only.)

Aug. 28, **Mohawk ARC Fleamarket**, Mohawk Drive-in Theater, Gardner, Massachusetts. Contact Bill, WJ1Y, 508-939-2643.

Aug. 28, **Cooke County ARC Hamfest**, Civic Center, Gainesville, Texas. Contact Cooke County ARA, Box 100, Gainesville, TX 76241-0100. (Exams.)

Aug. 28, **Lake of the Woods Repeater Assn. Hamfest**, Roseau High School, Roseau, Minnesota. Contact David Landby, KB0HAP, Rte. 3 Box 10, Warroad, MN 56763 (218-386-1092).

Aug. 28, **Somerset County ARS Hamfest**, Manville Civil Defense Bldg., Franklin Park, New Jersey. Contact Ron, N2RPK, 908-685-1191 (6-9 PM).

Aug. 28, **Chaffee, NY Hamfest**, Manion Park, Chaffee, New York. Contact Paul Sumski, KA2ZMC, 716-492-3198.

Aug. 29, **Yonkers ARC Hamfest/Computerfest**, Yonkers Municipal Parking Garage, Yonkers, New York. Contact John, WB2AUL, 914-963-1021.

Aug. 29, **Short Mountain Repeater Club Hamfest**, Cedars of Lebanon State Park, Lebanon, Tennessee. Contact Mary Alice Fanning, KA4GSB, 4936 Danby Dr., Nashville, TN 37211 (615-832-3215).

Oct. 29-30, **QCWA National Convention**, St. Petersburg-Clearwater (Florida) Airport Holiday Inn. Plan ahead for this Quarter Century Wireless Assn. annual event. Plans include a tech program featuring talks by Walt Maxwell, W2DU, and Lew McCoy, W1ICP. For info contact Jay Strom, K9BSL, 233 34th Ave. No., St. Petersburg, FL 33704 (1-813-822-9107).

Choose Your Mobile In 3 Easy Steps:

Step 1 Choose Your Bands!

Single Band: 2 Meters

Today's most popular band, the best place for new hams to meet old hands, learn good operating procedures. Very friendly, thousands of open repeaters & autopatches everywhere. Great for on/off-the-road help. Crowded, though, especially in cities. Single-band mobile is easy to learn & use. No-Code friendly!

Multiple Band: 2 Meter/440MHz

The two most popular FM bands. A "natural" mix of high activity & special group channels, this is becoming the amateur's favorite mobile rig. Instant control of either band, and you can set up your station as a crossband full-duplex repeater. Gateway into advanced operating systems unavailable on 2M.

440 MHz

Next most popular band, less crowded with more high-tech, "smart" repeaters offering autopatch, remote base, linking, digital-voice recording. Some are limited-access (PL). Allows crossband repeating between singleband handhelds & dualband mobiles. 440 gives access to advanced technical info. This is where the pros hang out! No-Code friendly!

2Meter/220MHz

For the unconventional, this combines the most popular & the least crowded bands. Gives access to the people & services on 2M, plus the privacy & open space of 220, plus the advantages of telephone-like duplexing. Valuable where privacy is a concern.

220MHz

Fairly quiet, less crowded than 440, with almost half as many repeaters and the same high-tech functions. Plenty of open channels for semi-private conversation. Great place to meet newcomers, youngsters. Ideal for ham family, since all classes have voice privileges on 220. No-Code friendly!

2M/440MHz/1.2GHz

If you live and breathe radio, these are the bands for you! They give you the activity, the expandability and the novelty. Particularly useful for advanced hams who work in the city and live in the suburbs.

1.2 GHz

Radio's new frontier for ham pioneers. Shorter range than 2M or 220/440 in the open, but penetrates buildings, even elevators & underground garages. Excellent for cities. Crystal clear reception. Signals can be "bounced" for distance. Number of repeaters increasing faster than any other band.

MultiBand

Widest selection of all: start with 2M/440. Add 6M for No-Code Skywave privileges. Add 10M for Novice and Tech-Plus privileges. Add 1.2GHz for the big city. If you're a shortwave buff, add scanning and SWL. Additional capacity sold as add-on modules.



Step 2 Choose Your Radio!

IC-28H 2 Meters



Ideal starter rig. 45-W single band, 21 memories, LCD display. Receives NOAA/WX

IC-228H 2 Meters



Same as IC-28, w/ color display, more skip & scan features & priority watch.

IC-229H 2 Meters



Even more features – automatic dialing, 50W power, ultracompact case.

IC-449H 440MHz



35W UHF transceiver, 20 memories, scanning, optional autodial.

IC-38A 220MHz



Same as IC-28H, with 220's privacy, 25W & 21 memory channels.

IC-1201 1.2 GHz



A natural for the city. Penetrates structures. 10W output, 20 memories & priority watch.

IC-3230A/H 2 Meter/440 MHz



One touch control, color-coded controls. 25/45W output, simultaneous reception, crossband repeat, 15 memories/band.

IC-2410A/H 2 Meter/440MHz



Same functions as IC-3230, plus ParaWatch for receiving 2 signals on same band simultaneously.

IC-2330A/H 2 Meter/220 MHz



Most popular & least used bands combined. One-touch control. 36 memories/band, variable power output, hi-res display.

IC-901 Modular MultiBand



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PHOTO A

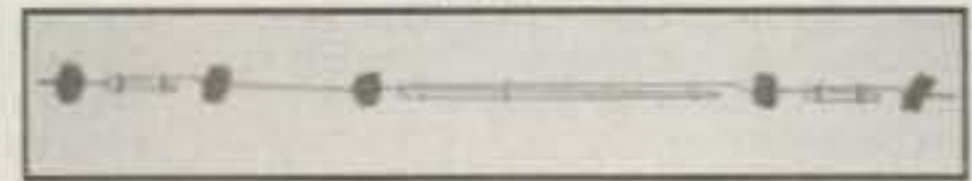


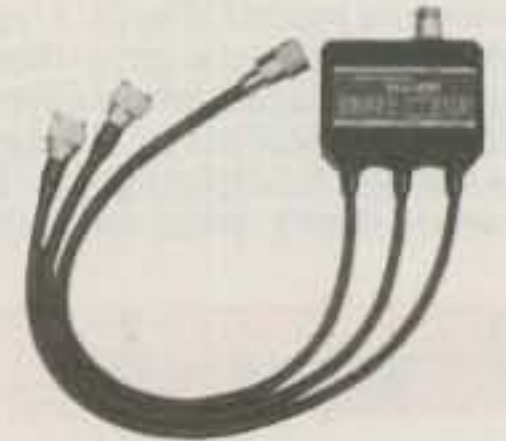
PHOTO B

COMET developed the Super Linear Converter (SLC) System to increase the actual gain of Dual/Triband antennas.

- A completely pre-formed phasing coil and phosphorus copper element eliminates additional components and gain loss. (Photo B)
- The SLC is electrically very efficient, providing a low angle of radiation directly to the horizon, for maximum performance. (Photo B)
- COMET sectional antennas use ABS (Transparent to RF) connecting joints for the finest pattern and easiest assembly. (Photo A)



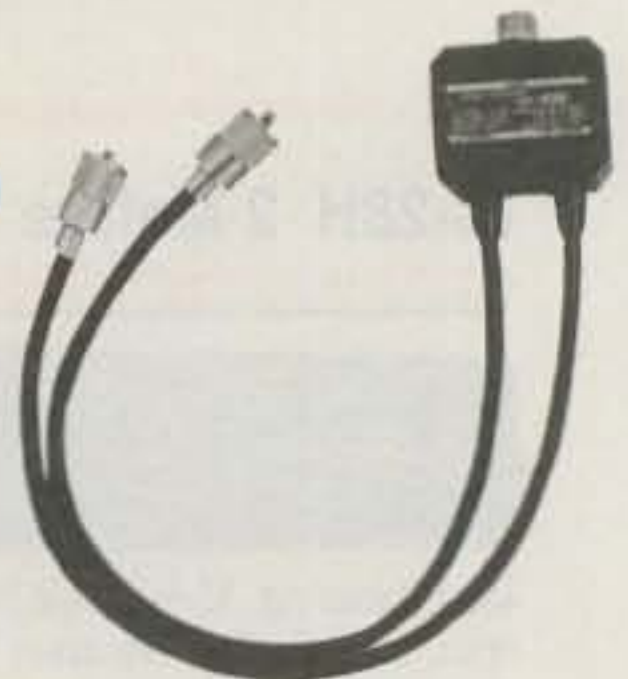
CFX-4310



CFX-431



CF-4160



CF-416

COMET DUALBAND ANTENNAS

MODEL #	BANDS	GAIN	MAX PWR Watts	CONN	WEIGHT Lbs' oz'	LENGTH Ft' In"	MAX WIND SPEED MPH
DualBand Base Station/Repeater Antennas							
GPX-2010	2M/70cm	9.5/13.2	200	SO-239	7'14"	23'4"	65 w/o guys 90 w/guys
Nylon Guys Included. Highest Gain Dualbander in the World!							
CA-2x4MAX	2M/70cm	8.5/11.9	200	SO-239	5'11"	17'8"	90
CA-2x4WX	2M/70cm	6.5/9.0	200	SO-239	3'8"	10'5"	90
CA-2x4FX	2M/70cm	4.5/7.2	200	SO-239	2'12"	5'11"	112
CMR-241	2M/70cm	4.5/7.2	200	SO-239	3'8"	6'10"	135
CA-350DB	10M/6M	2.15/6.5	100 FM	SO-239	7'8"	22'7"	65
CA-1243Z	70cm/23cm	9.4/12.8	150/50	N-Female	3'8"	7'5"	90
CA-1243E	70cm/23cm	6.0/8.4	150/50	N-Female	1'13"	3'4"	112
DualBand Mobile Antennas							
NEW B-Series BLACK ANODIZED Cellular Appearance							
B-10	2M/70cm	-2.15	50	PL-259	-	12"	-
B10NMO	2M/70cm	-2.15	50	NMO	-	12"	-
B-20	2M/70cm	2.15/5.0	50	PL-259	-	30"	-
B20NMO	2M/70cm	2.15/5.0	50	NMO	-	30"	-
NEW F Series: The Highest Quality DualBand Antenna You Can Buy!							
FL-62S	2M/70cm	3.6/6.0	150	PL-259	-	3'5"	-
FL-67S	2M/70cm	4.5/7.2	150	PL-259	-	4'11"	-
CA-2x4MB	2M/70cm	4.5/7.0	150	PL-259	-	4'11"	-
CA-2x4SR	2M/70cm	3.8/6.2	150	PL-259	-	3'4"	-
CHL-23J	2M/70cm	2.15/3.8	100	PL-259	-	20"	-
CHL-21J	2M/70cm	-2.15	100	PL-259	-	12"	-
NCG-1422M	2M/220MHz	2.15/3.4	100	PL-259	-	3'0"	-
CHL-350	10M/6M	-2.15	200	PL-259	-	7'0"	-

COMET TRIBAND ANTENNAS

MODEL #	BANDS	GAIN	MAX PWR Watts	CONN	WEIGHT Lbs' oz'	LENGTH Ft' In"	MAX WIND SPEED MPH
Triband Base Station/Repeater Antennas							
CX-725	6M/2M/70cm	2.15/6.2/8.4	200	SO-239	2'15"	7'11"	90
CX-333	2M/220/70cm	6.5/7.8/9.0	120FM	SO-239	2'	10'4"	112
CX-902	2M/70cm/23cm	6.5/9.0/9.0	200	N-Female	3'3"	10'0"	90
CX-903	2M/70cm/23cm	6.5/9.0/13.5	100	N-Female	3'6"	9'8"	90+
Triband Mobile Antennas							
CX-702	6M/2M/70cm	2.15/6.0/8.4	120	PL-259	-	6'10"	-
CX-801	2M/70cm/23cm	3.0/6.8/9.6	100	N-Male	-	3'3"	-
FL-95SN	2M/70cm/23cm	2.8/6.0/8.4	80	N-Male	-	2'7"	-
NEW! The Highest Gain 2M/220/440MHz Mobile In The World! Available from COMET, Of Course!							
CX-224	2M/220/70cm	2.15/3.6/6.0	150	PL-259	-	3'1"	-
CX-224NMO	2M/220/70cm	2.15/3.6/6.0	150	NMO	-	3'1"	-
NEW! QUAD-BAND Mobile Antenna. Simultaneous TX On 4 Bands. 6M And 2M Bands Are Constant. By Adding HF Coils, The CA-HV Can Be Used For 3 Or 4 Bands Easily!							
CA-HV	40/(20)/15/ 10/6/2Meters	HF -2.15/3.4	120SSB	PL-259	MAX 1'3"	MAX 6'3"	-
L-14	Optional 20M loading coil for the CA-HV.						

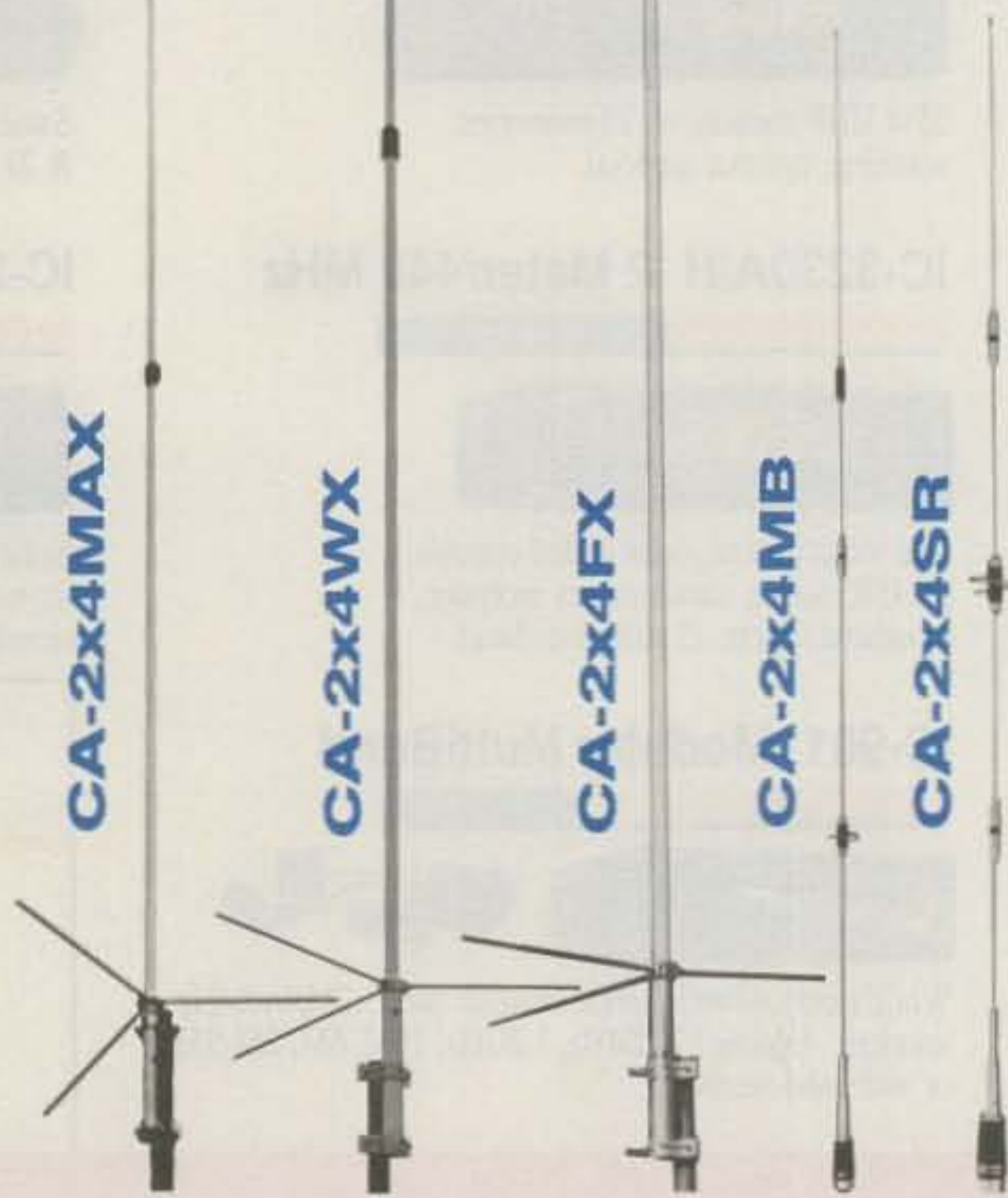
CA-2x4MAX

CA-2x4WX

CA-2x4FX

CA-2x4MB

CA-2x4SR



COMET HIGH-POWER DUPLEXERS AND TRIPLEXERS

MODEL #	PORT	Freq MHz	CW Watts	PEP Watts	Loss dB	Isol dB	Mix Conn	Port Conn
CF-416A (2M/70cm)	LPF HPF	1.3-150MHz 400-540MHz	450 300	800 500	0.15 0.25	60dB 60dB	SO-239	PL-259 w/leads PL-259 w/leads
CF-416C (2M/70cm)	LPF HPF	1.3-150MHz 400-540MHz	450 300	800 500	0.15 0.25	60dB 60dB	N-Female	PL-259 w/leads N-Male w/leads
CF-4160I (2M/70cm)	LPF HPF	1.3-150MHz 400-540MHz	450 300	800 500	0.1 0.2	60dB 60dB	SO-239	PL-259 w/o leads N-Male w/o leads
CF-4160K (2M/70cm)	LPF HPF	1.3-150MHz 400-540MHz	450 300	800 500	0.1 0.2	60dB 60dB	SO-239	PL-259 w/o leads PL-259 w/o leads
CF-4130A (70cm/1.2GHz)	LPF HPF	1.3-150MHz 840-1.4GHz	450 100	800 200	0.2 0.3	55dB 55dB	N-Female	N-Male w/o leads N-Male w/o leads
CF-360A (HF/6M-450MHz)	LPF HPF	1.3-30MHz 49-470MHz	350 350	600 600	0.2 0.25	45dB 45dB	SO-239	PL-259 w/leads PL-259 w/leads
NCG-1422D (2m/220MHz)	LPF HPF	144-148MHz 220-225MHz	50 50	100 100	0.5 0.5	40dB 40dB	SO-239	PL-259 w/leads PL-259 w/leads
CFX-431A (2m/70cm/1.2)	LPF BPF HPF	1.6-60MHz 100-150MHz 350-500MHz 840-1.4GHz	600 450 300 100	1KW 800 500 200	0.2 0.2 0.3 0.4	50dB 50dB 50dB 50dB	N-Female	PL-259 w/leads N-Male w/leads N-Male w/leads
CFX-4310C (2m/70cm/1.2)	LPF BPF HPF	1.6-60MHz 100-150MHz 350-500MHz 840-1.4GHz	600 450 300 100	1KW 800 500 200	0.15 0.25 0.25 0.3	50dB 50dB 50dB 50dB	N-Female	PL-259 w/o leads PL-259 w/o leads N-Male w/o leads
CFX-514 (6m/2m/70cm)	LPF BPF HPF	1.3-90MHz 130-200MHz 380-500MHz	450 450 300	800 800 500	0.2 0.25 0.3	55dB 55dB 55dB	SO-239	PL-259 w/leads PL-259 w/leads PL-259 w/leads
CFX-514J (6m/2m/70cm)	LPF BPF HPF	1.3-90MHz 130-200MHz 380-500MHz	450 450 300	800 800 500	0.15 0.2 0.25	55dB 55dB 55dB	SO-239	SO-239 w/o leads SO-239 w/o leads SO-239 w/o leads
CFX-324A (2m/220/70cm)	LPF BPF HPF	1.3-150MHz 200-320MHz 390-500MHz	350 350 350	600 600 600	0.2 0.25 0.3	40dB 40dB 40dB	SO-239	PL-259 w/leads PL-259 w/leads PL-259 w/leads
CFX-324B (2m/220/70cm)	LPF BPF HPF	1.3-150MHz 200-320MHz 390-500MHz	350 350 350	600 600 600	0.2 0.25 0.3	40dB 40dB 40dB	SO-239	PL-259 w/o leads PL-259 w/o leads PL-259 w/o leads

COMET MOBILE MOUNTING SYSTEMS

COMET has a wide selection of mobile mounts. All COMET cables have detachable connectors.

MODEL #	DESCRIPTION
3D4M	Standard coax assembly, 13ft low loss coax w/UHF connectors.
3D5M	Standard coax assembly, 16.5ft low loss coax w/UHF connectors.
3D4N	Standard coax assembly, 13ft low loss coax w/N-connectors. Recommended to 900MHz.
CK-5M	Deluxe coax assembly, 13ft VERY low loss coax + RG-188 UHF connectors. Avoids cable damage upon vehicle entry.
CK-5M5	Deluxe coax assembly, 16.5ft VERY low loss coax + RG-188 UHF connectors. Avoids coax damage upon vehicle entry.
CK-5N	Deluxe coax assembly, 13ft VERY low loss coax + RG-188, N-connectors. Avoids cable damage upon vehicle entry.
5D4N	13ft VERY low loss cable assy. For 1.2GHz N-Connectors
The Following Mounts are w/o Coax. Choose from the Cable Assemblies Above.	
RS-20	Medium-Duty Gutter Mount, Black w/Dial lock.
RS-80	Heavy-Duty Gutter Mount, Black w/Dial lock.
RS-81	Heavy-Duty Trunk Lip Mount, Black w/Dial lock.
RS-820	Heavy-Duty, low-profile Trunk lip mount. Black w/Dial lock.
RS-21	Multi-Purpose Mount, Trunk-Lip/Hatch-Back, Black, Adj. to any position.
RS-850	Heavy-Duty Pipe/Luggage Rack Mount 1.75" max width/diameter. Black w/Dial lock.
RS-9	Trunk Lip Mount, Black. For small antennas. (B-10, B-20, CHL-23J, etc.)
MS-3FVMM	Mag Mount, 13ft low-loss cable. 12 pole magnet. UHF Connectors
MS-5LXMM	Mag Mount, 13ft low loss cable + 10" RG-188 to avoid water leak/cable damage.
MS-5LXNN	Mag Mount, 13ft low loss cable + 10" RG-188, N-Connectors
TS-1M	Low profile trunk lip mount, w/3D5M coax assembly, UHF connectors
TS-5M	Low profile trunk lip mount, w/deluxe CK-5M5 coax assembly, UHF connectors.

COMET SINGLE BAND AND HT ANTENNAS

MODEL #	BANDS	GAIN	MAX PWR Watts	CONN	WEIGHT Lbs' oz"	LENGTH Ft' In"
New Single Band Antennas						
CHL-185	2m	4.1	200	PL-259	-	4'8"
CA-430HG	70cm	5.0	100	PL-259	-	2'5"
New HT Antennas						
CH-32 MINI Ant	2m/70cm	-	10	BNC	-	1.75"
CH-72S	2m/70cm	-3.2	50	BNC	-	15"
SH-95	2m/70/23cm	1.5/2/5.5	10	BNC	-	15"

ML-7 Micless Microphone

A Dynamic One-Piece Earphone/Microphone. An ultra-mini microphone located within the ear-piece picks up sound from the inner ear. Clear voice is transmitted, with less influence from outside noises.

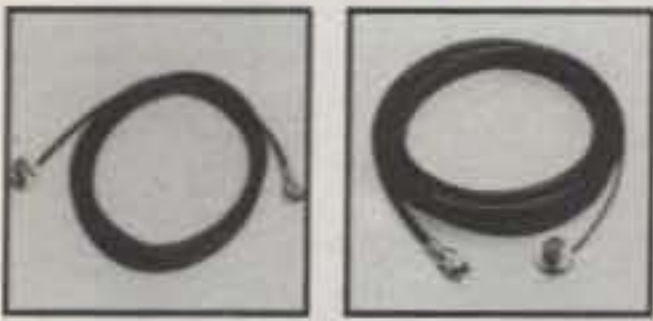
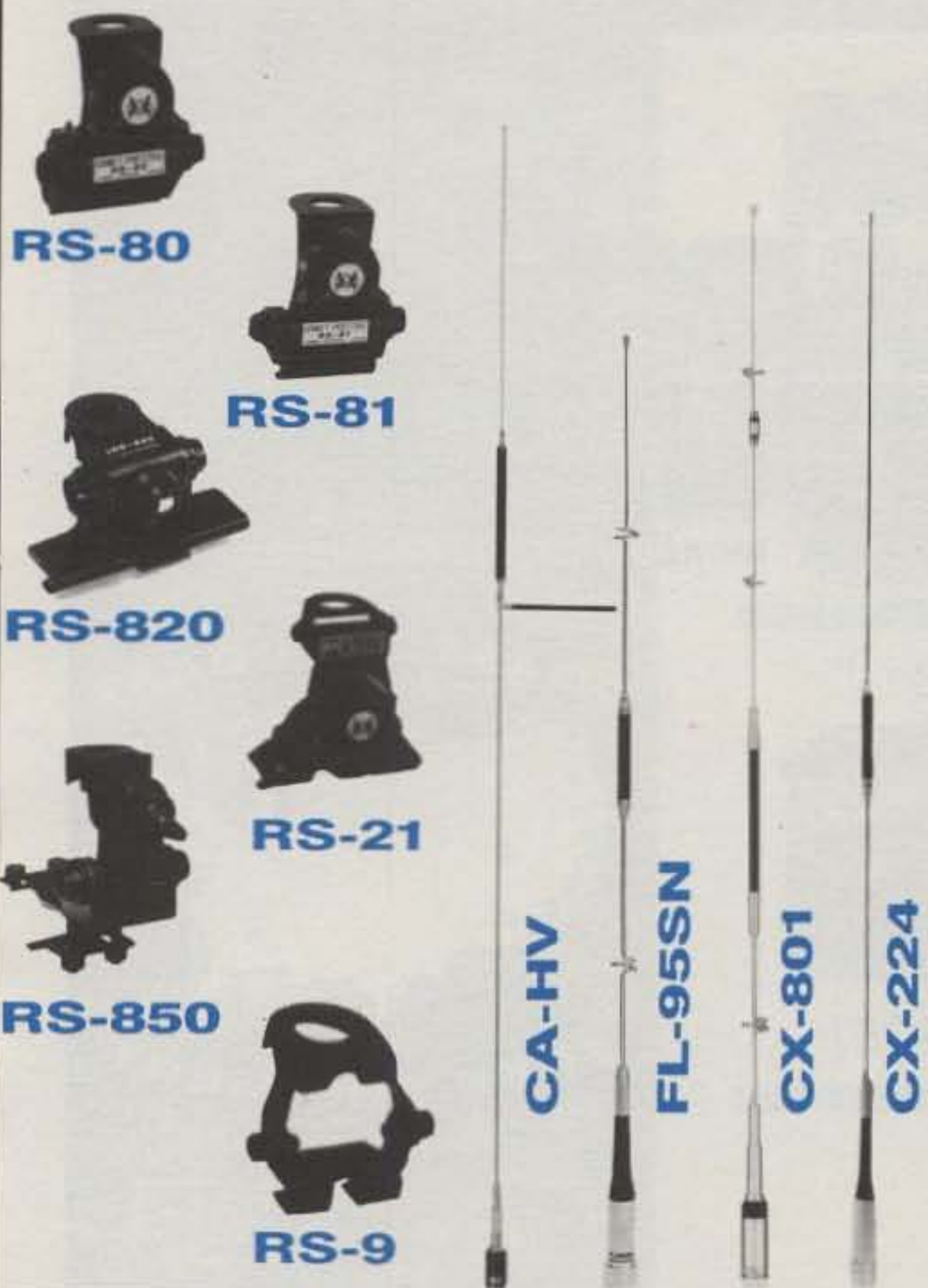
The ML-7 is not a conventional Speaker/Microphone. Receive is completely hands free.

• Especially effective in noisy situations: Parades, airports, factories, etc.

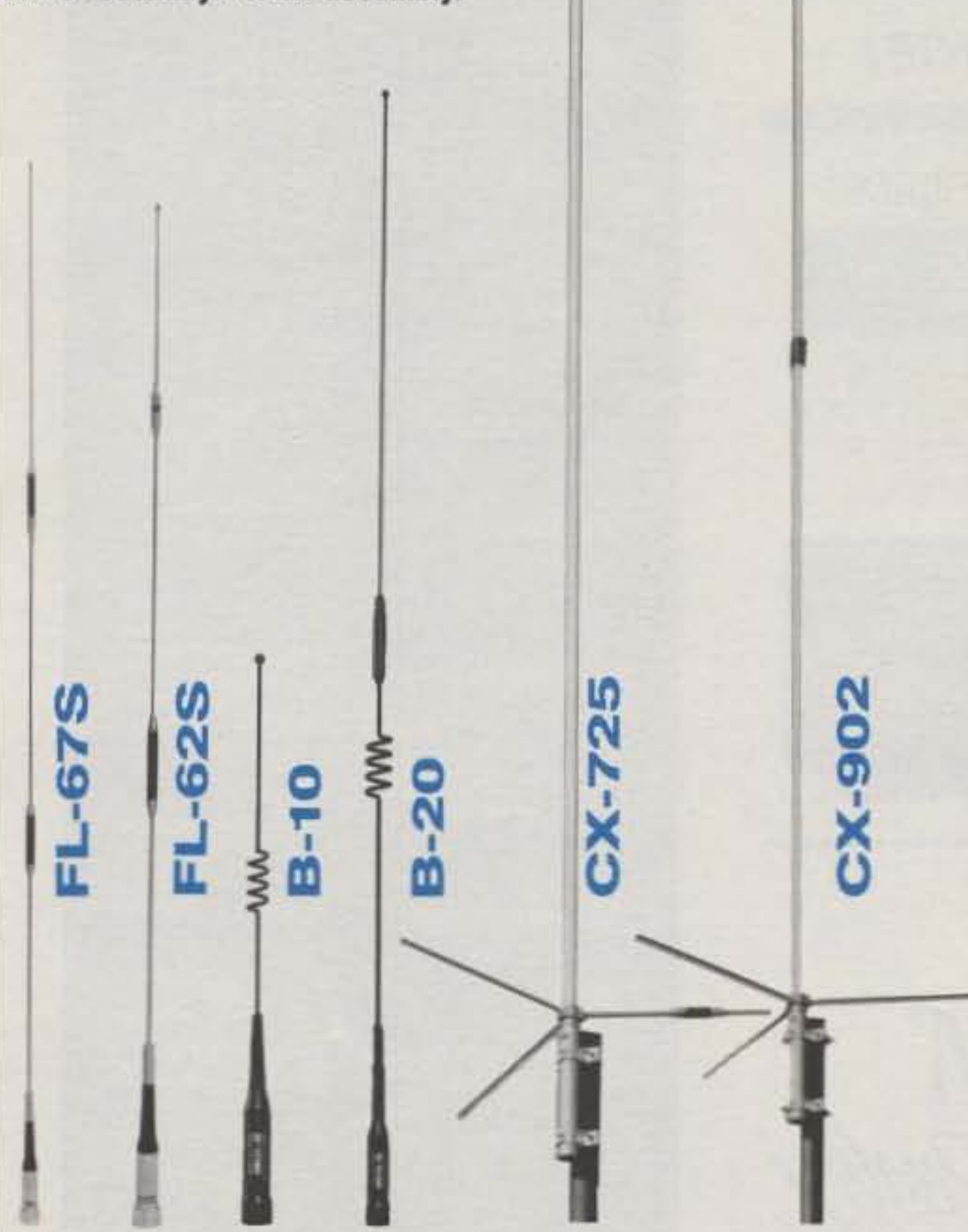
• Cordless mic is especially useful when activity is taking place: bike riding, skiing, hunting, driving, etc.
• Earphone provides privacy and security.
• Excellent TX and RX quality!

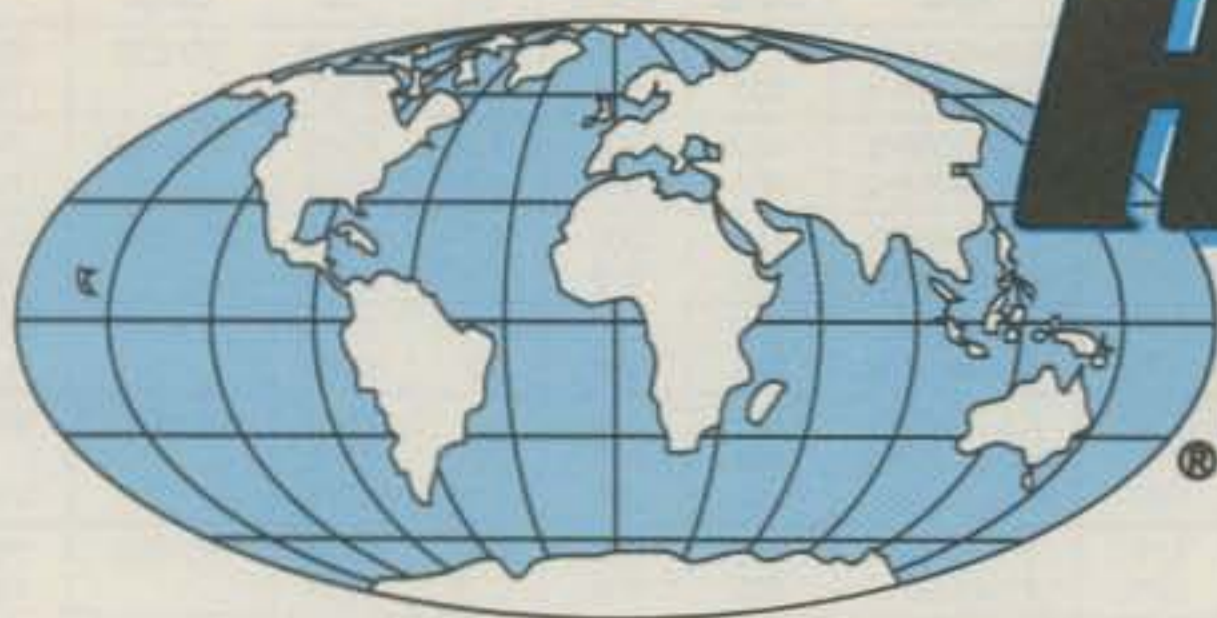
ML-7I: For Icom, Yaesu, Standard, Alinco
ML-7K: For Kenwood

Note: Please check for compatibility with your particular radio.



3D4M Standard cable assembly. CK-5M Deluxe cable assembly.





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This month we wrap up the series on ununs by W2FMI. In this final part the author offers 14 variations on matching 50 ohm cable, which should satisfy just about any requirement.

The Ultimate Multimatch Unun

BY JERRY SEVICK*, W2FMI

The use of the adjective "ultimate" to describe one's design can be risky business. The author assumes that the design will meet one of the most common definitions for this adjective—namely, "beyond which it is impossible to go." To many of us, the classic use of this adjective was initiated by Lew McCoy in describing his popular Transmatch.¹ Although there have been some improvements in his design, his use of this definite (and strong) adjective can be said to have withstood the test of time. I hope my use has a similar success.

Recently I described a multimatch design² which had five broadband ratios matching 50 ohm cable to lower impedances. In fact, two of the lower ratios worked well in matching 50 ohm cable to higher impedances. Thus, this gave seven usable applications in matching 50 ohm cable to impedances as high as 112.5 ohms and as low as 5.56 ohms. But the design³ in this article goes well beyond this. It offers ten broadband ratios, four of which work quite well in either direction! Therefore, this design offers 14 applications in matching 50 ohm cable to impedances as high as 112.5 ohms and as low as 3.125 ohms.

This achievement, however, comes at a price called *difficulty*. It uses a quadrifilar winding on the smallest feasible ferrite toroid in order to minimize the standing waves by using the shortest possible transmission lines. The 5-ratio unun used a trifilar winding which was considerably easier to wind. Furthermore, the 10-ratio unun has two of its windings tapped, while the 5-ratio unun had only one.

If you have had little experience in winding ununs or baluns, then a simplified version should be attempted first. This version would eliminate the tapping of the two windings, resulting in the fol-

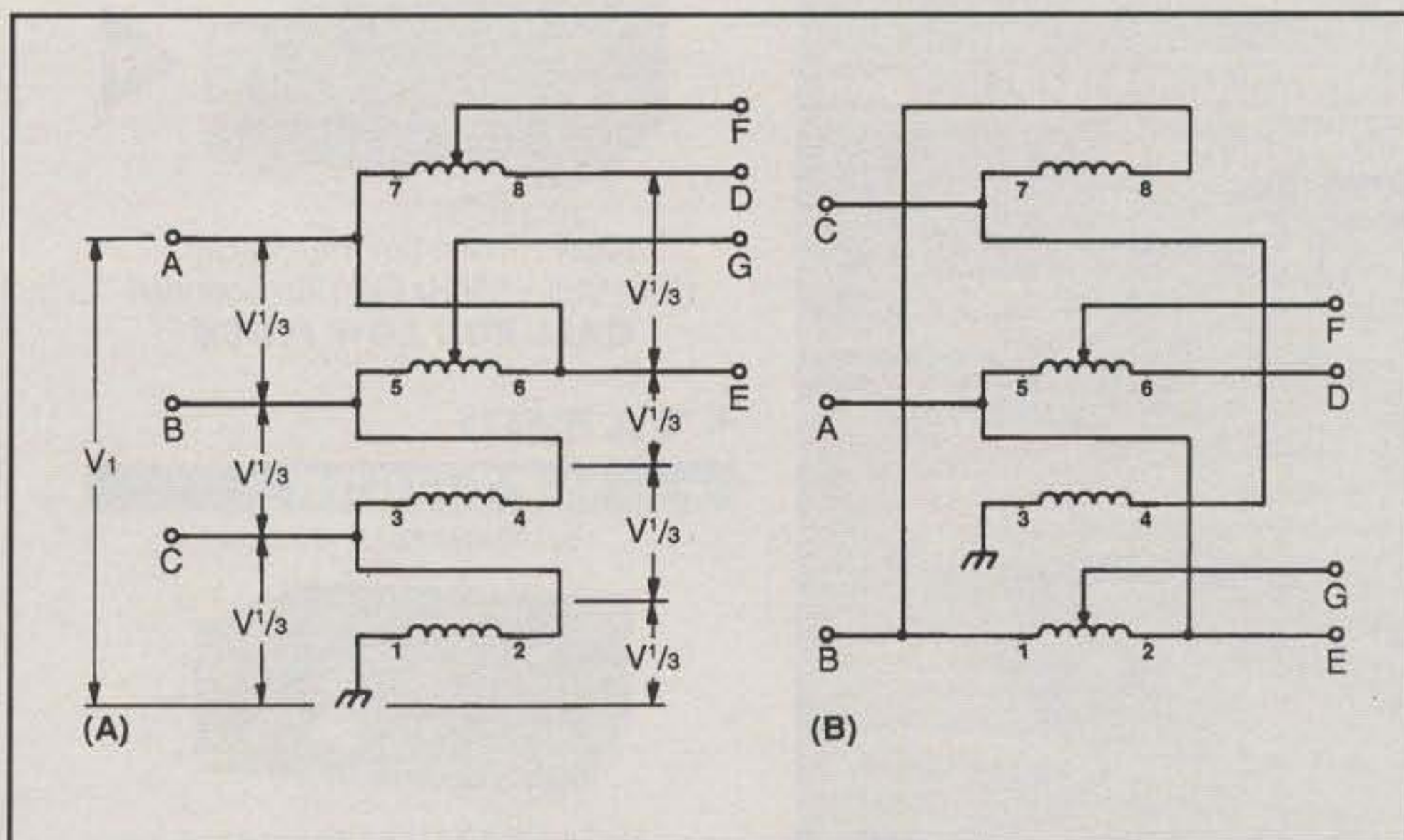


Fig. 1—Circuit diagrams for the 10-ratio unun: (A) diagram for analysis; (B) transposed windings for best overall performance.

lowing five broadband ratios matching 50 ohm cable to lower impedances: 1.78:1, 2.25:1, 4:1, 9:1, and 16:1. In fact, the 1.78:1 and 2.25:1 ratios can be used (quite successfully) in matching 50 ohm cable up to 89 ohms and 112.5 ohms.

Again, for those interested in the design considerations of this broadband multimatch unun, a brief review is presented in the first section. The second section presents a high-power design capable of handling the full legal limit of amateur radio power. The third, and the last, section includes a low-power design capable of handling the output of any HF transceiver.

Finally, I would like to conclude this introduction by referring to another popular application of the adjective *ultimate*. It is "to come to an end." This article presents the sixth, and quite likely my last, in the series on ununs. I think I have covered most of the important

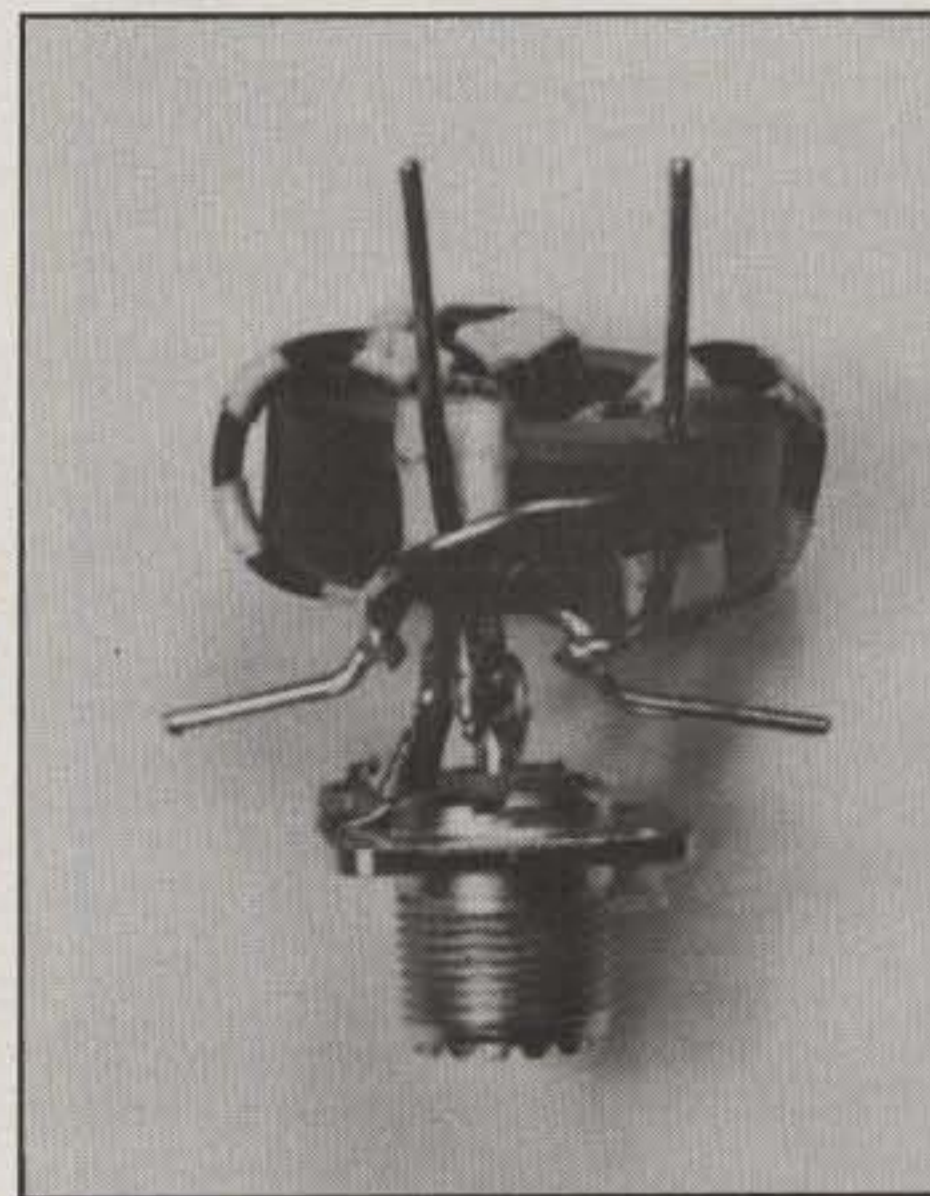


Photo A—Bottom view of the 10-ratio unun. The connector is on terminal A.

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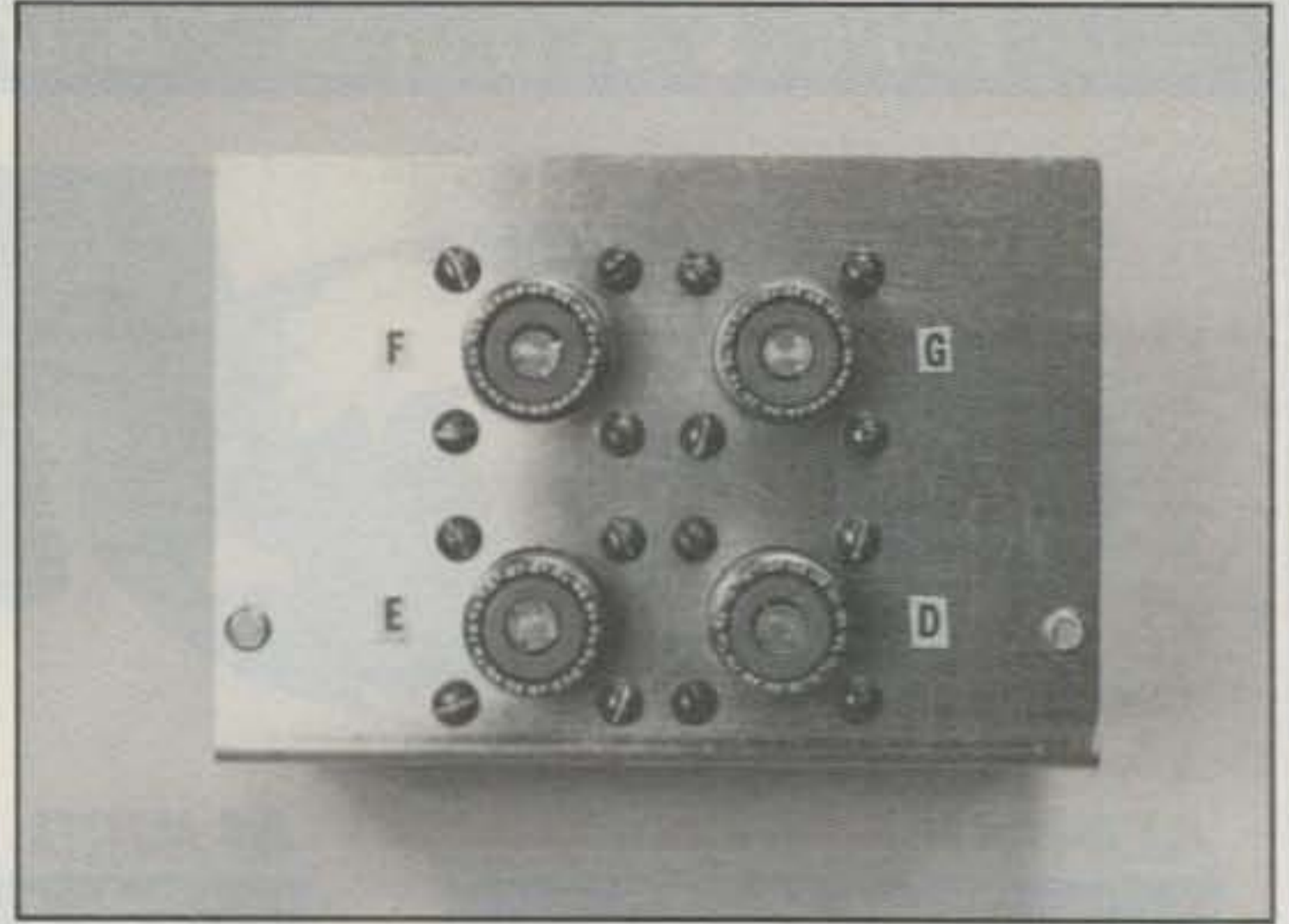
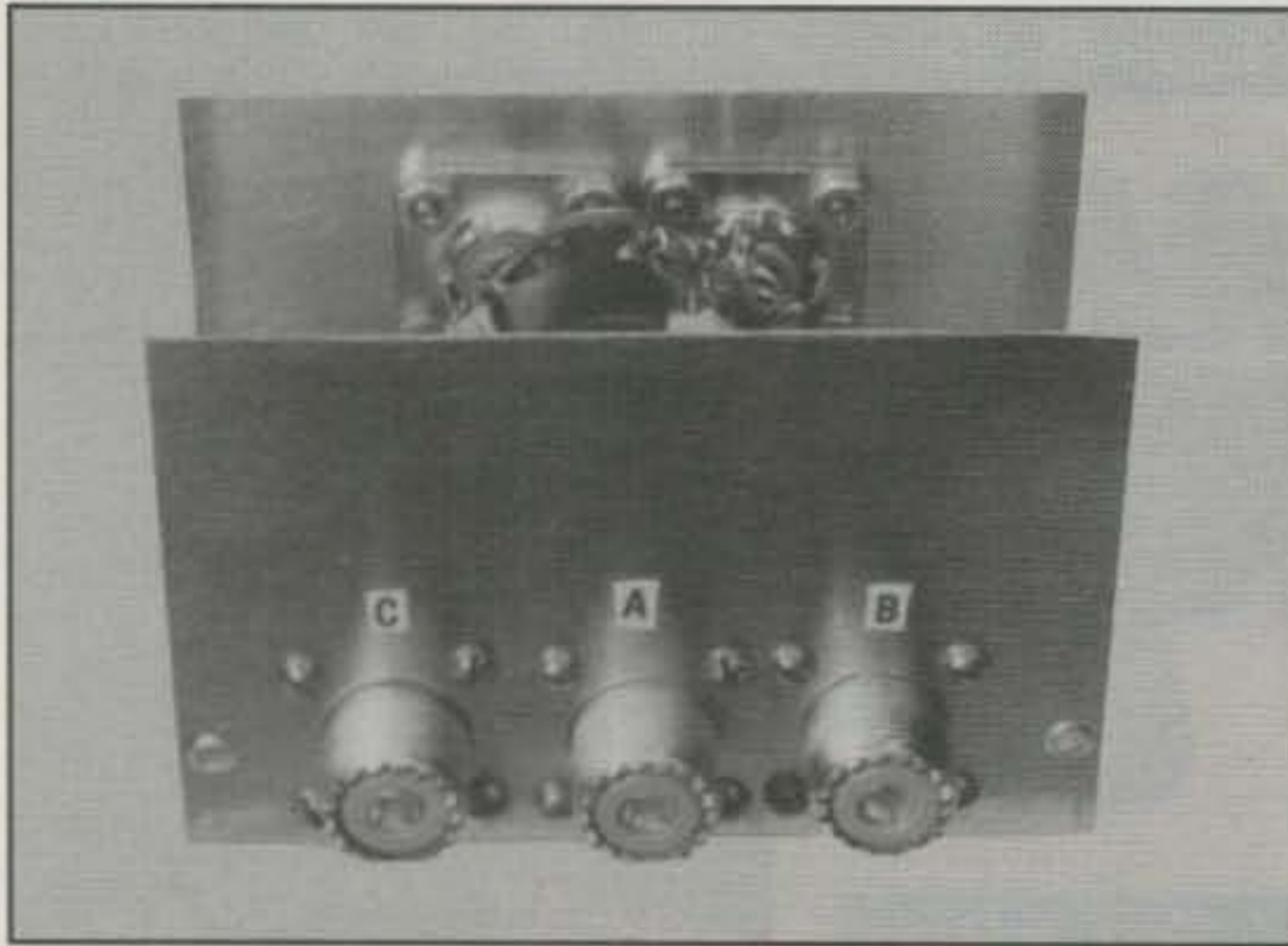
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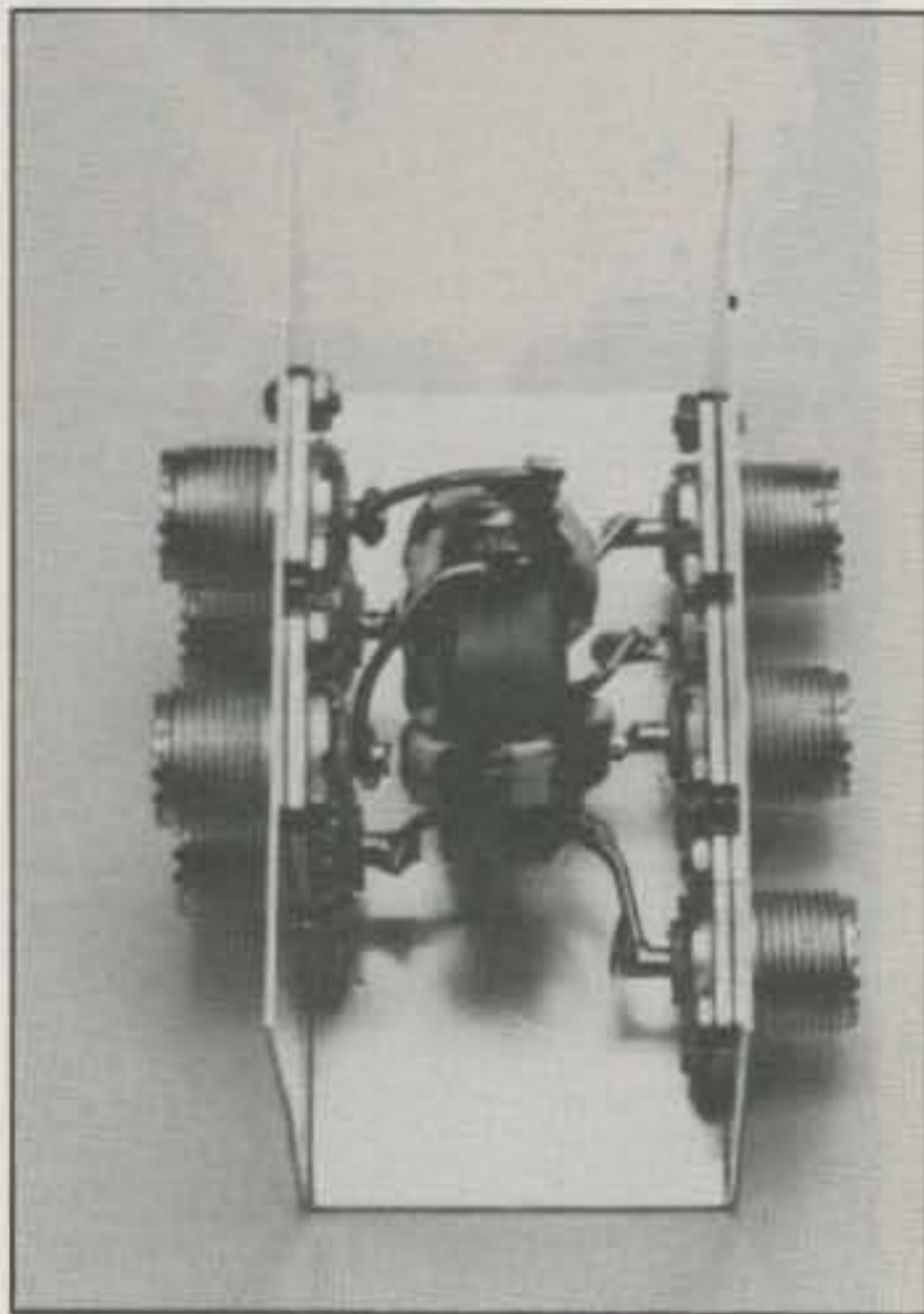
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Photos B—Three different views of the 10-ratio unun mounted in a 4"L x 2"W x 2.75"H CU-3015A minibox.



applications for amateur radio use. If not, I would entertain any suggestions.

The Circuit

Fig. 1(A) is presented here because it is the easiest form of a quadrifilar-wound unun to explain. With the input voltage, V_1 , connected to the various terminals on the left (the low-impedance side), and with very short transmission lines compared to the wavelength, we have the following transformation ratios:

1. V_1 connected to terminal A

a) At terminal D the output voltage V_o is $4/3V_1$. Therefore, the transformation ratio, g , with connection A-D is

$$g = (4/3)^2 = 1:1.78 \quad (1)$$

b) At terminal F the output voltage is

$$V_o = V_1(1 + n/3N) \quad (2)$$

where N = total number of turns and

n = number of turns from terminal 7.

The transformation ratio with connection A-F then becomes

$$g = (V_o/V_1)^2 = (1 + n/3N)^2 \quad (3)$$

2. V_1 connected to terminal B

a) At terminal E the output voltage is $3/2V_1$. Thus, the transformation ratio with connection B-E is

$$g = (3/2)^2 = 1:2.25 \quad (4)$$

b) At terminal G the output voltage is

$$V_o = V_1(1 + n/2N) \quad (5)$$

where n = number of turns from terminal 5.

The transformation ratio with connection B-G becomes

$$g = (V_o/V_1)^2 = (1 + n/2N)^2 \quad (6)$$

c) At terminal D the output voltage is $2V_1$. The transformation ratio with connection B-D is

$$g = (2)^2 = 1:4 \quad (7)$$

d) At terminal F the output voltage is

$$V_o = V_1(3/2 + n/2N) \quad (8)$$

where n = number of turns from terminal 7.

The transformation ratio with connection B-F then is

$$g = (V_o/V_1)^2 = (3/2 + n/2N)^2 \quad (9)$$

3. V_1 connected to terminal C

a) At terminal E the output voltage is $3V_1$. The transformation ratio with connection C-E becomes

$$g = (3)^2 = 1:9 \quad (10)$$

b) At terminal G the output voltage is

$$V_o = V_1(2 + n/N) \quad (11)$$

where n = number of turns from terminal 5.

The transformation ratio with connection C-G is

$$g = (V_o/V_1)^2 = (2 + n/N)^2 \quad (12)$$

c) At terminal D the output voltage is $4V_1$. The transformation with connection C-D becomes

$$g = (4)^2 = 1:16 \quad (13)$$

d) At terminal F the output voltage is

$$V_o = V_1(3 + n/N) \quad (14)$$

where n = number of turns from terminal 7.

The transformation ratio with connection C-F is

$$g = (V_o/V_1)^2 = (3 + n/N)^2 \quad (15)$$

A High-Power 10-Ratio Unun

After several attempts at rearranging the windings of fig. 1(A) for best overall performance (optimizing the effective characteristic impedances of the windings), fig. 1(B) evolved. Photo A shows the bottom view of an unmounted unun using the circuit of fig. 1(B). The top-left

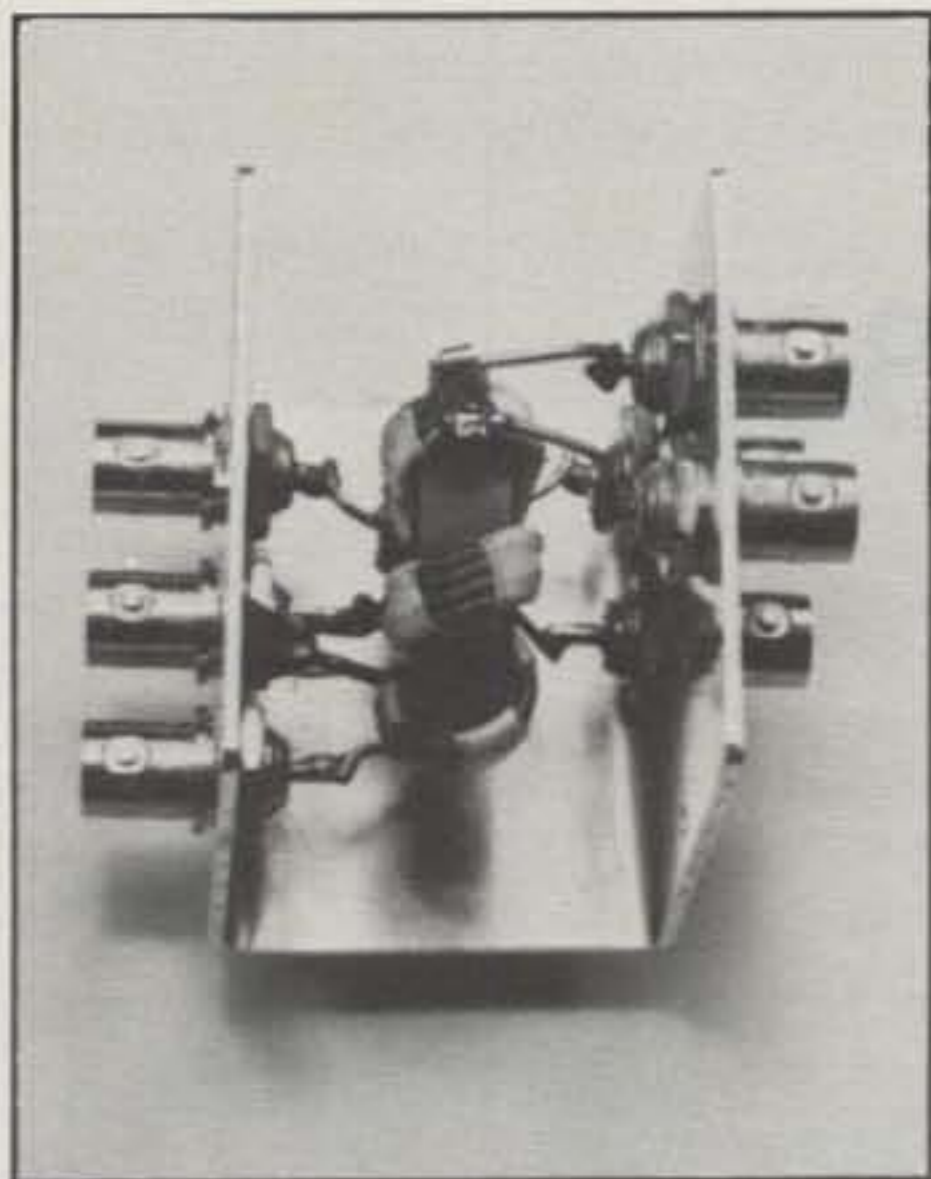


Photo C—The low-power 10-ratio unun mounted in a homemade 2.25"L x 1.5"W x 2.25"H minibox.

lead is terminal E. The top-right lead is terminal D. The bottom-left lead is terminal B. The center lead (connected to the SO-239 connector) is terminal A.

The bottom-right lead is terminal C. Below these three leads is a ground connection (terminal 3 in fig. 1[B]) to the SO-239 connector. Photo B shows three different views of this high-power unit mounted in a 4"L x 2"W x 2.75"H CU-3015A minibox.

This 10-ratio unun has four quadrifilar turns of No. 14 H Thermaleze wire on a 1.5 inch OD ferrite toroid with a permeability of 250. Winding 5–6 is tapped at 2 turns from terminal 5 and winding 7–8 is tapped at 2 turns from terminal 7.

If the 9:1 ratio (connection C–E), the 12.25:1 ratio (connection C–F), and the 16:1 ratio (connection C–D) are to be used at the full legal limit of amateur radio power, then it is suggested that winding 3–4 be replaced with No. 12 H Thermaleze wire. If not, then these three ratios should be used at lower power levels (of 500 watts continuous and 1 kW peak). It should also be mentioned that using No. 12 wire for winding 3–4 adds some more difficulty in the construction process.

A listing of the expected performance across the band from 1.7 MHz to 30 MHz, with the various ratios, is as follows:

16:1 (D–C); 50:3.125 ohms

Ratio is constant up to 21 MHz. It then decreases by 15 percent.

12.25:1 (F–C); 50:4.08 ohms

Ratio is constant.

9:1 (E–C); 50:5.56 ohms

Ratio increases by 5 percent.

6.25:1 (G–C); 50:8 ohms

Ratio is constant.

4:1 (D–B); 50:12.5 ohms

Ratio decreases by 5 percent.

3.06:1 (F–B); 50:16.3 ohms

Ratio decreases by 10 percent.

2.25:1

a) (E–B); 50:22.22 ohms

Ratio increases by 4 percent.

b) (B–E); 50:112.5 ohms

Ratio increases by 50 percent (the greatest deviation across the band of any of the ratios).

1.78:1

a) (D–A); 50:28.1 ohms.

Ratio is constant.

b) (A–D); 50:89 ohms.

Ratio increases by 15 percent.

1.56:1

a) (G–B); 50:32 ohms

Ratio increases by 10 percent.

b) (B–G); 50:78 ohms

Ratio increases by 40 percent.

1.36:1

a) (F–A); 50:36.8 ohms

Ratio decreases by 9 percent.

b) (A–F); 50:68 ohms

Ratio increases by 1.5 percent.

A Low-Power 10-Ratio Unun

Photo C shows a low-power unit mounted in a home-made 2.25"L x 1.5"W x 2.25"H minibox. It has five quadrifilar turns of No. 16 H Thermaleze wire on a 1.25 inch OD ferrite toroid with a permeability of 250. The tap on winding 5–6 (fig. 1[B]) is at three turns from terminal 5, and on winding 1–2 it is three turns from terminal 1. Since the number of turns is different from the high-power unit, so are the ratios which use the taps. In this case they are a little larger. Specifically, the tapped ratios are now as follows: 1:12.96, 1:6.76, 1:3.24, 1:1.69, and 1:1.44. If the taps were at two turns from terminals 5 and 1, the ratios would be a little less than those of the high-power unit. You can play with the equations in the first section in this article and arrive at many different ratios.

Since this unun has shorter transmission lines than its high-power counterpart, the deviations of the ratios across the HF band are generally less. Also, if winding 3–4 (in fig. 1[B]) were replaced with No. 14 H Thermaleze wire, this low-power unit could well be rated at 500 watts of continuous power for all ratios!

References

1. Lew McCoy, W1ICP, "The Ultimate Transmatch," *QST*, July 1970, pp. 24–27, 58.
2. Jerry Sevick, W2FMI, "A Multimatch Unun," *CQ*, April 1993, pp. 28–30.
3. Kits and finished units are available from Amidon Associates, Inc., 2216 East Gladwick Street, Dominguez Hills, CA 90220.

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CQ REVIEWS:

The Ameritron AL-80B HF Amplifier

BY LEW McCOY*, W1ICP

Some time ago I inherited a used Ameritron AL-1200 amplifier, which I installed as my station amplifier. I have now used the amplifier consistently for over a year and have been very impressed with its capabilities. Not too long ago I was approached by Ameritron and asked if I would review their newest product, the AL80-B, and I was happy to do so.

The AL-80B is a one kilowatt output linear amplifier that operates from 160 through 15 meters, and with a slight modification will cover 10 meters. Basic operation of the amplifier is in Class AB2. It uses a single 3-500Z tube that is operated in grounded-grid.

In my testing for the purpose of this review I concerned myself with several points: ease of tune-up, metering, key-up/key-down voltage shifts, construction innovations, and other points, not necessarily in that order.

The manual, which is well done, gives a chart for approximate tuning control settings for the two main controls, **Plate** and **Load**, for each band. A tuned circuit for each band, or a combination of bands—20/30, 15/17, and 10/12—is used in the drive portion of the amplifier circuit. Two meters are used to monitor the amplifier functions. The meters are of the dual-needle variety. The left meter (see panel photo) measures both the grid and plate current. The right meter monitors plate voltage (**HV**), reflected power (**REF**), ALC output voltage, **ALC** adjustment level, and **SWR**. These various functions are obtained via a front-panel **Multimeter** switch. Incidentally, the power output readings are exact, not relative.

The full no-load voltage is 3100 volts, and key-down or full load is 2700 volts (10 percent regulation). The rated output of the amplifier is SSB PEP, 1000 watts, and 850 watts key down, CW continuous. I found these figures to be



This is the AL-80B. Note the large meter at the upper left. The bandswitch is at the upper right, and the plate and loading controls are at the lower right.

exact, and I also had no problems at 1000 watts output on CW. A half-hour continuous rating for RTTY/AMTOR is 500 watts. Maximum drive power is rated at 100 watts, but full output can be obtained with 85 watts or even slightly less.

The power-supply circuit is a full-wave voltage doubler, capacitive input, and it uses computer-grade capacitors for a total of 26 mFd. (The power transformer comes in at 26 pounds.)

Several AC input voltages are available, but it comes wired for 120 volts. I tested the unit at both 120 and 240 volts. I prefer the 240 volts simply because I believe it provides better regulation.

I checked efficiencies, input versus output, and found that I could get 72 percent efficiency on CW and 70 percent on SSB, which incidentally I consider pretty good for AB2 operation. I also conducted several tests to check stability. One of these tests I learned

long ago—full voltage on, no drive, no load, and then vary the tuning and loading controls through each of their ranges on each band. If the amplifier doesn't take off, it is stable! It didn't. One thing I liked very much: the RF choke used in the plate circuit of 3-500 was obviously carefully designed to have no resonances. I actually removed the choke and checked. It is a credit to Ameritron that there were no signs of any resonances in or near any of the amateur bands.

Another important point discussed in the manual is that of reducing power and running the amplifier below full output. Ameritron carefully points out that some exciters/transceivers will put out very high output pulses which could damage a lightly loaded amplifier. Actually, Ameritron is being very polite, because there are several transceivers (in the 150 watt class) which use no ALC on their final stages, resulting in these

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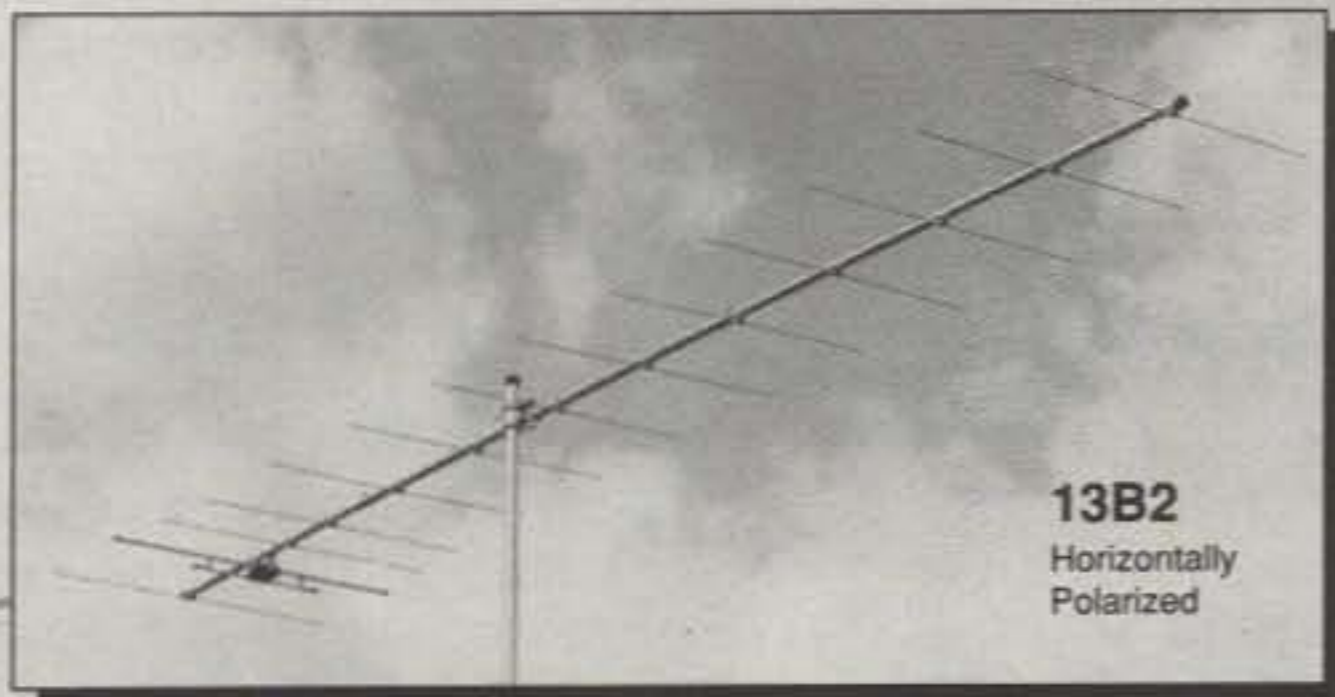
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"pulses" being transmitted. The Drake TR4 and TR5 have this characteristic, as do some of the more modern exciters. The simplest answer in this case if you want to run less amplifier output is to reduce the drive at your exciter and tune the amplifier for full and properly tuned output at this reduced drive level. While they don't say so, carelessness in tune-up can ruin the amplifier tube. (Keep in mind that what I am saying applies to all amplifiers, not just the Ameritron.)

