ICD 08241

Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945

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HAM RADIO

SPECIAL ANTENNA ISSUE

THE RADIO AMATEUR'S JOURNAL

KENWOOD

Mobile Companion!

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

Compact FM Mobile transceivers

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

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

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

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

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

Optional accessories

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

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
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KENWOOD

... pacesetter in Amateur Radio

Specifications guaranteed for Amateur band use only.

KENWOOD

TS-950SD

"DX-clusive" HF Transceiver

The new TS-950SD is the first Amateur Radio transceiver to utilize Digital Signal Processing (DSP), a high voltage final amplifier, dual fluorescent tube digital display and digital meter with a peak-hold function.

The Ultimate Signal.

• Dual Frequency Receive Function. The TS-950SD can receive two frequencies simultaneously.

• New! Digital AF filter. Synchronized with SSB IF slope tuning, the digital AF filter provides sharp characteristics for optimum filter response.

• New high voltage final amplifier. 50 V power transistors in the 150-watt final section, resulting in minimum distortion and higher efficiency. Full-power key-down time exceeds one hour.

• New! Built-in microprocessor controlled automatic antenna tuner.

• Outstanding general coverage receiver performance and sensitivity. Kenwood's Dyna-Mix™ high sensitivity direct mixing system provides incredible performance from 100 kHz to 30 MHz. The Intermodulation dynamic range is 105 dB.

• Famous Kenwood interference reduction circuits. SSB Slope Tuning, CW VBT (Variable Bandwidth Tuning), CW AF tune, IF notch filter, dual-mode noise blanker with level control, 4-step RF attenuator (10, 20, or 30 dB), switchable AGC circuit, and all-mode squelch.

Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications, features and prices subject to change without notice or obligation.

DSP

Digital Signal Processing

Without DSP With DSP

• Digital Signal Processor. DSP is a state-of-the-art technique that maximizes your transmitted RF energy.

• High performance IF filters built-in† Select various filter combinations from the front panel. For CW, 250 and 500 Hz, 2.4 kHz for SSB, and 6 kHz for AM. Filter selections can be stored in memory!

• *Multi-Drive Band Pass Filter (BPF) circuitry.* Fifteen band pass filters are available in the front end to enhance performance.

• Built-in TCXO for the highest stability.†
• Built-in electronic keyer circuit.
• 100 memory channels. Store independent transmit and receive frequencies, mode, filter data, auto-tuner data and CTCSS frequency.
• Digital bar meter.

Additional Features: • Built-in interface for computer control • Programmable tone encoder • Built-in heavy duty AC power supply and speaker • Adjustable VFO tuning torque • Multiple scanning functions • MC-43S hand microphone supplied

Optional Accessories
- DSP-10 Digital Signal Processor *
- SO-2 TCXO * • VS-2 Voice synthesizer
- YK-88C-1 500 Hz CW filter for 8.83 MHz IF *
- YG-455C-1 500 Hz CW filter for 455 kHz IF *
- YK-88CN-1 270 Hz CW filter for 8.83 MHz IF
- YG-455CN-1 250 Hz CW filter for 455 kHz IF *
- YK-88SN-1 1.8 kHz SSB filter for 8.83 MHz IF
- YG-455S-1 2.4 kHz SSB filter for 455 kHz IF *
- SP-950 External speaker w/AF filter
- SM-230 Station monitor w/pan display
- SW-2100 SWR/power meter
- TL-922A Linear amplifier (not for QSK)

* Built-in for the TS-950SD
† Optional for the TS-950S

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KENWOOD

Compact Champion!

TH-27A/47A

2 m and 70 cm Super Compact HTs

Here is a great new addition to Kenwood's HT family — the all new TH-27A for 2 meters and TH-47A for 70 cm! Super compact and beautifully designed, these pocket-sized twins give you full-size performance.

- **Large capacity NiCd battery pack supplied.** The standard battery pack is 7.2 volts, 700 mAh, providing extended transmit time with 2.5 watts. (TH-47A: 1.5 W.)
- **Extended receive coverage.** TH-27A: 118—165 MHz; TH-47A: 438-449,995 MHz. TX on Amateur bands only, (TH-27A modifiable for MARS/CAP. Permits required. Specifications guaranteed for Amateur bands only.)
- **Multi-function scanning.** Band and memory channels can be scanned, with time operated or carrier operated scan stop.
- **Frequency step selectable for quick QSY.** Choose from 5, 10, 12.5, 15, 20, or 25 kHz steps.
- **Built-in digital clock** with programmable timer.
- **Dual Tone Squelch System (DTSS).** Compatible with the TH-26AT Series and the TM-941A Triple bander, as well as other Kenwood series transceivers, this selective calling system uses standard DTMF to open squelch.
- **Five watts output** when operated with PB-14 battery pack or 13.8 volts.
- **T-Alert for quiet monitoring.** Tone Alert beeps when squelch is opened.
- **Auto battery saver, auto power off function, and economy power mode extends battery life.**
- **DTMF memory.** The DTMF memory function can be used as an auto-dialer. All characters from the 16-key pad can be stored, allowing repeater control codes to be stored!
- **41 memories.** All channels store receive and transmit separately for "odd split."
- **DC direct in operation.** Allows external DC to be used (7.2 – 16 volts). When external power is used, the batteries are being charged. (PB-13 only.)
- **Automatic offset selection (TH-27A).**
- **Direct keyboard frequency entry.** The rotary dial can also be used to select memory, frequency, frequency step, CTCSS, and scan direction.
- **CTCSS encode/decode built-in.**
- **Supplied accessories:** Rubber flex antenna, battery pack, wall charger, belt hook, wrist strap, dust caps.

Optional accessories:
- **BC-14:** Wall charger for PB-13, 14
- **BC-15:** Rapid charger for PB-13, 14
- **BH-6:** Swivel mount • **BT-8:** Six cell AA Alkaline battery case • **HMC-2:** Headset with VOX and PTT • **PB-13:** 7.2 V, 700 mAh NiCd pack • **PB-14:** 12 V, 300 mAh NiCd pack • **PG-3F:** DC cable with filter and cigarette lighter plug • **PG-2W:** DC cable • **SC-30:** Soft case • **SMC-31:** Standard speaker mic • **SMC-32:** Compact speaker mic
- **SMC-33:** Compact speaker mic with controls
- **WR-2:** Water resistant bag.

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A publication of

CQ Communications, Inc.
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Hicksville, NY 11801-USA.

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

The Radio Amateur's Journal

ON THE COVER: Mike Raskin, K4KUZ, handles his antenna work the easy way from a "crow's nest" at his Plantation, FL, QTH. (Photo by Larry Mulvehill, WB2ZPI)

APRIL 1991 **VOL. 47, NO. 4**

FEATURES

DEPARTMENTS

ZERO BIAS EDITORIAL

The other day I listened in on several pile-ups early in the morning and a few in the evening. One was a bit chaotic and virtually impossible to break through, and the others simply required patience and discipline. What struck me about the pile-ups was not the DXpeditions they represented or the potential for adding a new country to my total, but that the very nature of our hobby had changed from the days when I first began my amateur radio odyssey.

In the early to mid-1950s we read about DXing and great DXers who bravely traveled the globe searching out rare and exotic scrimpets of land to put on the air. These seemed to be daring tales of adventure, and the DXers names as I remember them were Danny, Dick, and Gus for the most part. Recently, however, without much fanfare or even a cognitive notice of the change, the names are more likely to be Iris, Kiyoko, or Hilde.

I know that amateur radio has traditionally been a male-dominated hobby, and most of the "guys" hitting the DXpedition trail still have names like Martti, Matts, Jackie, and Romeo, but it is interesting to see and hear that amateur radio too has made the transition to socialization.

Paper Cuts and The Revenge Of The Contest Committee

Within the small confines of the *CQ* Editorial office there is an even smaller area reserved for handling contest logs we receive. Usually this area is covered with white plastic mail buckets, the kind with which a lot of you are familiar. For a good part of the year we get daily buckets of logs which must be sorted out and sent to checkers. When I use the editorial "we," I mean Gail or me, and usually it just means Gail. The same internal contest committee is responsible for the receiving, facilitating, and eventual disposition of your log and award requests.

One thing that we have continually asked of you is that you mark the outside of your envelope or log entry with what is contained therein. This does speed things up and ensures prompt handling wherever possible. Most of you are pretty good at doing this, but a fair number are making our job a lot harder than it should be. The photo shows part of one day's logs received with nothing indicating the contest or mode.

Now my first thought is simply to throw them out and not count them. The next idea is to exact a small penalty, say penalize the first 500 contacts or so. For those who send their logs addressed "CQ WW DX Contest" (on our forms) to the ARRL, another 500 to 1000 contacts go up in smoke. It's just a thought we have as we have to open each log and try to figure out what's inside. Lest we forget, I have even thought of adding another 1000 or so penalty contacts for those who neglect to total or put in a summary sheet.

Do you see your log here on the floor? Guess where it's going next. This is part of one day's delivery of logs which have no indication of contest or mode. Each has to be opened and examined before sorting. It's not quite true that we practice flamenco dancing on them or that we see how durable discs really are.

The Shape Of Things To Come?

In early January there was a small feature in *Westlink Report* concerning the annual "Pepsi Vulcan Weekend" in Birmingham, Alabama. This is a series of races held over a weekend and includes the "Vulcan Run," which attracts thousands of runners each year. Communications for the event have been handled in the past by the Birmingham Amateur Radio Emergency Service. Evidently some problems arose between the event's committee and the amateurs, and now communications are being handled by individuals with portable cellular telephones. To quote Carl Howard, the event's Executive Director, "Everybody was extremely pleased with the way the telephones worked. The phones seem more practical. They can be carried in a back pocket by anyone—with or without a ham radio license."

No Code Is Now

This week, as I write this, the new No-Code licensing takes effect. I for one have been after a few friends of mine to start thinking about getting a license now that they don't have to think about CW initially. Notice I did include the word initially, as we still have the CW requirement for HF privileges.

While I don't really expect huge throngs of people to line up for exams, I do expect to see an increase in the number of new amateurs. How they find out about it, how they are encouraged, and most important how they are taught is still up to me and what we are willing to do about it.

At the very least, we who are already licensed are role models for amateur radio. Our attitudes, our sense of community and service, our expressions of enjoyment and personal satisfaction with the hobby all work towards turning someone on or off.

Next Month

For diehard amateurs there is no spot on the face of the earth that can conjure up fantasyland quicker than Dayton, Ohio. If only we could bring everyone who ever expressed an interest (however small) in amateur radio to experience the Dayton Hamvention. It's a super-saturated phenomena of total amateur radio immersion. Anything new, used, technical, non-technical, fun-producing, and down-right obscurely heuristic can be found at Dayton over a three-day period. It's a shopper's, buyer's, and seller's paradise. You can fill up a warehouse with just the literature you can collect. You can even have fun trying to figure out what some of the stuff in the fleamarket is, or what it may have been used for, or why the person ahead of you is so anxious to buy it. I'll be there. How about you?

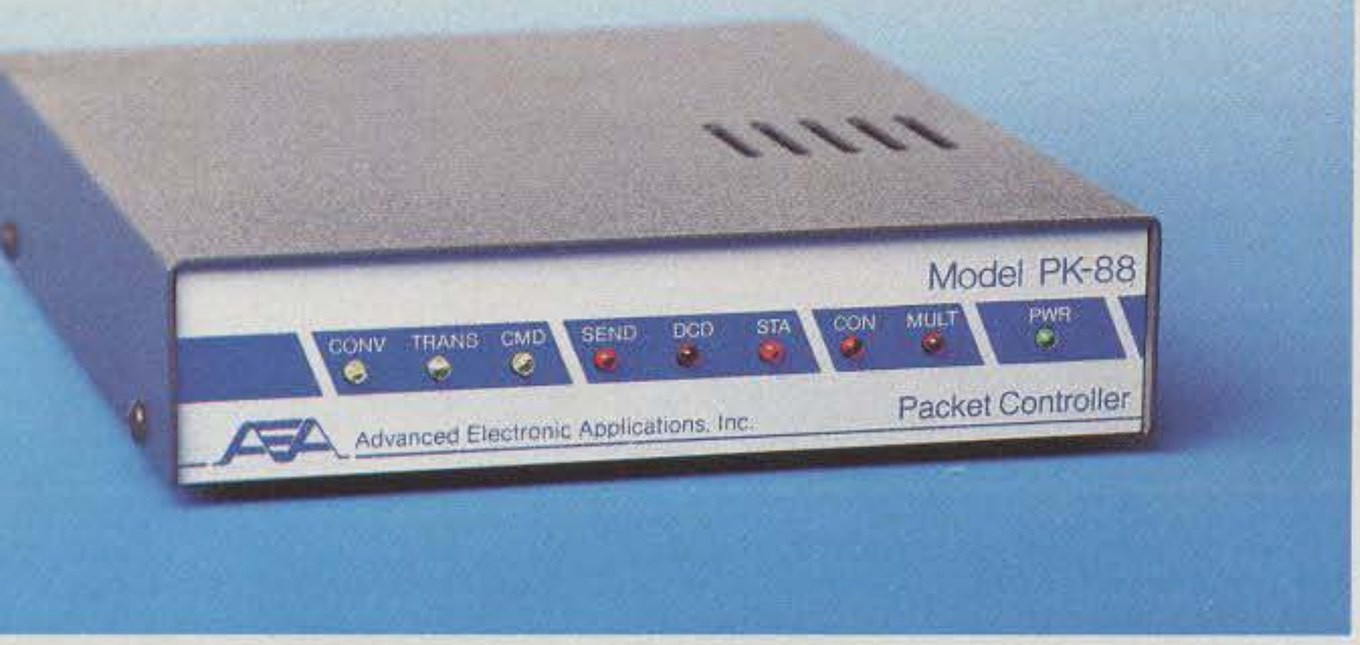
Antennas

As you can tell from the Table of Contents, our focus this month is antennas. Somehow we never get tired of reading about, building, and designing antennas. Even those of us who have tight budgets, and even tighter zoning restrictions, can dream of what it would be like to put up some sort of ultimate array. For most of us it is still just as amazing to see how many different configurations we can make out of a length of wire and a few insulators. We cut and try and dream. Amateur radio is the stuff that dreams are made of.

73, Alan, K2EEK

New Low Price!
Amateur Net $119.95*
Retail $134.95

AEA's PK-88™ Packet Controller



Unique operating features with a proven hardware and software design make AEA's PK-88 your best choice in packet radio - now with MailDrop, an 8KBytes efficient personal Mailbox. The MailDrop uses a subset of the well-known WØRLI/WA7MBL packet BBS commands. When your PK-88 MailDrop is active, other stations can connect to your PK-88, leave messages for you or read messages from you. You can also store a single message or up to 15 separately numbered messages. Your MailDrop also accepts inbound mail forwarding from your local WØRLI/WA7MBL auto-forwarding packet BBSs.

The PK-88's internal KISS Mode is your direct interface to KA9Q's "NET" TCP/IP protocol suite - a single KISS command presets all packet parameters for TCP/IP operation. AEA's unique Host Mode provides the type of complete interface protocol preferred by many professional programmers for efficient control of the PK-88 by external programs and special applications. Your PK-88 also accepts special "NET/ROM" EPROMs provided by Software 2000, Inc., for Level Three node operation and networking.

In addition to all the features of a "standard" TNC, the PK-88 offers features not found in any other TNC:

- WHYNOT command - Shows reasons why some received packets are not displayed.
- "Packet Dump Suppression" - Prevents dumping unsent packets on the radio channel when the link fails.
- CUSTOM command - Allows limited PK-88 customization for non-standard applications.
- Enhanced MBX command - Permits display of the data in I- and UI-frames, without packet headers and without retries and repeats.
- Enhanced MPROTO command - Suppresses display of non-ASCII packets from Level Three switches and network nodes.
- Unique MFILTER value $80 - Suppresses all graphics and control characters except TAB, CR and LF.
- Unique DFROM command - Permits selective digipeating ("Accept" or "Reject" digipeater operation by call signs).

AEA Brings You A Better Experience.

Specifications:

- Processor: Zilog Z80. RAM: Battery backed, 32K Bytes. ROM: 32K Bytes
- Hardware HDLC: Zilog 8530 SCC

Modem:

- Modulator/Demodulator: AMD 7910 "World Chip"(tm), with differential AM detection and phase-continuous sinewave AFSK generator
- Modulator Output Level: Adjustable, 5 to 300 millivolts RMS
- Input Sensitivity: 5 millivolts RMS
- Input Range: 5 to 770 millivolts RMS
- External Modem Connector for use with external modem
- Hardware Watchdog Timer: One-minute time-out

Rear Panel Input/Output Connections:

- Radio Interface: Locking eight-pin; Receive Audio, Transmit Audio, PTT, Auxiliary Squelch, Ground
- Audio Input/Output: 3.5mm mini-plug
- External Modem: Five pins on DB-25; Transmit Data, Receive Data, Data Carrier Detect, Clock, Ground
- Terminal Interface: Standard RS-232 25-pin DB-25 connector
- Terminal Data Rates: Autobaud settings at 300, 1200, 2400, 4800, 9600. TBAUD adds 45, 50, 57, 75, 100, 110, 150, 200, 400, 600 and 19,200 BPS terminal rates
- HDLC Link Data Rates: 45, 50, 57, 75, 100, 110, 150, 200, 300, 400, 600, 1200, 2400, 4800, 9600, 19200 BPS

Front Panel LED Indicators:

- Converse, Transparent, Command, Send, Data Carrier Detect, Status, Connect, Multiple Connect, Power

Power:

- +12 to +16 VDC @ 550mA, coaxial power connector, (center pin positive), Model AC-1 120 VAC wall adapter available

Physical:

- 7.5"W x 6"D x 1.5"H; Weight 2lbs.,6oz.

* Through participating AEA dealers only.

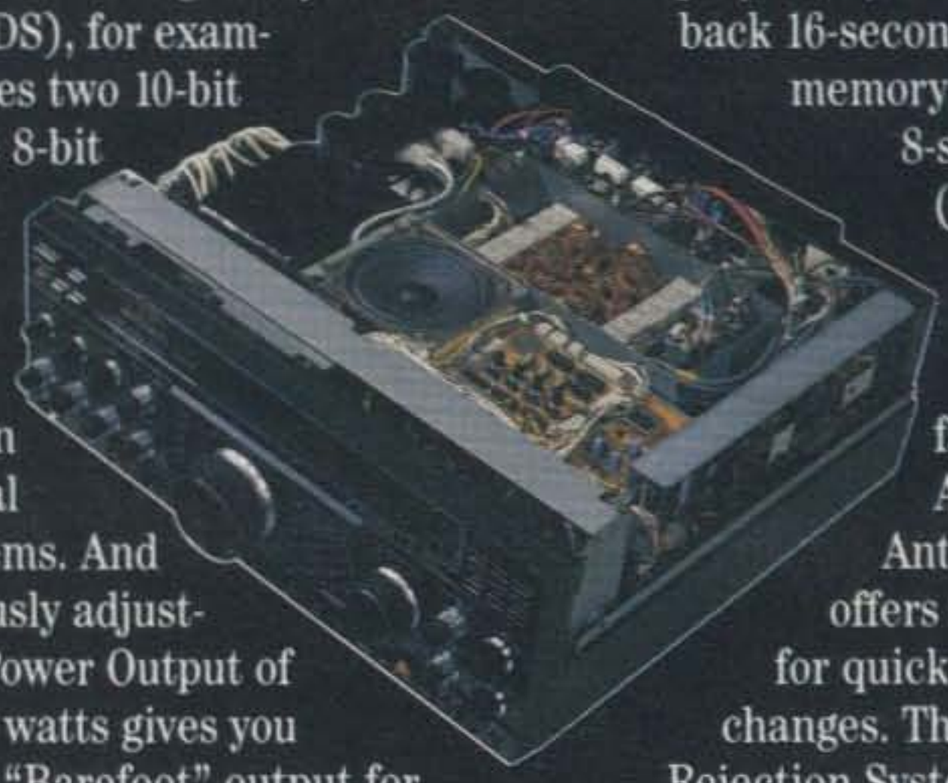
Advanced Electronic Applications, Inc.
2006-196th St. SW/P.O. Box 2160 Lynnwood, WA 98036 206-775-7373

Yaesu Announces
One Year
Limited Warranty
on all Amateur Radio Products

The Best of the Best

To be a star in international competition, you have to play your cards right. Stack the deck in your favor with Yaesu's FT-1000. It has all the features world-class winners demand.

Our Direct Digital Synthesis (DDS), for example, utilizes two 10-bit and three 8-bit DDS for fast lock-up and lower noise than traditional PLL systems. And continuously adjustable RF Power Output of up to 200 watts gives you excellent "Barefoot" output for pileups, plus generous drive for your linear. While the Stereo Dual Receive gives you two tuning knobs for easy spotting and simultaneous reception of two different frequencies — for cross-band dual receive or diversity reception using two antennas, add the optional BPF-1 module.



Auto-Antenna Circuitry

The FT-1000 also has the optional Digital Voice Storage (DVS-2) to let you play back 16-seconds of receive memory and two 8-second (or four 4-second) messages in transmit. A fast-action Automatic Antenna Tuner offers 39 memories for quick band changes. The QRM Rejection Systems include cascaded filter selections, IF width control, IF shift, IF notch filter, all-mode squelch, dual-mode noise blanker and CW audio peaking filter. Additional features include:

- 100 Memories.
- High Dynamic Range — 108dB.
- Multimode Selection on Packet/RTTY.
- CW Spot.
- Independent mode and filter selection on SSB/CW.
- Mode/Frequency/Filter Information Stored Independently in each VFO.
- Built-in Electronic Keyer Module.
- Twin Frequency Displays.
- Standard (FT-1000) and Deluxe (FT-1000D) Versions.

Be a Star Performer. For more information on the FT-1000 and other Yaesu amateur radio products call the Yaesu Dealer nearest you.

YAESU

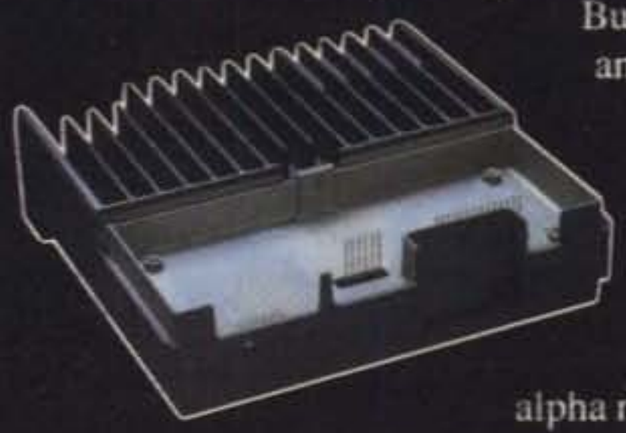
Performance without compromise.℠

STAR PERFORMER

Yaesu Announces
One Year
Limited Warranty
on all Amateur Radio Products*

Tested Tough...
to Military Specs.

We're not kidding. Superior engineering and durable construction comes standard on the FT-2400 and all Yaesu transceivers. That's why Yaesu is the official radio for the Nissan off-road race team. The FT-2400 is also the first radio ever to be submitted for the grueling MIL STD 810D rating.*



Built to take the abuse of highway and off-road use, the FT-2400 is packed with exceptional features including 26 full-function memory channels. The FT-2400 also allows you to identify channels with your choice of frequencies or alpha numeric readout. A new DTMF microphone with easy to see backlit keypad and a modular plug is included. And for effortless reading day or night a huge LCD display features big numbers and an automatic level dimmer control.

What's more, the engineers at Yaesu have added a practical feature, once you have programmed the FT-2400 just flip up the panel to keep those seldom used buttons out of the way, no more having to reset your mobile or accidentally pushing the wrong button.

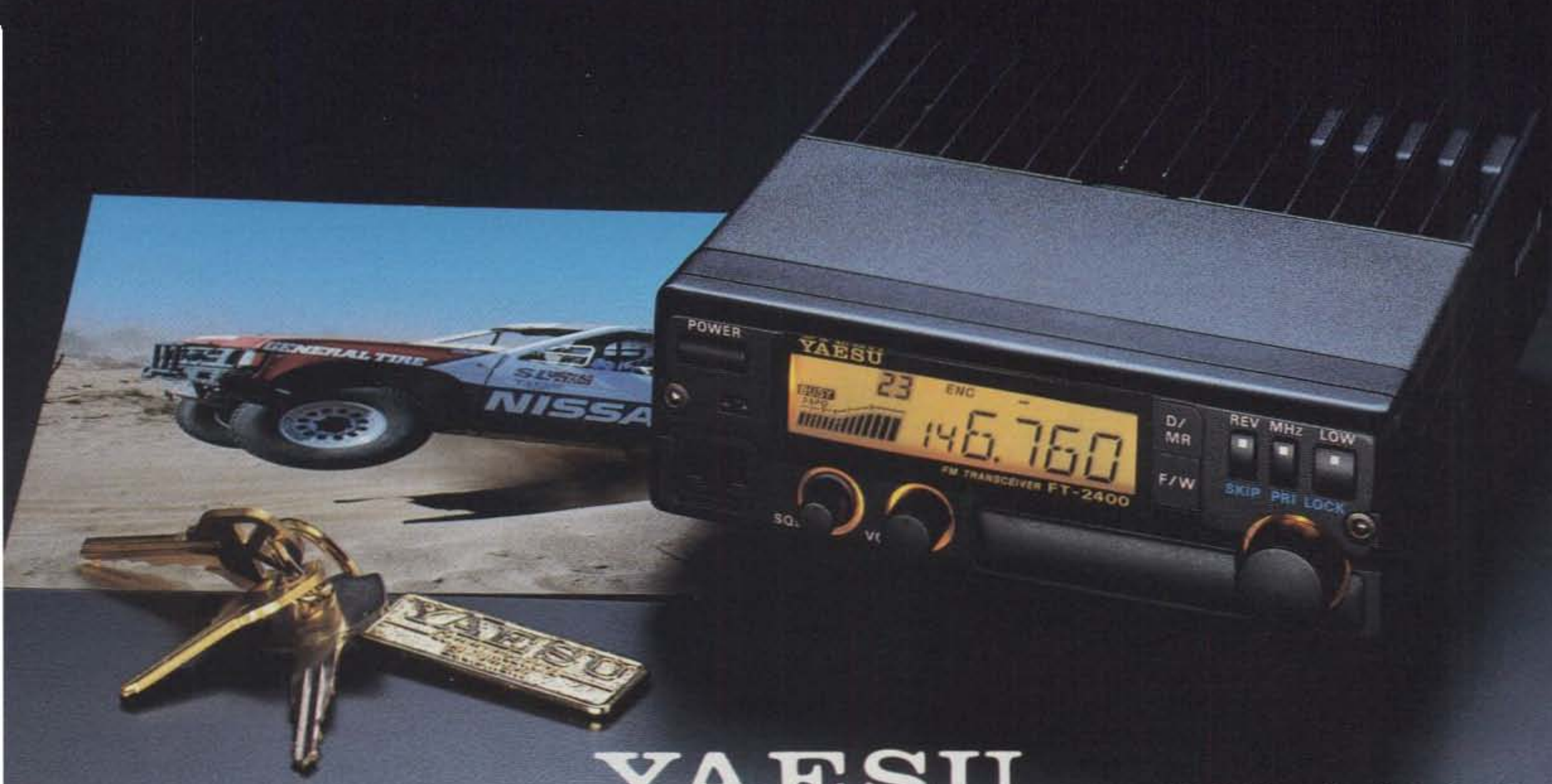
Features:

• VHF Hi-power mobile three selectable power levels 50w high, 25w mid, 5w low • Wide band receiver coverage 140–174 Rx, 140–150 Tx • CTCSS encode built-in selectable from front panel • 5 scanning functions: Band scan, Memory scan, Memory channel lock-out with selectable scan stops and priority scan • Channel steps: 5, 10, 12.5, 15, 20, 25 and 50 • One piece die-cast flame construction body and heat sink • Automatic repeater offset • Programmable call channel

Options:

• DTMF calling and pager option (requires FRC-6 paging unit) • CTCSS decode unit (FTS-17A) • External speaker (SP-7) • Heavy duty microphone (MH-25A8J) • Power supply (FP-700)

If you need a mobile that's ready for anything, you can't beat the FT-2400. Contact your nearest Yaesu dealer.



*Approval Pending

YAESU

Performance without compromise.

CIRCLE 19 ON READER SERVICE CARD

10, 12, 15, 17 and 20 Meters

cushcraft R5

Performance is always your top criterion, and when space is at a premium the R5 is your best choice. It needs no ground radials and stands 17 feet tall.

10, 12, 15, 17 and 20 meters are yours with fully automatic band selection and RFI supression. The only connection needed is the 50 Ohm coax from your transceiver.

The unique counterpoise has four 48" x 0.1" stainless steel rods for excellent ground independence. This allows the antenna to be mounted anywhere from ground level to roof top.

With the R5 you get quick assembly, easy installation and the highest "performance to size" ratio of any antenna available to the amateur today. Whether your space is large or small, the R5 will make ham radio more fun.

SOME MORE REASONS WHY

YOUR FELLOW HAMS AGREE THAT R5 IS THE PERFECT CHOICE

"I have worked more DX in the last two weeks than the last 5 years. Love the R5." KJ4KW

"Bought a second R5 to take to the Serengeti in Tanzania. Never had a problem, and my wife (in NY) and I never missed a sked. The communications were like being next door." WA2RUD/5H3WL/5Z4PI

"In 3 weeks have worked 12 new countries with R5 - It's super!" W6XF

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SPECIFICATIONS

Frequency, MHz	28, 24, 21, 18, 14
Gain, dBi	3
Electrical Wavelength	Half-Wave
SWR 1.2 : 1 Typical 2:1 Bandwidth	10m - 2 MHz 12m - 100 KHz 15m - 450 KHz 17m - 200 KHz 20m - 350 KHz
Power Rating, Watts PEP	1800
Radiation Angle, Degrees	16
Frequency selection	Automatic
Horizontal Radiation Pattern	360°
Height, ft (m)	17 (5.2)
Mast Size Range, in (cm)	1.5-1.75 (3.8-4.4)
Wind Load, ft² (m²)	1.4 (.13)
Weight, lb (kg)	8.7 (4)
Counterpoise Radials Supplied	Yes

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ANNOUNCEMENTS

• **Foundation for Amateur Radio Scholarships Available** - The Foundation for Amateur Radio will award 36 scholarships for the academic year 1991–92 to assist licensed radio amateurs who plan to pursue a full-time course of studies beyond high school and are enrolled in or have been accepted for enrollment at an accredited university, college, or technical school. The awards range from $500 to $2000 with preference given in some cases to residents of specific geographical areas or the pursuits of certain study programs. Additional information and an application form may be requested by letter or QSL, postmarked prior to May 31, 1991, from FAR Scholarships, 6903 Rhode Island Ave., College Park, MD 20740.

• **Chaverim of Delaware Valley Scholarship Offered** - The Chaverim of Delaware Valley is offering a scholarship of at least $600 to a licensed Jewish amateur radio operator who desires to pursue post-secondary education and is seeking financial assistance. Applications may be obtained by writing to Jay Kuperman, WA3IFY, 1934 Devereaux Ave., Philadelphia, PA 19149. Completed applications must be received no later than May 15, 1991.

• **North Eastern Illinois QRP Society Formed** - This society has been formed to further QRP operation and promote a forum for exchange of information relating to QRP functions and activities. The group meets monthly, and amateurs interested in QRP are invited to participate. For more information contact Donald Kozlovsky, KE9GG, 28W256 Purnell Rd., West Chicago, IL 60185 (708-231-3824).

• **The following special events will take place during April:**

One-land, from Vermont's 200th anniversary; Amateur Radio Bicentennial Project; throughout the year 25 kHz up from bottom of the Novice and General bands, RTTY/AMTOR, etc., in digital subbands. For certificate send $1.00 and SASE to Amateur Radio Bicentennial Project, P.O. Box 200, Graniteville, VT 05654. (Foreign stations send SAE and IRCs to cover postage.)

WF1N, from Martha's Vineyard (IOTA, NA-46), Dukes County, Massachusetts; April 12–15; SSB in General portions of 10, 15, 20, 40, and 75 meters, plus RTTY operation. QSL to WF1N direct, 1991 Callbook (KA1HBV in older Callbooks) or via the Buro. (Other team members are NT1I, K1SCN, KA1DIG.)

K2KN, from Young/Morse National Historic Landmark, Poughkeepsie, New York; Poughkeepsie RAC; 1400–2000Z April 27; CW 3.710, 7.110, 14.050, 21.110, 28.110 MHz; SSB 3.90, 7.235, 14.235, 21.335, 28.40 MHz (all plus or minus 10 kHz). DX QSL cards via the ARRL DX Bureau to K2JMY. USA QSLs via Ted Zulkowski, K2JMY, 4 Bishop Dr., Poughkeepsie, NY 12603 with SASE (for special certificate include 9 × 12 SASE, 60 cents).

WA3BAT, from *USS Olympia*, Philadelphia, Pennsylvania; Olympia ARC; 1300Z April 27 to 2000Z April 28; CW 7.133 MHz; RTTY 40, 20, 15 meters; 2 meter FM 145.270 MHz; phone 3.895, 7.245, 14.245, 21.365, 28.365 MHz

(Continued on page 88)

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The Concentric Yagi

BY BRUCE VAUGHN*, NR5Q

It was during the blizzard of '86, just five days before the big CQ DX contest, when my rotator failed. The old unit was replaced with one much larger and more expensive, with the hope that it would withstand the most severe ice storms. It did, only to be burned out by a lightning storm in July of '87. While waiting for the rotator to be returned by the repair facility, I started thinking of a way to avoid rotator problems.

Verticals were eliminated because of higher noise levels, relatively low gain, and the need for radials. Switchable phased arrays were also considered, but their modest gain versus the large area required for installation did not offer the solution we were looking for.

It seemed the best route to pursue was that of modified quads or Yagis. Time has proven that both antennas exhibit good forward gain, can be erected on most any lot, and are normally not too difficult to install and adjust. Of the two, the Yagi seemed to offer more potential.

The antenna shown in the picture is the result of two years of study and experimenting. As you well know, the typical Yagi consists of a ½-wave dipole, with one or more parasitic elements, the longer elements being the reflector(s) and the shorter elements being the directors.

It was reasoned that if we could design a circular Yagi with the elements spaced in the normal manner, then we could achieve maximum gain in all directions, thus eliminating the need for a rotator.

Twenty meters was selected as the band to use for our test model. I was sure if we could attain operation on 20, we could duplicate the results on other bands.

All measurements were taken from the *ARRL Handbook*. The tables and formulas need not be repeated here. For a frequency of 14,050 kHz the length of a half-wave dipole (driven element) is 33 feet, 8 inches. Since we wished to construct a circular antenna, we used our eighth-grade arithmetic to calculate a diameter of 10 feet 8½ inches, the radius being 5 feet 4¼ inches.

From the same table of measurements, we could see that the director length was 31 feet 11⅝ inches, and the reflector length 35 feet 5¼ inches. These were starting measurements, and we knew some adjustment of these dimensions could be necessary. Spacing between the elements then became 10 feet 1 inch (.15 wavelength).

With these figures in hand, we decided to first draw a diagram of the antenna before actually starting construction. This is where the first problems surfaced. When the director was placed 10 feet 1 inch from the driven element, we had a radius of 15 feet 5½ inches, the circumference being approximately 97 feet. While some

The overall size may tend to put some amateurs off the idea of trying a concentric Yagi, especially multi-element arrays. Here we see the original version installed near a conventional tribander.

*P.O. Box 203, Springdale, AZ 72765

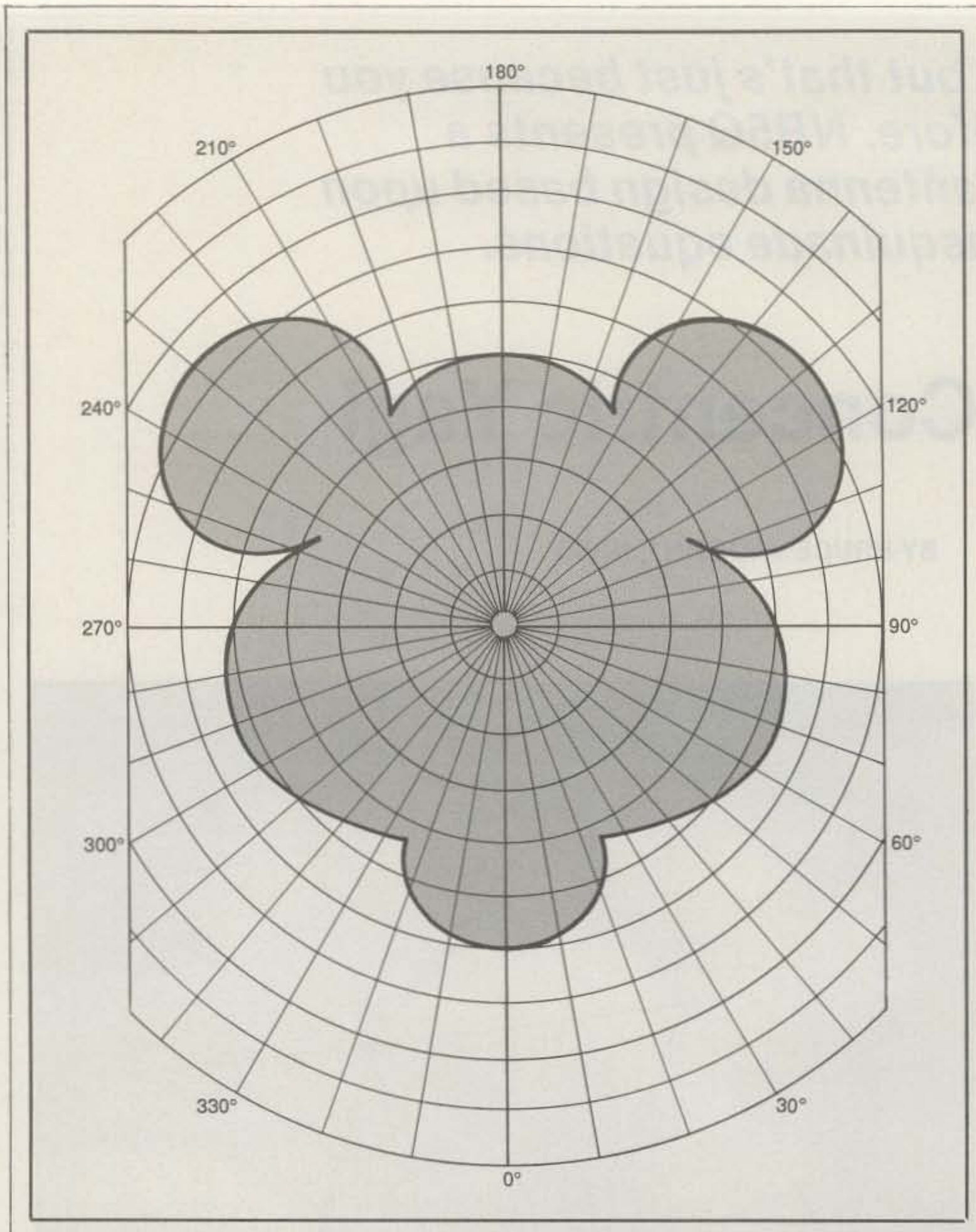

Fig. 1–A chart of the concentric Yagi's radiation pattern.

variations in the dimensions may be permitted, 65 feet longer than the calculated length did present a problem. But wait! If we broke the 97 foot director into three lengths, using 4 inch long insulators, we could be back on track.

Our next problem occurred with the reflector. Since our driven element was only 5 feet 4½ inches from the center of our circle, if we moved behind the driven element 10 feet 1 inch, this would place the reflector in front of the driven element, concentrating our signal back toward the center of the antenna and thus creating a negative power gain. I assumed this would be similar to the black holes in space.

I could see that this was going to take more than eighth-grade arithmetic. Since it was a little late for me to take up Quantum Mechanics and Functions of Complex Variables, I decided to build my antenna the way amateurs have built antennas for years—cut, try, and experiment.

To keep the project simple and easy to construct we chose to build a three-element antenna. If it worked, we could always try for more elements. However, adding one more element could present problems, since the effective boom lengths would be more than 50 feet, and the length of the wire in the second director would be approximately 160 feet. Obviously, 6- and 7-element arrays were going to be very difficult.

As my first step in construction I drew two circles on paper. Looking at them, I discovered my error. It was easy to see that for any given beam heading, the outer, or larger, circle, being in front of the inner circle, or driven element, became the reflector when we moved 180 degrees from our heading. This was working out better than I had hoped. We could forget the black-hole concept. Our problem now became how to make the larger loop (director-reflector) both longer and shorter at the same time. Compared to the difficulty of making a TNT transmitter stay in the 20 meter band, we thought this one should be easy.

Once construction was started, the answer became quite clear: use another loop. We calculated the circumference of the reflector loop, 106 feet 3¾ inches, by taking the reflector length given in the table, multiplying by 3, and adding 12 inches (three 4 inch long insulators). The radius of this loop would be 17 feet. But what about the .15 wavelength spacing? I was also concerned until I reread the chapter on beam construction in the *Handbook*. Chapter 20, page 19: "Fig. 44 shows the gain variation with director spacing is not especially critical." It seemed reasonable to assume that reflector spacing is also a flexible figure.

Our first model to undergo tests was constructed from the preceding calculations. As suspected, breaking the director and reflector loops into three segments gave us a pattern somewhat similar to a three-leaf clover. It was then we decided to build the version shown in the photograph. You can see that we placed two loops, separated by 18 inch spreaders, at the director and reflector position, breaking each loop into three parts. The insulators of the top loop were placed 60 degrees from the insulators of the bottom loop. This resulted in the pattern shown in fig. 1. Not really ideal, but improving.

The booms used for the project were wood. Aluminum or fiberglass would have been a better choice, but I had a supply of wood dowels left over from my experiments with roof-top Rhombics.

The driven element is aluminum tubing, fed at the center with coax, through a conventional 8-turn choke. The reflector and director loops are made from #16 wire. The elements are all insulated from the boom, and spreaders, with short pieces of plastic pipe. I believe the rest of the construction details are best left up to the builder.

After three months of use we are well pleased with the antenna—with one exception. CQs often result in simultaneous answers from Europe, Japan, South America, and Australia, with the result that we are unable to copy any of the calls.

Many of the amateurs in our club are skeptical of this antenna. Since it is somewhat unusual, I can understand their doubts and amusement. I do feel, however, that the term "Mickey Mouse Antenna" is undeserved and without foundation.

I am working on a way to make the antenna directional. If my experiments go as planned, I should have the answer by next April. CQ

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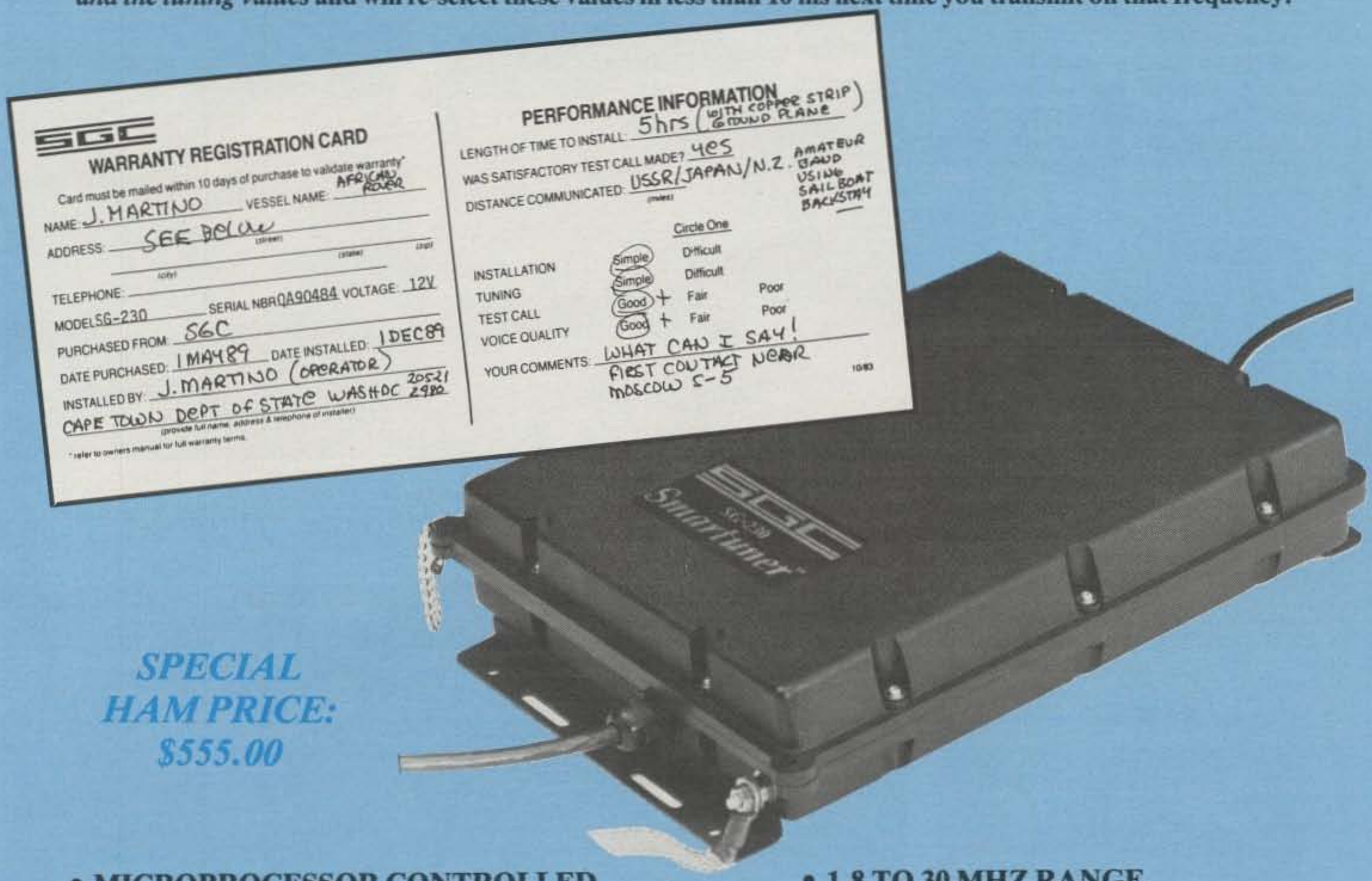
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CIRCLE 142 ON READER SERVICE CARD

CQ REVIEWS:

The Cushcraft A3WS 12 and 17 Meter Beam

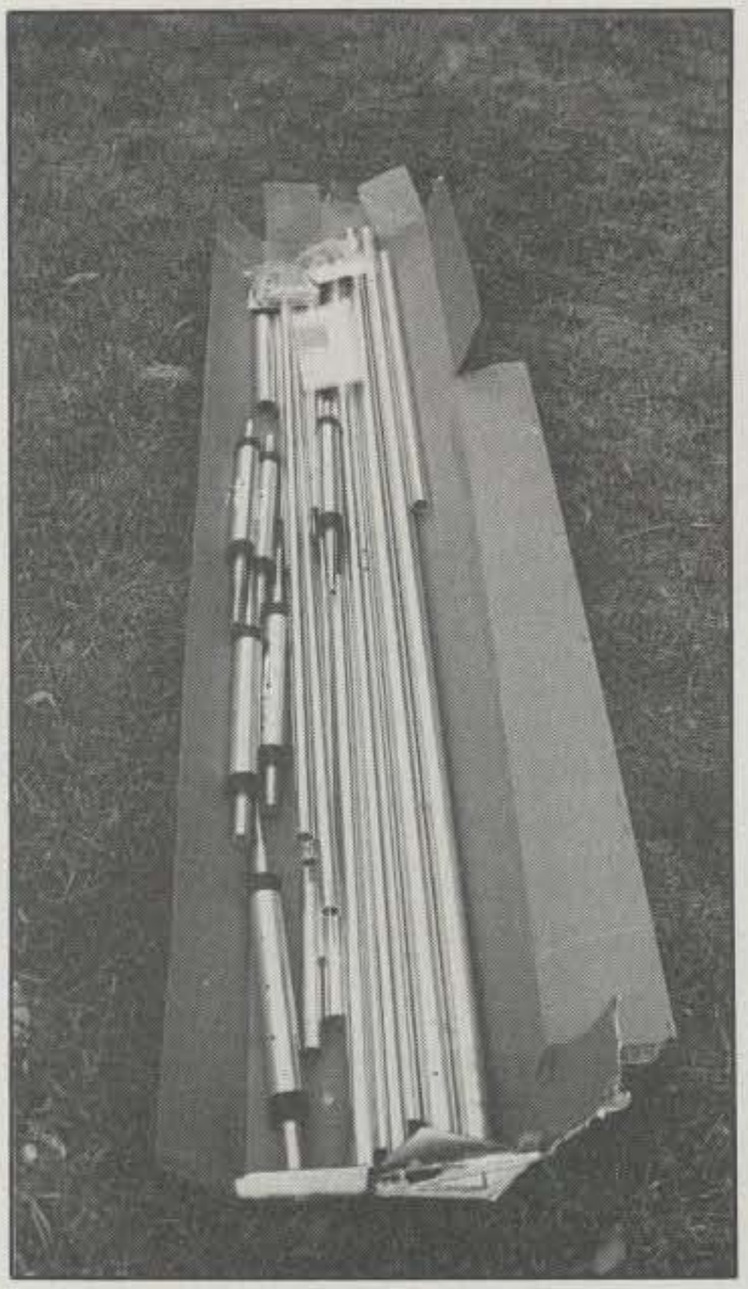
BY LEW McCOY*, W1ICP

With the coming of the two new WARC bands, 12 and 17 meters, activity has increased to the extent that you should start thinking of a beam antenna. A beam offers gain, directivity, selectivity in the form of unwanted signal rejection, etc. Cushcraft has come up with the A3WS beam, an excellent dual-band, three-element trap beam for both bands, and I must say that performance is outstanding. We checked the beam against two rotatable dipoles, and in all cases the signals on the beam were at least one to two S units better. Front to back and front to side were also very good.