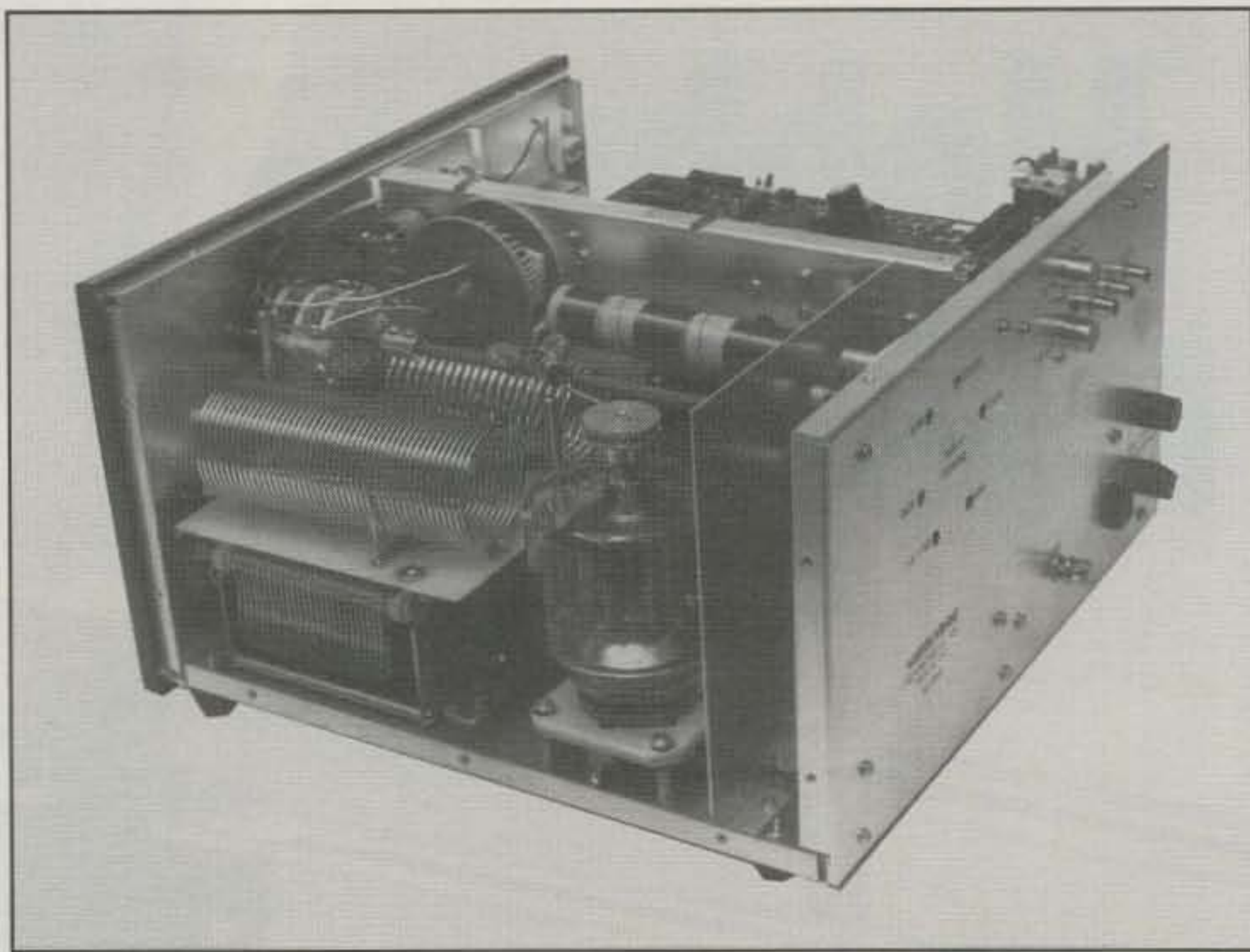
Going back to metering, I like the dual needles for reading forward and reflected power simultaneously. The power steps are marked off in 100 watt steps up to 2000 watts. The reflected reading is shown in 10 watt steps up to the 100 watt point and then in 100 watt steps to 500. Also, and this is important, the SWR is indicated via a red curve.

Some time ago I reviewed another amplifier and was called to task later because I had failed to mention how quiet the fan noise was. Well, let me say in this amplifier the fan is so quiet one doesn't realize it is on.

The amplifier tank circuit is a conventional pi network, with a regular inductor for 80 through 10 and a toroid type for 160. I don't have the exact values for the output variable, but it appears to be something over 500 μ Fd. Two large doorknob capacitors are also used to add the necessary output loading for the lower bands.

The special feature of this amplifier is the ALC circuit (and I consider the automatic bias just as important, so let me discuss the bias first). Many amplifiers are set so that the amplifier's tubes will draw a given amount of current, even though no drive is applied. For the neophyte, this is done so that the operating "class" can be set. The problem with this type of operation is that the amplifier tube is always working, even though no RF power is being transmitted. The plate current being drawn is referred to as the resting plate current. It is important that this amount of current be below the rated plate dissipation of the tube. In other words, let's say the tube has a 500 watt rating, as does the 3-500. To make our calculations simple, let's assume a plate voltage of 5000 volts. If we have a resting plate current of more than 100 mA (5000 volts, and 100 mA equals 500 watts), we will be exceeding the tube rating, and our \$140 tube will go sour and be ruined. In any case, resting plate current, if there is any, is always making the tube work, never giving it a chance to rest, and thereby shortening its life.

In the AL-80B they have designed a very effective automatic shut-off biasing system. When there is no drive (talking in the mic), there is absolutely no plate current and the tube is at full rest. This



Here is a view of the tank circuit section. At the upper inner left is the 160 meter toroid-wound tank circuit. Shielding, when the cover is installed, is excellent.

is what I call nice design work.

One thing that Ameritron is proud of is their ALC (automatic level control) system. Let me quote from the manual.

"The AL-80 B is one of the few amplifiers using a 'true' ALC circuit. The ALC actually samples grid current and power supply loading to determine the ALC voltage. The **ALC SET** knob is used to adjust the level of grid current that starts to produce ALC action. The ALC comes in softly over a few milliamperes range to minimize distortion. Soft-touch ALC is an Ameritron exclusive.

"The setting of the RF output control of the exciter determines how high the ALC meter reads and how 'full' the ALC action will be. Operation with the exciter audio gain at high levels will drive the ALC hard and a form of RF speech compression will occur. RF speech compression can greatly increase 'talk power' without increasing signal bandwidth or distortion. On SSB the audio background noise will increase in level with the high ALC levels. A quiet room and 'close talking' the microphone is necessary to minimize background noise when using the ALC to provide heavy speech compression."

In my own tests and operation it was determined that very careful setting of the ALC was required to prevent reports of heavy clipping. However, it only took a few tests to get the setting right—or correct.

I am aware that many newcomers are joining the hobby. Many of them are

looking to upgrade their equipment and are thinking of higher power. A few cautionary notes: Any amplifier has very lethal voltages present—and by lethal I mean killing—so if you are going to remove the cover, make sure that all voltages are off. The cabinet in this amplifier has a safety interlock built in so that when the cover is removed, the AC is removed. Unless you really know what you are doing, do not defeat this switch. It was put there for the purpose of protecting your life. Any of us old timers who have been "whacked" by high voltage know the dangers.

The manual is very detailed and explains tune-up in a step-by-step manner. Incidentally, while Ameritron rates the drive at 80 to 100 watts, I found that I could reach a very accurately measured 1 KW output with 70 watts of drive. The user is warned in the manual never to exceed 150 mA of grid drive, and they mean it! I have seen many newcomers destroy expensive tubes by using too much drive, so be careful. Don't be alarmed if you have a peak-reading power meter and find that on SSB the readings will go to 1200 watts indicated. This is perfectly okay, as the amplifier is capable of 1200 watts output.

The entire amplifier weighs 60 pounds and measures 14.5 inches deep, 14.5 inches wide, and 8.5 inches high. The list price is \$1195.00, and it is manufactured by Ameritron Corp., a division of MFJ, 921 Louisville Road, Starkville, MS 39759. ■

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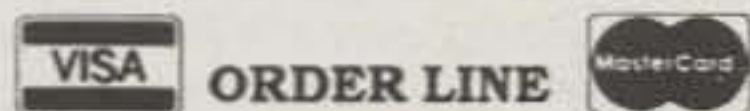
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The Islands On The Air (IOTA) Program

BY JIM SMITH*, VK9NS

For some time the idea of writing an article on the Islands On The Air (IOTA) Award was on my mind due to the strong impression that this award program is attracting a great deal of attention. The reason is perhaps the fact that many DXers have made huge inroads into the DXCC Award. There have been very high levels of activity from many previously unavailable DXCC countries.

The growing interest in the program means that radio amateurs are actually going to islands in the name of the IOTA Award. Many of these islands normally would be inactive in amateur radio terms.

Such activity has been going on for years—Heard, Bouvet, South Sandwich, South Georgia, and a bit nearer my own doorstep, Banaba, Willis, etc. However, such activity has always been in the name of DXCC. The fact that the island may also have an IOTA number rarely has been the driving force behind a DXpedition. It appears that this outlook is changing, though.

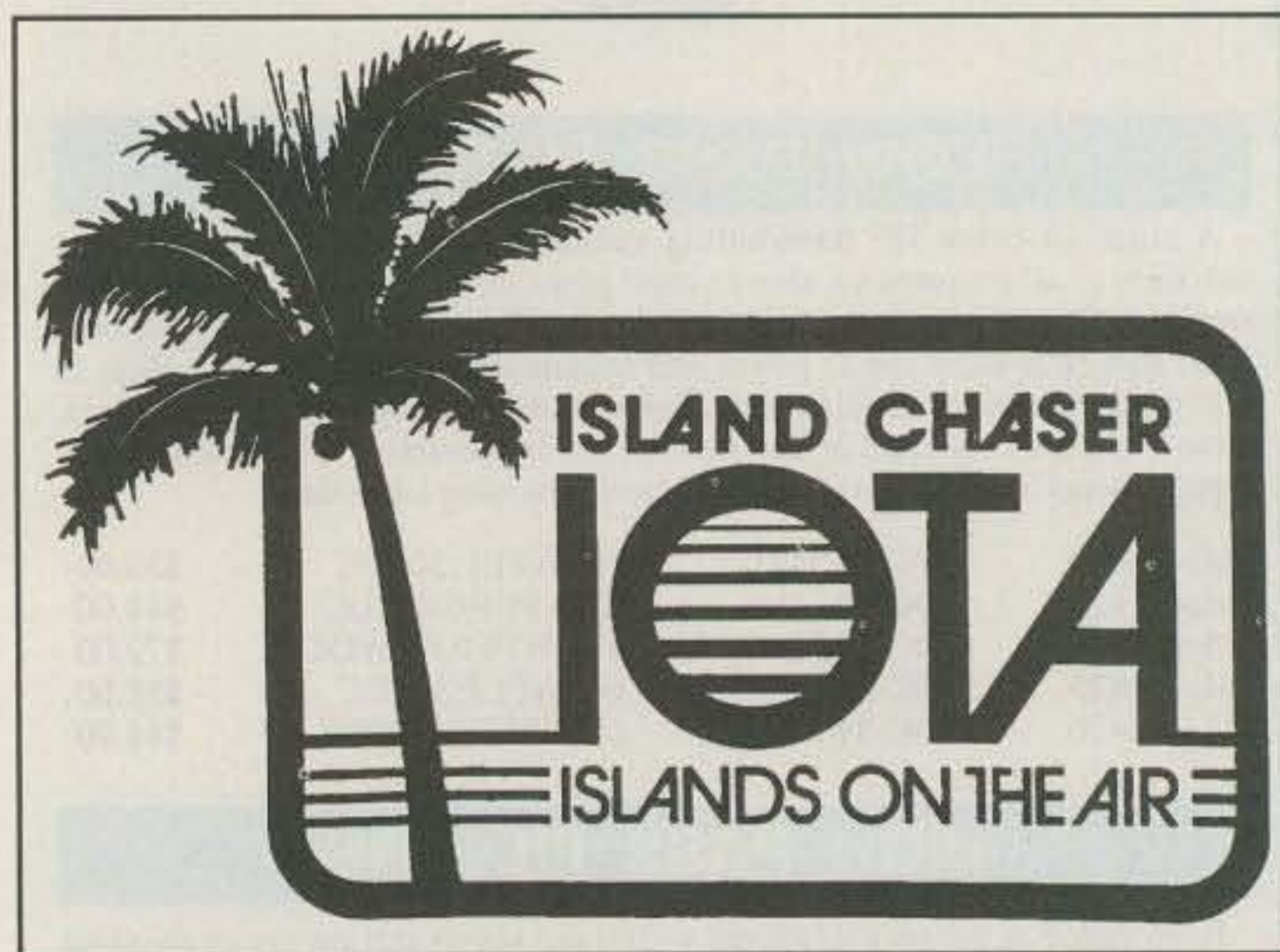
DXCC is quite easy to define: 100 countries confirmed and that is it. It is also true to say that many DXers do go on to work the complete DXCC Country List, multi-band and multi-mode QSOs providing that extra challenge.

What makes IOTA different is that by definition, islands—rather than countries—are the focus of attention (many islands are also countries). The challenge now becomes 100, 200, 300, 400 different islands to be worked and confirmed. I would add at this point a further difference is that there is no award endorsement for CW IOTA, SSB IOTA, no multi-band IOTA, etc. This may also be another reason for the apparent increase in interest in the program. Work and confirm island "X" once and that is it.

Another factor may have crept in. Many radio amateurs find themselves in the position of having an island or several islands in their area which qualify for IOTA. They too can generate interest and excitement on the bands by activating an island for the benefit of the IOTA hunters. This is very similar to a DXpedition, and DXers have long been interested in this sort of activity.

The IOTA program was conceived by Geoff Watts, SWL BRS 3129, way back in 1964. Being very active in those days, I can remember the basics of the IOTA Award idea being released. Geoff gave his reason for the idea of IOTA:

"Now that propagation conditions are poor, DX getting scarce, the possibility of brand new countries eventually becoming remote, top DXers retiring because there is nothing new to work, it is proposed that an entirely new DX achieve-



One of the logos of the IOTA Award (copyright IOTA program).

ment be created, the Islands On The Air Award, to promote more activity and interest among all DXers, many of whom could then go on a brand new island DXpedition themselves."

It is surprising to read this today and realize that it was written in July 1964. With some changes it could almost be the story of today. Geoff Watts could talk with authority, a member of the prestigious *CQ* magazine DX Hall of Fame, the first SWL station to be so honored. He was the first G SWL to have 40 Zones confirmed (how quickly we forget the eternal silence of Zone 23 of just a few years ago). Apart from also having over 300 countries confirmed (as an SWL), he also published the "DX News Sheet" for some 20 years (1962–1982). Finally, the illness of his wife forced him to give up the publishing of the "DX News Sheet." I can vouch for the strength of this publication. In DXing terms it set the very high standard which is still followed today under the guidance of Brendan, G4DYO.

The progress of the IOTA has been steady. The first 100 Islands Award certificate was issued two years after the start of the award program to a Swedish SWL, Eskil Eriksson. This was followed on the same day by the second certificate being issued to G8JM. It took over four years for the first 200 Islands certificate to be issued to W8DE. Yet another ten years elapsed before the first 300 Islands certificate was issued to IT9JT—*incredible really.*

In 1985 Geoff Watts asked the Radio Society of Great Britain (RSGB) if it was interested in taking over the program. Luckily, the RSGB was interested and used the HF Committee to

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administer the then existing IOTA Awards program. As we moved into the period of the RSGB administration of the IOTA Award it became obvious to many that the system as it stood needed a major overhaul. This comment in no way diminishes the efforts of Geoff Watts.

My basic problem with IOTA in those early days was this: It appeared to be a bottomless pit. There must be thousands of islands (as indeed there are) in the world. Where was the end of the tunnel? Also, on a more personal note, as I moved around, my previous island score became nil at my new DXCC location (similar to the rules for DXCC). Since my priority was always DXCC at the new location rather than IOTA, I always chased DXCC. However, there were many followers of the IOTA program. How else could we have totals of 400, 500, and 600 islands confirmed by the top IOTA hunters? Mind boggling in a way.

The HF Committee of the RSGB can take credit for the reorganization of the IOTA program into more meaningful terms. For example, as radio equipment became more portable, it became easier for a radio amateur to hop over to "island X" and activate it in the name of IOTA. As a result, there was an endless stream of requests to IOTA for the allocation of an IOTA number, and it became obvious that something had to be done.

Credit must go to Roger Ballister, G3KMA, who since 1985 has devoted endless hours to defining, in terms of IOTA, which islands would count for the program. The current Islands On The Air Directory, released in early 1993, defines in absolute terms the total count of islands which qualify, or would qualify, for an IOTA number. In addition, due to the efforts of the IOTA Committee, the rules and conditions for the award are also clearly defined. There are a whole range of IOTA awards to chase.

An IOTA number is allocated to islands in seven distinct

areas: Africa AF, Antarctica AN, Asia AS, Europe EU, North America NA, Oceania OC, and South America SA. To give a simple example for each area will suffice:

AN - 001	VP	Adelaide
AF - 001	3B6	Agalega
AS - 001	VU	Andaman
EU - 001	VK	Australia
OC - 001	SV	Dodecanese
SA - 001	CE	Easter Is.

It is obvious from the above examples that there is no conflict; we know they are islands. However, it is the defining of the island or island group in the directory which tightens the whole award into something much less open-ended. A short example of an entry for a particular area will explain the point.

The Oceania section of the directory under Cook Is. (as listed below) subheading Northern Cook Is. shows:

OC-014	ZK1	a. Manahiki Atoll (include Rakahanga)
OC-082	ZK1	b. Pernryn Atoll (Tongareva)
OC-098	ZK1	c. Pukapuka Atoll (Danger Island) (include Nassau)
OC-080	ZK1	d. Suwarrow Atoll (Suvorov)

Against each entry in the directory two further columns give the latitude and longitude of the island or group area.

The format is repeated for the Southern Cook Is. and all other groups in the Oceania region! At this point the reader should begin to comprehend the sheer magnitude of the effort required to produce this definitive IOTA Directory, especially when the listings for EU, AF, SA, NA, etc., are also added.

Returning to that small letter (a, b, etc.) given with each entry, this system provides a useful reference initial when discussing islands. Sometimes there is no number allocated since the area has not been previously activated. Therefore, you frequently hear those radio amateurs interested in IOTA talking in terms of small c, small d, and so on when referring to some island or group. It is true to say that many areas listed may never be activated due to difficulties with landing, getting permission, etc.

In the European listing under British Isles, sub-heading Scottish Islands, we have: EU - (no number) GM j. Rockhall Is. This island is all but impossible to set foot on, but it is listed nevertheless.

At a recent get-together with Roger, G3KMA, and other members of the RSGB IOTA Committee, I was told that some 99.9 percent of the islands and groups of islands have been completely cataloged in the latest IOTA Directory. Brave words, but as Roger, G3KMA, states, "If any country is dissatisfied with the current IOTA definition system, which may preclude this island or that island, then it is welcome to generate its own award." Some countries have done so.

In the current IOTA Directory, therefore, the following numbers have been allocated to islands:

AF	001 -	065
AN	001 -	017
AS	001 -	102
EU	001 -	160
NA	001 -	180
OC	001 -	182
SA	001 -	062
Total		768 Islands (or groups)

With that total of islands currently valid, you can see the challenge. Of course many of those listed were available many years ago and may never be reactivated (Kuria Muria, Farquar, Aldabra, etc.), but confirmed QSOs are okay from November 1945. By the same token, however, many islands are being activated today for the very first time. An example of this is the

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recent operation by Brian Young, VR6BX, of Pitcairn fame, signing VR6BX/P from Ducie Island lying some 280 nautical miles from Pitcairn Island. This remote spot was allocated a brand new IOTA number, OC - 182.

Incidentally, Ducie Island is listed in the Directory as OC - (no number) in the current directory under Pitcairn Is. and against small letter a. You can therefore see that if a newly activated island qualifies, then a number is quickly allocated.

There are also a few conditions for the "new ones" such as a minimum number of 50 QSOs in at least 5 DXCC countries. Totals of 100, 200, 300, and 400 are certainly within reach. The first sign that you have been bitten by the IOTA bug is a restless search through old log books. Of course, to find those hidden goodies you must have kept a good log in the first place! It will soon become apparent that many islands are easy to work and confirm; they usually fall into the basic ideas of an island. You may have many islands confirmed as a result of your interest in DXCC. However, checking for some of these illusive Scottish, South American, Oceania, etc., islands may be quite a challenge. Where was AL7HS/KL7, for example? Downtown Fairbanks or a rare Alaskan Island?

If you really feel that the IOTA program has something in it for you, then it is my solemn duty to warn you that you will find yourself getting involved. Those old log books will certainly keep you busy for a while. Did VK9NS/P count for something special? How about that UAØXYZ? Was he on Wrangel Island? Wonder how VE7AZT/KH6 will feel about getting a QSL request from me for a 1982 QSO? I see by my log that he was on The French Frigate Shoals and that it has an IOTA number OC 055, reference small a under Hawaiian Is. (as listed below). This is a very, very rare location.

Speaking for myself and my current interest in IOTA (IOTA 300 approved), I find the IOTA group a great bunch. There is a wealth of information of who was where, whether it counts, and so on available just for the asking. The IOTA meeting fre-

quencies of 14260, 21260, 28460, and 28560 kHz are very user friendly. These frequencies are where you will get the latest word on IOTA activity.

In passing, it must be said that if you join the IOTA group, it should be a priority to try to keep the program in good shape. By that they mean good operating, and consideration for the operator on the island you are chasing—in short, following the code of basic principles discussed in the IOTA Directory.

Oh, yes. While I have your attention, any chance of you going to that island, reference small d? We all need this brand-new one, and perhaps it is only a hundred miles off your coast line.

Come to think of it, it all seems a bit like DXCC, but with that total of over 700 current numbers, it still means many more areas than DXCC. Dare I shout "HELP!"?

Acknowledgements

Without the kindness of Roger Ballister, G3KMA, and his permission to quote freely from pages of the current IOTA Directory, it would have been much harder to put this short article together. Without the work of Roger and the past and present members of the IOTA Committee (a subcommittee of the RSGB HF Committee), the IOTA program would not be in its present form. And finally, without Geoff Watts, who conceived the IOTA Award, we would not have this wonderful idea to chase.

The IOTA logo is the copyright of various members of the IOTA program and is part of the IOTA Directory. It is printed here with due acknowledgement and thanks.

Further information may be obtained from Roger, G3KMA. In addition, the following country assistants have been appointed: Dewitt L. Jones, W4BAA, USA; Jean-Michel Duthilleul, F6AJA, France; Mauro Preliasco, I1JQJ, Italy; Dr. Rafal Krawies, SP6TMP, Poland; and Hans-Georg Goebel, DK1RV, Germany. ■

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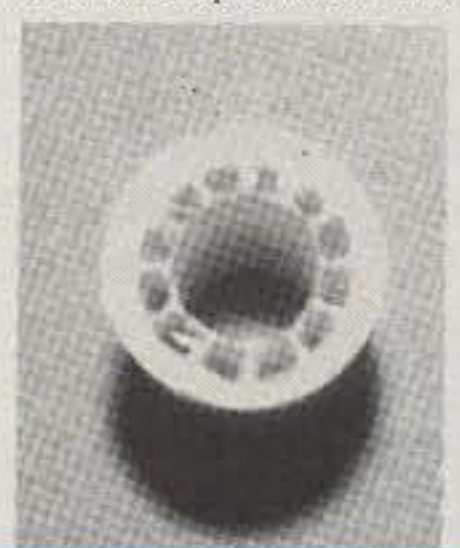
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CQ REVIEWS:

The Cushcraft 13B2 and 26B2 2 Meter Boomer Antennas

BY BUCK ROGERS*, K4ABT

Less than a year ago I moved to the Lynchburg, Virginia area and set about putting my station(s) together. As with any packeteer, there are times when I want to circumvent the local nodes and access a distant node, so I can link with a station beyond the means of local packet access or routing.

In the North Carolina and southern Virginia area packet growth has somehow managed to become uncontrolled. Thus, there are no keyboard-to-keyboard user frequencies. This makes it necessary to circumvent some of the nodes in order to reach a node in a distant LAN or on a keyboard-to-keyboard user frequency.

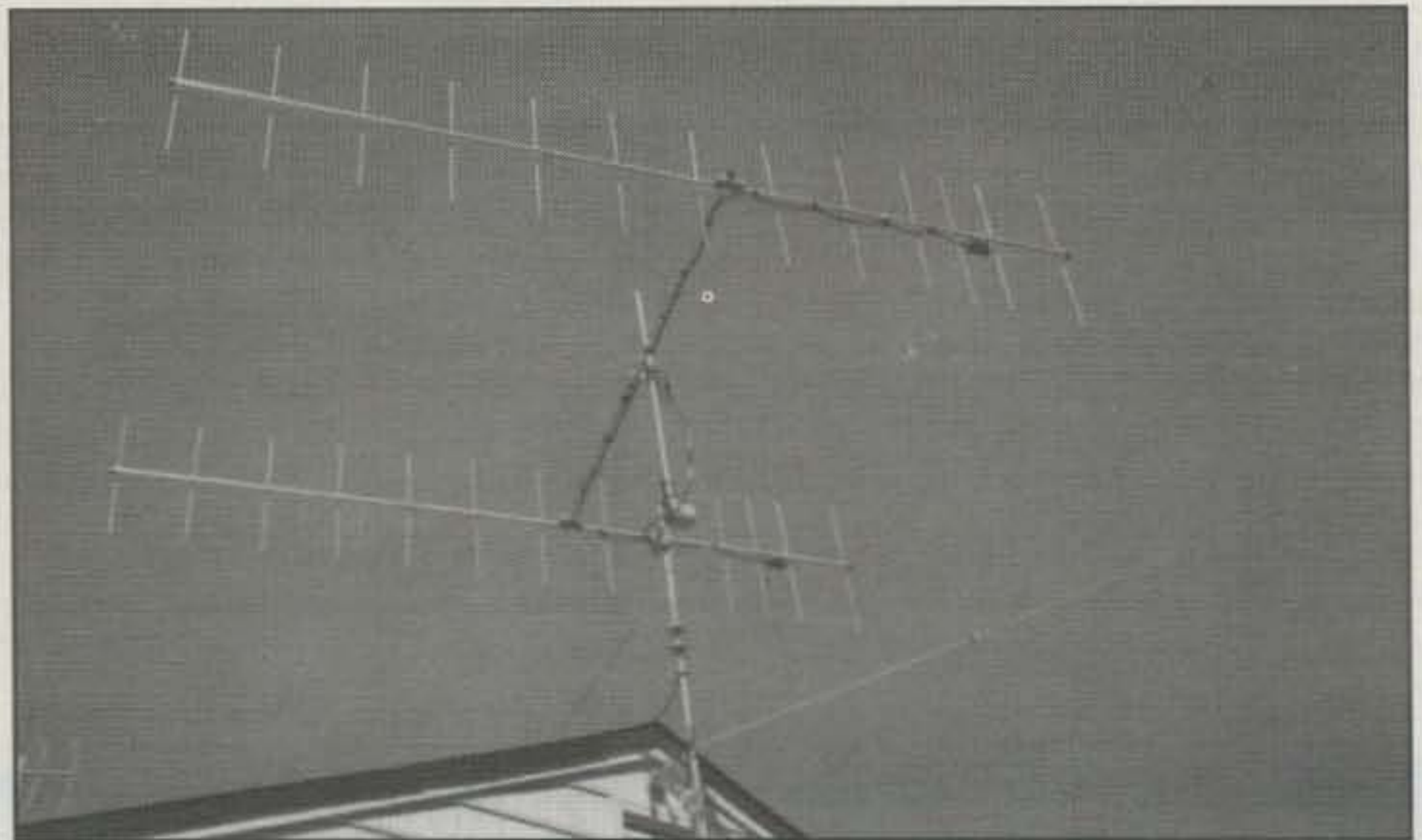
To make the trek from my Lynchburg area QTH to the distant nodes to the south, I needed a means to both transmit to the distant nodes and receive from them. I fiddled around with other beam types and a few so-called high-gain omni-directional VHF antennas trying to make connects into other LANS and states, but this turned out to be an exercise in futility.

From The Pages of CQ

The U.S. mail delivered the April issue of CQ magazine on Saturday morning, March 20th. I opened it and began to browse through the list of feature articles on page three. Somehow a few pages slipped from beneath my right thumb, and I was looking at page seven. As if directed by divine guidance, I was now looking at the bold blue line at the top of the page which read "Cushcraft—Where Performance Is A Tradition."

The first photo at the top of the left column caught my attention, because the word "Boomer" was inside the picture box, but the beam antenna displayed in the picture was not the same as other Boomers I had seen. This model was

*211 Luenburg Drive, Evington, VA 24550



The 26B2 comes supplied with complete harness and stacking kit. The Boomer is shown here mounted at a height of 40 feet.

labeled the 13B2. I read the paragraph below the photo and learned why this Boomer is different. It uses a matching network different from that of beam antennas I have used in years gone by.

The UltraMatch

I researched the type of match incorporated in this new generation of Boomer. Later I talked to some users of the UltraMatch 13B2 Boomers and learned that not only do they exhibit good gain, but they also show extremely good bandwidth. To follow up, I looked into the printed specs of the Cushcraft 13B2 Boomer. With 13 elements, Cushcraft has produced some real muscle power—15.8 dB of forward gain, and that is measured over a dipole, not a widget.

My thoughts were ahead of my calculator this time around, but just in case you missed chapter 8 in my new book *The Packet Radio Operator's Manual* (176 pages, available from CQ for

\$15.95 plus \$3.50 shipping and handling), I deal with ways to determine antenna gain and how to make field intensity measurements. By stacking another Cushcraft 13B2 Boomer alongside the first 13B2, I doubled my effective radiated power and increased the overall antenna gain by another 3 dB.

By stacking the 13B2's side by side, we now have the Cushcraft 26B2. A Cushcraft 26B2 exhibits almost 19 dB of forward gain, with a front-to-back ratio of 26 dB. The 26B2 is supplied with the complete harness and stacking kit, which makes our VHF lifestyle more enjoyable, sooner.

The manner in which the Cushcraft engineers accomplished the high gain attributes of this new Boomer is through the use of computer-aided design, which enabled them to optimize element spacing for maximum gain and bandwidth. (Table I lists the specifications of the 26B2 Boomer.)

I need to make it clear that spacing is not the only means Cushcraft employed

Specifications of the 26B2

Boomer

Frequency of operation: 144 to 148 MHz
Power Rating: 2000 watts PEP
Electrical Wavelength: 2.2
Number of Elements: 26
3 dB Beamwidth (degrees):
"E" Plane 2x18 degrees
"H" plane 2x9.5 degrees
Forward Gain: 18.8 dBd
Front-to-Back Ratio: 26 dB
VSWR (1.2:1 typical) 2:1 Bandwidth: >4 MHz
Side Lobe Attenuation ("E" plane): better than 60 dB
Longest Element: 39.75 in.
Boom Length: 15 ft.
Mast Size Range (mast diameter range that Boomer's U-bolt will accept): 1.5 to 2 in.
Weight: 21.5 lbs.
Wind Loading: 4.84 sq. ft.

Table I—Specifications of the Cushcraft 26B2 Boomer antenna.

to make the 13B2 broad-banded. The small, dark box attached to the driven element of the 13B2 (26B2 "stacked") is more than just a matching device. The UltraMatch also helps the antenna exhibit a low VSWR across the entire 2 meter band.

Assembly

A big plus of the Cushcraft 13B2 and 26B2 antennas is the phasing harness is completely assembled with nothing more to add. I assembled the 26B2 one beam at a time. This way I could keep track of the parts, and better still, I could assemble each in my 24 x 30 foot lab. No, I did not assemble the complete 26B2 inside the lab, as each boom is over 15 feet long, and the stacking boom is almost 120 inches long.

Putting the 26B2 (two 13B2's with stacking kit and harness) together took less than two hours. The parts required for the construction are packaged according to the assembly process. All of the parts placement and assembly is smooth and even. I found no ragged edges, and all holes are at the exact positions as shown in the well-defined, detailed drawings.

All parts such as screws, nuts, washers, brackets, straps, tubing, and half washer guides are shown on drawings that depict both appearance and size. In addition, the drawings display important sections of the assembly in exploded illustrations so that the smallest detail is presented to the builder. An example is the exploded view of the "T-Match" and UltraMatch assembly. The UltraMatch seemed to fall into place.

As if the assembly is not easy enough,

Cushcraft has displayed the assembly from more than one perspective. I suppose I was most impressed with how Cushcraft presented the parts description to the builder. Each part is shown in the following manner:

1. Key number
2. Part number
- 3. Display**
4. Description
5. Size
6. Quantity

Notice that number 3 is in bold type. By displaying the appearance of each part, Cushcraft has given many of us who like to arrange each part in an order for ease of construction a quick means of doing just that.

The element lengths are precise, and each element is self-aligned by the element nesting bracket used for this purpose. After I completed the assembly, I didn't have to be concerned with bending or rocking any elements into plane with other elements.

Performance

Since the photo shown near the beginning of this article was taken, the 26B2's have been moved to a higher tower. While the 26B2 was at the previous height of 40 feet, I ran several tests and made many contacts into other states



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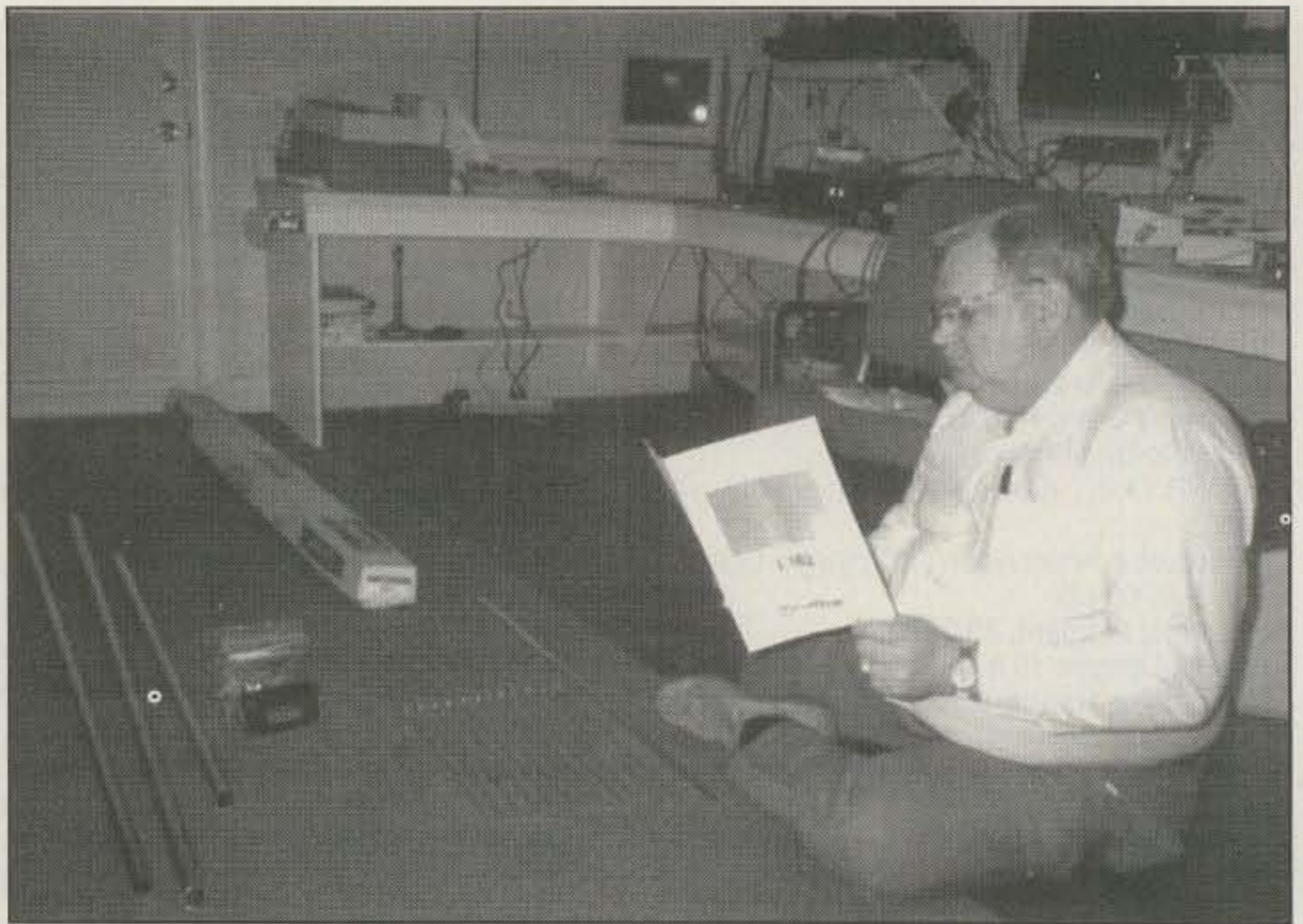
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There's one shared experience we've all had and can definitely relate to. As amateurs we've all passed through the rite of initiation that NZ5A describes so well.

Why Did I Buy The DX-60 Yesterday?

BY ROBERT S. LOGAN*, NZ5A

Why did I buy the DX-60 yesterday? What was the point, the purpose of my decision? It adds no capability to my station and I've been QRP since 1979 anyway. The DX-60 has no digital read-out, no dual VFOs, no DSP, no voice synthesizer, not even a WARC band. It is simply a 1960s style, stripped down, AM-CW, 80 through 10 meter, 90 watt input transmitter. Well, maybe a little less than that on 10 meters and maybe a little chirp and drift now and then with the external HG-10 VFO, which I also got in a package deal. I've got to rearrange the station layout, too. So why did I buy it?

The DX-60 has one feature that no other rig ever had or ever will have. That feature is a memory—not the bits and bytes kind, but the heartbeat kind, the cheerful feeling that comes on when you hear a young kid say to an XE1, "UR MY FIRST DX QSO BT PSE QSL DR OM."

I lived in Corpus Christi, Texas, a 14-year-old teenager with a Novice license some six months new and no money to buy a rig and no confidence to build one. One Saturday I went down to the YMCA to visit John Collins, an engineer for a local television station who taught my Novice class. Perhaps I also went to lord it over the unfortunates in the next Novice class, who were just now learning the code.

"Hello, John," I said during a class break.

"Hello, Bobby," he replied. "How's the hamming going?"

"It isn't," I said. "I don't have a rig yet."

He looked at me long and hard, and then set off a time bomb that's still ticking after 31 years.

"I've got a station set up in the basement," he said. "Want to use it?"

A silent vacuum settled over me. I was in a bell jar with air rushing out of my lungs.

"Yes," I said, my heart beginning to pound.

We went downstairs. There, on a folding table in the middle of the room, was a station. Thick black coax sneaked across the cement floor, crossed under some ping-pong tables, and climbed up to a ground-level window. It was all Heathkit: HR-10 receiver, DX-60 transmitter, HG-10 VFO. To the right of the VFO was a Hallicrafters T.O. Keyer. I had seen pictures of it in the back pages of the *Handbook*; it carried enticing advertisements then. In front of the DX-60 was a Vibroplex key with a solid chrome base and red finger knobs. All dark green and light green and silver and black, everything lined up in a row, the meter faces lit up, S-meter needle on the HR-10 going up and down, and the red slide switch beneath the meter on the DX-60 marked "Grid-Plate."

Forgive me, but it was as near to an altar as a young Methodist boy was ever likely to see. It was more beautiful than Pam Parker. But I never told her that. Sounds came through the speaker. I read the code perfectly in my mind.

"It's on forty, okay?" John asked. "Fifteen was a bit dead earlier."

I could hardly answer. My mouth was dry. We sat down. John switched the DX-60 to the XTAL X4 position.

"What's the Novice band for forty, Bobby?" he asked.

"7150 to 7200 kilocycles," I answered automatically.

He grinned and said, "Okay, you're on 7158 kilocycles. Plenty of activity there. All you've got to do is hit the foot switch and send. Then let up when you want to receive."

He hit the foot switch and the receiver went dead. He sent three Vs and they came from the T.O. Keyer. Then he took

his foot off the switch and sounds came again from the receiver speaker. This time there was so much QRM I had a hard time picking out anything.

"Okay, go at it," he said, rising. "I've got to get back to class."

In that moment I was left alone with this window to the world. Fifty zillion people were tuned exactly to my frequency to see what I would do. Signals were absolutely unintelligible. I could not read a single letter. My hands were so sweaty I kept wiping them on my pant legs. My heart was hitting my chest so hard I was about to faint. I moved the HR-10 dial pointer nearer to the 7160 mark and listened for a long time to the noise, trying to read somebody, imagining signals that were not there like at night when I practiced code softly on my accordion so as not to wake my parents or brothers. I had some great QSOs on the accordion when the band opened up and the treble shift was punched in.

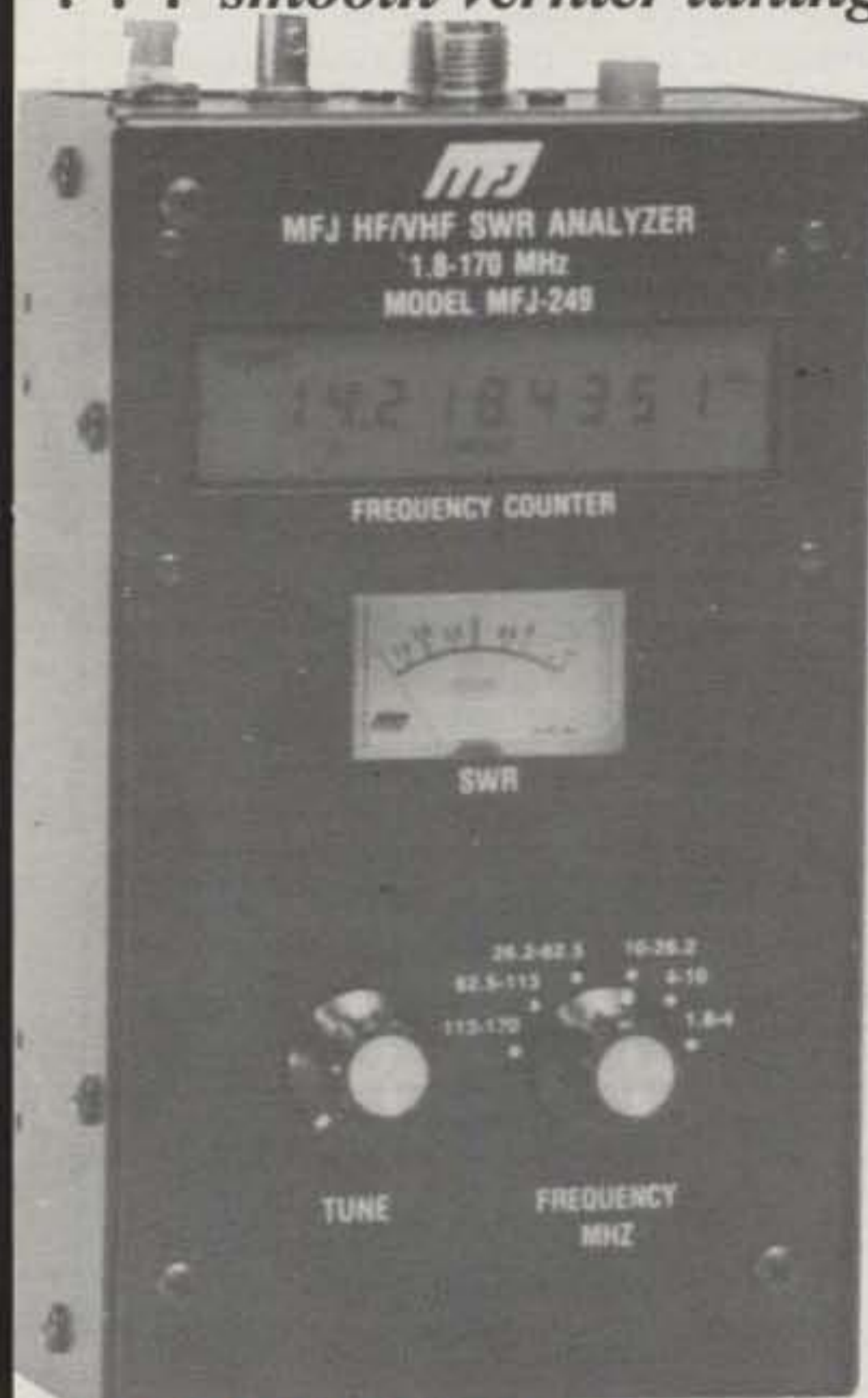
Finally, I decided to send CQ. The keyer, which I had never seen in person much less used, had a mind of its own. I sent the most pitiful CQ ever heard by man, woman, or child. No answer. Another CQ and no answer. Finally, I put the heavy Vibroplex in the middle of the table, squared up in a line through the middle of my body, and crouched over it like a praying mantis, arms in a loose hug on either side, and used my left index finger to hit "dits" and my right one to hit "dahs." I managed a respectable CQ, somewhat wobbly and erratic for sure, but at least I was able to assert some control over the possessed keyer. Three by three like the ARRL's operating booklet for Novices says and then my call: WN5CIY WN5CIY WN5CIY K.

I, the most competent code person in my class, was completely embarrassed at my incompetence. I, who in my test had sent one minute of perfect code at five words per minute with a J-38

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Jack for frequency counter. Use as signal generator. 7 1/2x 2 1/2x2 1/4 inches. Use 9 volt battery or 110 VAC with MFJ-1312B, \$12.95.



CIRCLE 170 ON READER SERVICE CARD

straight key while twenty people stood around watching, could not now even manage an E with the latest technology in an empty room. I was bogus, a charlatan, a fraud, defeated. I sat there, listening to the noise filling the room, and thought seriously that maybe I should just go back upstairs, find John, tell him I had made my first contact, and slink home. Who would be the wiser? Then suddenly I recognized IY in the speaker. I scrambled for a pencil.

"Dear God," I pleaded, "someone is calling me. Please, please, please let me copy him. Don't go. Wait a minute."

I copied DE and got his call fully, but not all at once: WN5 on the first send, BW on the second, and finally an E on the third. I was amazed at the inherent wisdom of the ARRL recommending three by three exchanges. WN5BWE! Wow, what a fine call! Then the K and it was my turn.

I raced through the first cycle and never even thought about it. RST-QTH-HANDLE-HW? At least I thought I raced through it, but looking back on it now, I must have used up the better part of an afternoon just exchanging basic information: RST RST RST 589 589 589 BT BT BT QTH QTH QTH IS CORPUS CHRISTI, TEXAS CORPUS CHRISTI, TEXAS CORPUS CHRISTI, TEXAS BT BT BT HANDLE HANDLE HANDLE IS

BOB BOB BOB BT BT BT SO SO HW HW OM OM? AR AR WN5BWE WN5BWE DE WN5CIY KN.

It looks long now even reading it, much less copying it at five words per minute in long hand with connecting letters and including all the mistakes caused by my "praying mantis" style of sending. But I will never forget Butch Bailey, a 13-year-old blind boy from Hattiesburg, Mississippi, who hung with me until I completed my first QSO and said UR FIST FB BT GL BOB. He sent me a glossy World Radio Labs QSL card with a map of the United States on it and an arrow pointing to where Hattiesburg is supposed to be. I never have been there, but if I do go some day, I know I'll have a friend there.

It was not a bad QSO for a young boy raised in small South Texas towns along the Mexican border, a lad whose ultimate vision to that point extended to his grandma's house 25 miles away in the next county. Not a bad chat for someone who rarely talked to anyone anyway.

John Collins gave me the 7158 crystal that afternoon in honor of my first contact ever. As soon as I got my "new" DX-60 home yesterday, I plugged the crystal into the XTAL X4 socket in the back of the rig. And even though that portion of the band is now filled with

sideband (which was fairly rare even in 1962) and restricted to Extra Class licensees (who did not exist at all then), I must confess I sent out a CQ in the wee hours of Sunday morning, hoping that Chief Operator Butch, WN5BWE, would hear my call. Foreign broadcast heterodynes from competing AM signals squealed in my ears just as hard that early Sunday morning as they did thirty years ago. But faintly there, just there, just when QSB minimized the bits of tinny music and phase shifts cancelled out one carrier with another, just at that moment I believe I heard a B and, yes, perhaps a W or an E. I'm not sure, but I think so. It might have been my imagination or maybe some phantom recall of my accordion on treble shift late in the night, but I believe it was Butch. FB ES GL MY FRND AR WN5CIY SK. ■

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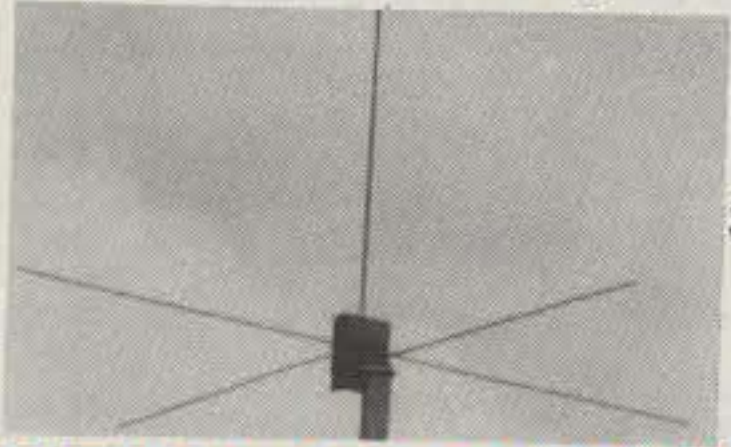
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For an incredibly low \$19.95, you get a complete 2 Meter 300 watt PEP 5/8 wave ground plane home station antenna. It gives you the maximum possible theoretical gain of any single element antenna.

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You get . . . shunt fed matching that bleeds off unwanted static and gives you lowest

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2 Meter Halfwave J antenna

MFJ-1730

\$14⁹⁵

Roll up this half-wave 2 Meter J-antenna and stick it in your pocket!

This new MFJ Pocket Roll-Up™ is the perfect gain antenna for traveling.

Get home station performance on the go. Just hang your Pocket Roll-Up in the clear, plug the handy BNC connector into your handheld and enjoy some great QSOs.

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

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MFJ-1740

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The MFJ-1740 is the most inexpensive way to put out a

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Your MFJ antenna comes with MFJ's famous No Matter What™ One Year Unconditional Guarantee. That means we will repair or replace your MFJ antenna (at our option) no matter what for a full year.

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

You get MFJ's famous one full year No Matter What™ Unconditional Guarantee.

The MFJ-1728 Maximum Gain™ 5/8 Wave Mobile Antenna gives you maximum mobile range and the most for your money. Get yours today.



MFJ Dual 5/8 Wave Super Gain™ 2-Meter Antenna . . . direct feed gives you irrefutable real gain.

MFJ-1764 This new MFJ Super Gain™ 2-Meter antenna directly feeds two full size 5/8 wave radiators and makes both elements strongly radiate. You get irrefutable real gain.

Plus, you get additional gain for FM and Packet because your mast doubles as a reflector. There's plenty of antenna gain to work stations off the sides and back, it's just stronger in the direction the MFJ-1764 faces.

The result? You get more range to reach distant repeaters and much better local coverage on direct channels and Packet.

You get an extremely wide 10 MHz 2:1 SWR bandwidth . . . excellent ferrite choke balun feedline decoupling to eliminate wasted power due to field pattern distortion . . . shunt choke for bleeding off unwanted static . . . strong lightweight aluminum construction protected by MFJ's Permanent Molecular Bonding Technology™. . . Made in USA.

It's fully assembled — simply attach radiators — no tuning required. Mounts vertically for FM and Packet or horizontally for SSB. Easy-to-install with single U-bolt (supplied) on any 1 to 1 1/2 inch mast or tower leg. Weighs 1 1/2 pounds, two 47 inch radiators, 23 inch boom. Also works as excellent 6 Meter full halfwave centerfed antenna. Has low SWR across entire band.

Double your Gain with direct feed!

You can double the gain of one MFJ-1764 5/8 Wave Super Gain™ 2-Meter Antenna by mounting two MFJ-1764s one above the other on the same mast and directly feeding both. Order MFJ-1766, \$89.95, includes 2 MFJ-1764 Super Gain™ 2-Meter Antennas and a Direct Feed Power Splitter/Cable Harness. Also double gain on 6 meters.

If you already have two MFJ-1764s, order MFJ-1765, \$29.95, Direct Feed Power Splitter/Cable Harness to feed your two MFJ-1764s.



Portable 3 element Yagi for 2 M

MFJ-1763 You can set up or take down MFJ's new portable 3 element 2 Meter Yagi in seconds! Elements simply screw into the boom.

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

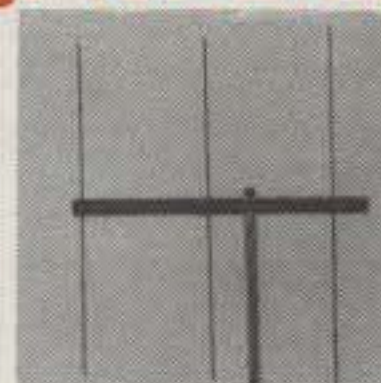
It's easy to store and sturdy enough to use as your home station antenna.

You can mount it vertically for FM or horizontally for SSB. You can easily center mount it on a mast or end mount it on a tower leg with a single U-bolt (included). It's great for packet and PacketCluster™.

Its compact 2 3/4 foot boom gives you a calculated gain within 1 dB of a four element Yagi with a boom nearly twice as long.

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

Elements and boom are made from strong lightweight aluminum and protected by MFJ's Permanent Molecular Bonding Technology™. Weighs just 2 pounds. Boom is 30 1/2 inches. Made in USA.



Dual Band Mobile

Mobile Antenna for 144/440 MHz

MFJ-1724B

\$14⁹⁵



For \$14.95, you get an MFJ dual band magnet mount mobile antenna

for 2 Meters and 440 MHz! Plus, it's covered by MFJ's famous One Year unconditional No Matter What™ Guarantee.

The MFJ-1724B is a 1/4 wave on 2 Meters and a gain antenna on 440 MHz — it's perfect for dual band radios.

Low SWR across both bands lets your rig safely deliver full power into your antenna.

The stainless steel radiator will withstand the toughest mobile service. It's only 19 inches tall so you can park in your garage without knocking over your antenna.

The MFJ-1724B handles 300 watts PEP, has 15 feet of coax and has an extra powerful magnet to hold it steady — even at highway speeds.

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Telescoping antennas for handhelds

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B. The Dual Bander™ for 2 Meters and 440 MHz. MFJ-1712, \$14.95. Got a new dual band handheld or separate units? One antenna fits all. It's a 1/4 wave for 2 Meters and a 5/8 wave with gain for 440 MHz.

7 1/4" collapsed, 19" extended.

C. The Pocket Linear™

3/8 Wave, 2 Meters. MFJ-1710, \$9.95. Carry this pen size antenna in your pocket like a ballpoint pen. When you're using your rubber duck, on the fringe and noisy, put on The Pocket Linear™, extend it to 24 1/2" and carry on your QSO. Has pocket clip. 5 1/4" collapsed.

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This month we take up the transmitter module for our six-part project. By now you should have completed Part I or be well underway, so let's get building!

The 40 Meter Fun Machine Part II—The Transmitter

BY PAUL CARR*, N4PC

I hope you've made good progress with Part I of our fun project (see last month's *CQ*). This month we will continue with the second step of our project—a small transmitter with 1½ to 2 watts output. The construction will again this month be centered around "the modified ugly technique," with most connections being made on a Radio Shack experimenter's circuit board. Construction is simple, straight-forward, and relatively fast. As I indicated in Part I, all circuits developed will find their permanent home in a 40 meter superhet transceiver. Read on.

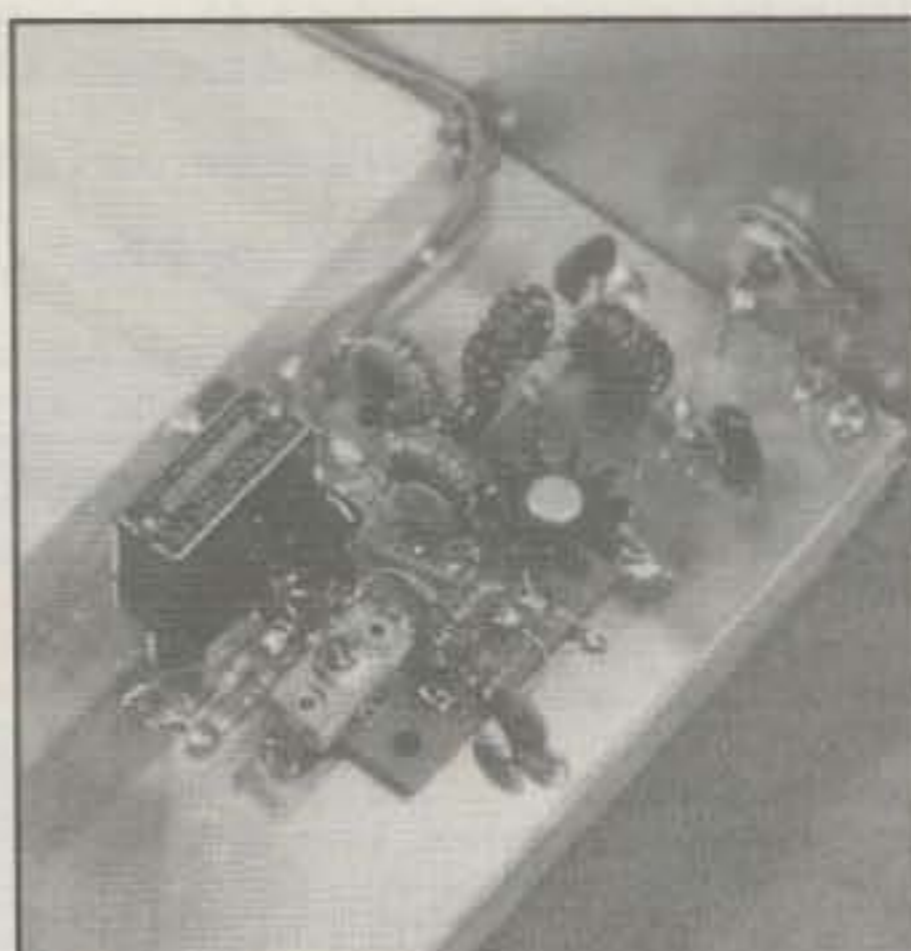
Philosophy and Circuit Description

Very often, the first construction project attempted by an amateur is that of a simple crystal-controlled transmitter. More often than not, this effort produces poor results in the form of key clicks or poor harmonic attenuation. Often, simple design is blamed for these problems. This need not happen. Good performance can be attained from simple designs, but *design* is the key word. The initial circuit design must be capable of good performance from the outset. Careful attention has been paid to all phases of this transmitter, from signal generation to antenna. Now let's look at the specifics of this transmitter.

Specific Circuit Details

Signal generation is accomplished by using a crystal-controlled Colpitts oscillator. Feedback is introduced by the combination of a 100 pF capacitor in the emitter circuit in conjunction with stray capacitance from the base to emitter. I

*97 West Point Rd., Jacksonville, AL 36265



The completed transmitter module as built on one half of a Radio Shack experimenter's circuit board. You can use the other one half of the board not used in last month's installment.

have tried several 40 meter crystals and I have had no crystal that failed to oscillate with these values. The output is routed through a tank circuit consisting of the primary of T(1) and a 200 pF compression capacitor.

The final amplifier consists of a 2N3866 transistor (a 2N3553 is also usable). The input to this stage is obtained from the secondary of T(1). A 39 ohm resistor is placed from the base of the 2N3866 to ground. This helps to provide a proper load and enhances overall stability. The final transistor gets rather warm during normal operation, so a clip-on heat sink is necessary to ensure long life.

You will note in the circuit diagram that a 36V zener diode is placed from the final amplifier collector to ground. This is the SWR protection circuit. This assures that no more than 36 volts can be developed across the transistor, even

if the transmitter is keyed into an open or a short circuit. **Do not omit the diode.** The life of your final amplifier transistor depends on it!

Harmonic suppression is accomplished by a two-section pi-network filter. This filter is designed with a Q of 1 and a cutoff of about 7.5 MHz. On the final transistor end of the filter you will notice a 51 pF capacitor in series with a coil. This is a series tuned circuit to provide a connection for the station receiver. During transmit, the two diodes conduct effectively, placing the 51 pF capacitor in parallel with the 390 pF capacitor and limiting the RF input to the receiver. This provides a semi break-in capability.

Keying and signal shaping are accomplished by a 2N4036 PNP transistor and the associated components. This circuit is often omitted from "simple" designs, but it should not be. The keying pattern produced by this circuit forms a trapezoid. The resulting pattern is firm, however it has no clicks. I have received many compliments on the signal produced by this circuit.

Construction Details

Start the transmitter construction by cleaning a 3" x 6" piece of circuit board with steel wool. This will serve as a base for our transmitter section. Next, clean one half of a Radio Shack dual experimenter's circuit board. If you have built the circuit covered in Part I of this series, you have a circuit board already. After cleaning the pads, turn over the experimenter's board and place two layers of electrical tape over the holes on the non-copper side. This will help to ensure that no solder accidentally runs through the holes and creates a short circuit by contacting the foil on the larger board that serves as a ground plane.

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MFJ's Deluxe 300 Watt Tuner



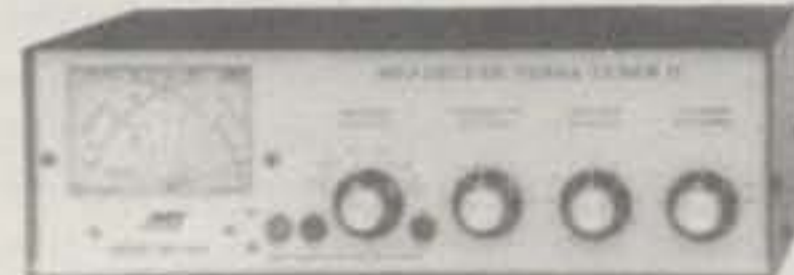
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You get a lighted peak and average reading Cross-Needle SWR/wattmeter, antenna switch, 4:1 balun for balanced lines, 1.8-30 MHz coverage and a full size dummy load that easily handles 300 watts of abusive tune-up power.

The inductor switch is specially designed to withstand the extreme voltages and currents that are developed in your tuner—it's not an underrated off-the-shelf switch that can put you off-the-air.

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

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MFJ-901B **\$59⁹⁵**

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MFJ's Super Value Tuner



MFJ-941E **\$109⁹⁵** 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 **\$289⁹⁵** 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 \$10 s/h.

MFJ's Random Wire Tuner

MFJ-16010 **\$39⁹⁵**

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-945D **\$89⁹⁵**



Don't leave home without this mobile

tuner! Have an uninterrupted trip as the MFJ-945D 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. Lighted Cross-Needle SWR/Wattmeter makes tuning easy while in motion. Has lamp switch. 1.8-30 MHz. 300 watts PEP. Mobile mount, MFJ-20, \$4.95.

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MFJ-962C **\$229⁹⁵** MFJ-962C lets you use your bare-foot rig now and have the capacity to add a 1.5 KW PEP amplifier later. It covers 1.8-30 MHz.

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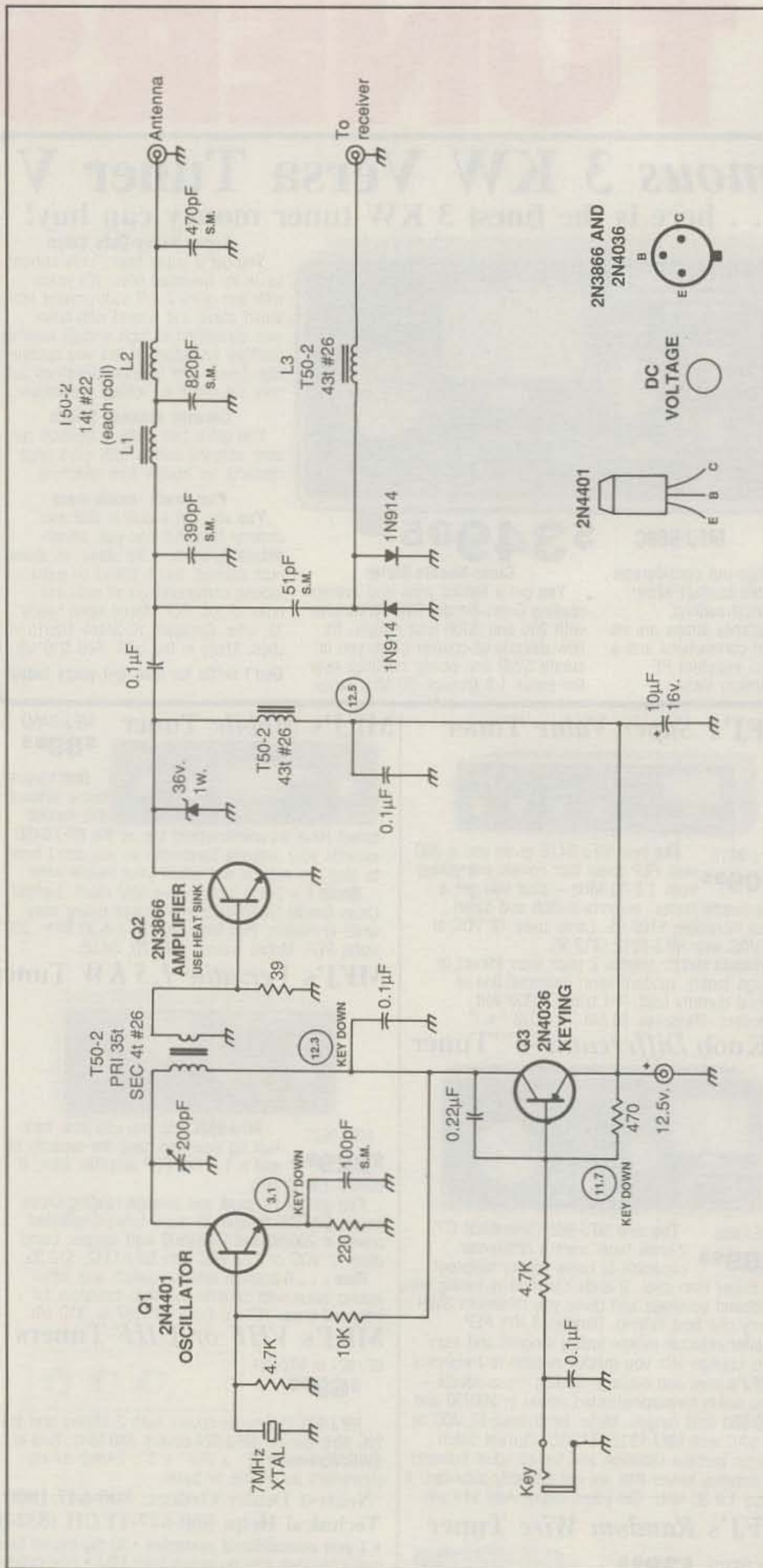


Fig. 1—The schematic diagram for the transmitter section.

Transmitter Parts List

Resistors (1/4 watt composition)

Two 4.7K ohm
 One 10K ohm
 One 220 ohm
 One 470 ohm
 One 39 ohm

Capacitors

One 100 pF, silver mica or poly
 One 51 pF, silver mica or poly
 One 390 pF, silver mica or poly
 One 820 pF, silver mica or poly
 One 470 pF, silver mica or poly
 One 0.22 µF, disc ceramic
 Three 0.1 µF, electrolytic
 One 200 pF compression trimmer

Toroids

Five T50-2 (red core)

Diodes

Two 1N914
 One 36V 1 watt zener

Transistors

One 2N4401
 One 2N3866
 One 2N4036

We are now ready to begin the circuit construction. Begin with the oscillator section. Start by trimming the leads on the oscillator transistor to about 1/2 inch. Next, bend the ends of the transistor leads so that about 1/8 inch is perpendicular to the lead. Remember, we want to place the leads flat on top of the pads on the circuit board and solder them in that position. Do not be tempted to place the transistor leads into the holes, because solder can penetrate the electrical tape and cause a short circuit. Choose three adjacent pads and solder the transistor on the board.

Now place the smaller components (resistors and the 100 pF capacitor) on the board. Next wind the transformer T(1). The form for this transformer is a T50-2 (red core). The primary consists of 35 turns of wire and the secondary is 4 turns wound in the same direction over the cold end (the end away from the collector) of the coil. Either #26 or #28 wire is suitable for this transformer. Mount the transformer as indicated on the schematic and place the 200 pF compression trimmer from the top end of the coil to ground. Bypass the cold end of the transformer to ground through the indicated by-pass capacitor. Temporarily connect the top of the secondary through a 39 ohm resistor to ground and also ground the other lead of the secondary. We are now ready for a preliminary test.

First check the circuit board for wiring errors and solder bridges. Make any corrections necessary. After the visual test is complete, take a multimeter and check for any shorts that you may have overlooked. After these two tests have been completed, connect about 12.5V to the circuit and adjust the compression capacitor until the circuit begins oscillation as detected on a receiver or an oscilloscope. The capacitor should be adjusted for maximum output. Is everything working? Great! If not, stop and find out why.

Now wire the final amplifier stage by first placing the smaller components and then progressing to the larger components. The coils for the pi-network circuit are wound on T50-2 toroid coil forms with #22 wire to keep the losses small. These coils are supported by using the corresponding capacitors as standoffs. The 51 pF capacitor and associated coil form a series resonant circuit to connect the antenna to the receiver. I used a 220K ohm 1/4 watt resistor to provide a support point for the receiver end of this coil.

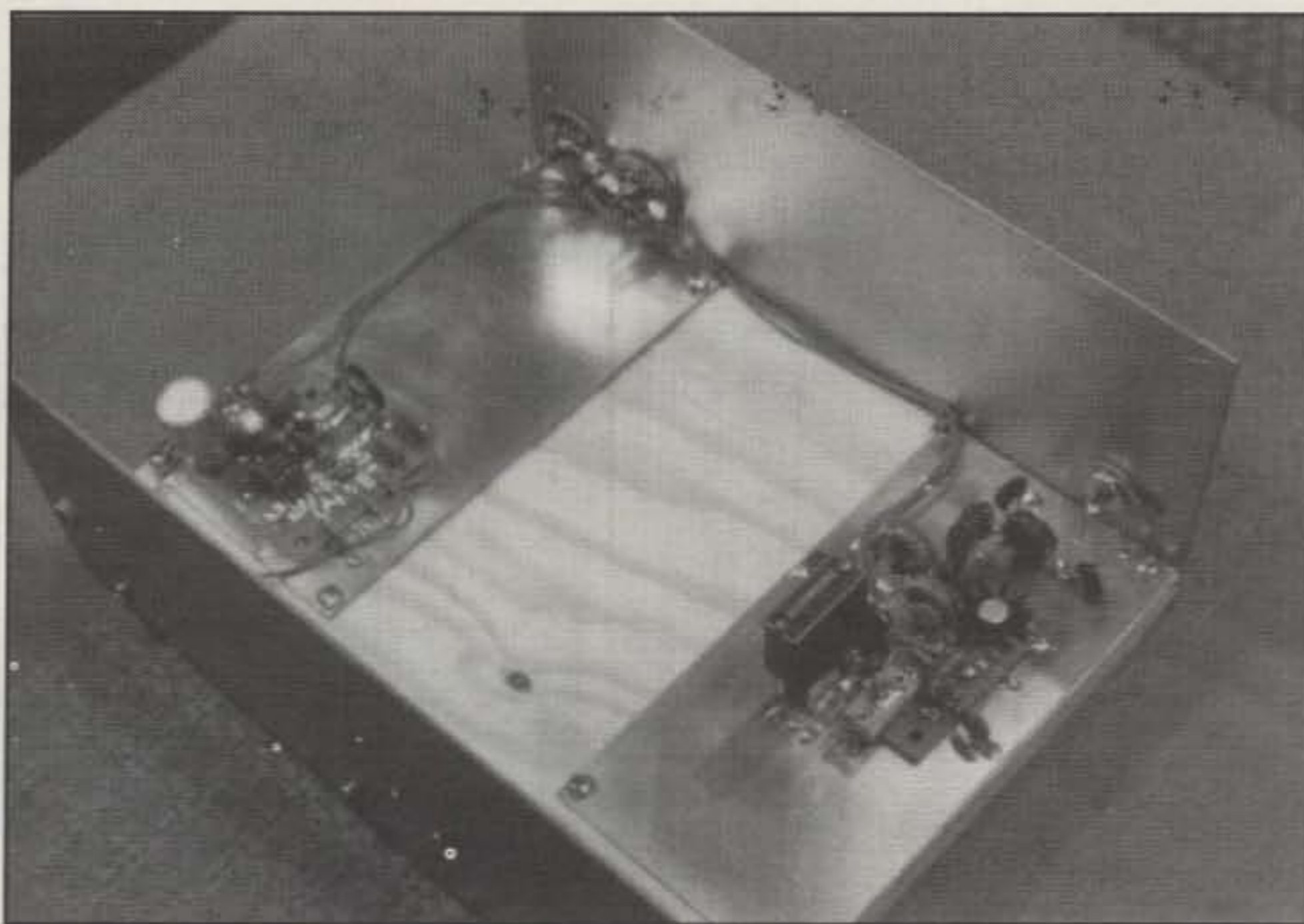
Again, pause and perform a visual and an electrical short-circuit check. If everything is okay, connect a 50 ohm dummy lead to the antenna end of the pi network. (Two 100 ohm 2 watt resistors in parallel make a good dummy load for a QRP rig.) Apply voltage and check the output. The circuit can be keyed by touching the negative lead of the power supply to the ground plane on the larger circuit board. Output level can be determined by using a QRP output power meter, an oscilloscope, or an RF probe. Does everything check? Great! If not, stop and find out why.