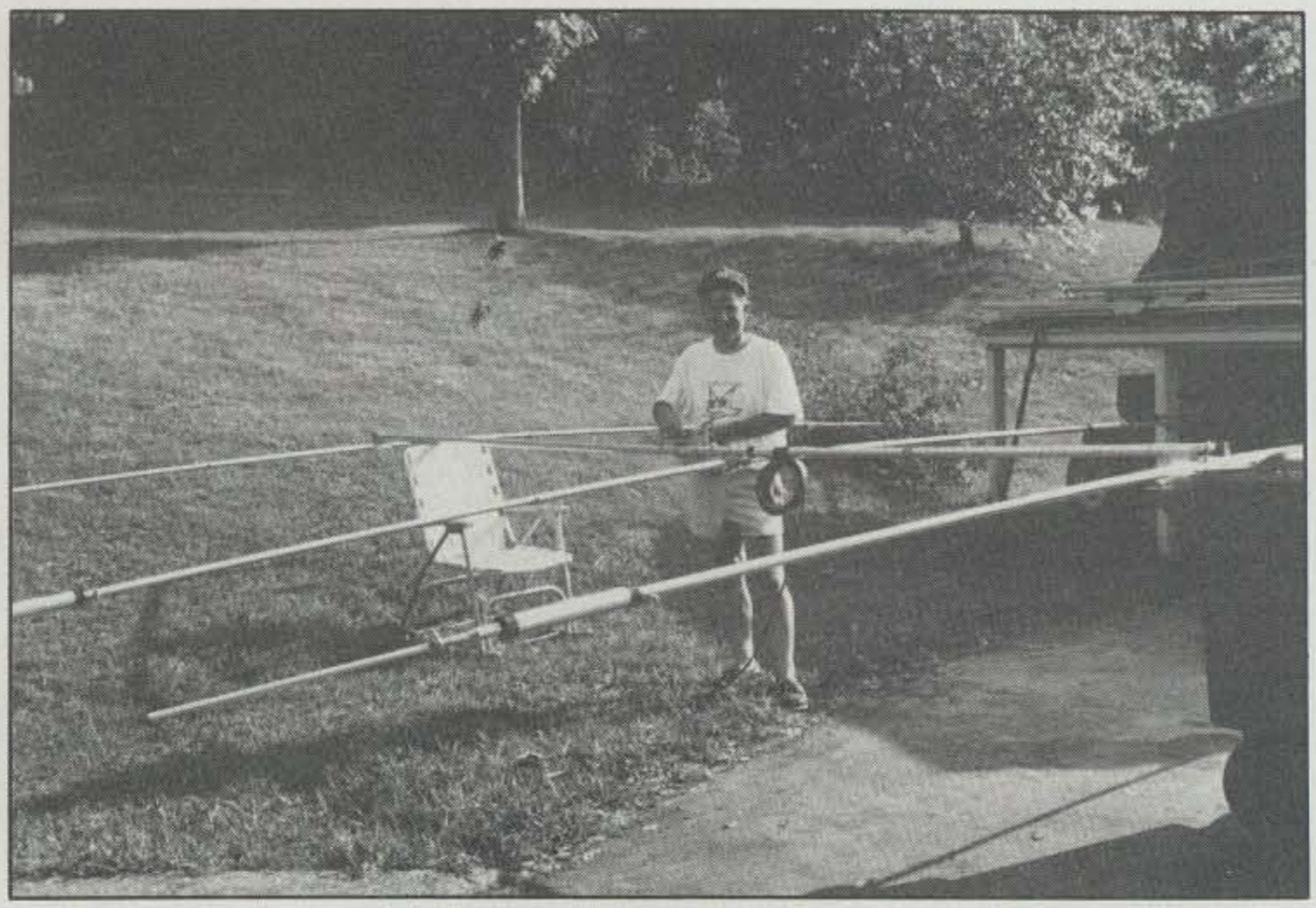
The boom length is 14 feet, with the

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

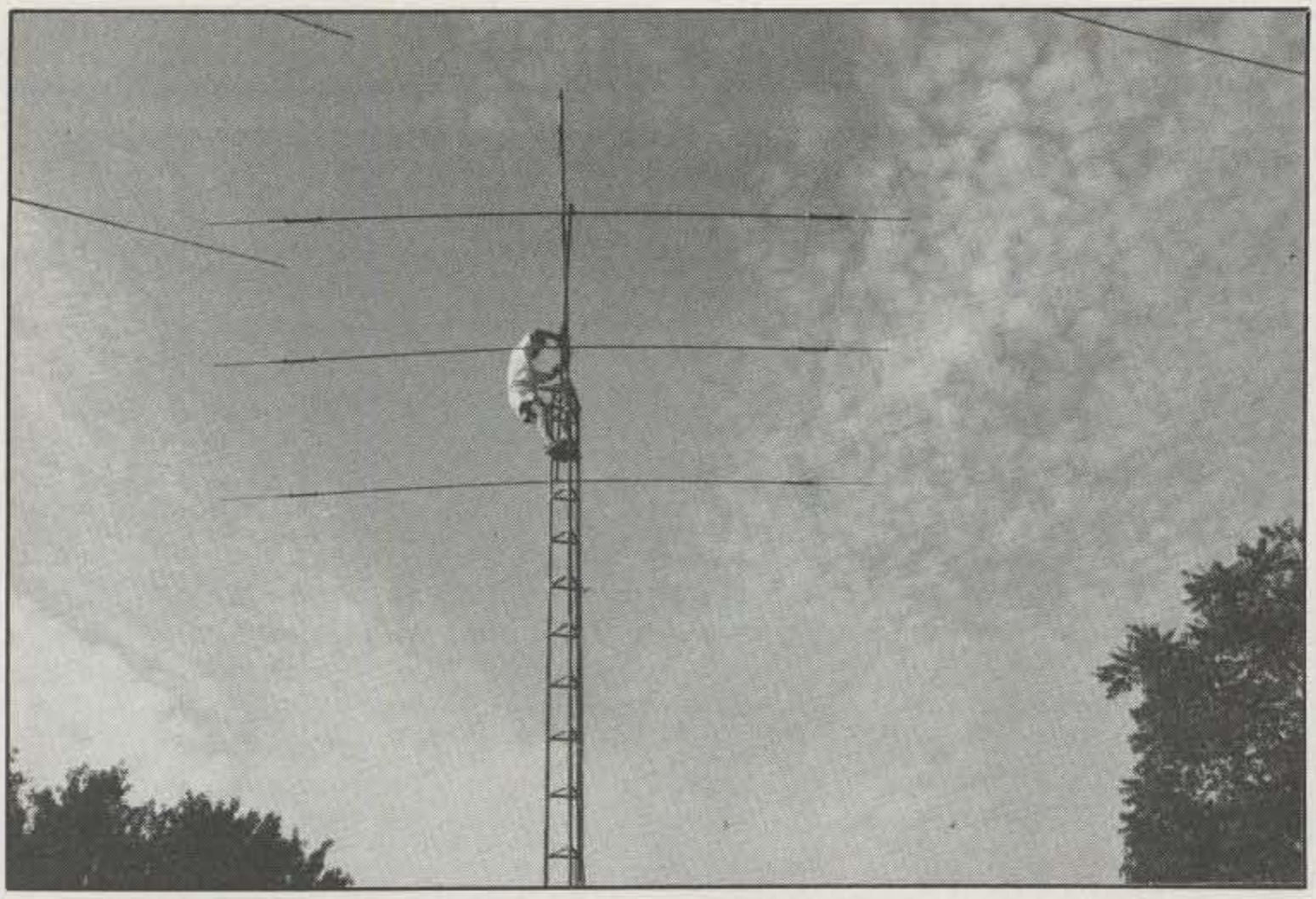
The world's greatest antenna assembly range. Prime tools include a garbage can, a lawn chair, and a screwdriver, plus the chief engineer, WB4FLB.



This is what the Cushcraft A3WS looks like as it is shipped and before assembly. There are two traps in each element.



Another view of the construction. Note the RF choke made up of coax at the feed point.



Gary at the top of the 60 footer putting the final touches in place. I observed and gave encouragment (from the ground).

longest element (the reflector) being 25 feet 1 inch. This gives a turning radius of slightly over 14 feet. The two-band beam is a lightweight, coming in at 22.5 pounds. Total wind surface area is 4 feet. Cushcraft rates the forward gain at 8.0 dBd with a front-to-back ratio of 25 dB typical.

I have no method of checking the gain, but on front to back, assuming an S unit is 6 dB (and my receiver checks out at that figure), I can verify that I reached front-to-back figures even in excess of Cushcraft's ratings on some signals. Checking with a line-of-sight local, the front to back was four S units difference.

The actual frequency-range ratings are 18.068–18.168 and 24.890–24.990 MHz. The manufacturer rates the SWR on both bands at 1.2 to 1 maximum across the bands. I found the beam to be

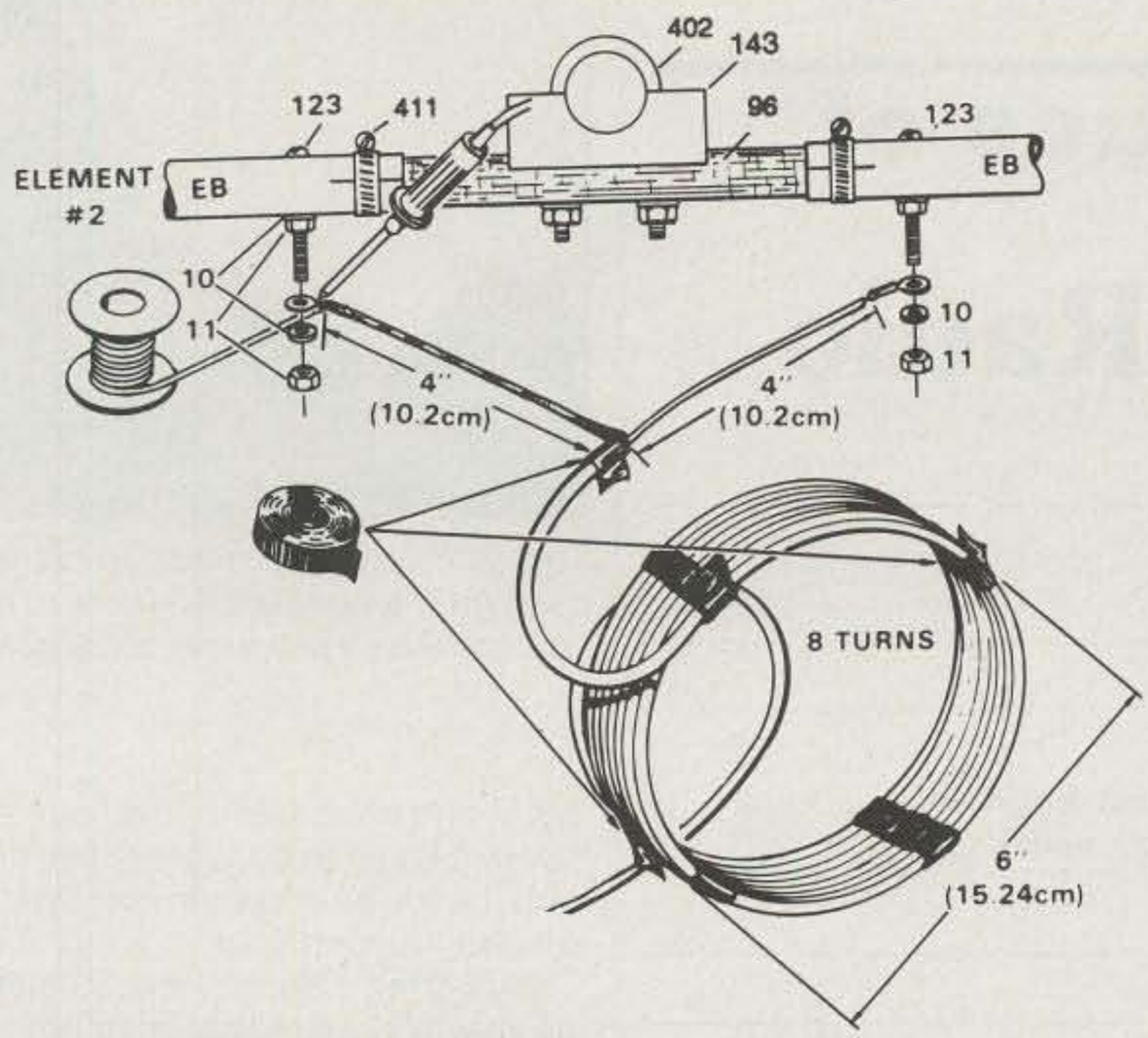
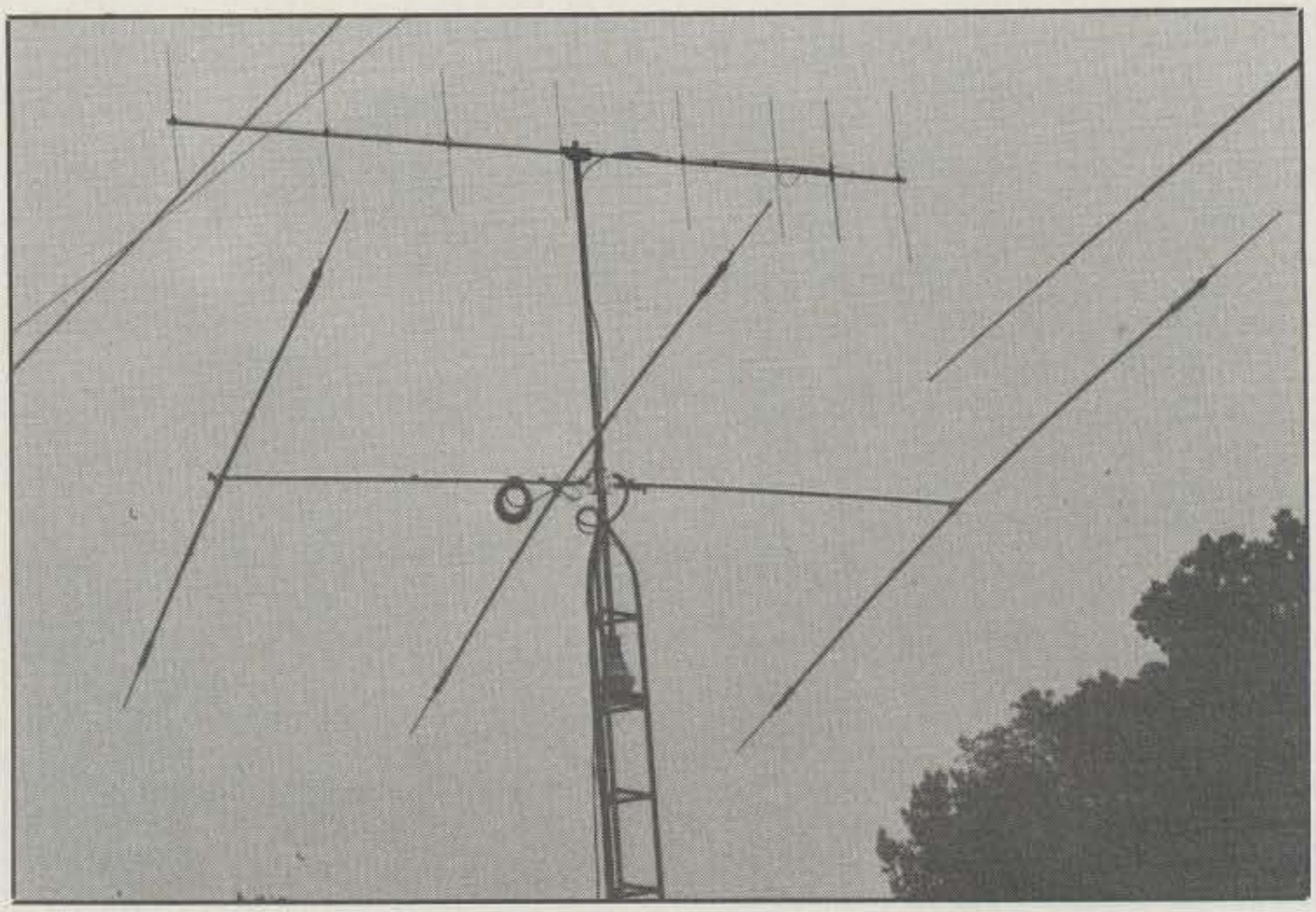


Fig. 1– As stated in the text, the instruction book is clear and detailed. This drawing from the book shows the construction details of the RF choke, and is an example of the instructions' clarity. This choke does an excellent job of feeding the beam and eliminating a balun.

as flat as a proverbial "pancake"—actually less than 1.2 to 1.

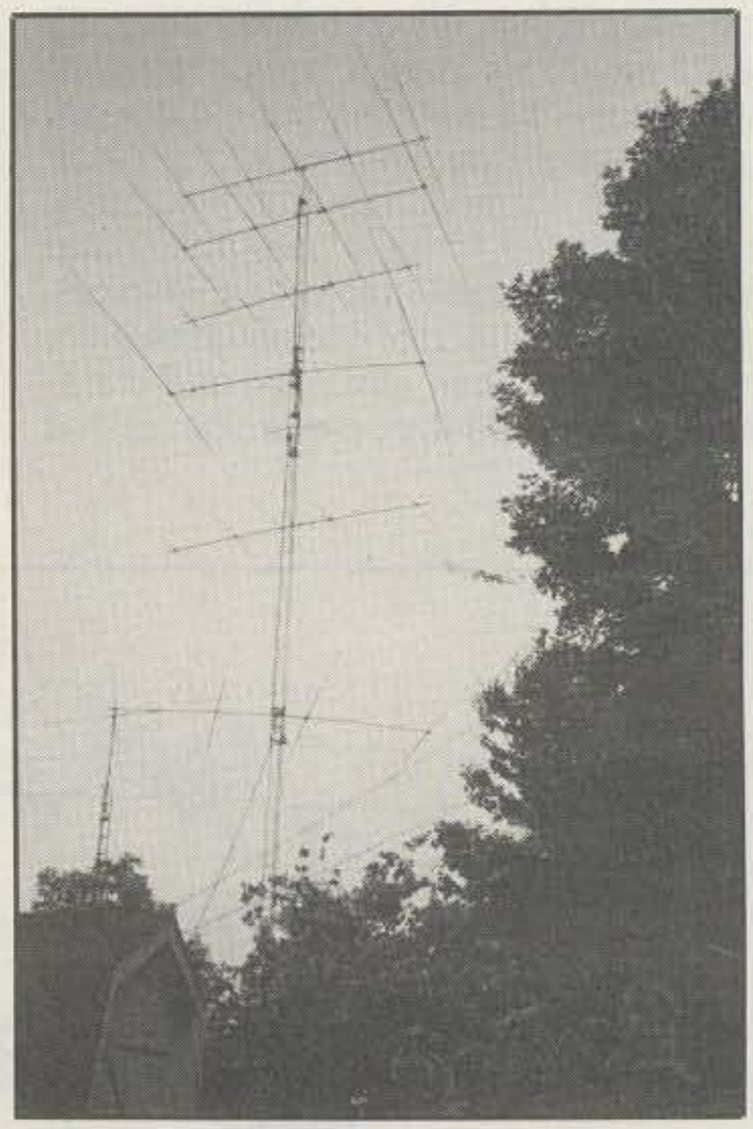
The antenna is shipped in a UPS-transportable box (see the photo). The first step was to make sure that all items checked out against the parts list, which they did. We (not an editorial "we," because Gary Hext, WB4FLB, did nearly all the work) then began the process of putting together the antenna. The antenna was supported, as you can see, on a lawn chair and a garbage can. Construction was fast, about an hour and a half from reading the directions to completion. Everything went together smoothly. Hose clamps are used throughout to hold the traps and various sizes of tubing together.

Being a writer, one of the things that has bothered me over the years when doing technical reviews is what to say about instructions or instruction manuals. Too many manufacturers make the assumption that the buyer or builder knows all about the equipment. It is always a pleasure to build Cushcraft products, however, because their manuals are very good and very detailed. In fact, I consider them excellent. Certainly the instructions with the A3WS are no exception. The parts list is not just a list, but an actual pictorial of each part. The construction of each element is thoroughly described with dimensions in both inches and centimeters. The RF choke at the feedpoint is shown very clearly in a pictorial, and I guarantee the most inexperienced beginner will have no problems. As you can gather, I am very impressed with the instructions, as I am with the performance of the antenna.



Here is the three-element beam completely installed.

Cushcraft recommends an RF choke at the feedpoint of the beam consisting of eight 6 inch turns of 50 ohm coax so no balun is required. Incidentally, we did the installation of the antenna at Gary's place in Bowling Green, Kentucky, and as you will note from the photographs, we made plenty of comparisons to wire antennas. Needless to say, it was a real ball using the Cushcraft beam and chasing DX (sometimes 100 watts, sometimes full



This is a view from the base of the tower used for the two-bander—lots of nice antennas which produce lots of contacts.

bore, and often QRP). In all our tests the beam proved to be a great performer on both bands as shown in some of the pileups we "topped" out.

Cushcraft also offers a 30 meter add-on kit which we did not have nor test. Details are available directly from Cushcraft.

The A3WS lists for $350.00 and is manufactured by Cushcraft Corp., 48 Perimeter Road, P.O. Box 4680, Manchester, NH 03108. CQ

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Sooner or later most amateurs start to think in terms of antenna tuners and whether or not they should use them. Often what is not clear is why they need them and how they work. Who better to answer those questions than our own W1ICP.

How To Adjust A Transmatch Part I

BY LEW McCOY*, W1ICP

Anyone looking at the title of this article will probably figure that McCoy has lost his marbles! Why a two-part article on how to tune a transmatch, when the story could probably be told in a few paragraphs? The reason for two parts can easily be explained. I have found that many, in fact most, readers like to know the history of why things happen in amateur radio, and certainly antenna tuners and Transmatches have an important history. I hope the reader finds this subject interesting, as I enjoyed writing it.

Frankly, in all my many years of amateur radio I never thought I would be able to make the statement that nearly every amateur operating below 10 meters uses a Transmatch. I guess I still can't. However, for 160 through 10 meters the number of those who do use a Transmatch has to be over 90 percent. I find that much of my mail consists of questions about using Transmatches. And more important, no matter how much I write about the subject, there remains a strong demand for more discussion.

Before getting into actual adjustment practices (and that is what this article is suposed to be about), let's look at some history.

One of the earliest problems confronting radio amateurs was that of coupling the final stage of a transmitter to the antenna. Because the antenna was usually installed at a location relatively remote from the transmitter, it was necessary to use a feed or transmission line.

Even in the earliest times of our hobby it was possible to determine the feed characteristics of any given antenna. The properties in the feed of an antenna's impedance haven't changed. They remain the radiation resistance, ohmic resistance, and reactance. I won't go into a lengthy discussion of these properties except to state them simply.

The radiation resistance of the feed point of an antenna can be described as the useful part of the antenna impedance. While expressed in ohms ("ohms" are thought of by many newcomers as something that reduces voltages and consumes power), in this case the ohms of the radiation resistance are the "useful" part of the impedance.

Next we have the actual ohmic resistance, such as the ohmic loss in the wires, etc., and this is a pure loss in that any power used up is dissipated as heat.

When an antenna is not resonant, there is reactance present, and while it is expressed in ohms, you cannot dissipate power in a reactance. It simply stops the flow of power. Therefore, we must compensate or cancel out the reactance to get power into the antenna. A good example of what I am explaining is a half-wavelength dipole fed at the center. Such a dipole, one-half wavelength above earth, has a resonant impedance or feed point of 70 ohms—at resonance. When you QSY away from resonance, the feed point becomes reactive. The resonant dipole consists of approximately 68 ohms radiation resistance and 2 ohms, more or less, of ohmic resistance. To simplify let's assume we have 70 watts reaching this feed point. We would have 68 watts being radiated and 2 watts being lost as heat. This ratio of radiated power to lost power is very, very good. In fact, an ordinary half-wavelength dipole is probably the most "efficient" antenna you could use.

So much for the antenna end as far as the feed point is concerned. Admittedly, I have left out a lot to simplify the discussion. I might add, however, that in the early days there was a lot of mystery about feeding antennas. This is no longer true. With modern computer programs you can determine the feed impedance of practically any antenna.

The feed line used to connect the amplifier to the antenna was usually of an open-line variety—two identical conductors equally spaced using spacers to keep the two wires symmetrical. Such lines became known as "balanced" feed lines. Coaxial line also has two conductors—an inner conductor plus an outer conductor which surrounds the inner conductor, separated by dielectric material. While coax is a symmetrical line, it is commonly known by amateurs as an unbalanced feed line.

However, transmitter amplifiers of those early days were customarily designed for what was known as "link cou-

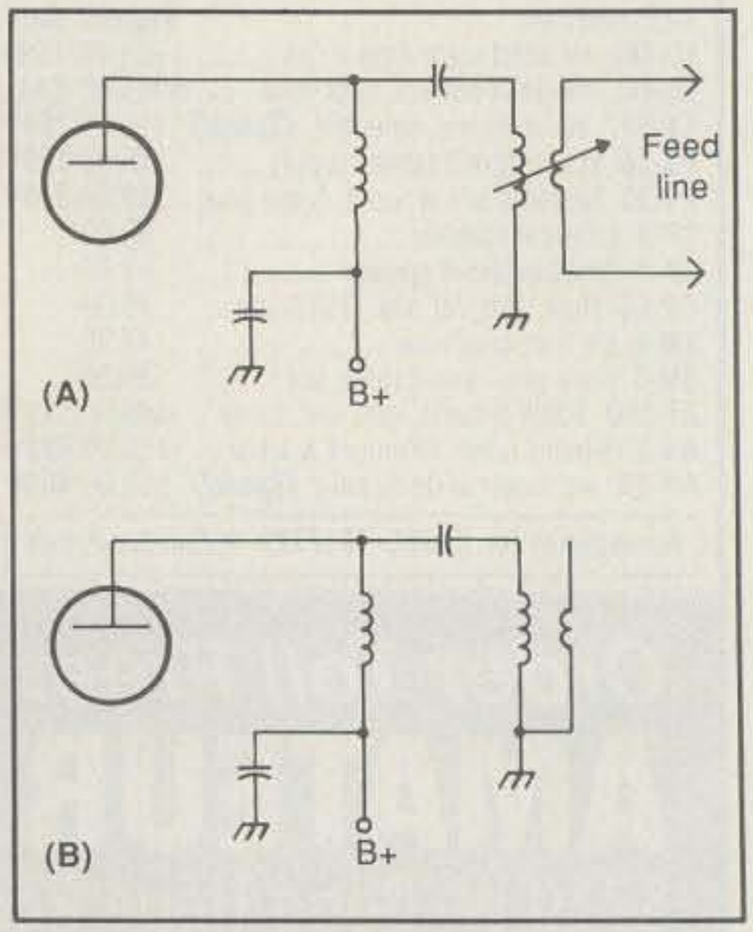

Fig. 1– At (A) is one of the common methods of using link coupling from the amplifier to the feed line. At (B) is a method used to adjust the link using a series variable capacitor for coax lines.

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

pling'' to connect the amplifier tank circuit to the open-wire feed line (fig. 1). There were many tank-circuit designs, but believe it or not, few (if any) used the circuit that is common today. Nearly all tank circuits in current use are some form of the pi network, originally designed by Art Collins, founder of Collins Radio. The reason for the change in circuits is simple enough, but the history is not.

With early transmitters, in order to change bands you usually had to change the coils in the transmitter using plug-in coils (or have individual amplifiers for each band). When World War II came along, the groundwork was laid for many basic changes in our hobby.

Up until WW II the common type of feedline was open-wire line. This type of line was inexpensive, easy to construct, and extremely efficient. In fact, it is still the most efficient line you can use. During WW II, however, coaxial feed lines, which were difficult for amateurs to make, became extemely common, and after the war this same coax entered the surplus market, where it was readily and cheaply available. Coax was and is popular because it is a shielded line and unlike open wire it can be installed directly alongside metal objects or even buried without harmful effects. During the war, though, amateurs didn't really make a mass move towards coax simply because it meant considerable redesign of the circuits in use. One more thing was then to happen to change our methods—and I might add forevermore.

In the late 1940s television suddenly became accessible. In the beginning TV sets were terribly expensive and usually only could be seen in local bars where they were used to attract customers—and they had 5 inch screens! Whenever an amateur station was operated in the near vicinity of a TV set, the interference the amateur transmitter created either destroyed the picture or made it unusable. However, because TV sets were few in number, amateurs were not really concerned.

I cannot help but add an aside here about my personal life that was to affect my future. At the time, 1947, I was W9FHZ (Fanny's Hand Zipper!) and was living south of Chicago. I was also happily chasing DX. I had seen TV in the taverns (where I rarely went!), but no one had a set anywhere near where I lived. That fall I went east to Boston to visit my wife's family and two weeks later when I returned I noted a strange antenna on my *nextdoor* neighbor's house. You guessed it! He was the first one in a very wide area to purchase a TV set. He was a good friend and neighbor, but I have to state, not for long. I can probably safely say that shortly after that time I knew as much about TVI, public relations, etc., as any

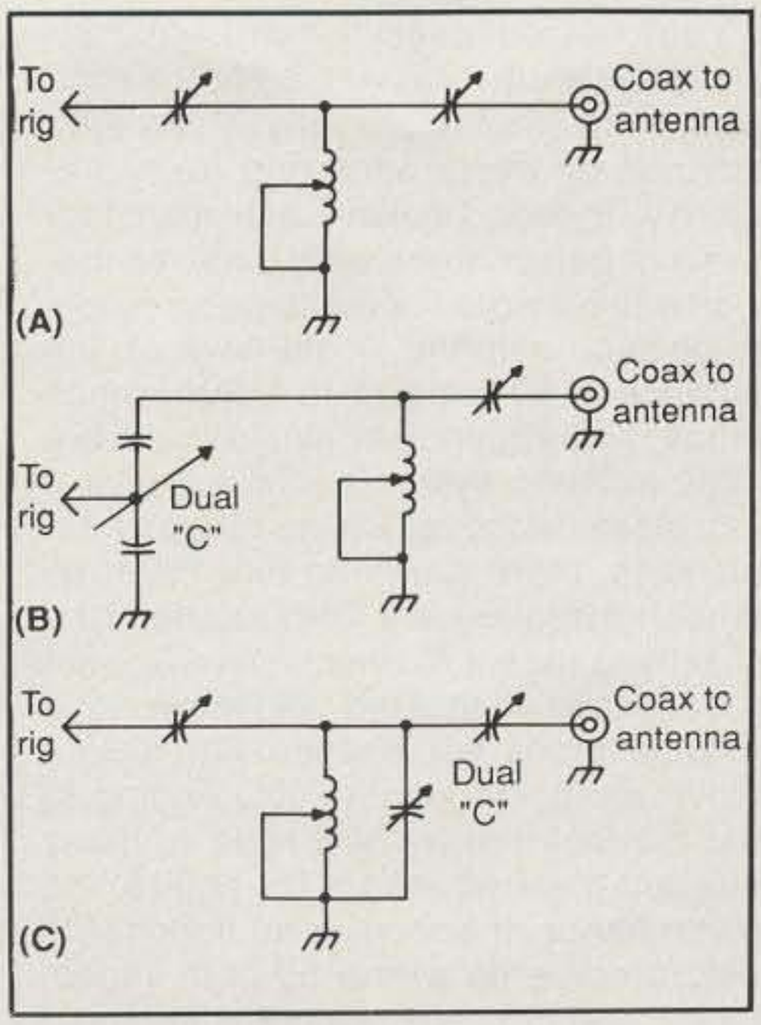

Fig. 2– At (A) is the more popular of the current types of Transmatches. This consists of two variable capacitors and a variable inductor. Shown at (B) is the Ultimate Transmatch and at (C) the SPC. As I mentioned in the text, any of these three, using the proper value variables, will match any load an amateur is likely to encounter. The circuit at (A) is preferred because of its simplicity.

ham alive. I wound up selling my home and moving to Missouri, becoming W0ICP and living in the Ozark Mountains. There was no TV and little of anything else. Strangely, though, all these problems were probably for the best. After starving for a year in the Missouri Ozarks, a job opened up at ARRL Headquarters in Connecticut.

At that time George Grammer, W1DF, Technical Editor of *QST*, and Phil Rand, W1DBM, were working very hard to find methods whereby amateurs could coexist with TV. I applied for a job in the Technical Department, and I will always remember my first interview with George Grammer when he asked me if I had had any experience with TVI!

My first job in the Technical Department was traveling around the then 48 states and Canada lecturing on the causes and cures of TVI. I visited and lectured in well over 150 cities. I transported two TV sets, transmitters, TVI-causing devices, and so on. I guess I knew about TVI.

Meanwhile, back to the subject at hand, George Grammer and Phil Rand and others had determined the only answer to TVI was complete RF tight shielding of a transmitter and the use of low-pass filters on the transmitter and high-pass filters on the TV sets. No longer was it possible to use plug-in coils for band-switching, because you lost the shielding integrity or effective shielding became

almost impossible to sustain. It was important that the generated RF be contained so that the output could be fed through a low-pass filter to effectively kill any TVI causing harmonics. It was much simpler to design the amplifier tank circuits for bandswitching using a pi network to work into the low-impedance filter designs. This meant coax feed lines, at first 70 ohm line and then 50 ohm line, simply because 50 was more readily available.

The pi-network circuit lent itself to simple bandswitching, plus it had a great deal of flexibility in dealing with wide ranges of reactance and impedance mismatches. Probably the best of those early commercial rigs was the Johnson Viking Ranger, which had the ability to match some really crazy loads. Gradually, however, the commercial manufacturers started to eliminate tank circuit flexibility and require that the amateur have an antenna load that was very close to 50 ohms impedance. With the advent of solid-state amplifiers, the manufacturers built in devices to actually limit the mismatch to protect the solid-state devices. Solid-state amplifiers have the nasty habit of burning out if operated into a large mismatch. We all are fairly familiar with standing-wave ratios, and what we are faced with now is maintaining an SWR of less than 2 to 1 or the transmitter will shut itself off.

You must realize at this point that practically every amateur wanted an antenna system that would be exactly 50 ohms impedance on every band and every frequency. In fact, I believe that manufacturers of transmitters really believed that such a thing would come to pass, where an all-band antenna would have an impedance of 50 ohms (1 to 1 SWR on all bands, all frequencies). While there are some antenna systems that will give a very close match for a wide range of frequencies, there are none that cover all bands, all frequencies. They just don't exist in the amateur market.

Keep in mind that the feed impedance of an antenna will change with height above earth, frequency, etc. Adding to that the fact that we now have so many different low-frequency (10 meters and lower) bands, it becomes an impossible task to come up with a 50 ohm impedance, all-band, all-frequency antenna. There are a few such antennas for military use, but they are huge, cost fantastic sums, and require a large amount of real estate. Keep that point in mind, because if you desire a perfect 1 to 1, 50 ohm load on all frequencies, then a Transmatch is required no matter what you read or hear.

Under certain fixed environments, and accepting certain losses, we can come up with antennas that will cover a wide range of frequencies. However, remember what I said: The cutoff point where the amplifier power is automatically reduced with modern transceivers is a mismatch of 2 to 1, or very close to that figure.

At this point I would like to add a word in defense of antenna manufacturers and SWR figures. To repeat what I said earlier, you should keep in mind that the impedance, and hence the SWR, of an antenna can vary widely for different installations, and these factors include height above ground, type of ground, nearby objects or other antennas, and on and on.

The antenna manufacturer sets up (adjusts his matching system) for a given height under given conditions. Normally his tests would be made using an antenna in an area all by itself—no wires or metal or other antennas in the near vicinity. His conditions (SWR curves and so on) are set for that location and height. The amateur buys this antenna and usually puts it up among other antennas and in an environment completely different from what the manufacturer used. The amateur then gets upset when his antenna doesn't meet the SWR curves of the manufacturer. The buyer must understand that we are dealing with two *different* installations which will produce different SWR results. Keep that in mind.

In Part II I will get into the actual mechanics of installing and using/tuning/adjusting a Transmatch. CQ

(To Be Continued)

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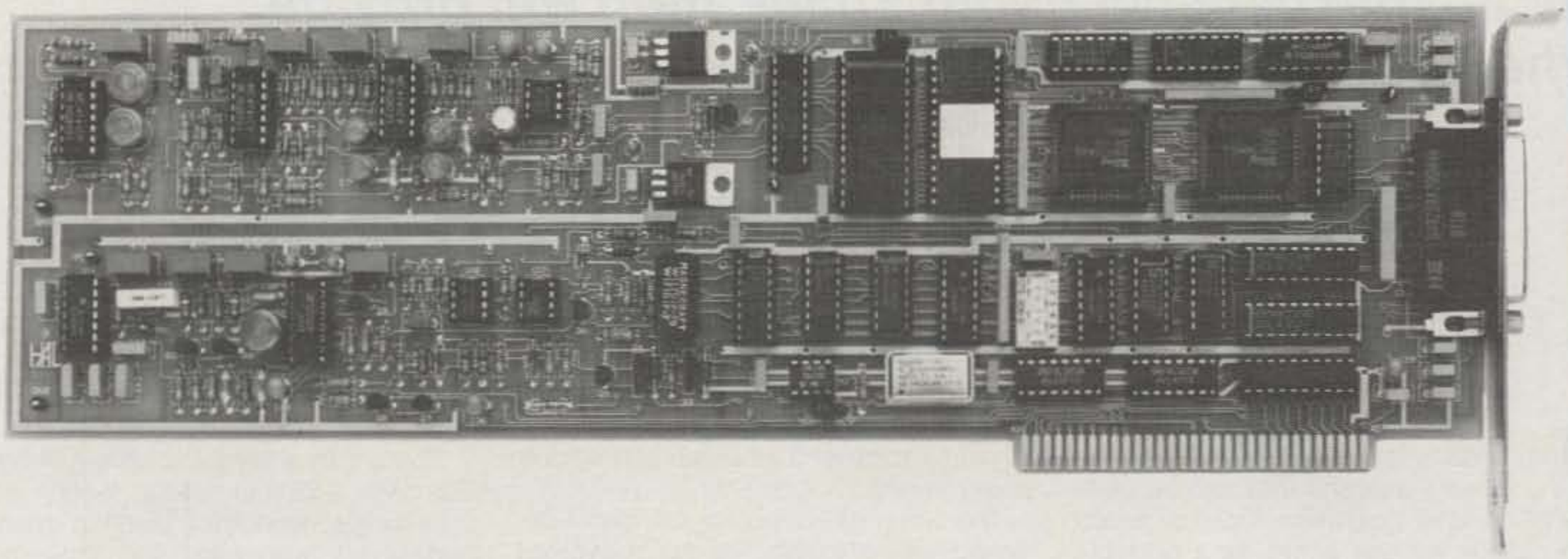

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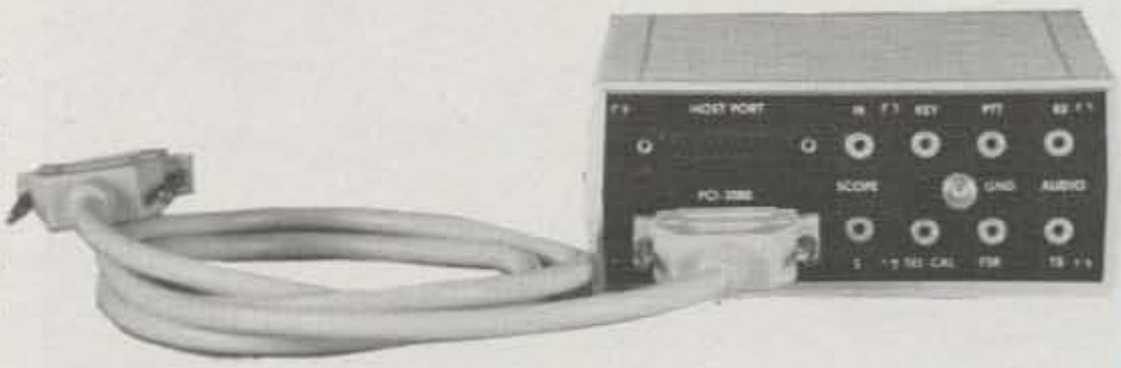

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W4FA describes a very simple wire antenna that can be used for all-band HF operation. You can assemble the antenna from individual components, or an inexpensive Radio Shack item will provide the basis for the antenna.

The W4FA "Fast Antenna"

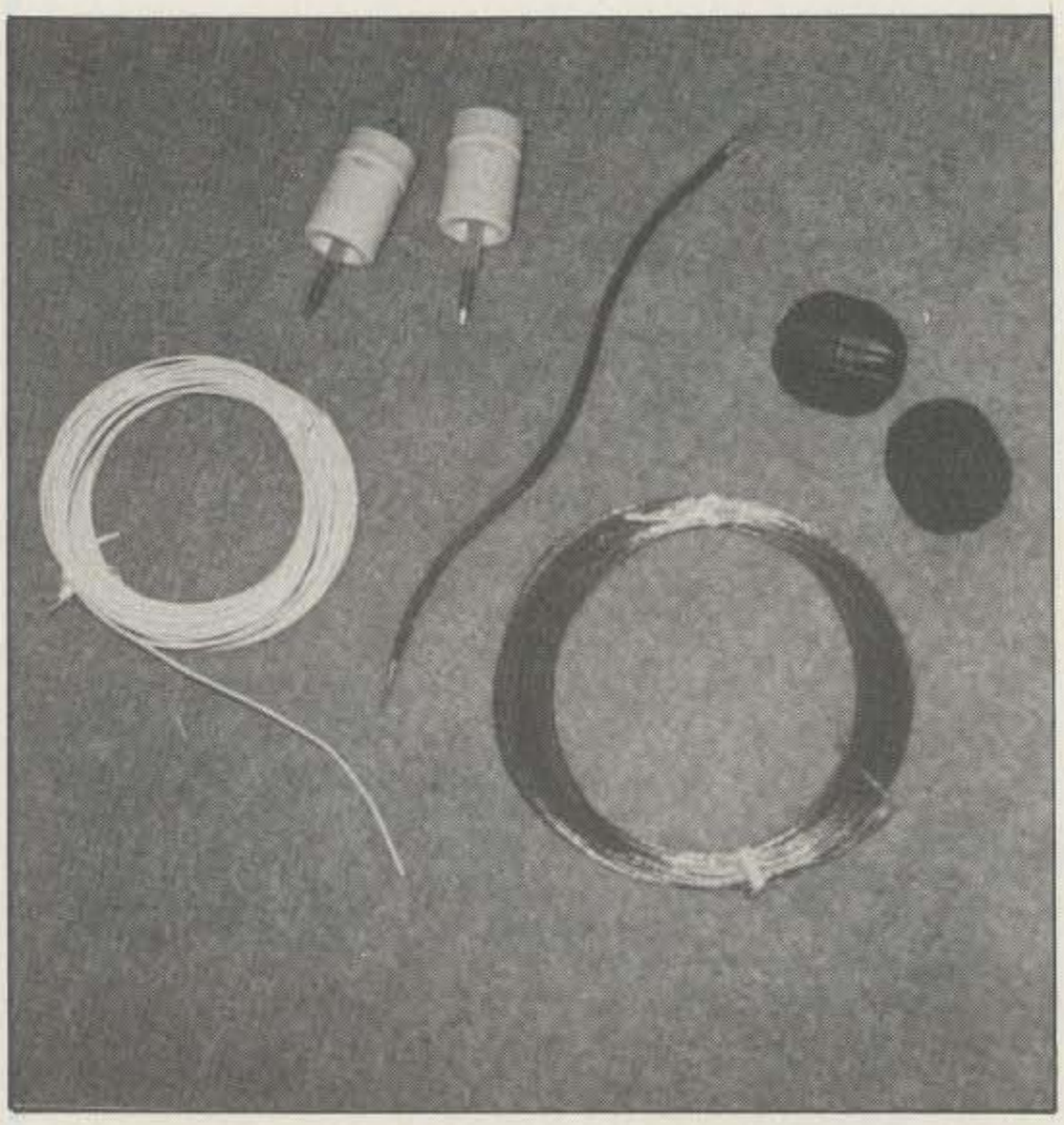
BY JOHN J. SCHULTZ*, W4FA

This article describes a very simple, low-cost wire antenna that can be used for all-band HF operation. It can be erected quickly for use either as a portable antenna or even as a permanent station antenna. Depending upon the materials used for its construction, it can handle power outputs of from 100 to 1500 watts over the 80 to 10 meter range, although it is mainly advanced as a low- to medium-power antenna.

The antenna is not a computer-designed piece of magic. The design evolved out of experiences with many portable HF antennas. The design, in fact, incorporates some features which would have been regarded as undesirable in previous years. Although the antenna may exhibit some low-impedance resonances at certain frequencies such that an antenna coupler is not required, in general it does require the use of an antenna coupler with a transceiver.

The antenna layout is shown in fig. 1. Basically, a 75 foot flat-top section is fed by a single conductor feedline approximately 50 feet long. The antenna is "worked" against ground. Many readers at this point may say that the antenna is just another Windom antenna design. That is not really true. The original Windom had a ½-wavelength flat-top section and a single wire feedline connected slightly off of the center point of the flat-top section (about 14% of total antenna length) such that the antenna would more or less resonate on each even harmonic

*302 Glasgow Lane, Greenville, NC 27858



These are the parts of the Radio Shack #278-758 SWL antenna kit: 75 feet of antenna wire, 50 feet of lead-in wire, antenna end insulators, stand-off insulators, and a plastic feed-through for getting the lead-in wire through a window. Although this kit was intended for SWL use, it does contain the essentials for the antenna described and has worked well at the 500 watt output level with a transceiver/linear-amplifier/antenna-tuner setup.