The only part remaining is the keying circuit. This is the same keying I used in "The 30 Meter Fun Machine" (CQ, November and December 1989, January 1990). The circuit produces a clean, crisp note with no clicks. I have had many nice comments about its keying characteristics. The 2N4036 has more current-handling capacity than necessary, but it was available in my junk box and the results are very satisfactory.

Only the oscillator stage is keyed in the transmitter, but additional circuits will be keyed in the transceiver.

Testing and Operation

Since the transmitter was tested on a stage-by-stage basis, you should be ready to package it and put it on the air. Crystal-controlled transmitters do have their good points and their bad points. On the plus side, they have excellent stability, but on the negative side, the number of frequencies you can operate is limited by the number of crystals avail-



Our transmitter module mounted in the cabinet on the opposite end from the completed section covered in Part I.


able. Nonetheless, you should be able to log many contacts with your new creation.

Afterthoughts

This transmitter and our first construction project (the sidetone oscillator and audio amplifier) have been designed as


stand-alone projects or for inclusion in the ultimate plan—the superhet transceiver. I hope you continue with the entire project. I will try to answer any questions (SASE, please).


Next month the construction project will be a VFO and doubler circuit to give your transmitter additional versatility. See you then. ■



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CQ REVIEWS:

The AEA HamLink Radio Controller

BY JOE LYNCH*, N6CL

It all started 29 years ago when I was at the Oakland Army Terminal awaiting transportation back to my duty station in Cu Chi, Vietnam. I was the Non Commissioned Officer-in-Charge (NCOIC) of the Army MARS station (callsign: AB8AJ) at the 25th Infantry Division Headquarters in Cu Chi. Our principal task was providing phone patches back to the States. We did this using MARS stations at military bases and amateur radio operators authorized to operate MARS frequencies.

While I was hanging around the terminal, performing the classical duty of "hurry up and wait," I thought about my MARS station in Cu Chi and what they would be doing at that time of day. My thoughts went to their phone-patch activities and the fact that they had been using the MARS station in Ft. Benning, Georgia quite a bit recently. Suddenly my creative mind suggested that I try to call the Ft. Benning MARS station and see if they were, indeed, in contact with Cu Chi. Locating an office, I asked to use their phone to place an AUTOVON call to Ft. Benning. Thinking that I knew what I was doing, they let me proceed.

I reached the MARS station and found out that they were, in fact, in contact with AB8AJ. I asked them to put me on the phone patch at the first opportunity so that I could talk with the guys back in Cu Chi. Well, my fellow operators were very surprised to hear from me, and I was quite pleased with myself: I could use a telephone to "control" a radio across the country to make contact with another station in another part of the world. Then I thought, "Wouldn't it be nice to be able to exercise complete control over the radio?"

Well, the priorities of being in the Army and on my way back to Vietnam forced these thoughts to the back of my mind. And the idea never took on much urgency over the years. Even when my friend and arch competitor Larry Hazelwood, W5NZS, called me at work to tell of his latest 6 meter conquest, I was



The HamLink, manufactured by AEA, allows you to control your radio from any DTMF-equipped phone, anywhere.

not goaded into taking action. My biggest obstacle was having to tie up my computer in order to control my radio. I did not want to leave it and the radio on all the time.

Well, now it appears that my idea has been thought of by those at Advanced Electronic Applications, Inc. (AEA). Their new HamLink HL 60 radio controller does just what I want it to and answers my problem of subjecting my computer and radio to day-long power consumption.

Not wanting to miss yet another band opening while away from my QTH, I ordered a HamLink for my station. It came with cabling (model number HL 62) ready to interface with my Kenwood TS-440. (The interface cable for Yaesu is HL 61, and the interface cable for ICOM is HL 63.) But alas, my TS-440 was not ready for it. More on that later.

After unpacking the HamLink I removed the eight screws holding the lid in place, thereby exposing the internal RJ-11 modular telephone jack. I connected a spare DTMF-equipped telephone to the jack. (Note: You cannot use a pulse-dial type telephone because the tones generated by a DTMF telephone are what controls the EEPROM in the HamLink.)

Next I connected the 9-pin "D" type connector to the unit. Then I connected the microphone, headphone, key, and interface connectors to their appropri-

ate locations on the TS-440. After connecting the power-supply cable to the HamLink, pressing the reset button, and entering my password, I thought I was ready to go.

The instructions advised me to turn on the radio and enter a "1" followed by a "0" from the telephone keypad. I did so and waited for the confirming four beeps in the earpiece. I waited and waited and nothing happened. At least according to the directions I should have heard eight beeps followed by two beeps, indicating that the HamLink was not communicating with the TS-440. I didn't even hear that.

I placed a call to Bill Everett, K7RIE, the vice president at AEA and the designer of the HamLink. He asked me if I had the two chips (the uPD8251AC and the TC4040BP, the two chips that make up Kenwood's IC-10 kit) necessary for computer interface installed in the TS-440. I replied that I had not. That was my problem.

Not wanting to wait for the return trip for an order to Kenwood, I shopped the local parts houses for equivalent chips. One had one equivalent chip. The other had equivalents for both chips for less than \$7.00 total. After carefully installing the chips in their appropriate places within the TS-440, I tried the HamLink again. Voila! Four beeps.

I entered my password and tried controlling the radio from the phone

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plugged into the internal RJ-11 jack. Everything worked according to the instructions. I found that, among other things, the HamLink will control the frequency up or down by as little as 10 Hz.

One note on controlling the memories: The HamLink starts out on memory location 01. I happen to have 28.885 MHz stored in memory location 00 and found out about this memory-addressing characteristic of the HamLink from another call to Bill. Only a small inconvenience. I just found another location for my favorite HF frequency.

To find out what frequency I was on, I pressed the appropriate sequence of buttons on the telephone keypad. The voice enunciation of the frequency was a male sound and was clear and distinct. That is because the voice recorded on the chip is human.

After playing around awhile with the telephone plugged into the internal RJ-11 jack, I tried an experiment. I located my cordless phone and plugged its base into the RJ-11 jack. I tried controlling the TS-440 with the cordless phone and it worked! Now I was in the living room, watching television and talking on 40 meters at the same time via my cordless phone—not exactly what the manufacturer had in mind, but it operated just fine.

Taking this discovery one step fur-



Used with the HamLink, the OpLink allows you to use a key or keyer to send CW up to 40 WPM over the phone line to your radio. Additional jacks support user-supplied headphones and/or headset/boom microphones (Yaesu YH-2, ICOM HS-10, or equivalent).

ther, I found another application. My fiancée, Carol King, K5CPZ, is visually impaired. Therefore, she relies on radios that have a voice synthesizer for the frequency readout. The HamLink plus the cordless phone work perfectly for this application.

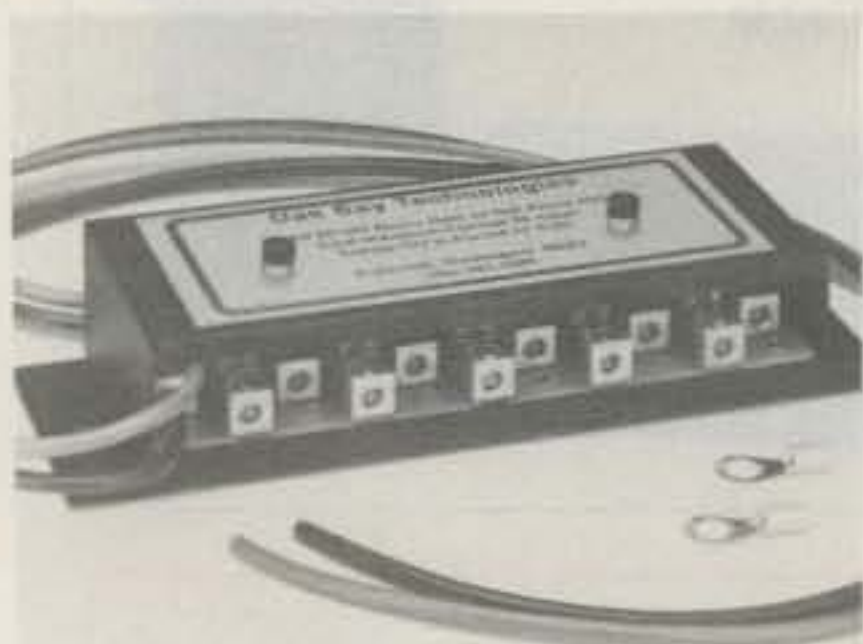
After playing around with the cordless phone, I decided to use the HamLink for its intended purpose. I used the phone one more time to set the answer feature

of the HamLink. There are several options, one of which allows for a certain number of rings and a callback for an answer. This is the option I chose in order to bypass my answering machine, which answers on either two or five rings, depending on whether or not I have any messages.

Next I moved the jumper, JP 1, to its appropriate place (it supplies voltage to the telephone to enable the tones), un-

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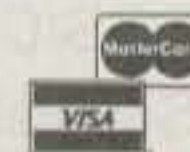
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plugged the cordless phone from the RJ-11 jack, replaced the cover and the screws, and connected the outside phone line to the external RJ-11 jack.

I called my telephone number from my fiancée's phone and promptly found myself in control of the TS-440 via the phone—except for one thing. I could not control the built-in antenna tuner.

Just a bit of a challenge, however. The HamLink supplies seven logic outputs via the DB 25 connector on the back. Five of these can be used to turn on something for as long as it is set "high." (There is a schematic diagram for controlling a relay included in the instructions.) A sixth output is pulsed high for 100 ms. The seventh is kept high for as long as the HamLink is used to control a radio. I can use any one of the five to control the antenna tuner by connecting a wire across the antenna tuner switch on the TS-440 (and with a little guessing while waiting a few seconds) or I can use the pulsed line to control the tuner for bursts of time until I am satisfied that the tuner has found its match. Additionally, I can use the seventh line to control a relay that will supply power to the radio when I am controlling it via the telephone.

What about CW? If you have a telephone that produces a continuous tone when you press the button, you can use the star, or asterisk, button to send CW. That can get a bit tiring, however. AEA has thought of this and supplies the OpLink (model number OP 80). With it you can plug in a key (or keyer) and send CW to your heart's content (up to 40 WPM). Also, if your phone only produces short bursts of tones when the buttons are pressed, you will not be able to send CW. Therefore, you will need the OpLink to provide the keyed tones for CW operation.

The OpLink works in series with your phone line. You insert the RJ-11 plug from the phone cable in your house into the appropriate jack on the back of the OpLink and then insert the telephone cable RJ-11 plug into the other jack. You control the HamLink the normal way through the telephone, but you send CW via the key plugged into the jack on the front of the OpLink.

The OpLink also comes with two jacks that will accept a Yaesu YH-2 or ICOM HS-10 (or equivalent) headset/boom microphone, thereby freeing you from having to use the telephone handset while you are on SSB. (You can also just use the headphone jack and still use the telephone handset for the microphone.)

The HamLink is a fun little device that allows me instant access to my radio from wherever I may be (even at work?). However, I would recommend that when you acquire yours, thoroughly read the

instructions before operating your radio from a remote location. It is even a good idea to have the manual for the HamLink in front of you as you make your first attempts to remotely control your radio. It can be a bit tricky, especially operating split frequency. You certainly don't want to hear over your telephone one of the "radio police" saying, "Wrong VFO!"

Would you like a test drive before you buy one? Call AEA's toll-free number (800-432-8873) and request the HamLink brochure. Once you receive it, you can call the telephone number in the brochure and use the included instructions to control a live transceiver (except to transmit).

Back to my arch rival (not really), Larry Hazelwood, W5NZS. Now, using the HamLink, I can compete with Larry no matter where I am in the world as long as I have access to a DTMF tone source.

Nevertheless, I may have, by my own hand, augmented Larry's competitive

edge last July. Following the CSVHF conference in Kerrville, a group that included Bob Magnini, K6QXY, Al, WA6MXA, Steven Hazelwood, N5NDV (Larry's son), Chet Hazelwood, W5GDH (Larry's dad), and myself, helped Larry install his new 11-element, 2.5-wavelength M² six meter antenna. Now Larry is working stuff I can't even expect to hear no matter where I am calling from.

Curses, Larry, I'm foiled again! I wonder if I could sneak over to his place and hook up the HamLink without his noticing? Nah, I don't think so.

The HamLink and the OpLink are available from AEA, P.O. Box C2160, 2006 196th Street SW, Lynnwood, WA 98036 (phone 206-774-5554). You may also contact your favorite authorized AEA dealer. The suggested list price for the HamLink is \$269.00, and the suggested list price for the OpLink is \$130.00. Specify which radio you will be controlling when placing your order. ■



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NEWS OF CERTIFICATE AND AWARD COLLECTING

This month's featured counties award chaser is:

**Charles "Bart" Bartlett, N7LWX
USA-CA All Counties #790
November 20, 1992**

Bart was born and raised in Brunswick, Maine and graduated from Brunswick High School in 1959. He joined the U.S. Navy "... to see the world." However, in the legendary wisdom of the service, his first duty station was the Naval Air Station at Brunswick. From there the Navy sent him to Aviation Electrician School. Bart's other duty stations were the *USS Bon Homme Richard* (CVA-31) and the training center at San Diego. Bart married his wife, Rae, in 1961 while he was stationed in Florida.

Following Bart's discharge, he served in the San Diego County Sheriff's Office for five years. The next nine years found Bart manning the U.S. Customs station at the San Diego/Tijuana, Mexico border. He then moved north to the other end of Interstate 5 to the Blaine, Washington border station, where he continues to serve.

Bart's introduction to amateur radio came while he was in high school and a friend got his General ticket. His dad bought him the best equipment and antenna system that money could buy at the time. Bart says, "After several hours of watching him 'work' his station, I was hooked. Several years went by while Rae and I were building our family and my career. Often I would dream about amateur radio and make meager attempts at obtaining a license, but it did not come to pass until we bought our current home here in the northwest. An 11 x 15 foot building just behind the garage would be just right for my amateur radio shack. Two years later I fulfilled my childhood dream by getting my first amateur radio license. I then quickly moved from Technician to Advanced to Extra.

"Theory was not a problem, as the Navy trained me in electronics, but the code was a stumbling block to be reckoned with. Five words a minute seemed so fast, but by learning the characters, the first code test was out of the way. Then thirteen per... well, it hardly made any sense at all. The letters seemed disconnected at that speed. After months of study I squeezed passed that one.

Box 76, Pleasant Mount, PA 18453-0076



Charles "Bart" Bartlett, N7LWX, USA-CA All Counties #790, at his very neatly arranged station.

"Studying code was like going to get a beating. I dreaded it. After all, why did I need this stuff anyway?"

"Finally, after another whole year of twice-a-day practice I passed twenty words per minute. Oh happy day!"

(Bart is now a Volunteer Examiner, and five words seem so sloooooow. But don't look for him on any CW nets.—ed.)

"After receiving my Advanced ticket, my 'Elmer,' Jack De Lorme, K7DZE, loaned me my first HF rig and introduced me to County Hunting. On August 5, 1989 I worked my first county, Leon TX, with KF5XQ. About two weeks later I bought a used rig. Guess what? It was a Kenwood TS440AT fully rigged for mobile work. I mean with power cord, mounting bracket, mobile antenna, etc. County Hunting here I come!"

Since then Bart has completed his shack, learned how to climb a tower, installed a 70 foot tower complete with TH7DX, acquired a Kenwood TS850AT with a HeathKit SB-1000, and gathered other necessary support equipment.

"My plans are to complete contacts for the Washington Award, a mobile-to-mobile endorsement, and Bingo!" Will I go around again? Probably, but I will enjoy not needing to race with a self-imposed clock.

In random order Bart listed his most memorable County Hunting moments:

- Giving Cooter, N4EED, his last for the whole ball of wax.
- Searching for those elusive county-



N7LWX shown here doing one of the things he does best—going on the road chasing counties.

line signs in a strange place on the proverbial "dark and rainy night."

- Putting out that county line in upper Michigan, where my feet were in one time zone and the rest of me was in another.

- Hearing the congratulations for getting that last county for the whole ball of wax.

- From the state of Washington, helping someone on the net with an emergency in a part of San Diego County that I knew well.

USA-CA Special Honor Roll

Charles A. Dobbins, KA5PVB
USA-CA All Counties #803
Mixed Band and Mode, 05-11-93

Bo Lysell, NO2W
USA-CA All Counties #804
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USA-CA Honor Roll

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KA5PVB	981	DL2XN	2684
NO2W	982	WB5LBJ/DU6	2685

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is \$4.00. For nonsubscribers it is \$10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Communications, 76 North Broadway, Hicksville, NY 11801 USA for \$2.00. 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 June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Custodian, Star Rt. 40, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

•Working K7DZE in San Juan County for my last one — and knowing what he went through to get there for me.

•Having Eddie, G4KHG, at 59 relay me into a Florida mobile.

•Having a contact with my son-in-law, Cory, N6VFG, as he bobbed up and down in the North Atlantic on a Coast Guard ship.

•Meeting and making friends at the Marysville, WA mini-convention.

•Seeing my callsign in print for the first time in CQ magazine.

•Receiving a QSL card from a DX station with N7LWX/M on it.

•Getting my USA-CA number before K7DZE.

•And last but not least, having my wife surprise me by bringing dinner to me in the shack so I could stay and continue running the net.

"Having received USA-CA #790, I must thank all those who participated in that endeavor. This includes all the net controls who spent endless hours running the net; the assistant who spent the same endless hours helping; all the mobiles who drove immeasurable miles to put out counties; the bureau, who handled countless numbers of MRCs; and finally to my wife, who put up with my

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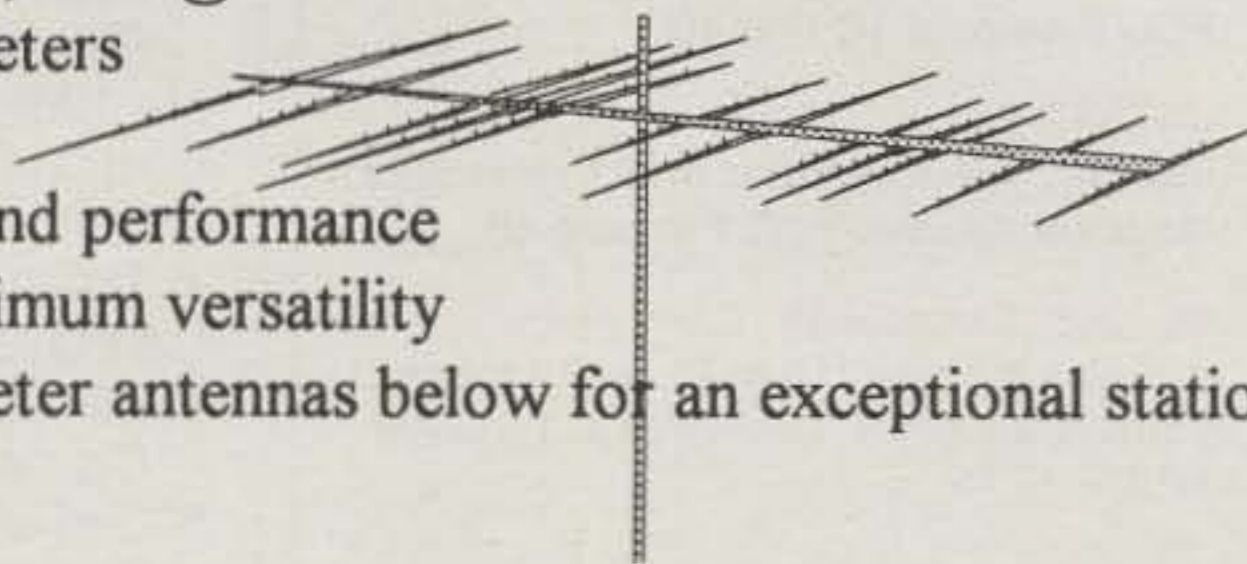
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constant listening to the net (there were speakers everywhere), my sprinting to the shack or the truck to 'get that count,' and my extended periods of time living in the shack.

"Man, what a hobby! Thanks everyone.—73, Bart, N7LWX, USA-CA 790."

CQ magazine congratulates Bart on his achievement.

Awards Issued

Charles A. Dobbins, KA5PVB, who received USA-CA 500 #2164 way back in March 1987, submitted his completed book for USA-CA All Counties #803, USA-CA 3000 #828, USA-CA 2500 #905, USA-CA 2000 #981, USA-CA 1500 #1073, and USA-CA 1000 #1275.

Bo Lysell, NO2W, submitted a complete book the first time around and received USA-CA All Counties #804, USA-CA 3000 #829, USA-CA 2500 #906, USA-CA 2000 #982, USA-CA 1500 #1074, USA-CA 1000 #1276, and USA-CA 500 #2683.

Congratulations to the two newest USA-CA All Counties holders!

Larry Cahoon, WD3P, received his seal and the ribbon for USA-CA 1500 #1073.

Sterling Whitaker, WA7JHQ, received his initial award USA-CA 500 #2682 along with seal and ribbons for USA-CA 1000 #1276.

Dr. Emmerich Rath, OE3RE, wins the perseverance award this month. His first USA-CA award was for USA-CA 500 #930 back on March 20, 1973. He receives USA-CA 1000 #1277.

Ronald W. Asbill, W9ROK, took ten years to submit documentation for USA-CA 1000 #1274.

Enrique Perez, N2FKE, followed up his 1986 submission with another 500 contacts for USA-CA 1000 #1278 (All CW).

The following received their first USA-CA numbers and the handsome award certificate to display in their shack:

Clarence W. Waits, N8LVD, USA-CA 500 #2681.

Hermann A. Singer, DL2XN, USA-CA 500 #2684.

And finally from the Philippines came Clarence E. Green, WA5LBJ/DU6, for USAC-CA 500 #2685.

Awards Available

Swedish Awards Program. This month we feature awards available from the Swedish Amateur Radio Society (Sveriges Sandareamatorer).

The Worked All Sweden Award. The WASA award will be issued to licensed radio amateurs for verified contacts with Swedish lan (counties) and callsign districts (0-7) made after January 1, 1988.



THE OFFICIAL SWEDISH AWARDS PROGRAM



FÖRENINGEN
SVERIGES SÄNDAREAMATÖRER
Swedish member Society of the NRAU and IARU

Booklet describing awards available from the Swedish Amateur Radio Society (Sveriges Sandareamatorer).

Each individual contact must be made on the same band and mode. The same station may be contacted on several different bands. All contacts shall be with land-based stations. Separate awards will be issued for HF, 144 MHz, 432 MHz, 1296 MHz, and Satellites. For HF 1.8, 3.5, 7, 10, 14, 18, 21, 24, and 28 MHz are counted as separate bands. Stickers can be obtained for 2xCW, 2xPhone, 2xSSB, and 2xRTTY.

WASA-HF. Applicants in Europe must fulfill the following requirements.
Class 3—All lans on 2 different bands.
Class 2—All lans on 3 different bands.
Class 1—All lans on 4 different bands.
Plaque—All lans on 5 different bands.

Applicants outside Europe:
Class 3—All callsign districts.
Class 2—All lans.
Class 1—All lans on 2 different bands.
Plaque—All lans on 5 different bands.

WASA—144 MHz
Class 2—All callsign districts.
Class 1—All lans.
Plaque—5 different stations in each lan.

WASA—432 MHz
Class 2—All callsign districts.
Class 1—All lans.
Plaque—3 different stations in each lan.

WASA—1296 MHz
Class 1—All callsign districts.
Plaque—All lans.

WASA—Satellite
Class 2—All callsign districts.
Class 1—All lans.
Plaque—All lans in two modes each.

Swedish Lans: Stockholm City, Stockholm lan, Uppsala Lan, Sodermanlands lan, Ostergolands lan, Jonkopings lan, Kronobergs lan, Kalmar lan, Gotlands lan, Blekinge lan, Kristianstads lan, Malmohus lan, Hallands lan, Goteborgs and Bohus lan, Alvsborgs lan, Skaraborgs lan, Varmlands lan, Orebro lan, Vastmanlands lan, Kopparbergs lan, Gavleborgs lan, Vasternorrlands lan, Jamtlands lan, Vasterbottens lan, Norrbottens lan.

Hear All Sweden Award. The HASA will be issued to all listeners (SWLs) for verified reports of stations in Swedish lans and callsign districts for contacts made after January 1, 1988. The award is issued in the classes and groups corresponding to the rules for the Worked All Sweden Award (WASA). Plaques will not be issued for the HASA, however.

Swedish Locator Award. The SLA will be issued to licensed radio amateurs for verified contacts made with the various locator squares in Sweden, as defined by the maidenhead system, for contacts made after January 1, 1988. The award is also issued to listeners (SWLs) on equivalent basis.

All amateur radio bands may be used. Endorsements can be obtained for individual bands and modes. The requirements are as follows:

Basic award—25 squares.

Stickers—35, 45, 55, 60, 61, 62, 63, 64 squares.

Swedish Locator Squares: KP09, JP88, JP98, KP08, KP18, JP87, JP97, KP07, KP17, JP76, JP86, JP96, KP06, KP16, KP26, JP75, JP85, JP95, KP05, KP15, KP25, JP64, JP74, JP84, JP94, KP04, JP53, JP63, JP73, JP83, JP93, KP03, JP62, JP72, JP82, JP92, JP61, JP71, JP81, JP60, JP70, JP80, JP90, JO59, JO69, JO79, JO89, JO99, JO58, JO68, JO78, JO88, JO98, JO57, JO67, JO77, JO87, JO97, JO66, JO76, JO86, JO96, JO65, JO75.

Field Award. The Field Award will be issued to licensed radio amateurs for verified contacts with fields, as defined by the locator system adopted as of January 1, 1985 (Maidenhead Locator). Contacts on or after this date are valid for the award. The award is also issued to listeners (SWLs) on equivalent basis.

All amateur radio bands and modes are valid. Endorsements are not issued. Requirements are as follows:
Bronze (Basic Diploma)—100 fields.
Silver (Rosette)—150 fields.
Gold (Rosette)—200 fields.
Platinum (Rosette)—250 fields.
Plaque—300 fields.
Plaque with gold seal—324 fields.

Requirements: The SSA Awards Programme is available to all licensed radio amateurs and listeners (SWLs) worldwide, who are members of their coun-

try's IARU affiliated radio society. All contacts shall have been made from the same country. Any contacts made with earth-based repeaters are not valid.

All contacts shall be verified with QSL cards or the equivalent on which there is sufficient information required for approval.

Applications shall consist of QSL cards and a list of these with the lans, districts, locator squares, or fields in alphabetical/numerical order.

Instead of sending QSL cards, overseas applicants may get their cards checked by (GCR) an official of their National Society. SSA reserves the right to examine any or all QSLs claimed for credit.

Record books providing complete lists of lans (WASA), Locators (SLA), and fields (Field Award) with maps and room to record all necessary data are available in English, German, and Swedish from the SSA.

SM5AGM has produced a world atlas showing the new locator grids. It can generally be purchased from each na-

tional amateur radio society.

The fees are as follows:
Basic Award—30 SEK or 6 IRCs.
Sticker—5 SEK or 1 IRC.
Rosette (field)—30 SEK or 6 IRCs.
Plaque—125 SEK or 25 IRCs.
Record Book—20 SEK or 4 IRCs.
World Atlas—30 SEK or 6 IRCs.

All applications should be sent to: Sveriges Sandreamatorer, Ostmarksgatan, 43 S-123 42, Farsta, Sweden.

Special Notice

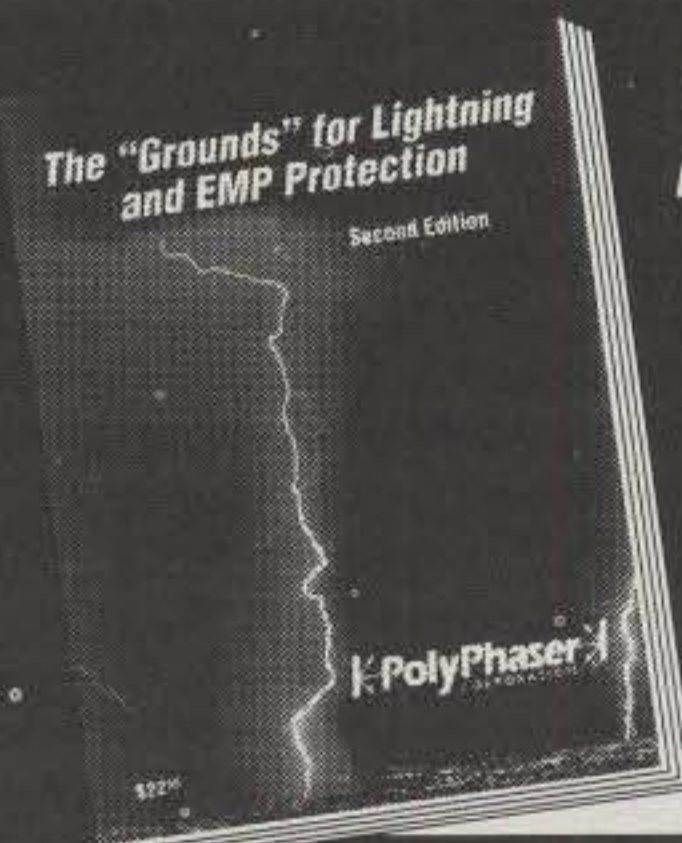
CQ magazine has advised us that the cost of the USA-CA All Counties plaque has increased to \$50 US up from \$40.

And Finally . . .

The USA-CA All Counties Award requires a certain level of commitment and perserverance. Don't be discouraged. Just keep at it, and we will be honoring your call on the Special Honor Roll!
73, Norm, WA3RTY

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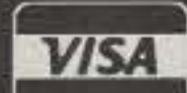

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THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

The Z-Match Antenna Tuning Unit

There's a lot of interest "down under" in the so-called Z-Match ATU which purports to be a simple, wideband matching unit suitable for use with balanced or unbalanced feed systems.

No doubt, such a unit is needed. Experience has shown that using an unbalanced tuner in conjunction with a toroid balancing transformer sometimes can create more problems than it indeed solves. Working into a load having a high SWR is one example. Ferrite baluns don't like this situation, and the result is a good proportion of the transmitter output goes towards heating the balun core. Sleeve baluns have the same problem. They work okay into a low SWR, but heat up when the SWR is high. How high? That's a good question not easily answered. I cooked a 4-to-1 balun running about 500 watts into a 3:1 SWR situation. The balun was rated at 1500 watts at an SWR of unity. With an SWR of less than 1.5:1 the balun ran cool.

Many amateurs use a multiband, center-fed antenna (the G5RV, for example) in conjunction with a coax feedline. The SWR on the line can reach high values under certain conditions, and this prevents proper transmitter loading, especially with a modern solid-state rig. The problem is overcome by the use of an ATU.

In some cases the center-fed antenna employs a balanced transmission line, running right to the equipment, plus some form of tuner to couple the balanced line to the 50 ohm antenna port of the transceiver. This is where a ferrite core balun is often used, but sometimes with unfortunate results.

The "Down-Under Z-Match"

In 1990 a modified impedance matching network was described in *Amateur Radio*, an Australian publication. It was followed up by a simplified version shown in *Break-In* (in 1992), a New Zealand amateur magazine. Finally, a how-to-build-it article on the network, now called a Z-match, appeared in *Amateur Radio*, in February 1993.¹

The description of the Z-match activated my memory bank, and I rum-

maged around in old copies of *QST* magazine until I came up with two source articles describing the scheme.

The first article was by Allen King, Jr., W1CJL.² The idea was to design a push-pull tank circuit for a tube-style transmitter than would cover 3.5 to 30 MHz without bandswitching. A single tuned circuit was impractical because of the change in L/C ratio at the extremes of the frequency range. The solution to the problem was a multiple-tuned circuit—one which tuned to two different frequencies at the same time, preserving a reasonably constant L/C ratio across the range (fig. 1).

W1CJL explained circuit operation: "If L1 is a coil of relatively large inductance while L2 and L3 are small, the inductances of L2 and L3 can be considered negligible at low frequencies. In that case, condensers (sic) C3 and C4 are, for all practical purposes, connected in parallel with C1 and C2. Hence the low-frequency limit of the circuit is determined by a rather large coil and a large value of capacitance, as indicated in fig. 1(B).

"On the other hand, the four condensers in series with L2 and L3, also in series, form a circuit resonant to some high frequency. For this frequency, L1 is large enough to be looked upon almost as a choke and hence does not have a pronounced effect on the resonant frequency of the circuit. This is indicated in fig. 1(C).

"At intermediate frequencies all three coils take part in the operation of the circuit, the effect being to provide a greater frequency ratio than would be possible with a single coil-condenser circuit. For any given setting of the tuning condenser (all four of them should be ganged for convenient operation) the circuit is resonant at two frequencies—for example, a low frequency of 3.5 Mc. (sic) and a high frequency of 12 Mc.

"Power output can be coupled out of such a circuit by means of a tapped coil, L4, coupled to the low frequency coil, L1, the taps being adjusted for the impedance into which the tank is to work. It has been found that the coupling to the load remains substantially constant over the entire tuning range."

In the design described by King the tuning ranges of the network were 3.45 to 8.5 MHz and 12 MHz to 30 MHz. There

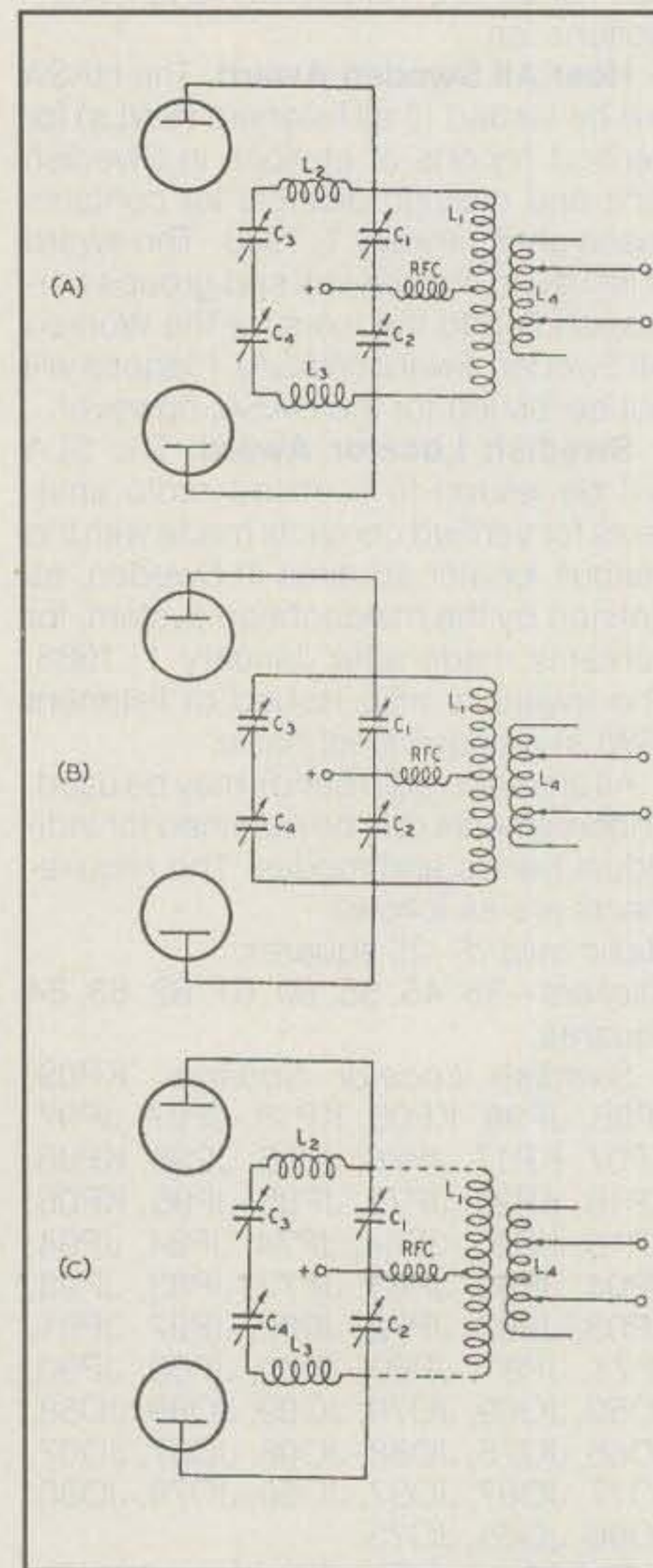


Fig. 1—The circuit of the multiple-tuned tank (A) and equivalent circuits for low (B) and high (C) frequencies. (Drawing courtesy QST.)

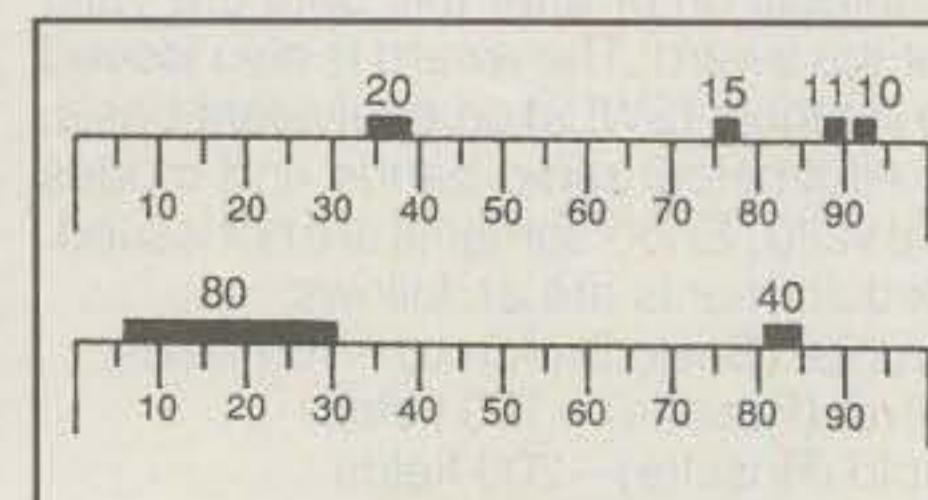


Fig. 2—Positions of the bands on the dial. To avoid confusion, the two ranges are shown separately. In actual tuning, starting from the high-capacitance end of the scale, the tank goes through the following bands in succession: 3.5, 14, 21, 7, 27, 28 MHz.

48 Campbell Lane, Menlo Park, CA 94025

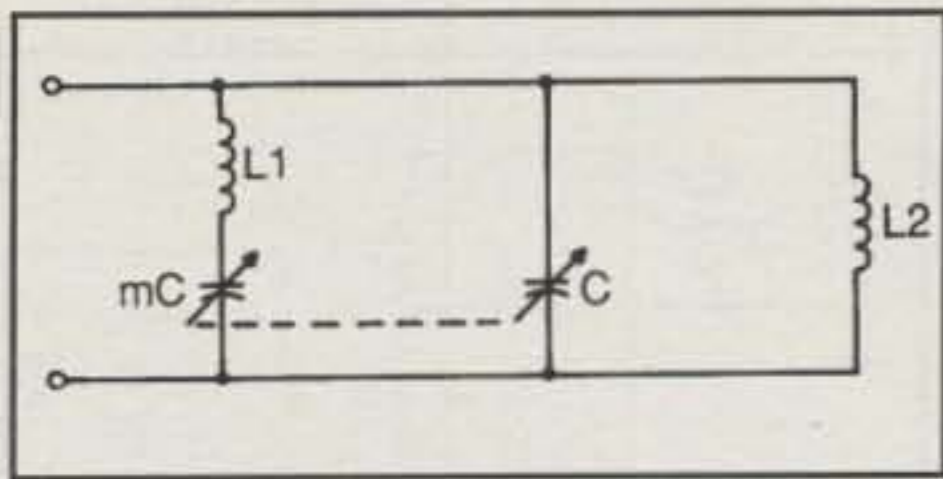


Fig. 3—Basic circuit of a single-ended multiband tuner.

was a tuning gap from 8.5 to 12 MHz. The positions of the amateur bands are shown in fig. 2. The sequence of tuning across a typical 0–100 degree dial is 3.5, 14, 21, 7, 27, and 28 MHz. (That's back in the days when the 11 meter band was an amateur assignment.)

This unique tuning device was commercially available as the National Company type MB-40 and MB-150 assemblies, which were rated at 40 and 150 watts, respectively.

The clever idea really never got off the ground, as push-pull amplifier circuits were going out of vogue, and the multiple tuner had unwanted resonances which often enhanced TVI problems!

Multiband Tuning Circuits

The basic multiband circuit, however, had merits, even though the theory behind it was vague and little design information was available. Finally in 1954 Ralph Johnson, W6MUR, provided the mathematical analysis of multiband tuning circuits.³ For simplicity, he analyzed a single-ended circuit instead of the push-pull arrangement (fig. 3). The capacitors are ganged and the coils have no mutual inductance between them.

W6MUR went through the mathematics and provided design information covering the general case, and then went on to discuss a special case (fig. 4). This circuit uses a center-tapped coil with a split-stator tuning capacitor. He provided data to build an experimental circuit that would tune 3.45 to 11.4 MHz and 10.4 MHz to 35.9 MHz.

Ralph predicted the circuit of fig. 4 would have wide application in amateur equipment and that "further experimental work will undoubtedly bring forth improvements and further modifications of the circuit."

Such was not the case, though. The multiband tank circuit sank without a trace until it was resurrected by some heads-up amateurs in Australia and New Zealand. They decided to employ the circuit as a wideband antenna tuner.

General Design Information

Before describing the Z-match tuner, some basic design data is helpful for

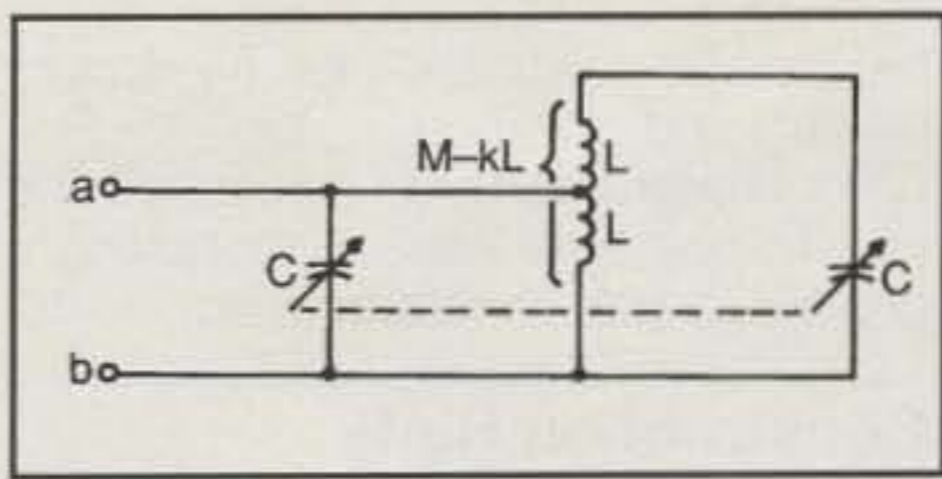


Fig. 4—Multiband-tuner circuit using a center-tapped coil.

those experimenters who wish to play with this interesting circuit. W6MUR provides the following suggestions:

1. The tuning capacitor range should be about 9:1 for best coverage. Taking stray capacitance into account, this calls for a minimum value of about 200 pF per section.
2. The coil is selected so that one-half the coil has a length-to-diameter ratio of 0.525.
3. For maximum setting of the capacitor, the number of coil turns of the half-coil should resonate near 6.19 MHz.
4. The final coil has twice the number of turns of the half-coil and twice the length.
5. The circuit can be tested using a dip-meter. Adjusting the coil tap will vary the high-frequency tuning range.

A Practical Z-Match Tuner

The single-coil impedance matching network described by New Zealand amateur ZL3QQ in 1992 is shown in fig. 5. The similarity between this and the Johnson circuit (fig. 4) is apparent. The final design—by Ron Cook, VK3AFW, and Ron Fisher, VK3OM—modified the input circuit, using an extra tap on the coil (fig. 6). This is the circuit of the Z-match at the present date.

Two tuning controls are required. One of the capacitors is a split-stator affair. For low power (up to 100 watts or so) either a two-gang broadcast tuning capacitor (usually 350 pF per section) or ganged capacitors can be used. The output of the tuner is via a link coil. The terminals may be either balanced (for ladder line) or unbalanced (for coax). The original Australian design had a loose-fitting link that could be moved up and down the main coil a bit, although

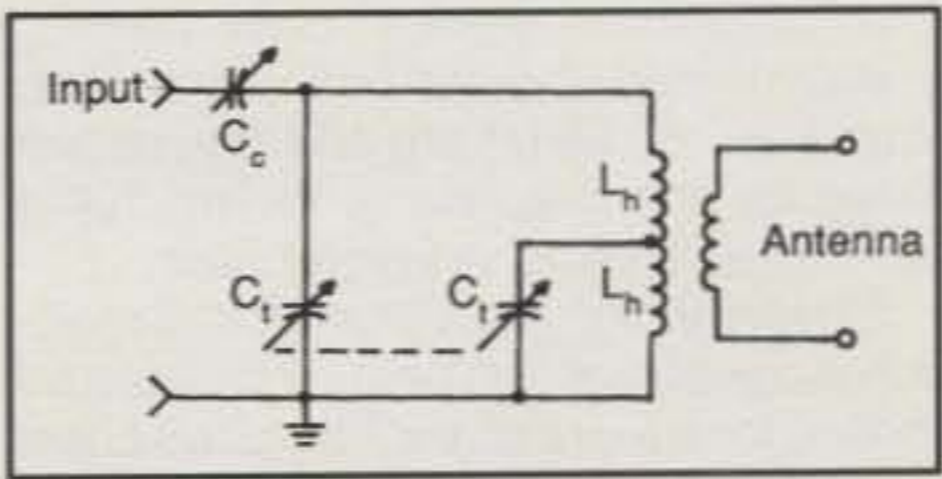


Fig. 5—The single-coil Z-match as described in NZART Break-In, March '92.

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it should be positioned near the bottom ("cold") end of the coil.

For higher power, a huskier coil and transmitting-type capacitors having a greater air gap should be used.

Construction Hints

It is a good idea to use reduction dials on the tuner. Tuning is quite sharp and interlocking. I used surplus dials from an old BC-375 surplus tuning unit. Other vernier drive dials would probably work just as well.

The circuit is high-C and there is high circulating current in the coil. At 150 watts the coil I used ran warm. It was wound with No. 18 tinned wire. I would suggest using No. 12 enamel-coated wire to reduce coil loss.

It is easy to set the tuning ranges of the Z-match with a dip meter. My first Z-match tuned down to 2.8 MHz, but would not tune to 10 MHz. Using the dip meter, I trimmed the top end of the coil until the lowest resonant frequency of the circuit was about 3.4 MHz. That permitted the unit to resonate on the 10 MHz band near minimum capacitor setting.

Keep all leads short and heavy for the greatest possible tuning range. After a little diddling around, my Z-match covered the 3.5 to 29.7 MHz range. My test antenna was an off-center-fed 7 MHz flat-top with balun and coax feed. I could tune it up for near-unity SWR on all bands, including 80 meters.

I never modified the 4-turn pick-up coil. There may be merit in trying more or fewer turns in a difficult loading situation.

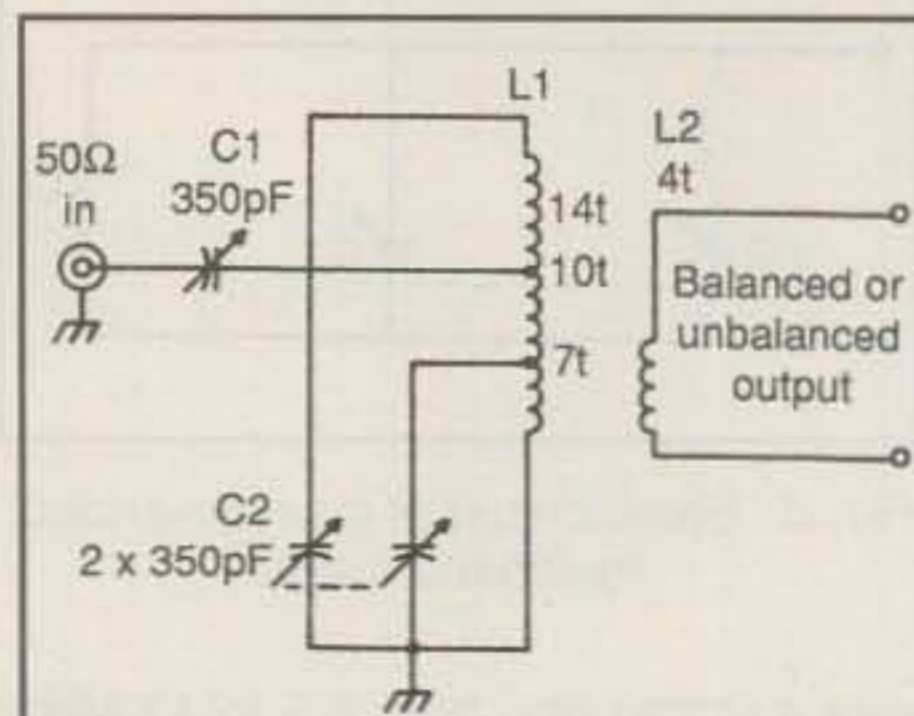
I would be interested in hearing from experimenters who try this simple tuner. Your comments?

The Junk Box Phone— Bicycle Mobile!

It may be difficult for a modern amateur to believe that it was possible "in the Good Ole Days" to get on the air with a workable VHF transceiver for a few dollars. Many thousands of licensed (and some unlicensed) experimenters did just that in the mid-forties.

That was a period of great interest in the "ultra-short waves" (less than 10 meters). In particular, the old 5 meter band (56–60 MHz) provided great promise for the beginner who was full of enthusiasm but short on money!

Shown in fig. 7 is a one-tube, 5 meter transceiver that can be built on a breadboard for a few dollars. The circuit uses a battery-type, dual-triode 19 tube as either a modulated oscillator or as a super-regenerative receiver. As a transmitter, grid modulation is used for



C1—350 pF, .02" spacing.
C2—two-section, 350 pF, .02" spacing.
L1—14 turns #12 enamel wire, 1 3/4" diameter spaced to 3 3/4" long. Tap at 10 and 7 turns.
L2—4 turns insulated #14 hookup wire wound over "cold" end of L1.

Fig. 6—Up-to-date Z-match (150 watts).

simplicity, a telephone-type microphone (often "liberated" from a pay phone) comprises the complete audio system.

The oscillator is a "unity coupled" design that uses a two-turn coil wound of copper tubing. The feedback coil is passed within the tubing. The simple circuit is changed from transmit to receive via a double-pole, double-throw knife switch. The antenna is a quarter-wave wire or rod tapped onto the copper coil with a clip.

Untold thousands of these little rigs

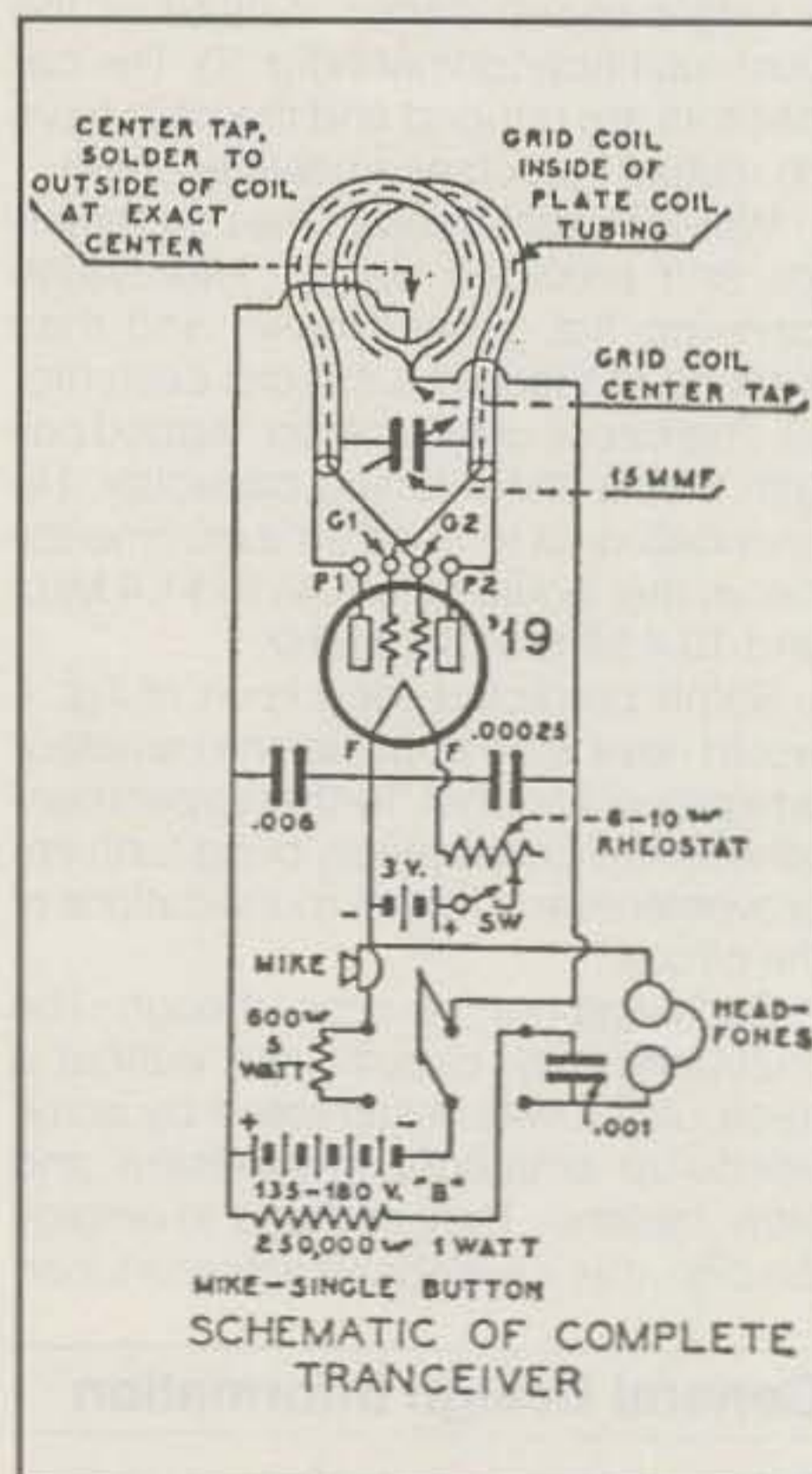


Fig. 7—The junk-box phone for 5 meters. One tube does it all!

were built as high school shop projects. After school was out in the early afternoon, the users would get on the air, making the 5 meter band miserable for the older, more technically minded amateurs who viewed the interlopers with a mixture of disdain and amusement.

The batteries could be strapped to the frame of a bicycle, the transceiver mounted atop the handlebars, and the happy user would have an instant mobile rig! A copper rod (aluminum was almost unobtainable) mounted to a wood bracket completed the installation. The operating range of the transceiver was about a half-mile, depending upon how loud the user shouted into the microphone.

Unfortunately, the super-regenerative receiver radiated a rough signal that was almost as loud as the transmitter signal. A nearby listener could hear the receiver being tuned back and forth as the listener strived for a contact. Two or three of these rigs in an urban neighborhood would nearly destroy the band for the more advanced operator who was using good equipment.

Nevertheless, the one-tube transceiver was a stepping stone into amateur radio, and many of today's Old Timers built this little circuit as their first introduction to amateur radio.

Joe Carr's "Cookbook" Of SWL Antennas

Joe Carr, K4IPV, is certainly familiar to readers of *CQ* and *Communications Quarterly*. He has written hundreds of articles and over 40 technical books. His latest epic is *Joe Carr's Receiving Antenna Handbook*, a large, 190-page text that is aimed at shortwave listeners (and amateurs!) interested in improving their receiver's potential. The chapter on loop antennas for reception is well worth the price of admission! One-sixty meter operators will certainly gain insight on the advantages of the loop for cutting down on miscellaneous noise, which ruins the band for many would-be 160 meter DXers.

Joe also covers active antennas, the Beverage antenna, antennas for limited space, plus trade-offs and compromises inherent in any real-world antenna system.

There are thirteen chapters devoted to receiving antennas. And it is true that many of these antennas can be used for transmission. It is too bad the title really doesn't cover the inclusive nature of the book! For example, the section on site survey, noise considerations, and building permits and other legal information is most helpful.

As an author-publisher myself, I say hats off to the beautiful appearance, lay-

out, and illustrations in the book! It is a work of art.

The book is a product of HighText Publications, Box 1489, Solana Beach, CA 92075. Cover price is \$19.95, plus \$3.00 shipping (call 1-800-888-4741), or see your amateur radio distributor.

Radio Publications Handbooks—At Last!

My own handbooks covering amateur antennas (*Beam Antenna Handbook*, *All About Wire Antennas*, and others) are now at hand in a new reprinting. They probably will be available at leading distributors by the time this magazine reaches you. Or, they may be ordered from Radio Amateur Callbook, Box 2013, Lakewood, NJ 08701 (phone 1-908-905-2961; FAX 1-908-363-0338).

The Dead Band Quiz

The sunspot cycle drops lower as the months roll on. I'm sure the need for this quiz will be even greater in the months to come! These last fall and spring DX seasons were not very impressive, and by next fall the 10 meter band probably will be gone for several years, which is not a pleasant thought.

Ah, well . . . Getting down to my quiz on the three lamps and four SP switches, the following are among the elite who quickly solved the problem. Congratulations! SMØJHF, Roy Cragg, KZ1R, KH6GI, W1WRN, WDØDAN, Orest Kowalyshyn, K2JJI, KL7CMN, XE1MD, W4WFL, KH6KL, TJ1GR, and DL2MEE.

Here's another lamp problem for you. I found it in a recent issue of *Parade*

Magazine in a quiz column by Marilyn vos Savant: A room contains three exposed light bulbs. Three switches, each controlling one bulb, are outside the room. The room's door is closed. You are outside and cannot see into the room. Your problem is to determine which switch controls which bulb. You are allowed to go into the room—but once you've opened the door, you may not touch the switches. Good luck!

And here's a quiz of the "Jeopardy" type. This is the answer: "9.W." What is the question? Good luck!

And thanks to the following who wrote me personal notes. I'm sorry I can't reply individually, but there just isn't enough time. Believe me, I read and thoroughly enjoyed all of your remarks: N5GVU, W4ULD, VE1YJ/3, VE6WN, W4UW, KØKL, LU1FA, W1ZZE (Jack, I believe I worked you many years ago when you were W2HMT and I was W2HCE), NA2M, W2YYI, W6GED, WA4BNO, K2PH, C31HK, KD6JUI, K4OQK, K5GW, W3LUL, KE5YU, N1LT, DL3FM, N5GVU, KB4BJM, VE3LMH/W5, G4XKF, W2KTF, KA5PNR, W6FGE, NA2M, WB2CUB, KB4XI, C31HK, W6JIC, N6GRF, and KA1ADF. Thanks to all and "see you on the low end."

73, Bill, W6SAI

Footnotes

1. Cook and Fisher, "Randon Radiators," *Amateur Radio*, Feb. 1993, New Zealand Amateur Radio Transmitting Society (NZART), pp. 13-15.

2. King, "No Turrets—Just Tune!" *QST*, July 1948, pp. 59-63.

3. Johnson, "Multiband Tuning Circuits," *QST*, July 1954, pp. 25-28.



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WHAT'S NEW AND HOW TO USE IT

The Hybrid Circuit

This month we will describe a circuit that is used in most telephone sets, but that also has interesting possibilities for the amateur experimenter. This circuit is the so-called Hybrid. The Hybrid is what enables a separate microphone and a separate speaker in a telephone to interface to a common transmit/receive line. The Hybrid is also what enables a common transmit/receive line to be split into separate directional signals for transmission.

All communications systems begin (and end) with the four-wire configuration shown in fig. 1(A). As we all know, most amateur communication is half-duplex; we either transmit or receive at any given time. This scheme is shown in fig. 1(B) and is fine for radio communications. The push-to-talk method, however, is not really convenient for the general public. For copper-wire-based systems to avoid push-to-talk and offer full-duplex communications (talk and listen at the same time) requires an extra wire. The extra wire needed (fig. 1(C)) adds extra cost to the system, which of course is undesirable. As a result, the two-wire full-duplex scheme evolved. In the two-wire system both wires are used to transmit as well as receive, often at the same time. They must be separated for transmission, however. Enter the Hybrid.

Fig. 2 is a block diagram of what the Hybrid accomplishes. A four-wire configuration is converted to and from a two-wire configuration. There is no switching, and operation is instantaneous. There are two types of Hybrids in common use today. The first is the transformer-coupled Hybrid shown in fig. 3. This is the type found in most of the older telephone sets such as the popular 2500 series. Various windings on two transformers are connected so that they add or subtract, resulting in the Hybrid function. Operation is as follows.

1. A transmit signal applied to terminals 7 and 8 is coupled to windings C and D by windings A and B.
2. The signal flowing through winding D also flows through winding F and the output circuit.
3. The signal flowing through F is coupled to winding H.
4. At the same time, the signal flow-

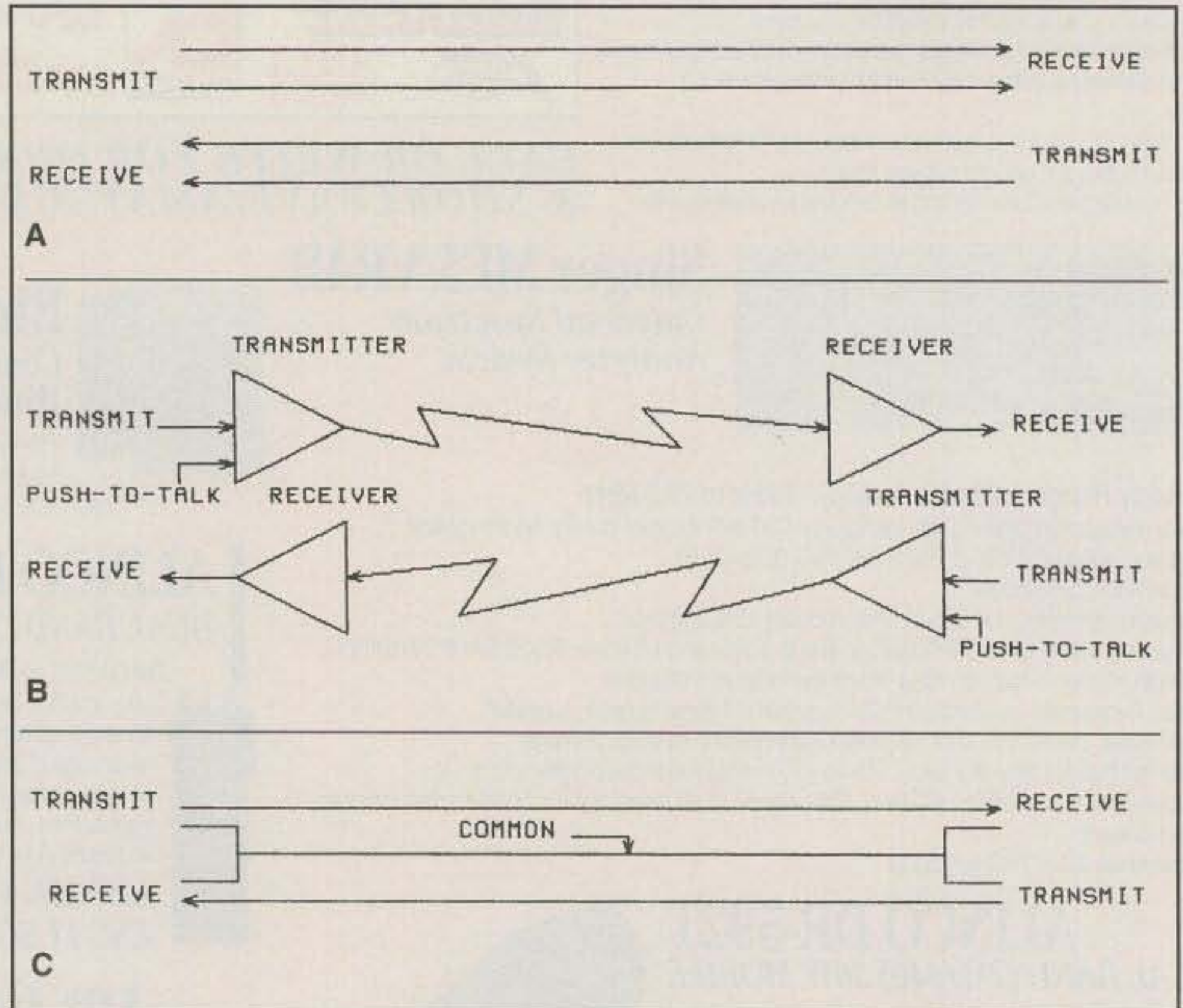


Fig. 1—(A) Basic four-wire transmission system. (B) Basic radio transmission system. (C) Transmission system with three wires.

ing through winding A is coupled to C.

5. The signal flowing through C also flows through E and the balancing network. The impedance of the balancing network is the same as the impedance of the load. This assures complete symmetry in the circuit and proper operation of the cancelling windings.

6. The signal flowing through E is coupled to G.

7. Since the signal flowing through C, E, and the balancing network is the same as the signal flowing through D, F, and the load, the signal flowing

through G is equal to the signal flowing through H.

8. The signal in G is equal to but out of phase with the signal in H due to the crossed connection from C. The result is that the transmitted signal is applied to the output but cancelled at the receive input.

9. In a similar manner, a signal applied to terminals 1 and 2 flows through D and F.

10. The signal in D is coupled to B, and the signal in F is coupled to H.

11. The signal in H flows through G

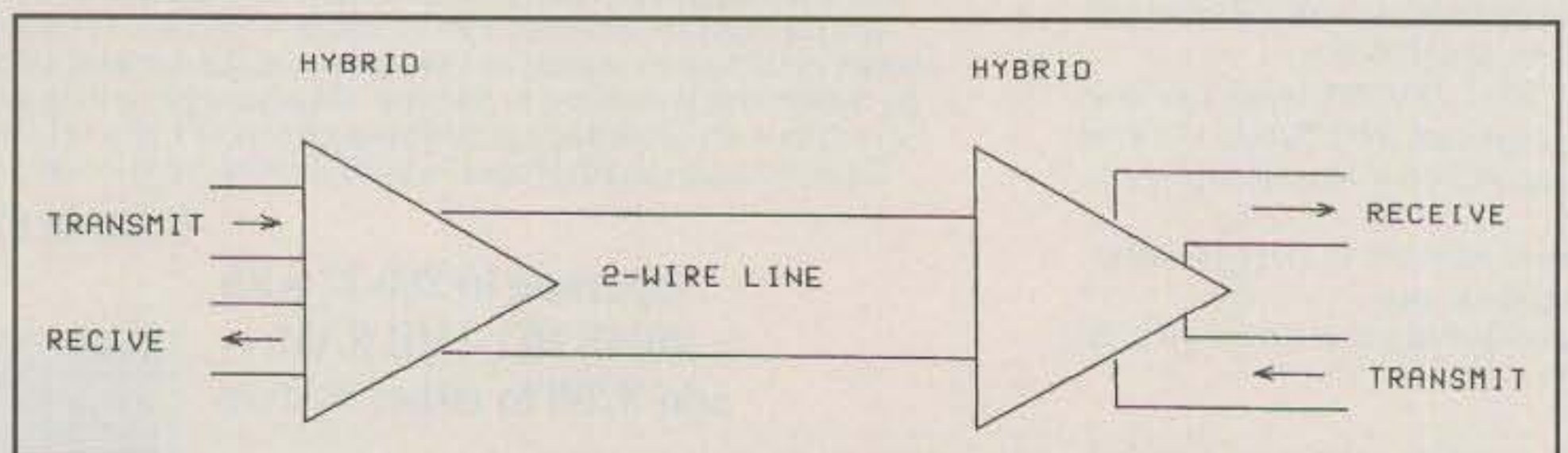


Fig. 2—Basic Hybrid function.

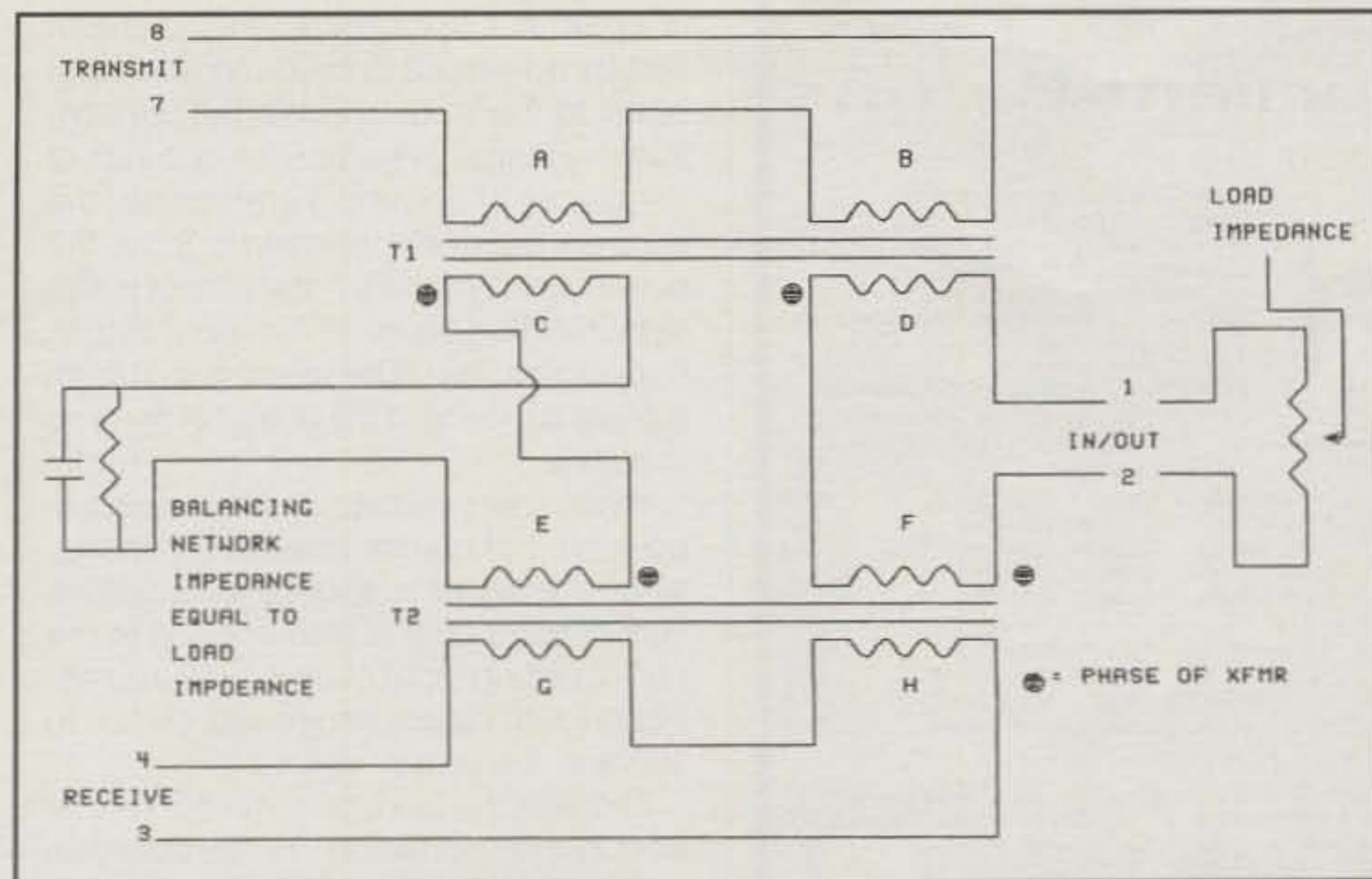


Fig. 3— Schematic representation of transformer-coupled Hybrid.

and receive terminals 3 and 4.

12. The signal flowing in G is coupled to E and flows through C, coupling a signal into A.

13. Since A is out of phase with B, the signals cancel.

14. As a result, a signal flowing into terminals 1 and 2 only appears at terminals 3 and 4.

The transformer-coupled Hybrid requires special transformers which are available from transformer manufacturers such as Stancor and Triad. Such transformers are intended primarily for telephone-line audio. For both audio and higher frequencies, an electronic

version of the Hybrid can be used. Fig. 4 is a schematic of such a circuit.

Op-amp 1 is connected in a normal amplifying configuration with a gain of 2. A signal applied to its input is amplified and applied to the resistive divider made up of the balancing resistor and the load impedance. Since both of these are the same value, the signal divides evenly, with one half dropped across the balancing resistor and the other half (equal to the original voltage level) applied to the load.

Op-amp 2 is connected as a differential amplifier. Its inverting input 9 (-) gain is set to one half, so the full output

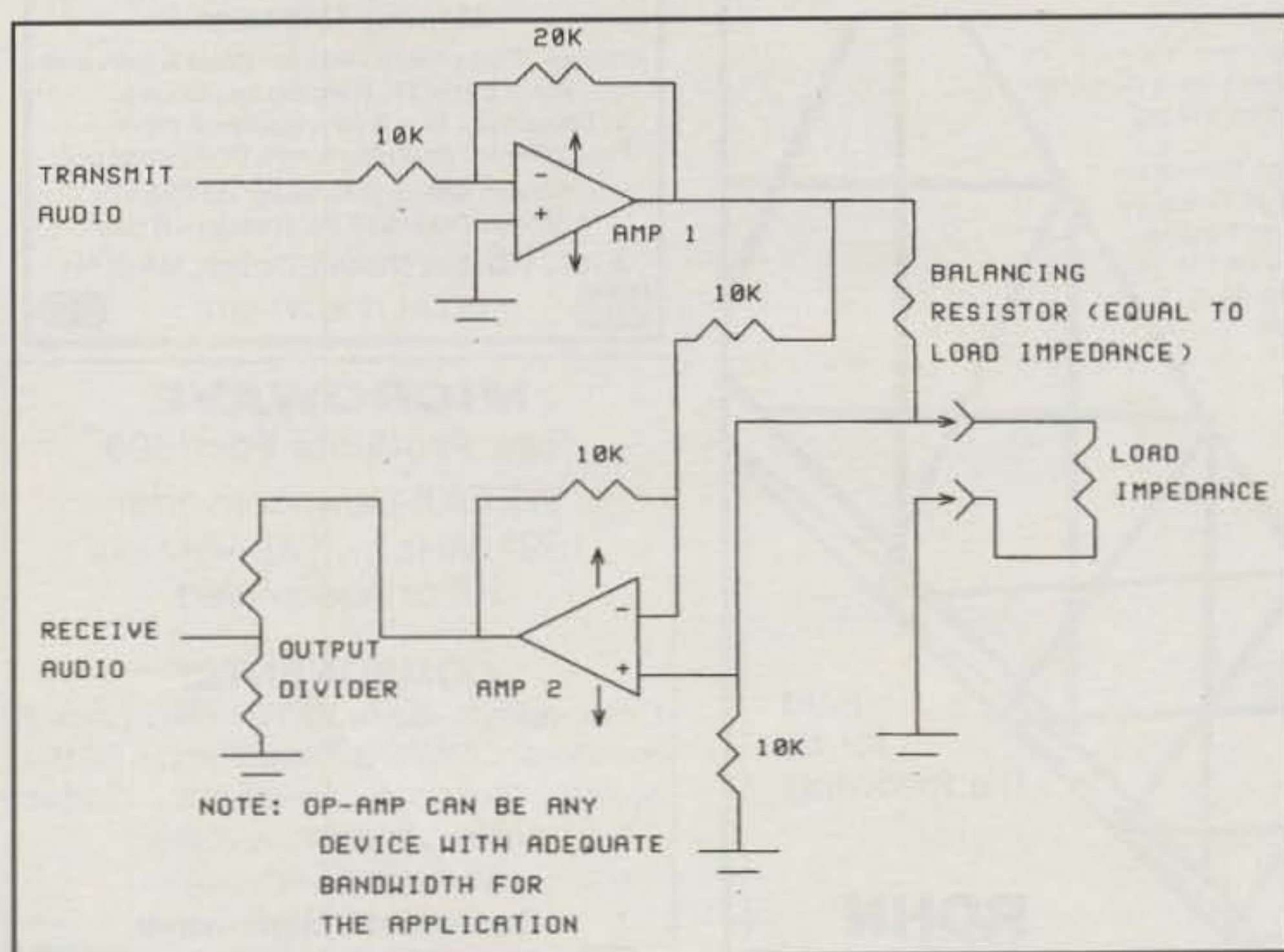
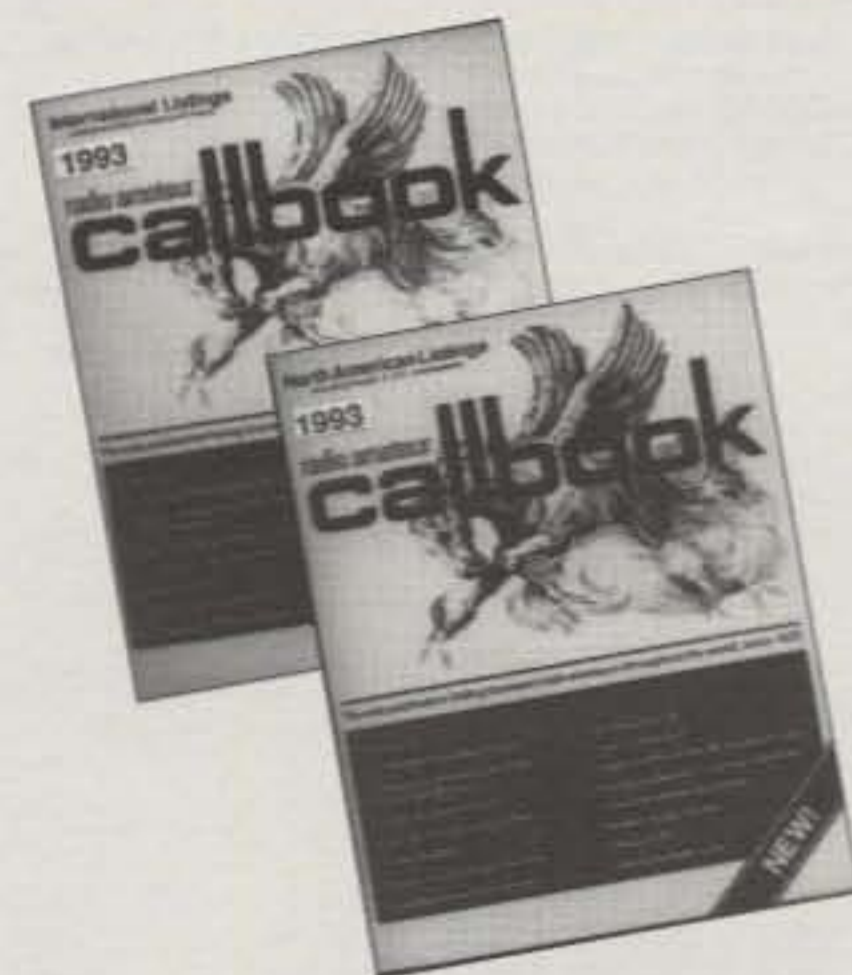


Fig. 4— Schematic diagram of electronic Hybrid.

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of op-amp 1 (2x input signal) is amplified by op-amp 2 to produce an output equal to the input but inverted. Its non-inverting input (+) amplifies one half of the output of op-amp 1 (remember the divider), but does not invert it. Since the non-inverting gain is 2, the output of this signal is also equal to the input signal, but not inverted. The result is that both signals cancel and the output of op-amp 2 is zero.

When a signal is applied to the circuit, op-amp 1 of course does not respond, since the signal is applied to its output. Half of the signal is also applied to the non-inverting input of op-amp 2 and appears in its output, multiplied by two to arrive at the proper value.

The electronic Hybrid will operate at frequencies limited only by the op-amps used. I have personally built circuits such as this which operate into the MHz region. Rejection of the transmit signal in the receive path is limited only by the accuracy of the match between the load and the balancing network.

I would be curious to see what types of applications my readers come up with using this circuit.

73, Irwin, WA2NDM

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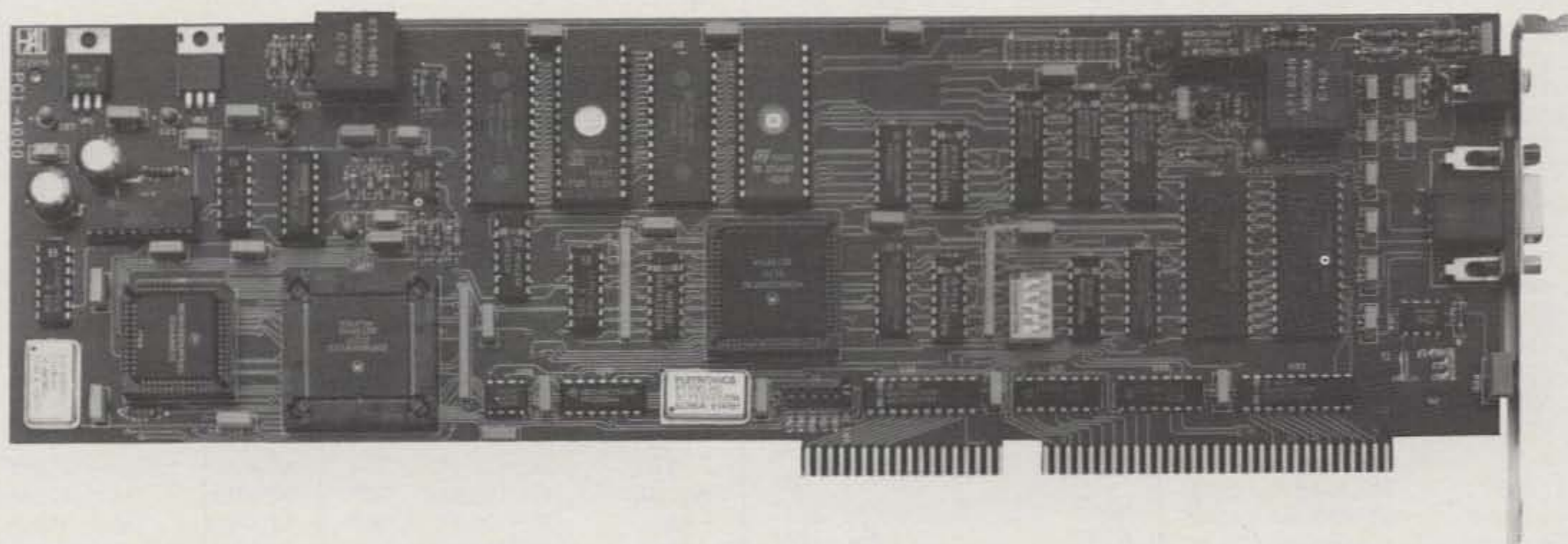
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- ♣ Easy interface to your transceiver
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- ♣ Error correcting using Reed-Solomon error correction

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1993 CQ WW 160 Meter Contest High-Claimed Scores

The following scores are high-claimed scores only (as received by May 5, 1993) and are subject to verification. M/S indicates M for multi-op or S for single op.

Call	CW		
	M/S	Score	QSOs
P40PI	S	998,704	896
4U1UN	M	697,170	1246
KP2A	S	632,928	906
ON4UN	S	551,300	839
VE3EJ	S	530,900	1047
TI1C	S	512,116	848
GW3YDX	S	473,892	771
WW2Y	M	447,916	1130
W2GD	M	395,908	1151
K5NA	M	366,572	1068
K1KI	S	366,567	1067
K1ZM	S	365,792	1038
K8PO	S	347,984	915
KH6CC	S	344,862	501
KN8Z	M	325,738	1153
PA3DWD	M	324,162	608
I4EAT	M	321,972	640
OM3KAP	M	317,856	607
AH1A	M	309,339	477
AB4RU	M	304,616	1039
WB9Z	M	300,884	1060
KY1H	M	297,108	876
PA3FNE	M	292,240	604
VE1/W2XL	S	289,085	634
EA8/OH2BCI	S	288,176	348
W3BGN	S	283,765	768
IT9ZGY	S	281,920	574
8P9DX	S	279,496	495
W0ZV	S	265,144	994
VE3ABG	S	265,045	666
AA5BL	M	264,768	988
S54CW	S	261,378	602
OK5W	M	260,901	529
NX1G	M	259,200	803
K2KIR	S	253,062	838
OZ7YY	S	251,559	575
PI4COM	M	250,770	545
DK8ZB	S	243,130	522

KZ3H	S	242,944	805
EA3KU	M	241,898	487
ON7TK	S	240,880	480
4X4NJ	S	239,652	398
AA4S	S	237,553	911
AA1K	S	230,398	844
N6DX	M	224,960	870
DK2OY	S	220,022	516
W7XR	M	218,400	784
WA2SRQ	S	217,046	813
K3WW	M	216,400	732
WT3Q	M	212,721	802
PI4TUE	M	211,651	504
G4BYG	S	211,560	428
GM3YOR	S	209,748	437
OM3KCM	M	209,160	486
UL7ACI	S	208,120	400
WR8C	M	202,224	920
9A2TW	S	198,750	442
K8CC	S	197,706	1018
F6EZV	S	197,062	445
HA8EK	S	193,954	461
VE5RA	S	190,330	558
KY0A	M	190,242	872
YU7AU	S	184,174	457
W3MM	M	183,729	790
DK3KD	S	177,548	455
KC5DX	M	176,661	927
N6SS	S	175,536	747
N2NT	S	174,984	641
AA4G	M	173,952	613
KD9SV	M	173,360	748
K7SV	S	171,120	713
S57MM	S	170,744	408
ES5RY	S	170,667	481
N2RM	S	169,400	617
W3GH	S	167,854	762

SSB

XK3EJ	S	469,014	1239
TI4CF	S	370,491	650
K1ZM	S	302,834	1226
AB4RU	M	280,440	1245
WB9Z	M	266,394	1260
N5OLS	S	213,760	1129
IR4T	S	192,000	477

HIGH-CLAIMED CLUB SCORES

Club	Score
Southeastern DX Club	6,582,655
Frankford Radio Club	4,844,945
Yankee Clipper Contest Club	3,199,255
Mad River Radio Club	1,796,263
Potomac Valley Radio Club	1,639,368
North Coast Contesters	1,292,655
Society of Midwest Contesters	1,201,377

KZ3H	M	184,107	1013
WR8C	M	176,325	1014
AA4S	M	165,396	903
KD9SV	S	156,439	908
HH2B	S	152,740	414
W1OO	M	152,640	754
W9UP	M	148,807	985
K4PI	S	146,984	809
K4LTA	S	145,854	855
WW2Y	M	142,990	706
N4RJ	S	142,080	720
K4YT	S	140,817	838
N8ATR	S	139,468	903
K4JPD	M	138,530	877
ON7TK	S	132,145	368
W9ZRX	S	130,382	860
EA3KU	S	129,433	308
IV3PRK	S	128,908	384
OY9JD	S	127,440	401
CU2CE	S	124,304	223
VP5JM	S	123,220	397
WY2X	S	122,213	625
LY3MR	M	119,826	392
OZ7YY	S	119,682	376
F1GTR	M	119,470	288
AC4QT	M	116,289	683
K4ODL	M	116,193	626
LY2ZO	M	115,632	460
KM4HH	S	114,648	743
VE3DC	M	110,000	417
W3BGN	S	109,350	525
K0LIR	M	109,179	797
KN2T	S	107,380	653
EA3ALD	S	106,284	274

NK7U	M	106,206	754
KF4HK	S	105,700	656
AA4MM	S	105,490	540
K3WW	M	105,365	704
W3TS	S	102,438	731
N5NMX	M	102,168	697
NE3F	M	101,080	625
KX4R	S	100,640	624
AB4XA	M	98,761	579
HB9CXZ	M	98,481	383
AA8U	M	97,240	641
G3NAS	S	96,669	241
WU3M	M	95,358	542
F6EZV	S	95,352	316
VE3RM	S	91,312	368
KD4KDH	M	91,256	591
VE3POS	S	90,882	351
WB4ZNH	S	89,776	667
9A2TW	S	89,705	307
IT9ZGY	M	89,408	253
ES5MC	S	87,426	299
KE4TV	M	86,250	526
I6FLD	S	85,320	282
EA6AAX	S	84,474	269
VE3NXA	S	82,908	365
WF2W	S	82,530	583
NO0Y	S	80,925	562
KE0RO	M	76,966	601
WX3N/0	S	76,428	500
VE6JY	M	75,354	285
K7QQ	S	74,820	541
N9ITX	S	71,685	548
K6HNZ	S	69,192	458
KH6CC	S	68,460	198

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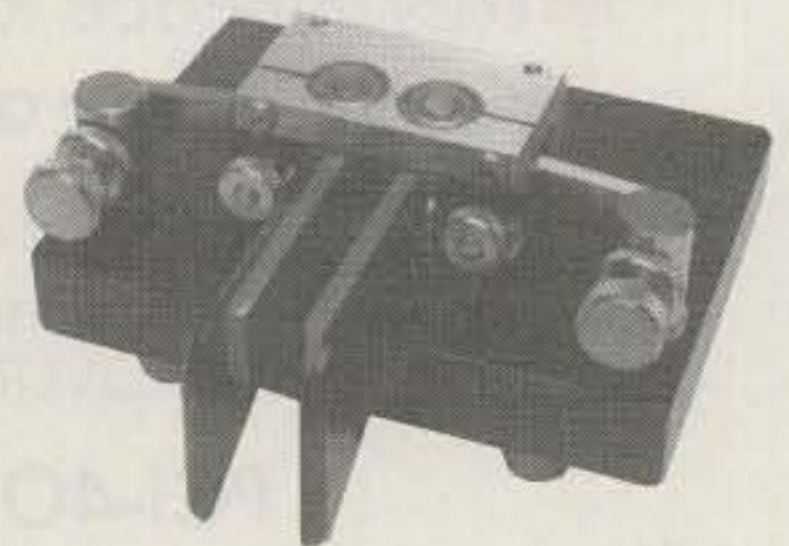
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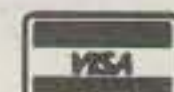
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MODEL VS-50M

SPECIAL FEATURES

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

PERFORMANCE SPECIFICATIONS

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

SL SERIES



• LOW PROFILE POWER SUPPLY

MODEL	Colors		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
SL-11A	•	•	7	11	2 ⁵ / ₈ x 7 ⁵ / ₈ x 9 ³ / ₄	12
SL-11R	•	•	7	11	2 ⁵ / ₈ x 7 x 9 ³ / ₄	12
SL-11S	•	•	7	11	2 ⁵ / ₈ x 7 ⁵ / ₈ x 9 ³ / ₄	12
SL-11R-RA		•	7	11	4 ³ / ₄ x 7 x 9 ³ / ₄	13

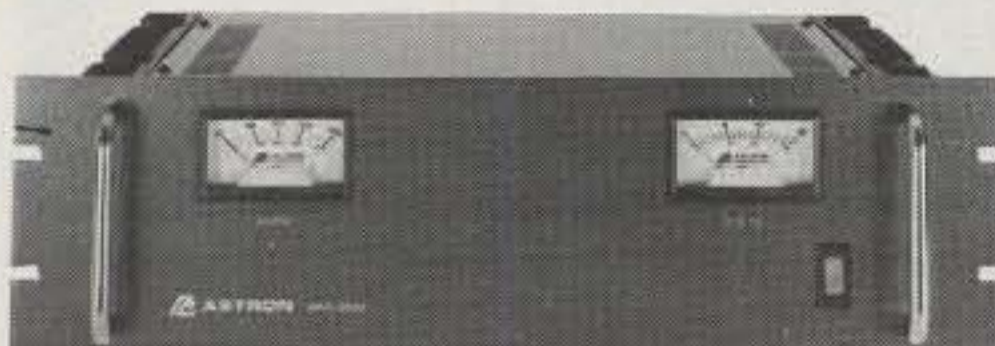
RS-L SERIES



• POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RS-4L	3	4	3 ¹ / ₂ x 6 ¹ / ₈ x 7 ¹ / ₄	6
RS-5L	4	5	3 ¹ / ₂ x 6 ¹ / ₈ x 7 ¹ / ₄	7

RM SERIES



MODEL RM-35M

• 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RM-12A	9	12	5 ¹ / ₄ x 19 x 8 ¹ / ₄	16
RM-35A	25	35	5 ¹ / ₄ x 19 x 12 ¹ / ₂	38
RM-50A	37	50	5 ¹ / ₄ x 19 x 12 ¹ / ₂	50
RM-60A	50	55	7 x 19 x 12 ¹ / ₂	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5 ¹ / ₄ x 19 x 8 ¹ / ₄	16
RM-35M	25	35	5 ¹ / ₄ x 19 x 12 ¹ / ₂	38
RM-50M	37	50	5 ¹ / ₄ x 19 x 12 ¹ / ₂	50
RM-60M	50	55	7 x 19 x 12 ¹ / ₂	60

RS-A SERIES



MODEL RS-7A

MODEL	Colors		Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-3A		•	2.5	3	3 x 4 ³ / ₄ x 5 ³ / ₄	4
RS-4A	•	•	3	4	3 ³ / ₄ x 6 ¹ / ₂ x 9	5
RS-5A		•	4	5	3 ¹ / ₂ x 6 ¹ / ₈ x 7 ¹ / ₄	7
RS-7A	•	•	5	7	3 ³ / ₄ x 6 ¹ / ₂ x 9	9
RS-7B	•	•	5	7	4 x 7 ¹ / ₂ x 10 ³ / ₄	10
RS-10A	•	•	7.5	10	4 x 7 ¹ / ₂ x 10 ³ / ₄	11
RS-12A	•	•	9	12	4 ¹ / ₂ x 8 x 9	13
RS-12B	•	•	9	12	4 x 7 ¹ / ₂ x 10 ³ / ₄	13
RS-20A	•	•	16	20	5 x 9 x 10 ¹ / ₂	18
RS-35A	•	•	25	35	5 x 11 x 11	27
RS-50A	•	•	37	50	6 x 13 ³ / ₄ x 11	46
RS-70A	•	•	57	70	6 x 13 ³ / ₄ x 12 ¹ / ₈	48

RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4 ¹ / ₂ x 8 x 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 x 9 x 10 ¹ / ₂	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 ³ / ₄ x 11	46
RS-70M	57	70	6 x 13 ³ / ₄ x 12 ¹ / ₈	48

VS-M AND VRM-M SERIES



MODEL VS-35M

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

MODEL	Continuous Duty (Amps)			ICS* (Amps) @13.8V	Size (IN) H x W x D	Shipping Wt. (lbs.)
	@13.8VDC	@10VDC	@5VDC			
VS-12M	9	5	2	12	4 ¹ / ₂ x 8 x 9	13
VS-20M	16	9	4	20	5 x 9 x 10 ¹ / ₂	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13 ³ / ₄ x 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5 ¹ / ₄ x 19 x 12 ¹ / ₂	38
VRM-50M	37	22	10	50	5 ¹ / ₄ x 19 x 12 ¹ / ₂	50

RS-S SERIES



MODEL RS-12S

• Built in speaker

MODEL	Colors		Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-7S	•	•	5	7	4 x 7 ¹ / ₂ x 10 ³ / ₄	10
RS-10S	•	•	7.5	10	4 x 7 ¹ / ₂ x 10 ³ / ₄	12
RS-12S	•	•	9	12	4 ¹ / ₂ x 8 x 9	13
RS-20S	•	•	16	20	5 x 9 x 10 ¹ / ₂	18
SL-11S	•	•	7	11	2 ³ / ₄ x 7 ⁵ / ₈ x 9 ³ / ₄	12

ALL ABOUT THE WORLD ABOVE HF

This Year's Perseids: A Potential Storm!

The *Perseids* meteor shower is the most popular of showers because it is long running (evidence of the shower starts appearing as early as 15 July) and it occurs in the summertime. Its peak is generally around 11–12 August. Many VHF+ operators will take vacations in order to be home during the shower. What makes this year's shower so special is the possibility of a storm!

The sighting of the Swift-Tuttle Comet last September led the way to one amateur astronomer's prediction of a possible meteor storm for this year's *Perseids* meteor shower. This is exciting news for those of us who work the VHF+ frequencies because the potential for a storm means the potential for sporadic-E like propagation on 6 meters and 2 meters during the event.

Background: Meteor showers are principally caused by debris discharged from comets as they make their way around their orbit. Most of the debris, consisting of sand and small pebbles, is expelled when the comet grows a tail as it moves to its closest point to the sun (called perihelion). This debris tends to travel in orbit both ahead of and behind the comet. When the Earth travels close to the orbit of a comet, it runs into this debris, thereby creating a meteor shower as the debris enters the Earth's atmosphere.

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

An astronomer, Dr. Brian G. Marsden, who works at Harvard University's observatory, wrote an article entitled "The next return of the comet of the *Perseids* meteors," which appeared in the September 1973 issue of *The Astronomical Journal*. This article examined historical sightings of comets and tied them to a prediction of the return of the Swift-Tuttle Comet. In the article Marsden actually made two predictions in one when he stated: "The point is, of course, that if the comet has not been found before late 1983, it would certainly be desirable to start thinking about searching . . . in 1992 . . ." (page 662). During his research Dr. Marsden tried to make a comet sighting in 1748 "fit" with the comet sighting of 1862. Finding that there were flaws in this assumption, he went back to a comet sighting in 1737 (the Kegler Comet). In order to predict the 1992 sighting he assumed that since the 1737 sighting was 11 years earlier, the next sighting would be 11 years later than a possible 1981 date. Yet he left the door open for discussion by saying: "Our procedure for forcing the linkage of the 1737 and 1862 observations is certainly open to question, and these resulting 1992 predicted elements are consequently somewhat uncertain."

P.O. Box 73, Oklahoma City, OK 73010



Once again I use my rental car for an antenna farm. The hood is raised so that I have access to the battery for power to the FT 650. On top of the car is the 6 meter SQLLOOP. On the trunk of the car is the 2 meter SQLLOOP. In the background is the southern California coastline.

This "hedging his bet" caused Marsden to be somewhat indifferent about the September sighting until he remembered the tremendous activity reported by amateur radio operators, in particular Shelby Ennis, W8WN, who sent reports to *Sky and Telescope* following the 1991 *Perseids* meteor shower. (In an article that appeared in the January issue of *S&T* Marsden discussed the possibility of the comet hitting the Earth in the year 2126. Within that article Marsden reviews his reservations about his own prediction, but upon examination of Ennis' reports, he remarks: "Maybe the comet really was coming!")

Another astronomer, an amateur, Joe Rao, who has observed the *Perseids* since 1966, also took notice of the amateur radio opera-

tors' reports. Following my article in last August *S&T* (on "listening to" the *Perseids*), Rao contacted me to find out more about the way meteors affect propagation on the VHF+ frequencies. Being assured that there was a tie-in between the increase in visual observation and the increase in radio-wave propagation, Rao set about to see what the implications were for shower activity should the comet actually be sighted.

Following the September sighting of the comet, Rao examined Marsden's orbital data which appeared in the *Astronomical Journal* article and calculated that the orbits of the comet and Earth may come within 100,000 miles of each other. With clumps of debris being contained in knots as big as 100,000

VHF PLUS CALENDAR

Aug. 2	Full Moon. Very poor EME conditions.
Aug. 7–8	ARRL UHF Contest. See text for details.
Aug. 8	Moderate EME conditions.
Aug. 10	Last quarter moon.
Aug. 12	<i>Perseids</i> meteor shower possible peak: 0115 UTC, plus or minus three hours. (See text for details.)
Aug. 13–15	East Coast VHF Conference. See text for details.
Aug. 15	Moderate EME conditions.
Aug. 17	New moon.
Aug. 18	Perigee.
Aug. 21–22	First weekend of the ARRL 10 GHz Cumulative Contest. (See text for details.)
Aug. 22	Good EME conditions.
Aug. 24	Last quarter moon.
Aug. 29	Moderate EME conditions.
Aug. 31	Apogee.

RF POWER AMPLIFIERS

NEW!
400 WATTS
AVG.
(144-148 MHz)

Model	Pin (W)	Pout (W)	Ic (A)	Gain/NF (dB)	(13.8 V) Type
50 MHz					
0503G	1-5	10-50	6	15/0.6	LPA
0508G	1	170	28	15/0.6	Standard
0508R	1	170	28	+	Repeater
0510G	10	170	25	15/0.6	Standard
0510R	10	170	25	+	Repeater
0550G	5-10	375	60	15/0.6	HPA
0550RH	5-10	375	60	+	Repeater HPA
0552G	25-40	375	55	15/0.6	HPA
0552RH	25-40	375	55	+	Repeater HPA
144 MHz					
1403G	1-5	10-50	6	15/0.6	LPA
1406G	25	100	12	15/0.6	Standard
1409G	2	150	25	15/0.6	Standard
1409R	2	150	24	+	Repeater
1410G	10	160	25	15/0.6	Standard
1410R	10	160	24	+	Repeater
1412G	25-45	160	20	15/0.6	Standard
1412R	25-45	160	19	+	Repeater
1450G	5	350	56	15/0.6	HPA
1450RH	5	350	56	+	Repeater HPA
1452G	25	350	50	15/0.6	HPA
1452RH	25	350	50	+	Repeater HPA
1454G	50-100	350	40	15/0.6	HPA
1454RH	50-100	350	40	+	Repeater HPA
220 MHz					
2203G	1-5	10-40	6	14/0.7	LPA
2210G	10	130	20	14/0.7	Standard
2210R	10	130	19	+	Repeater
2212G	30	130	16	14/0.7	Standard
2212R	30	130	15	+	Repeater
2250G	5	220	40	14/0.7	HPA
2250RH	5	250	40	+	Repeater HPA
2252G	25	220	36	14/0.7	HPA
2252RH	25	250	36	+	Repeater HPA
2254G	75	220	32	14/0.7	HPA
2254RH	75	250	32	+	Repeater HPA
440 MHz					
4403G	1-5	7-25	4	12/1.1	LPA
4410G	10	100	19	12/1.1	Standard
4410R	10	100	18	+	Repeater
4412G	20-30	100	19	12/1.1	Standard
4412R	20-30	100	18	+	Repeater
4448G	5	100	22	12/1.1	HPA
4448R	5	100	22	+	Repeater HPA
4450G	5-10	175	34	12/1.1	HPA
4450RE	5-10	175	34	+	Repeater HPA
4452G	25	175	29	12/1.1	HPA
4452RE	25	175	29	+	Repeater HPA
4454G	75	175	25	12/1.1	HPA
4454RE	75	175	25	+	Repeater HPA



MODEL 1410G
STANDARD



MODEL 1450G
HPA

All amplifiers (non-rptr) are linear, all-mode with fully automatic T/R switching and PTT capability. The receive preamps use GaAs FET devices rated at .5 dB NF with +18 dBm 3rd order IP. LPA, Standard and HPA amps are intermittent duty design suitable for base and mobile operation. Repeater amps are continuous duty, class C.

Amplifier capabilities: High-power, narrow or wideband, 100-200 MHz, 225-400 MHz, 1-2 GHz, Military (28V), Commercial, etc. - consult factory. A complete line of Rx preamps also available.

RX Preamplifiers

Band	Model	NF (dB)	Gain (dB)	Connector
50 MHz	0520B	.5	25	BNC
50 MHz	0520N	.5	25	N
144 MHz	1420B	.5	24	BNC
144 MHz	1420N	.5	24	N
220 MHz	2220B	.5	22	BNC
220 MHz	2220N	.5	22	N
440 MHz	4420B	.5	18	GNC
440 MHz	4420N	.5	18	N
1.2 GHz	1020B	.9	14	BNC
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miles in diameter, Rao concluded that we might graze one of these knots. However, not being totally satisfied with his own calculations, he took his findings to Marsden. Marsden calculated that the orbits might be as close as 93,000 miles.

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

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

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

Using the regularity of meteor storms (every 33 or so years) associated with the *Leonids* shower as a model and the fact that this regularity closely follows the periodicity of the Temple-Tuttle Comet, the parent of the *Leonids* shower, most astronomers theorize that there is a knot (or knots) of debris in close proximity to the comet. Applying this theory to the Swift-Tuttle Comet, relating the intense increase in radio propagation activity of the *Perseids* during the 1991 and 1992 showers, and noting that the comet's passage by the Earth's orbit has occurred only 224 days before for these orbits nearly intersecting, as compared to 332 days for the 1862 orbits, Rao concludes that there exists a high probability for a storm for this year's *Perseids* display.

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

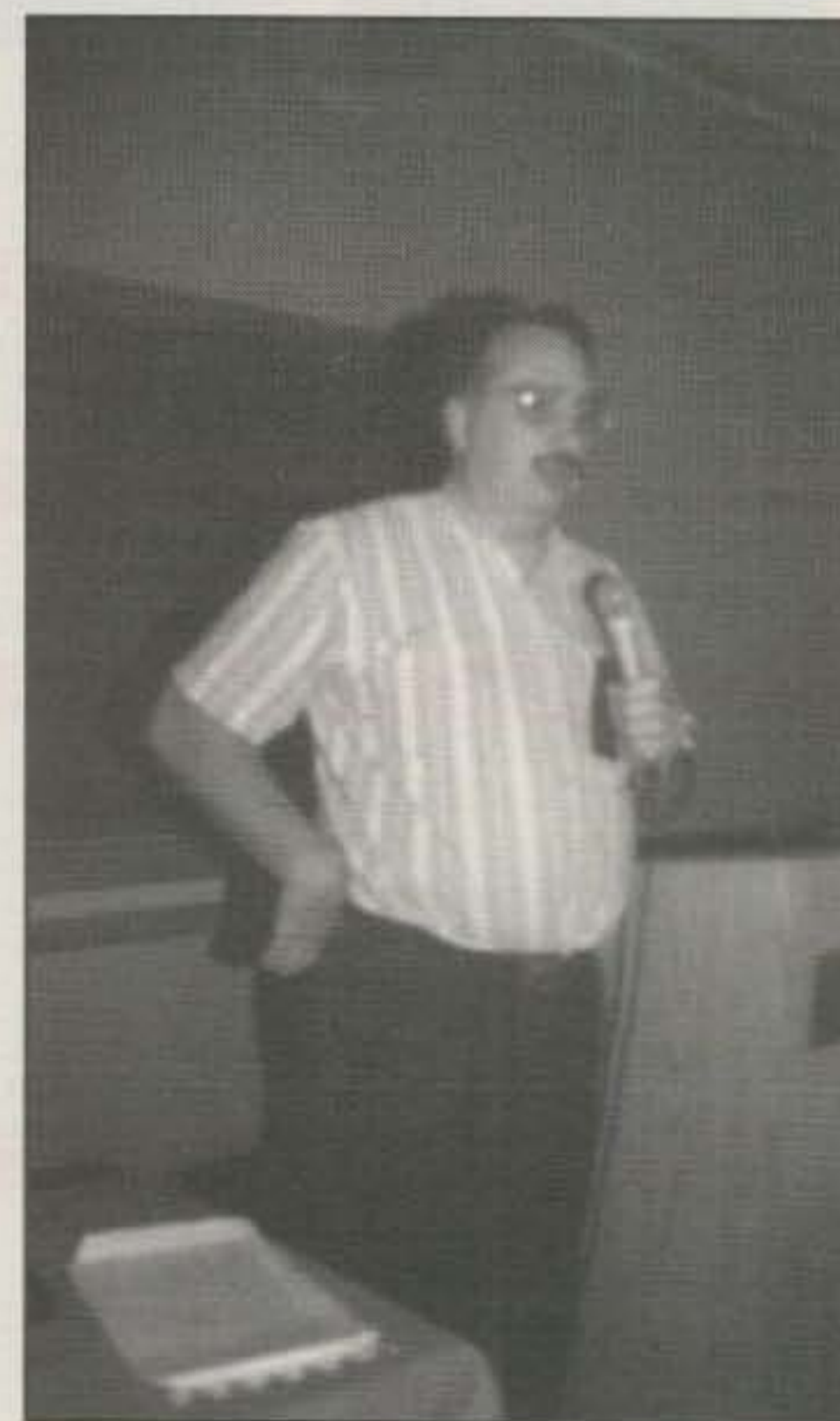
When is the storm going to occur? Rao notes that the time the Earth crossed the node for the 1992 orbit was at 1926 UTC 11 August



Tim Marek, NC7K, and Pat Coker, N6RMJ, man the Ventura County Amateur Radio Club (the sponsors of the conference) booth in the exhibit area during the West Coast VHF Conference.

and the observed maximum for the *Perseids* shower was a couple of minutes earlier, at 1924 UTC. However, he observes that the time that the Earth crossed the node in 1991 was 1331 UTC 12 August, but the observed maximum was 1622 UTC, almost three hours later! This year the Earth will cross the node at 0115 UTC 12 August. By extrapolation, based on the past two showers, Rao predicts that the peak could occur three hours earlier, or around 2222 UTC 11 August. Rao also reports that, based on observations of past showers, the peak will be not much more than an hour long, centered on this predicted time. It is also worth noting that the times of the peak make it a daytime shower (or storm) for those of us in North America.

Rao cautions, however, that we may pass



Carl Lodstrom, W6/SM6MOM, one of the many speakers at the West Coast VHF Conference, talked about mechanically switching RF.

through a lull in debris. He feels that (however unlikely) we may actually be crossing in between two knots of debris that were expelled from the 1737 and 1862 orbits, respectively. And that these knots are still being held relatively intact. Nevertheless, he has booked passage on a cruise ship that will be traversing the Mediterranean Sea in order to be able to have the best advantage of observing the storm.

For more on Joe Rao's prediction see this month's *Sky and Telescope* magazine.

What can we expect on the VHF+ frequencies? If the 1946 storm that affected 6 meters and the 1966 *Leonids* storm that affected 2 meters are any indicators, we will be in for a lot of propagation during the one hour, or so, peak or spike. The 6 meter band will appear to be open to everywhere at once on short skip. The 2 meter band will have bursts, or spurts of activity in several directions all at once. These bursts may last as long as more than a minute, thereby making it possible to have multiple QSOs in a particular direction.

The 135 cm band may also exhibit short bursts of propagation, but not lasting nearly as long as 2 meters. Additionally, the 70 cm band may contain possibilities for completion of QSOs during very brief bursts (lasting no more than a few seconds) of activity. Your editor has heard of at least one attempt being planned for 23 cm, that being between Dave Hallidy, KD5RO, and Al Ward, WB5LUA. We will report on the results of their efforts in a future column.

With as the amount of activity that the storm may generate, the VHF+ frequencies, particularly 6 and 2 meters, will be crowded. Therefore, it will be prudent to stay off the calling frequency. Remember the plan I discussed last month for 2 meters. Here is a review of it. It is very simple. Operators who are looking west or south should transmit on 144.195 MHz and successive frequencies lower in the band. Operators who are looking north or east transmit on 144.205 MHz and successive frequencies higher in the band. These frequencies should be spaced 5 kHz apart in order to reduce the QRM. Cooperation in staying off the calling frequency will help make it possible for considerably more operators to make successful meteor contacts during these very unusual conditions.

What kind of equipment is needed for the storm? Probably the minimum station is a multi-mode transceiver and a 100 watt linear amplifier. Many operators have made successful contacts running only 25 watts, however. The antenna should be one which has a fair amount of gain, but a somewhat broad pattern. You will want as broad a pattern as you can obtain without sacrificing gain, because you want to be able to capture the propagation generated by meteors that may not be entirely in line with the direction your antenna is pointing. In fact, all but the simplest EME arrays have patterns that are too narrow to be of much use with the meteors. The Ham Pro H144-15 or the Cushcraft 13B2 is a sufficient antenna. And if you are looking for a used antenna, the Cushcraft 215 WB is an excellent choice.

Are you on satellite? Your multi-mode radio and the 2 meter antenna will be excellent, as long as you use a brick. Additionally, the ability to elevate your antenna may help you make the shorter distance contacts because of the higher angle of the propagated signal of these closer-in stations.

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Are you set up with a couple of high-gain antennas vertically polarized because you principally work long-haul FM on 2 meters? No problem, because unlike tropospheric propagation, polarization is hardly a factor in working the meteors. Just hook up a multi-mode radio and an amplifier to the antennas. Additionally, the broadness of the pattern of the antennas is actually an asset.

Above all, have fun! This event will present plenty of opportunities for everyone to have fun, so be courteous, have lots of fun, and tell me all about your results.

Other Meteor Shower Activities

While not nearly as impressive as the *Perseids* meteor shower, there are a number of southern latitude showers also occurring this month. The *Southern Delta Aquarids* peaks around 29 July. The *Alpha Capricornids* peaks around 30 July. The *Southern Iota Aquarids* peaks around 5 August. The *Northern Delta Aquarids* also peaks around 12 August. The *Northern Iota Aquarids* peaks around 20 August. All of these are considered minor showers with less than 20 rocks falling per hour. Nevertheless, one never knows when one of these showers may suddenly become very active. Operators close to and south of the Equator should be watchful for possible meteor-caused propagation on or around the above dates.

West Coast VHF Conference A Success

Over the weekend of 21-23 May over 300 VHF+ enthusiasts from ten states gathered at the Ventura Holiday Inn for an excellent West Coast VHF Conference. Those of us who made it in Friday night either went out on the town (which was within walking distance), walked with our sweethearts (if they were tolerant enough of us to come along on the trip) on the walkway overlooking the beach, or hung around the hospitality room and watched Gordon West, WB6NOA, demonstrate his GPS receivers.

The seminars began on Saturday morning. There were two running back to back, which made for a difficult choice. At 9 AM Chuck Swedblom, WA6EXV, gave an overview of the microwave spectrum in one room and Tim Marek, NC7K, gave a slide presentation on being a VHF contester and Rover in the other room. At 10 AM Carl Lodstrom, W6/SM6MOM, talked about mechanically switching RF, while Jim Vogler, WA7CJO, spoke on optimizing TWT power output for narrow-band CW/SSB operation.

At 11 AM Rus Healy, NJ2L, spoke on getting on the microwave bands using modern, low-cost equipment, while your editor gave a talk on this month's *Perseids* meteor shower (storm). At 1:30 Doug Sharp, WB2KMY, gave a slide presentation on the W2SZ Contest Group's activities from Mount Greylock, Massachusetts, while Dave Glawson, WA6CGR, spoke on an improved microwave source locking system for more closely determining your 10 GHz frequency. At 2:30 PM Jim Fortney, K6IYK, gave an introduction to packet radio, while Jim Bogdan, WB6IMV, told us how to shop for used test equipment. At 3:30 PM James Wilson spoke on new and improved

Hewlett-Packard/Avantek products, while Rus Healy, NJ2L, spoke on the QST product review process.

For those of us who brought our 6 meter radios, at 4:00 PM it was time to work the 6 meter Sprint. Jack Henry, N6XQ, used an AEA handi-talkie and went up and down the elevator operating "elevator mobile." Evidently, the elevator could serve as a very good RF shield room, because every time the door closed, his signal would drop 20 dB. Roger Wagner, K6LMN, took off to the foothills. A little while later he came on and in a very frustrated voice told of being chased out of a neighborhood by a man who ran out from behind his house in a bathing suit, yelling something about messing up his TV!

Your editor set up a Yaesu FT 650 and an M² SQLOOP that was graciously loaned to me by Myrna Staal, WA6GXF (the better half of M² Antennas). The SQLOOP was set on top of a couple of chairs on the balcony of my eleventh floor room. Mike Ramirez, W6YLZ, accompanied me to my room, and when he saw that I was not making much headway in the contest, he urged me to go up a hill and set up from there. (Being on the north side of the hotel precluded me from being able to work stations to the south.) Because I was missing out on contacts into the Los Angeles area, I decided to go ahead and drive up the hill.

I stuffed the FT 650 in my carry-on bag, grabbed the SQLOOP and the mobile cabling for the radio, loaded everything into the car, and headed for the hill. Upon arrival at the site I raised the hood, clamped the cabling onto the battery, and turned on the radio, only to hear Doug Allen, W2CRS/Ø, calling CQ. Finding out that the band was open, I made several more contacts in eleven more grid squares. (I had already worked about everyone in DM04, my grid square from the hotel room.) By the time I finally had to QRT for the banquet, I had worked 28 stations throughout California, Oregon, Montana, Colorado, Idaho, and Utah.

I almost regretted having to go to the banquet. However, the banquet was very enjoyable, with Julian Macassey, N6ARE, entertaining us with a speech on politics versus technology. Additionally, during the banquet Dave Peters, K16FF, was presented with a well-deserved special plaque for his untiring efforts in organizing the 2 Meter SSB West Coast Net.

Following the banquet we were on our own. Those of us who had devices for the noise figure measuring contest went to the exhibit room to have them checked. Several others went to the hospitality room. Not having anything to test and having visited the hospitality room the night before, I took a stroll on the sidewalk adjacent to the beach (by myself, because my sweetheart had to work and could not accompany me to the conference).

Upon returning to the hotel I ran into Jack Henry, N6XQ, who was looking for me because he had heard Darrell Bevan, N6DX, calling a 5W1 station while listening to 6 meters on his AEA handheld.

Jack suggested that we go to my room to listen on the FT 650 and the SQLOOP. On the way we repeatedly announced Jack's reception report. This commotion caused others to join us. When we finally arrived at my room about ten of us were crowded around the radio waiting for the DX.

Once again finding that the hotel was shield-



At the West Coast VHF Conference banquet Dave Peters, K16FF, received a special plaque from Hank Meyer, W6GGV, for his untiring efforts in organizing the 2 Meter SSB West Coast Net.

ing us from any propagation to the south (we couldn't hear Darrell because he was south of us in Santa Monica), Dan O'Connell, WA7TDZ, volunteered that he was on the south side of the hotel on the same floor. We disassembled the station and headed to Dan's room. By this time the crowd had grown to more than fifteen. Upon arrival, we found that Dan's roommate, Sam Hawley, WA7TDU, had already gone to bed and was fast asleep. Being awakened by all the commotion, Sam was a very good sport and allowed us to barge in on him.

We set the station up and turned it on. We found Darrell and asked him if he had made contact with the 5W1 station. Now out came the awful truth surrounding Darrell's transmissions. It turns out that he was calling the station "on schedule."

No matter, though, because, as true 6 meter operators, we spun the dial to the beacon sub-band. Immediately we heard Larry Lambert, NØLL's beacon. We spun the dial back up to the phone portion and ran into Doug Allen, W2CRS/Ø, working someone in southern California. Upon completion of his QSO, Dan called him and worked him. Following that QSO several others in the room picked up the mic and said hello to Doug.

After the excitement died down from that set of QSOs we once again started spinning the dial. This time we ran into Tim Mc Laughlin, N2PC/Ø, who was formally V73AT. Because most of us had worked Tim while he was on the Marshall Islands, we all had to say hello. Tim finally ended up with about a dozen entries in his log from the eleventh floor of the hotel, plus one entry from Mike Staal, K6MYC, who used his SQLOOP mounted on his car while operating from the parking lot below.

After Larry's beacon finally faded out around 9:30 PM, local time (0430 UTC), most of us faded back to our respective rooms or the hospitality suite.

Sunday morning brought breakfast and a talk given by Wayne Overbeck, N6NB, concerning electromagnetic radiation hazards. Clearly, it was the most thought-provoking talk given at the conference. During and following breakfast many of us gathered at the swap meet. Several good deals were made swap-

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Jack Henry, N6XQ, operates as XF1G, on 10 GHz during their mid May DXpedition. Photo courtesy N6XQ.

ping one person's garage full of junk for another's and vice versa.

(After seeing Jim Sharlow, WB2ODH, in his Rochester VHF Group shirt Friday night, I



Bernardo Gonzalez, XE2HWB, is ready to make VHF+ contacts during the XF1G DXpedition. (Photo courtesy N6XQ)

made sure that I wore mine to the swap meet area in honor of him.)

Around 10 AM several of us gathered on top of the parking garage to measure antennas, to enjoy the last vestiges of fellowship from the conference, and to talk about our plans to attend next year's conference. (Steve Noll, WA6EJO, later reported that over 30 antennas were measured and plotted.)

You had better make your plans to attend, as well. It will once again be at the Ventura Holiday Inn. The dates are tentatively set for 13-15 May or possibly 20-22 May. I will publish the

exact dates as soon as they are available. If you would like a copy of the Proceedings of this year's conference, send \$12.00, plus \$3.50 shipping to the ARRL (225 Main St., Newington, CT 06111).

I know that I speak for all who attended the conference in saying that Steve Noll, WA6EJO, and Jim Sharlow, WB2ODH, went out of their way to make the conference both enjoyable and educational. Thanks again, guys!

Current Conferences

This month: The 19th annual Eastern VHF/UHF/SHF Conference, sponsored by the Eastern VHF Society, the NEVHF Association, and the Northeast Weak-Signal Group, will be held 13-15 August at the Quality Inn, Vernon, Connecticut. Once again the conference chairman is Tom Kirby, W1EJ. The Quality Inn is located on the Hartford Turnpike (State routes 30 and 83) between exits 63 and 64 on I84, nine miles east of Hartford.

Friday night will feature an informal social gathering. Technical talks are scheduled for all day Saturday. Additionally, a noise-figure clinic and contest is scheduled for Saturday afternoon. The traditional banquet will be held on Saturday night. A flea market and antenna gain measurement tests are scheduled for Sunday morning (weather permitting).

For conference registration, send an SASE to Byron Blanchard, N1EKV, 16 Round Hill Road, Lexington, MA 02173. For motel reservations, contact Lori Tozier, at 203-646-5700. Rates are \$49.95 for a single room and \$55.00 for a double room. The prices include a continental breakfast.

September: The annual Microwave Update is scheduled for 24-25 September at the Northwest Atlanta Hilton in Atlanta, Georgia. A block of rooms has been reserved for \$62 per night. For your room, call 404-953-9300 and mention the conference for the special rate. The technical program will be handled by Rick Campbell, KK7B. To date papers on the following subjects have been submitted: 10 GHz transverter construction, waveguide filters, 24 GHz operating experiences, single board 1296 MHz transceivers, advances in low-noise technology, microwave engineering techniques, radio astronomy with a 100 foot dish,

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 YG-455C-1 500 Hz CW filter (2nd IF) 154⁹⁵ **144⁹⁵**
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 DRU-2 Digital record unit; 850/950 131⁹⁵ **124⁹⁵**
 DSP-100 digital signal proc. 450/850 . 669⁹⁵ **609⁹⁵**
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 HW-3 V 2.2 3 1/2" HamWindows IBM soft.139⁹⁵
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 LF-30A 1kw PEP low pass filter 51⁹⁵
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 MC-80 Electret desk mic w/up-down 94⁹⁵
 MC-85 Multi-funct. electret desk mic .. 149⁹⁵ **139⁹⁵**
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 YK-88SN 1.8 KHz SSB filter 94⁹⁵
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 PG-4K 13' remote cable kit 47⁹⁵
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 UT-50S 50w 6m unit 325⁹⁵ **299⁹⁵**
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 UT-440S 35w 440 MHz unit for 641A 325⁹⁵ **299⁹⁵**
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 TSU-4 Decoder 46⁹⁵

Accessories for TH-28A/48A/78A

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 PB-14 300ma 12v (5w) battery 86⁹⁵
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 PB-18 1100ma 7.2v battery 86⁹⁵
 PG-2W DC cable w/fuse 12⁹⁵
 PG-3H Cigarette lighter cord w/filter 27⁹⁵
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 SP-23 External speaker 74⁹⁵
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 TS-50S Compact HF xcvt 1049
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 PB-10 600ma 7.2v battery..... 9⁹⁵
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Current Contests

The ARRL UHF Contest is scheduled for 7-8 August. The contest period is for 24 hours beginning 1800 UTC Saturday. There are several categories for entry. Scoring: Count three points for 222 or 432 MHz contacts, six points for 902 and 1296 MHz contacts, and 12 points for contacts on 2.3 GHz and above. Exchange is your four-digit grid square. New this year is the availability of pins, such as those currently available in other ARRL contests. The minimum number of contacts necessary for a pin is five. Submit your log by 8 September to the League to be eligible for awards. For complete rules, see July QST.

The dates for the first weekend of the seventh annual ARRL 10 GHz cumulative contest are 21-22 August (the second weekend is 18-19 September). The operating times are 8 AM to 8 PM local time each day. Exchange is the six-digit Maidenhead locator (grid square). Scoring is adding the sum of the distances in kilometers of each station worked to the sum of each unique callsign worked multiplied by 100. If you work four unique stations (two of which operated from two separate locations), that are 97, 107, 154, 205, 157, and 147 km apart (for a total of 867 km) then your final score would be 1267 (867 + 400). To be eligible for contest awards, submit your log by 19 October. For complete rules, see June QST.

Remember, 31 August is the deadline for submitting your logs for the CQ WW VHF WPX contest. Please send the completed logs to me by that date in order to be eligible for scoring awards. If you need logs and/or entry sheets, send an SASE to me right away.

Rochester VHF Group Video Tape

The gang at the RVHFG has produced an excellent video tape of their June 1991 contest efforts. Not only is the tape entertaining, it is educational. It will give you ideas for setting up your VHF contest station. This tape truly is top-drawer category. If you would like to have a VHS copy of it to show for one of your club's programs, send \$5.00, plus a video tape mailer with sufficient return postage to: Vic Gauvin, 27 Van Cortland Drive, Pittsford, NY 14534-3046.

XF1G DXpedition To Guadalupe Island

A group of amateurs consisting of Jose Luis Ogawa, XE2TT, Eusebio Morales, XE2EEA, Felix Nunez, XE2JNE, Bernardo Gonzalez, XE2HWB, and Jack Henry, N6XQ, operated a DXpedition from Isle De Guadalupe 15-17 May. The island is 155 miles west of Baja California and 350 miles south of Los Angeles.



Necessity is the mother of invention. After discovering that they forgot the 432 MHz Yagi when they changed locations on the Isle de Guadalupe DXpedition, the guys rigged up this dipole and made a full quieting contact with Al Johnson, KF6YM, who was using only a handheld in his home. (Photo via N6XQ)

The group went to the island principally to give out IOTA contacts. (It is designated NA 179.) However, Bernardo and Jack brought VHF+ equipment for possible contacts from two separate grid squares. (The island is roughly cut through the center by the 29th parallel, thereby placing half of it in DL08 and half in DL09.) Time did not permit, however, any opportunity to make contacts from both grid squares.

Jack reports that all of the QSOs were via tropo paths because, as Murphy would dictate, sporadic-E was very evident both the day before arrival on the island and the day after departure from the island.

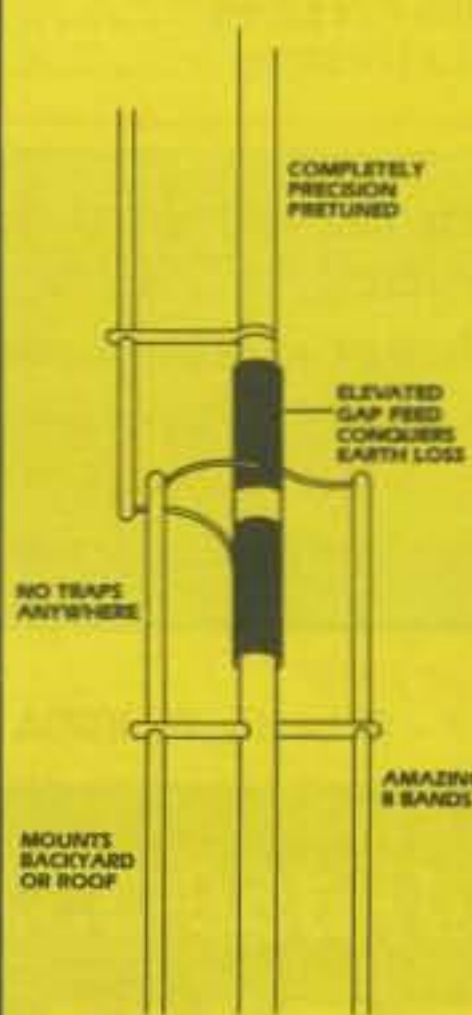
The VHF operators first set up in a crest with poor northern paths because of rolling hills to the north. Their first contact was on 2 meters and was with W6OYJ. When they moved their station to the 4,000 foot peak on Monday, they were able to complete several 10 GHz contacts. The first one was with Phil Lee, W6HCC, over a 375 mile path (to San Bernardino) with 40 dB over nine signals. When Phil returned to his home in Cherry Valley (which is in the flatlands), he was able to complete another 10 GHz QSO with the guys by bouncing the signal off mountains to the north. In spite of the indirect path, he still received an S-5 report.

After their arrival to the peak they discovered that they had forgotten to pack the 432 MHz antenna. Nevertheless, being true hams, they fashioned a dipole from a couple of wires. They worked Al Johnson, KF6YM, who was inside his Running Springs home using an HT with a rubber duck. Signals were full quieting both ways!

The best DX was on 2 meters and was with

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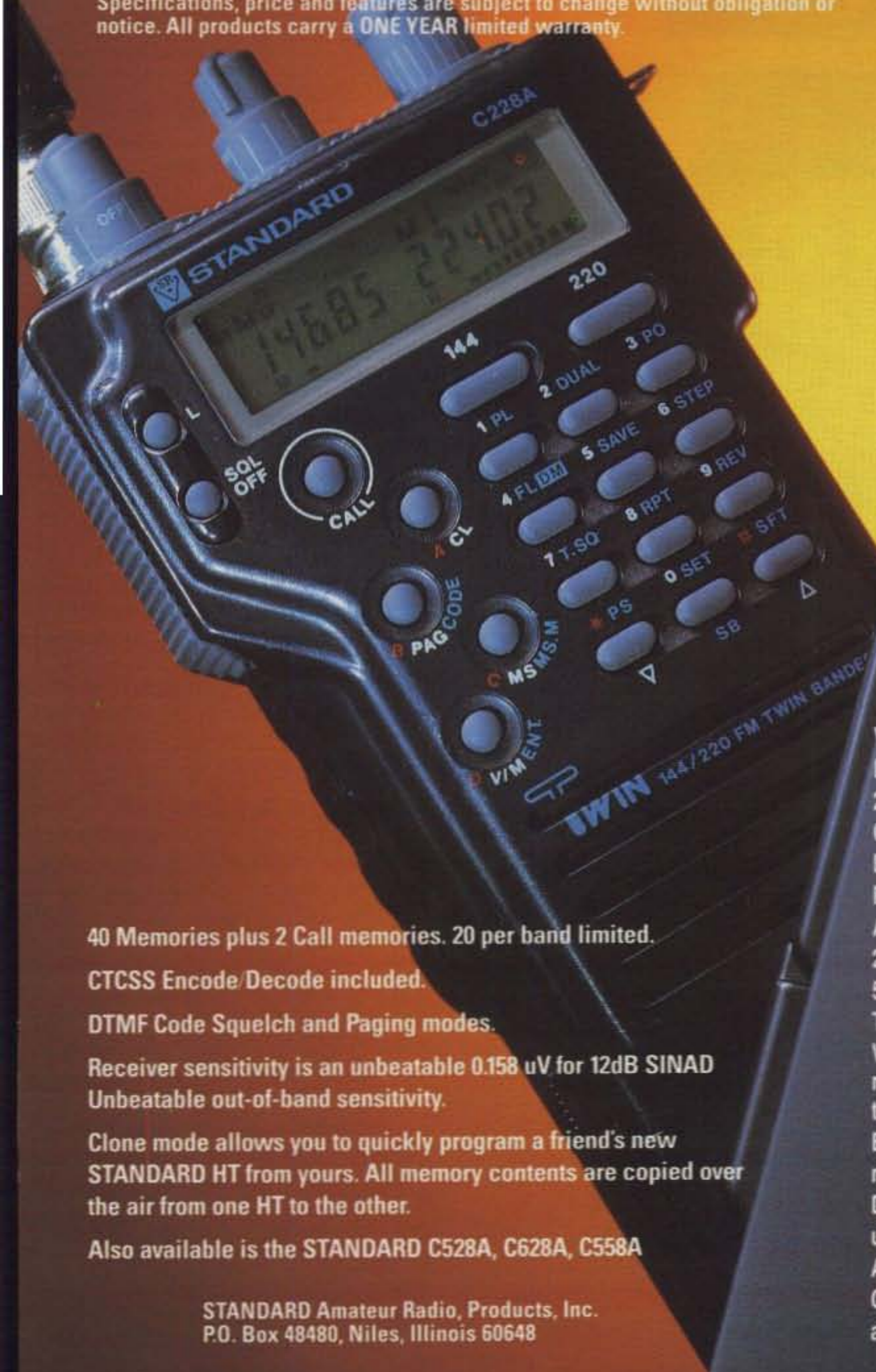
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FT-6200 440KHz	1699.00	Call \$
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Dave, WA6CGR, who was operating portable at Point Reyes, north of San Francisco, a path of almost 700 miles. Dave was running only 10 watts into a 4-element Yagi.

Altogether they completed over 100 contacts, with the bulk being on 2 meters. Jack reports that the hospitality of the fishermen and their families was wonderful. They slept in a small one room school house and their diet wad carne de chivo (goat), frijoles (beans), and tortillas.

Jack related that the camp had a pet goat named Chivo Loco because it was mean and crazy. He says that it would sneak up, chase, and try to butt members of the party with its long horns. He wondered how it escaped the dinner table.

Jack was most fascinated with the sea elephants. He noted that once they were acclimated to the members of the team, they allowed them to pet them.

Jack expresses his appreciation to Jim Sharlow, WB2ODH, and Chip Angle, N6CA, for loaning equipment and handling traffic to the home QTH and providing liaison for the 10 GHz contacts. QSLs for both the HF and VHF operations go to XE2EEA via his Callbook address.

N8NQS Makes Another Trip To DM02

Between 7-10 May Dave Bostedor, N8NQS, made another successful trip to San Clemente Island. The island is owned by the U.S. Government and 90 percent of it lies within the very rare grid square DM02. There is no public access to the island. Therefore, the only way the grid square is activated is by boat or by someone fortunate enough to have permission to land on the island.

This trip, thanks to Jim Sharlow, WB2ODH, and Jack Henry, N6XQ, who met him at his hotel room with arms full of radios and antennas, Dave was able to take equipment for 222 and 432 MHz. Altogether, Dave made 108 contacts, with his best DX being DM09, near Reno, Nevada. He doubts that he will be making any more trips until next spring. However, when he does, he may just take some microwave equipment along.

Dave noted that the guys were more than friendly. He states, "Being quite new to this hobby (only two years), I was happy to make the new friends and enjoyed the venture all the more. I can't wait for the next chance to visit DM02." Neither can we, Dave.

Bill Wiseman, KM1E Again Operates As C6AGN

Between 25 April and 23 May Bill Wiseman, KM1E, operated as C6AGN. Among the highlights are: 28 April, contacts with LU5EEM and LU7DZ; 12 May, contact with YV4AB; 14, heard the KL7GLK (Maryland) and the W3VD beacons, completed contacts in EM48, EM64, EM66, EM68, EM73, EM76, EM84, EM92, FM29, FN20, and FN32; 15 May, made contacts in EL49, EM21, EM40, EM55, EM64, EM66, EM73, EM74, EM81, FN12, FN20, FK38, and FK58, the last two being with HH2PK and HI8W; 23 May, by far the best day, with 56 QSOs in CN84, DM78, EL59, EN40, EN61, EN71, EM09, EM12, EM13, EM14, EM21, EM22, EM27, EM29, EM30, EM31, EM32,

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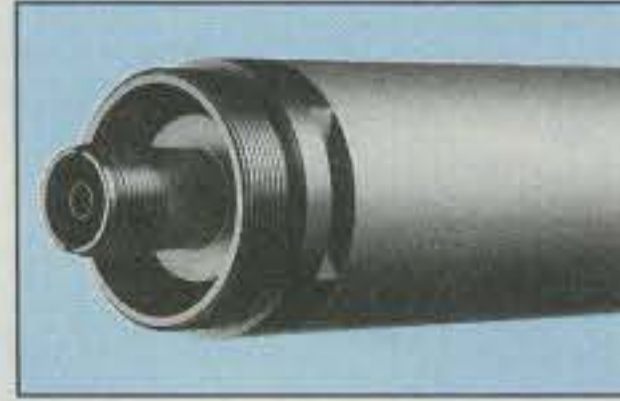
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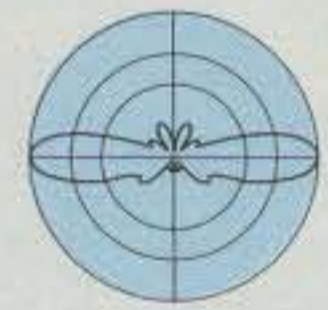
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RADIAL ASSEMBLY



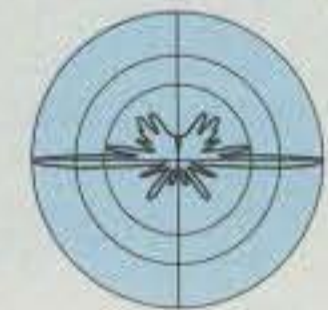
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Xseries

MODEL	BAND(MHz)	GAIN(dBd.)	WATTS	CONN.	HT. Ft.	RATED WIND/ MPH
X-50A	144/440	4.5/7.2	200	UHF	5.6	135
X-200A	144/440	6.0/8.0	200	UHF	8.3	112
X-300A	144/440	6.5/9.0	200	UHF	10.2	112
X-510NA	144/440	8.3/11.7	200	N	17.2	90
X-510MA	144/440	8.3/11.7	200	UHF	17.0	90
X-500HNA	144/440	8.3/11.7	200	N	17.8	90+
X-700HA	144/440	9.3/13.0	200	UHF	24.0	90
X-2200A	144/222	6.0/7.8	150	UHF	11.5	112
X-3200A	144/222/440	6.0/7.8/8:0	100/200	N	10.5	112
X-6000A	144/440/1240	6.5/9.0/10.0	100/100/60	N	10.5	112



147MHz



445MHz

RADIATION PATTERNS FOR
X-500HNA/X-500MA/X-510NA

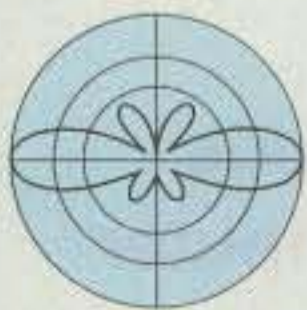
BAND: 144=144 - 148MHz. 222=222 - 225MHz. 420=420 - 430MHz.
430=430 - 440MHz. 440=440 - 450MHz. 1240=1240 - 1300MHz.
* X510NJ :144 - 147 / 430 -440MHz

X510

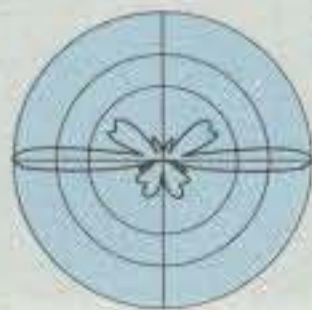
GH/F/U&V series

MODEL	BAND(MHz)	GAIN(dBd.)	WATTS	CON N.	HT. Ft.	RATED WIND/ MPH
DP-GH62	50	6.0	200	UHF	21.0	78
F-22A	144	6.7	200	UHF	10.5	112
F-23A	144	7.8	200	UHF	15.0	90
F-142A	222	5.5	200	UHF	6.0	110
F-718A*	440	11.5	250	N	15.0	110
F-1230A	1240	13.5	100	N	10.5	90
U-200A	440/1240	8.3/11.7	100	N	5.9	135
U-300A	440/1240	8.6/13.2	100	N	8.3	110
U-5000A	144/440/1240	4.5/8.3/11.7	100	N	5.9	135
V-2000A	50/144/440	2.1/6.2/8.4	150	UHF	8.3	110

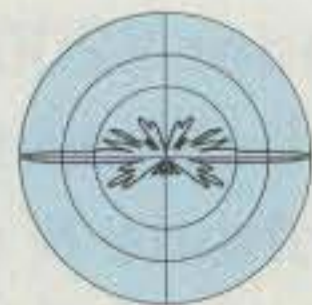
*F-718A:440 - 450MHz, F-718J:430 - 440MHz, F-718L:420 - 430MHz



F-22



U-300A 440MHz



U-300A 1200MHz

F22

U5000

GH62



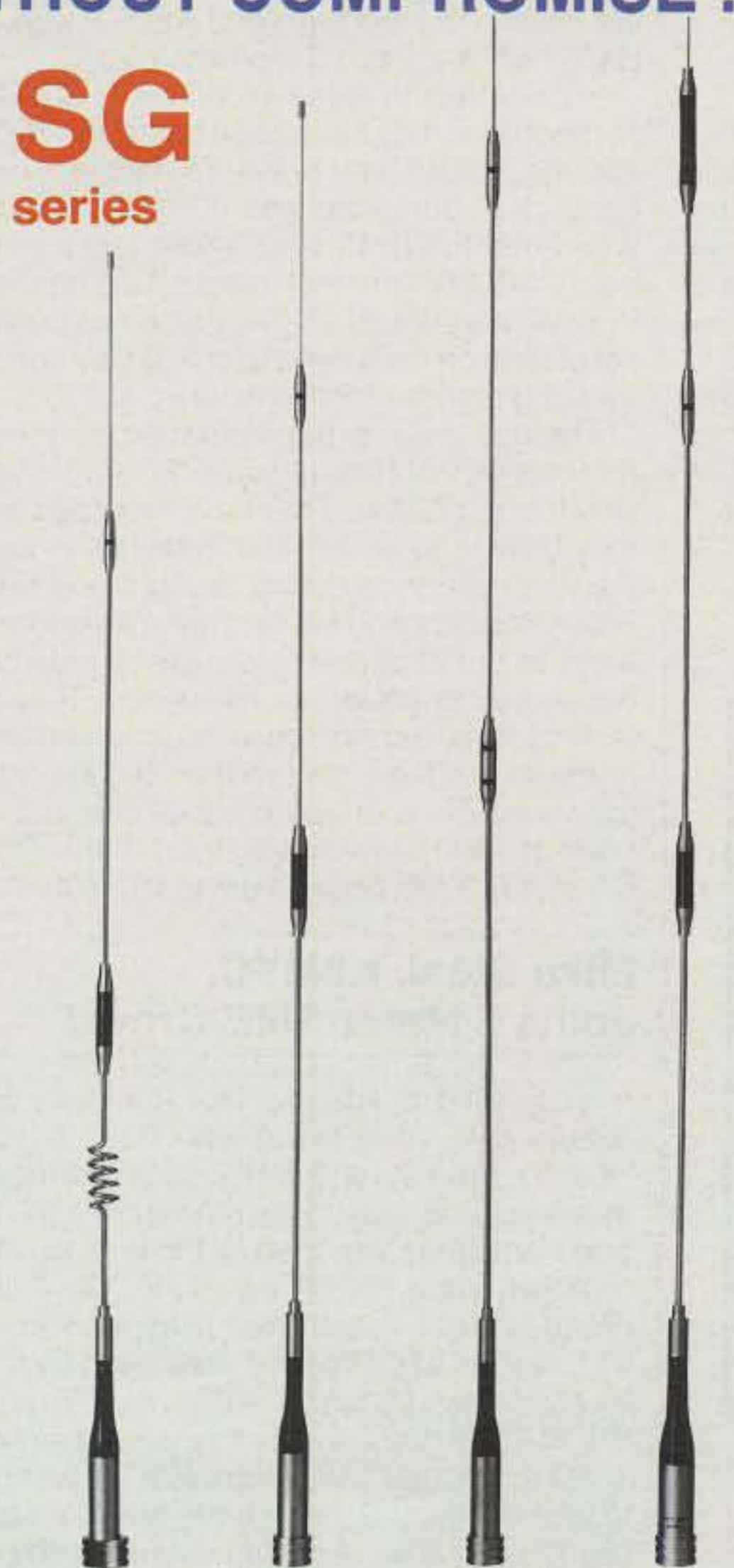
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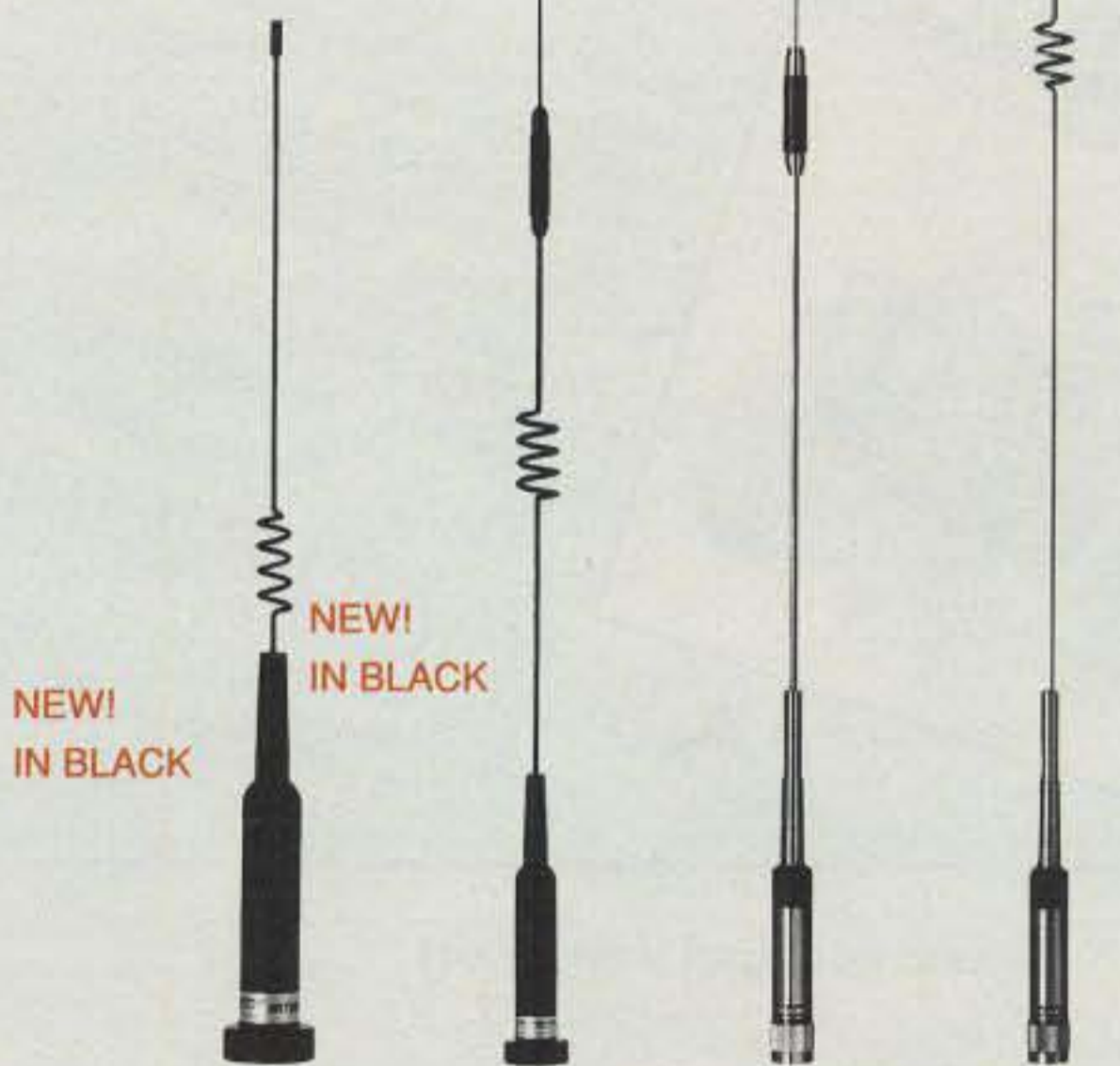
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SG series



SG7200NMO SG7500 SG2000 SG7900

NR series



NR72BNMO NR73BNMO NR770R NR770H

CR series



CR214S CR320A

MODEL	BAND	GAIN(dBd)	POWER (w)	MOUNT	HT (IN)	ELEMENT PHASING
NR-72BNMO	2m/70cm	2.15	100	NMO	13.8	1/4 λ, 1/2 λ
NR-73BNMO	2m/70cm	2.15/5.3	100	NMO	33.5	1/2 λ, 2-5/8 λ
NR-770SA	2m/70cm	2.15/2.15	100	UHF	16.9	1/4 λ, 1/2 λ
NR-770HA	2m/70cm	3.0/5.5	200	UHF	40.2	1/2 λ, 2-5/8 λ
NR-770HNMO	2m/70cm	3.0/5.5	200	NMO	38.2	1/2 λ, 2-5/8 λ
NR-770RA	2m/70cm	3.0/5.5	200	UHF	38.6	1/2 λ, 2-5/8 λ
NR-790A	2m/70cm	4.5/7.2	120	UHF	57.5	6/8 λ, 3-5/8 λ
SG-7000	2m/70cm	2.15/3.8	100	UHF	18.5	1/4 λ, 6/8 λ
SG-7200NMO	2m/70cm	3.2/5.7	150	NMO	36.6	1/2 λ, 2-5/8 λ
SG-7500A	2m/70cm	3.5/6.0	150	UHF	40.6	1/2 λ, 2-5/8 λ

MODEL	BAND	GAIN(dBd)	POWER (w)	MOUNT	HT (IN)	ELEMENT PHASING
SG-7900	2m/70cm	5.0/7.6	150	UHF	62.2	7/8 λ, 3-5/8 λ
SG-2000	2m	5.2	150	UHF	62.6	7/8 λ
NR-140A	1-1/4m	3.8	100	UHF	36.2	5/8 λ
NR-124	23cm	8.4	100	N	25	4-5/8 λ
CR-214S	2m/1-1/4m	2.15/3.4	120	UHF	37	1/2 λ, 5/8 λ
CR-224A	2m/1-1/4m	5.0/6.0	150	UHF	68.5	7/8 λ, 2-5/8 λ
CR-320A	2m/1-1/4m/70cm	2.15/3.8/5.5	200/200/100	UHF	37.4	1/4 λ, 1/2 λ, 2-5/8 λ
NR-2000NA	2m/70cm/23cm	3.15/6.3/9.7	100	N	39	1/2 λ, 2-5/8 λ, 5-5/8 λ

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EM33, EM35, EM38, EM40, EM48, EM57, EM58, EM63, and EM66. Bill reports that he worked Arkansas, Colorado, Idaho, Illinois, Kansas, Louisiana, Missouri, Oklahoma, Oregon, South Dakota, Texas, Utah, and Wyoming. He also had a partial with a VE7, failing to get his prefix. Bill wonders if the second and third hops of the opening were because of a large cloud or two separate clouds. His suspicions are raised because of so many contacts in a widespread area in the west and southwest.