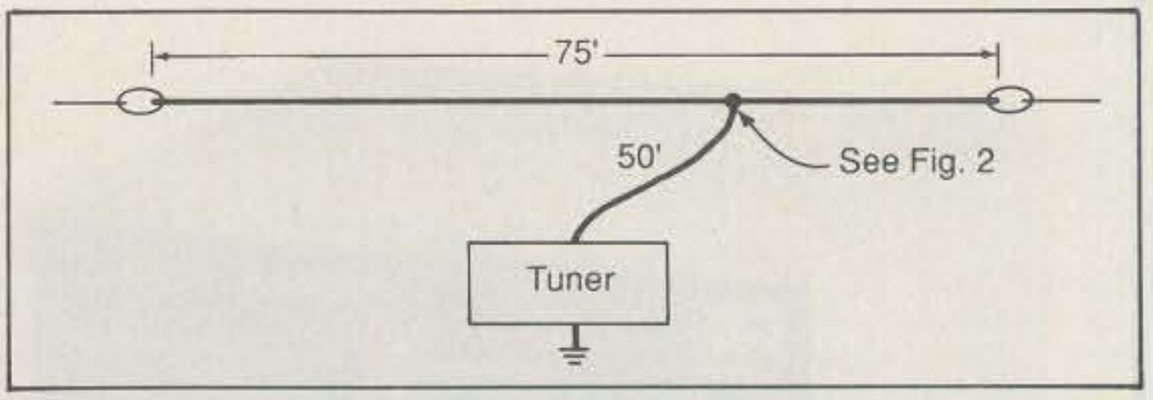


Fig. 1– The overall dimensions of the simple multiband antenna. The dimensions are not critical, but are simple representative values. The antenna should be "worked" against a good ground connection, especially on 80 and 40 meters.

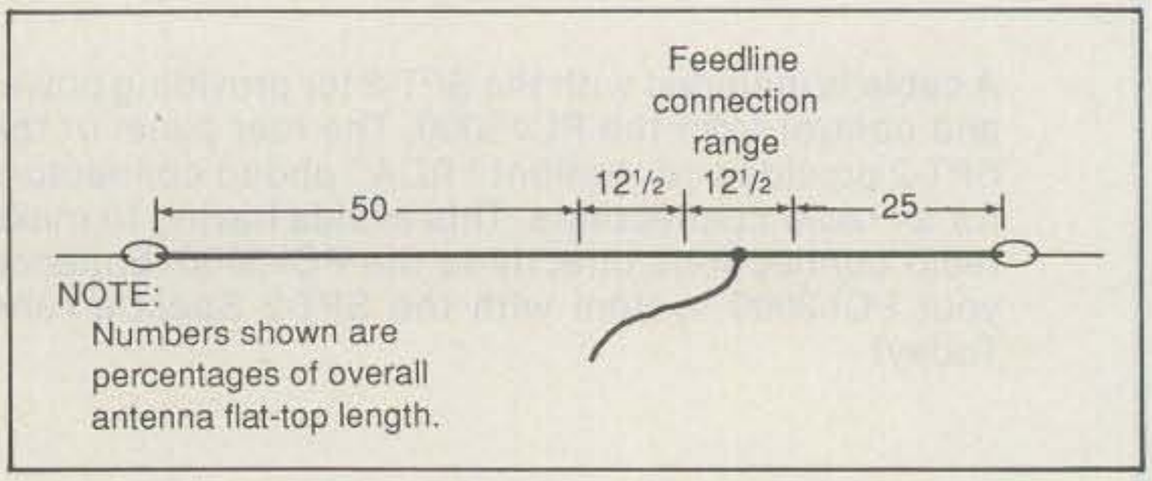


Fig. 2– Connection of the 50 foot downlead some place in the range indicated seemed to produce the best overall compromise with regards to a reasonable SWR across all of the HF bands. Many compromises are involved in this very simple but quickly erectable antenna, and you can experiment with the feedline connection point to optimize the ease of matching on any given band.

band. That is, if the flat-top were cut for 80 meters, the antenna would resonate again in the 40, 20, and 10 meter bands with a reasonably low SWR at the transceiver end of the feedline.

The antenna design of fig. 1 does not normally resonate on any given band. The idea of the design was to find an extremely easy to erect antenna form which did not require any exact length measurements. The idea of the design was also to achieve a reasonably low feedline SWR (less than about 1:4 on any HF band) such that no extremely high RF voltages would be present at the end of the feedline. The 1:4 SWR ratio limit and the lack of any extremely high RF voltages at the end of the feedline meant that relatively simple antenna couplers (even most automatic tuners) would be able to efficiently couple power into the antenna.

As I said, this antenna did not evolve with the aid of any computer analysis; it evolved from simple cut-and-try experiments. The connection point of the feedline to the flat-top portion of the antenna is not critical, but it has to be within a broadly defined range, as shown in fig. 2. In a field situation, you have only to determine the center point of one half of a flat-top section and then make the feedline connection from the latter point slightly towards the center point of the entire flat-top section. It can all be done just by folding the flat-top piece of antenna wire temporarily together twice over. No measuring tape is necessary. However, don't be tempted to simply connect the feedline at the very center or at one end of the flat-top section just for the sake of convenience. Very high RF voltages which an antenna coupler might not be able to accommodate will be present at the transceiver end of the feedline on some bands. Also, on SSB problems with RF feedback may develop.

If you have the time, the feedpoint connection point can be varied over the range shown in fig. 2 to provide the easiest transceiver loading on one or more favored bands. On the lower frequency bands the antenna seems to have a fairly omnidirectional pattern, while on bands above 20 meters the radiation seems to slightly favor the direction to the left of figs. 1 and 2. Since the antenna consists of little more than some pieces of wire, it can be put together from available materials. However, if you do want to quickly assemble the antenna, the Radio Shack 278-758 antenna kit at $8.49 is a reasonable buy. It provides all of the wire necessary, including some good non-stretch, hard-drawn stranded copper wire for the 75 foot "flat-top" plus lead-in wire, end insulators, etc. It does contain some stand-off insulators of dubious value since they are meant to be *nailed* into the side of a building.

One little portable antenna erection kit I assembled, and used quite successfully, consisted of the wire pieces for the antenna plus a slingshot, #4 fishing weights, and 10 and 50 lb. test fishing line. I used the slingshot to get the 10 lb. line and a #4 weight over some trees and used that line to pull up the 50 lb. line, which in turn was used to pull up the antenna wire. It doesn't sound very sophisticated, but it worked quite well, and the total cost for everything, except the antenna wire, was less than $10.00!

The simple antenna I've described has been a lot of fun to use. There is no guarantee that it will put out an outstanding signal, but it certainly seems to perform better than a totally random length antenna if you just need a quick, easy-to-install and relatively inconspicuous multiband wire antenna. Why not give it a try?

Some of you might want to file this away under "I" for ideal, but it just might provide some interesting things to consider.

Notes on the Angle of Radiation

BY AL P. LAPLACA*, W2WW

In April 1948 *CQ* magazine published an article by its then assistant editor, Oliver P. Ferrell, on the subject of antenna takeoff angles. The article was called "Notes on the Angle of Radiation," and I found it to be most intriguing, to the extent that it left a lasting impression on me. To this day the study of that subject greatly interests me.

It has long been appreciated in amateur radio that antenna height plays a very important role in a station's ability to put substantial signal levels into DX locations. As a general rule, "the higher, the better." But not always. There are certain conditions under which a low antenna will outperform a much higher one. I'm sure you've noticed it. Have you ever wondered why that is? Read on.

*Box 233, Centereach, NY 11720-0233

The mechanics of HF radio wave propagation and the interaction with the ionosphere are covered in substantial detail elsewhere[1,2] and will not be repeated here. However, an understanding of these fundamentals is necessary before proceeding further, and the reader is urged to "come up to speed" on the subject before reading the remainder of this article.

Every antenna radiation pattern has lobes. These vary in number, size, shape, magnitude, and the angle of their axes with respect to the horizon. It is the latter quality with which this article deals. For any given height above ground, an antenna's major lobe will have a specific angle between its axis and ground. This angle is called by various names, usually either "vertical angle of radiation," "wave-angle," or "takeoff angle." In general, there is a specific *range* of these angles which is *optimal* for any given amateur HF band. Fortunately, the average amateur antenna at low heights has such broad lobes that variations of ionospheric height, tilt, and density are easily accommodated during the short term (the duration of a contact, or a series of contacts over a short period of time) so that antenna height adjustments to maintain communications are not necessary.

Amateur and commercial radio communications experience on HF over a long period has concluded that the optimum wave-angles for the major DX and contest amateur bands are shown in Table I.[3]

40 meters	10–35 degrees
30 meters	8–26 degrees
20 meters	6–17 degrees
17 meters	5–12 degrees
15 meters	4–11 degrees
12 meters	3–10 degrees
10 meters	3–9 degrees

Table I– Optimum wave-angle ranges for HF amateur bands

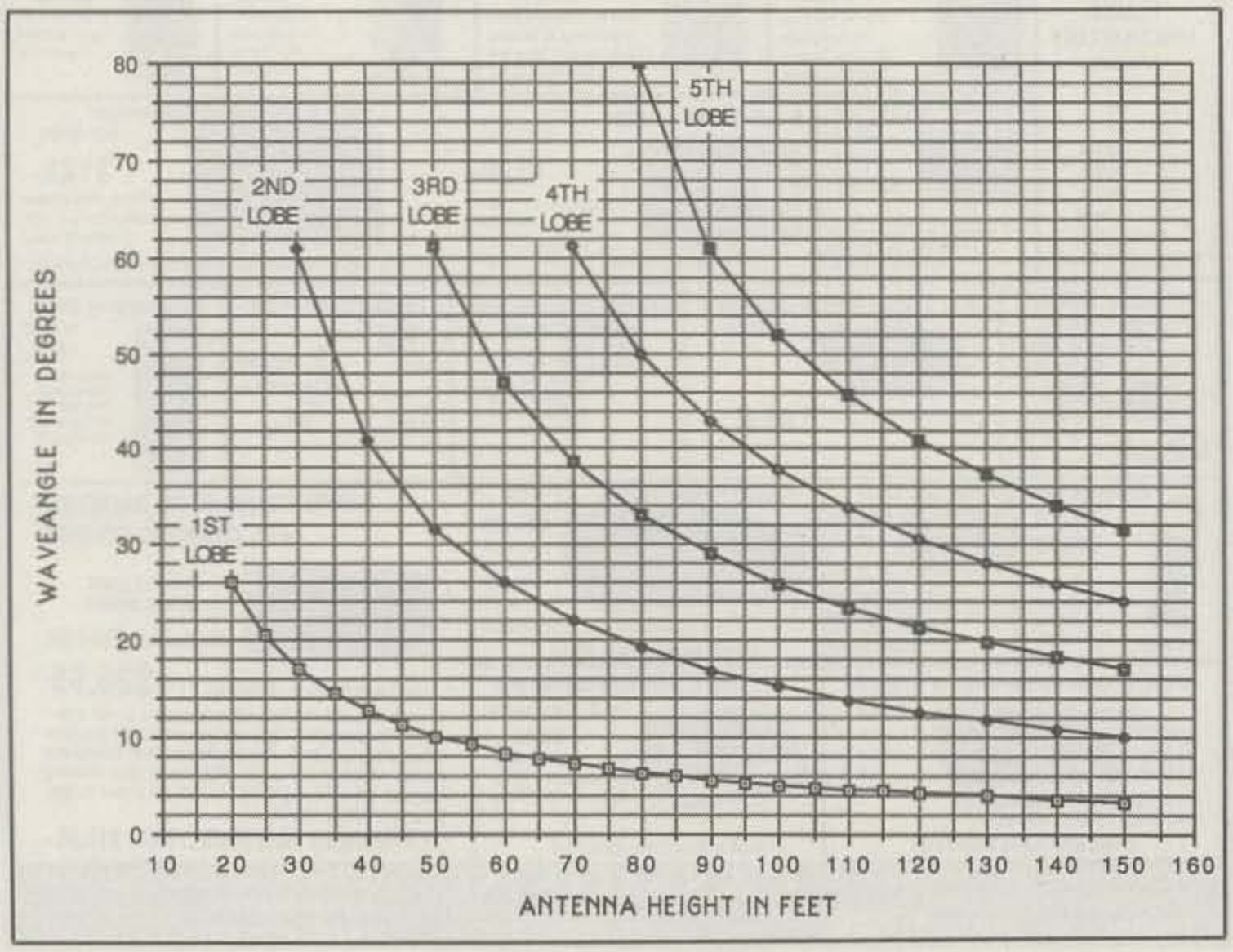


Fig. 1– Comparisons for a 10 meter horizontal antenna.

Knowing what these angles are is merely academic. However, applying that knowledge to your benefit is a very worthwhile exercise. But where do you begin? What do you do with this information? How does it apply to your station? These are questions you might well ask. Otherwise this information will remain forever arcane and useless.

The antenna's lowest wave-angle can easily be calculated by the formula[4]

wave-angle = wavelength/4 × height

where:

wave-angle is in radians (radians × 57.3 = degrees)

wavelength is in meters

(299.793077/MHz = wavelength) height is antenna height in meters (feet × 0.3048 = meters).

If, for example, we were to calculate the required minimum height (corresponding to the *highest* useful angle of radiation as indicated above) for each of the bands, antenna heights would be as shown in Table II.

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MFJ-812B **$29.95**

Covers 2 Meters and 220 MHz. 30 or 300 Watt scales. Also reads relative field strength 1-170 MHz and SWR above 14 MHz. 4½x2¼x3 in.

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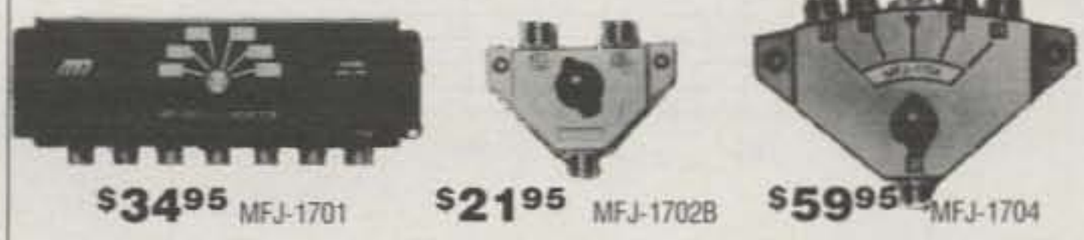

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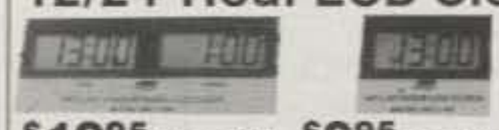

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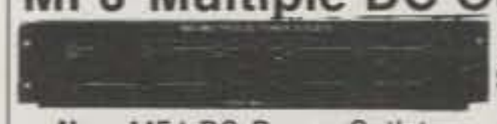

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40 meters	60.5 feet
30 meters	55.5 feet
20 meters	60.0 feet
17 meters	65.0 feet
15 meters	61.0 feet
12 meters	57.0 feet
10 meters	55.0 feet

Table II– Antenna height for highest optimum wave-angle.

This is not to say that lower antenna heights will not work. Of course they will; it just means you'll spend more time in the pileups, you won't be the first to hear the DX when the band is just opening, and you won't be the last to hear the DX when the band is closing. But take heart. You'll still work plenty of DX. It will just take longer. If, just for laughs, we were to calculate the *maximum* height required (corresponding to the *lowest* useful angle of radiation as indicated above) for each of the bands, antenna heights would be as shown in Table III.

40 meters	199.5 feet
30 meters	175.0 feet
20 meters	167.0 feet
17 meters	155.5 feet
15 meters	167.0 feet
12 meters	188.5 feet
10 meters	164.5 feet

Table III– Antenna height for lowest optimum wave-angle.

Somewhere between these minimum and maximum antenna heights lies the most useful heights for each of the amateur bands, and contrary to popular belief, heights closer to the minimums (except on 40 meters) are probably more desirable than heights up near the maximums. This is true for a number of reasons. To begin with, the late Jim Lawson, W2PV, after much experimentation regarding antenna heights, concluded in his book[5] that the optimum antenna height for all-around usefulness is probably 1.5 wavelengths. This corresponds to the heights shown in Table IV for each band.

40 meters	208.0 feet
30 meters	146.0 feet
20 meters	105.0 feet
17 meters	81.5 feet
15 meters	70.0 feet
12 meters	59.3 feet
10 meters	51.8 feet

Table IV– Antenna heights of 1.5 wavelengths for amateur HF bands.

Note that on 10 meters the 1.5 wavelength height is lower than that required for the minimum height to meet the highest useful angle. Fortunately, the –3 dB beamwidth of most antennas, especially in the H-plane, is broad enough so that the difference is of no real concern.

The other reasons for favoring lower heights (as long as they are above the minimum) are that less tower height and coax are required (big dollar savings there), there should be less hassle with the neighbors, and there is less likelihood of wind damage to the antenna. Last, as an antenna is placed higher above ground, it exhibits additional lobes at higher angles than the major (lowest angle) lobe. All lobes become narrower. The ERP is constant for a given power output, so if there are more lobes, then the energy is split among them and each lobe is narrower. Now the lowest lobe is less forgiving—less able to "fill in" at nearby (lower) takeoff angles, and height is very much more critical. And these higher angle lobes make for stronger reception of closer-distance signals (read that as unwanted QRM).

The greatest height, in terms of wave-

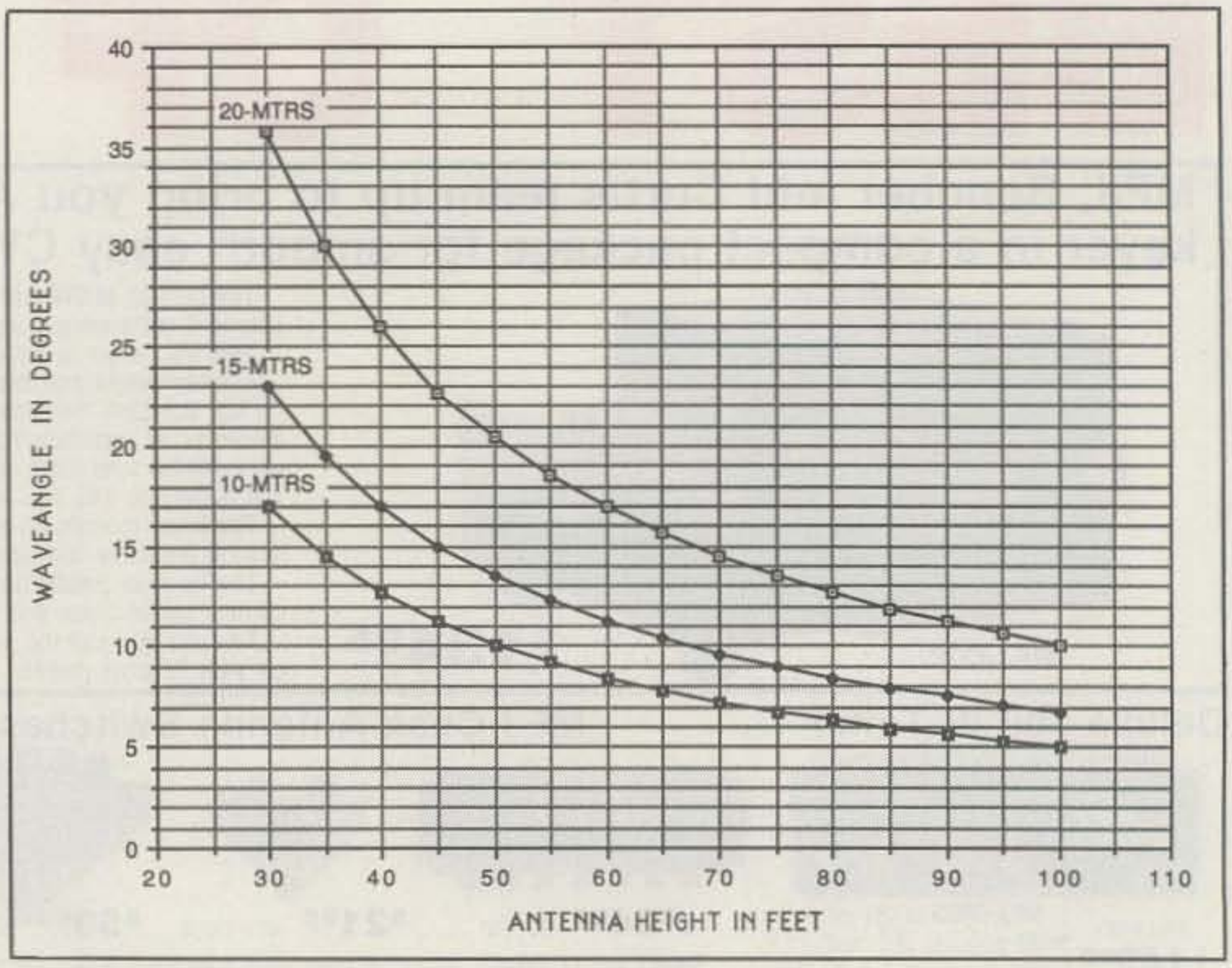

Fig. 2– Figures for a typical 10–15–20 meter triband antenna.

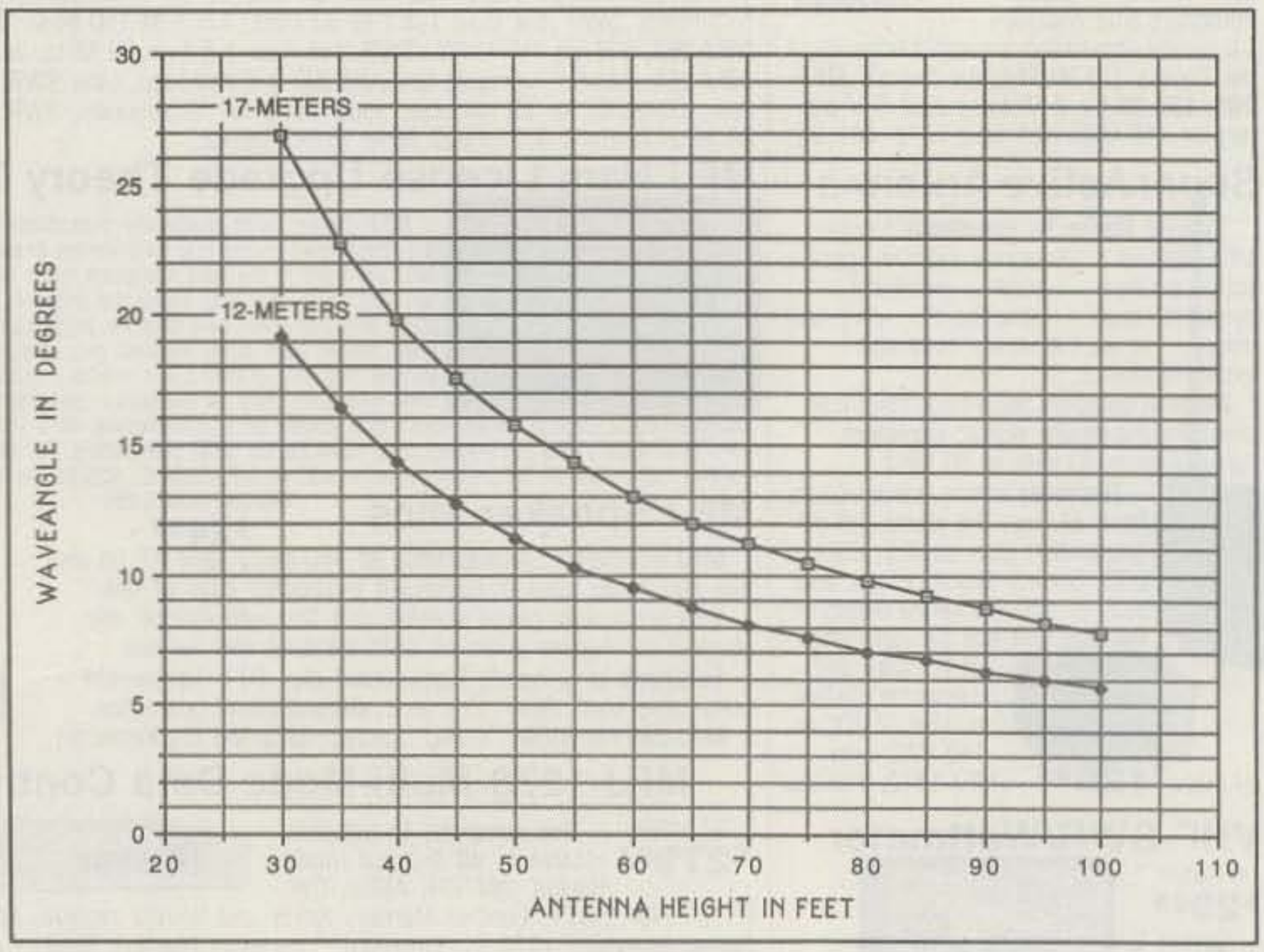

Fig. 3– The data for a 12 and 17 meter duoband antenna.