Bill reports that on a number of days he heard the W5VAS beacon, sometimes on meteor scatter and sometimes on sporadic-E propagation. It was the most consistent North American beacon he heard during his trip. Additionally, Bill heard the YV4AB beacon at least a couple of days and the CX1CCC beacon on his first day of propagation. Bill states

that his hat is off to the beacon operators (your editor seconds this tribute). If you need a QSL card, send yours (with an SASE) to his manager, KA1DIG, via his *Callbook* address.

K6QXY and WA6MXI Report On 6 Meter EME Tests

A report was sent by Bob Magnani, K6QXY, and Al Ferrera, WA6MXI, summarizing their tests on the weekend of 6-7 February. The results are as follows: G8RV copies "CQ de K6QXY," using only a 3-element Yagi on a 6 foot boom 30 feet high. SM6PV copies "K6QXY," "CQ de K6QXY," signal strength S1, using an 8-element Yagi on a 10.5 meter boom. PA2HJS copies "CQ de K6QXY," using a home brewed Yagi (YO design) with 9.8 dBd. LA9ZV copies "CQ de K6QXY," "O," and "CQ de K."

SM6FHZ copies "CQ," "K6," "CQ de K6QXY," using two 4-element Yagis, on 4.2 meter booms. G7GHI reported "meteor ping like signals," using a 5-element Yagi. GUØJDN reported "bursts of signals" using a 3-element Yagi. G7BZD copies CW letters but does not copy the code! He tape recorded K6QXY working G4CVI while using a 3-element Yagi.

Subsequent to these experiments Bob and Al report that they have been heard by I5MXX, ZS6WB, W5OZI, and KN5S. To date they have confirmed contacts with OH2BC, G4CVI, W5FF, K5FF, W7HAH (who runs just a single Yagi), N5JHV (another single Yagi station), VE6JW, and WA4NJP. They also ran another set of tests on the weekend of 1-2 May and are awaiting results of these tests.

Through their experimentation they have discovered that Faraday rotation may be very, very fast at 50 MHz. They have recorded what they believe to be full 360° rotations in just a matter of seconds during daylight hours. Because of this phenomenon they are wondering whether or not circular polarization may be a better way to go at that frequency. They are looking for a fast response, high speed chart recorder that they can use (borrow) to confirm their suspicions. If you know of one, contact them at 1500 Los Alamos Road, Santa Rosa, CA 95409-3308, or call them at 707-996-8100.

Mike Staal, K6MYC, Joins 6 Meter EME Crowd

After making his final contact (for now) on 2 meters EME (that being with Dave Batcho, N5JHV), Mike Staal, K6MYC, took down these antennas and put up four 7-element 32 foot boom antennas for 6 meters. His first contacts, however, were not off the moon. On 7 June (Sunday night, local time) Mike worked into VE7. A short while later he was called by Mike, NL7OW, then by LA7C, KL7F, AL7FY, and a fifth KL7 over the course of more than an hour.

Mike reported that it took him seven hours to take down his 2 meter array and put up the new 6 meter array. Additionally, he reports that with his first key down he heard his own echoes.

On The Air

As expected sporadic-E propagation dominates the reports for 6 meters. Several days in May produced widespread openings. Significant were the openings that occurred on 23 May as attested to by the above report from Bill Wiseman, C6AGN. Randy Galloway, KN4QS, reported working KT7V in DN72 and N0XX/7 in CN84, using only 3 watts! Additionally, your editor, operating asXE2/ N6ØL between 27-30 May, experienced openings every day I was in Ojinaga, Mexico (grid square DL79). The most significant date was Sunday, 30 May.

Reports of CU1EZ being worked all over the east and central part of the U.S. on Wednesday evening (3 June UTC) have surfaced. Additionally, Carl Huether, KM1H, reported that he worked EH3LL, for country number 81 on 5 June. Additional reports of east coast stations working into Europe on that weekend have also surfaced.

Reports of 2 meters and above indicated a widespread opening during the first week of June. A stationary front, stretching between

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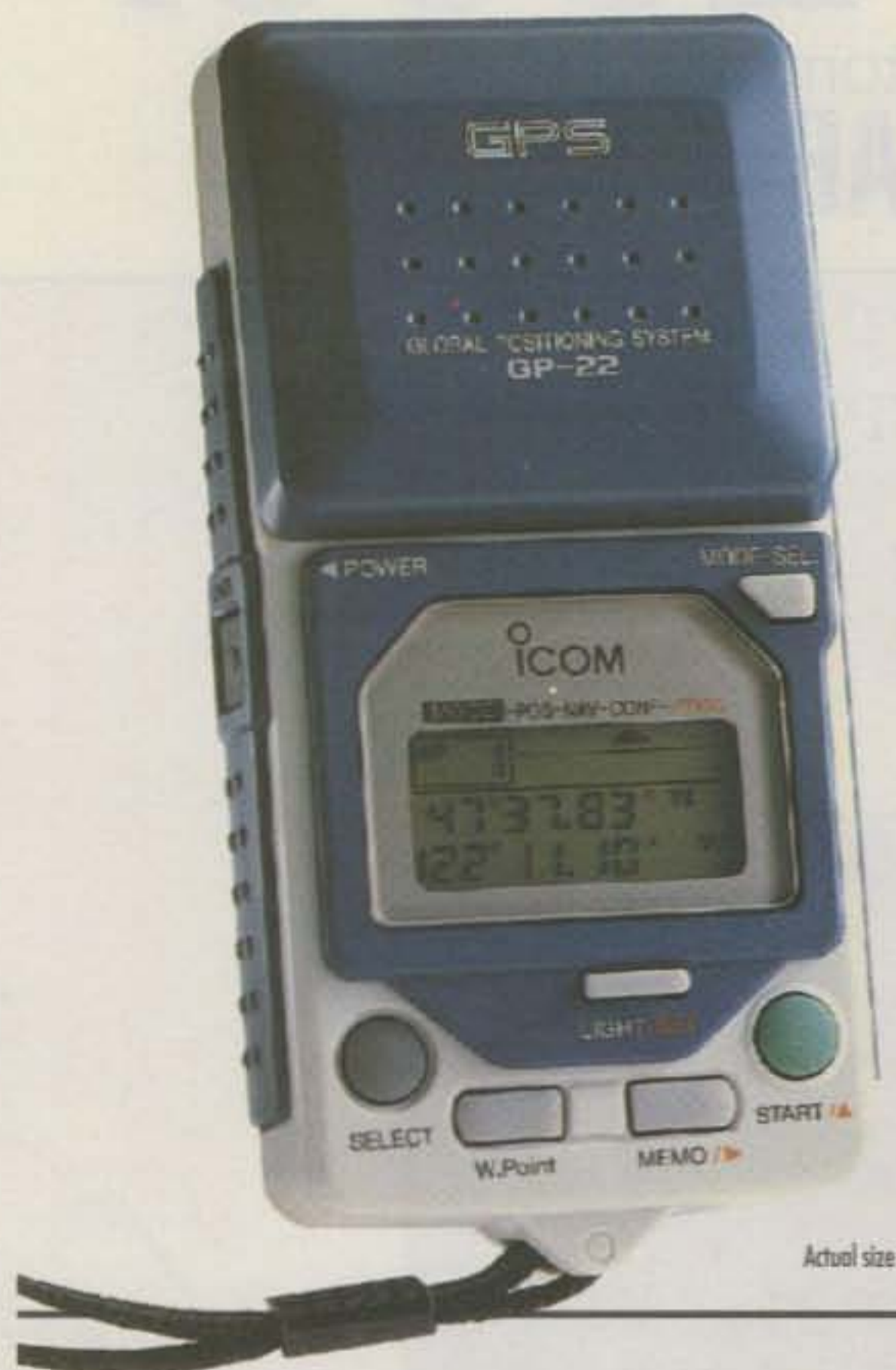
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Oklahoma and Kentucky, created conditions just right for long-haul tropo. One report issued by Bob, KA2DRH, on the Southeast Packet Cluster Net was of his hearing W5SFW in DM95, a distance normally typical of sporadic-E. Randy Galloway, NN4QS, typical of the operators on the air at the time, reports the following: On 3 June, KG5DF, EL18, 2 meters, W5VY, EL09, 70 cm. On 4 June, W5SUS, EL88, WB4OOJ, EL88, KC4ZCE, EL86, NV5W, EL09, W4ZD, EL97, WA1GUD, EL87, WB4JEM, EL79, all on 2 meters, and WA1GUD, EL87, on 70 cm. Randy goes on to say that after the front passed through, he worked N8TLZ, FM09, for yet another new one on 2 meters. Additional reports show WA4VCC calling out KB5IUA, NV5W, and KF5OF, and AC4OP calling out NZ5C and N5LKC, all on 3 June. As I am writing this column, Gary Gerber, KB0HH, called to tell me that last night (10 June UTC) 6 meters was wide open to everywhere and 2 meters had sporadic-E propagation between Chicago and Arizona. More on this next month.

And Finally

I have run out of space! So many reports and so little space. Thanks so much to all of you who support this, your column, with your reports and notes of encouragement. Next month I will write about my trip to Mexico as well as more of your exciting activities on the VHF+ frequencies. Please remember that you can FAX your reports to me. My FAX number is 405-528-0746. Additionally, you can leave a message for me on CompuServe, or even call me on the phone. Until next month...

73, Joe, N6CL

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YAESU FT-411E (C) • 2m, 140-150MHz (tx), 140-174MHz (rx). 2½w FM HT. LCD, keypad and rotary-dial freq entry. 5½"h 2½"w x 1½"d, .85 lb. **SALE \$299.95**

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YAESU FT-911 (A) • 1w, 1.2GHz **SALE \$429.95**

YAESU FT-416 Black 2m FM HT/batt/chgr **SALE \$339.95**

YAESU FT-816 Black 440 FM HT/batt/chgr **SALE \$379.95**

YAESU FT-470 (B) • 2m/440MHz, 2.3w, FM HT. Similar to FT-411/811. Simult. receive, both bands, 21 memories/band. 6½"h x 2½"w x 1½"d, .88 lbs. **SALE \$389.95**

\$30 Coupon

on FT-470 - until 8/31/93

YAESU FT-415 (D) • 2m FM HT. 2w, 130-174MHz/rx (140-150MHz tx). Dual VFOs, 41 tunable memories. 2½"w x 5½" h x 1½"d, 12½ oz. **CLOSEOUT \$319.95**

FT-815 • Similar to FT-415 but 70cm, 2W, 430-450MHz receive and transmit. **CLOSEOUT \$349.95**

These are similar to FT-415/815 but without TTP

FT-26/25 • 2-meters, 2W, 130-174MHz receive and 140-150MHz transmit **SALE \$249.95**

FT-26/27 • 2-meters, 5W, 130-174MHz receive and 140-150MHz transmit **SALE \$279.95**

FT-76/25 • 70cm, 2W, 430/450 MHz. **SALE \$279.95**

YAESU FT-23R-17 (E) • 2m FM HT 2.5w output, rotary dial frequency entry, LCD display, 10 memories, scanning, priority. Rugged and weatherproofed. 4½"h 2½" x 1½"d, 1 lb. **SALE \$239.95**

FT-23R-12 • as above but 2m, 5w. **SALE \$249.95**

FT-33R • 220 MHz FM, 5w **SALE \$289.95**

FT-530 • 2m/440 FM HT w/TTP **SALE \$479.95**

FRG-100B (rt) • Shortwave receiver **SALE \$559.95**

FRG-8800 • Shortwave receiver **SALE \$659.95**

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G-250 • Light duty, 4 sq. ft. rotor **\$114.95**

G-400RC • Light/medium duty, 11 sq. ft. **\$239.95**

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G-800S • Med/hvy duty, 21 sq. ft., 450° rot. ... **\$319.95**

G-800SDX • Med/hvy duty, 21 sq. ft., presets. ... **\$359.95**

G-1000SDX • HD, 21 sq. ft., 450° rot/presets **\$449.95**

G-2700SDX • HD, 34 sq. ft., 450° rot/presets **\$899.95**

G-5400B • Light/med, 11 sq. ft. az/el combo **\$479.95**

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&
FT-890/AT
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YAESU FT-890 • 100W 160-10m all mode transceiver with 100kHz-30MHz receiver. Optional internal automatic antenna tuner. 13.5VDC @ 20A. 9½"w x 3½" x 9½"d, 12.3 lbs. **SALE \$1159**

YAESU FT-890/AT • w/ant tuner **SALE \$1329**



YAESU FT-747GX (left) • 100W, 160-10M SSB/CW base or mobile transceiver with 100kHz-30MHz receiver, and optional FM transmit7 receive. 12V DC @ 20A. 3½"h x 9½"w x 9½"d, 7 lbs. **SALE \$749.95**



YAESU FT-650 (right) • 100W, 6, 10 & 12M all mode with 24.5-56.0 MHz receive. 105 memories: 99 for channels, 4 programmable scan memories and 2 priority channels. Built-in AC supply or 12V DC @ 18A. 5½"h x 11½"w x 11½"d, 18 lbs. **SALE \$1479**

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In Memorium

**JA1MP
SAKO HASEGAWA**

March 10, 1929 to June 12, 1993
Founder, Chairman of the Board
Yaesu Musen Co., Ltd.
Tokyo, Japan

As an electronic engineer and amateur radio experimenter, Mr. Hasegawa introduced Single Sideband Radio telephony to amateur bands in Japan in 1956. He constructed SSB generators based on the works of his contemporaries in the U.S., and soon had many requests for complete transmitters and receivers. In 1959 he incorporated Yaesu Musen Co., Ltd. to meet the demand for this equipment. From his inspiration and under his guidance, the company developed the FT-101 transceiver which revolutionized amateur radio. His spirit of innovation and engineering excellence continued with the development of Yaesu's flagship transceiver, FT-1000, that has set a standard by which other top flight transceivers are compared. Mr. Hasegawa was known throughout the company as a hands-on president, taking personal interest not only in the lives and work of each of his employees, but in everyone who chose to use Yaesu equipment.

His call sign, JA1MP became well known in many countries. He was awarded the first Japanese RTTY WAC award in 1971, and remained active in amateur radio and associated activities throughout his life. During the 1980's he co-founded and served as president of the Japan Amateur Industry Association.

As a testimony to Mr. Hasegawa's pioneering spirit and interest in technological advancement, Yaesu has become a leading manufacturer of radio communications equipment throughout the world.

YAESU U.S.A.

Cerritos, California

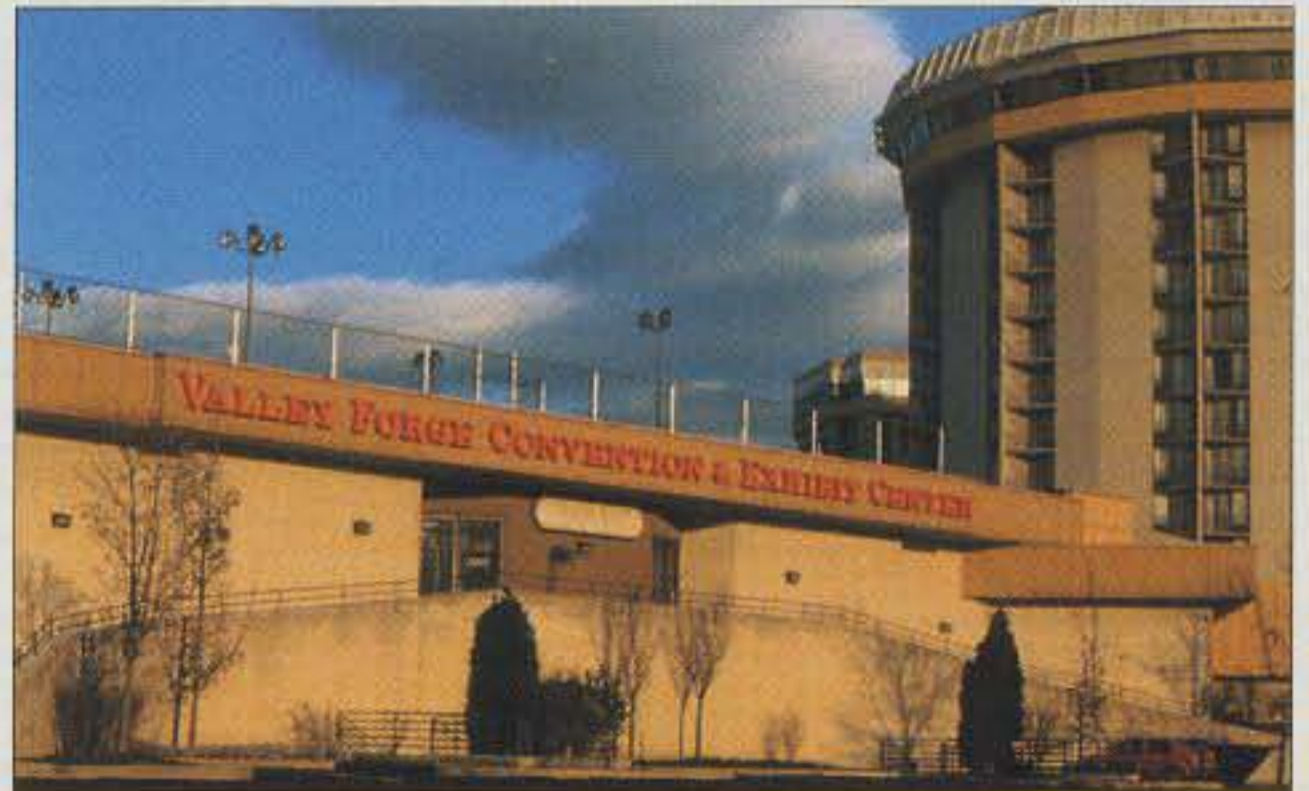


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PRESENTS
VALLEY FORGE



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CQ SHOWCASE

PolyPhaser Corp. Grounded Bulkhead Entrance Panels

PolyPhaser's series of Grounded Bulkhead Entrance Panels facilitate transmission line entry into a communications building. These units feature a fully adjustable clamping support on the inside of each of the weatherized ports. The support acts as a ground kit and mechanically secures a coax or rigid line up to 3 1/8 inches in diameter. Each port has a rubber boot that provides a watertight, flexible means of sealing each incoming coax line. The entrance panel is made of 1/8 inch half hard copper with threaded holes for extra surface area interconnections. Universal PolyPhaser® coaxial protector mounting adapters are pro-



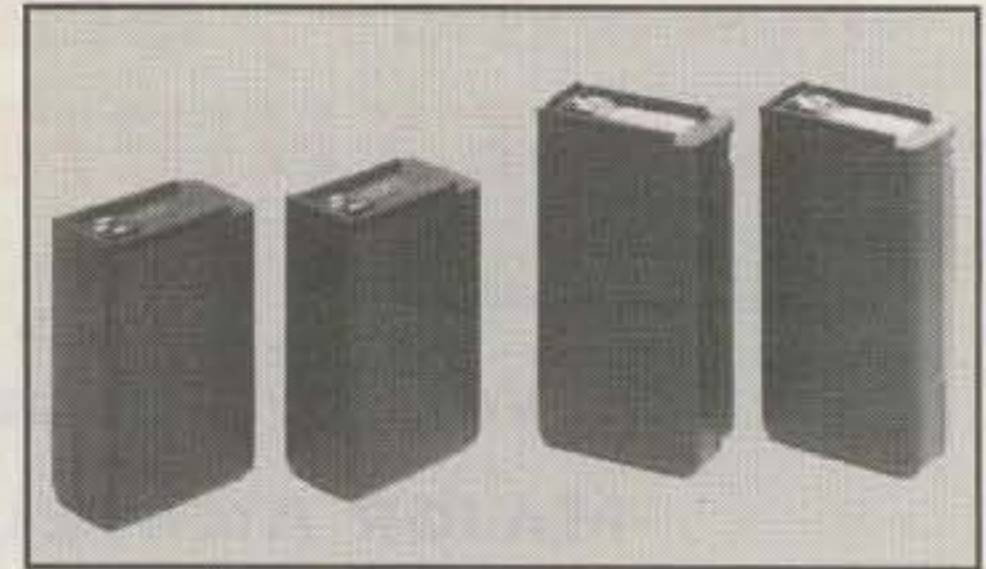
vided in the form of a subpanel on which to secure their "Lightning Arrestor." The mounting panel is removable to facilitate elliptical or rectangular wave guide. Also included are two 15

foot long, 6 inch wide copper grounding straps and a sandwich-bar for a low-impedance, high surface area connection to the perimeter ground system.

The Bulkhead Entrance Panels are available in 3, 5, 8, 16, and 24 port sizes. Prices start at \$650.95 US. For more information, contact PolyPhaser Corp., Customer Service Dept., P.O. Box 9000, Minden, NV 89423-9000 (800-325-7170), or circle number 105 on the reader service card.

Periphex Battery Packs For Yaesu Handhelds

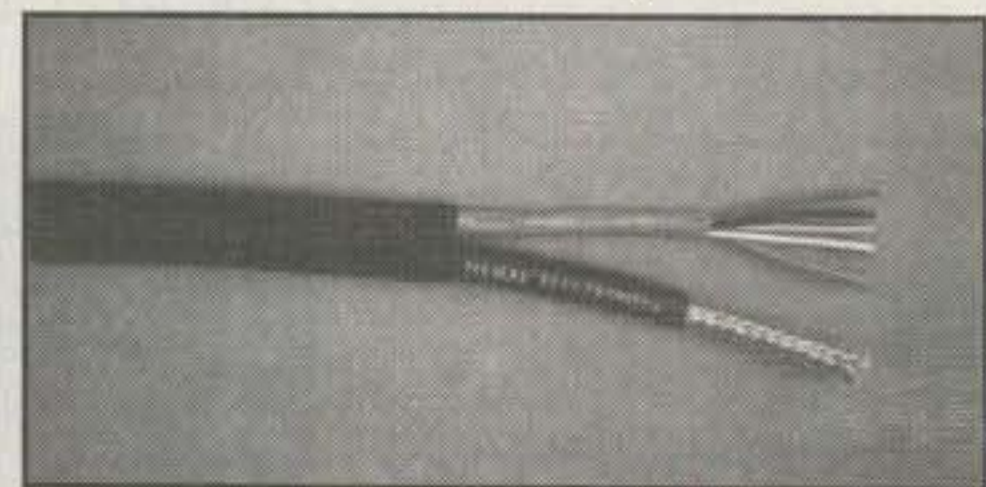
Periphex has announced longer operating time, higher capacity, lower cost batteries for the Yaesu FT-26, FT-76, FT-415, FT-815, and FT-530 handheld radios. The FNB-26S (7.2 volts, 1400 mah) offers a 40% increase in operating time at low power, while the FNB-27S (12 volts, 800 mah) offers a 33% increase in oper-



ating time at 5 watts output. Both batteries are priced at \$65 and are 3.75 inches tall. Also available are the standard FNB-26 and FNB-27 (3 inches tall) for \$60. All battery packs include overcharge protection, over-temperature protection, short-circuit protection, and a one-year warranty. For further information, contact Periphex, Inc., 115-1B Hurley Rd., Oxford, CT 06478 (800-634-8132; in CT 203-264-3985), or circle number 104 on the reader service card.

Nemal's HAMCABLE

Nemal Electronics International has introduced a line of composite RF/Control cables. The HAMCABLE constructions consist of a coaxial cable and 8-conductor rotor cable with an overall weather-resistant jacket. Available



versions include RG8, RG8X, or RG213 for coaxial members with either standard 8C1822 or heavy-duty 8C1620 for rotor control. Part No. HC100 consists of RG8 low-loss foam with 8C1822 and a black jacket. Other constructions and colors are available by special order.

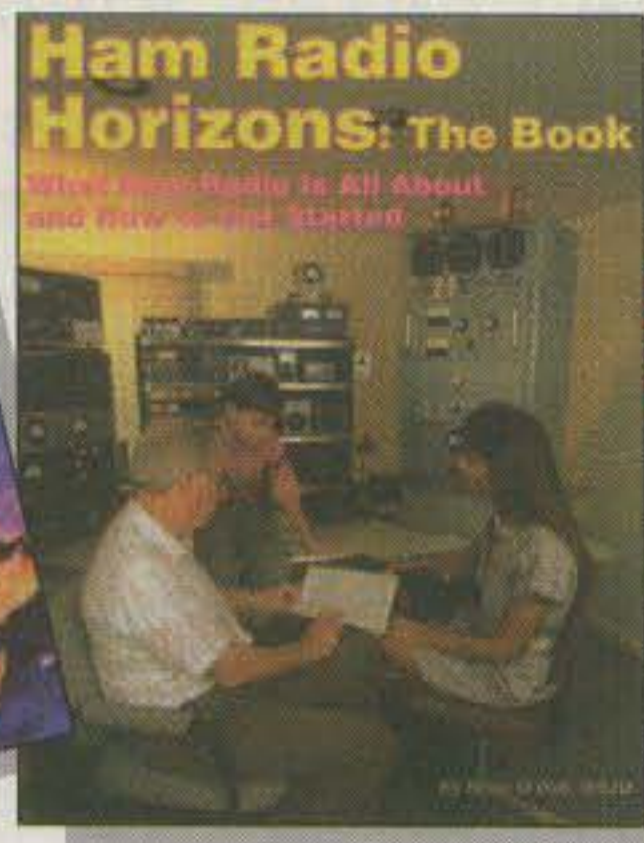
For more information, contact Nemal Electronics International, Inc. 12240 NE 14th Ave., North Miami, FL 33161 (phone 305-899-0900, or FAX 305-895-8178), or circle number 101 on the reader service card.



PRESENTS

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CQ Communications, 76 North Broadway, Hicksville, NY 11801
or call 516-681-2922 FAX: 516-681-2926

AEA Automatic Tuner For IsoLoop 10-30

The new IT-1 IsoTuner automatically tunes the IsoLoop to any frequency from 10 to 30 MHz. The IT-1's features include one-touch tuning, eight memories for storage settings, 10-segment multi-purpose LED bar, typical tune-up time of 1 to 2 seconds, serial interface



for remote control, and 12-button keypad with audible beep.

The IT-1 has a suggested list price of \$279. For more information, contact Advanced Electronic Applications, Inc., 2006 196th St. SW, Lynnwood, WA 98036 (800-432-8873), or circle number 102 on the reader service card.

Micro-Ohm Measurements Ohm Extender

The Ohm Extender, when combined with the user's digital multimeter, permits reading down through the milli-ohm range into the lower portion of the micro-ohm range. The user can therefore measure shunt resistors; precisely determine wire length; verify circuit



board trace resistance; read motor, transformer, and choke values; and check switch and relay contacts.

The unit is battery operated (two D-cells, not included). The unit also carries a one-year limited warranty. It is priced at \$161. For more information, contact Micro-Ohm Measurements, P.O. Box 460, Brookshire, TX 77423 (713-934-4659), or circle number 103 on the reader service card.

Connect Systems CS-900 Control Station Interconnect

The CS-900 control station interconnect incorporates one-half second Electronic Voice Delay (EVD), built-in programming keyboard with digital display, speed dialer, last number redial, toll restrict, land to mobile selective calling, ringout on 1-9 ring, busy channel monitor, line in use detect, call waiting, and more. The CS-900 is voice activated and can be used simplex or through any remotely located repeater. The standard EVD prevents syllable and word clipping.

For more information, contact Connect Systems Inc., 2064 Eastman Ave., Suite 113, Ventura, CA 93003 (805-642-7184), or circle number 101 on the reader service card.

Ten-Tec Scout 555 HF Transceiver

TEN-TEC has introduced the Scout 555 miniature HF transceiver. Plug in the desired band module and run SSB or CW on any band 160-10 meters, including the WARC bands. The 555 comes with one band module of your choice. It measures 2.5" x 7.25" x 9.75" and weighs 5 lbs. This 50 watt travel companion has a patented Jones filter, which provides a variable bandwidth 9-pole crystal filter from 500 Hz to 2.5 kHz. A RISC microprocessor runs the FLS frequency lock system to keep



VFO virtually drift free, maker says, and manages a built-in iambic keyer.

Standard features include: QSK, offset tuning, 3 inch speaker, and one band module of choice. For more information, contact Ten-Tec, P.O. Box 8010, Sevierville, TN 37864 (800-833-7373).

2 IN 1

Now you can have a high gain antenna on your dual band HT with the AL800.

An impressive gain 3.2 dBd on 2 meters and 5.6 dBd on 70 cm lets you enjoy dependable QSO's, where other antennas would fail, (and it collapses for convenience)

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440 MHz - 5.6dBd	IMPEDANCE: 50 ohms.



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ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

New Antenna Stuff '93

In Part III of this series we continue along in the same vein as in the past two months, this time covering new books, in addition to antenna items and software. Let's get going!

Antennas and Related Items

Two New Antennas from MFJ. MFJ, long known for its wide-ranging amateur and SWL-oriented accessories, is slowly building up a product line of highly competitive HF, VHF, and UHF antennas. Two of their new antennas bear noting here.

First is the MFJ-1796, a halfwave vertical for HF that is relatively ground independent and requires no radials, ground connection, or counterpoise wires. The antenna covers 40, 20, 15, 10, 6, and 2 meters, yet is only 10 feet high with a 24 inch "footprint." Frequency selection is automatic, with nothing to adjust. End loading with high-Q coils offers multi-band capability with a full electrical half wavelength on each HF band.

A combination of capacitive hat and inductive end loading delivers close to a 50 ohm match to coax; SWR is claimed to be better than 1.5:1 at resonance on each band. Pattern distortion and power loss caused by feedline radiation are minimized by decoupling and isolation of the feedline from the antenna with a ferrite choke balun. The antenna is priced at \$169.95.

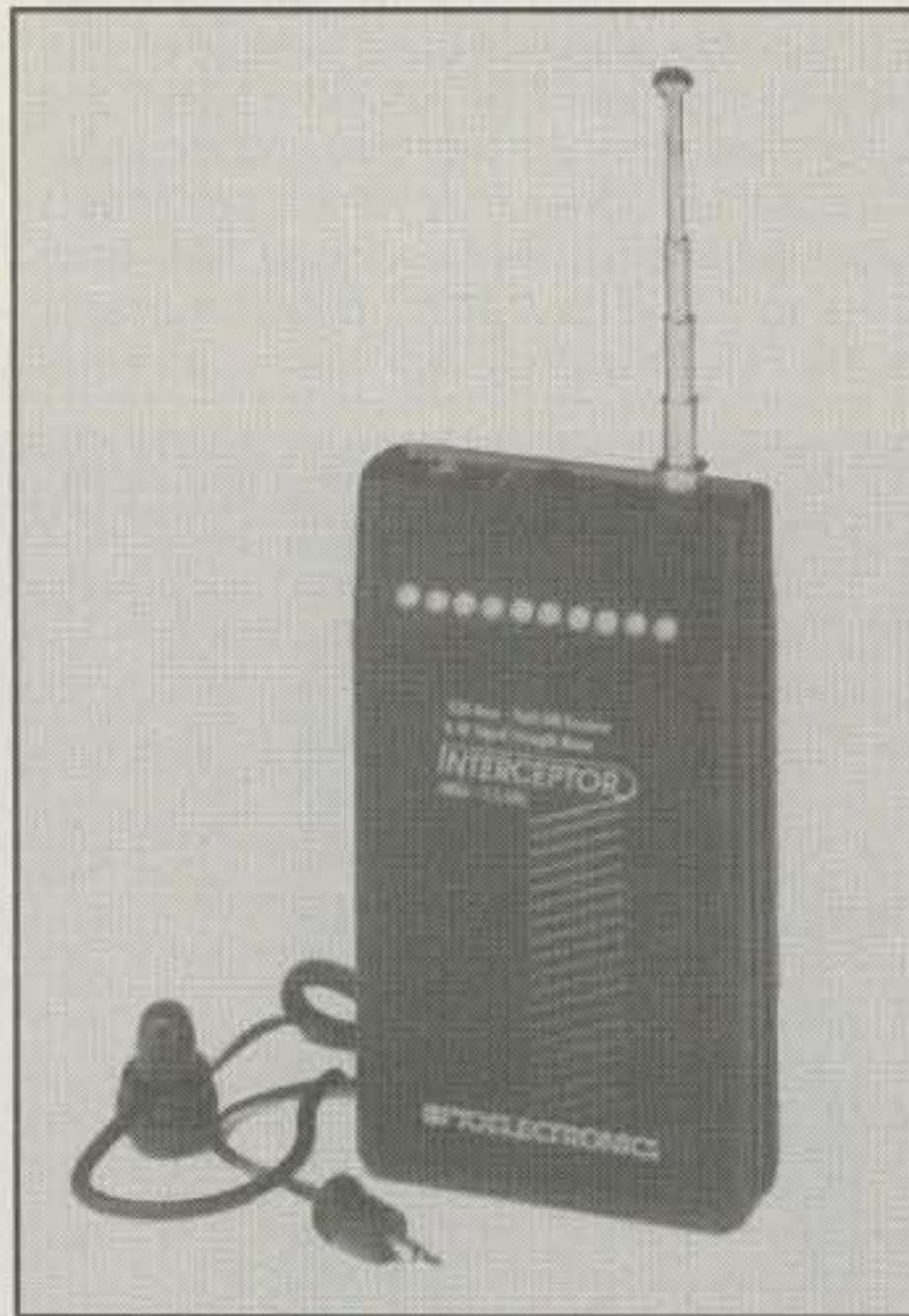
Also new is the MFJ-1784 Super Loop™. It's a very small, but reasonably efficient, 10-30 MHz continuous coverage transmitting loop only 36 inches in diameter. The antenna's compact nature lets you take it with you and have it operating in minutes from practically anywhere—on trips and vacations, from hotels and motels, on a DXpedition, or while camping. The antenna also is a good candidate for at-home installations where space is limited, as in apartments, condominiums, attics, and small lots.

The Super Loop is a remotely tuned, high-Q antenna with a narrow bandwidth; the thick-wall aluminum radiator features all welded construction. The antenna doesn't need a ground, radials, or counterpoise. It handles up to 150 watts over 10-30 MHz, including the WARC bands, with SWR less than 1.3:1. The remote control, with a built-in cross-needle SWR bridge and wattmeter, is included; it automatically tunes the antenna to the desired band. A separate control cable is not required, since the coax carries both RF power and tuning control signals. It's \$199.95.

For more information contact MFJ Enterprises, Inc., Box 494, Mississippi State, MS 39762 (1-800-647-1800).

Optoelectronics RF Communications Interceptors. Fairly new on the scene is the

289 Poplar Drive, Millbrook, AL 36054



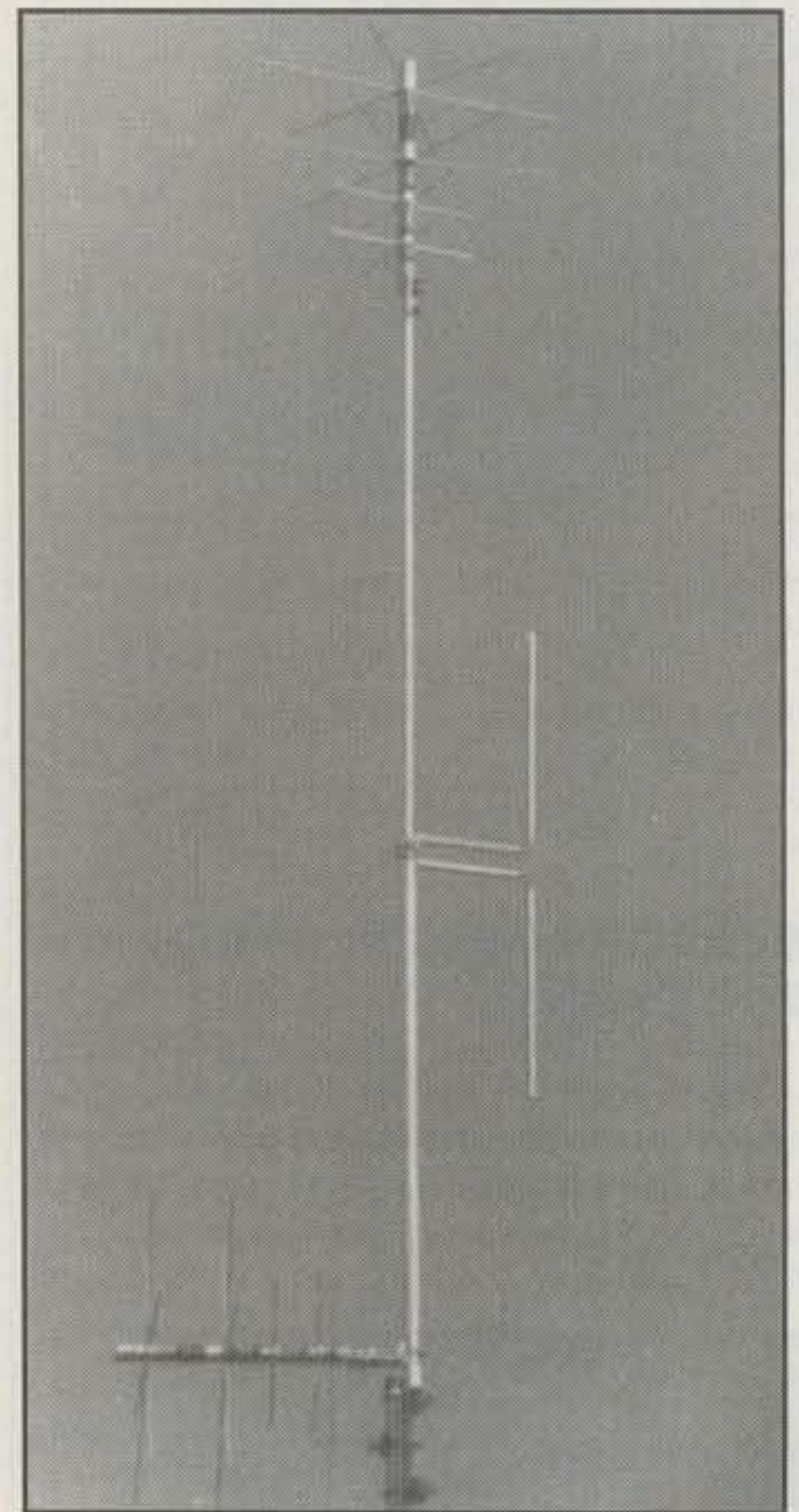
The Optoelectronics R20 AM Interceptor is both a sensitive RF signal-strength meter and a near-field AM receiver. The 10-segment LED bargraph responds with nominal 3 dB increments to RF signals received by the built-in antenna. The R20 is pager-size and covers 0.5 MHz to 2.5 GHz. A comparable FM model, the R10, also is available.

(Photo courtesy Optoelectronics, Inc.)

RF Communications Interceptor™. This wideband device intercepts, detects, and captures nearby radio transmissions, which eliminates searching, scanning, or tuning for them, so you don't have to tune through the radio spectrum to find signals. Both AM and FM models are available.

The R20 AM Interceptor is both a sensitive RF signal strength meter and a near-field AM receiver. The 10-segment LED bargraph responds with nominal 3 dB increments to signals received through the built-in antenna. You can think of the R20 as a high-tech version of the crystal radio with microwave diodes and transistors replacing the classic chunk of galena. Amplitude-modulated signals are detected and audio is processed using automatic level control circuitry, eliminating the need for a volume control. An earphone is supplied.

The R20 is pager-size and covers 0.5 MHz to 2.5 GHz. The set is designed especially for communications testing and aircraft communications monitoring, but you can listen to any AM-modulated signal, including CB radio and AM broadcast. You can use the signal strength bargraph for RF field strength measurements, to check transmitter output, locate "stuck" rigs, test microwave oven leak-



The compact MFJ-1796 HF halfwave vertical is relatively ground independent, meaning that no radials, counterpoise, or ground wires are needed for proper operation. The low-angle radiator covers 40, 20, 15, 10, 6, and 2 meters. (Photo courtesy MFJ Enterprises)

age, and ferret out hidden transmitters. It's \$119.

A companion unit, the R10, lets you find signals from any FM transmitter over 30 MHz to 2 GHz. Tuning is automatic. A dual, ten-segment LED bargraph provides deviation and relative signal level indication. It's \$359. Also offered is the TC200 Tone Counter, a companion for the R10, to measure subaudible signaling tones. The \$179 accessory also can be used with scanners and communications receivers to monitor transmitted subaudible tones.

For more details, contact Optoelectronics, Inc., 5821 N.E. 14th Avenue, Ft. Lauderdale, FL 33334 (1-800-327-5912).

Autek SWR Bridge/Wattmeter. Autek Research has for many years offered the Model QF1A Active Audio Filter as its main product. It's a highly flexible selectivity-enhancing device for SSB, CW, or AM receivers and transceivers. It allows razor-sharp reception and a high degree of QRM rejection

Super-Duper V5.0						ET5D1
Band	15	20	40	80	160	All
QSOs	3					3
Dupes						
Mults	3					3
Pts	9					9
WPX Contest						
Score:						27

2nd February 1993 - 17:27:58

Band	Time	QSO	Call	RST	Serial
10m	16:26	001	VK1AAA	59	059 Mult
10m	16:27	002	ZL1888	59	059 Mult
10m	16:27	003	XZ2AA	59	059 Mult
10m	17:27	004	HELP.....		
			OVR		

Press any key to continue

Help

F1 - States/Zones next band HF
 F2 - States/Zones next band LF
 F3 - States/Zones on all bands
 F4 - Countries by Continent
 F5 - Countries worked by band
 F6 - Single Country wkd/needed
 F9 - QSOs by Call
 F10- Quick Memory Recall
 Comma - Calls by Prefix
 Full Stop - Calls by Suffix
 Minus - Abandon QSO or Edit
 Esc - Delete or Restore Field

END BAND HELP MEMO
 ONLINE OFFLINE DUMLOG RST
 SOUND NOSOUND WRITELOG
 BXX Change to Band XX

Editing - Enter QSO number
 F1/F2 - Edit Band HF/LF
 Insert - Toggle OVR/INS Mode
 Space Expand Field in OVR Mode
 \ # ' Toggle Keyboard/Log Mode

Fig. 1—Super-Duper, offered by Paul O’Kane, EI5DI, is a highly competent PC logger designed for several international competitions such as the CQ WW and WPX contests and the IARU HF Championship, together with RSGB contests for both U.K. and DX entrants. The \$35 program boasts several impressive features, as described in the text of this month’s column.

by electronically shaping the receiver’s audio-response curve.

Less well known, but of equal quality, is Autek’s Model WM1 Computing SWR Bridge and Wattmeter. It’s a capable dual-meter unit that offers several features many other units don’t offer. Among these are fast, automatic computing of SWR; selectable PEP and average power reading; a remote RF head that lets you position the coax up to 4 feet from the meter; dual linear 2³/₈ inch meters; usability from under 1 watt to 2000 watts with three power scales of 20, 200, and 2000 watts; high measurement accuracy of both power and SWR; and negligible insertion loss.

The WM1 is \$119 plus \$6 shipping/handling from Autek Research, Box 302B, Odesa, FL 33556 (813-920-5810).

ANT-Ventures Update. In the September 1992 column we profiled the ANT-Ventures line of quarter-wave linear matching transformers (LMTs). These devices let you efficiently use your 50 ohm radios and antennas with 75 ohm hardline of the type used by cable TV companies. The LMTs connect directly to the 75 ohm hardline and mate with standard UHF male connectors. The units cover 146 to 445 MHz in four models priced from \$22.95 to \$24.95, depending on band. We also noted that ANT-Ventures offers hardline-compatible UHF-type male and female connectors (\$5.95) that feature easy, fast installation without the need for special tools. Also available is a 75 ohm hardline cable splice (\$6.95).

A novel new offering looks like a weather vane but actually is an antenna. It’s called the “Stealthy Antenna” and is for locations where restrictive covenants or ordinances might force you off the air. The antenna, essentially a halfwave vertical, comes in mod-

els for 146, 223, and 445 MHz. The Stealthy Antenna looks like (and is) a functional weather vane, so anyone looking for your antenna will have trouble finding it. Each model is \$59.95. A special “neighbor version” that looks like the Stealthy Antenna but actually is *only* a weather vane, is \$24.95.

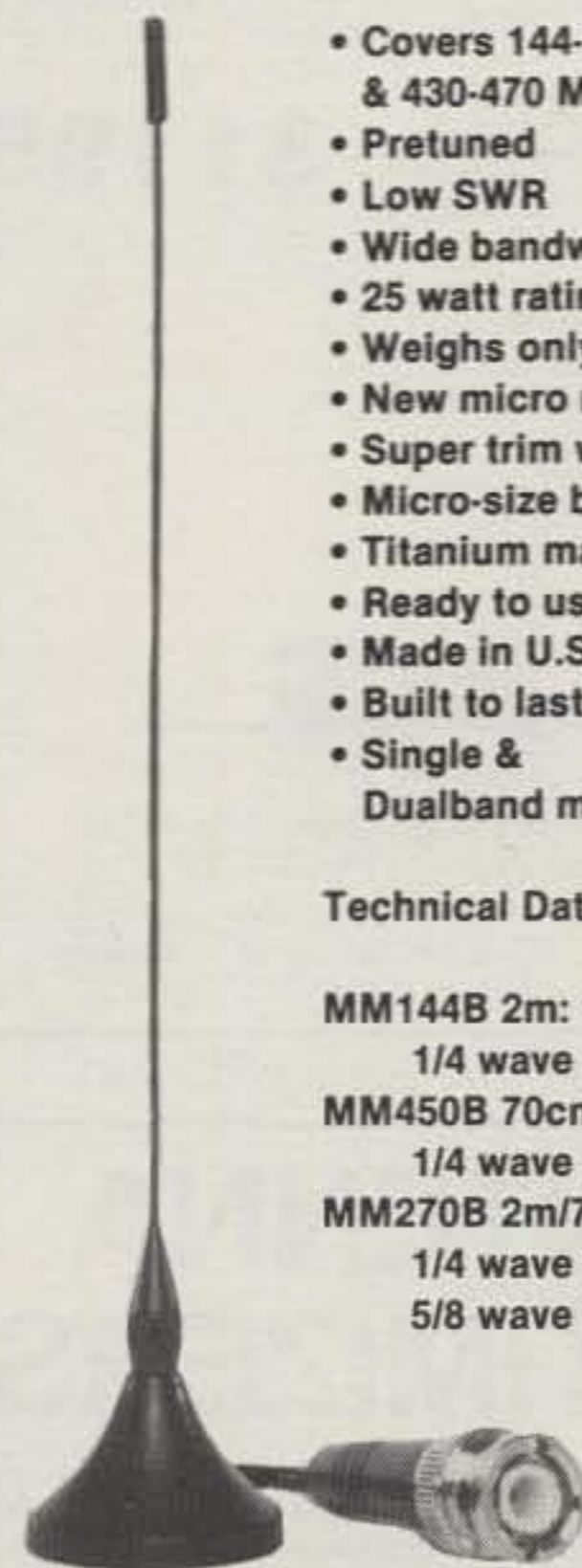
ANT-Ventures also offers an end-fed, half-wavelength “no-ground” mobile antenna; pretuned models are available for 146, 223, and 446 MHz. The rugged antenna includes a matching network that allows it to function with or without a ground plane. It’s specifically aimed at vehicles with plastic or fiberglass bodies. It’s also a natural for mounting on vehicle roof racks; tractor-trailer mirrors; motorcycle bars; and boat masts, rails, decks, or cabin roofs. The antenna is suggested for portable or apartment use, as it can be mounted to wood or metal, or directly to the back of the radio. Price of each antenna is \$39.95; a wooden mounting base is \$5.95.

ANT-Ventures has available a short, but educational, free application note on using 75 ohm semi-rigid hardline effectively. The note also describes the hardline hardware and the various antennas we profiled. For more information, contact ANT-Ventures, P.O. Box 776, McHenry IL 60050-0776.

Tokyo Hy-Power Catalog. On several occasions, most recently in the March 1993 column, we described the products offered by Orion Business International. To recall, on the antenna end of the coax, Orion offers the OR-2300 Rotator, a heavy-duty worm-gear unit with an antenna wind load area capacity of 35 sq. ft., a maximum vertical load of 1800 lbs., and a maximum horizontal load of 2400 lbs. Orion also offers two strong but lightweight roof-mount towers for medium-size HF beams, VHF/UHF arrays, OSCAR anten-

ELITE PETITE!

“Stylish, trim, and petite” only begin to describe PRO-AM’s exciting new 2 meter, 70 cm, and dualband mobile antennas. They feature a slender black chrome whip and small candy kiss-size base that looks terrific on any auto. Inside the little 1¹/₂ inch diameter base is a newly-developed and ultra-strong titanium magnet that holds in place like a bulldog, even at high speeds. These new micro magnet antennas are supplied fully assembled and ready to use, with 8 feet of RG-174 mini coax and BNC connector.



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- New micro magnet look
- Super trim whip
- Micro-size base
- Titanium magnet
- Ready to use
- Made in U.S.A.
- Built to last
- Single & Dualband models

Technical Data

- MM144B 2m: 19" tall
1/4 wave whip
- MM450B 70cm: 6.5" tall
1/4 wave whip
- MM270B 2m/70cm: 19" tall
1/4 wave 2m,
5/8 wave 70 cm

These unique new ‘designer’ antennas combine a fresh new look with proven performance, and they are available from amateur dealers nationwide. Every big league mobile needs a little PRO•AM Kiss!

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AR3000

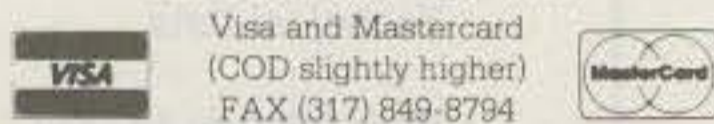
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YO 5.0 automatically optimizes monoband Yagi designs for maximum forward gain, best pattern, and minimum SWR. YO models stacked Yagis, dual driven elements, tapered elements, mounting brackets, matching networks, skin effect, ground effects, and construction tolerances. YO optimizes Yagis with up to 50 elements from HF to microwave. YO runs hundreds of times faster than MININEC. YO is calibrated to NEC for high accuracy and has been extensively validated against real antennas. YO is intuitive and highly graphical. YO 5.0, \$75. YOC 5.0 (assembly language, much faster), \$100. NEC/Yagis 1.0 (professional accuracy reference), \$50.

YOC and NEC/Yagis require a math coprocessor; MN and YO come with both coprocessor and noncoprocessor versions. All except AO run on any IBM PC compatible with graphics. All programs include extensive documentation. Add 7.25% CA, \$5 overseas. Visa, MasterCard, U.S. check, cash, or money order. 3.5" or 5.25" disk.

Brian Beezley, K6STI
507 1/2 Taylor, Vista, CA 92084
(619) 945-9824, 0700-1800 Pacific Time

SAM Version 1.10

Find Call

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KC4CQY Roderick M Thompson
RT 2 BOX 75
LACEYS SPRING, MS 35754
County: Morgan

Class: Technician
Birthday: Sep 14, 1954
Expiration: Oct 4, 1998
Licensed: Dec 15, 1987

Enter Call for Search

KC4CQY

[Enter] Begin Search

[F1] Help [F2] Export [F5] Find Call [F6] Find Name [F9] Options
[F3] Print [F4] File [F7] Browse Calls [F8] Browse Names [F10] Exit
[PqUp] Previous [PqDn] Next [↑] Select

Fig. 2—SAM "Find Call" mode. SAM '93 offers several extra-cost options (at \$7.50 each), such as a county cross-reference, license expiration date, previous callsign cross-reference, year first licensed, and full licensee birthdate; the options are installed in this example. Over 600,000 U.S. and Canadian amateurs are included in the database. The menu-driven program has an attractive user interface that gives you fast access to licensing particulars.

nas, and verticals. The ORT-4 is 47 inches high with a 23 inch base width; the ORT-8 is 94 inches high with 39 inch base width.

Recently Orion's Loren Pleet sent me their catalog of equipment for the other end of the coax: the 1993 Tokyo Hy-Power catalog. It includes medium-power VHF/UHF and dual-band amplifiers; transverters covering several band combinations; a 430 MHz preamplifier; and remote-control accessories. For a copy, contact Orion Business International, Inc., 360 W. Bedford Ave., Suite 111, Fresno, CA 93711 (209-432-4155).

New Software '93

Super-Duper Contest Logger. Paul O'Kane, EI5DI, sent me the contest logging program he's spent the past three years developing. It's Super-Duper (see fig. 1), which was designed at first solely for DX entrants to the ARRL DX Contest. Since then, he's extended it to cover several international contests, including the CQ WW and WPX contests and the IARU HF Championship, together with RSGB contests for both U.K. and DX entrants.

Key Super-Duper features are fast and simple logging and editing; separate "expert" and "novice" modes; instant duping; checklist, multiplier list, and summary sheet generation; partial callsign inquiry by prefix or suffix; online or offline logging; built-in memory keyer; an option to split logs by band; user-defined multipliers; QSL label printing; and more. Paul stresses that the strongest features of his program are the simple and consistent interface across the various contest types and the complete check made of the log for consistency after each

QSO. The price is \$35 (U.S.), plus \$4 or four IRCs for airmail postage of the 3.5 inch disk and a printed manual. You need to specify your callsign when ordering, as it's built into the program.

Alternately, Paul also offers a special version of Super-Duper, free of charge, that has full facilities for DX entrants to any RSGB contest. The logs it produces are formatted to RSGB specifications, now the standard for computer logs in IARU Region 1. For this special version, send a blank, formatted 3.5 inch 720K disk and 2 IRCs, or 4 IRCs without the disk. Contact Paul O'Kane, EI5DI, 36 Coolkill, Sandford, Dublin 18, Ireland.

Personal Code Explorer. Personal Code Explorer (PCE) lets shortwave listeners (SWLs)—with a minimum of hardware—decode a variety of digital signals, including FAX, Morse, RTTY, ASCII, SITOR/AMTOR/NAVTEX, and HF packet transmissions. All that's required is a stable SSB receiver covering 3–30 MHz and an 8 MHz or faster IBM PC compatible computer with a CGA, EGA, or VGA video card. Slower PCs can run all modes except packet and FAX, while full grayscale FAX can be seen only with VGA cards.

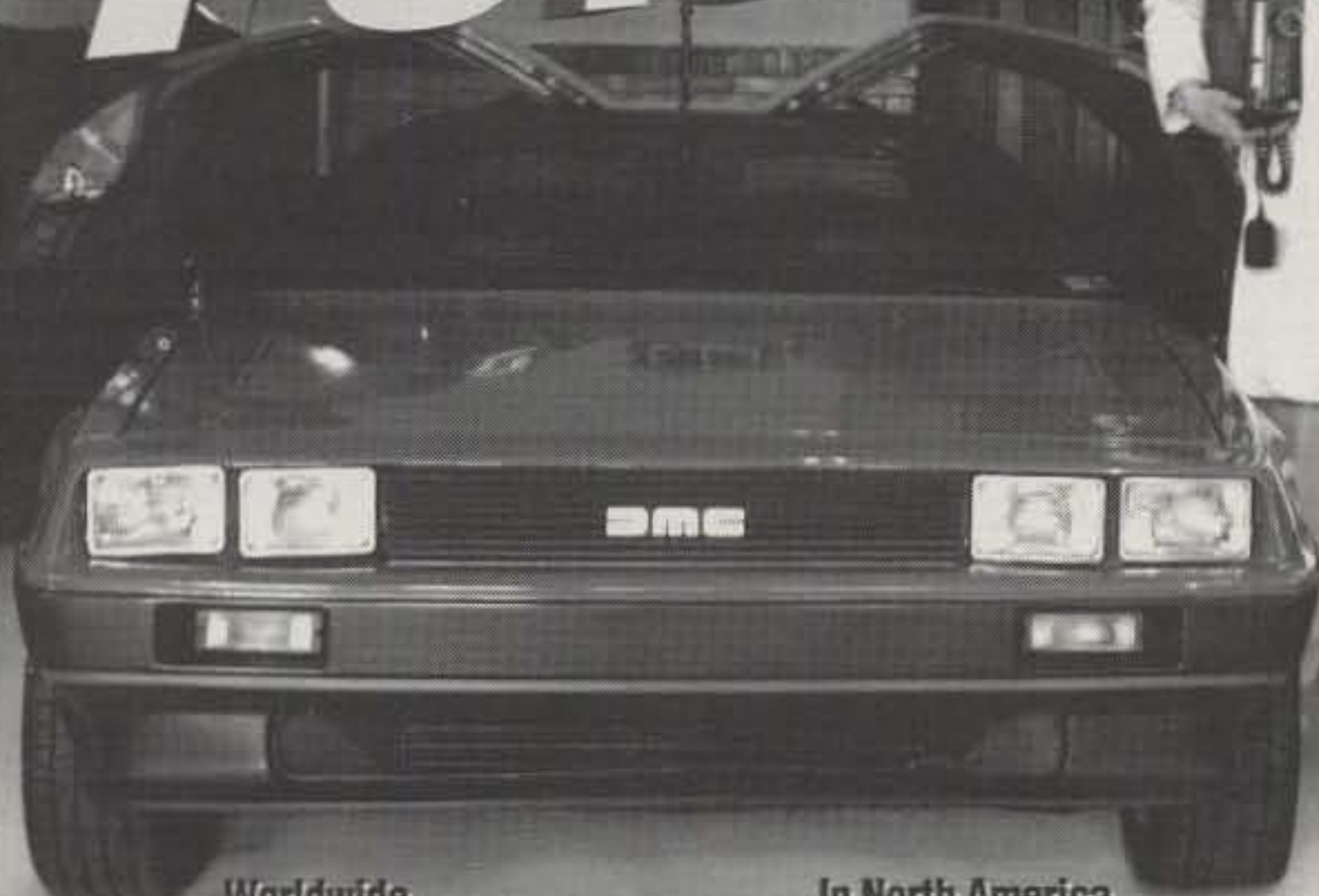
The PCE package consists of both software and hardware. The interface is a small demodulator that plugs into one of the PC's serial ports and has a cable that connects to the receiver's external speaker or headphone jack. The software can run on a floppy disk or a hard disk, but a hard disk is required to save large FAX images. An extensive manual provides setup guidance and suggested frequencies to tune. A utility disk has sample FAX pictures and a GIF graphic file conversion program. PCE is \$129.

PCE was developed by Microcraft, which

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Gordon West - Worldradio

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Jim Bail - 73 Magazine Review

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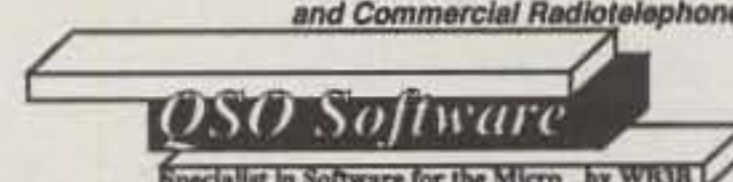


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has offered a variety of code readers since 1978. Another new product is the hand-held Model CSCAN CODE SCANNER which copies and automatically decodes Morse, Baudot, and ASCII code and presents it on a built-in, 32-character liquid-crystal display. It's \$189.

For more information, contact Microcraft Corporation, P.O. Box 513, Thiensville, WI 53092 (414-241-8144).

SAM '93. In the November 1992 column we described the SAM, or "Search for AMateur," an amateur radio callsign database. The menu-driven program has an attractive user interface that gives you fast access to licensing information such as callsign, name, license class, address, and year of birth. SAM lets you look up amateurs by callsign, name, city, state, or ZIP code; browse by call or name; and print labels. SAM accesses data by callsign or name directly from the screen, and it lets you export data in several different ways to create mailing lists, regional directories, tables, dBASE™ compatible databases, or other custom printed or disk outputs.

Several changes reflect the features most often asked for or suggested by users. The new SAM '93 version (see figs. 2 and 3) includes Canadian, club, military club, and RACES calls. Also, SAM now both lets you edit the database without losing the government data and create a comment field for brief notes.

There also are several extra-cost options (at \$7.50 each). The options include a county cross-reference, with the ability to search by county; license expiration date information (month, day, and year); previous callsign referenced to the current call; and full licensee birthdate (month, date, and year). About 580,000 U.S. and 32,000 Canadian amateurs are included in the database. The program requires a IBM PC compatible, a high-density 3.5 or 5.25 inch disk drive, and 16.5 MB of free hard-drive space. Additional hard-disk space is needed for option files.

SAM '93 is \$39.95. A new version is offered at the beginning of each calendar year; an update to work with that version is available about 6 months later. A subscription (SAM '93 plus the June supplement) is \$55. For more information, contact RT Systems, Inc., P.O. Box 8, Laceys Spring, AL 35754 (205-882-9292).

LOGic 3. Several times previously, most recently in the June 1992 column, we profiled LOGic™, a full-featured logger suitable for DXing, nets, paper chasing, and rag-chewing. Now Dennis Hevener, WN4AZY, has introduced LOGic 3, the follow-on to LOGic II. The new enhancements are considerable and reflect much more than the change from Roman to Arabic version numbering.

LOGic 3 is a comprehensive database manager with a sharp-looking, windowed user interface. The program allows logging in real-time and non-real-time modes. It has a customizable screen, flexible data retrieval, automatic tracking of practically any major award, QSL management features, user-defined data fields, sophisticated print options, and multiple free-form QSO notes.

LOGic 3 interfaces to most computer-compatible transceivers to control the radio and logging of mode, frequency, and band.

SAM Version 1.10

Browse Names Canada

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VE1AKT ALLAN K THURBER
69 PUGSLEY STREET
FREDERICTON, NB E3B 6A3

VE2EXA	THUOTTE, GERMAIN	ST-ALEXIS DE MONTCAL	PQ J0K1T0
VE1AKT	THURBER, ALLAN K	FREDERICTON	NB E3B6A3
VE1JVT	THURBER, JACK V	OROMOCTO	NB E2V2G3
VE7TGM	THURSTON, GORDON M	BURNABY	BC V5C4P2
VE3WOR	THURSTON, JOHN R	TORONTO	ON M4V2B9
VE3KMT	THURSTON, NORMAN E	THORNHILL	ON L3T1N6
VE7TSR	THURSTON, SYLVIA R	BURNABY	BC V5C3P2
VE7BJT	THWAITES, JOHN B	WEST VANCOUVER	BC V7S2W3
VE7EJK	TIAN, PAUL J	KEREMEOS	BC V0X1N0
VE4ITT	TICHON, GLENN A	FORK RIVER	MB R0L0V0
VE4IT	TICHON, JOHN M	FORK RIVER	MB R0L0V0
VE4PAT	TICHON, PATRICIA A	DAUPHIN	MB R7N3B3

[F1] Help [F2] Export [F5] Find Call [F6] Find Name [F9] Options
[F3] Print [F4] File [F7] Browse Calls [F8] Browse Names [F10] Exit
[PqUp] Previous [PqDn] Next [t+] Select

Fig. 3—SAM browse feature. SAM '93 can find amateurs by partial names or callsigns using the browse mode, which provides a scrolling listing for review. Here, I casually browsed the Canadian database to see if there were any VE-prefix Thurbbers north of the border. Success: SAM found two DOC-licensed Thurbbers in New Brunswick.

It boasts automatic contest duping and scoring; beam rotor control via the RS-232 interface; a menu-driven report writer; a "QSL manager" with a database update and subscription plan; a day/night grayline propagation chart; and mail merge to computer-generate letters using data found in your disk-based logbook.

LOGic 3 includes a large table of amateur callsign prefixes which contains parameters such as ITU and CQ magazine zone and DXCC country names. The \$79 program (at this writing—a price increase is possible) interfaces with several callsign databases.

Some of many new features include a data terminal/packet cluster interface that spots not only DX, but *anything* that can be determined from the callsign. There's also full mouse support, optional EGA/VGA 43- or 50-line display, and a backup/restore facility that can store 40,000 QSOs on a single disk. Many LOGic II features have been enhanced, especially the report writer, which has been made easier to use and which now offers a WYSIWYG ("what you see is what you get") field layout. The new version is faster and takes advantage of extended or expanded PC memory.

A simplified \$39 version, LOGic Jr. V3, promotes easy introduction to computerized logging. It offers most of the features of LOGic 3 but lacks the radio interfacing options. LOGic 3 itself also can be operated in "junior mode."

Contact Personal Database Applications, 2616 Meadow Ridge Dr., Duluth, GA 30136-6037 (404-242-0887). Various program update and QSL list subscription options are available.

ELNEC Update. Several times previously, and most recently in the October 1991 column, we discussed ELNEC for the IBM PC and compatibles. The already highly capa-

ble program has been improved, and we'd like to bring the improvements to your attention along with information on a new program option.

To recall, ELNEC, billed as "the smart antenna analysis program," is based on the classic MININEC program. ELNEC is a surprisingly easy to use program for modeling and analyzing virtually any antenna. Its menu-driven structure, spreadsheet-like entry format, graphic and tabular antenna displays, and shortcut features make it very friendly. ELNEC plots azimuth and elevation patterns; tells you gain, feedpoint impedance, SWR, and current distribution; and reports beamwidth, angles of the 3 dB pattern points, and front-to-back (F/B) ratio.

Improvements in recent versions include graphical antenna representations; disk storage of antenna calculations and plots; the power to save and recall traces; and the capability to superimpose multiple traces on the current pattern for comparison. Two versions are offered—one for coprocessor-equipped PCs and the other for non-coprocessor PCs; each is \$49.

In addition, a "MaxP" (Maximum Pulse) option is \$25. This option more than doubles the complexity of antennas ELNEC can analyze by increasing the number of "pulses" from 127 to up to 260. This feature needs a coprocessor, hard disk, and 640K RAM.

For a spec sheet contact Roy Lewallen, W7EL, P.O. Box 6658, Beaverton, OR 97007 (503-646-2885).

Kentrol for Windows Update. In the January column we noted Kentrol for Windows, developed by Brian Gilhuly, VE3BGB. This is a comprehensive control, logging, and memory management program that takes advantage of the Windows graphical user interface (GUI) and works with all recent Kenwood HF radios. Radio control features are implement-

ed primarily through the Tuner Window, which tunes both VFOs and selects memory channels via the scroll bar; automatic scrolling of frequencies and split-frequency operation are supported. The program also manages radio memory.

Brian recently sent us the new Version 3, and he hopes to continue to foster the development of quality Windows-based amateur software. Unfortunately, we're not yet set up to do hands-on Windows-based software reviews on our aging PC (due for replacement soon).

Brian said he continues to receive inquiries about the program as a result of the January column which quoted the old price. He asked me to note that with Version 3 Kenrol has increased in price to \$49 (U.S.) or \$64 (Canadian). For details, contact Brian Gilhuly, VE3BGB, 490 Concord Avenue, Toronto, Ontario M6H 2P8, Canada (416-516-4146). You can download a shareware version on CompuServe's HamNet, the Radio roundtable on GEnie, and several BBSes that feature amateur radio software.

Engineering Consulting Catalog. The Commodore 64 may be near the end of its useful life as a conventional PC. However, it may live on as a computer controller. An 18-page catalog offering a variety of electronics and communications products, largely based on the C-64, is available from Engineering Consulting.

The catalog includes information on products such as an advanced C-64 based repeater and remote base controller, a duplex autopatch, a mini-computer controller for the

Yaesu FT-727R handie-talkie, a miniature audio amplifier for handie-talkies, a VOX-operated simplex repeater controller, RFI filters for telephones and TV sets, and various accessories. Also offered are broadcast and cable TV products, including video page and graphics generators using the C-64. For a copy, contact Engineering Consulting, 583 Candlewood St., Brea, CA 92621 (714-671-2009).

New Books '93

Heath Nostalgia. Millions of people around the world enjoy assembling high-quality electronic products with their own hands, and they learn something useful in the process. However, for various reasons, interest in kit building has declined over the past decade, and mainstay Heath left the kit business.

Whether or not we actually *built* any Heathkits over the years, most amateurs probably feel that a bit of ham radio disappeared when Heath left the business. As most readers know, the Heath Company of Benton Harbor, Michigan was the world's largest manufacturer of electronic kits.

Terry Perdue, K8TP, a former Heath employee, has assembled *Heath Nostalgia*, a 124-page brief history and scrapbook that covers the firm's nearly half-century of building Heathkits. The book is divided into three sections. The first is "Heath History," which briefly recounts the firm's development. The second is "Picture Potpourri," a scrapbook of photos taken from company activities over the years. Third is "Memory Miscellany,"

which contains stories and anecdotes submitted by various contributors, many of whom were longtime Heath employees.

The book also includes a chronological tabulation of major product introductions. These range from the 1947 oscilloscope and vacuum tube voltmeter (VTVM) to the last Heath amateur product, the 1991 intelligent antenna rotator.

Terry's 1992 book isn't a definitive history, and it's in need of a table of contents and index. But many readers who have fond memories of their kit-building experiences will enjoy renewing those memories by perusing this book. I know I did.

The book is available from Heath Nostalgia, 4320-196th S.W., Suite B-111, Lynnwood, WA 98036. It's \$9.95.

Radio Works: Dual Catalog Philosophy. Wire antenna specialist Jim Thompson, W4THU, recently let me in on some new projects at The Radio Works. Jim has finished his new "Reference Catalog," which is distinct from the familiar "General Catalog."

Jim wrote the Reference Catalog to read more like a magazine than a conventional catalog. While the General Catalog runs about 72 pages, the Reference Catalog is 128 pages; together, the two catalogs total about 200 pages of useful information on building, installing, and optimizing wire antenna systems and maximizing station performance. The new reference includes full specifications and descriptions of each Radio Works antenna and balun, along with extensive data and general observations on wire, coax, and antenna support line. The information is presented in an easy-to-read

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(2) Quad antennas
(3) Folded dipoles
(4) Rhombic and V antennas
(5) Yagi beams

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2:1-HDU50	50:22.22-OHMS	\$49.95	1.5:1-HB75	75:50-OHMS	\$59.95
	50:25-OHMS		2:1-HB100	100:50-OHMS	\$59.95
2.25:1-HU112.5	112.5:50-OHMS	\$34.95	4:1-HBM200	200:50-OHMS	\$39.95
2:1-HU100	100:50-OHMS	\$34.95	4:1-HB/U200	200:50-OHMS	\$59.95
2:1-HDU100	112.5:50-OHMS	\$49.95	4:1-HBHT200	200:50-OHMS	\$59.95
	100:50-OHMS		6:1-HB300	300:50-OHMS	\$59.95
1.78:1-HU50	50:28-OHMS	\$34.95	6:1-HB/U300	300:50-OHMS	\$119.95
1.5:1-HU50	50:32-OHMS	\$34.95	9:1-HB450	450:50-OHMS	\$119.95
1.5:1-HU75	75:50-OHMS	\$34.95	12:1-HB600	600:50-OHMS	\$199.95
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style and is illustrated with photos, charts, tables, drawings, and antenna patterns.

More than just a listing of Radio Works products, the Reference Catalog contains several articles. There are features on high-performance wire antennas, installing skywires in trees, knots and pulleys, and more. Several pages are dedicated to support line, and a section is devoted to solving ground problems. Many hard-to-find products, connectors, wire, and coax types are offered and are not found in the General Catalog.

The new Reference Catalog, along with a complementary copy of the General Catalog, is \$4 postpaid from The Radio Works, P.O. Box 5169, Portsmouth, VA 23703 (804-484-0140).

Incidentally, Jim advises that, with the sunspot low gradually approaching, he's working on several new antenna systems for the low bands. He expects that his newest antenna, the Vertically Radiating Dipole (VRD), which radiates both horizontally and vertically, will be a popular system. He also now has a 2:1 balun for loop antennas and two different 6:1 baluns for off-center-fed skywires. Too, Jim is carrying a new Dacron® antenna support line that's made to military specs, as well as easy-to-install silver-Teflon® Type N connectors that are designed to be no harder to work with than PL-259s.

Wrapping It Up

That's all for this time. Next month more Antennas and Accessories subjects of current topical interest. See you then.

Overheard: A 90-day warranty virtually guarantees that the product you buy will "go west" on the 91st day.

73, Karl, W8FX

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*FNB-10(S)	7.2v @	1000 MAH
FNB-12	12v @	500 MAH
FNB-12(S)	12v @	600 MAH
FNB-17	7.2v @	600 MAH
equiv. to FNB-11 (1/2" shorter)		
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FNB-25	7.2v @	600 MAH
FNB-26	7.2v @	1000 MAH
*FNB-26A	9.6v @	800 MAH
**FNB-26(S)	7.2v @	1500 MAH
*Same size as FNB-26 case		
FNB27	12v @	600 MAH
**FNB-27S	12v @	800 MAH
**(1/2" longer than FNB27)		

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"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Opportunity Denied

As you may know, this columnist submitted a proposal which would have allowed Novice and Technician-Plus amateurs to use the existing 30 meter band, which is 10,100 to 10,150 kiloHertz. Only code is allowed on the 30 meter band, and the Novice power limit applied to all operation on this band.

At the present point in the 11-year sunspot cycle, 10 meters is dead most of the time and 15 meters is subject to severe fading (QSB) when it is open. In essence, the 10 and 15 meter bands are not very useful, leaving Novice and Technician-Plus operators with practically no opportunity to contact distant (DX) stations.

Another factor that contributes to the current reduction in the usefulness of the Novice bands is the fact that the optimum transmission frequency (FOT) frequently dips down to the 40 meter band. This condition results in strong foreign broadcast stations being heard every 5 kHz (7105, 7110, etc.) throughout the 40 meter Novice band. This band does not afford operators much chance to work DX, even under the best of circumstances, since it cannot be used by amateurs in International Telecommunications Union (ITU) Regions I and III; it is only available to amateurs in North, Central, and South Americas. The net result is that this 40 meter band, which is normally not useful for working most of the world, becomes less useful when the FOT causes powerful shortwave broadcast stations to be received in the U.S.A. at stronger reception levels.

The 80 meter Novice band has been shifted down 25 kHz to reduce the possibility of interference with voice operation by foreign amateurs. This long overdue change is appreciated, and the new 3675-3725 kHz 80 meter Novice band has a lot to offer. However, the long antenna sizes related to this band cause it to be lightly used by most amateurs.

The factors detailed in the preceding paragraphs show that at least one additional Novice band is needed. The most obvious first choice is the 30 meter band, since operation on this band fits existing Novice limitations. I believe the FCC made a bad decision when they turned



Here is Rusty Smith, KD4GLC, operating a Ten-Tec Argonaut 505 with the matching 50-watt amplifier. He was operating from Nassau in the Bahamas when this picture was taken during August 1992. Rusty has been licensed since November 1991. He upgraded to General in April 1992. He is the ARRL Assistant Section Manager for Kentucky, and he hopes to attract many other young amateurs into leadership positions. Rusty led his state with 239 code contacts during the 1992 ARRL Novice Roundup Contest. He has worked all states, and he has the WAC and WPX awards. Rusty is developing his interest in low-power (QRP) operation.

down my proposal to make 30 meters another Novice band. When the 15 meter bands are dead, DX opportunities can be excellent on 30 meters; it is an excellent DX band. Another frequency segment that should be considered as a possible Novice band is 14,100-14,150 kHz, a segment which is currently (for all practical purposes) just used by foreign (DX) amateurs. U.S.A. amateurs can operate code in this segment, but such operation is almost nonexistent. The Extra Class voice segment starts at 14,150 kHz (and up), leaving 14,100-14,150 kHz essentially unused by American amateurs. There was a time when there were very few foreign operators, and it could have been argued that they needed frequency spectrum where they would not be drowned out by the horde of American amateurs. I did not agree with that position decades ago and the basis for it no longer exists, since there are more for-

eign amateurs now than we have in this country. Opening up a 20 meter Novice band would provide our newer amateurs with excellent opportunities to work DX stations all around the world. I think it is time for American amateurs to use this frequency spectrum.

More than one half of our American amateurs are Novices or Technicians. At the present point in the sunspot cycle their operating opportunities are poor to terrible. What is even worse to consider is the fact that the conditions on the existing Novice bands will continue to deteriorate as the sunspot cycle continues to drop. I believe these new amateurs are not being treated fairly. Our Amateur Radio Service is sure to suffer if new Novice bands are not established soon. Past and present Novices and Technicians are urged to make their views (regarding this subject) known to the ARRL (225 Main Street, Newington, CT 06111) and/or the FCC (Private Radio Bureau, 1919 M Street NW, Room 222, Stop Code 1170, Washington, DC 20554).

If you were never a Novice or Technician, or if you have forgotten what it is like to be restricted to the Novice bands, I hope you will try an experiment. Please restrict your amateur operation to the privileges of a Novice amateur. If you do this one week, I believe you will concur that changes must be made to the existing Novice bands. I hope the FCC has a couple of active amateurs who will try this experiment; it could enlighten them in a hurry!

This subject could make an interesting discussion program at a club meeting. It should be interesting to have a few members (active amateurs) restrict a week's activities to Novice band operation, and then to report their observations at a club meeting. I spend a lot of time operating in the Novice bands. I know a problem exists.

Twelfth National Boy Scout Jamboree

The National Boy Scout Jamboree is held once every four years. This year's Jamboree starts 2 August and ends 9 August. Approximately 40,000 Scouts and their leaders are expected to attend this event. Special-event station K2BSA/4 will be

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used to send and receive messages. Fort A.P. Hill is the site of this Jamboree; it is near Fredericksburg, Virginia. It is anticipated that the Jamboree station will provide thousands of scouting personnel with a great introduction to amateur radio.

The Scouts will use the following frequencies for single-sideband (SSB) voice contacts: 3.99, 7.29, 14.29, 21.36, 28.35, and 28.99 megaHertz. Note that 28.35 MHz (28,350 kHz) is in the Novice 10 meter voice segment. There will be five positions active on these voice frequencies, plus very-high-frequency (VHF) and satellite positions. The majority of the contacts will probably involve SSB voice, since that is the mode which is best understood by non-amateurs. It is also the easiest mode for non-amateurs to use to enjoy on-the-air contacts.

Some A1A code and digital (AMTOR, packet, and radioteletype) contacts will also be made in the 10 through 80 meter high-frequency (3-30 MHz) bands.

The best times to contact K2BSA/4 are 1300-2100 UTC and 2300-0230 UTC. These times are equivalent to 0900-1700 and 1900-2230 Eastern Daylight Savings Time. The maximum number of Scouts should be present near the amateur operating positions at these times.

Message handling is strongly encouraged to and from the Jamboree. Messages will be handled through amateurs (like you and me), National Traffic System (NTS) nets, and packet radio. Messages addressed to jamboree attendees must include their full name and home town/city, plus their Jamboree (not hometown troop) number. More than 2500 outgoing messages were handled from the last (1989) Jamboree. Please make an effort to handle Jamboree traffic this year. If you handle messages from the Jamboree, it is important that they be forwarded promptly, or the Scouts may arrive back home before the messages get there. All messages should be in the standard NTS format.

If you work K2BSA/4, they would like to exchange QSL cards with you. Mail your QSL to K2BSA, 1325 Walnut Hill Lane, Irving, Texas 75062. Enclose a self-addressed, stamped envelope (SASE) with your card, if you are an American amateur. Foreign (DX) amateurs can provide contacts that will be especially exciting and memorable to the Scouts. DX amateurs who want to exchange cards can do so through the DX QSL Bureau, or cards can be expedited to DX operators who enclose an International Reply Coupon (IRC) with their QSL card and their self-addressed envelope.

I am active in Boy Scout matters, and I intend to have several local Scouts visit my shack. I hope to let them at least hear K2BSA/4. If we are lucky, they may get to talk to someone at the Jamboree. It would

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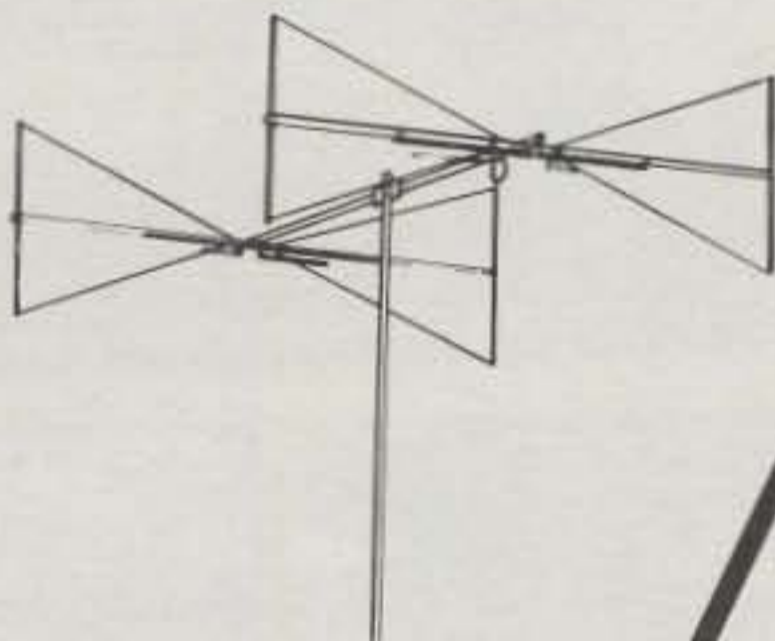
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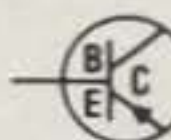
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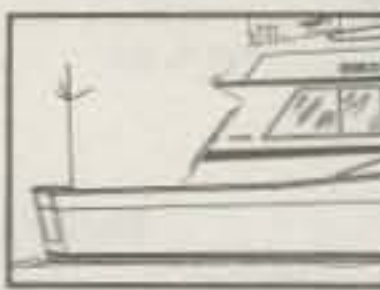
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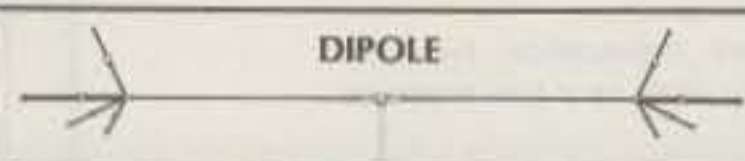
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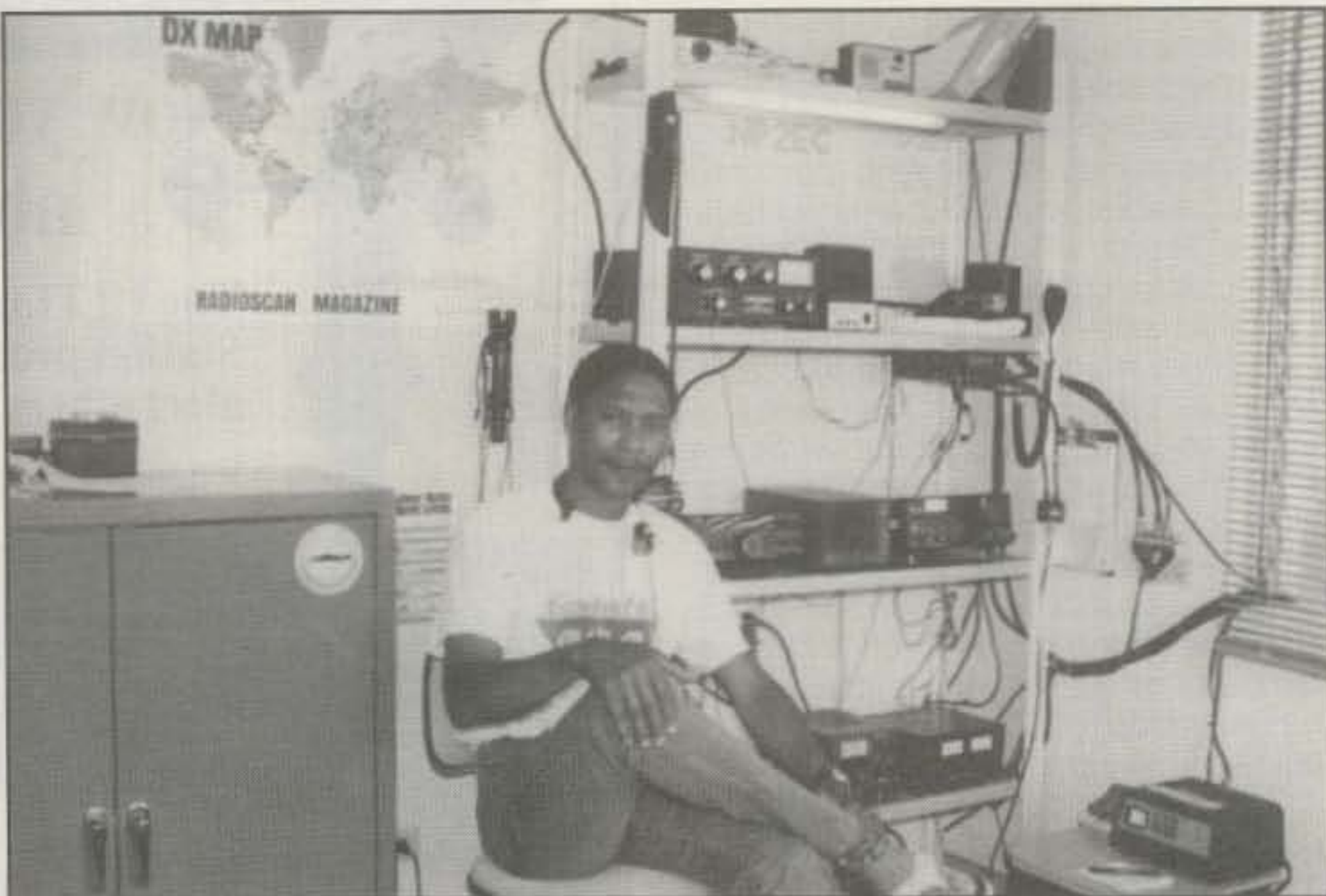


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Kent A. Gomez, NP2EG, of St. Thomas, Virgin Islands has worked more than 100 countries using a Kenwood TS-690S with a Carolina Windom. Kent was the first No-Code Technician licensed in the U.S. Virgin Islands. He has since upgraded to an Advanced class licensee.

be nice to have many amateurs take advantage of this unique opportunity to provide their local Scouts with a meaningful exposure to amateur radio.

Cayman Islands Contacts Available

T.M. (Mike) Zane, K6URI, will be operating as ZF2VA from the Cayman Islands

September 5-17 this year. Mike intends to spend a couple of hours each day in the 10 meter Novice voice segment and the 15 meter Novice code band. His operating procedure is to initially answer new amateurs calling CQ. When/if that system runs dry, he calls CQ and works short contacts with the amateurs who respond to his calls. If you work him, send your QSL request to P.O. Box 455, Lodi,



Vacil Marcelo Pera, PY2AE, continues to keep Valinhos, Brazil available to those of us who operate in the U.S.A. Novice bands. He is a mechanical engineer who has been a licensed amateur since he was 14 years old. He has more than 200 countries confirmed using a Kenwood TS-440S transceiver, a Mac Li-2000 linear amplifier, antenna tuner, homebrew iambic keyer, and several other items.

CA 95241. He is good for a QSL whether or not you have one to send, and whether or not you enclose a self-addressed, stamped envelope.

If you contacted Mike when he operated from Aruba during the 1992 WPX contest, he invites you to request one of his P4ØZ cards. Mike is a retired police sergeant. He has established a good high-frequency amateur radio station at the Nichols Elementary School in Lodi, California. He has about a dozen boys and girls enjoying on-the-air contacts. He expects to have a few of these students become licensed.

Brazilian DX Guide

The *Brazil DX Guide* is published quarterly; it is issued each January, April, July, and October by Ronaldo Bastos Reis, PS7AB. The present guide consists of 31 pages printed in English. It covers Brazilian awards, beacons, clubs, DXpeditions, normal and special call signs, QSL bureaus, QSL managers, and other pertinent subjects. The price is \$4 (U.S.) per edition. The guide is revised each month. Their address is P.O. Box 2021, 59094-970, Natal, RN, Brazil, South America.

Tesla

Michael DiPersio, KC2Q, invites amateurs to check into the Tesla Amateur Radio Net (TARN) on 14,290 (±6) kHz Saturdays. TARN starts at 1800 UTC, with participants invited to discuss Nikola Tesla, his ideas, and his inventions. Additional information can be obtained from Michael DiPersio, 409 4th Avenue, P.O. Box 357, Bradley Beach, NJ 07720. Your SASE envelope would be appreciated.

Novel-Tees By KA5CXP

Jim Einert, KA5CXP, offers a nice line of amateur radio specialty items. These call-sign items include a blaze orange cap, bumper sticker, camouflage cap, desk call/name plate, gold braid (scrambled eggs) for any cap, light color front cap, sport shirt, sweatshirt, T-shirt, white front cap, and white front visor. The address is P.O. Box 10, Ozone, Arkansas 72854-0010.

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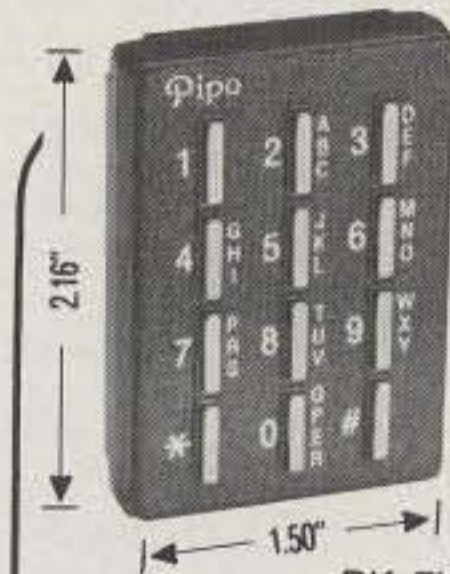
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Radio/Tech Modifications 5A & 5B

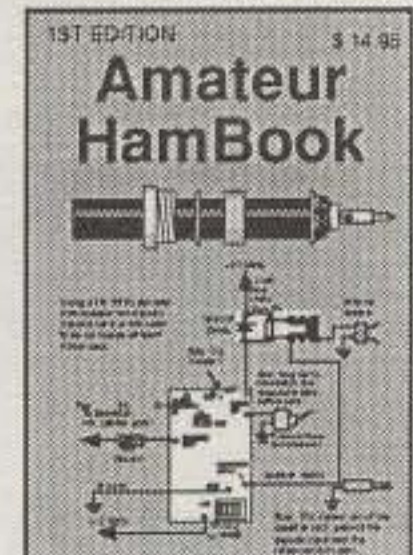
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CIRCLE 145 ON READER SERVICE CARD



The Tokyo International Amateur Radio Association (TIARA) celebrated its 20th anniversary during a breakfast shared with the fledgling Yokota Air Base (Yappers) Amateur Radio Club. The attendees (left to right) were 7J1AKS, 7J1AJH, 7J1ABV, 7J1ALF, 7J1ALM, 7J1AJJ, 7J1AIK, 7J1ALI, 7J1AIW, 7J1AKN, 7J1AKY, and 7J1ALB. Tiara President Frank Striegl, 7J1AAL/KA2TNZ, took this picture; his son is standing in front of the group.

Their address is W6EL Software, 11058 Queensland Street, Los Angeles, CA 90034-3029. A 52-page 8.5" x 5.5" booklet provides detailed instructions regarding proper use of MINIPROP PLUS.

Equipment and Accessories

Wyatt Industries offers an interesting assortment of equipment and accessories in kit and assembled forms. There are 51 units listed on their current brochure, with 24 of these items being kits. Their product line includes a Baycom modem packet for PC clones without a TNC, color SSTV for Atari ST, Digicart 64 cartridge form program, Digicom 64 modem, general-purpose power supplies (6 with various ratings), QRP transceivers (20, 30, and 40 meter versions), satellite video board (2.4 kHz AM demodulator), smart battery changer, transmit-receive sequencer, viewport VGA-color SSTV, visual voltmeter with 20 LED readout, WEFAX (FM detector with tuning aid), and WEFAX discount packages.

The address of Wyatt Industries is P.O. Box 1305, Arroyo Grande, CA 93421-1305 (telephone 805-925-3102). The kits and assembled units are products of A & A Engineering, 2521 West LaPalma, Unit K, Anaheim, CA 92801. The A & A Engineering telephone number is 714-952-2114.

Photographs Wanted

Photographs of new amateurs in their shacks provide introductions to a few of the newer licensees. Photograph size is unimportant, but good definition, con-

trast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year CQ subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest CQ issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

Printed Aids

My previous columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business-size (#10) self-addressed and stamped envelope to my California address. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.73,

Bill, W6DDB

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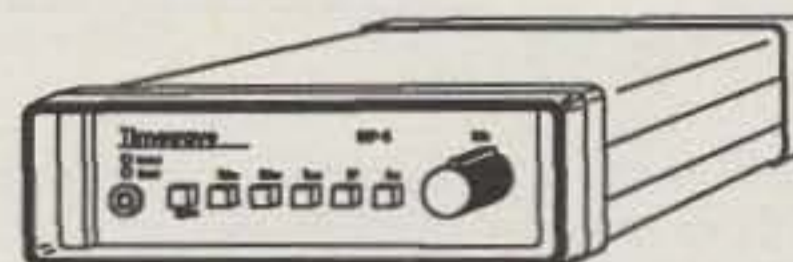
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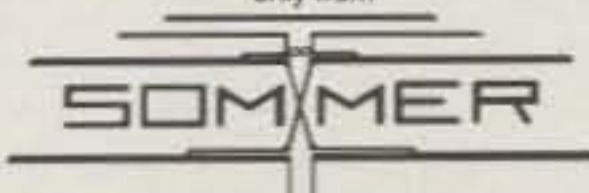
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CIRCLE 59 ON READER SERVICE CARD

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

Implementation and Use Of The Newest European X-1 Firmware

This month is an introduction to the implementation and use of the European X-1 bank-switching, 1993 version of TheNet networking firmware for TNC-2 and clones. We will cover the SYSOP end of the X-1J nodes—how to build, install, and configure the X-1J node. Next month in Part II we will cover the many facets, features, and user options related to the X-1J.

The firmware modification uses the old TheNet 1.01 platform, but introduces many new features which enable networking latitudes that have never before been available to the packet radio SYSOP and user. Here are just a few of the features you will find in the X-1 firmware:

1. Backbones and trunk (access or restrict).
2. AX.25 routing.

3. IP addressing and routing for each X-1/X-2 node.

4. Full NOS and TCP/IP support.
5. BBS forwarding (access allow or restrict).
6. DX spotting (access allow or restrict).
7. HOST servers user.

8. Hardware interfaces that allow users to obtain readings of their deviation and signal strength from local X-1 nodes.

As you are about to discover, these are only a few of the TheNet X-1 features. Although the X-1 code has evolved through versions from X-1A to X-1I, there is yet another version (X-1J) which I am operating in a test-bed as this month's column goes to press. In a phone conversation with Dave Roberts, G8KBB, in Suffolk, England, I learned there are several new features being planned for this version, and they include some very interesting hardware attachments and interfaces. These additions will enable interactive user-level access and

benefits. The hardware interface devices associated with the X-1 nodes are simple and easy to install.

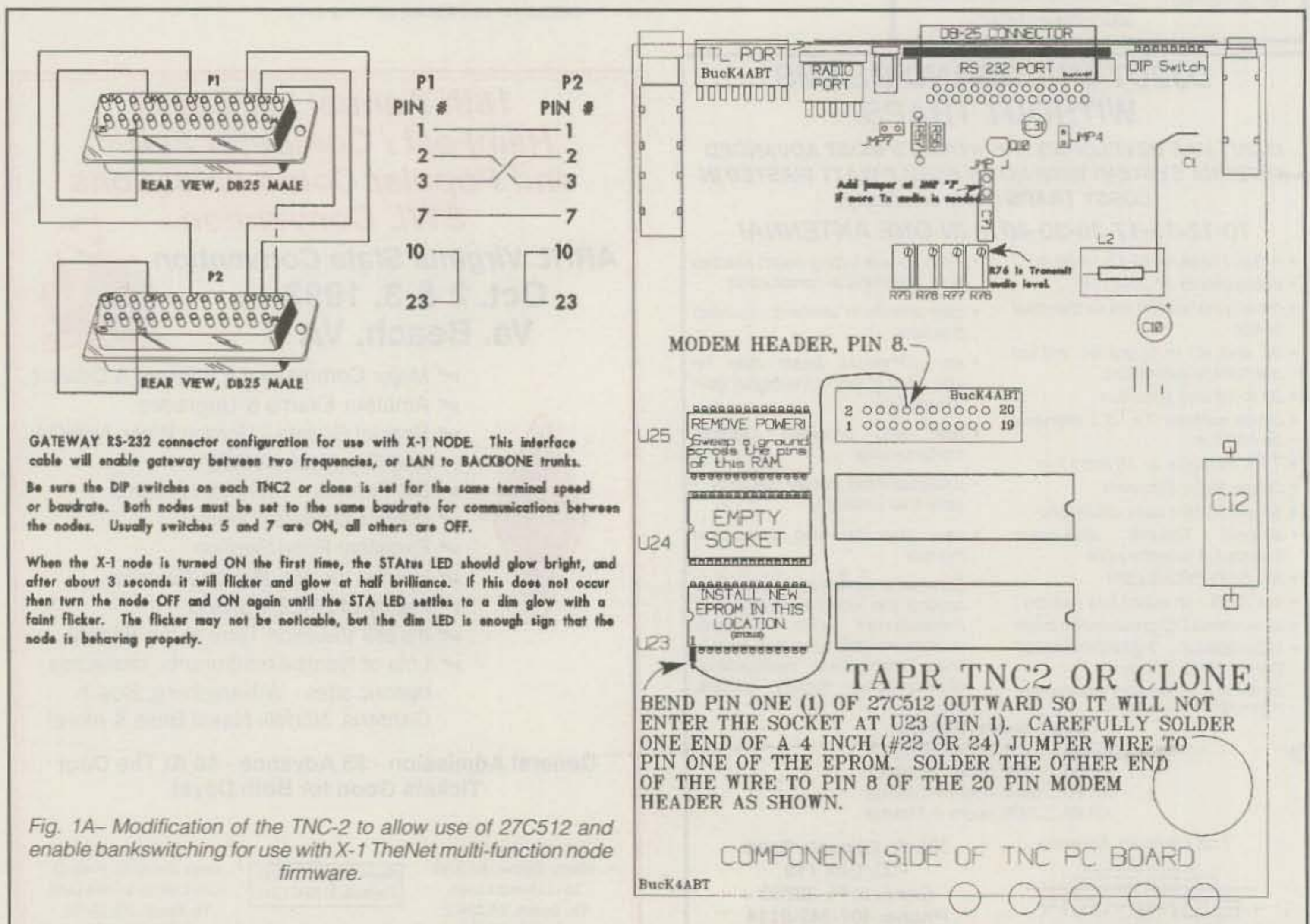
Hardware Requirements

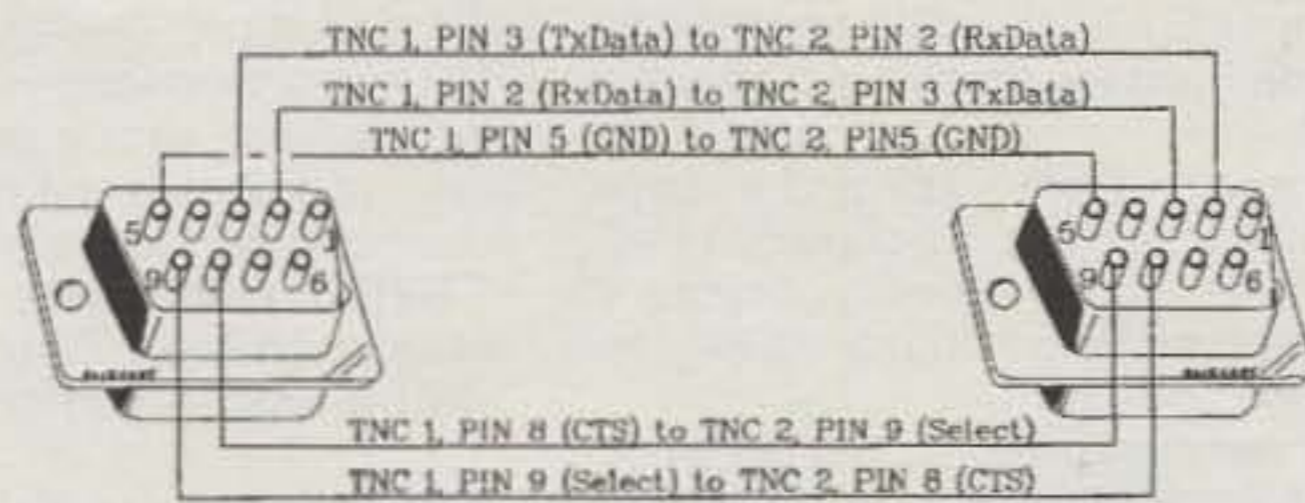
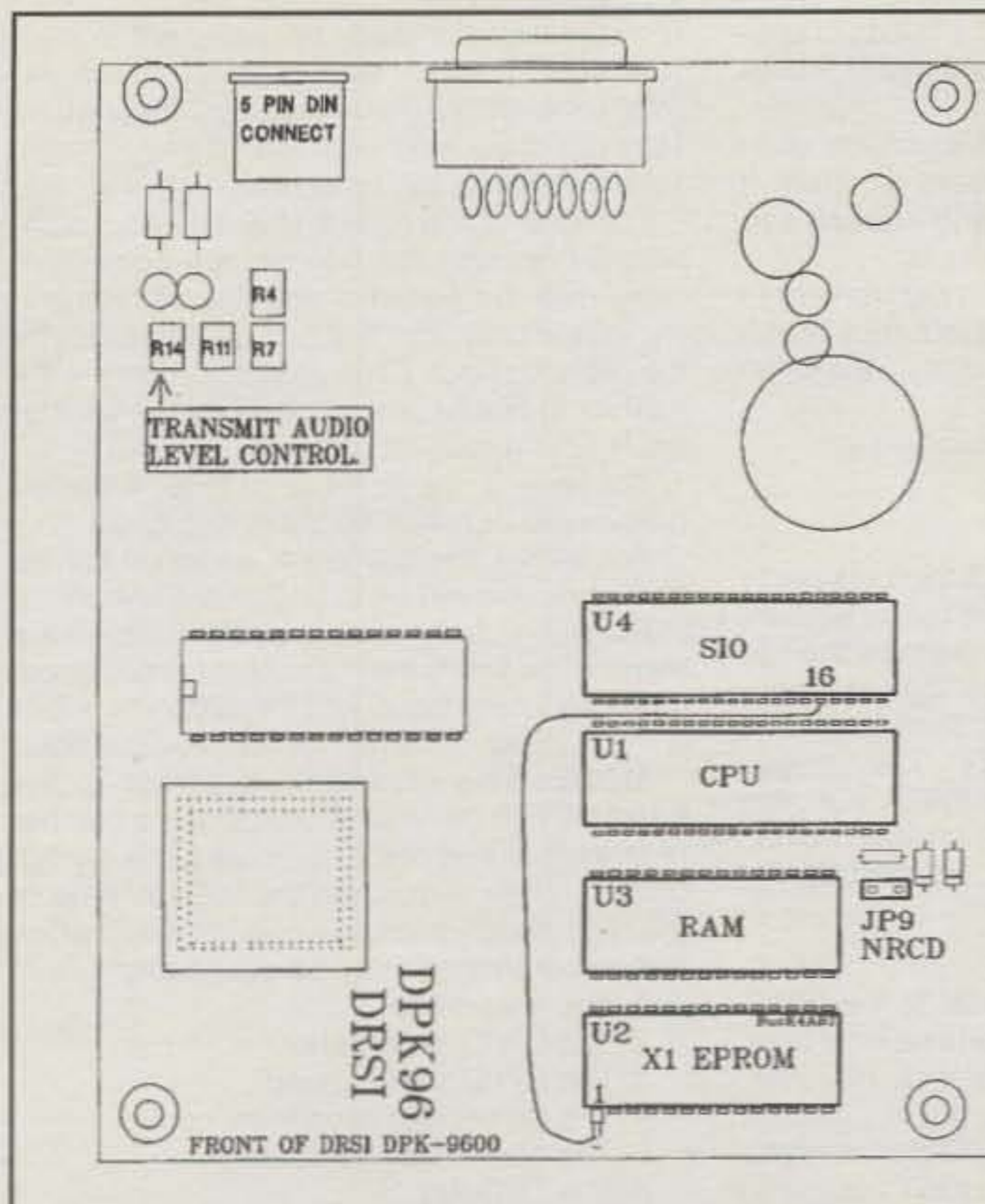
It is first necessary that we become familiar with the hardware requirements for the X-1 node(s). The software runs in a Z80-based TNC-2 or similar clone such as the DRSI DPK-2. It is installed as described in the bankswitch mods file, but essentially all it needs is a single piece of wire from pin 8 of the modem disconnect header to pin 1 of the EPROM (see fig. 1A). In the case of the DRSI DPK-2 TNC, use the technique used at fig. 1B.

The EPROM needed is a 27C512, rather than the 27C256 in a normal TNC-2. Pin 1 of the EPROM is bent out from the socket and connected as described in fig. 1A or 1B.

The TNC needs at least 32K bytes of RAM,

211 Luenburg Dr., Evington, VA 24550





Cable configuration to interface the DRSI DPK-2 and DPK-9600 for use as 1200 baud to 9600 baud gateway.

X1 BankSwitch Modification

- 1) Bend pin 1 of 27C512 so that it will not enter socket U2. Insert X1 EPROM into socket U2.
- 2) Solder one end of a 5-inch piece of small wire to pin 1 of EPROM.
- 3) Solder the other end to pin 16 of SIO at U4. Pin 16 remains in socket.
- 4) For back to back (gateway) operation, install jumper at JP9 (NCRD).
- 5) Wire a jumper from pin 9 to 1 in (RS232) serial connector.

The steps at 4 & 5 enable firmware signaling (handshaking) with a host terminal, or another network TNC.

Fig. 1B- X-1 bankswitch modification for the DRSI DPK-2 and DPK-9600.

and it needs to have DCDB from the SIO/0 connected to pin 23 of the RS232 connector (see fig. 2).

Obtaining The Support Files

The documentation for the X-1 code is the best I have ever seen published for this kind of system. The text follows a well-defined pattern, and covers every detail of the X-1 networking firmware. The complete set of files is part of the zipped files that are included with the actual code for the X-1 node. For this reason I will not cover all the features and command syntax in this month's column.

To obtain a set of files for TheNet X-1+, you can contact one of the several landline BBSes across the country which support amateur radio files. These BBSes are likely to have the current version of the X-1 files. Many large clubs have telephone BBSes for use by the membership and the amateur community. If all else fails, try the Cleveland HamNet BBS.

I can supply the files, but only if the following conditions are met! *You must:*

1. Supply the disk "formatted" (MS/DOS), 3.5 or 5.25 inch.
2. Supply a pre-addressed, postage paid, return mailer.

I will not format disks, I do not add the return address, and I do not supply postage! My mail load is large, so please understand why my time (and money) is at a premium.

Once you have obtained the disk of zipped files, you should first read the OVERVIEW documentation text file. There are other text files, and they too should be read so you have a clear understanding the X-1 software and firmware.

Here is a list of files you will need when build-

ing these switches:

- THENET1.X1H—part 1 of the code.
- THENET2.X1H—part 2 of the code.
- CONFIGUR.X1H—installation guide.
- USERGUID.X1H—user's guide to the node.
- OVERVIEW.X1H—SYSOP's manual.
- PATCH.EXE—menu-driven patcher for TheNet?.x1h.
- QUICKREF.X1H—handy quick reference guide.
- BANKSWIT.MOD—information on the hardware bankswitching.

Using X-1 With A TCP/IP System

One of the reasons for the inclusion of the IP router was to help with the development of IP networks. This is accomplished in two ways.

1. It allows an IP station that does not run 24 hours a day to run an IP router for the others in the area, without leaving the PC running.
2. It allows existing nodes to double as IP routers.

In the scenario above, where a station runs a TNC-2 clone with a KISS ROM or similar, this software may be used instead of the KISS ROM.

The patcher (PATCH.EXE) has been altered. The code now comes as two parts and PATCH.EXE patches both at the same time. It needs and expects to be able to access both the parts listed below.

- TheNet1.X1H—part 1 of the code.
- TheNet2.X1H—part 2 of the code.

RS232 Connections

It is important that you understand the RS232 connections. The RS232 port will operate in one of two basic modes—a dumb terminal

mode and a protocol mode. Each of these modes has two basic types of operation. These are described in further detail below.

The decision as to whether the node operates in dumb terminal or protocol mode depends on the setting of the DCDB input of the serial communications chip (the SIO/0). In TNC-2 clones this is the signal on pin 23 of the RS232 connector, but in most TNCs you will need to either insert a link or a piece of wire, as detailed in fig. 2.

After connecting the links, if needed, then leaving pin 23 open, the circuit will cause the TNC to operate in dumb terminal mode, and setting it to a negative voltage (i.e., connecting it to pin 10) will cause it to operate in protocol mode.

When using the X-1 node in a gateway configuration with two TNC-2s at each port, use the RS-232 interface described in fig. 1A or 1B. If more than two, and up to four, nodes are configured in a cluster, then use the multiport diode matrix shown in fig. 3.

Introduction To Nodes

Although Dave, G8KBB, has covered this in the text files supplied, I feel it should also be printed here to help the prospective (new) node SYSOP better understand what a node is and what it does.

If you have not used a TNC-based node before, the following notes on the operation of the "dumb terminal" port may be of use. When pin 23 on the RS232 interface is high, and with a terminal or terminal emulator on the RS232 port, the node will not appear to respond to anything. If you send an ESCape character, the node should respond with a *. If it does not, look at the TNC status LED. It should be dimly lit with a little bit of a flicker. If not, the

node is not operating. If it is, you have an RS232 problem. If you receive unsolicited garbage whenever the TNC receives data, you have pin 23 tied low and you are receiving crosslink or KISS frames.

If it *does* respond with a star and a space, you can now type one of three characters—C, D, or P. P will display the current password. D will disconnect you from the node. C will connect you to the node.

Try the C command. You should get a connected message. Hit ? followed by a return and you will get a list of all commands.

Escape commands only work on the RS232 port when in dumb terminal mode. Don't forget to disconnect from the node before you disconnect the terminal.

Structure

One of the problems in extending older versions of TheNet is the 32K EPROM limitation imposed by the architecture of TNC-2 clones. The solution to this is to implement bankswitching. This is easily achieved by the addition of a single wire as detailed in figs. 1A and 1B. This is at the expense of the HIGH and LOW commands.

A Partial Listing Of The New Commands

The following commands are part of the new versions of X-1: BYE, BBS, HOST, STATS, MHEARD, MODE, MANAGER, AUDIT, TALK, CALIBRATE, LINKS, ACL, CLOSEDOWN, BTEXT, DXCLUSTER, HELP, CTEXT, ALIAS, BBSALIAS, HOSTALIAS, DXCALIAS, QUIT, IPROUTE, ARP, IPSTATS, IPADDRESS, IPBROADCAST, UI.

The following commands have been changed: CQ, NODES, RESET, SYSOP.

The following features have been added to the code: an Internet router; ability to respond to three additional aliases; a CWID keyer; the command processor has been extended; KISS mode operation on the RS232 port; HOST mode support on the RS232 port; remote configuration of all parameters; additional textual help messages.

In addition, a number of small changes have

been implemented to satisfy the needs of special situations, such as the ability to digi beacon packets.

Network management in this context does not just mean setting parameters remotely. It means the ability to set, read, and interpret various monitors and diagnostic tools.

BYE or QUIT: There are no parameters to these commands. When entered, they terminate the session. Both commands do the same thing.

BBS: The syntax of the command is:

BBS [* | ? | callsign]

With no parameter, the command connects to a station previously specified by the SYSOP. Setting the BBS destination is done by the use of the BBS command with a callsign as a second parameter. Setting the BBS to allow this may only be done by a SYSOP. The * option may also only be executed by the SYSOP; this command clears a previously specified BBS.

HOST: The syntax of the command is:

HOST [* | ? | callsign]

This command is very similar to the "BBS" command. It allows connection to a local host, BBS, or other server. The difference, however, is that as long as the TNC is not in crosslink mode (i.e., pin 23 on the RS232 port is high), and if a callsign is not set, the HOST command connects to the local port.

STATS: The STATS command has no parameters. It prints a number of internal TNC statistics. In this version, this is limited to the level 1 stats of the radio channel and the internal clocks; the level 2 (AX.25), 3, and 4 statistics; and the CPU health checks.

For level 1, six pairs of numbers are printed, corresponding to the percentage of time the transmitter was on followed by the percentage of time the receiver DCD was on, for each of the last six 10-minute periods. The data is presented with the most recent period first. Two pairs of numbers are then displayed showing the transmitter underrun and receiver overrun.

Frame checksum errors:

Total packets heard.

Total packets received by the node (i.e., sent to it).

Total packets sent by the node.

Total receiver not ready packets sent.
Total reject packets sent.
Total receiver not ready packets received.
Total reject packets received.
Total number of link timeouts.

For each of the level 2 statistics, four numbers are shown. The first two are cumulative totals over the period of one hour, incrementing in real time. The last two are the totals for the previous hour. Each pair of numbers is the total for the radio port followed by the total for the RS232 (crosslink) port.

For level 3, the number of level 4 frames gatewayed between nodes is displayed.

For level 4, the number of transport frames sent and received by the node are shown.

For level 3 and 4 statistics, two numbers are shown. The first is the number of frames accumulating for this hour, and the second number is the number of frames for the previous hour.

MODE: This command is similar to the PARAMETER command, as it allows a number of other features of the software to be configured remotely. It removes the need for most of the host mode <escape> commands. The following parameters may be configured:

1. The host mode.
2. The CWID send period.
3. The CWID keyer speed.
4. The port nodes broadcast control.
5. The crosslink/XISS control.
6. The Tx Delay.
7. The full duplex flag.
8. The RS232 port node broadcast interval.
9. The node broadcast algorithm.
10. The beacon period.
11. The "connect" redirector.
12. The "help message enable" flags.
13. The "hash" node broadcast port control.
14. Whether the node will listen for the extra aliases.

In operation, it behaves just like the PARAMETER command.

The Feature Commands

MHEARD: The TNC can be instructed to keep a list of the last "nn" stations heard, where "nn" is an integer between 1 and 100. It can also be disabled. The syntax of the command is:

MHEARD [nn]

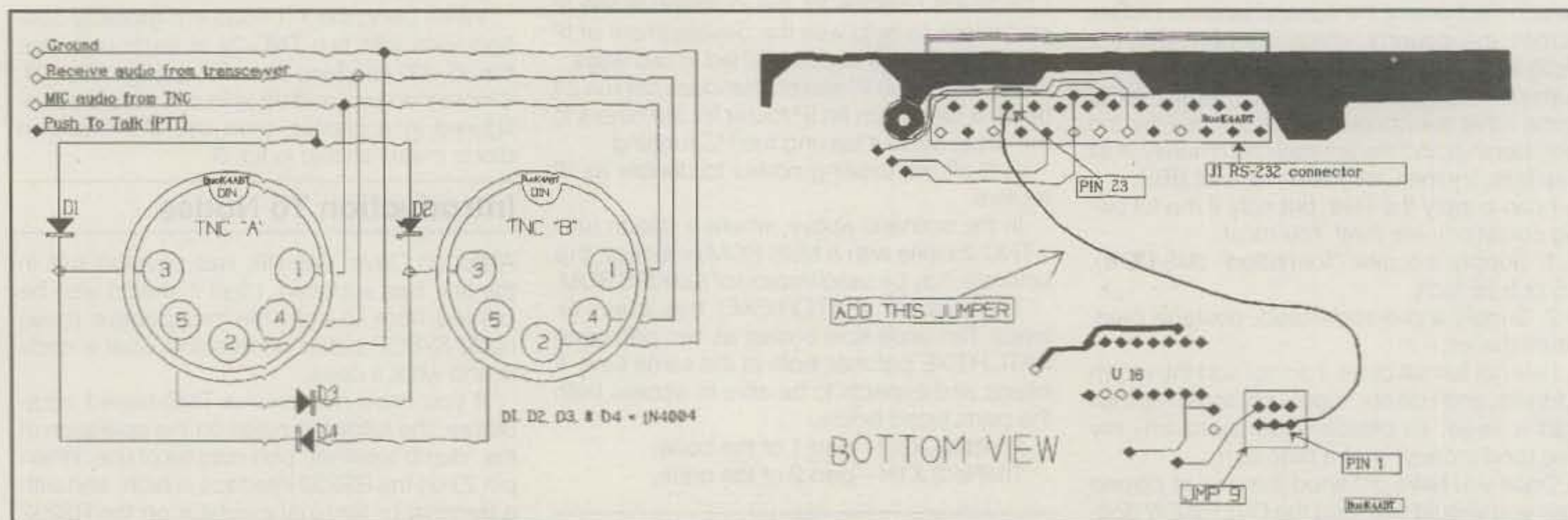


Fig. 2—(Left) Use this special radio port cable when adding a 2400 or 9600 baud node to the same radio as that used by a 1200 baud node. This interface controls PTT activation and allows only one TNC PTT at a time. (Right) This modification is incorporated in most TNC-2s and clones manufactured since 1990. The DRSI DPK series uses a 2-pin JMP connector to enable or disable this jumper. It is identified as "JP9." The jumper must be installed when using these TNCs in gateway configuration.

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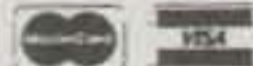
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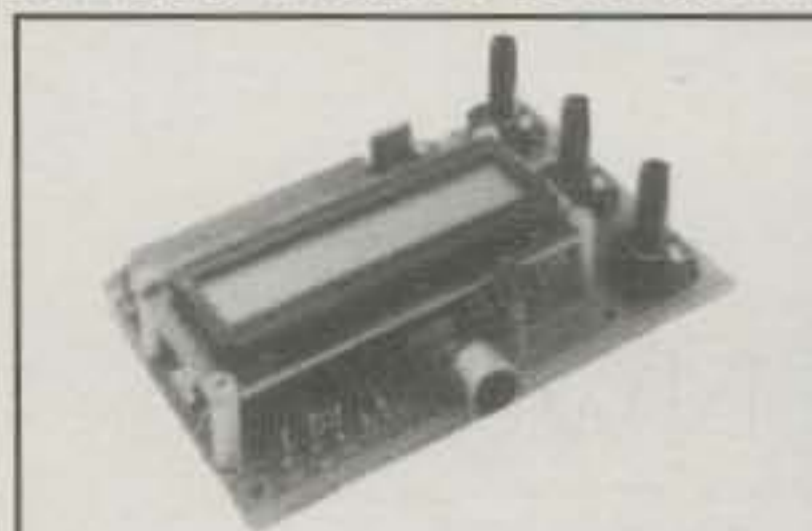
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The parameter is optional and only operates for the SYSOP. It sets the maximum length of the list. Setting to zero disables the function.

The HEARD list uses free buffers for the list, so a large setting means less RAM for the node software. The list is maintained as linked list, with the most recently heard station first.

The display shows the number of packets heard from that station and the time since it was last heard in hours, minutes, and seconds. In addition, it shows the port on which the station was heard together with an indication as to whether the station is a node and a TCP/IP station. It does this by examining the PID byte.

To disable the internal updating of the list (and thereby stop the CPU expending effort on the function), set the size to zero rather than just disabling the command. Note, though, that the node will not clear the list as updates have been disabled, so it will be up to 12 hours before the buffers used are freed.

CQ: When CQ is disabled, the command now reports apologetically rather than simply ignoring the request.

ALL COMMANDS: There is often a requirement to be able to disable the CONNECT command while allowing level 3 relaying. This is achieved by the use of a command qualifier, the syntax of which is:

CONNECT [+|-]

If - (minus sign) is entered by the SYSOP, then the CONNECT command will politely refuse to work. This can be reversed by the + command. This has no effect on layer 3 relaying. Also, the BBS and HOST commands will still allow connections to be made if they are enabled and set. Further, the syntax is valid for all commands. For example, the CQ command can also be disabled in the same way. Be careful, though. The command is only accepted from the SYSOP, so if you disable the SYSOP and manager commands, you will lock out remote management!

NODES: When information on a node that is not known is requested, the program prints out an error message rather than giving the names of all known nodes. When a node entry is made by the SYSOP, callsign checking is forced ON rather than being determined by the callsign checking parameter.

The entire contents of the node table routes may be obtained by the SYSOP or manager by the command **NODES ****. This will dump info on all nodes, one node per line, with the following format:

Alias:call route1 route2 route3

where route1, route2, and route3 comprise the quality, obsolescence count, and port, followed by the neighbor callsign for each of the three route entries for that node. If any of the routes are in use, a chevron will be shown by that route.

The extended command is only for SYSOP use, as it, like auditing and conferencing, causes the node to be a source of a significant amount of data (dumping a large number of node details can consume hundreds of buffers!). It is quite possible that used indiscriminately, it could cause a warmstart of the node. Be careful.

RESET: The syntax of the command is now:

RESET [anything else]

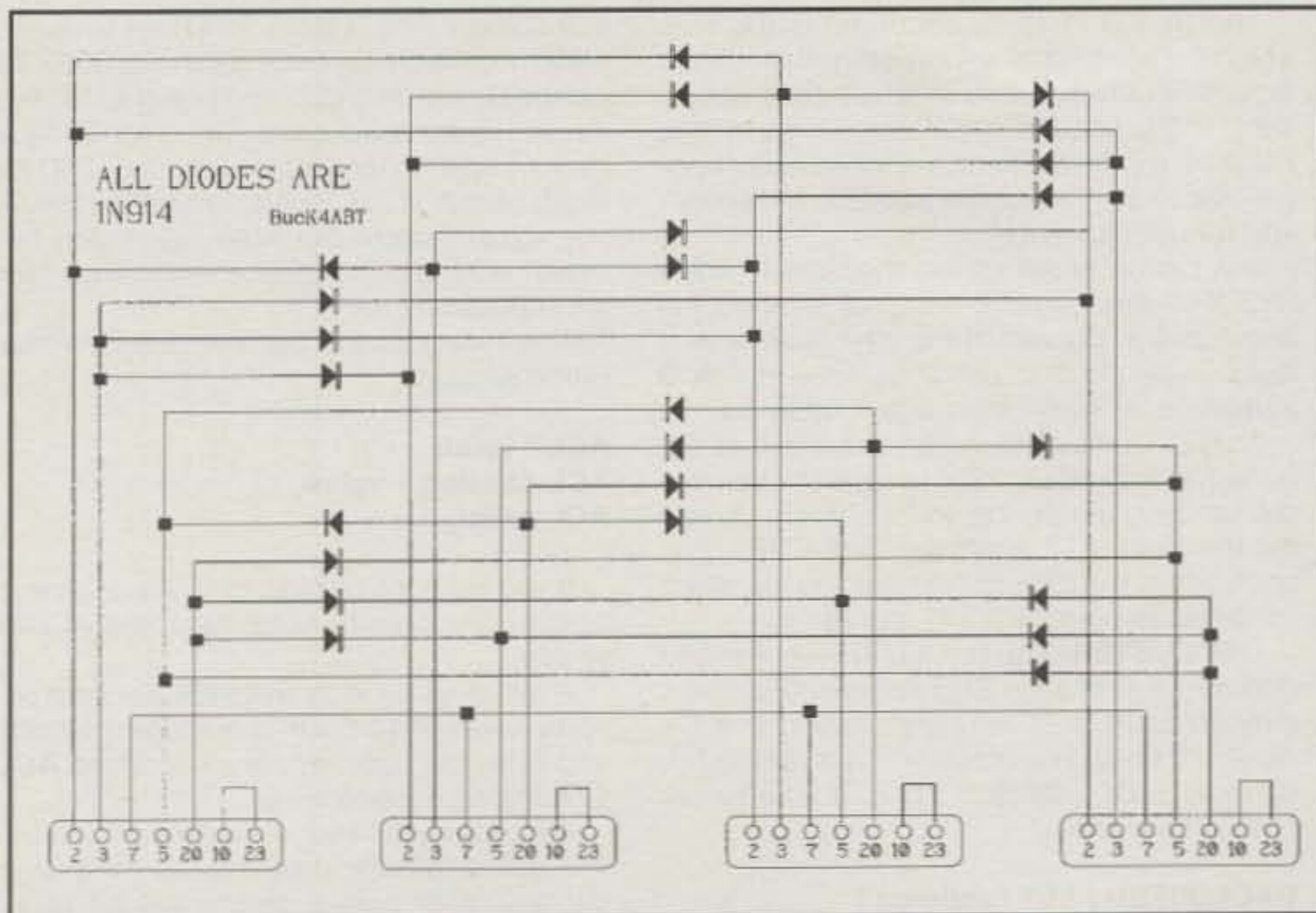


Fig. 3—When more than two X-1 nodes are linked to gateway from band to band, or from 1200 to 9600 bauds, use this diode matrix to interface the RS232 ports together. An unused port will not affect other ports that are in use.

Entering the RESET command alone will do a warmstart. If any other parameter is entered, a coldstart is performed.

MANAGER: The MANAGER command gives the user extra privileges. In this version, this amounts to the ability to receive audit messages from the node. The level of auditing is set by the AUDIT command.

The privilege remains in force until cleared by a command that affects the user state. Specifically, these are entering the TALK state, executing the SYSOP command, entering the MANAGER command and getting the password wrong, or disconnecting from the node. Failing to get the second password right when using the CLOSDOWN command will also remove the MANAGER privilege. A user with MANAGER privilege also has SYSOP privilege.

AUDIT: Syntax of the AUDIT command is:

AUDIT [new-value]

where new value is an integer value. If no value is given, or the user does not have SYSOP status, the current mask value is displayed. Otherwise, the mask is updated and the new value displayed.

TALK: Talk is a conferencing command. It allows a number of stations to hold a simultaneous conference, similar to that used in the DX conference. There is only one conference, and stations may connect to it by connecting to the node and issuing the TALK command. It may be exited by disconnecting or issuing the command "/EXIT" at the start of a line. /EXIT, may be abbreviated to /EX, and it is not case sensitive.

Each line sent by a user is copied to all other users in the conference, preceded by the call-sign of the user. Whenever a new station enters the conference, or a station leaves the conference using the "/EXIT" command, the other conference users get a message informing them of the event.

These status messages are sent with the

callsign of the node rather than the user.

Finally, when entering the TALK command, a message may be sent to all those users who are connected to the node but not otherwise doing anything. For example, if AA4UA enters the line:

TALK Hello Buck, can I have a chat, type "TALK"

then all other stations connected to the node, present in the USER list but idle, will have the following message displayed on their terminal:

AA4UA>> Hello Buck, can I have a chat, type "TALK"

NOTE: Merely connecting to the node does not constitute being connected to the switch. Stations connected to the switch appear in the USER list.

SYSOP: The SYSOP command has been enhanced to increase the level of security offered. One problem of the old system is that the password is easily visible unless the user repeats the SYSOP command a number of times. Even then, correlation between passwords is easy, so the password needs frequent changing. To reduce the change period, and make it harder to discover, the node will accept a string of characters and scan it for the password. Hence, a response of, say, 30 or 40 characters can be sent, with a random number of random characters preceding the actual data and a random number following it.

LINKS: This command shows the current level 2 links to the node. Displayed one per line, the two call-signs are shown followed by the link state, port number, and current retry count.

CALIBRATE: This command allows remote calibration checks of the transmitter deviation. Its syntax is:

CALIBRATE period [toggle]

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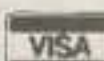
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The period (1 to 60 seconds) is the time which the transmitter will key up, with constant tone. It is undefined as to which tone will be sent. If the second parameter is given, the node will toggle between the tones every [toggle] seconds. The toggle must be between 1 and [period] seconds.

If a period is not given, the user is not a SYSOP or a manager, or if it is out of range, the command is ignored. If the tone generator is busy because it is about to send a CWID sequence, a "busy" message is returned.

NOTE: Quite often it can appear that the node has locked up, having failed to transmit the full calibrate period. In fact, this is usually the hardware PTT watchdog in the TNC. The node thinks it is still sending, but the hardware timer has removed the PTT signal.

DXCLUSTER: The DXCLUSTER command operates just like the BBS command in that it may be used to effect a connection to a DX cluster. It should be disabled if it is not intended to be used to access a cluster. The syntax of the command is:

DXCLUSTER [* | ? | callsign]

HELP: The HELP command gives a message from the ROM. In general, it is expected that the message will be designed to assist new users in understanding the operation or configuration of the node.

CTEXT: The CTEXT command sets or displays a message sent to a user who connects to the node by uplinking to the node's alias. The syntax of the command is:

CTEXT [message]

BTEXT: The BTEXT command sets or displays the additional beacon text sent along with the beacon packets. The syntax of the command is:

BTEXT [message]

ACL: ACL is a more complex addition to the X-1 node. It should be used with care, and only when you really understand its operation. Mistakes can result in the need to go to a remote site (probably when it is cold and wet) to reconfigure the node. The command allows selective control, based on callsign, of a list of different events. The ACL contains two types of entry, a default value and zero or more callsigns, each of which is associated with a value. When one of the controlled events occurs (such as an incoming level 2 connection or a nodes broadcast), the ACL is scanned for an entry that matches the callsign of the sender. If no match is found, the default value is used. Each bit of the value controls a different function, as shown:

- 0—bar incoming level 2 connection.
- 1—bar outgoing level 2 connection (downlink).
- 2—ignore nodes broadcasts from this station.
- 3—bar gatewaying at level 3 to/from this station.
- 4—bar incoming level 4 connections.
- 5—bar outgoing level 4 connections.
- 6—ignore SSID in matching an entry.

For example, if an entry exists for a callsign WX4XXX of 6, then the node will not allow outgoing level 2 connections to the node (downlinks), and will ignore node broadcasts from

that station. The "ignore SSID" bit is used to match a callsign without regard to its SSID. This makes life interesting when finding a match, so the list is scanned twice, once for an exact match and then for a match ignoring SSID if an exact match is not found. There can only be one exact match, but when searching for a match without using SSID, the first entry found will be used.

The syntax of the command is as follows (three versions):

ACL * value
ACL callsign + value
ACL callsign -

If you are not a SYSOP, or if ACL is given on its own, the current contents of the ACL are shown.

A word of caution: **NEVER** connect to a node. Execute a SYSOP or manager password and enter the command level and type **ACL * 127** and then disconnect.

If you do try the above, you are on your own! The action is quite catastrophic. Neither you nor any other packet station will be able to access the node again until you travel to the site and do a complete reset of the node—and I mean a *complete reset!*

There is one way to access the node after making this mistake, but only via the host port. No one else will be able to connect to or from the node.

If you intend to experiment with the command, you should start by entering your own callsign with a value of zero to ensure that you can get back in again!

A Useful Purpose: The list can be used as an accept or reject list by judicious use of the default. To create a list that excludes specific calls, put them into the list set with the required bits.

The default should be zero. To create an "accept" list, put in entries with the required bits zero and set the corresponding bits in the default. Set a node with the command "ACL * 127". While you are still connected, you may set your call into the node so that it will accept only your call. For any other you decide to allow access to, you must use this syntax:

ACL [callsign] - 127 <enter>

Do this for each station, node, or callsign you wish to have access to the node. This is useful when adapted to use on limited connect backbones and trunks.

ALIAS: The ALIAS command allows the node's alias to be changed. The syntax is:

ALIAS [* | new-alias]

If no parameter is given, or if the user is not a SYSOP or Manager, the current alias is displayed. If the alias is deemed to be a valid alias, the node's alias is changed to the new one entered. Note that the algorithm that checks for the alias structure is a bit queer. It is, however, the original algorithm of TheNet and I hesitate to change it for fear of side effects. Note too that the companion CALLSIGN command is not included; chaos is not something I crave. If the SYSOP gives the parameter *, the node's alias is cleared.

IPADDRESS & IPBROADCAST: These commands are used to set or display the IP addresses used by the node. The syntax of

each is (by way of example):

IPADDRESS [ipaddress]

where IPADDRESS is in the form

nnn.nnn.nnn.nnn

where nnn is an integer in the range 0-255.

So to set the node IP broadcast address to that used over here, the command would be:

IPBROADCAST 44.131.0.0

The IPADDRESS is the address to which the node will respond. It is used only as detailed in section 7. The IP broadcast address is the one used to denote broadcast packets that largely will be ignored. Note that port addressing is not currently supported. Anyone who finds this limiting, drop me a line and I'll see if I can change it.

IPROUTE: This is one of the two main databases used by the node. The IPRoute table is used to tell the router where to send a frame for a specific destination. It maps addresses or address ranges to a gateway IP address and to sub-network ports.

The ARP database then tells the node what station corresponds to that address and protocol. The database is stored in an ordered list, in decreasing order of the number of relevant bits. This is to permit searching of the database when trying to find a specific destination. Given an address, it scans addresses with decreasing numbers of bits until it finds a match.

ARP: The ARP table maps a pair of address+port to hardware address+subnetwork mode. The address is either a destination or a gateway in the form nnn.nnn.nnn.nnn. The protocol is either NETROM or AX25.

Other Changes

This section covers the other miscellaneous changes to the software. The command processor has been altered. In general, but not in all cases, commands only appear on the help menu when they are enabled. For example, the "BBS" command will not be shown unless it has been enabled with the "BBS +" command. The exception is the SYSOP commands—such as MODE, LINKS, and PARAM—which are never shown to users but are of interest to them. If the appropriate bit is set in the MODE command, however, then for the SYSOP or Manager all commands appear in the Help prompt. The Help screen now shows commands in a combination of upper- and lower-case characters.

It is possible to set a digi in the address used for beacon packets. Details of how to do this are contained in the configuration guide. Note that this is provided for those rare occasions when there is a genuine need. This is rarely the case and should not be done unless it is really necessary.

Dealing With The Password

Following is an example of a node password:

**THISISA
1234567**

**PASSWORD
89101112131415**

Here is an example of how the password is handled. If you need to set parameters, change beacon text, connect text, or make other mode changes, connect to the node and type MANAGER or SYSOP. You should receive five numbers. These numbers represent letters or characters of the password.

The following is an example of the response from the node after I type and send the SYSOP or MANAGER command to the node. The node responds with:

781512

My response to the five numbers should be the following:

APDTH <enter>

Notice there are no spaces when I send the corresponding five characters to the node. *There will not be a response from the node, only an ACK frame.* You may also enter letters or numbers before or after the five characters of the password, as long as you make sure the five characters are in the order called for by the number sequence, they are all together, there are no spaces, and they are in the correct case (upper or lower).

Another example of my response could be:

VAPDTHRE <enter>

To determine if you have entered the correct sequence of letters/number, use the "P,"

or Parameter, command to make a test of the password entry. Send a P and then wait for the 26 parameters to be returned to you from the node as shown in the following example:

**ALIAS:K4ABT-3} 50 32 188 255 7 5 3600 10
300 2 5 180 4 4 900 64 10 4 2 8 100 18000
1 0 2 1**

If the first number is 50, try sending another number to the node:

P 60 <enter>

If your PASSWORD entry was correct, the node will allow you to make a change in the first number of the parameter list, and you should see the following appear on your screen:

**ALIAS:K4ABT-3} 60 32 188 255 7 5 3600 10
300 2 5 180 4 4 900 64 10 4 2 8 100 18000
1 0 2 1**

Notice how the first number was changed from 50 to 60.

Conclusion

By no means have I covered all the parameters, commands, and features of this new X-1 node in this month's column. Next month we will continue to explore the X-1.

73, de Buck4ABT @ WD4ELJ.VA.USA

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CIRCLE 62 ON READER SERVICE CARD

NEWS OF COMMUNICATION AROUND THE WORLD

Pratus Island—A Potential New One

In April the DX Advisory Committee (DXAC) received a petition to add **Pratus Island BV** to the DXCC countries list as a New One. This petition allows an opportunity to learn more about the process by which new countries are added to the DXCC list.

Pratus Island is a coral atoll about 13 miles in diameter, located in the South China Sea about halfway between Hong Kong on the Chinese mainland and the northern tip of Luzon, in the Philippines. Since 1949 the Republic of China in Taiwan has maintained a weather station on the low, flat atoll.

For the purposes of evaluating the potential of Pratus as a New One for DXCC, the DXer should review DXCC Country Criteria Point 2: Separation by water. This rule states: "An island or a group of islands which is part of a DXCC country established by reason of *government*, Point 1, is considered as a separate DXCC country under the following conditions: (a) The island or islands are situated off shore, geographically separated by a minimum of 225 miles of open water from a continent, another island or group of islands that make up any part of the 'parent' DXCC country." (The rest of Point 2 concerns *additional* islands, and is not relevant to Pratus.)

From this rule, the decision to add Pratus appears to be a simple one: If Pratus is at least 225 miles from Taiwan, with no intervening rocks or islands, then it should count as a New One, right? Unfortunately, life is seldom that simple, and DX is *never* that simple. There are two additional questions to be answered: the political control of Pratus, and the DXCC status of Taiwan. However, before we get to these questions, we'd better re-check the maps and distances, because if Pratus isn't at least 225 miles from the closest part of Taiwan, the other questions are moot.

The petition to add Pratus gives the detailed positions of both Pratus Island and its nearest neighbor under Taiwanese control, Chi-mei Yu, the southernmost of the Pescadores Islands, situated between Taiwan and the Chinese mainland. Various mathematical methods can be used to calculate the exact

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Oscar Jimenez, HIBOMA, scatters his antennas on his Santo Domingo rooftop. He's looking for 6 meter gear to put HIB on that band.

distance between two points on the earth, given their exact latitude and longitude. A quick way, for those DXers who have access to a copy of W6EL's superb propagation prediction computer program, is to use MINIPROP PLUS. Entering these data gives a minimum distance between Pratus and Chi-mei of 244 statute miles. A check of a large-scale navy map of the intervening region shows nothing above sea level between Pratus and Chi-mei. Pratus appears to meet the distance requirement easily.

The next question to be answered is who "owns" Pratus? For Pratus to be considered "part of the DXCC country" of Taiwan, Taiwan must have unambiguous control of the island. Here we get into sticky questions of international politics. Both the People's Republic of China (PRC) and the Republic of China (ROC) continue to proclaim that they are the legitimate government of all of China, both mainland and the island of Taiwan. However, for practical purposes, there have been two completely separate governments in the region since 1949. The PRC has the mainland, and ROC has Taiwan and *several nearby islands*. When Kuomintang troops, under the direction of Chiang Kaishek, fled to Taiwan in the face of the overpowering PRC troops, the Kuomintang

were able to maintain garrisons on Queymoy and Matsu islands, just off the Chinese mainland. They also set up military bases on Pratus and the Pescadores. Taiwan has continuously occupied all these islands since 1949. At no time has the PRC occupied any of these islands between China and Taiwan.

Further evidence that Pratus is under Taiwan control is that Taiwan citizens can fly directly to Pratus from Taiwan on a civilian airplane, and do not require visas to visit. Although the *National Geographic* atlas shows the word "China" next to Pratus, the presence of the Taiwan military continuously since 1949 seems to firmly establish that Pratus is under the control of Taiwan, and may be considered "part of the DXCC country" of Taiwan.

This brings us to the last requirement, the most interesting of the three. In order for Pratus to be a DXCC country separate from Taiwan, Taiwan must be a "Point 1" country—that is, a DXCC country by reason of government. To see what this means, imagine an island about 250 miles from Hawaii. This island would not fall under DXCC Country Criteria Point 2(a), because Hawaii is not a "Point 1" country, a country by reason of government. It is, in fact, an offshore island, more than 225 miles from the nearest point of the US. (For another

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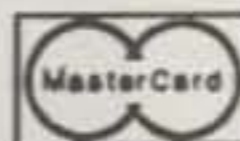
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er island off Hawaii to count as a separate DXCC country, it would have to be more than 500 miles from Hawaii, under Point 2[b].)

Well, you ask, haven't we already determined above that the Republic of China (Taiwan) and the People's Republic of China are two separate governments? Yes, they are indeed separate governments, but Taiwan lacks many of the official trappings of a formal government, while it continues to maintain that it is the legitimate government of all of China.

After 1949 the US government, and most other governments, regarded Taiwan as the legitimate Chinese government. Taiwan held the China seat in the United Nations. That changed dramatically in 1971, when the United Nations gave the China seat to the PRC and booted the Taiwan government out. Taiwan subsequently withdrew from all international bodies, such as the ITU (International Telecommunication Union), the Universal Postal Union (the IRC people), WHO, UNESCO, and all the other alphabet soup of United Nations and international organizations. Under pressure from the PRC, many nations even dropped diplomatic relations with Taiwan, as the United States did in 1979. As of 1989, not a single country in the world retained diplomatic relations with Taiwan.

This has created an interesting international situation. Taiwan is included in the CIA's *World Factbook*, but not in alphabetic order; it's stuck in at the end, all by itself. Taiwan's extensive foreign trade and many overseas visitors cannot go to a local embassy or consulate; there aren't any! All such business is handled by the Coordination Council for North American Affairs, and similar organizations around the world. Nor does the US maintain an "embassy" in Taiwan; instead, US citizens can get help from the American Institute in Taiwan, a private institution. Whereas prior to 1979 official US maps tried to pretend that the PRC didn't exist, our official line today is that the ROC doesn't exist.