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length, at which an antenna produces only one major radiation lobe (other than straight up, at 90 degrees) is 0.75 wavelength high. Above that, a second lobe appears. Table V shows a listing of *minimum* heights at which further lobes appear.

3rd lobe	1.275 wavelength
4th lobe	1.758 wavelength
5th lobe	2.267 wavelength

Table V– Minimum heights at which lobes appear for horizontal antennas.

There are times when the condition of the ionosphere is such that higher angles are refracted better than lower ones. Higher antennas, then, with their array of lobes at various angles, could be competition for the lower antennas the takeoff angles of which are normally higher to begin with. Fig. 1 depicts the first five lobes of a 10 meter horizontal antenna. Note that the higher-order lobes are not present at the lower heights above ground. Also, for a given angle, if the antenna is high enough, there may be more than one lobe.

By this time it should have become apparent that a motorized tower capable of varying antenna heights from a low of 50 feet to a high of approximately 200 feet is very desirable—not too practical or affordable, but certainly desirable!

Okay. Let's get real. Most of us have antenna supports ranging from 30 feet to 100 feet. If a Gaussian distribution of all amateur radio antenna heights worldwide were plotted, I'm sure that the highest percentile would be in that range (skewed slightly to the high side thanks to the OHs and W6s).

Probably the most common antenna in use by the DX and contest crowd these days is the triband beam. This puts one antenna for 10, 15, and 20 meters at a fixed height. Presumably at best it will be optimum on only one band. If that band is 15 meters, it will be a good compromise. Is that true, though? Fig. 2 shows the takeoff angles for each of the three bands of a tribander as a function of height above ground over the range of heights at which most of us have our antennas. It can be seen that a tribander at 60 feet will do the job. But one at 80 feet will lower the 10 meter angle by 1.25 degrees, the 15 meter angle by 2.6 degrees, and the 20 meter angle by a whopping 4.2 degrees!

Now take a look at the 100 foot level and compare the wave-angles with those in Table I. At 100 feet the wave-angles for each band are precisely those of the geometric mean[6] for the range of angles indicated for each band in Table I. Given the normal H-plane –3 dB beamwidth of the average 3-element Yagi (even several wavelengths above ground), the entire range is covered quite nicely by the main lobe. Food for thought there.

The 12 and 17 meter bands are beginning to get noticed by the antenna manufacturers, and at least two of them, Cushcraft and Mosley, put out duoband 3-element Yagis for these WARC bands. Fig. 3 shows the takeoff angle versus height plot for such an antenna. Again, compare the wave-angles at a height of 100 feet to those listed in Table I. Interesting, that.

Calculations for the tables and graphs in this article have been taken from the author's Excel 2.2[7]-based spreadsheet running on an Apple Macintosh II. The spreadsheet contains wave-angle information for all non-90° lobes and nulls up to and including the 10th, for antennas from 5 to 250 feet above ground. Copies of this 482k file, along with instructions for its use, are available at nominal cost from the author. If interested, please send an SASE for details.

Footnotes

1. *The ARRL Handbook*, ARRL, Newington, CT, any edition.
2. *The ARRL Antenna Book*, ARRL, Newington, CT, 1988, p. 23-1.
3. *The ARRL Antenna Book*, ARRL, Newington, CT, 1988, p. 23-17.
4. Oliver P. Ferrell, *CQ* magazine, Radio Magazines, Inc., April 1948, p. 43.
5. *Yagi Antenna Design*, Lawson, ARRL, Newington, CT, 1968, pp. 5–12.
6. The *n*th root of the product of *n* numbers (the square root of *x* times *y*, for example) which yields more accurate mean for non-linear sequence.
7. Microsoft® Corporation, One Microsoft Way, Redmond, WA 98052-6399.

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CIRCLE 177 ON READER SERVICE CARD

CQ Book Review:

Reflections
Transmission Lines and Antennas

By Walt Maxwell, W2DU

REVIEWED BY LEW McCOY*, W1ICP

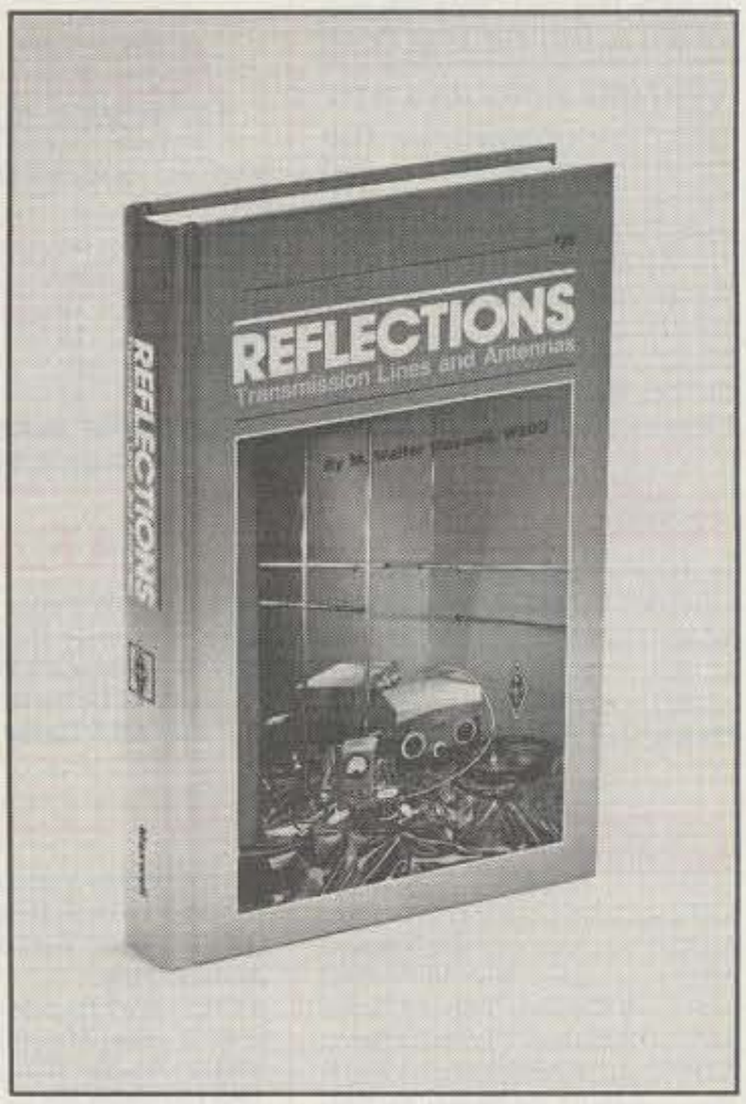
The long-awaited book on SWR and antennas by Walt Maxwell, W2DU, is now in print. For those readers not familiar with Walt, he is an amateur who has made many contributions to both amateur radio and the United States Space Program.

Walt has written many articles debunking the myths that have sprung up about standing wave ratio and its importance (or unimportance) in radio. His book contains 24 chapters, 7 of which are his *QST* articles which have been reworked for book form, plus 17 chapters of new information on many subjects, including verticals, baluns, and mobile antennas. In addition, a software disk for IBM and compatibles is available ($10.00) for those who have computers. The software is aimed at simplifying any mathematics encountered.

From my personal knowledge, I was afraid that Walt would come up with a book that would overwhelm the reader with math. However, such is not the case. After you read the book, the only impression you are left with is one of a job very well done. Anyone can follow the simple explanations of the intricate problems of voltage and current ratios encountered in SWR and feed-line work.

If you are interested in antennas and feed methods—and just about all of us are—then you must have this book in your library. For example, Maxwell clearly explains the phenomena of reflected power. As the designer of the Monimatch back in the 1950s, I know I opened a Pandora's Box because simply, many amateurs started to believe the readings of feed-line SWR meters when it came to reflected power. The misunderstanding about reflected power is very widespread, and early on Walt undertook the education of the uneducated. His book is another step on this road. I can guarantee that any reader will become very savvy in a hurry.

Book reviews are tough to do, because if you give away too much of the contents, the potential of the book is lost. But I will



give away one item in the book (and there are plenty) that is worth the price by itself. This has to do with vertical mobile antennas and grounds, plus other important losses. A common popular antenna for 80 mobile is a center-loaded whip with a top hat just above the coil, plus a matching network at the base. Many amateurs assume this is the best, but Maxwell shows in clear language how this can be an extremely lossy system, plus he tells us how to avoid the pitfalls.

Likewise, there is plenty of information on the "Maxwell" balun which is becoming so popular. This is the current-type balun and included is complete construction information, the number of ferrite beads to use, plus charts showing the advantage over the more common voltage balun.

As I said, it is an excellent handbook of over 380 pages. The book is available from *CQ*'s Book Shop, Greenville, NH 03048. The price is $20 plus shipping. CQ

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CIRCLE 168 ON READER SERVICE CARD

CQ REVIEWS:

The HAL Communications PCI-3000 System

BY LEW McCOY*, W1ICP

For several years, since the advent of computers in amateur radio, I have been a participant in the use of various devices making use of computers. I saw and played with the first keyboard CW unit, and it didn't take much of a fortune teller to predict the future of such devices. Very early on HAL Communications got into the field of computer-generated CW and RTTY and quickly became the "quality" manufacturer of such gear. Again, I have been an interested observer, and on some occasions have done reviews of their products. When Bill Henry, K9GWT, President of HAL Communications (and probably one of the most knowledgeable people in the teletype field) asked me if I would review his latest device, I jumped at the chance.

The PCI-3000 is a full-length PC card designed to fit into an IBM PC (XT or AT) or any of the clones of this type, including the PC-386 and PC-486 machines. It is designed to send and receive CW, RTTY, and AMTOR. Before going further, let me state that I have been fascinated with computer-copied CW since its inception. It is simple enough to "generate" CW to transmit, but a computer's ability to copy received CW is an entirely different story. Such ability requires some rather exotic programming. Let me say at the outset, the algorithms used in the PC-3000 border on the fantastic.

Talking about the algorithms used, the AMTOR algorithm is a very large improvement over what has been available in the field. I have been informed that the inspiration came from an article by Paul Newland, AD7I ("QEX," July 1988, ARRL Tech. note bulletin). The inspiration, plus many new wrinkles, resulted in a much improved AMTOR acquisition (faster) and better tracking in the face of noise. In fact, the new code is so good, HAL informs me that they are using it in their military and government gear. Amateurs to whom I have talked who use the system all seem extremely pleased.

Here is a shot of the bar LED tuning unit.

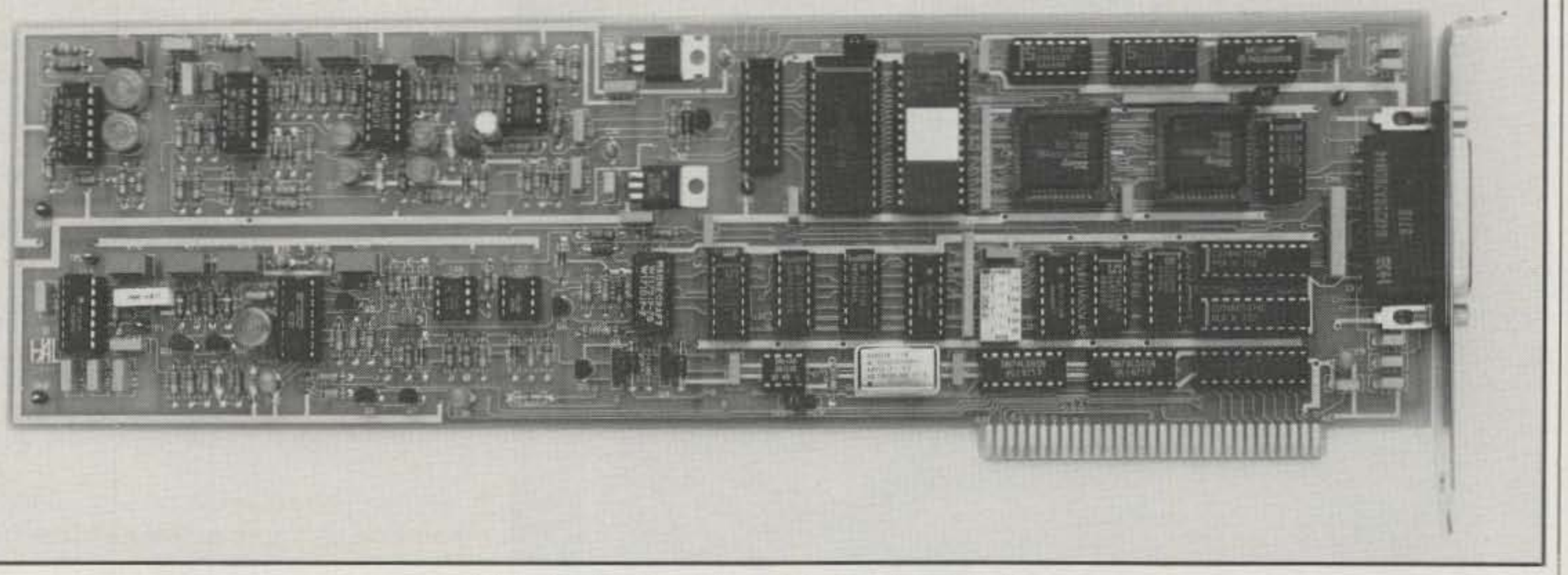
The PC-3000 has two control methods, the first via the PC-bus using PC-AMTOR provided software (included), or via the "Host Port," using most serial terminal software (not HAL). Therefore, you can experiment and write your own software, even in BASIC or compiled BASIC.

HAL informs me that the "Host Port" started out as an easy way to use APlink. When they started the PC-3000 project, Vic Poor, W5SMM (the guru of AMTOR), wrote APlink drivers for some other HAL equipment. As it turned out, these drivers were directly compatible with the 3000. The drivers, with some extra commands, worked like a charm. Vic tried the 3000 and liked it so much that he wrote a third driver, one specifically for the 3000.

You will note that the PC-3000 is designed to be used with AMTOR, CW, or RTTY—not packet. It is strictly for HF work, and I for one applaud HAL for their decision to stick strictly to these HF modes. Many engineering-oriented amateurs feel that HF packet is a real disaster as practiced. The protocol and modem standards may be great for VHF and phone-line use, but they suffer severely for real HF signal use. I know I will get arguments for the multi-multi mode device builders, but I would much rather see a well-designed unit for given modes than one which tries to be everything to everyone and winds up falling apart in many areas. (End of speech!)

I installed the PC-3000 in my 386 computer and connected up SPT-2 (tuning indicator unit) in about 30 minutes. My immediate tests were receiving CW. Let's be honest. There are a lot of CW operators out there who send less than perfect code. While the PC-3000 won't copy a really lousy fist (sending), I found that the unit was accurate enough so that I could copy just about everyone I tuned in. There were gaps where the sending operator goofed, but these could easily be filled in by an astute listener. Either high- or slow-speed code presented no problem and was a joy to operate; 40 or 50 words per minute are a snap. I don't want to give the impression that the code-copying ability is perfect, but it is a long, long way from what has been available on the market. As to actual CW specs, the unit will transmit up to 127 words per min-

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



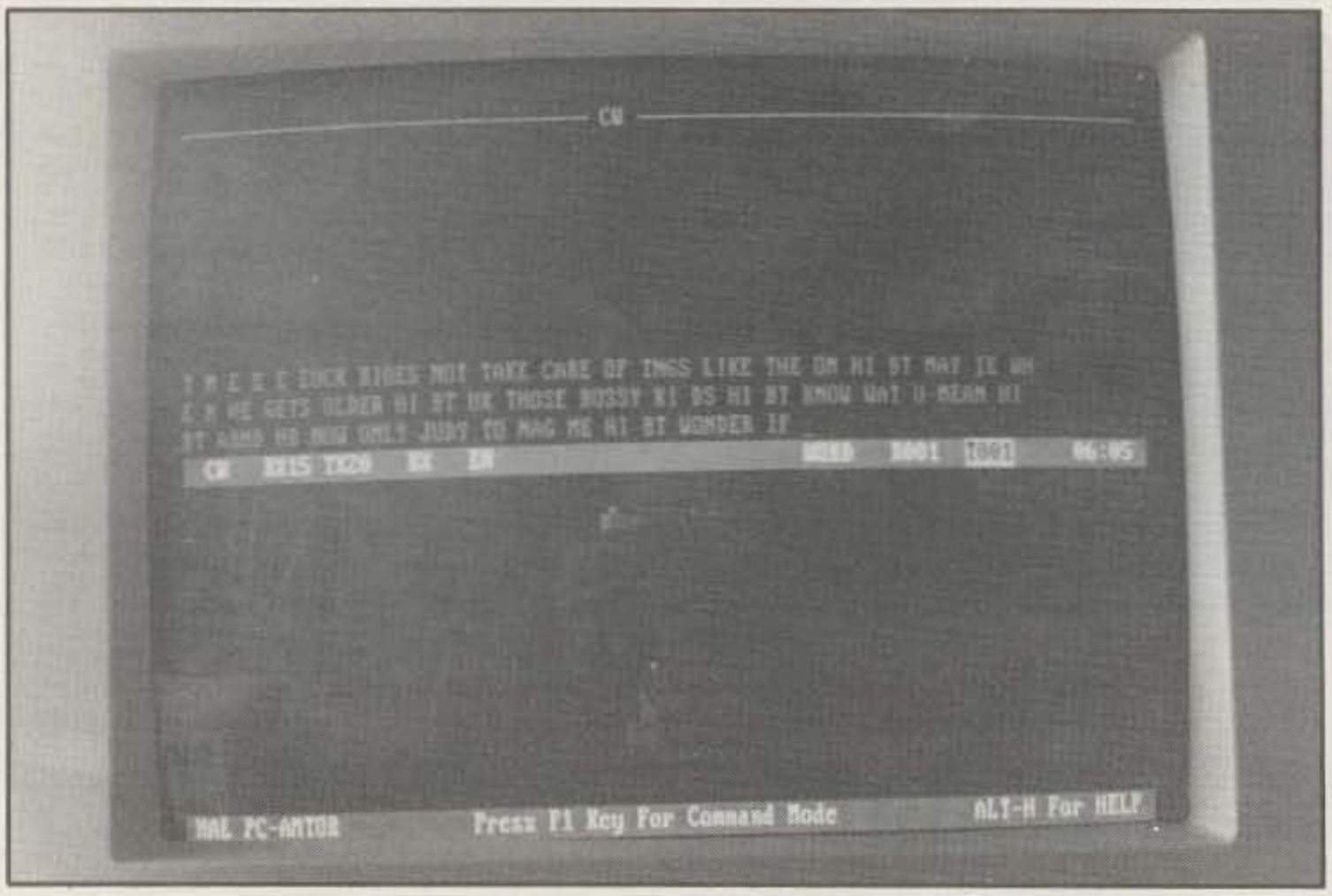
This is the hardware board for the Hal PC-3000.

ute (!) and receive as high as 99 WPM. This should satisfy the highest speed operator to be found!

The SPT-2 Spectra-Tune is a tuning indicator specifically designed for the HAL PC-3000. The frequency spectrum of the received signal is displayed on a calibrated linear 30-segment bar graph. The center of the frequency scale is automatically set by the PC-3000 to 800 Hz for CW reception or 2210 Hz for AMTOR and RTTY (1360 Hz for export version). There is up to 5 Hz tuning resolution achievable using the unit. Front-panel LEDs also indicate AMTOR/RTTY or CW mode. The unit is both powered and controlled by the 3000 through an included mating cable. Although designed for the PC-3000, the tuning indicator will work with the HAL PC-2000.

For the uninitiated AMTOR is an error-correcting communications mode. AMTOR actually has five submodes which may be chosen. First is ARQ mode "A," and the letters *ARQ* mean Automatic Repeat Request. The FEC mode stands for Forward Error Correcting mode. Next is Mode "S," or SEL-FEC, meaning Selective Broadcast Mode. Last are the "Listen" and "Standby" modes. If you want to hear an AMTOR station, 20 meters is a good place, from 14,080 to 14,090. They are easily distinguished by the characteristic chirps (not to be confused with a chirpy CW signal).

It is well nigh impossible to describe all



This is monitor screen during CW copy.

the information about AMTOR in this product review. However, I can safely state that the PC-3000 will handle *all* facets of the mode. Nothing is left out. I might add that the unit is furnished with very well-written manuals (three), and they are easy to read and understand. I have tried many other multimode controllers that include AMTOR, but in my experience none could approach the ease of AMTOR copy with the 3000.

In the RTTY mode the unit supports two RTTY modes—Baudot and ASCII. Either may be sent and received with data rates of 45, 50, 74, or 110 bits-per-second (baud). Baudot is the original 5-bit asynchronous RTTY code amateurs have used for many years. Baudot supports *only* upper-case letters, numbers, and some symbols (the same as used in AMTOR). Amateurs typically use 45 baud (60 WPM) or 74 baud (100 WPM) for HF Baudot RTTY. Either the "US Military Baudot" or the "CCITT No. 2" baudot character set may be selected via the 3000 configuration menu.

ASCII (American Standard Computer Information Interchange) is an 8-bit code commonly used for HF amateur communication, but not as frequently as is Baudot. ASCII includes upper- and lower-case letters, numbers, and many symbols and control codes. Amateurs typically use 110 baud (100 WPM) for HF ASCII RTTY.

At this point it would be worthwhile to mention a very special feature of the HAL PC-3000, namely the **Auto Search** mode. Included in the system is a mode that will automatically *search* for the proper code, mode, polarity, and speed of a received data signal. It is extremely simple to use. You simply press the **F1** key and a window appears showing the **Code** menu. Use the down arrow to highlight **Search** and press **Enter**. Tune in a signal—AMTOR, RTTY or CW—and then press **F10**. The 3000 will then search for a match and start printing (you must admit that this is rather exotic—and very useful).

A split screen is used for the video dis-

play. The top half shows the received text, and the bottom half the transmit text. The top line shows the mode in use. The center, or dividing, line contains the status operation, including parameters, and the bottom line shows prompts for Command Key operations. The upper ten lines above the center show received text.

The receive text has a total of 250 display lines of storage. The center status line has two designators—R001 and T001—which are indicators of the receive and transmit buffers.

The operations manual gives very detailed coverage of disk and file operations. There are two basic operations for sending text stored in a disk file: **Load TX Buffer**, which loads file into transmit buffer, and **Send From Disk**, which will send a file directly without loading the buffer.

There are five save-to-disk options:
1. SAVE TO DISK CONTINUOUS
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4. RECEIVE BUFFER BLOCK SAVE
5. TRANSMIT BUFFER BLOCK SAVE

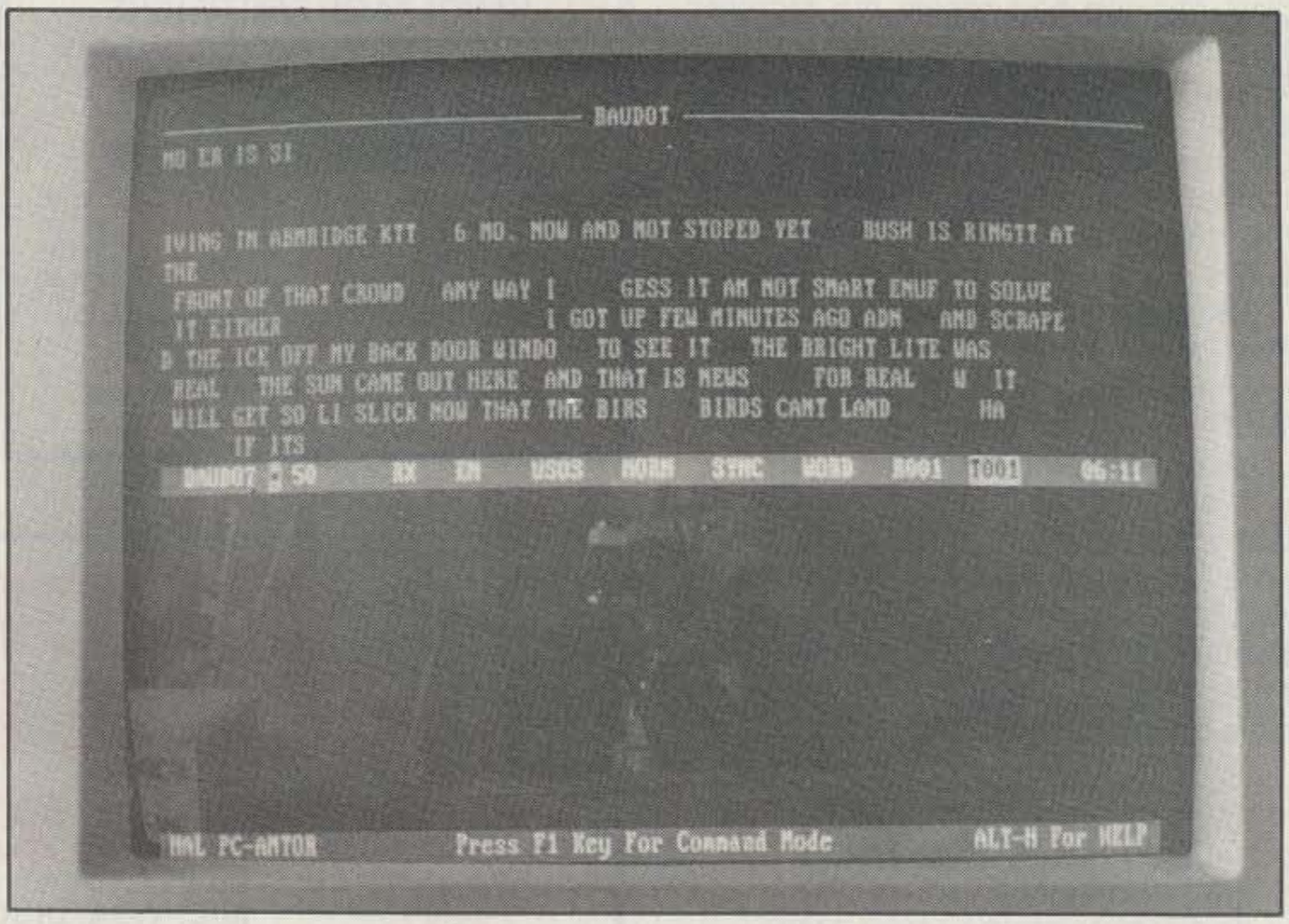
The above operations apply to all modes. The manual treats each operation in extensive detail, and I might add in simple-to-understand language. I might also add that nothing ticks me off as much as inadequate instructions, particularly inadequate computer instructions. I always feel it is so simple for the writer of instruction manuals to provide step-by-step examples rather than make the reader experiment for hours to find the correct methods. HAL gives clear examples, a practice which gets a high rating from this reviewer. For example, to **STOP** recording and save a file, here is what HAL tells you:

1. Press [F1] to enter COMMAND mode.
2. Type F to get FILES menu.
3. Type [Down-arrow] twice to STOP SAVE.
4. Type [ENTER].
5. Type Y in response to STOP STORE TO DISK (Y/N?).

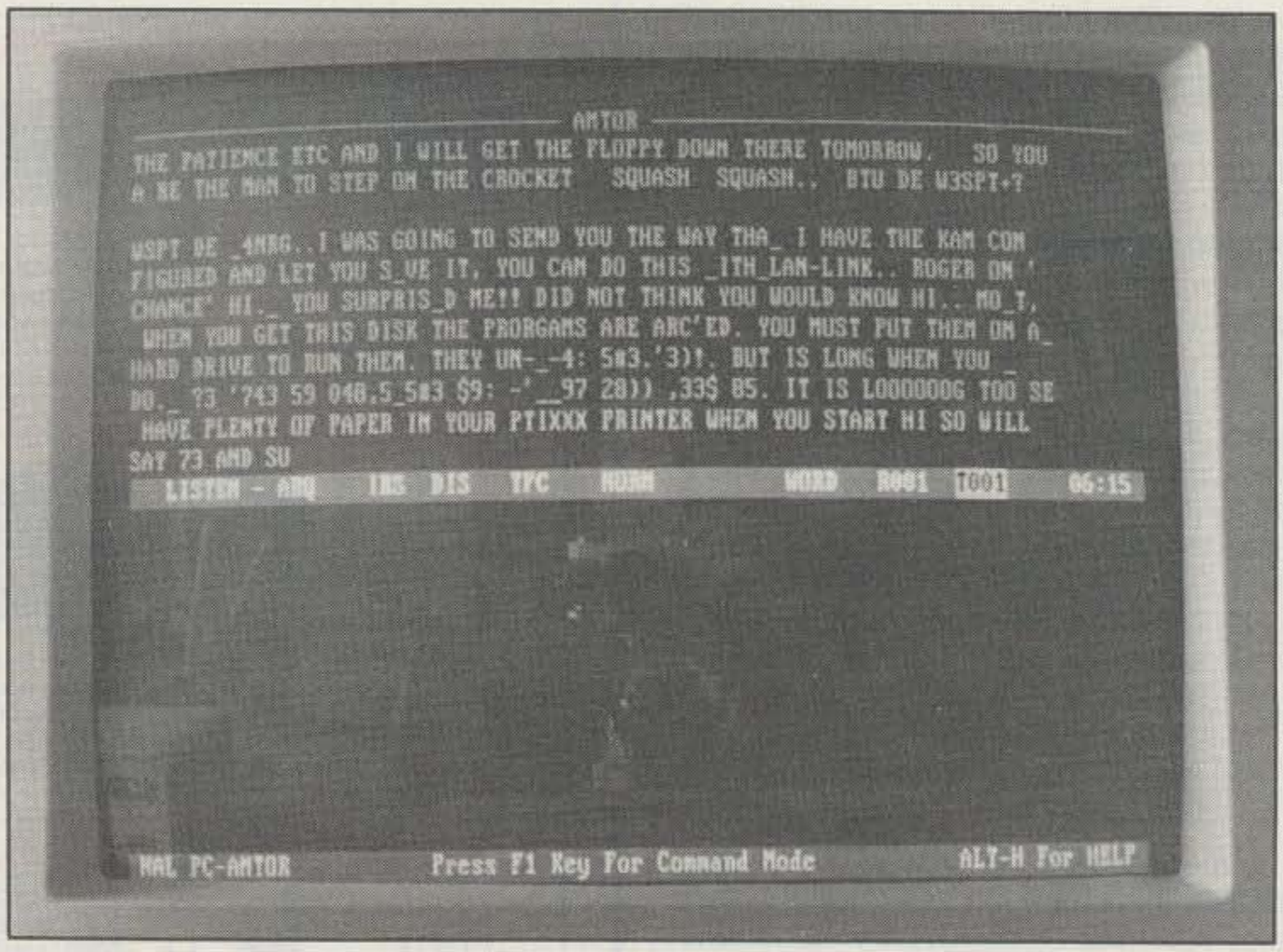
I mentioned NAVTEX, and the unit will handle this operation. NAVTEX is a special transmission of marine weather and navigational aid bulletins sent using standard AMTOR FEC transmissions on 518 kHz. It is intended for use by vessels and marine-related concerns located within 100 nautical miles of an ocean-shore station. PC-AMTOR includes a special file storage mode for NAVTEX messages.

As to RTTY baud rates, procedures are available for setting of the Baudot or ASCII data rates. These are 45, 50, 57, 74, and 100 baud. Either Baudot or ASCII may be used at any of these rates. Keep in mind that the Search mode mentioned earlier goes through these various rates when seeking to decipher a received code.

Earlier I discussed CW speeds. I might



RTTY copy. Note center-line status.



AMTOR copy, in listen mode.

add that CW Transmit Weight can be adjusted. The default weight is the so-called "standard weight" of a ratio on one dash to three dots. However, this ratio and others can be changed by entering the configuration menu.

I am certain that by now you have the impression that I am highly impressed by this equipment, and you are correct. The PC-3000 and the tuning unit are a joy to use. If I had a complaint, it would have to fall in the area of desired software, such as contest and DXing, etc. However, with the HOST Mode, in which you can write your own software, I expect it won't be long before the AMTOR bulletin stations will show such items as being done—and available.

The HAL PC-3000 is listed at $395, and the SPT-2 tuning unit is $169. The manufacturer is Hal Communications Corp., Box 365, Urbana, IL 61801.

They also have a filter option, FIL-1, in the event that your own CW filter is inadequate. It sells for $69. A complete package of the three items is priced at $595.

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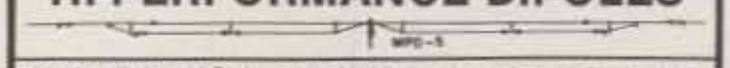

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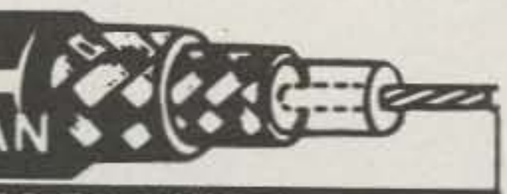

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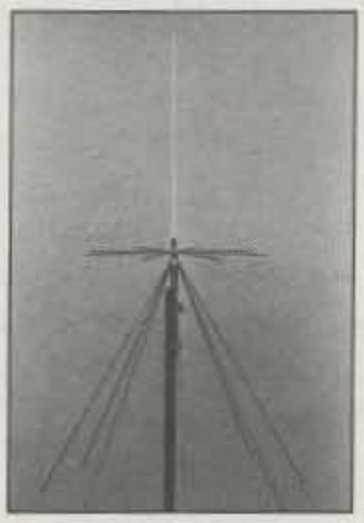

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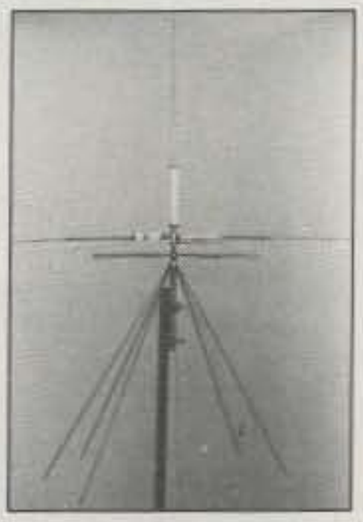

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Here's a quick and simple mobile antenna that you can build and use in the same weekend.

The Hatchback Mobile Dipole For 2 Meters

BY THOMAS M. HART*, AD1B

The completed antenna is simple to install and fun to use.

Recently I decided to retire my 15-year-old magnetic-mount antenna. It had been getting a little beat up around the edges; there was a kink from hitting the garage door too often, along with the general wear and tear of the years that made it a candidate for replacement.

It seemed like the time for something completely different, so I decided to try a bumper-mounted vertical dipole for a change. The thought of not having to put the mag mount on the roof each morning seemed quite attractive.

My car is a hatchback. I decided that it would be convenient to place the antenna on the rear bumper and then run the coax through the rear hatch. Well, the long and short of the matter is that the antenna works very well, and I am only sorry that I did not make the change several years ago, before incurring all of the mag-mount scratches on the roof!

The antenna is made from a 30 inch length of .5 inch PVC and an 18.25 inch length of threaded rod (refer to the illustration for details). The antenna mount is the PVC, which bolts to the bumper by means of two pieces of threaded rod that are 8 inches apart. There is an end cap on the tube which supports the threaded rod radiator. The coax enters through the side of the tube and feeds a vertical dipole. The lower section of the dipole is nothing more than a piece of hookup wire that is the same length as the radiator. I am using RG-8X (52 ohm) coax to feed the antenna.

In order to make the construction as easy as possible, I cut two pieces of hookup wire to a length of 20 inches and made a dipole. By using a Heath VHF SWR meter, I was able to trim each end and obtain a 1:1 match on the test dipole at my favorite operating frequency. In my case, the

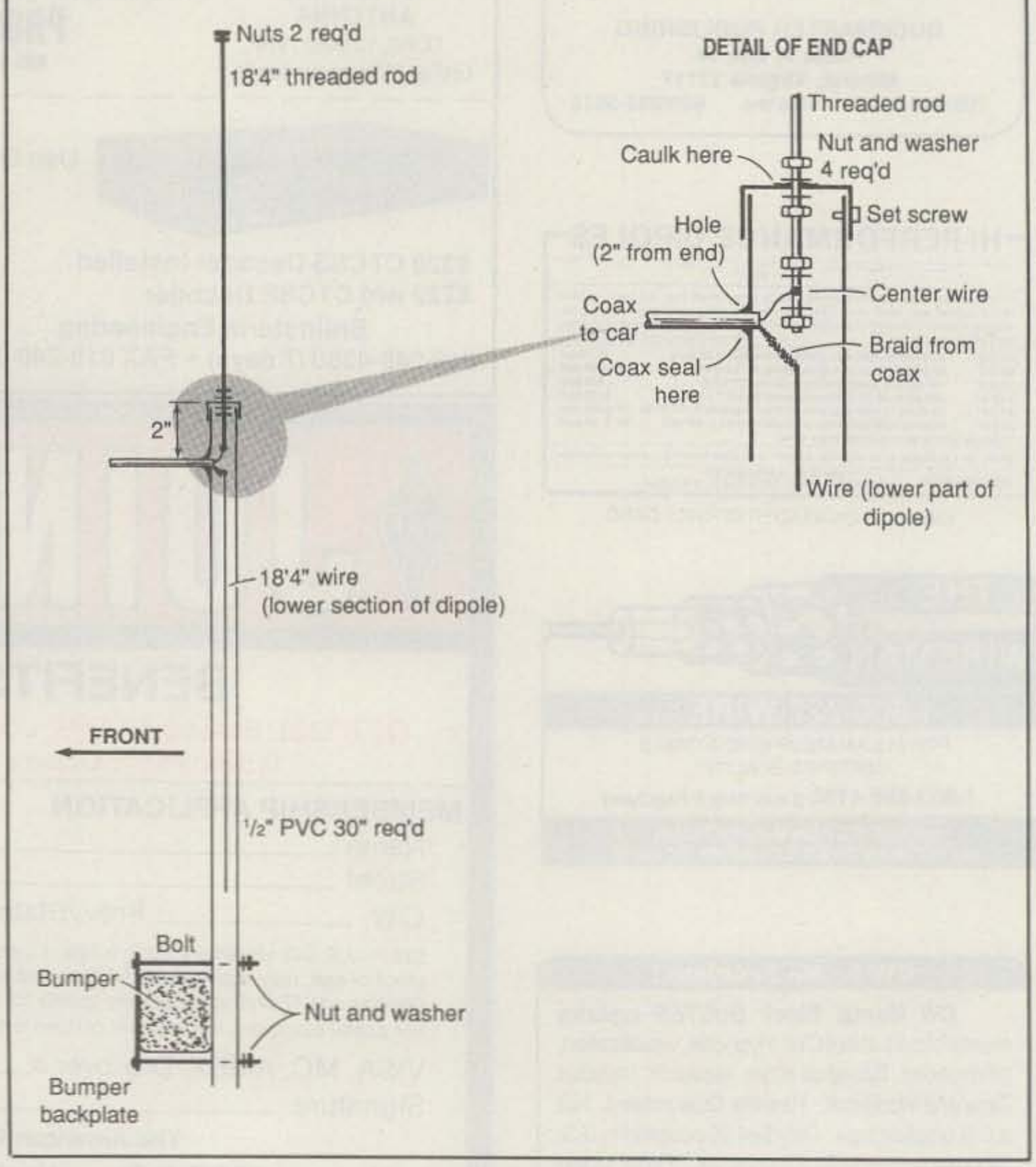


Fig. 1– Construction details for the 2 meter vertical dipole.

*54 Hermaine Ave., Dedham, MA 02026

elements of the vertical dipole were each 18.25 inches long.

Next I cut a piece of threaded rod to the same length as the hookup wire. I replaced the wire with the rod and verified that the SWR remained the same. At this point I cut the tube to length, drilled holes for the coax and mounting rods, and prepared the end cap. By the way, any good hardware store will be able to provide the PVC and threaded rod that you need. Further, you may have to adjust the length of the PVC and the spacing of the mounting holes for your particular vehicle.

Since water is an enemy of antennas, I used Coax Seal® and bathroom caulk to make the coax feed point and the top of the antenna watertight. The bottom is open to allow drainage, should anything get inside. I painted the contraption black and mounted it on the car. I was pleased and amazed to find that the antenna retained an SWR of 1:1 and that it had good band coverage.

While it is clear that the Hatchback Mobile Dipole represents no great step forward in the evolution of antenna theory, it works great and has eliminated the need to fiddle with the mag mount every morning. By the way, one important tip: Be sure to locate the HMD on your bumper so that the hatch has enough clearance when you want to open it. It's no fun to have to take the antenna off every time you need to load the groceries. CQ

Out of sight, out of mind. AD5X shows us how to fabricate a simple device for raising and lowering vertical antennas.

Build A Swivel Mount For Your Vertical Antenna

BY PHIL SALAS*, AD5X

Sometimes there are reasons why you might want to "put away" your HF antenna after use. As an example, you'll tend to draw less attention to yourself when your neighbors have some static on their TV sets. If you live in an open area, taking down your antenna will also be safer from a lightning standpoint. And finally, minimizing the view of your antenna frequently improves the disposition of your non-amateur spouse.

The Mount

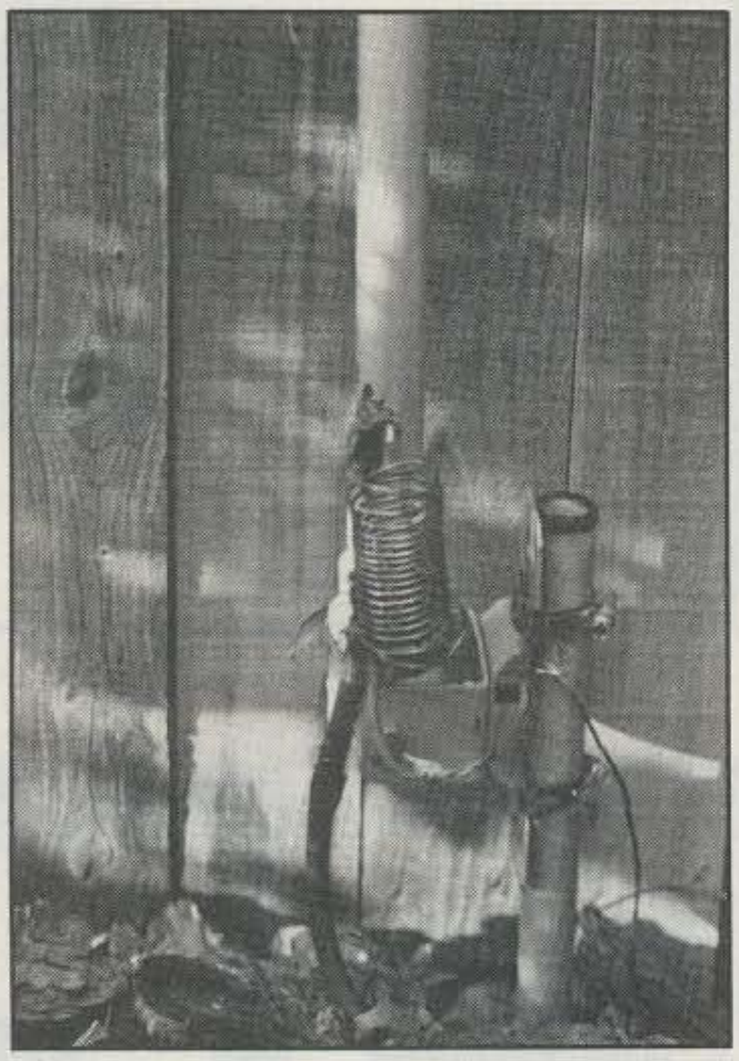
The basis of the swivel mount is the Universal Mast Mount available from Radio Shack (RS 15-5068A) for $6.99. This mount was designed for mounting a mast on a roof. For this application, the mount is attached to a steel pipe driven into the ground. Before getting into the discussion of this mount, however, let's first discuss the upper mount needed to hold the antenna when swung into the vertical position. How you construct the upper support determines where the swivel-mount pipe is driven into the ground.

My upper support consists of two 1 foot lengths of 2×4s bolted to my backyard wooden fence. First, you must make the quick-release bracket for the upper support. Start with a 3½" × 3½" steel L-bracket as shown in fig. 1. Mark a point 2 inches from either end. Now clamp the L-bracket in a vise at one of the marked points and tap with a hammer until you have bent the bracket about 45 degrees. Repeat for the other marked L-bracket leg. Your modified bracket should look like fig. 2 when you are finished. This is your quick-release bracket.

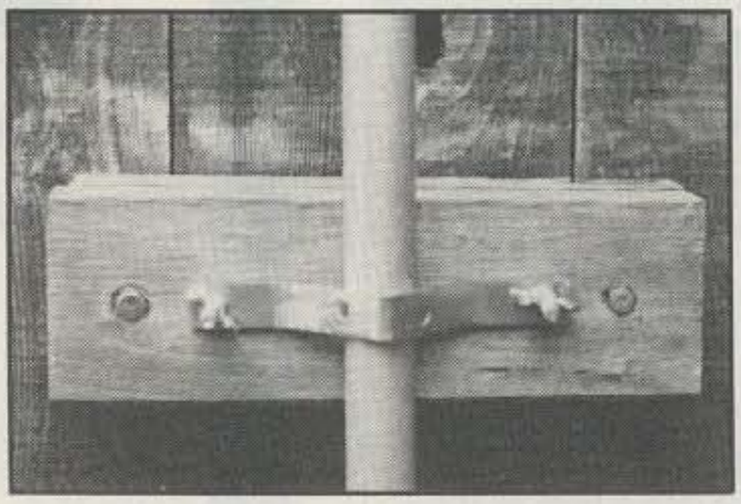
Now center up the quick-release bracket on one of the 2×4s as shown in fig. 3 and mark the two mounting holes. Drill 3/16 inch holes at these two points. Drill 5/16 inch holes 1 inch from each end of *both* 2×4s as shown (make sure these end holes are aligned when the two 2×4s are stacked on each other). Insert two #10 × 3 inch machine screws through the L-bracket mounting holes, stack the two 2×4s together with the screw heads clamped between them, and bolt the complete assembly to your wooden fence or other wooden support 4 feet above the ground. Refer to fig. 4. Finally, attach the quick-release bracket to the upper support using two #10 wing nuts.

Now let's get back to the swivel-base mount itself. Referring to fig. 5, attach the Radio Shack Universal Mast Mount to a 1 inch diameter 3 foot length of steel pipe with two steel pipe clamps. Place the steel-pipe/swivel-mount assembly under the upper support bracket to determine its proper location. Now drive the pipe in-

*1517 Creekside Drive, Richardson, TX 75081



The base swivel mount assembly.



A view of the mast support.

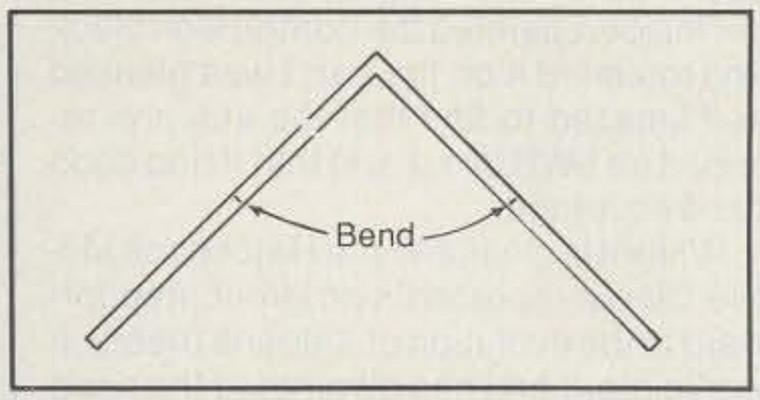


Fig. 1– Start with a metal L-bracket.