This dilemma causes problems when one reviews the DXCC Country Criteria to see if Taiwan really is a Point 1 country. (The Point 1 rule is too long to quote in its entirety here; see a recent copy of the ARRL DXCC Countries List for the complete text.) Among the ways an entity qualifies as a Point 1 country is membership in the United Nations. Taiwan obviously can't meet that requirement, having been tossed out in 1971. However, the authors of this rule realized that UN membership is not the *only* way to determine if an entity is a separate DXCC country by reason of government. (Otherwise, we'd have to throw

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SSB: 350 IV3BKL, IK0QDD, EAB8WW, 400 EAB8WW, 450 WM1Q, EAB8WW, 500 WM1Q, KE4BM, EAB8WW, 550 WM1Q, IV3JDD, KE4BM, HC2HYB, EAB8WW, 600 N3DRD, WM1Q, KE4BM, EAB8WW, 750 WA7OBH, 800 WA7OBH, 1050 K9EC, 1100 K9EC, 1150 K9EC, KA5TQF, NG9L, 1200 K9EC, KA5TQF, 1250 KA5TQF, 1350 K2EEK, 1800 WE2L, N7TT, 1850 N7TT, 1950 W4UW, 2550 NJ0C.

CW: 350 SM3LGO, DK6AP, IK4GME, KF7JF, 400 SM3LGO, DK6AP, IK4GME, KF7JF, 450 SM3LGO, NH6T, K9EC, DK6AP, IK4GME, KF7JF, 500 SM3LGO, NH6T, K9EC, DK6AP, IK4GME, 550 SM3LGO, NH6T, DK6AP, IK4GME, 600 SM3LGO, NH6T, KL6AP, IK4GME, SM5INC, 650 SM3LGO, NH6T, DK6AP, SM5INC, 700 SM3LGO, DK6AP, SM5INC, 750 SM3LGO, DK6AP, SM5INC, 800 SM3LGO, DK6AP, KA5TQF, SM5INC, W8LRY, 850 DK6AP, W4TYU, KA5TQF, SM5INC, 900 DK6AP, W4TYU, SM5INC, W4UW, 950 DK6AP, W4TYU, SM5INC, 1000 DK6AP, SM5INC, 1050 WA2EYA, SM5INC, 1100 WA2EYA, SM5INC, 1200 W4ZYQ, 1750 IT9VDQ, 3250 N6JV.

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15 Meters: OH2-612
20 Meters: IV3JDD
40 Meters: NH6T
80 Meters: 11-21171, NH6T

Asia: SM3LGO, NG9L
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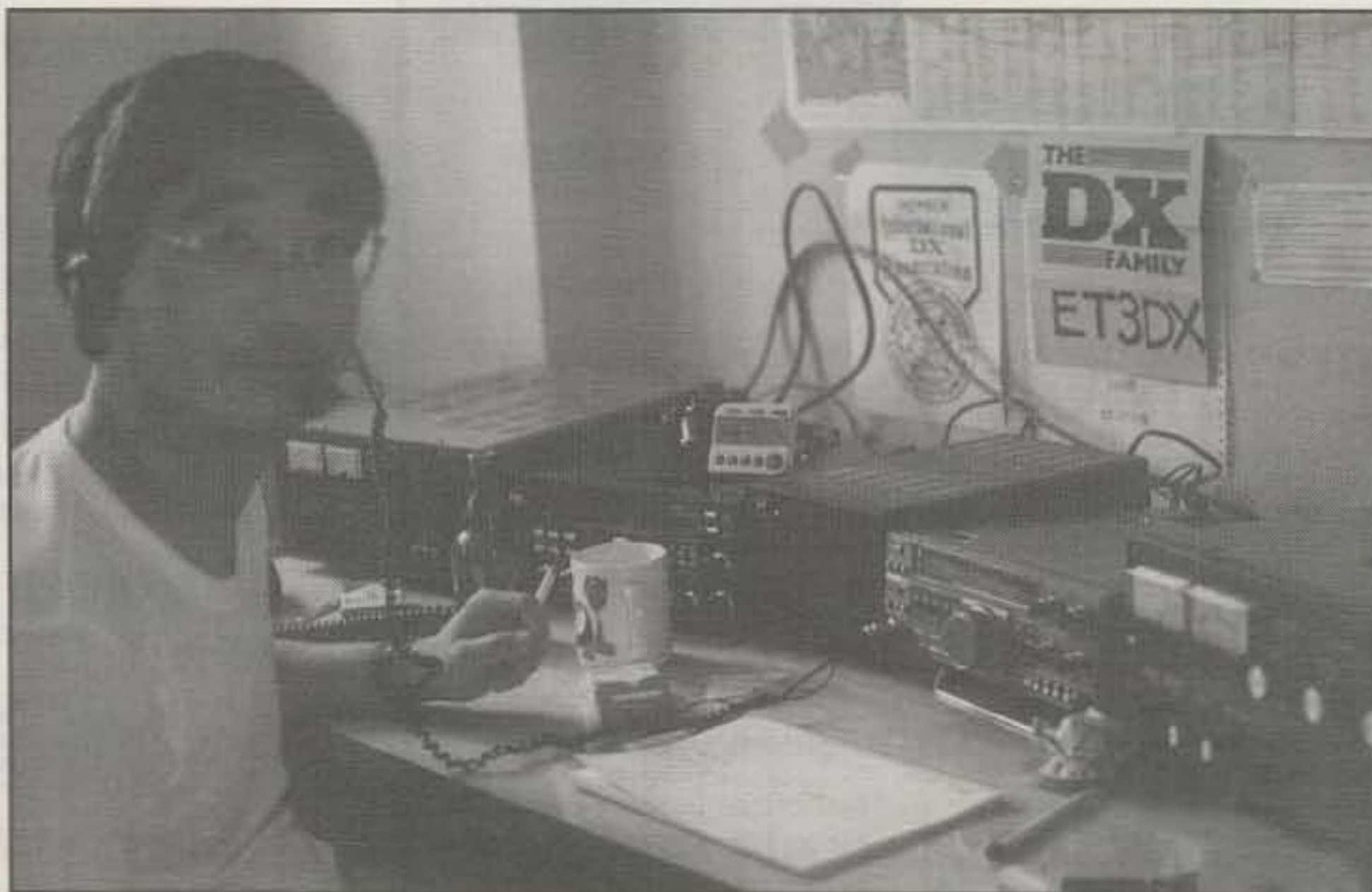
Award of Excellence Plaque Holders with 160 Meter Endorsement: FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, K9QFR, NX0I, G4BUE, LU3YLW4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCY.

Complete rules and application forms may be obtained by sending a business-size self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to: "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

out Switzerland, Andorra, Liechtenstein, San Marino, Tonga, Tuvalu, the Vatican, and other somewhat obvious "countries" that are not UN member states.)

The Point 1 criterion thus lists several other characteristics that may be considered in making a reasonable determination if a country has a sufficient

degree of sovereignty to count as a country by reason of government. These are: **(1) recognition by UN member states.** Taiwan bats zero on that one. **(2) Membership in specialized agencies of the UN, such as the ITU.** Again, Taiwan bats zero. It is not a member of one single international organization, much less of a UN



JH1AJT operated as 9E2A from Ethiopia earlier this year. (Photo via DJ9ZB).

The WAZ Program

Single Band WAZ

10 Meter SSB

456JE4WOK 458JR7CDL
457KE5PO

15 Meter SSB

443ZL1AK 444JA1JMF

17 Meter SSB

6EA4AV

20 Meter SSB

921N5HSF 922KF7VC

15 Meter CW

243JK1AJX

17 Meter CW

7K8MFO

20 Meter CW

431OE3EMN

40 Meter CW

162K5PC 164W1WAI
163JA6VU 165ON4ACG

80 Meter CW

35W1MK 36JA6VU

17 Meter Mixed

18N5CB

Satellite

2VE6LO

All CW

27AA5BT 29AA6WJ
28WS1F

All Band WAZ

SSB

4062JL2EZB 4067KA8JHD
4063IK7NXM 4068OH1KF
4064ZL1AK 4069GM4XLU
4065JH7XVB 4070JR8KJR
4066DK8UH

CW/Phone

7338ZL1AK 7340OH2RL
7339KS4Q

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agency. (All of the above-mentioned non-UN members belong to several UN agencies.) (3) **Authorized use of ITU-assigned callsign prefixes.** Sorry, Taiwan; another strikeout. The B prefix is assigned to China, meaning the PRC. Taiwan is using the BV prefix without authorization. (4) **Diplomatic relations,** including maintaining consulates and embassies. As mentioned above,

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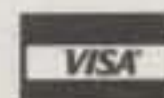
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Members of the Russian-Speaking Radio Club International gather in Ed Kritsky, NT2X's shack. Anyone interested in joining this new group can contact Ed at Box 715, Brooklyn, NY 11230. That's Ed on the right, and Romeo, 3W3RR, on the left.

Taiwan has no such diplomatic relations. (5) **Entering into international agreements.** Now we are getting someplace. Taiwan clearly enters into international agreements with a wide variety of individuals, companies, and, through its quasi-consulates, with other governments. These include trade and banking agreements, foreign aid, INTERSAT ground stations, and more. Taiwan clearly is a sovereign nation when viewed economically. (6) **Regulation of foreign trade, commerce, and customs.** Again, Taiwan is clearly a sovereign nation. (7) **Regulation of immigration and licensing, and issuance of currency and stamps.** Taiwan is certainly in charge of its own immigration, and requires visas issued at its non-consulates for all visitors. And as any visitor to Taiwan quickly learns, Taiwan licenses everything, from amateur radio operators to street vendors. Also, Taiwan has its own currency, the New Taiwan dollar (NT\$), which is completely different from the PRC's Zen-min-bi. And it has its own stamps and efficient postal service. (8) **Maintain a standing army.** Again, no question on this one. Taiwan maintains a more than 1,000,000 member army (out of a total population of over 20 million), and spends one third of its government budget each year maintaining that army.

So does Taiwan possess sovereignty? The DXCC rules define a nation possessing sovereignty as "a body politic or society united together, occupying a definite territory and having a definite population, politically organized and controlled under one exclusive regime,

and engaging in foreign relations." Under this definition Taiwan is clearly a sovereign nation, and thus is a DXCC country by reason of government, a Point 1 country. Its inability to meet many of the specific requirements in the DXCC rules stems from its ambiguous status as the ex-government of China, and its unwillingness, at least officially, to acknowledge that reality. Outside of that one point (and the Taiwan government has excellent reason to feel it is an important point; they were tossed off the mainland at gunpoint, after all), Taiwan would simply be another ordinary country, just like many others in the region.

Based on this reasoning, the members of the DXAC will probably vote in favor of adding Pratus Island to the DXCC countries list, effective with the first accredited operation from the island. However, the DXAC doesn't have the final word. The DXAC recommendations must be endorsed by the Awards Committee at ARRL Headquarters. This semi-secret committee is made up of the most knowledgeable and active amateurs on the headquarters staff, and is (usually) the final authority on DXCC matters. The Awards Committee can vote to accept the DXAC's recommendations, thereby closing the matter, or the Awards Committee can send a DXAC recommendation back to the DXAC for further consideration. (Or, as happened with Macedonia, simply not take any action at all for months.) The Executive Vice President of the ARRL, Dave Sumner, K1ZZ, can overrule the Awards Committee, and the League's Board of Directors has final say on all

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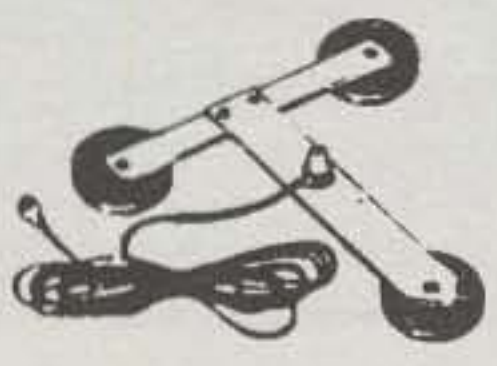


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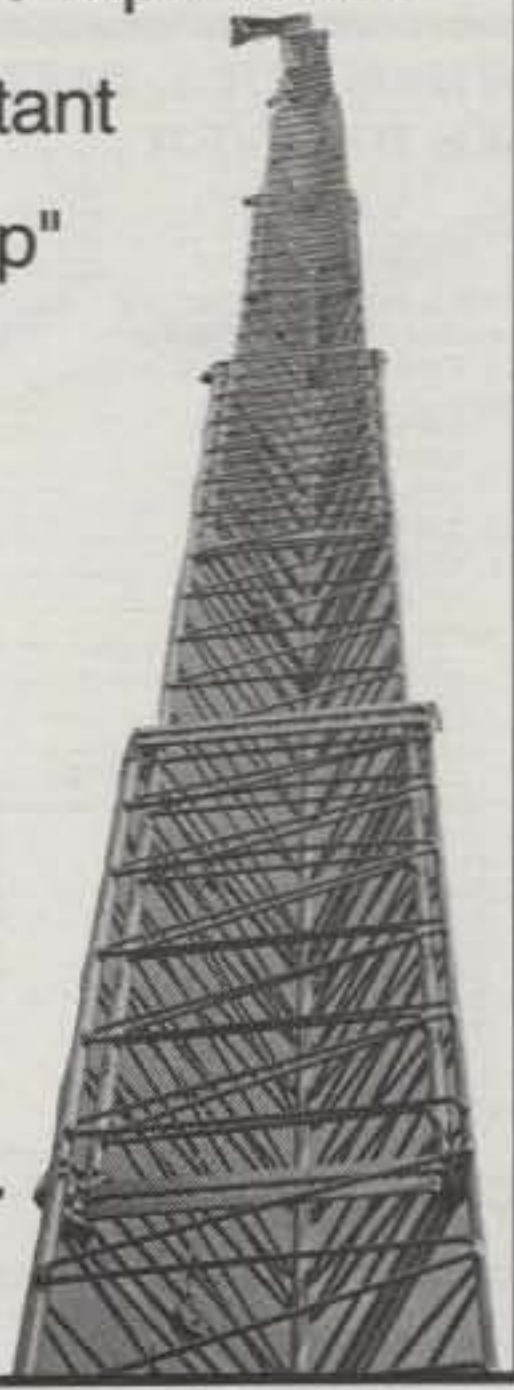
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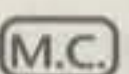
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S59VM

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K6YRA, 199 (34)	N7RT, 199 (34)
PY7ZZ, 199 (34)	VE7AHA, 199 (34)
K0CS, 199 (34, 40m)	W1FZ, 199 (26)
AA4KT, 199 (26)	IK2GNW, 199 (1)
K7UR, 199 (34)	W9CH, 199 (26)
K9EL, 199 (26)	AC0M, 199 (34)
NA0Y, 199 (26)	SM6AHS, 198 (12, 31)
VE7DX, 199 (34)	K1ST, 198 (19, 26)
W0PGI, 199 (26)	4X6DK, 198 (4, 6)
W2YY, 199 (26)	AB0P, 198 (23, 34)
W9WAO, 199 (26)	UA3AGW, 198 (1, 12)
K6EID, 199 (34)	KL7Y, 198 (34, 36)
IK8CNT, 199 (12)	VO1FB, 198 (19, 27)
W1JR, 199 (23)	W6TC, 198 (34, 37)

The following have qualified for the basic 5 Band WAZ Award:

IK0EIM, 174 Zones	DK2OY, 198 Zones
K2AJY, 160 Zones	HA5WA, 200 Zones
G4BUE, 200 Zones	XE1VIC, 198 Zones

Endorsements:

K5PC, 190 Zones	JA6VU, 200 Zones
K3NW, 197 Zones	W1WAI, 191 Zones
KE4VU, 195 Zones	

827 Stations have attained the 150 zone level as of April 30, 1993.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and \$1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all CQ awards is \$4.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

League matters, but with rare exceptions, the power to create a new DXCC country lies with the DX Advisory Committee, subject to the concurrence of the Awards Committee. These individuals will go through an analysis similar to that above to make the final decision on whether or not to add Pratus Island to the DXCC list.

Many thanks to the *CIA World Factbook, Taiwan*, by Robert Stoney, the ARRL DXCC Countries List, and the petition for Pratus by Samuel Liu, BV4VB, for the facts in this article. The opinions are, of course, as always, mine alone.

DX News

The following operations are now accepted for DXCC credit: ET3YU, from 26 Feb. 1993; 9F2CW, from 15 Dec. 1992; ET3RA, from 22 Nov. 1992; ET3JR, from 15 Oct. 1992; ET3DX, from 11 Apr. 1993; 5R8DJ, from 24 Nov. 1992; S21ZM, from 7 Mar. 1993; S21ZJ, from 6 Mar. 1993;

S21ZH, from 6 Mar. 1993; S21ZG, from 6 Dec. 1992; D2/AA4HU, from 26 Jan. 1993; D2/N6QHO, from 26 Jan. 1993; D2/KC6HUE, from 26 Jan. 1993; D2BG, from 17 Feb. 1993; S21ZK, from 6 Mar. 1993; T53UN, from 20 Mar. 1992; 6O/G3KOX, from 14 Dec. 1992; T5/KF6BL, from 26 Dec. 1992; T55FO, from 6 Jan. 1993; T5CB, from 31 Jan. 1993; T5/K3OQF, from 21 Feb. 1993; YI9CW, from July 1992; 5X1A, from 4 Mar. 1993; 5X1B, from 12 Mar. 1993; 5X1C, from 29 Apr. 1993; 5X1XT, from 26 Apr. 1993; and 9G1AA, from 24 Mar. 1993.

Japanese Language for Ham Radio: Sakae Obara, AB5MF, a Japanese amateur radio operator who lives in the US, has written a Japanese-language guidebook for English-speaking amateurs. The 16-page, spiral-bound booklet includes about 100 phrases and sentences in English, with transliterations of the Japanese equivalent, and a pronunciation guide. It also includes helpful notes to explain Japanese word usage, numbers, ham radio technical terms, and more. Cost, including postage, is only US\$4 in the US and Canada, and US\$6 elsewhere. Contact Sakae at 7205 Hart Lane #2010, Austin, TX 78731.

New Bosnia-Herzegovina Prefix: The use of the new T9 prefix for Bosnia-Herzegovina spells the end of the credit for Serbian stations operating in Bosnia-Herzegovina. The DXCC had been accepting these stations for DXCC credit, despite the fact that they were operating under Yugoslavian authority, and not Bosnia-Herzegovina licensing. Now that the legitimate Bosnia-Herzegovina stations are using the T9 prefix, the Serbian stations using any Yugoslavian prefix such as 4O or 4N will no longer count for DXCC credit.

August DXpeditions

The Kyoto Amateur Radio Club of Japan heads out on its sixth multi-operator DXpedition, to celebrate the 40th anniversary of the club's founding. This year they will travel to Belau, formerly known as the Eastern Carolina Islands, August 8-13. They will be on all bands, 160-6 meters, including the new bands, on CW, SSB, RTTY, and FM. Their Belau callsigns, and their home calls, are:

KC6IG/JH3FJG; KC6IJ/JR3OFX; KC6IL/JF3PLF; KC6IM/JK3AOG; KC6KY/JH3BVH; KC6LI/JI3DLI; KC6OG/JE3OGK; KC6TZ/JH3TXR; KC6UP/JH0XUP.

QSL all these callsigns via JA3OIN. The West Island Amateur Radio Club of Montreal, Canada, will operate as **CY9CWI** from St. Paul Island off the northern tip of Nova Scotia August 14-18. They be active on CW, SSB, and RTTY on 160-10 meters. Try 1835, 3505, 7040, 10120, 14035, 18105, 21040, 21120, and 28050 kHz on CW;

The WPX Honor Roll

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ Master Prefix List. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or confirmation of, present total. If no up-date, file will be made inactive. Lifetime Honor Roll fee is \$4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4441	9N2AA	2924	I2UIY	2674	YU7SF	2287	K9QFR	1960	WB2YQH	1740	WA1JMP	1531	KA5TOF	1229	KS0Z	1039	HP2CWB
4434	F9RM	2915	W2FXA	2655	I6SF	2274	SM6DHU	1946	N6JM	1737	G4OBK	1504	CT1OF	1214	W9IAL	1032	I1ZQD
4087	K2VV	2914	N4MM	2628	9A2NA	2203	HABIT	1905	DK5AD	1701	NV9S	1499	IK2ILH	1194	N6IBP	902	JN3SAC
3476	EA2IA	2911	K0BLT	2609	YT7DX	2202	HA8HW	1897	W6OUL	1689	WB2ABD	1484	K5IID	1178	K7LAY	851	VE7CBH
3323	K6JG	2904	YU1AB	2561	SM7TV	2174	I2EOW	1881	WE2L	1688	W9IL	1483	PY2DBU	1165	K9BQL	840	VE3OMM
3231	VE3XN	2889	WA8YTM	2556	HA8XX	2163	K2POF	1868	N2AIF	1681	KS4S	1471	WB3DNA	1164	CT3CU	813	WT3W
3210	K6XP	2858	PY4OD	2549	N2AC	2147	K5UR	1860	K2OLG	1674	S51NU	1461	S58MU	1160	K0IFL	788	VE6BMX
3156	N6JV	2852	W9DWQ	2530	HA0DU	2142	I1WXY	1856	YU1GR	1640	W3KH	1417	I0AOF	1146	N7JXS	770	N3KR
3127	IT9TQH	2803	IN3ANE	2525	K9BG	2133	3A2LF	1797	VE3MS	1638	VE1RJ	1405	DF4ZL	1125	W0IZV	755	CT1EEB
3103	N4NO	2797	ZP5JCY	2482	N4UU	2097	S53EO	1785	DF6EX	1632	W8CNL	1325	KC7V	1122	K7KBN	753	OZ-2044
3025	I2PJA	2762	KA5W	2449	IT9QDS	2082	W4UW	1768	HA5NK	1628	WB8ZRL	1324	I2EAY	1119	NH6T	720	EA3CWK
2996	N9AF	2752	I1EEW	2435	K9AGB	2052	KL7AF	1762	WB4RUA	1589	K5DB	1298	KI3L	1118	G4SDJ	711	WK3Z
2983	W4BQY	2722	PA0SNG	2339	UA3FT	2048	K8LJG	1749	KB0G	1547	EA1JO	1282	LU8DY	1061	HB9DDZ	640	JR3TOE
2978	SM3EVR	2704	W1BWS	2301	KF2O	1992	I2DMK	1741	SM6CST	1532	CT1YH	1267	NJ1T	1044	I1-50156	635	JA4DUD

SSB

4320	F9RM	2483	F2VX	2098	W9DWQ	1758	4X6DK	1535	I6NOA	1274	OE6CLD	1153	K5IID	991	YB3OSE	781	G0FWG
3895	I0ZV	2480	NJ0C	2087	K9QFR	1757	CT1BY	1510	CT1UE	1272	KB0C	1138	K8DMU	976	I8IYW	764	WT3W
3497	K2VV	2460	OZ5EV	2067	I8KCI	1742	WE2L	1509	YU7SF	1269	I2DMK	1135	OE2EGL	970	HP2CWB	755	CT1EEB
3392	ZL3NS	2437	W0YDB	2065	WF4V	1712	KC8YM	1443	KA0ZFX	1266	KS4S	1117	FE6FNA	962	VE3MS	751	EA3EQT
3338	VE1YX	2421	N4NO	2046	9A2NA	1708	CX6BZ	1405	K8LJG	1258	I8WYD	1112	WA3FKF	951	KB0G	693	CE5FSB
3104	IT9TQH	2407	I1EEW	2004	EA3AQC	1700	EA2AOM	1392	IT9JKY	1258	W6OUL	1098	IK2AEQ	951	KB4HU	683	AA4UF
3031	K6JG	2398	I4CSP	1993	CT4UW	1686	SM6DHU	1352	K2EEK	1254	KA5TQF	1073	WB6SRK	917	KK5P	678	SM6CST
3015	I2PJA	2395	PA0SNG	1969	KF2O	1655	N4UU	1350	LU8DY	1226	IK0EIM	1063	CT4RH	910	NH6T	643	JR3TOE
2917	WD8MGQ	2370	KA5W	1956	I2EOW	1654	IK5ACO	1339	W5AWT	1206	W5ILR	1062	NG9L	860	EA1JO	618	VE1RJ
2833	K6XP	2319	HA8XX	1914	W4UW	1600	KL7AF	1327	CT1DIZ	1199	K3IXD	1038	WB6GFJ	844	CP1FF	612	JA4DUD
2758	CT4NH	2291	WA8YTM	1892	LUBESU	1586	HA0IT	1317	N2AIF	1188	EA9LZ	1036	K9BQL	836	KA9MOM	611	EA8BWW
2676	ZP5JCY	2282	W4BQY	1871	PY4OY	1581	IN3QCI	1310	LU7HJM	1187	CT1BWW	1034	HA5NK	831	IT9JPK	610	KI6PG
2622	N4MM	2159	I5ZJK	1856	CT1AHU	1551	KF7RU	1305	WN5MBS	1174	I3ZSX	1019	KC7V	814	KE7UH	606	KE4BM
2563	EA2IA	2129	PY4OD	1840	K5UR	1545	N6FX	1287	DK5WQ	1162	HP6AYV	1016	5Z4BP	811	K0IFL	603	HB9DDZ
2525	I2UIY	2105	WA4QMQ	1811	KD9OT	1536	K2POF	1278	IK2DUU	1162	G4OBK	1003	DF4ZL	800	KF7IO	600	JA2OCU

CW

3447	K2VV	2406	YU7LS	1965	N4MM	1700	K5UR	1569	W1WAI	1461	ZS6EV	1304	VE3MS	1004	AH6JF	789	KL7UR
3323	WA2HZR	2401	I6SF	1940	I2UIY	1681	SM6DHU	1567	VE1RJ	1442	KB0G	1277	EA1JO	952	W9IAL	787	PY4WS
3134	N6JV	2400	K6XP	1896	IK8ADY	1673	G4SSH	1556	SM0AJU	1408	HA5NK	1195	I2EAY	944	FE1JUD	760	3A2CIN
3124	IT9TQH	2340	W4BQY	1866	G4UOL	1671	I2DMK	1555	W5AWT	1405	CT1YH	1193	NJ1T	923	DF4ZL	758	4X6DK
2835	VE7CNE	2320	N2AC	1801	N4YB	1668	HABIT	1555	W9PWM	1402	W6OUL	1151	ZP5JCY	917	EA6AAK	749	VE3OMM
2674	N4NO	2311	W9DWQ	1790	EA7AZA	1627	SM6CST	1536	KF2O	1398	VS6UW	1141	LU2YA	908	KC7V	710	HB9DZZ
2605	YU7LS	2209	LZ1XL	1787	KA7T	1618	K2POF	1523	G3VQO	1364	IK3GER	1133	JA9CWJ	907	K5IID	688	N5GFX
2577	PY4OD	2196	WA8YTM	1770	T14SU	1608	N6FX	1515	K8LJG	1354	DJ1YH	1118	KS4S	897	W4UW	669	NH6T
2534	EA2IA	2165	VE7DP	1745	9A2NA	1599	KL7AF	1506	N2AIF	1341	I1EEW	1102	IK2ECP	852	KA5TOF	630	AA6WJ
2495	K6JG	2128	N4YUU	1721	IT9VDQ	1596	HA8XX	1504	I7PXV	1324	G4OBK	1047	K9QFR	847	JN3SAC	611	KI4UJ
2491	W3ARK	2054	KA5W	1715	W8IQ	1576	S51NU	1490	OZ5UR	1308	S51MU	1036	KA1CLV	827	WB5MTV		

1840, 3780, 7205, 14195, 18130, 21295, 24490, and 28395 kHz on SSB; and 90 kHz up on RTTY. Ops are Benoit, VE2JBF; Alain, VE2DAV; Mark, VE2PTT; Mark, VE2HVW; Reg, VE2AYU; Jean-Claude, VE2JCX; Andrew, VE2WHO; and Fred, VE2SEI. QSL to the West Island Amateur Radio Club, P. O. Box 884, Pointe-Claire/Dorval, Quebec H9R 4Z6, Canada.

The Hervey Bay Amateur Radio Club of Queensland, Australia, won't be offered a special award during the Whale Festival the first week of August this year. However, the VK4s will be active near 3794, 7100, 14235, 21250, and 28495 kHz, looking for the Deserving. Their VI4HBW and VI4FOW awards are still available for US\$5 each, via Box 829, Hervey Bay, Queensland 4655, Australia.

The Calgary Amateur Radio Association will operate **CH8MNP** from Cameron Island (NA-009 for Islands On The Air) August 18-25. Cameron is only 100 kilometers from the magnetic North Pole. They will be on all bands, 160-6 meters, on CW and RTTY. Try 3760, 7060, 14260, 21260, and 28460 kHz on

SSB, and 5 kHz up on CW. QSL to CARA, P.O. Box 592, Station M, Calgary, Alberta T2E 5J6, Canada, with an IRC, or appropriate Canadian postage stamps, please.

Buzz, N5FTR; Al, WD5IQR; Bobbi, KA5BOA; and Dave, P29BT, will be on a mini-DXpedition to Ambergris Caye (San Pedro Island, IOTA NA-073) in Belize using the callsign **V31BR** from Aug. 9-16. The group is planning to take along a triband beam for 10, 15, and 20 meters and wire antennas for other bands. Operation will be mainly SSB and RTTY, with possibly some CW. QSL via Buzz, N5FTR, *Callbook* address.

QSL Notes

SM0AGD has a new address, effective June 1: Eric Sjolund, Vestag 27, 19556 Marsta, Sweden.

QSL **CO2KK** via W9JUV, but expect some delays, as logs are slow in arriving.

QSL **9K2ZW** via Karen McErlane KD4NDS, 2219 Lime Tree Dr., Edgewater, FL 32141.

WD5B's address is not correct in the

1993 *Callbook*; QSL **VP5/WD5B** via Rich Duncan, WD5B, 5 Troxell Lane, Conway, AR 72032.

Eddie DeYoung, VK2KS, has moved again. QSL **C21XX, 3D2XX, VK8XX**, and his wife Mina's calls of **C21YL, 3D2MM, and VK8MM** via 1/127 Cardinal Avenue, West Pennant Hills, New South Wales 2125, Australia.

5U7M QSLs 100% of his contacts via the bureau system. He asks that DXers not send cards direct, and don't send IRCs nor postage funds. DXers may answer his QSLs via the Japanese JARL bureau.

Ed Schneider, AA7AN, is the QSL manager for **VQ9KC, 4F3AAL, and UA8TAA**. Ed's address is 6502 Wildcat Drive, Cave Creek, AZ 85331.

FG4FR continues to use F6FNU as a QSL manager, but for those DXers who prefer to QSL direct, FG4FR's direct address is: M. Frantz Selbonne, Res: Merosier Narbat, Bat. J2-N, 21-Belcourt, F-97122 Baie/Mahault, Guadeloupe, via France.

The Syktyvkar Friends Radio Society has established a QSL bureau for **UA9X** stations: P.O. Box 1526, Syktyvkar



Francisco, CT1EDY, operated CQ1A from Portugal during the CQ WPX SSB test in March. (CT1EEB photo)

167002, Komi, Russia. The use of this address will avoid the delays, IRC removal, and fees encountered via Box 88, Moscow.

QSL **OD5RAK**'s North American contacts only via Dwaine Modock, WA8MEM, 28265 Gardenia Dr., North Olmsted, OH 44070.

QSL **8P9EA**, **8R1K CQWW 1992 CW and SSB**, **PJ2/OH0XX**, and **8R1RPN** via Olli Rissanen, OH0XX, 1313 So. Military Trail, Suite 599, Deerfield Beach, FL 33442. (QSL the **1991 CQWW CW** operation of **8R1K** via OH2BH.)

DL6NA, QSL manager for 9X5AB, P40NA, and P40ZJ, says the recent

CQ DX Awards Program

SSB

2013.....LU6FAZ	2018.....I8SAT
2014.....EA8BWW	2019.....KD4FAZ
2015.....EA7CD	2020.....YV5DEH
2016.....VE3HO	2021.....HL5AP
2017.....N6RJY	

CW

877.....JG2NXV	879.....VE3HO
878.....KK4XL	880.....K9CC/M

SSB Endorsements

320.....K4MZU/328	320.....IK0IOL/325
320.....K2TQC/328	320.....XE1CI/324
320.....K2FL/328	320.....W2CC/324
320.....W9DWO/328	320.....WA4JT/324
320.....W9SS/328	320.....W2FGY/324
320.....WA4IUM/328	320.....W5LLU/324
320.....KZ2P/328	320.....WA4WTG/323
320.....K6YRA/328	320.....I8SAT/322
320.....DJ9ZB/328	320.....K2ARO/322
320.....K6JG/328	320.....I8LEL/322
320.....WA6OET/328	320.....W7FP/322
320.....VE1YX/328	320.....VK4LC/322
320.....WB1DQC/328	320.....VE3HO/321
320.....N4MM/328	320.....AA6AA/321
320.....DL9OH/328	320.....N5FG/320
320.....XE1AE/328	310.....YV5IVB/318
320.....CX1TE/328	310.....KB2MY/318
320.....K5OVC/328	310.....KB8O/316
320.....W6EUF/327	310.....WB2JZK/316
320.....W4NKI/327	310.....WB4DBB/315
320.....N6AHU/327	310.....N5ORT/312
320.....CX4HS/327	310.....ZL1BOQ/310
320.....W0YDB/327	300.....EA2AOM/306
320.....EA2IA/327	300.....N6RJY/303
320.....YU1HA/326	300.....N5HSF/302
320.....K3UA/326	300.....4X4JO
320.....W4UW/326	300.....AB4UF/300
320.....KF7SH/326	275.....LU6FAZ/281
320.....K2JLA/326	275.....KG6LF/277
320.....KZ4V/326	250.....YV5DEH/270
320.....K9BWQ/326	3.5/7 MHz.....I8SAT
320.....VE3MR/325	28 MHz.....I8SAT
320.....VE3MRS/325	1.8 MHz.....I8SAT
320.....N7RO/325	

CW Endorsements

320.....K2TQC/328	320.....W7CNL/321
320.....K1MEM/328	320.....N7MC/321
320.....W9DWO/328	320.....VE3HO/321
320.....K6JG/328	310.....AA6AA/319
320.....N4MM/328	310.....N7RO/318
320.....K2FL/327	310.....W1WAI/317
320.....DL1PM/327	300.....K2JLA/309
320.....K3UA/327	300.....IK2ILH/301
320.....WA4IUM/326	250.....N5FG/266
320.....K9BWQ/326	200.....KB8O/235
320.....W2UE/324	200.....WB4DBB/234
310.....KZ4V/324	150.....K9CC/M/161
310.....EA2IA/323	1.8 MHz.....EA4DO
310.....IT9QDS/322	

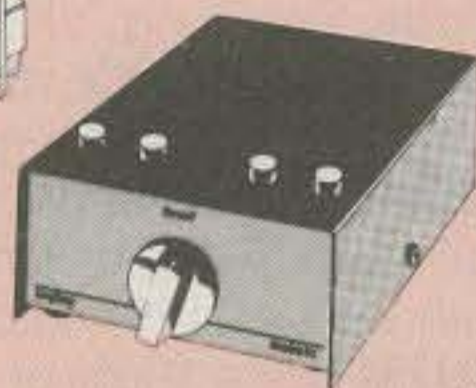
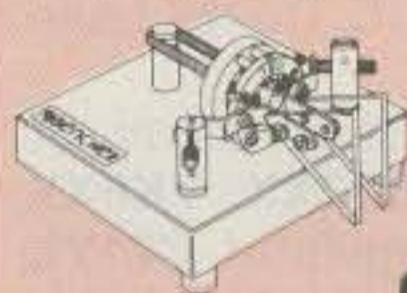
Total number of active countries is 328. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

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Derived from the classic Super CMOS II keyer featured in Nov. 1990 QST, the K-1 answers the CW operator's every wish. Smooth, forgiving timing makes for clean and responsive keying, a real pleasure to operate. Perfect for any CW operator, Novice to Extra — a Keyer to grow with!

Features include:

- Commands entered through paddle, no keypad!
- Now includes Curtis "A" timing emulation if desired.
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- Messages may call other messages and can loop
- Linear speed control 6-60 wpm, full weight range
- New Ultra-Speed mode for memory messages; 70-990 WPM for meteor scatter
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- Built-in Speaker, tune-up function, superb manual
- Provision for remote switching, + and - keying
- And more, at \$119.95, yet unmatched at any price.



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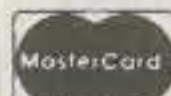
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increases in German postage mean he will have to return many direct QSL requests via the bureau. He needs US\$2 or two IRCs for direct airmail return. Address: Harry Wismath, Anne-Frank-Str. 101, 6000 Frankfurt AM 50, Germany.

QSL **T42CW** via P.O. Box 21056, Havana 12500 Cuba. Two IRCs or US\$1, please.

Ameritron *no tune* Solid State FET Amplifier

No tuning, no fuss, no worries -- just turn on and operate... Incredibly low \$1299 includes AC power supply, 700 Watts output, continuous 1.5-22 MHz coverage, instant bandswitching, no warm up, no tubes to baby, fully SWR protected, extremely quiet, very compact

Ameritron's revolutionary ALS-600 is amateur radio's only linear amplifier that uses four rugged TMOS RF power FETs -- gives unequalled *no tune* solid state performance

\$1299 includes Ameritron's *no tune* FET Amplifier ALS-600 and a 120/220 VAC, 50/60 Hz AC power supply for home operation

Instant bandswitching, no tuning, no warm up -- just turn on and operate

Output Power -- 700 Watts PEP, 500 Watts CW

Continuous Coverage -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit

SWR Protection -- prevents amplifier damage if you switch to wrong band, use wrong antenna or have high SWR

Over Power Protection -- if output forward power or reflected power exceeds safe level, output power is automatically reduced to prevent amplifier damage by controlling ALC to exciter

Extremely quiet -- low speed, low volume fan is so quiet you'll hardly know it's there, unlike noisy blowers used in other amps

Very Compact -- 6 x 9 1/2 x 12 inch amplifier takes up less desktop space than your transceiver and weighs about the same -- only 12 1/2 pounds

Illuminated Cross-Needle SWR/Wattmeter -- lets you read SWR, forward and reflected *peak* power simultaneously

Operate/Standby Switch -- lets you run "barefoot", but you can instantly switch to full power if you need it

Front Panel ALC Control -- exclusive Ameritron feature -- convenient front panel control lets you adjust your output power

Transmit, ALC, SWR LED indicators -- keeps you informed

12 VDC output jack -- lets you power low current accessories

Separate ALS-600PS power supply (included) can be placed conveniently out of the way and plugged into your nearest 120 VAC outlet -- no special wiring needed

\$1299

Suggested Retail
(Includes AC Power Supply)



ALS-600PS Heavy Duty Power Supply

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



- **Massive choke input filter** greatly improves voltage regulation and reduces peak AC line current
- **Ameritron's exclusive Multi-Voltage Power Transformer** lets you compensate for stressful high line voltage and performance robbing low line voltage
- **Step-Start Inrush Protection™** stops damaging inrush currents and extends life of power supply components
- **Illuminated Cross-Needle Meter** monitors voltage and current of 50 VDC line
- **Extremely quiet fan**
- **Very compact** 6 x 9 1/2 x 12 inches -- can be placed conveniently out-of-way
- **Wired for 120 VAC**, supplies 50 VDC at 25 amps to ALS-600 amplifier
- **Also use on 100-130 VAC and 220-250 VAC, 50/60 Hz**
- **Draws less than 12 amps at 100 VAC and less than 6 amps at 230 VAC**
- **Includes prewired cable** to plug into ALS-600 amplifier
- **Made in USA**

Ameritron *no tune* Solid State Amplifier

deal mobile amplifier -- uses 13.8 VDC mobile electrical system, very compact 3 1/2 x 9 x 15 inches, extremely quiet, 600 Watts output, continuous 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm up, SWR protected

ALS-500M
\$799
Suggested Retail



Mobile *no tune* Solid State Amplifier -- uses four rugged SC2879 high power linear RF power transistors

Instant bandswitching, no tuning, no warm up -- just turn on and operate -- makes mobile QSOs safer

Very Compact -- just 3 1/2 x 9 x 15 inches -- fits in nearly any mobile installation; weighs only 7 pounds, that's less than some mobile HF transceivers

Extremely quiet -- quiet low speed, low volume fan stays off and silent until temperature rises

Output Power -- 600 Watts PEP, 400 Watts CW

Continuous Coverage -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit

Load Fault Protection -- disables and bypasses amplifier if antenna has excessively high reflected power or if bandswitch is set lower than exciter frequency -- virtually eliminates damage because of operating error; has Load Fault LED indicator

Thermal Overload Protection -- disables and bypasses

Actual power output of amplifiers may vary on each band.

amplifier if temperature is excessively high; automatically resets when temperature drops to safe level; has Thermal Overload LED indicator

- **Excellent harmonic suppression --** multiple section output network and push-pull output circuit gives excellent harmonic suppression
- **DC current meter** lets you monitor collector current
- **ON/OFF Switch --** bypasses amplifier for "barefoot" operation without having to disconnect high current power supply cables
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QSL **VF3SRE** via Bob Chandler, VE3SRE, 155 Monarch Park Ave., Toronto Ontario Canada M4J 4R5.

VP5P has a new QSL manager. Effective immediately it is Timothy Fanus, WB3DNA, 6140 Chambers Hill Road, Harrisburg, PA 17111-3312.

QSL **S59CM (ex-YU3KH)** via the *Callbook* address of YU3KH, substituting Slovenia for Yugoslavia, or to: Carl Mark, P.O. Box 43, 65280 Idrija, Republic of Slovenia.

QSL **PJ8X** from the 1993 CQ WPX SSB Contest, and **PJ2/OH6DO** via OH1VL.

QSL **TA5D** direct only to P.O. Box 963, TR-35214, Izmir, Turkey, and *not* via any DL5 callsign.

The QSL cards for the Winter 1992 M-V Island operation of **4J1FM** and the CQWW SSB operation of **4J1FW** are well in progress and many cards have already been sent out. All direct cards will be completed by the end of May or first week in June, and bureau cards will be completed the same time. Send QSL requests to OH2LVG, Vanhaistentie 5 E 73, 00420 Helsinki, Finland.

The **H44IO/XO**, **FW/Y31XO/Y58IO**, **T28IO/T25AO/T21XO**, and **3D2AO/IO/XO** QSL cards from the young German team late last year have been delivered in bulk to the US. The 120 pounds of cards were available for DXers at Dayton, with the remainder being sent either direct, or to district bureau managers for distribution via the incoming bureau. The DXpeditioners used this method of distribution because of the recent increases in German postage, which now costs DM3 or about US\$2 for airmail to the US (and two IRCs), or DM2 or US\$1.25 for surface postage to the US (or one IRC). With the printing bill for the cards at US\$2700, they chose to QSL 100%, and hand carry the cards to Dayton. Anyone still needing a card should send the QSO data (no QSL card needed) to their new address: P. O. Box 73, 10122 Berlin, Germany.

GOLIST is a new product of the W6GO/K6HHD QSL Manager List. It consists of the complete QSL manager files from all the paper lists, in an easy-to-access computer format. It even runs directly from low-density 3.5 inch floppy discs! In addition to current information, the **GOLIST** also includes historic QSL routes, complete with a reminder not to use these old routes for current operations, in case of a re-issued callsign. **GOLIST** is also compatible with DXBase. Cost is \$12 in the US, including postage. If you have an IBM-compatible computer, you need a copy of the list program. With it, you can throw away all those crumbling key copies of the GO list that are taking up valuable space in your shack!

73, Chod, VP2ML

QSL Information

3C1TR to K8JP
 3G1I to CE1HIK
 3G3R to CE3FIP
 4D9RG to DU9RG
 4J4GAT to DL1VJ
 4J4JJ to GW3CDP
 4J8GC to IK7SUE
 4K1B to UZ1PWA
 4K2MAL to UA4FC
 4K3RRC to I1HYW
 4L1BR to UF6FFF
 4L8A to OZ1HPS
 4L9A to UF6FFF
 4N4/OH6XY to OH1LHS
 4N4CA to I4QGU
 4N4CR to SM5AQD
 4N4CX to WA4WTG
 4N4DD to 9A2GU
 4N5FK to YU5DRS
 4N5PK to YU5XVD
 4N7DW to YU7BJ
 4O1V to YU1DX
 4O4AU to YU1FW
 4O4D to YU4FDE
 4O4IW to YU1FW
 4O4K to YU4EKK
 4O4XR to YU1FW
 4U/OH3MIG to OH3GZ
 4U1UN to W8CZV
 4V2B to F6DZU
 4V2PK to HH2PK
 4Z0T to 4Z4UT
 5H3RA to JA3PAU
 5N0MVE to ON7LX
 5N0ZCO to OM3WM
 5N0ZKJ to OM4WM
 5N6MRE to K4ZKG
 5R8AL to F6ACT
 5R8DG to F6FNU
 5R8DP to JA1OEM
 5T5AO to DC8TS
 5V7YD to F6AJA
 5W1CW to ZL1AMO
 5X1C to DJ5RT
 5X1DX to N3JCL
 5X1XT to WF5T
 5X1XX to K7UP
 5Z4JD to F6AJA
 6Y5/DF5UL to DF5UL
 6Y5/DL4ZBI to DL4ZBI
 7Q7LA to G8IAS
 7Z2AB to AA0BC
 8P9AA to DJ4ZL
 8Q7VM to DL9WVM
 9A7A to YU2HDE
 9D5CW to PY2CWW
 9G1AA to PA2FAS
 9J2B0 to W6ORD
 9J2HN to JH8BKL
 9K2GS to WB6JMS
 9K2MU to 9K2AR
 9K2TC to VE3OMC
 9K2ZZ to W8CNL
 9M6QQ to DF5UG
 9X5AB to DL6NA
 A22BW to DK3KD
 AP/WM3C to WM3C
 BV2BT to I0WDX
 BV4CT to NO0C
 C21/VK2BEX to VK2BEX
 C49C to 5B4NC
 C91J to W8GIO
 C91TDM to C9TDM
 C9LCK to I4LCK
 C9NAF to NV1U
 CQ1A to WA1ECA
 CQ1B to DJ0MW
 CQ5N to CT4NH
 CR9R to HB9CRV
 CT5P to CT1DIZ
 CT8T to AB4PW
 CU0MB to CU3AN
 CU0WPX to KB3RG
 CU2T to CU2AP
 CZ7Z to VE7ZZZ
 D2/AA4HU to AA4HU
 DA0SAX to DL1SBF
 DA2ED to PA3EFR
 DL8YR/T5 to DL8YR
 ED3HH to EA3RCH
 EF3MRV to EA3FZO
 EG1RX to EA1JO
 EH1DD to EA1DD
 ER0F to DF8BK

ER0Q to SP7LZD
 ER1/U85FBV to R85FF
 ER40WQ to SP7LZD
 ET3TI to OH5MVI
 ET3YU to YU1FW
 EU80 to DL1GWS
 EV8A to F6AML
 FT5YE to F1AAS
 GB8TW to GM4FDM
 GU6YB/P to G3SWH
 H25Z to 5B4ES
 H44MS to DL2GAC
 HC7SK to SM6DYK
 HC8A to WV7Y
 HK00EP to HK0NZY
 HS0AC to HS1HSJ
 HT1T to SM0KCR
 ID1X to I1RBJ
 IF9/IK1TZO to IK1TZO
 IG8R to I8RIZ
 I5NA to I5OYY
 IL3/I3BQC to I3BQC
 IO4VEQ to I4VEQ
 IO5LDV to I5FNN
 IU2MM to IK2GZU
 IY0GA to IS0JMA
 IY0ORP to IK0USA
 IY0TCI to I0KHP
 J42T to SV2TSL
 J49GI to SV1AFN
 J5UAI to NW8F
 J73WA to KC4DWI
 JW0E to RB3MM
 JW0F to SP2GOW
 JW6RHA to LA6RHA
 JX7DFA to LA7DFA
 LY7A to LY2ZO
 OD5/SP7LSE to SP7EJS
 OL5PLZ to OK1DRQ
 OT3A to ON7LR
 OX3D0 to OZ4FR
 OX3XR to OZ3PZ
 P290K to N4EOF
 P29DX to G3LOP
 P29VMS to DL2GAC
 P43A to P43ARC
 PJ9X to OH1VL
 PR0R to PP5JR
 PW1Z to PP1CZ
 PW2N to PY2NY
 PX0Z to PY1NEZ
 PX4B to PY4BA
 RA3DFP/4K4 to DL8AAM
 RA3ST/4K4 to DL8AAM
 RE6A to UA6BGB
 RK50U to UA9UWA
 RK50U to UA9UWA
 RM6MW to DL6ZFG
 R040A to SP9HW
 RU1A to KC1WY
 RY7E to UB5EDU
 S21ZG to W4FRU
 S58AA to YU3FX
 S79FIB to SM0FIB
 S79MX to HB9MX
 S02FCJ to OK1FCJ
 SP5WM/VU2 to SP6CEF
 SU1ER to OE6EEG
 SV9/W9GHY to WB9MFC
 T46CG to CO6CG
 T5THW to DL8KAW
 TG9GI to I0WDX
 TJ1CR to F6AXD
 TK6A to F6AJA
 TL8GR to F5XX
 TL8MS to DL6NW
 TL8NG to WA1ECA
 TM2V to FF6KRC
 TM6YEU to F6AUS
 TM93C to F6DZU
 TO5M to FM5CD
 TO6A to F6HMQ
 TR8LC to FD1PYJ
 TU2PA to KE0LS
 TU2XR to KE0LS
 TU4SR to OH8SR
 TU5DX to F6ELE
 U50 to DL1GWS
 UA1ZFO/4K4 to UA1ZK
 UA2FO to DL1FCM
 UD6OFF to WB2REM
 U18QU to K9FD
 U18UQ to K9FD

UI8ZAA to K9FD
 UI9A to F6FNU
 UI9ACP to F6FNU
 UN7FL to UL7FEC
 UN7YA to DL4DBR
 UN9LM to UL7LAH
 UR8J to W2FXA
 US1U to PA3BUD
 US7I to NA3O
 UY7E to UB5ECE
 V21PI to DJ5KX
 V31AA to WA0RDZ
 V310B to WN0B
 V31RY to WN0B
 V31WN to KT0Y
 V47NF to WB8GEW
 V47WC to KB8WC
 V47WZ to WZ8D
 V47XS to N8LXS
 V51JM to NK2T
 V63CS to G4WFZ
 V73C to AH9C
 V85BJ to VK2KFS
 V85KX to G3JKX
 V16CKB to VK6ZX
 VP2EY to HB9SL
 VP5G to N6ZJM
 VP5L to K4UTE
 VP5P to WB3DNA
 VQ9AC to WN8O
 VQ9GB to K7GB
 VQ9TV to W4TV
 VQ9YA to KD4YE
 VR6BB to JF2KOZ
 VS6CM to W0JLC
 VS6CT to KA6V
 VS6WO to AA0CR
 VY80X to VY2OX
 XA5T to XE2KB
 XJ2ZP to VE2ZP
 X02DQU to VE2DQU
 X00X to CE3ESS
 XT2BW to WB2YQH
 XU3UN to SP5AAS
 XU5UN to SP5AAS
 XU7VK to HA0HW
 XW2A to JA2EZD
 YB0ARF to N2MM
 YB1ARW to W4LCL
 YI9CW to SP5AUC
 Y09FVU to DF3OX
 YR0DCF to YO4DCF
 YS1X to DJ9ZB
 YT1R to YU1JW
 YW59M to YV5AJ
 ZA1BF to IT9ZGY
 ZA1EM to SM7AIO
 ZA1H to HB9BGN
 ZA1Z to HB9BGN
 ZC4DB to G0KUC
 ZC4ST to G4SGD
 ZD88V to G4ZVJ
 ZD8LI to G0LLI
 ZD9CQ to ZS6SA
 ZF2SQ/ZF8 to WA0TJB
 ZF2UB/ZF8 to N9ALC
 ZF2UM to W1MJ
 ZK1AQY to F1DBT
 ZK1NB to DL8NBE
 ZK2XO to DL8NBE
 ZK3RW to ZL1AMO
 ZP3AA to ZP5YV
 ZP92M to ZP5XHM
 ZV8BI to PT7BI
 ZW0F to PY5EG
 ZW3A to PY3AA
 ZW5Z to PY5EJ
 ZX0F to PY5EG
 ZY3TD to I0WDX
 ZY5C to PY5CA
 ZZ1CZ to PP1CZ
 BY4SBA to Young, P.O. Box 51, Suzhou, PRC
 FY/N4QDX to Jay Weaver, 2320 South View Dr., Lancaster, PA 17601
 V29AQF to Dave, P.O. Box 1124, St. Johns, Antigua
 VQ9KC to Charles R. Tersteeg, Rt. 3, Box 193, Pequot Lakes, MN 56472
 VR6BX to P.O. Box 182, Pitcairn Isl., via New Zealand
 VR6MW to M. Warren, P.O. Box 27, Pitcairn Isl., via New Zealand

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Size: 2-3/4" Wide x 1-1/2" Deep x 7-1/2" High

Frequency Coverage	Default Steps
25.000 - 25.995 MHz. (AM)	5.0 KHz
26.000 - 28.995 MHz. (AM)	5.0 KHz
29.000 - 53.995 MHz. (NFM)	5.0 KHz
54.000 - 71.995 MHz. (WFM)	50.0 KHz
72.000 - 75.995 MHz. (NFM)	5.0 KHz
76.000 - 107.995 MHz. (WFM)	50.0 KHz
108.000 - 136.995 MHz. (AM)	12.5 KHz
137.000 - 173.995 MHz. (NFM)	5.0 KHz
174.000 - 215.995 MHz. (WFM)	50.0 KHz
216.000 - 224.995 MHz. (NFM)	5.0 KHz
225.000 - 399.995 MHz. (AM)	12.5 KHz
400.000 - 511.995 MHz. (NFM)	12.5 KHz
512.000 - 549.995 MHz. (WFM)	50.0 KHz
760.000 - 823.995 MHz. (NFM)	12.5 KHz
849.0125 - 868.995 MHz. (NFM)	12.5 KHz
894.0125 - 1,300.000 MHz. (NFM)	12.5 KHz

Signal intelligence experts, public safety agencies and *CQ Magazine* readers have asked us for a world class handheld scanner that can intercept just about any radio transmission. The new Bearcat 2500XLT is just what you've been waiting for. It can store frequencies such as police, fire, emergency, race cars, marine, military aircraft, weather, and other broadcasts into 20 banks of 20 channels each. The new rotary tuner feature enables rapid and easy selection of channels and frequencies. With the AUTO STORE feature, you can automatically program any channel. You can also scan all 400 channels at 100 channels-per-second speed because the Bearcat 2500XLT has TURBO SCAN built-in. To make this scanner even better, the BC2500XLT has AUTO SORT - an automatic frequency sorting feature for faster scanning within each bank. Order your scanner from CEI.

For more information on Bearcat radio scanners or to join the Bearcat Radio Club, call Mr. Scanner at 1-800-423-1331. To order any Bearcat radio product from Communications Electronics Inc. call 1-800-USA-SCAN.

Great Deals on Bearcat Scanners

- NEW! Bearcat 8500XLT-F base/mobile . \$379.95
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- Bearcat 200XLT-F handheld/SPECIAL \$208.95
- Bearcat 100XLT-F handheld \$149.95
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- Bearcat 65XLT-F handheld/SPECIAL \$99.95
- Bearcat 855XLT-F base \$159.95
- Bearcat 210XLT-F base/SPECIAL \$119.95
- Bearcat 172XL-F base \$109.95
- Bearcat 147XLT-F base \$83.95

New FCC Rules Mean Last Buying Opportunity for Radio Scanners

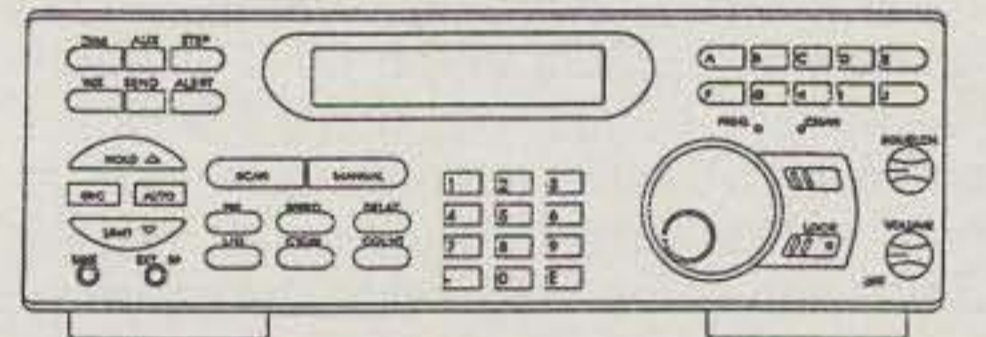
On April 19, 1993, the FCC amended Parts 2 and 15 of its rules to prohibit the manufacture and importation of scanning radios capable of intercepting the 800 MHz. cellular telephone service. Supplies of full coverage 800 MHz. scanners are in *very* short supply. When this inventory is exhausted, there will be no more full coverage scanners available to our U.S. customers. If you have an inquiring mind that wants to know, today could be your last opportunity to own a Bearcat 800XLT scanner. Call Communications Electronics now to order your scanner.

Bearcat® 800XLT-F
List price \$549.95/CE price \$199.95/LAST CHANCE
40 Channels • 12 bands • 2 banks • Priority
Wide 800 MHz. coverage • Search/Scan • AC/DC
Bands: 29-54, 118-174, 406-512, 806-912 MHz.
The Uniden 800XLT receives 40 channels in two banks. Call CEI now at 1-800-USA-SCAN before they're gone.

NEW! Bearcat® 890XLT-F
List price \$489.95/CE price \$254.95/SPECIAL
200 Channels • VFO Control • 10 banks
Turbo Scan • Weather Alert • Priority channels
Auto Store • Auto Recording • Reception counter
Size: 10-1/2" Wide x 7-1/2" Deep x 3-3/8" High

Frequency Coverage	Steps
29.000 - 54.0000 MHz. (NFM)	5.0/12.5/25.0 KHz.
108.000 - 136.9950 MHz. (AM)	5.0/12.5/25.0 KHz.
137.000 - 174.0000 MHz. (NFM)	5.0/12.5/25.0 KHz.
216.000 - 224.9875 MHz. (NFM)	12.5/25.0 KHz.
225.000 - 399.9875 MHz. (AM)	12.5/25.0 KHz.
400.000 - 512.0000 MHz. (NFM)	12.5/25.0 KHz.
806.000 - 823.9875 MHz. (NFM)	12.5/25.0 KHz.
849.0125 - 868.9875 MHz. (NFM)	12.5/25.0 KHz.
894.0125 - 956.0000 MHz. (NFM)	12.5/25.0 KHz.

The Bearcat 890XLT gives you pure scanning satisfaction with amazing features like Turbo Scan. This lightning-fast technology enables the Bearcat 890XLT to scan and search up to 100 channels per second. Because the frequency coverage is so large, a very fast scanning system is essential to keep up with the action. That's why Uniden's latest technology, *Turbo Scan* is built into our new Bearcat scanners. Other features include *VFO Control* - (Variable Frequency Oscillator) which allows you to adjust the large rotary tuner to select the desired frequency or channel. *Weather Alert* - Lets your scanner function as a severe weather warning radio. *Auto Store* - Automatically stores all active frequencies within the specified bank(s). *Auto Recording* - This feature lets you record channel activity from the scanner onto a tape recorder. You can even get an optional *CTCSS Tone Board* (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. *10 banks* - Each bank contains 20 channels, useful for storing similar frequencies in order to maintain faster scanning cycles. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box \$14.95; MB001 Mobile mounting bracket \$14.95; BC002 CTCSS Tone Board \$54.95. The BC890XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited warranty from Uniden. Order today.



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- Uniden PC122-F SSB CB Mobile \$107.95
- Uniden PC66A-F CB Mobile \$78.95
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- Uniden PRO520XL-F CB Mobile \$49.95
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- ICOM R72A-F base (add \$39.00 shipping) \$944.95
- ICOM R7000-F base (add \$39.00 shipping) \$1,199.95
- ICOM R7100-F base (add \$39.00 shipping) \$1,259.95
- ICOM R9000-F base (add \$89.00 shipping) \$4,934.95
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- Grundig Satellit 500-F portable with AC adapter \$359.95
- Grundig Cosmopolit-F with cassette recorder \$179.95
- Grundig Yacht Boy 230-F portable \$139.95
- Grundig Traveller 2-F portable \$79.95
- Sangean ATSG06-F ultra compact \$149.95
- Sangean ATSG06P-F radio with antenna & AC adapter \$169.95
- Sangean ATSG00-F portable \$79.95
- Sangean ATSG03A-F portable with AC adapter \$159.95
- Sangean ATSG08-F portable \$159.95
- Sangean ATSG18-F portable without cassette recorder \$189.95
- Sangean ATSG18CS-F with cassette recorder \$209.95
- Sangean ANT60-F portable shortwave antenna \$9.95

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Public safety agencies responding to hazardous materials incidents must have accurate, up-to-date weather information. The Davis Weather Monitor II is our top-of-the-line weather station which combines essential weather monitoring functions into one incredible package. Glance at the display, and see wind direction and wind speed on the compass rose. Check the barometric trend arrow to see if the pressure is rising or falling. Our package deal includes the new high resolution 1/100 inch rain collector part #7852-F, and the external temperature/humidity sensor, part #7859-F. The package deal is order #DAV1-F for \$524.95 plus \$15.00 shipping. If you have an IBM PC or equivalent, when you order the optional Weatherlink computer software part #7862-F for \$149.95, you'll have the world's most powerful computer weather station at an incredible price.

Other neat stuff

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- RELM RH256NB-F VHF synthesized transceiver \$289.95
- Ranger RCI2950-F 25 watt 10 meter ham radio \$244.95
- Ranger RCI2970-F 100 watt 10 meter ham radio \$369.95
- Uniden LRD9000W-F Laser/Radar Detector \$159.95
- PWB-F Passport to Worldband Radio by IBS \$12.95
- LIN-F Latest Intelligence by James Tunnell \$12.95
- NPD-F Uniden National Police Directory \$12.95
- FBE-F Uniden Eastern Frequency Directory \$12.95
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NEWS/VIEWS OF ON-THE-AIR COMPETITION

What's All The Talk About QSO Rates?

August's Contest Tip

Here's an idea for that 2nd VFO in your transceiver. When you're in "search and pounce" mode, try searching with both VFOs. While waiting to work one station on VFO "A," you can use that idle time to find another needed QSO with the second VFO. Try tuning up from the bottom with one and down from the top of the band with the other. If you are using a multi-band antenna, you can even try this technique across two different bands!

I've always used QSO rates as an important measure of my performance when operating contests. Many of you may remember the overused phrase, "Keep the rate up!" While operating at multi-op stations, rate has been an important method to determine band selection and operating strategy. And today, nearly every contest logging program has a "window" dedicated to reporting QSO rates.

For the uninitiated, QSO rates in contests are nothing more than a measure of the number of stations you work in a given hour. "Hey, Joe, I just had a 145 hour to Europe" means that K2XYZ just entered 145 QSOs in his contest log during the past 60 minutes.

I thought it would be interesting this month to look at QSO rates from a variety of perspectives by analyzing some of the top logs submitted in the 1992 CQ WW SSB Contest. Let me begin with a qualifier. The data I am using is a representative sample of logs rather than a complete compendium. For example, there will be faster rates in logs that I do not have. Having said that, I still believe it is useful to use what is available to obtain a "rate picture" in today's contests. Are there differences between low- and high-power stations? How do rates compare between East and West Coast U.S. stations? I'm not sure we'll have definitive answers to questions like these, but the data is certainly fascinating.

Single Operator USA

Although the outrageous rates for U.S. single operators are found on the East

c/o CQ magazine
Internet: p00259@psilink.com
CompuServe ID: 71301,424

Calendar of Events

Jul. 24-25	RSGB IOTA Contest
Jul. 24-25	Venezuela CW DX Contest
Aug. 7-8	ARRL UHF Contest
Aug. 7-8	YO DX Contest
Aug. 7-8	North American CW QSO Party
Aug. 14-15	Worked All Europe CW Contest
Aug. 14-15	Maryland-D.C. QSO Party
Aug. 21-22	North American SSB QSO Party
Aug. 21-22	Seonet SSB Contest
Aug. 21-22	New Jersey QSO Party
Aug. 28-29	Empire State QSO Party
Sep. 4	Panama Anniversary Contest
Sep. 4-5	Bulgarian DX Contest
Sep. 4-5	All Asian SSB DX Contest
Sep. 11-12	Worked All Europe SSB Contest
Sep. 18-19	Scandinavian Activity CW Contest
Sep. 25-26	Scandinavian Activity SSB Contest
Sep. 25-26	CQ WW RTTY Contest
Oct. 13-15	YLRL CW Anniversary Party
Oct. 27-29	YLRL SSB Anniversary Party
Oct. 30-31	CQ WW SSB Contest
Nov. 6-7	ARRL CW Sweepstakes
Nov. 20-21	ARRL SSB Sweepstakes
Nov. 27-28	CQ WW CW Contest

Coast, it seems that all geographies get their shot at good runs at some point in the contest. The 12-14Z hours are clearly the highlight of the contest for the East/Midwest, as three of the five logs analyzed reported fastest runs during this time period. For example, K1AR, KM1H, and W9RE collectively worked 1259 Day 1 QSOs for an average rate of 139.8 QSOs/hour. On the west coast, however, N7AVK could almost sleep during the same hours. Conversely, Doc managed to work 467 QSOs in the 00-01Z hours (both days combined) or 26.2% of his entire log! Another interesting fact is that none of Doc's big runs are on 20 meters, which is a sharp contrast to the others.

Single Op Low Power USA

Hats off to these guys! There is really only one point to make in this category. Even the serious competitors do not have big runs. This category's high rate begins at 88 QSOs/hour (by the way, not a bad number) and goes downhill from there.

Multi-Single USA

Unfortunately, I did not have access to any Multi-Single logs from parts of the country other than the East Coast. I'm sure that the rate patterns found in the

Single Operator logs apply here as well. One notable fact was that there were several Single Operator hours that exceeded the M/S tallies. Additionally, it was interesting to see that the best hours of N3RS and K1DG did not coincide in clock times. DG's best hours (17-20Z range) were later in the day compared to Sig's (13-16Z).

Multi-Multi USA

So who says there has been a decline in JA activity? You would never know it by AA6TT's 200 rate in the first hour of the contest on 15 meters! It is interesting to see that the Multi-Multi stations don't have any better rates than any other operating category. In fact, their average rates are actually slower than the Single Operators. This is not surprising given that they are on each band for the entire contest and don't experience the QSO bursts that a Single Operator does when he first arrives on a new band. By the way, notice how tight the peak hours were at N2RM. In the 12-13Z time period they worked 655 QSOs (both days), or 9.1% of their total QSOs. If you add in the 11Z 172 hour in Day 1, the percentage of QSOs grows to 11.5% of their final QSO number (7177).

International Rates

I received a very non-representative sample of logs for this category. Nevertheless, the data was interesting. Every time I look at a Caribbean rate sheet, I wonder how these guys do it. KP2A, as an example, worked 911 QSOs in the first 3 hours of the contest! And it doesn't seem to automatically slow down as the contest progresses. You can see how PJ1B had their fourth best hour in the contest at 21Z! Examples like that remind me of HC8A (N6KT operator) working a 300+ rate in the last hour of a recent contest. Looking at the international component of this discussion is something that needs more analysis and data. I'll try to give it a better look in a future column.

Some Final Thoughts

Rate analyses are interesting, but they also point out a critical area that all contestants need to keep in mind. Your QSO rate is only as good as the accuracy of the callsigns you log. It is a fact of nature



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Callsign	GMT Hour	Day	Rate	Band
K1AR	12	1	220	10
	13	1	173	10/15
	19	1	172	20
	14	1	165	10
	11	1	155	10/15
KM1H	11	1	148	10/15
	13	1	145	10/20
	15	1	142	10
	12	1	134	10/15/20
W9RE	19	1	128	20
	13	1	120	10/15
	16	1	115	10/15/20
	12	1	112	10/15
N7AVK	13	2	107	10/15/20
	14	1	98	10/15/20
	01	1	127	10/15
	00	2	125	15
	01	2	116	15
KØKX	02	2	113	15
	00	1	99	10
	14	2	121	10
	18	2	106	15
	15	2	93	10
	14	1	91	10/20
	13	1	79	10/15/20

Table I—Single Operator/All Band USA rate comparisons (top 5 hours).

Callsign	GMT Hour	Day	Rate	Band
KG1D	15	1	88	10/20
	13	2	71	10/30
	13	1	68	10/15
	16	2	56	10/15
	14	1	47	15/20
KØEJ/4	16	2	54	10
	11	1	51	15/20
	12	1	50	10/15
	14	1	44	10/15
	13	1	42	10/15

Table II—Single Op/All Band Low Power USA rate comparisons (top 5 hours).

Callsign	GMT Hour	Day	Rate	Band
N3RS	14	1	162	15/10
	13	1	130	15/10
	16	2	123	10/15/20
	15	1	120	10/15/20
	15	2	113	10/20
K1DG	17	1	175	10/15
	19	1	133	10/15/20
	19	2	133	15/20
	18	1	131	10/15/20
	20	1	127	10/15/20

Table III—Multi-Single USA rate comparisons (top 5 hours).

that error rates are directly related to QSO rates. I don't mean to imply that fast operators have sloppy logs. Rather, I want to simply offer a reminder that attention to accuracy is more critical at high operating speeds than anywhere else. And for us poor folk left in the U.S. dust, high rates can still be made even when you sign your callsign regularly from that fine spot in FG5 land!

Keep your mail and input coming. As I've said in the past, "soft-copy" contest rule submissions on disk make our lives much easier here. Please remember that the deadline for the October issue is August 1st.

73, John, K1AR

ARRL UHF Contest

1800Z Sat. to 1800Z Sun., Aug. 7-8

Activity on this one starts at 220 MHz and goes all the way up to 2.3 GHz and higher.

Exchange: Grid square locator.

Points: Three for 220 or 432 MHz contacts. Six for 902 or 1296 MHz. Credit 12 points for 2.3 GHz or higher.

Multiplier: Total number of different grid squares worked on each band.

Final Score: Total QSO points from all bands times the sum of the grid-square multiplier from each band.

An award pin program is now available for this contest. Details including the full rules were published in the July issue of *QST*. It is suggested you send a large SASE to the ARRL for official log and summary sheets.

Send logs to ARRL UHF Contest, 225 Main Street, Newington, CT 06111.

YO DX Contest

2000Z Sat. to 1600Z Sun., Aug. 7-8

This is the annual running of the YO DX Contest sponsored by the Romanian Amateur Radio Federation. This is a worldwide contest with everyone working each other on SSB and CW.

Classes: Single Operator All Bands/Single Band and Multi-Operator/Single Transmitter.

Frequencies: CW: 3510-60, 7010-40, 14010-60, 21010-60, 28010-60 kHz. SSB: 3700-75, 7040-90, 14150-250, 21200-300, 28400-600 kHz.

Exchange: RS(T) plus ITU Zone. YO stations will substitute their two-letter country abbreviation for their zone.

Scoring: 8 points for YO QSOs, 4 points for QSOs outside your continent, and 2 points for QSOs within your continent. Final score is computed by multiplying your total QSO points times the sum of YO counties and ITU Zones worked on each band.

Deadline for logs is September 3, 1993 and they should be mailed to: RARF, P.O. Box 05-50, R-76100 Bucharest, Romania.

North American QSO Party

CW: 1800Z Sat., Aug. 7 to 0600Z Sun., Aug. 8
SSB: 1800Z Sat., Aug. 21 to 0600Z Sun., Aug. 22

This is a short but fun QSO party that can have some fast rates at times. Any licensed radio amateur may enter. The object is to work as many North American stations (and/or other stations if you are in North America) as possible during the contest period.

Classes: Single operator and multi-operator, two transmitter. Multi-operator stations shall keep a separate log for each transmitter. Multi-operator stations must have at least 10 minutes between band changes. Single operator entrants may only have one transmitted signal at a time. Output power must be limited to 150 watts for eligible entries. Multi-operator stations may operate 10 out of 12 hours. Off times must be at least 30 minutes in length and must be clearly marked in the log.

Mode: CW only in CW parties. Phone only in Phone parties.

Bands: 160, 80, 40, 20, 15, and 10 meters only. You may work a station once per band. Suggested frequencies are: 1815, 3535, 7035, 14035, 2135, and 28.035 (20 kHz up from band edge for Novice) on CW, and 1865, 3850, 7225, 14250, 21300, and 28.600 (28.450 Novice) on phone. Try 10 meters at 1900Z and 2000Z, 15 meters 1930Z and 2030Z, and 160 meters at 0430Z and 0530Z.

Exchange: Operator name and station location (state, province, or country).

Scoring: Multiply total valid contacts by the sum of the number of multipliers worked on each band. Multipliers are states (including KH6 and KL7), Canadian call areas (VE1-VE8, VO1, VO2, VY1, and VY2) and other North American countries (do not count USA, Canada, KH6, or KL7 as countries). Non-North American countries do not count as multipliers, but may be worked for QSO credit.

Team Competition: Team competition is limited to a maximum of five single operator stations as a single entry unit. Groups having more than five members may submit more than one team entry. To qualify as a team entry, the name, callsign of each operator, and callsign of the station operated should the operator be a guest at a station other than his own (e.g.,

Callsign	GMT Hour	Day	Rate	Band
N2RM	12	1	177	15
	11	1	172	15
	13	1	163	10
	12	1	161	10
	13	1	154	10
AA6TT	00	1	200	15
	14	1	128	10
	03	2	124	15
	02	2	121	15
	01	1	121	15
NK7U	16	2	111	15
	22	1	110	15
	18	1	98	15
	00	1	88	15
	16	1	80	15

←Table IV—Multi-Multi USA rate comparisons (top 5 hours).

Table V—International rate comparisons (top 5 hours).

Callsign	Category	GMT Hour	Day	Rate	Band
KP2A	Single Op	01	1	334	20
		00	1	310	20
		02	1	267	20
		15	1	244	10/15
		13	1	212	10/15/20
PJ1B	Multi-Multi	00	1	299	20
		19	1	263	15
		01	1	256	20
		21	1	245	10
		14	1	245	10

N4RJ op by KM9P) must be registered with K8CC. The team registration information must be in written or telegraphic form and must be received before the start of the NAQP. There are neither distance nor meeting requirements for a team entry.

Awards: A total of five trophies will be awarded for the high score for the Single Operator CW, Single Operator Phone, Multi-Operator CW, Multi-Operator Phone, and Single Operator Combined score categories. Certificates of merit will be awarded to the highest scoring entrant with at least 200 QSOs from each State, Province, and North American Country. T-shirts will be awarded to each member of winning teams.

Contest logs must be sent to Dave Pruett, K8CC, 2727 Haris Road, Ypsilanti, MI 48198. Entries must be postmarked not later than 30 days after the party to be eligible for trophies and awards. The logs may be submitted by K8CC's NA program or MS-DOS ASCII files if generated from another logging program.

Maryland DC QSO Party

1600Z Sat. to 0300Z Sun. Aug. 14-15
1600Z to 2359Z Sun. Aug. 15

The Maryland/DC QSO Party is sponsored by the Antietam Radio Association. Non-Maryland stations work Maryland/DC operators. Maryland/DC station may work anyone. Stations may be worked once per band/mode and mobiles/portables that change counties may be worked again for QSO credit.

Exchange: RS(T) and QTH (county for MD stations, state/province/DXCC country for others), and operating category (Club, QRP, Mobile, Novice, Technician, and Standard).

Frequencies: SSB: 1.86, 3.92, 7.23, 14.26, 21.37, 28.37, 50.15, and 146.55 MHz. CW: 3.643, 7.06, 14.04, 21.115, and 28.06 MHz.

Scoring: Each Maryland county, Baltimore city, and D.C. are multipliers. Score 10 points for club station QSOs, 5 points for mobiles, 2 points for a CW MD QSO, and 1 point for any other valid contact. QSO points are cumulative (e.g., mobile MD stations count 5 points). Mobiles add 100 bonus points to their final score for each county outside their own from which 20 QSOs were made. **Note:** There is a new rule allowing a 3 point credit for QSOs with QRP stations and/or Novice/Technicians. Final score is total QSO points times multiplier (25 maximum).

Awards: Certificates will be awarded to the high scorer from each state and Canadian province. In addition, there will be awards to the high score from a MD club station, MD mobile, top 10 MD logs, Novice, Technician, DX station, and MD YL. Certificate to each station with at least 50 QSO points in entry, and the top 3 SWL and QRP logs. There is a special award this year. *The top MD and non-MD winners will receive an official limited edition Maryland-DC QSO Party watch.*

Logs are to be postmarked by September 10, 1993 and sent to: Antietam Radio Association, P.O. Box 52, Hagerstown, MD 21741. Be sure to indicate your operating class on the summary sheet. If you want the final results, include an SASE with your entry.

European DX Contest

CW: Aug. 14-15 SSB: Sept. 11-12
1200Z Saturday to 2400Z Sunday

This is the 39th annual contest sponsored by the DARC. The activity will be between European countries and the rest of the world on all five bands, 3.5-28 MHz. (IARU Region I regulation of frequencies for contest operation.)

Only 30 hours of operating time out of the 36-hour contest period are permitted for single operator stations. The 6-hour off times may be taken in one, but not more than three, periods any time during the contest and must be indicated in the log. The minimum operating time on a band is 15 minutes. This rule does not apply to new multipliers.

Classes: (a) Single operator, all band. (b) Multi-operator, single transmitter. Only one signal on any band at the same time. (c) Multi-operator, multi-transmitter. All transmitters must be located within a 500 meter diameter and within the property limits of the station licensee's address. (d) SWL. **Note:** DX packet cluster spotting is allowed for all classes.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Points: One point per QSO and 1 point for each QTC reported.

Multiplier: The multiplier for non-Europeans is determined by the number of European countries worked in each band (see WAE country list). Europeans will use the ARRL DXCC list of non-European countries.

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 by 3, and on 10/15/20 by 2.

Final Score: Total QSO points plus QTC points times the sum total multiplier from all bands.

SWL: Only the single operator, all-band class may be used. The same callsign, European or non-European, may only be logged once per band. The log must contain both callsigns and at least one of the control numbers. Each QSO logged counts 1 point, each complete QTC 1 point (maximum of 10 per station). Multiplier is determined by the DXCC and WAE country lists.

QTC Traffic: Additional point credit may be earned by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that took place earlier in the contest and was later sent back to a European station. It can only be sent by a non-European station back to a European. The general idea is that after a number of Europeans have been worked, a list of these stations can be reported back during a QSO with another station. An additional, one point credit can be claimed for each station reported.

A QTC contains the time, call, and QSO number of the station being reported (e.g., 1300/DL2DN/134, which means that at 1300Z you worked DL2DN and received #134).

A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to a station is allowed. The same station may be worked several times to complete this quota. Only the original contact, however, has QSO value.

Keep a uniform list of QTCs sent; 3/7 indicates that this is the third series of QTCs sent and that 7 are being reported.

If more than 100 QTCs are claimed, a check list must show that the maximum quota of 10 per station is not exceeded.

Club Competition: This rule requires the club to be a local group and not a national organization. Eligible club members must operate within a 500 km diameter. To be listed, a minimum of three logs must be received from a club. Entries must clearly indicate their club name on the summary sheet. A special trophy will be awarded by the DARC to the winning clubs from Europe and non-Europe.

Awards: Certificates will be awarded to the top scorers in each class in each country. Each participant with at least half the score of the continental leader will also receive a certificate. Plaques will go to continental winners in the single- and multi-operator classes and the winning EU and non-EU clubs.

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WAE Country List: C31, CT1, CU, EA, EA6, EI, F, G, GD, GI, GJ, GM, GM Shetland, GU, GW, HA, HB, HBØ, HV, I, IS, IT, JW Bear, JW Spitsbergen, JX, LA, LX, LZ, OE, OH, OHØ, OJØ, OK, OM, ON, OY, OZ, PA, S5, SM, SP, SV, SV5 Rhodes, SV9 Crete, SY Athos, T7, T9, TA1, TF, TK, UA1346, UA2/UZ2F, UA1 Franz-Josef-Land, UB UC, UN/UA1N/UZ1N, UO, UP, UQ, UR, YO, YU167, YU2, YU3, YU4, ZA, ZB2, 1AØ, 3A, 4J1M-V, 4N5, 4U1 Vienna, 9A, and 9H1.

Mailing deadline is September 15th for CW entries and October 15th for SSB to: WAEDC Contest Committee, P.O. Box 1328, D-8950 Kaufbeuren, Fed. of Germany.

SARTG RTTY Contest

Three Periods GMT

0000-0800 & 1600-2400 Sat., Aug. 21

0800-1600 Sun., Aug. 22

This is the 23rd annual contest sponsored by the Scandinavian Amateur Radio Teleprinter Group. Use all bands 3.5 through 28 MHz. The same station may be worked on each band QSO and multiplier credit.

Classes: Single operator all band, single operator single band, multi-operator single transmitter, and SWL.

Exchange: RST and QSO number.

Points: QSOs with own country, 5 points. With other countries on same continent, 10 points. With other continents, 15 points.

Multiplier: Each DXCC country and each W/K, VE/VO, and VK call area.

Final Score: Sum of QSO points from all bands times the sum of the multiplier from each band.

SWLs use same scoring but based on sum of stations and messages copied.

Awards: Certificates to the top-scoring stations in each class in each country and each call area of the U.S., Canada, and Australia.

Use a separate sheet for each band, and include a summary sheet showing the scoring, comments, and other essential information, and your name and address in block letters.

Logs must be received by October 10th and go to: SARTG Contest Manager, Bo Ohlsson, SM4CMG, Skulsta 1258, S-710 41 Fellingsbro, Sweden.

New Jersey QSO Party

2000Z Sat. to 0700Z Sun., Aug. 21-22

1300Z Sun. to 0200Z Mon., Aug. 22-23

This is the 34th annual party sponsored by the Englewood ARA. Phone and CW are part of the same contest. The same station may be worked on each band and mode, and NJ stations may contact in-state stations for QSO and multiplier credit.

Exchange: QSO number, RS(T), and QTH. County for NJ, ARRL section for others.

Scoring: NJ stations score 1 point for W/K and VE/VO contacts, and 3 points for DX. Multiply total by ARRL sections worked. KP4,

KL7, KH6, are 3-point contacts and section multipliers.

Out-of-state stations multiply total NJ QSOs by number of NJ counties worked (maximum of 21).

Frequencies: 1810, 3535, 3950, 7035, 7135, 7235, 14035, 14285, 21100, 21355, 28100, 28400 kHz and 50-50.5, and 144-146 MHz. Suggest phone on even hours, 15/10 meters on odd hours, and 160 at 0500Z.

Awards: Certificates to the top scorers in each NJ county, ARRL, section, and DX country. Second-place awards if four or more logs are received from that section. Also Novice/Tech. and mobile awards. There are four plaques donated by the section managers for NNJ and SNJ to the winning stations in those sections.

Use UTC time and indicate the multiplier only the first time it is worked. Be sure to include a QSO check sheet, and a summary sheet showing scoring, etc. Send a large SASE if you want a copy of the results.

Stations planning activity in NJ are requested to advise the EARA by August 1st so that coverage in all counties may be planned.

Logs must be received no later than Sept. 18th and go to: Englewood ARA, P.O. Box 528, Englewood, NJ 07631-0528.

Empire State QSO Party

1600Z Sat. to 2200Z Sun., Aug. 28-29

This is the annual running of the New York QSO party sponsored by the Albany Amateur Radio Association. This is a single op-only contest with total operating time limited to 24 hours and at least three 15 minute off-times. Work stations once per band and mode. NY stations may be worked again if they change counties by stations outside of NY state.

Frequencies: CW 1805 and 40 kHz up from band edge. Phone 1850, 3850, 7230, 14250, 21300, 28450 kHz. Novice 10 kHz up from band edge. Try CW on the half hour.

Exchange: QSO number, state (county in NY)/province/country.

Scoring: SSB QSOs are 2 points and CW contacts are worth 3. Multiply QSO points times the number of NY counties (61 maximum). New York stations multiply by number of states and provinces.

Awards are available to winners. However, there was nothing specific in the most recent contest announcement.

There is a county database available for CT Version 8.0. Send an SASE with a formatted MS-DOS floppy to: N1CC, 21 High Dune Dr., Albany, NY 12203 by August 14th.

Contacts with AARA members and Albany County count for the club's WARM award. Send for details.

Logs in hard copy or IBM MS-DOS formatted disks must be postmarked by October 15th and sent to: AARA, c/o John Yodis, K2VV, P.O. Box 460, Hagaman, NY 12086.

All Asian SSB Contest

0000Z Sat. to 2400Z Sun., Sept. 4-5

The same rules for the CW Contest on June 19-20 apply here. See June Contest Calendar for complete rules. Logs for this one must be received by the committee no later than October 15th. They go to: JARL, P.O. Box 377, Tokyo Central, Japan.

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REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

FCC Folds Novice Testing Into VEC Program

Effective July 1st, the FCC Commissioners have agreed to place Novice Class operator license examinations in the Volunteer Examiner Coordinator (VEC) System. This really doesn't come as much of a surprise, since the FCC has been working on consolidating the two separate programs for more than a year now. The July 1st date is the same date that new Novice and Technician question pools were implemented.

Up until recently there were two entry-level amateur license testing plans: the Novice program and the (codeless) Technician. The VEC System examines five of the six amateur radio levels—that is, all classes except Novice. Until July 1st the Novice exams were informally administered by two General Class or higher level amateurs selected by the applicant.

To become a Novice amateur operator you must pass a five words-per-minute Morse code test along with a simple multiple-choice examination on the basics of amateur radio. This 30-question test is called Element 2.

The Codeless Technician entry route into the Amateur Service became available in early 1991. Very quickly it became the path of choice into amateur radio. To give you an idea just how popular the beginning Technician Class has become, until 1991, 85% of all newcomers began as Novices. Now 80% of newcomers start at the Codeless Technician level. Those who wish to learn the code do so later.

Becoming a Technician requires passing two short written exams. A second 25-question multiple-choice test (Element 3A) which emphasizes VHF operation is simply substituted for the code. The two written exams contain a total of 55 questions. You must get a total of 41 correct—22 on the first test and 19 on the second—to qualify for the Technician Class amateur ticket. All questions, multiple choices, and an-

swers that might appear on any amateur test are all known and are widely published.

You do not have to pass both tests at the same time. And if you only pass one of the two exams, you have a year to pass the other portion before you lose credit for the one already completed. Technician exams are taken at a more formal VEC System test session.

Novice and Technician operating privileges are different. Novices get to use small frequency slivers in the HF, VHF, and UHF bands. Technicians, on the other hand, get all amateur spectrum and privileges at full power above the 30 MHz high-frequency level, including the 2 meter chat band, amateur satellite operation, and two-way computer-to-computer "packet" radio.

Novice Testing Under The VEC System

Basically, the FCC authorization pretty much followed the suggestions of the American Radio Relay League and the W5YI-VEC, the original two petitioners in the matter. After collaborating on the issue, the two Petitions for Rulemaking were simultaneously filed on February 26, 1992.

The ARRL and W5YI-VEC asked that:

1. All operator license examinations—including Novice level—be coordinated by a VEC.
2. All administering VEs must be accredited by the coordinating VEC.
3. All examinations—including Novice level—must be administered by three VEs.
4. Each VE who administers Novice Class operator license examinations must hold an FCC-issued Amateur Extra, Advanced, or General Class operator license.
5. A public announcement must be made before administering any examination—including the Novice Class.

The W5YI-VEC petition and the FCC Notice of Proposed Rule Making both provided for expense reimbursement (a test fee). The ARRL did not address that matter at all in their proposal.

The FCC said they were folding

Novice testing into the VEC System to end the confusion of two different examination programs and to standardize amateur testing. They also noted that there are substantially less paperwork errors made in the VEC System, and the program is perceived as being the more credible and efficient. For one thing, it takes three examiners to conduct a VEC System test session instead of two. And the examination elements required for the Novice license are already being administered in the VEC System, since these exams are also requirements for all other classes of amateur radio operator licenses.

The VEC System consists of eighteen different coordinating organizations (VECs) who approve (or "accredit") amateur radio volunteer examiners (VEs) with higher level operator licenses to conduct lower class license examinations. The VEs send the test session paperwork to their VEC once the appropriate examinations required for an operator license are passed. The VEC screens and forwards the license applications to the FCC in Gettysburg.

Test session information provided by each VEC gives the FCC a timely overview of the examination process and a means to gauge the effectiveness of the testing system. No such information, such as the number of failed exams, is available on Novice testing. The FCC will also be able to eliminate the separate Novice certification section on the license application Form 610.

Bringing Novice exams under the VEC System will also provide a greatly improved means of communication between the VECs' Question Pool Committee (QPC), which develops, deletes, and revises all written test questions, and the VE who administers them. Previously, Novice VEs were not known to the QPC, so they did not know to whom to forward test question changes. Now all VEs teams, including those administering Novice exams, will be a known factor.

Expense Reimbursement

The Commission believes there is no

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (tel. 817-461-6443)

valid reason to require VEs and VECs who donate their time to absorb the additional cost of providing Novice examinations. In addition, every examiner and VEC must certify that all costs for which reimbursement was obtained were necessary and prudent. The FCC pointed out that the small fee (a current maximum of \$5.60) "... has not hampered the growth of the other license classes, for which reimbursement is permitted."

Responding to the ARRL's question regarding a waiver of the test fee, the FCC said, "The examination-by-examination [computation] method allows the VEs and VECs the option of not recovering out-of-pocket costs from any particular examinee. The annual method [which all VECs use] does not allow such an option."

The "annual method" involves totaling up all expenses for the prior year and dividing by the number of examinees. Where this individual test fee amount exceeds the maximum allowable reimbursement, then this amount (currently \$5.60) is the most that may be charged at exam sessions during the following year. The maximum allowable amount is adjusted annually based on changes in the Consumer Price Index (inflation). It is still not clear how the ARRL-VEC will handle test fees for the 5 wpm (Element 1A) and Novice written (Element 2) examinations.

General VEs To Test Technicians

The W5YI-VEC Reply Comments suggested that the FCC should consider permitting the General Class VE to examine the Technician Class as well, "In view of the massive influx of beginning amateur radio operators at the Technician level . . . There can be no doubt that the Technician Class needs VEs more than the Novice level." The statutory regulations permit the General Class amateur to examine amateur radio license classes of a lower level. The Western Carolina and Sunnyvale VECs were among those making a similar request to the FCC.

The FCC acknowledged that several commenters were concerned that the addition of another VE would cause a hardship to examinees in remote areas. One amateur even suggested that perhaps only one VE should be required for Novice examinations administered in Alaska because of the absence of highways, the rugged terrain, and the fact that air travel must be relied upon. The ARRL agreed that "... no matter how many examination opportunities are

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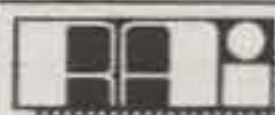
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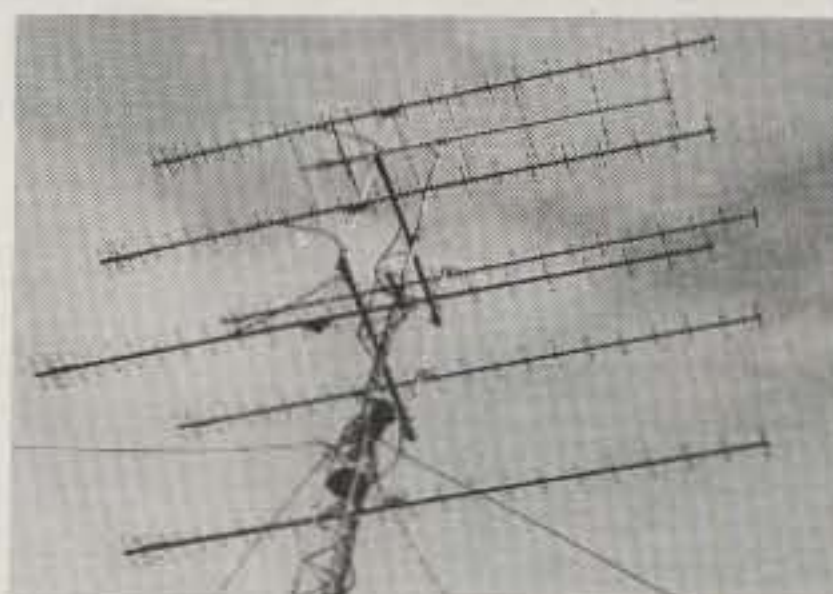
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"Sparsely-populated areas, by their nature, often involve some higher degree of inconvenience in matters requiring human assistance than do other locales," the FCC stated in their Order. "The presence of three administering VEs at each examination session, however, is the cornerstone of the VEC System." Three VEs provide cross-checking of answers, assure proper completion of the application form, and minimize the likelihood of fraud and abuse.

The FCC said that "Rather than reducing the number of administering VEs to two, we believe that a better approach would be to authorize General Class licensees to also administer the Technician examination . . . This will provide a pool of almost 300,000 possible VEs to administer examinations for the two [entry level] classes . . ." This nearly doubles the potential number of examiners for the Novice and Technician Class. Right now there are approximately 170,000 Advanced and Amateur Extra Class licensees who qualify as examiners for the Technician Class. Effective July 1, accredited General Class VEs will be able to examine and certify Technician class applications.

Conclusion

The Commission feels "The number of examination opportunities will grow as a result of our decision allowing General Class operators to administer both Technician and Novice operator license examinations and permitting VECs and VEs to be reimbursed for their out-of-pocket expenses when coordinating and administering Novice examinations. We believe that amateur operator license examinees will continue to be well served by the VECs and their accredited VEs."

Accordingly, the FCC has decided effective July 1, 1993 to change the Amateur Service rules to place the responsibility for the preparation and administration of Novice Class operator license examinations under the VEC System and to allow recovery of out-of-pocket costs for coordinating and administering such examinations.

Accrediting General Class Volunteer Examiners

There are eighteen different VEC organizations. The two largest, the ARRL-VEC and W5YI-VEC groups, account for 85% of all amateur license testing. You

can obtain an ARRL-VE application by writing to: ARRL-VEC, 225 Main Street, Newington, CT 06111 (tel. 203-666-1541). The W5YI-VEC also has them available from: P.O. Box 565101, Dallas, TX 75356 (tel. 817-860-3800 during regular business hours).

If you want to speed things up, you can simply write out the following short statement, add your signature, and send (or FAX) to the W5YI-VEC along with a copy of your operator license. We will forward your accreditation by return mail. There is no cost unless you want a colorful wall certificate (\$1.00). Here's the statement to send:

"I am a currently licensed General (or Advanced or Amateur Extra) Class amateur radio operator and wish to be a volunteer examiner. I have never had my station or operator license revoked or suspended. I do not own a significant interest in nor am I an employee of any company or entity engaged in the amateur radio equipment or license preparation business. My age is at least 18 years old."

Send that statement to: W5YI-VEC, P.O. Box 565101, Dallas, TX 75356, and you will be sent your VE credentials by return mail. You may also FAX this information to 817-548-9594. Again there is no cost.

Each VEC has slightly different examination procedures, so you will need to contact your coordinator. The W5YI-VEC, however, has easy-to-use examination software that generates properly constructed written tests using IBM-compatible PCs. The examinations can even be administered at the computer, which ejects a scored answer sheet immediately after the test.

Simply ask for the examination disk if you want to provide an examination service for a beginner wishing to become a Novice or Technician. There is no cost for this computer program. Every examination generated will be different. Be sure to state whether you need 3.5 or 5.25 inch disks.

Remember, however, that the rules require you make a public announcement prior to conducting the test session, and three W5YI-VEC accredited examiners must be present to administer the examination and certify the Form 610.

Most VEC organizations charge a test fee of \$5.60 to applicants being administered amateur radio operator examinations. This amount is collected from the examinee. Both the ARRL-VEC and W5YI-VEC share expense reimbursement with its volunteer examiners, since they too have costs that must be paid.

73, Fred, W5YI

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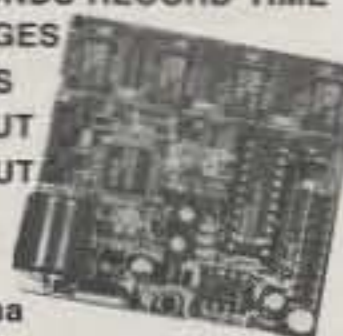
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CIRCLE 42 ON READER SERVICE CARD

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspots Continue To Decrease

The Royal Observatory of Belgium reports a mean sunspot number of 62 for April 1993. There was considerable day-to-day variation reported, with a high of 98 recorded on April 21 and 24, and a low of 15 observed over a three-day period beginning April 14.

The mean value for April results in a 12-month running smoothed sunspot number of 77 centered on October 1992. This is a drop of 3 points from September's level.

A smoothed sunspot count in the upper 50s is predicted for August 1993.

A corresponding decrease was reported in the 10.7 cm solar flux level. Canada's Dominion Radio Astrophysical Observatory in Penticton, B.C. reports a monthly mean of 116 for April 1992. This results in a smoothed value of 131 centered on October 1992. A smoothed level of approximately 115 is forecast for August 1993.

Cycle 22 Minimum Predicted for 1997

Two leading scientific organizations involved in sunspot studies have recently issued their predictions for the demise of sunspot cycle 22.

The Institute of Telecommunication Sciences, National Telecommunications and Information Administration, Boulder, Colorado is calling for the end of Cycle 22 to occur during April 1997. This is a 90% prediction interval. There is a 10% chance according to this prediction that the end of Cycle 22 could occur two or three months earlier or later.

The Space Environmental Services Center, Space Environment Laboratories, NOAA, Boulder, Colorado bases its prediction on both sunspots and observed values of 10.7 cm solar flux levels.

Based on solar flux values, they expect the end of Cycle 22 to occur during March 1997. This is also a 90% prediction interval. However, based upon sunspot data, SESC indicates that the cycle's end may occur as early as June 1996.

This is fairly good agreement, considering that the results are based on inde-

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for August 1993

Propagation Index.....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 10-11, 13-14, 20	A	A	B	C
High Normal: 2, 7, 12, 15, 18, 21-22, 27, 29	A	B	C	C-D
Low Normal: 1, 4-6, 8-9				
16-17, 19, 26, 28, 31	A-B	B-C	D	D-E
Below Normal: 3, 13, 25, 30	B-C	C-D	D-E	E
Disturbed: 24	C-E	D-E	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on August 1, good (B) on 2, fair-to-poor (C-D) on 3, good-to-fair (B-C) 4 through 6, good (B) on the 7th, etc.

pendent studies dealing with sunspots and with solar flux levels. The results also compare closely with the prediction made in this column last August that the end of Cycle 22 is most likely to occur between November 1996 and May 1997. This was based on a cycle matching procedure developed by the editor of this column.

Despite this fairly close agreement, I must repeat again what I have said so often in the past concerning the prediction of solar activity. Since solar activity is a function of nature, for which present-day science has no full explanation, an accurate prediction based on scientific facts is not yet possible. The fact that three independent studies result in approximately the same range for the expected date of Cycle 22's demise may increase confidence in the results. It will still be up to Mother Nature, however, to determine the exact date.

To repeat a note of optimism, there is no need to panic, or to start thinking of

taking down your antenna or seeking other hobbies because the sunspot count is declining.

Whatever the sunspot count, even at the very minimum of a cycle, there will always be plenty of DX to work on the HF bands used by radio amateurs. Indeed, a bit more patience may be required during low periods of solar activity, and the DX openings may occur for shorter periods of time, and peak on different bands than during periods of high solar activity, but the fun and excitement will still be there. Take this as a guarantee from someone who has operated on the HF bands through five sunspot cycles!

Annual Ionosphere Salting

During the last days of May, as this is being written, I am making plans for my annual "salting of the ionosphere" in preparation for the 1993 CQ World-Wide DX Contest. This year it will be to the high Alps and Pyrenees in France. I have also requested an audience with the real guru of propagation, Professor Jerzy Ostermond-Tor. Older readers of CQ will no doubt recall that name and the series of articles he published during the 1960s, which foretold much of what has taken place in the field of telecommunications and amateur radio during the past quarter-century.

August Propagation

August and early September are perhaps the most difficult period of the year for which to make a shortwave propagation forecast. On many days typical summertime conditions will prevail, and the bands will sound much as they did during July. On other days, particularly as September approaches, conditions will begin to conform more to a winter pattern of higher daytime and lower nighttime usable frequencies. Since this is a period of transition, this month's DX Propagation Charts cover only a *one month* period, rather than the usual two month span. Short-Skip Charts for use during August appeared in last month's column.

Fairly frequent 10 meter openings are expected during the daylight hours in August towards Central and South America, Africa, and the South Pacific

11307 Clara Street, Silver Spring, MD 20902

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas, and with some-what less accuracy in the KH6 and KL7 areas.

2. The predicted times of the openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

3. The propagation index is the number that appears in () after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate daylight time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 KW, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the propagation index will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

Central & South Asia	Nil	09-12 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-20 (1) 20-22 (2) 22-00 (1)	05-07 (1) 19-21 (1)	Eastern & Central Africa	13-15 (1)	11-13 (1) 13-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-22 (3) 22-00 (2) 00-02 (1)	20-00 (1) 21-23 (1)*
Southeast Asia	Nil	08-10 (1) 10-12 (2) 12-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 08-10 (2) 10-11 (1) 19-22 (1) 22-00 (2) 00-01 (1)	Nil	Southern Africa	11-13 (1)	08-10 (1) 10-12 (2) 12-16 (3) 16-17 (2) 17-18 (1)	06-09 (1) 13-15 (1) 15-18 (3) 18-20 (2) 20-22 (1) 22-00 (2) 00-01 (1)	19-21 (1) 21-00 (2) 00-01 (1) 21-00 (1)*
Far East	Nil	09-11 (1) 18-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-13 (1) 18-20 (1) 20-22 (2) 22-00 (1)	05-06 (1) 06-07 (2) 07-08 (1) 06-07 (1)*	Central & South Asia	Nil	09-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1) 19-21 (1)
South Pacific & New Zealand	11-15 (1) 15-18 (2) 18-20 (1)	09-15 (1) 15-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	12-20 (1) 20-22 (2) 22-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-12 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-07 (2) 07-09 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*	Southeast Asia	Nil	10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-13 (1) 19-21 (1) 21-23 (2) 23-01 (1)	06-08 (1)
Australasia	16-17 (1) 17-19 (2) 19-21 (1)	09-11 (1) 16-18 (1) 18-21 (2) 21-22 (1)	07-10 (2) 10-16 (1) 16-18 (2) 18-22 (1) 22-00 (2) 00-02 (1)	03-04 (1) 04-07 (2) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*	Far East	Nil	09-11 (1) 15-16 (1) 16-18 (2) 18-20 (1)	19-22 (1) 22-00 (2) 00-02 (1) 07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (1)	03-06 (1) 06-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-16 (3) 16-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-18 (3) 18-20 (4) 20-02 (3) 02-04 (2) 04-06 (1) 06-07 (2)	19-20 (1) 20-21 (2) 21-03 (4) 03-05 (3) 05-06 (2) 06-08 (1) 20-00 (1)* 00-05 (2)* 05-06 (1)*	South Pacific & New Zealand	09-15 (1) 15-17 (2) 19-20 (1)	09-13 (1) 13-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	08-10 (3) 10-13 (2) 13-18 (1) 18-20 (2) 20-23 (3) 23-03 (4) 03-05 (3) 05-08 (2)	00-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 01-03 (1)* 03-06 (2)* 06-07 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-12 (1) 12-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-11 (2) 11-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (1)	13-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 22-02 (3) 02-03 (2) 03-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1)	20-23 (1) 23-05 (2) 05-07 (1) 03-06 (1)*	Australasia	09-11 (1) 14-16 (1) 16-19 (2) 19-20 (1)	09-11 (1) 15-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	08-10 (3) 10-13 (2) 13-20 (1) 20-22 (2) 22-23 (3) 23-01 (4) 01-05 (3) 05-08 (2)	02-04 (2) 04-05 (1) 05-06 (3) 06-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	07-08 (1) 08-10 (2) 10-13 (3) 13-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-22 (4) 22-01 (3) 01-05 (2) 05-08 (3)	19-20 (1) 20-21 (2) 21-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 20-23 (1)* 23-05 (2)* 05-06 (1)*	Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-11 (1) 11-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	12-16 (1) 16-17 (2) 17-19 (3) 19-22 (4) 22-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-10 (1)	20-22 (1) 22-05 (2) 05-07 (1) 02-05 (1)*
McMurdo Sound, Antarctica	Nil	14-16 (1) 16-18 (2) 18-19 (1)	18-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-07 (1) 07-09 (2) 09-10 (1)	01-05 (1)	McMurdo Sound, Antarctica	Nil	13-15 (1) 15-17 (2) 17-20 (1)	17-19 (1) 19-21 (2) 21-01 (3) 01-03 (2) 03-07 (1) 07-09 (2) 09-10 (1)	01-06 (1)

**August 15 to September 15, 1993
Time Zone: EDT (24-Hour Time)
EASTERN USA TO: ○**

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	09-15 (1)	08-10 (1) 10-15 (2) 15-17 (1)	05-06 (1) 06-07 (2) 07-10 (3) 10-11 (2) 11-13 (1) 13-14 (2) 14-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-21 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 20-21 (1)* 21-00 (2)* 00-02 (1)*
Northern Europe & European USSR	09-13 (1)	08-09 (1) 09-14 (2) 14-16 (1)	05-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-21 (1)	19-21 (1) 21-00 (2) 00-02 (1) 20-21 (1)* 21-00 (2)* 00-01 (1)*
Eastern Mediterranean & Middle East	11-14 (1)	08-09 (1) 09-16 (2) 16-17 (1)	07-09 (2) 09-14 (1) 14-16 (2) 16-19 (3) 19-22 (2) 22-01 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Western Africa	11-14 (1) 14-16 (2) 16-17 (1)	07-09 (1) 09-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-23 (4) 23-02 (3) 02-06 (2) 06-09 (1)	20-23 (1) 23-02 (2) 02-03 (1) 21-02 (1)*
Eastern & Central Africa	13-16 (1)	10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-22 (2) 22-00 (1)	20-02 (1) 21-01 (1)*
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	09-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	08-15 (1) 15-17 (2) 17-21 (3) 21-22 (2) 22-00 (1) 00-02 (2) 02-03 (1)	20-22 (1) 22-01 (2) 01-03 (1) 21-02 (1)*

**Time Zones: CDT & MDT (24-Hour Time)
CENTRAL USA TO: ○**

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	09-14 (1)	09-11 (1) 11-14 (2) 14-16 (1)	05-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-00 (1)	19-22 (1) 22-01 (2) 01-02 (1) 20-01 (1)*
Northern Europe & European USSR	08-12 (1)	11-16 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-16 (3) 16-18 (2) 18-20 (1)	19-20 (1) 20-00 (2) 00-01 (1) 20-00 (1)*
Eastern Mediterranean & Middle East	Nil	10-11 (1) 11-13 (2) 13-15 (1)	06-08 (1) 08-10 (2) 10-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-22 (1)	19-00 (1) 20-23 (1)*
Western Africa	10-12 (1) 12-16 (2) 16-17 (1)	07-10 (1) 10-13 (2) 13-17 (3) 17-19 (2) 19-20 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-00 (3) 00-01 (2) 01-08 (1)	20-23 (1) 21-02 (2) 01-02 (1) 21-00 (1)*

**Time Zone: PDT (24-Hour Time)
WESTERN USA TO: ○**

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	Nil	09-11 (1) 11-13 (2) 13-15 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-14 (3) 14-15 (2) 15-18 (1) 22-23 (1) 01-02 (1)	20-21 (1) 21-23 (2) 23-00 (1) 22-23 (1)*
Central & Northern Europe & European USSR	Nil	09-11 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-17 (1) 22-00 (1)	18-20 (1) 20-22 (2) 22-23 (1) 21-22 (1)*

Eastern Mediterranean & Middle East	Nil	08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (1) 19-20 (1) 20-22 (2) 22-23 (1)	20-22 (1)	South Pacific & New Zealand	09-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-21 (1)	09-13 (1) 13-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-00 (1)	05-09 (2) 09-11 (3) 11-13 (2) 13-17 (1) 17-19 (2) 19-22 (3) 22-01 (4) 01-05 (3)	22-23 (1) 23-04 (3) 04-06 (4) 06-07 (3) 07-08 (1) 23-01 (1)* 01-03 (2)* 03-05 (3)* 05-06 (2)* 06-07 (1)*
Western & Central Africa	13-16 (1)	08-11 (1) 11-13 (2) 13-15 (3) 15-17 (2) 17-18 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-00 (2) 00-07 (1) 07-09 (2) 09-10 (1)	21-00 (1)	Australasia	09-14 (1) 14-18 (2) 18-20 (1)	09-11 (1) 14-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-00 (1)	13-20 (1) 20-22 (2) 22-23 (3) 23-02 (4) 02-05 (3) 05-08 (2) 08-10 (3) 10-13 (2)	01-02 (1) 02-03 (2) 03-06 (3) 06-07 (2) 07-08 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Eastern Africa	Nil	09-13 (1) 13-16 (2) 16-18 (1)	13-15 (1) 15-18 (2) 18-19 (3) 19-21 (2) 21-22 (1)	20-22 (1)	Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-16 (2) 16-17 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-20 (4) 20-00 (3) 00-05 (2) 05-06 (3)	19-20 (1) 20-21 (3) 21-04 (4) 04-05 (2) 05-06 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Southern Africa	10-13 (1)	07-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-22 (1) 22-23 (3) 23-00 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*	Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-11 (1) 11-14 (2) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-00 (2) 00-07 (1) 07-09 (2) 09-11 (1)	20-23 (1) 23-04 (2) 04-05 (1) 00-04 (1)*
Central & South Asia	Nil	09-11 (1) 17-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-20 (1) 20-22 (2) 22-23 (1)	06-08 (1)	McMurdo Sound, Antarctica	Nil	13-17 (1) 17-19 (2) 19-21 (1)	09-11 (1) 17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-04 (1)	23-03 (1) 03-05 (2) 05-07 (1)
Southeast Asia	16-19 (1)	09-11 (1) 15-17 (1) 17-20 (2) 20-21 (1)	21-01 (1) 01-03 (2) 03-04 (3) 04-07 (2) 07-09 (3) 09-10 (2) 10-12 (1) 19-21 (1)	03-07 (1)					
Far East	15-18 (1)	09-11 (1) 14-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	21-23 (2) 23-01 (3) 01-02 (2) 02-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-12 (2) 12-14 (1)	02-03 (1) 03-05 (2) 05-07 (3) 07-08 (1) 02-05 (1)* 05-06 (2)* 06-07 (1)*					

* Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

For 12 meter openings interpolate between 10 and 15 meter openings.

For 17 meter openings interpolate between 15 and 20 meter openings.

For 30 meter openings interpolate between 40 and 20 meter openings.

areas. By the end of the month some openings should also be possible to Europe and the Far East. These east-west openings should increase considerably during September.

Excellent daytime DX openings are forecast for 15 meters to Latin America, Africa, and the South Pacific areas. Some east-west openings to Europe and the Far East should also be possible, and these should increase considerably as September approaches. Exceptionally strong signal levels are expected during many openings this month, and 15 meters should be the best band for DX to many areas of the world from shortly after sunrise through the late afternoon hours.

Excellent world-wide propagation conditions are forecast for 20 meters during August. Peak conditions should occur, often with exceptionally strong signal levels, for a few hours after sunrise and again during the late afternoon and early evening hours. To many southern and tropical areas, the band may remain open throughout much of the darkness period as well. As September approaches, the band will tend to close earlier than it did during June and July.

Static levels are expected to decrease considerably by mid-August, with a noticeable improvement in 30 and 40 meter DX conditions during the hours of darkness and the sunrise period. Fairly good 80 meter DX openings are also forecast for the nighttime hours, with conditions expected to peak just as the sun begins to rise on the "light" side of the path. By late August some 160 meter DX openings may also be possible during this time period.

Short-Skip Conditions

For openings over distances ranging between 50 and 250 miles, use 80 and 40 meters during the day and 80 and 160 meters at night. Between 250 and 750 miles the best bands should be 40 and 30 meters during the day and 40 and 80 meters during the hours of darkness. For openings between 750 and 1300 miles the best bands should be 20 and 17 meters during the day, with some fairly good openings also possible on 15 meters. From sundown to midnight try 40 and 30 meters, and from midnight to sunrise conditions should be best on 80 meters. Between 1300 and 2300 miles the best daytime bands should be

20 and 17 meters, with some good openings also possible on 15 meters. Try 30 and 40 meters during the hours of darkness.

VHF Ionospheric Openings

While sporadic-E propagation is expected to taper off considerably by mid-August, some 6 meter openings should still be possible over distances of approximately 750 to 1300 miles. During periods of intense and widespread sporadic-E ionization, two-hop openings may be possible considerably beyond this range. Check the 2 meter band for an occasional sporadic-E type opening between approximately 1200 and 1400 miles. While these types of short-skip openings can take place at any time, as the name implies, during the late summer there is a tendency for them to peak between 8 AM and noon and again between 6 and 9 PM local daylight time. The occurrence of sporadic-E openings should decrease considerably by mid-September.

Trans-equatorial (TE) propagation conditions on 6 meters should begin to improve during August, and some openings may be possible by the end of the month. The best time for these openings is between 8 and 11 PM local daylight time. This type of propagation considerably favors openings from the southern tier states into deep South America, but an occasional opening should also be possible from more northern states.

The *Perseids*, one of this year's major meteor showers, is expected to take place between August 10th and 14th. It should peak on August 12 with an expected count of about 50 meteors an hour. Ionization produced by this meteor shower, especially during the period of maximum intensity, is expected to make possible frequent meteor-scatter-type openings on the 6 and 2 meter bands up to distances of several hundred miles.

Although August usually is not a very good month for auroral-type scatter propagation on the VHF bands, some openings may be possible. Auroras during August are most likely to occur coincident with Below or Disturbed conditions on the HF bands. Check the Last-Minute Forecast at the beginning of this column for those days during the month that are expected to be in these categories. Auroral-scatter openings can range from a few hundred miles up to about a thousand miles, and they are usually characterized by very rapid flutter fading and Doppler shift on SSB signals.

73, George, W3ASK



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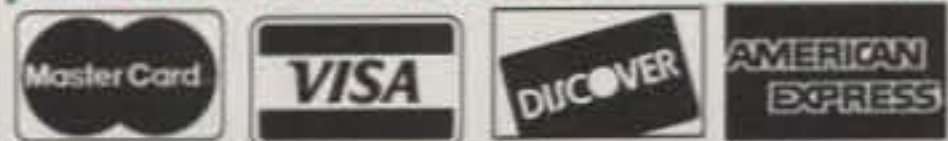
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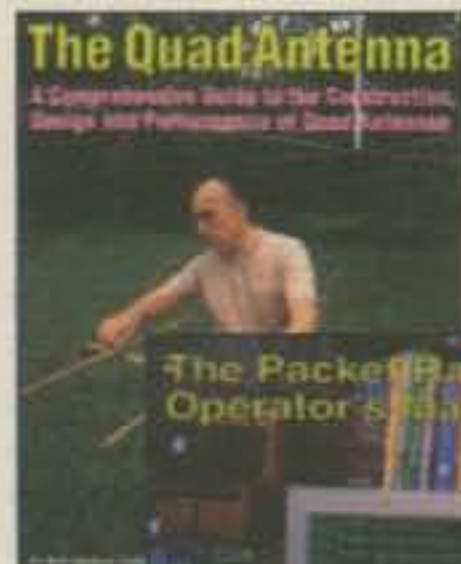
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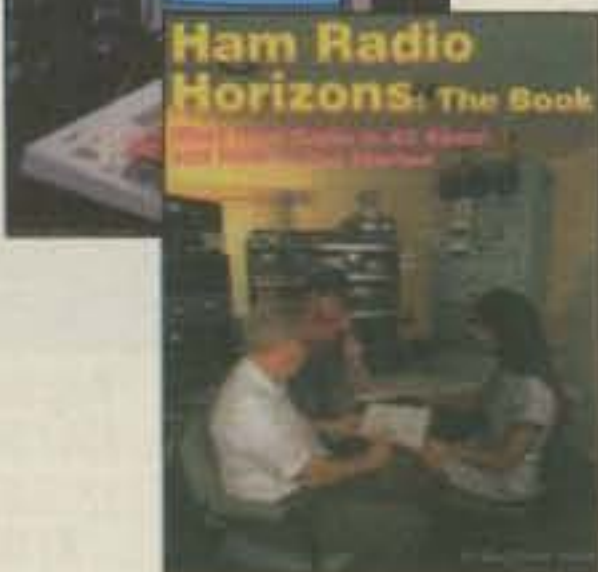
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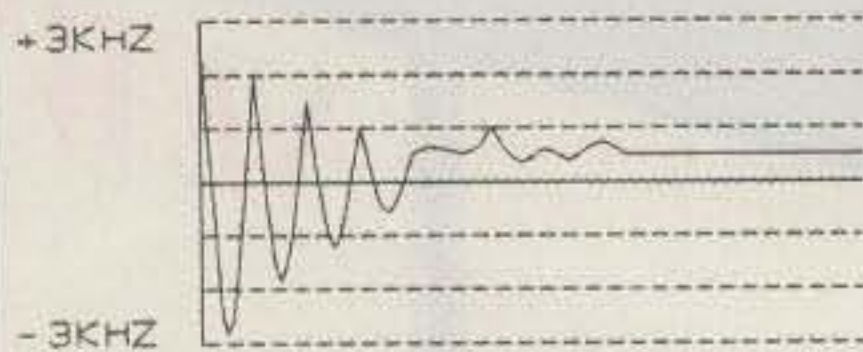
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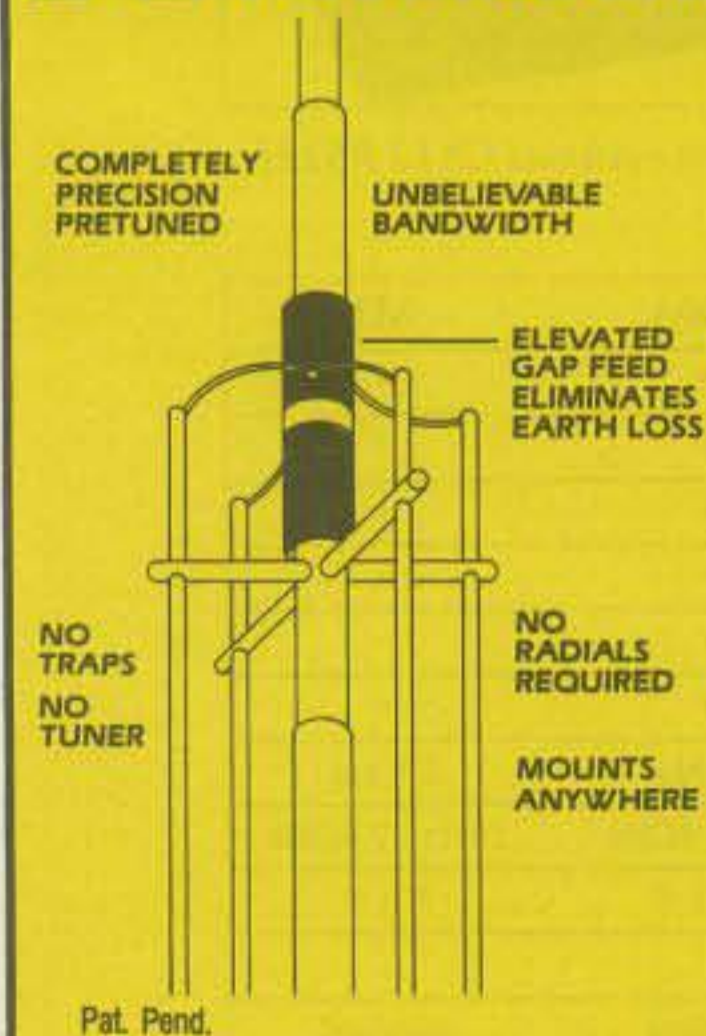
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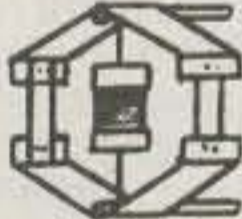
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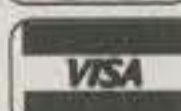
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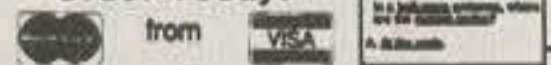
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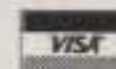
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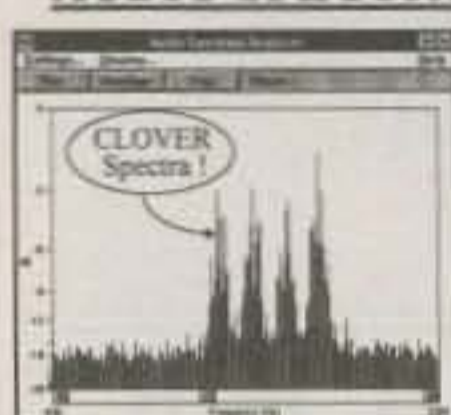
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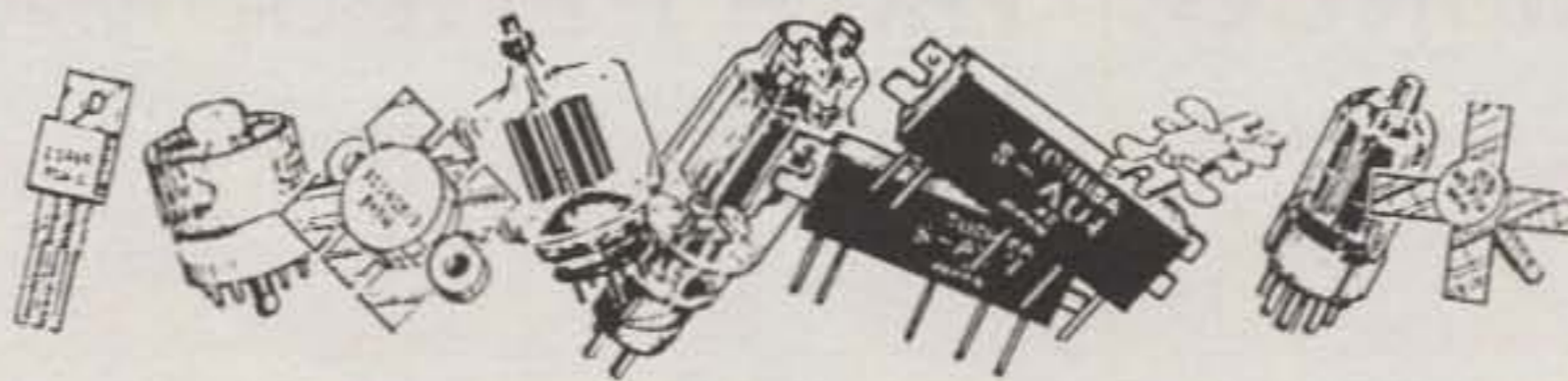
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Advertiser's Index

8Radio Products	140
AEA/Adv. Elec. Applications	5
ARRL	53,143
ASA	124
AMSOF	138
AVC Innovations Inc	138
Ace Communications	86
Action Communications	109
Alfa Electronics	45
Alinco Electronics	6,7
Amateur Elec. Supply	69,79,133,137
Ameritron	117
Amidon	89
Anli International	83
Antenna Mart	27
Antenna Masters Ind	138
Antennas West	45,142
Antennaco	105
Antique Electronic Supply	89
Antique Radio Classified	58
Artsci Publications	95
Associated Radio	76
Astron Corp	61
Atlas Radio	134
Austin Amateur Radio Supply	140,141
Barry Electronics	125
Beezley, Brian, K6STI	86
Bencher, Inc	76
Bilal Co./Isotron Ants	138
Buckmaster Publishing	30,36,45,110,129
Burghardt Amateur Center	121
Butternut Electronics	93
CB City International	140
CQ Videos	82
CQ Books	134
C & S Sales	90
Cable X-Perts	104
Carrizo Solar Corp	31
Case, The	31
Command Productions	52
CommPute, Inc	142
Communications Concepts Inc	90
Communication Electronics	119
Cottage Solutions Inc	109
Cushcraft Antennas	21
DX Solutions	104
DX Engineering	142
Delta Loop Antennas	102
Diamond Antennas	74,75
Down East Microwave	58
EDE	49
Echotrak	89
ETO	2
Electronic Specialists	107
FB Enterprises	129
Force 12 Antennas	47
Fair Radio Sales	129
Ft. Worth Computers	51
GAP Antennas	70,136
Get-Tech	129
Grapevine Group, The	124
HR Bookstore	107
HAL Communications	59
Ham Companion	78
Ham Radio Outlet	14,16,17
Ham Repair	68
Ham Shows	81
Ham Station, The	36
Hamtronics	110
Henry Radio	143
Hardin Electronics	134
Height Towers	111
Hustler Antennas	139
ICOM America, Inc	11,78,Cov. IV
Industrial Comm. Engineers	23
Interactive Image Tech	8
International Components Corp	105
itech	104
Ivanhoe Software Systems	140
J Com	30
Japan Radio	77
Jun's Electronics	31
K1EA Software	129
K2AW's "Silicon Alley"	138
K-Quest	111
Kelvin Electronics	111
Kent Morse Keys	60
Kenwood, USA	Cov. II,1,67,101
Lakeview Co	111
LaRue Electronics	103
Lentini Communications	95
Lewallen, Roy, W7EL	110
Lightning Bolt Antennas	138

(continued on page 147)

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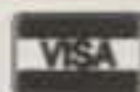


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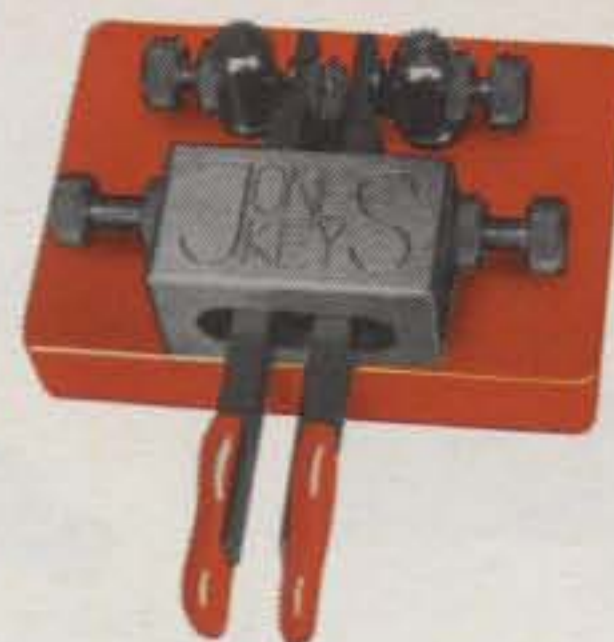
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Advertiser's Index (cont'd)

Logikey	114
Luke Co	112
MD Electronics	109
MFJ Enterprises	35,37,39
Mackey, James E	109
Martin Engineering, Glen	51
Match All	25
Memphis Amateur Electronics	60
Morningstar Printing	138
Motron Electronics	136
NCG Inc. (Comet Antennas)	12,13
National Amateur Radio Assoc.	128
Namlulu Communications	138
Nemal Electronics	41
Nye Engineering	102
ONV Safety Belt Co	112
OPTOelectronics	43,135
Oak Bay Technologies	44
Oklahoma Comm. Center	29
Orion International	19
Outbacker Antennas	87
PASS Publishing	44,136
PC Electronics	26
PKD Software	89
PKT Electronics	102
Palomar Engineers	52,147
Peet Brothers Co	93
Periphex Inc	65
Phillips-Tech Electronics	142
Pioneer Hill Software	142
Pipo Communications	95
Polyphaser	49
Pro-Am/Valor	85
QSL's by K2QFL	142
QSL's by W4MPY	45
QSL's by WX9X	110
QSO Software	87
RC Distributing	111
RAI Enterprises	127
RGD Electronics	124
RF Concepts	9
RF Connection	142
RF Enterprises	70
RF Parts	145
RT Systems	97
Radio Amateur Callbook	57
Radio Center USA	146,148
Radio City Inc	72
Radio Club of JHS 22	124
Radio Engineers	140
Radio Place, The	114
Radioware	128
Radio Works	58
RayCom	107
Robert Hall Electronics	49
Ross Distributing	45
Rutland Arrays	127
S & S Engineering	112
SGC Inc	73
Scrambling News	102
Sescom Inc	111
Solder-It	90
Sommer Antennas	97
Spectrum International	96
Spider Antennas	94
Standard Amateur Radio	71
Surplus Sales Of Nebraska	65
Synthetic Textiles	102
TE Systems	64
TFI	142
Tapto Corp	102
Telex Hy-Gain	10
Tejas RF Technologies	142
Texas Towers	63
Timewave Technolgy Inc	97
Tucker Surplus Store	54,55
UNR-Rohn	58
Universal Amateur Radio	87
VIS Study Cards	138
Virginia Beach Hamfest	97
Versatel Communications	90
W5YI Marketing	94,138,140
W9INN Antennas	142
WJ2O Master QSO Logging Program	127
W & W Associates	91
Wacom	96
West Radio School, Gordon	48
Wireman Inc	31
Yaesu Electronics	80, Cov. III-III A-III B
Yost & Co	97

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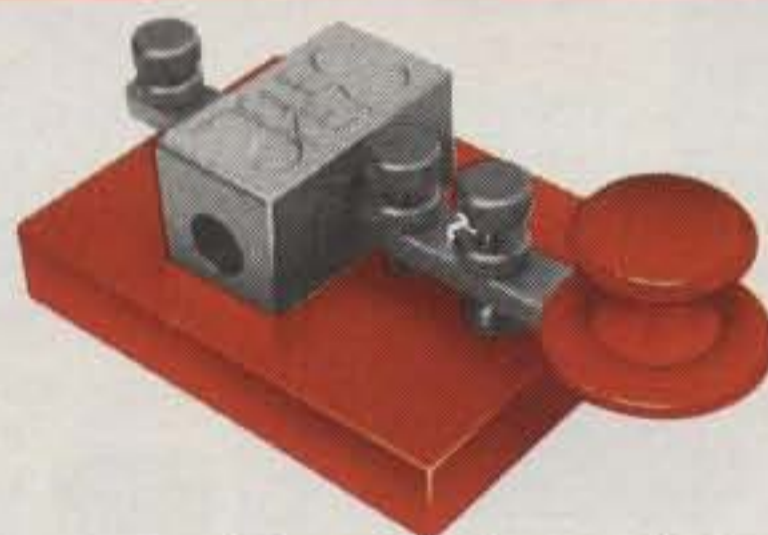
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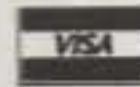
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Dual CTCSS Decoder	YES	NO	NO	NO
Battery Voltage Readout	YES	NO	NO	NO
Automatic CTCSS Tone Search	YES	NO	NO	NO
Transmit Battery Saver (Repeater & Simplex Operation)	YES	NO	NO	NO
Built-In Vox	YES	NO	NO	NO
One Touch Reverse Button	YES	NO	NO	NO
Dual In-Band Receive (V+V, U+U)	YES	YES	NO	YES
Programmable External Speaker Audio	YES	NO	NO	NO
Optional Digital Display Mic with "S" Meter	YES	NO	NO	NO
AM Aircraft Receive	YES	YES	YES	YES

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144-148 MHz TX
70 cm 430-450 MHz RX/TX
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w/FNB-27: 5.0, 3.0, 1.5, 0.5W
- DTMF Paging and Coded Squelch
- AOT – Auto On-Timer with built-in clock and alarm functions
- IBS – Intelligent Band Select (provides automatic TX band select on scan stop)
- Backlit keypad and display with time delay
- Built-in cross-band repeat function
- APO – Automatic Power Off
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NC-42 1 House Desk Charger
FNB-25 600 mAh Battery (2 watt)
FNB-26 1000 mAh Battery (2 watt)
FNB-27 600 mAh Battery (5 watt)
FBA-12 6 AA Cell Holder
CSC-56 Vinyl Case w/ FNB-25
CSC-58 Vinyl Case w/ FNB-26/27
E-DC-5B 12 VDC Adaptor
YH-2 Headset for VOX
MH-12A2B Speaker Mic
MH-18A2B Lapel Speaker Mic
MH-19A2B Mini Earpiece Mic
MH-29A2B LCD Display Mic with Remote Functions
MMB-54 Mobile Mounting Hanger



No other dual band handheld beats the FT-530 on features for performance and ease of use. With the largest backlit keypad available, 82 memories, exclusive Dual CTCSS Decode and AM Aircraft Receive, the FT-530 is simply the best value there is.

Compare for yourself, then forget "the rest." See your dealer for the best dual band handheld you can buy. The FT-530.

YAESU

Performance without compromise.SM

"200 watts, real cross band receive, even two flywheel-weighted main knobs!"

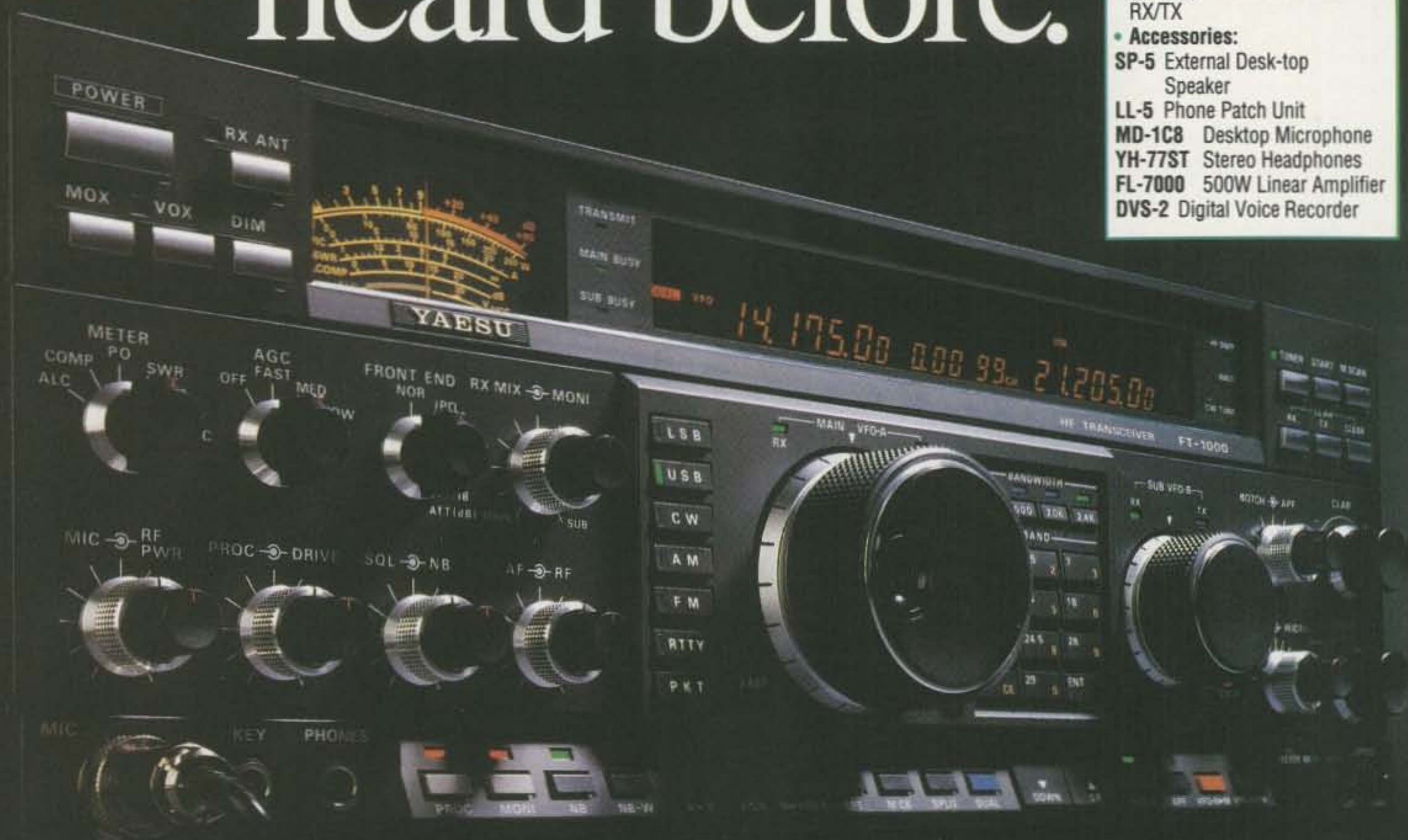
"Yaesu did it again!"

"Right, there's only one real performer – the FT-1000."

FT-1000 All Mode HF Transceiver

- RF Power Output: Up to 200 Watts
- True Cross-band Dual Receive: Two Large Tuning Knobs
- Front Panel RX Antenna Switch: For Beverage or Loop
- Direct Digital Synthesis (DDS)
- Automatic Antenna Tuner: Built-in, 30 Memories
- Frequency Range: 100kHz-30MHz (RX), 160-10 meters (TX)
- 100 Memories: Independent ATU and Mode/IF Filter Memory
- CW Spot and Two CW Key Jacks for Maximum Convenience
- Dynamic Range: 108 dB
- Optional Digital Voice Recorder (DVS-2): 16 Seconds Each RX/TX
- **Accessories:**
 - SP-5 External Desk-top Speaker
 - LL-5 Phone Patch Unit
 - MD-1C8 Desktop Microphone
 - YH-77ST Stereo Headphones
 - FL-7000 500W Linear Amplifier
 - DVS-2 Digital Voice Recorder

Hear signals you've never heard before.



You're a competitor. You want optimum receiver performance and you want "muscle" on transmit. First with 200 watts – more power than any competing transceiver – and "hand warm" at maximum RF. It's easy to see why the FT-1000 has been judged "best overall" by top DX'ers worldwide.

For elite-class contesting and DX operation, exclusive features maximize your score. Dual Receive – Watch a multiplier or new country on one frequency, run QSOs on another. Diversity Reception – Use two antennas at different heights or opposite polarization. Extensive Cascaded IF Filtering – For "low end" battles.

Dramatic front panel design features two flywheel-weighted tuning knobs, RX antenna selector and two large displays.

A perfect blend of electronics and human engineering, the FT-1000 is the Best of our Best!

To hear signals you've never heard before and get the competitive edge, see your Yaesu dealer today.

YAESU

Performance without compromise.™

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Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

"Built-in duplexer and 94 memories!"

"Great price and smallest dual band made, too!"

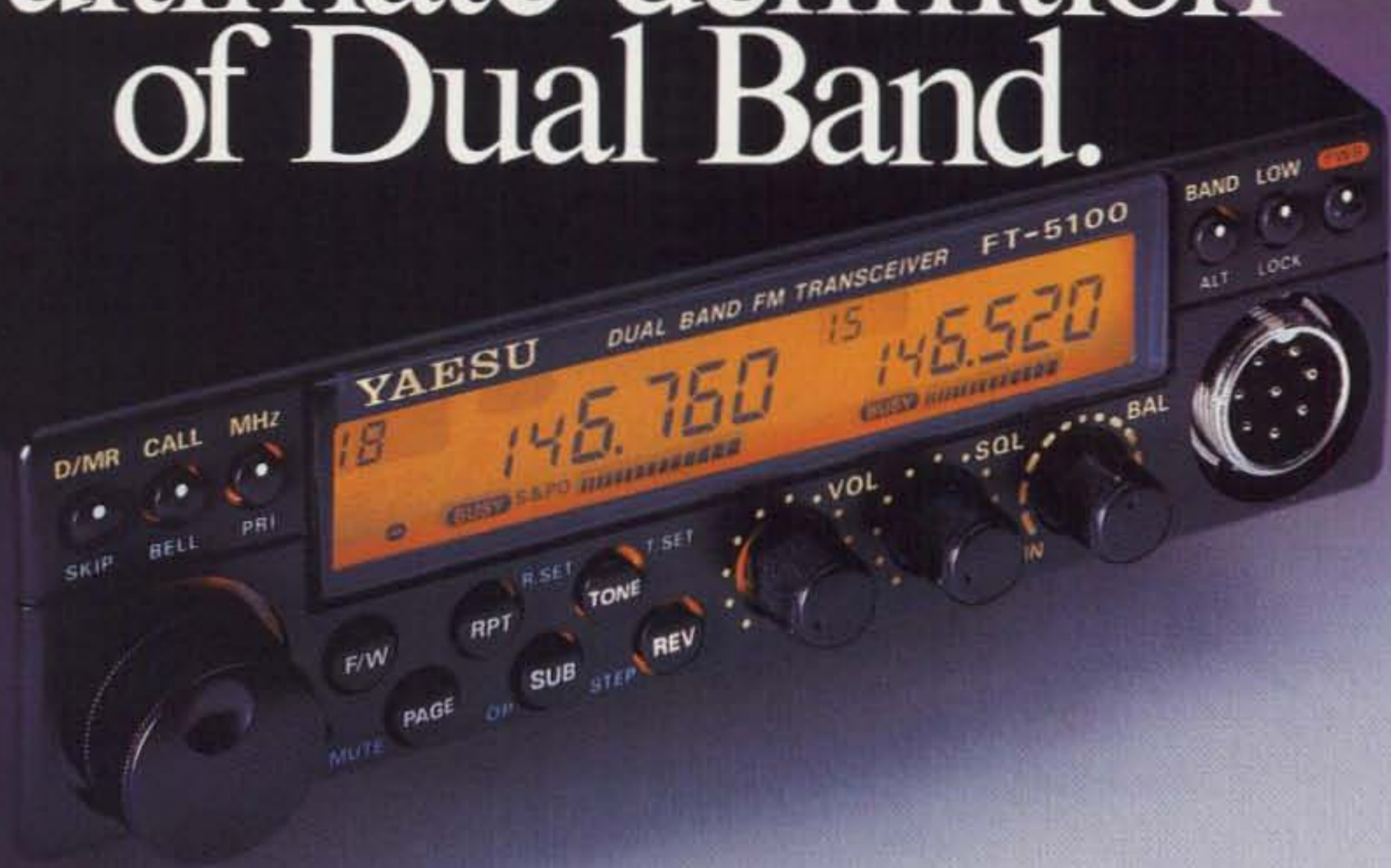
"Comes with a backlit DTMF Mic!"

"Yaesu did it again!"

FT-5100 Dual Band Mobile

- **Frequency Coverage:**
2M: 130-174 MHz RX
140-150 MHz TX
70 cm: 430-450 MHz RX/TX
- 94 Memories (47 per band)
Odd Splits In Any Memory
- Dual in-band receive
(V/V, U/U or V/U Receive Operation)
- DTMF Paging and Coded Squelch Included.
- Packet Radio TNC Jack
Built-In To Back of Radio
- CTCSS Encode Built-In
- Dual Receive with Balance Control
- Full Duplex Cross Band Operation
- Built-In Antenna Duplexer
- Back Lit DTMF Microphone
- Automatic 8 Level Display Dimmer
- Built-In Cross Band Repeat
- RF Output Power:
2M: 50/5 watt (high/low)
70 cm: 35/5 watt (high/low)
- **Accessories:**
FTS-22 CTCSS Dual Decoder
SP-7 External Speaker
MW-1 Wireless Microphone/
Controller

The ultimate definition of Dual Band.



Now you can listen to two, 2 meter frequencies, or two, UHF frequencies, at the same time with In-Band Dual Receive*. Although equipped with traditional dual band, Yaesu has taken receive two steps beyond in the remarkable FT-5100. Combined in one compact mobile transceiver, it's the ultimate meaning of "dual band".

With 94 memory channels – more than any other radio in its class – and the optional MW-1 Wireless Mic, the flexibility of the FT-5100 is matchless. But to make sure the FT-5100 is complete, and an even better value, unlike the competition, there's a backlit DTMF mic included.

Through advanced miniaturization technology you'll find practical additions like the built-in antenna duplexer – an option on similar transceivers – and equally important, DTMF paging and coded squelch. All in the smallest dual band made!

Priced for the shrewd buyer, you've got to hear it to believe it. Dual band re-defined. Combinations like this can't

Three Dual Receive Configurations



VHF/UHF



UHF/UHF



VHF/VHF

Dual band redefined.
And the choice is yours.

In-Band Dual Receive available only on FT-5100.

Here's another Yaesu exclusive!
The MW-1 Wireless Mic
with Remote Control.



be found anyplace else, so contact your nearest Yaesu dealer and tell him you want the "ultimate dual band". The FT-5100.

FT-5200 Dual Band Mobile.

Offers the security of a quick release front control panel (not available on the FT-5100), 32 memories, DTMF paging (w/optional FRC-4), Back-lit mic, built-in antenna duplexer and more.



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Performance without compromise.SM

*In-Band Dual Receive available only on FT-5100.

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The IC-781 Is Just Too Much Transceiver To Squeeze On One Page

It is almost impossible to fit the prestigious IC-781 on a single page. Its futuristic design and superior features defy boundaries.

Never before has a transceiver captivated radio enthusiasts so intensely. The IC-781 inspires countless hours and loyal attention to your hobby...whether it is DX'ing, contesting, exploring new interests or simply enjoying legendary performance.

From the Multi-Function 5-Inch CRT and Spectrum Scope to Twin Passband Tuning, Dual Watch, ICOM's exclusive DDS System and continuous coverage of all amateur bands, the IC-781 is a total communications package designed to exceed your every expectation. The IC-781...Today's Standard of Excellence. See it at an ICOM Dealer near you.



TWIN PASSBAND TUNING

DUAL WATCH

INDEPENDENT FILTER SELECTION

AUDIO PEAKING FILTER FOR SUPERB CW RECEPTION

MULTI-FUNCTIONAL CRT DISPLAY
Can be used as a terminal to display DX packet cluster information!

SEPARATE RX & TX FOR EACH VFO

SPECTRUM SCOPE

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Customer Service Hotline (206) 454-7619
CUSTOMER SERVICE CENTERS
18102 Skyway South, Ste. 52-B, Irvine, CA 92714
3071 - 45 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada
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ICOM
Experience the Quality

CIRCLE 85 ON READER SERVICE CARD

AUTOMATIC ANTENNA TUNER

DUAL WIDTH NOISE BLANKER

FULL CW BREAK-IN