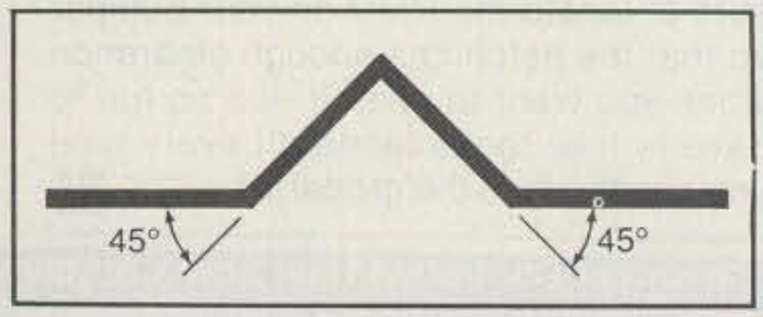


Fig. 2– Bend the bracket in fig. 1 as shown.

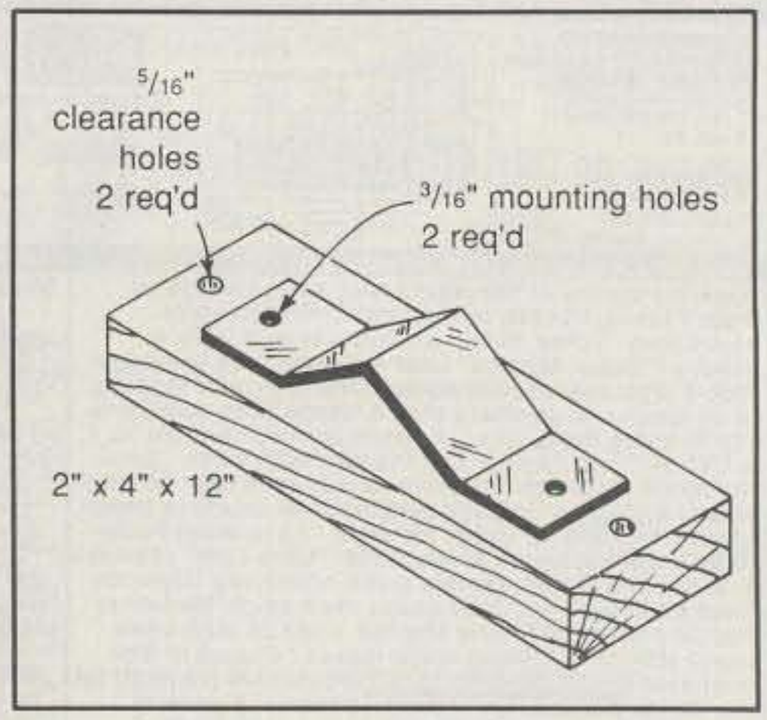


Fig. 3– How to make the wooden support.

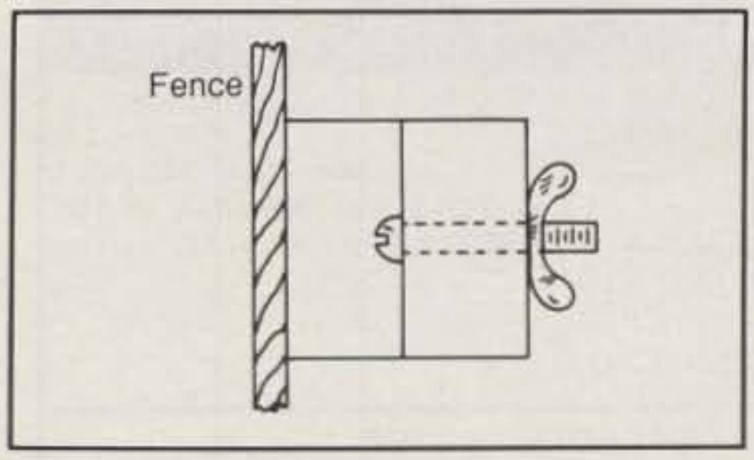


Fig. 4– Side view of the wooden support showing the wing nut.

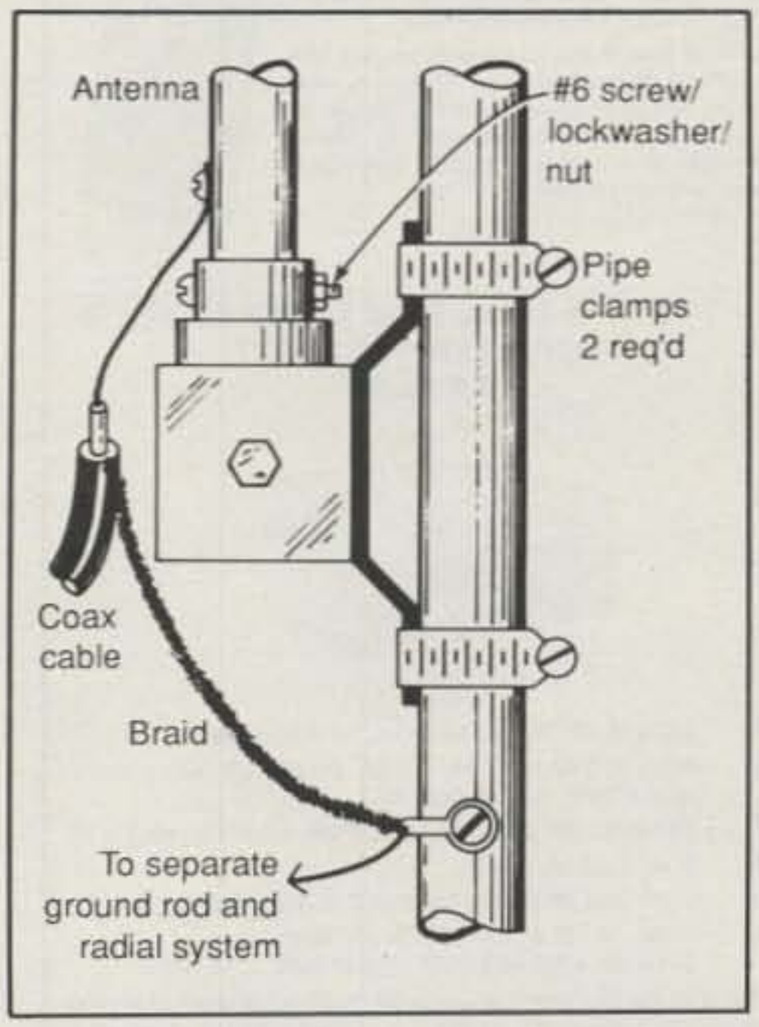


Fig. 5-Assembly details for swivel mount.

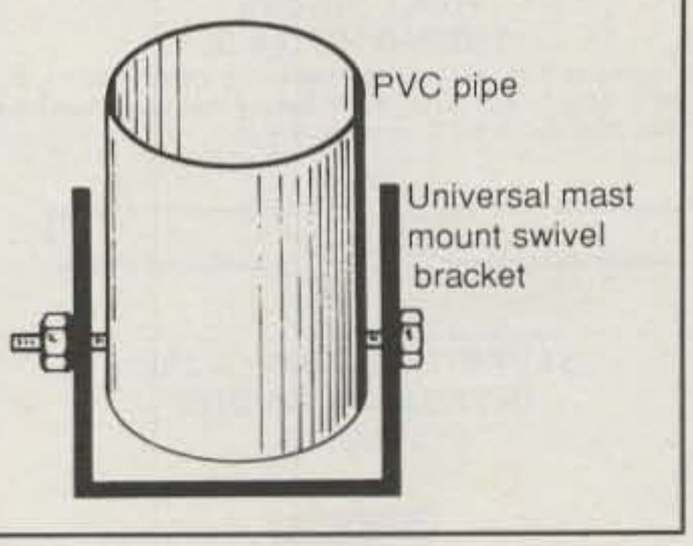
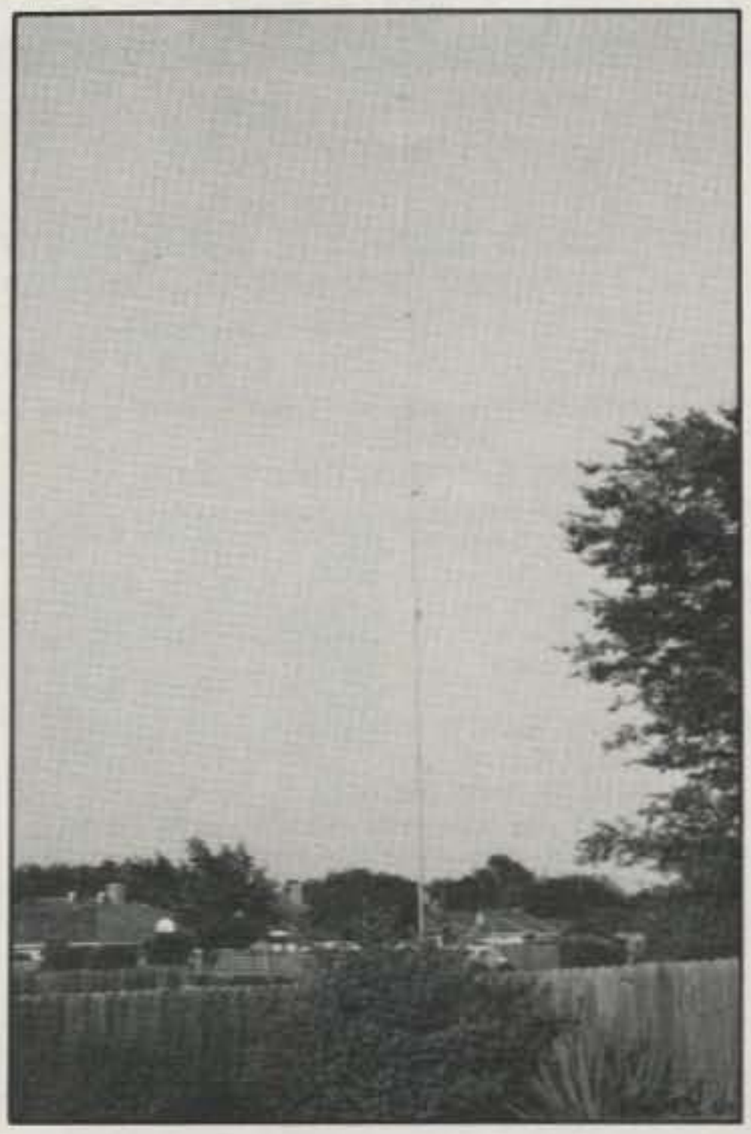


Fig. 6– The universal mast mount.

to the ground, leaving the upper 1 foot section above ground.

The swivel part of the universal mast mount consists of a U-shaped metal bracket as shown in fig. 6. The vertical bottom insulating mount is built with sections of PVC pipe. Start with a 2 inch diameter by 4 inch long piece of PVC pipe. Drill a ¼ inch hole through this pipe ½ inch from one end for passing the mounting bolt. Now glue decreasing diameters of PVC pipe within each other until you reach the diameter of the antenna mast required. Finally, drill clearance holes



The antenna can be raised and lowered quite easily.

through the final PVC section and the antenna mast for a #6 screw of a length necessary to pass completely through everything, and fasten the antenna base to the swivel mount with this screw.

Fig. 5 shows the final assembly. I also added a self-tapping screw and a solder lug to the steel pipe as shown. The coaxial cable braid is soldered to this solder lug, as is a wire which goes to a separate ground rod and the antenna radial system. To complete the project, I covered all connections with electronics-grade silicon rubber. Make sure you use electronics grade, as the acetic acid in most hardware-store-variety silicon rubber will attack and corrode your connections.

Now all you need to do to put up your antenna is remove one wing nut and loosen the other one on the upper support bracket, raise the antenna and place it under the modified L-bracket, reinstall the removed wing nut, and tighten both wing nuts. This entire operation will take less than a minute.

The photos show the completed base swivel mount, upper support bracket, and antenna location at my QTH.

Conclusion

I've described a simple and inexpensive swivel mount for vertical-antenna users. Everything is readily available from your local Radio Shack and hardware stores. The complete assembly and installation can easily be done in an afternoon. The ability to raise and lower an antenna as needed can sometimes reduce some of the stress encountered by today's amateur. CQ

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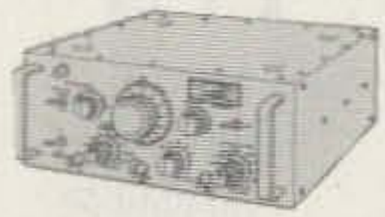

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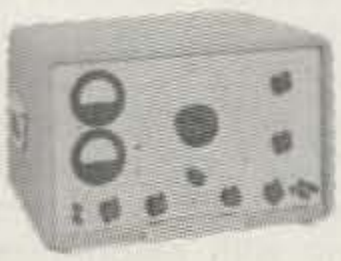

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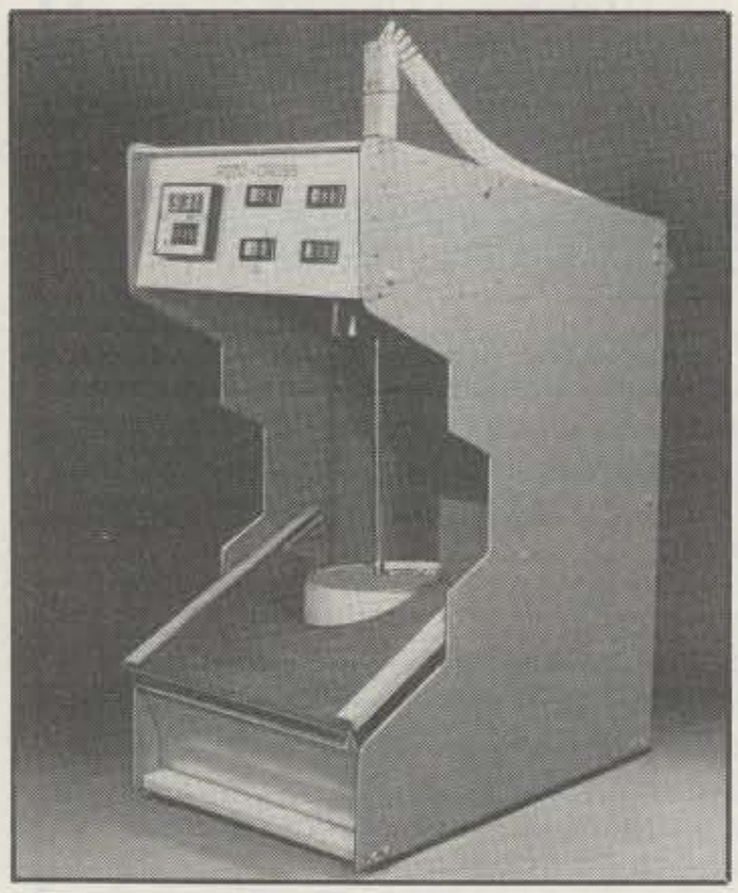
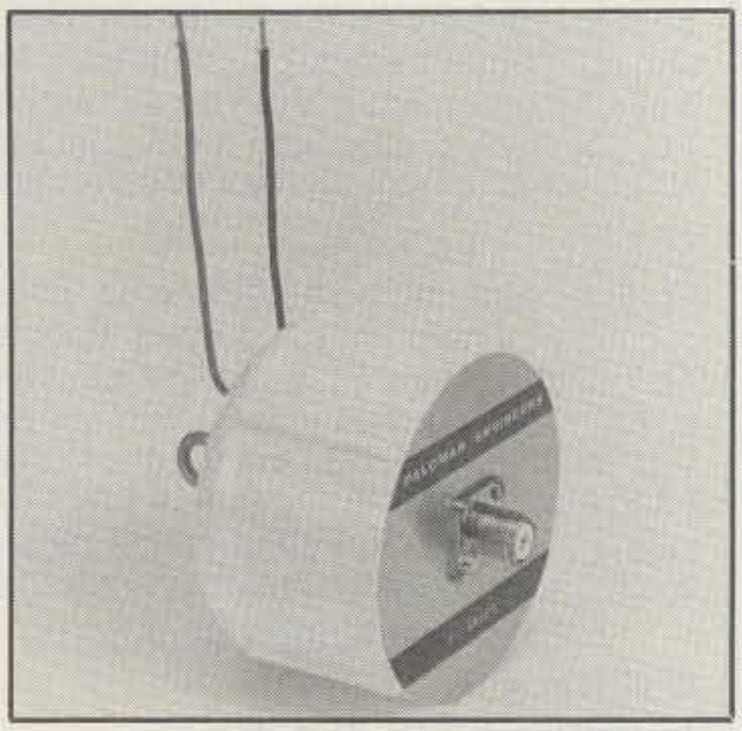
CQ SHOWCASE



Atlantic Magnetics Solder Tinning Station

Atlantic Magnetics Inc. has announced a new solder station for dip-tinning copper wires in electrical and electronic manufacturing facilities. Advanced thermal engineering limits power consumption to 250 watts. Its automatic surface-skimming feature eliminates needless operator motion and imparts a 15-second production rhythm, thereby increasing operator throughput by 20% and more, maker says. The Roto-Dross Dip Tinning Station also reduces burn hazards. A wide foundation provides an ultra-stable base that prevents the unit from accidentally tipping over, and a large insulating air space beneath the unit prevents heat from radiating into the tabletop where it sits. This reduces localized heating, warping, discoloration, and fire potential. Roto-Dross features a solder pot control with three thumb-wheel digits to set its temperature, a microprocessor control to keep it within ±5 degrees F, and an easy-to-read LED display that indicates the solder temperature. A 50 CFM exhaust fan with high-density activated charcoal air filter keeps noxious fumes to an absolute minimum, and a wooden hand rest reduces operator fatigue and increases efficiency.

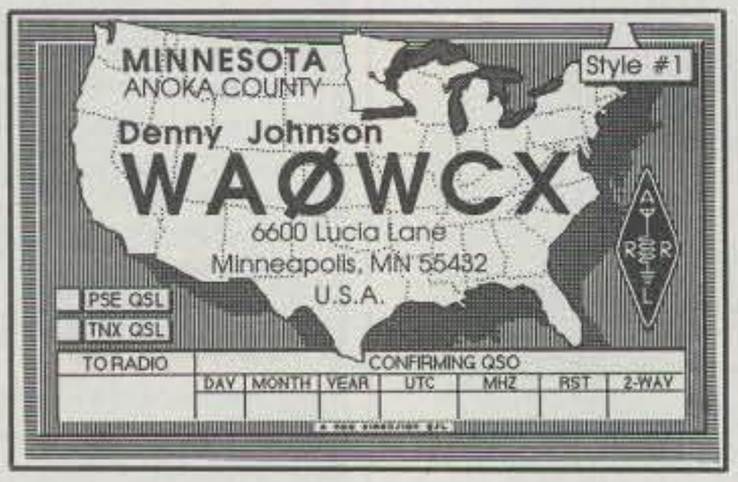
The Roto-Dross Dip Tinning Station is priced at $1295. For more information, contact Atlantic Magnetics Inc., 1441 SW 30th Avenue, Pompano Beach, FL 33069, (305-979-7920; FAX 305-977-5128) or circle number 101 on the reader service card.

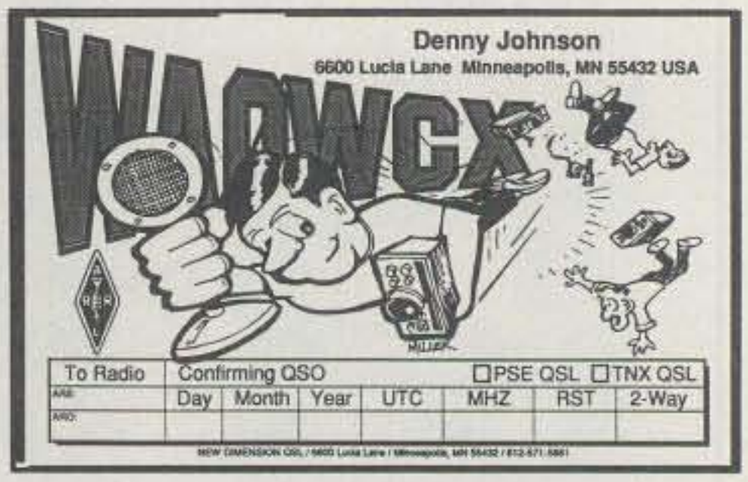


Palomar Engineers High SWR Balun

Palomar Engineers has announced a new addition to their high-power balun line. Model SB-4 is specially designed to operate at high SWR so it can be used in antenna tuners, at the feedpoint of multi-band dipoles, and to convert from ladder line to coaxial line outside the hamshack. Model SB-4 has 1:4 impedance ratio and operates efficiently from 1.8 to 30 MHz. Power capability is 2000 watts continuous power at up to 10:1 SWR. The balun is weatherproof, epoxy-filled, and sealed with teflon-insulated SO-239 connector and wire leads for the antenna or ladder line. A stainless eyebolt is provided for mounting. Size is 4″ dia. × 4″ high. Price is $74.95.

For further information, contact Palomar Engineers, P.O. Box 455, Escondido, CA 92033 (619-747-3343; FAX 619-747-3346), or circle number 104 on the reader service card.





New Dimension QSLs

Using a Macintosh computer and laser printer, New Dimension QSL has available one-color, two-dimensional QSL designs on assorted stock colors. Two examples are shown above. Some of the prices are as follows: laser copy (artwork) only $15; "Budget Bristol" (1,000 QSLs, black on white) $39.95; "Custom Bristol"(1,000 QSLs, black on color stock) $59.95; "Custom Classic" (1,000 QSLs, black on color) $79.95; Thermography (500 QSLs, black raised printing on white) $99.95.

For more information, contact New Dimension QSL, 6600 Lucia Lane, Minneapolis, MN 55432 (612-571-5881), or circle number 105 on the reader service card.

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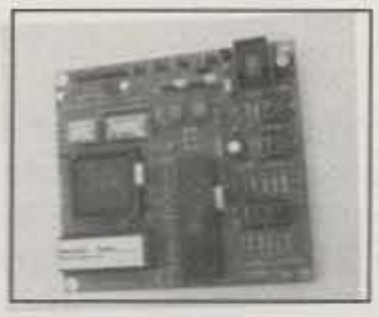

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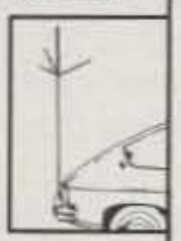

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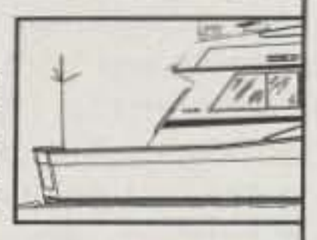

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Sometimes simple is better. N5RM shows us a simple yet effective means of adding 80 meter capability.

A (Moderately) Tunable 80 Meter Antenna

BY R.H. MITCHELL*, N5RM

At a recent hamfest I ran into an amateur who had operated from my house in a DX contest over 20 years ago. During his reminiscing he was telling me—and some fellow DXers—about the marvelous tunable antenna I had had for the 3.5 MHz band. He described it as "simple and a world beater." Memory does play tricks on some of us older fellows, but the interest displayed by some of the listeners caused me to write this article.

At the time I was living on a city lot. I had a 100 foot tower with a Hy-Gain TH-6 at 101 feet and a Hy-Gain 402-BA at 110 feet. These covered 10 through 40 meters fairly well, but I needed a good antenna for 80. And since I wanted to work both the CW and phone contests, I needed something fairly broadbanded.

My lot was about 90 feet wide, and I had a reasonably clear space of about 60 feet going from the tower to the power line and back fence. My experience with shunt-fed towers had not been good so I cast about for something that would work within my space constraints.

Quite obviously, some sort of vertical was in order. I considered using a sloping, loaded half-wave vertical just to get the radiation out of the backyard and house. Some of the good books indicated that a vertical can't slope more than 30 degrees from the vertical and still maintain a vertical radiation pattern. (By that time I was trying to figure out a way to avoid the use of loading coils.)

A quick sketch of my backyard and some high-school trigonometry indicated that the southeast corner of the yard was some 72 feet from the base of the tower. This meant that I had a 123 foot diagonal from the corner of the yard to the top of the tower. I decided that I really needed an antenna about 123 feet long, but I didn't want the top end of the antenna to come right against the metal tower. The exact southeast corner of the yard was occupied by a 35 foot wooden utility pole, from which came the power line to our house. I then figured that if I could run the antenna up beside the pole for about 20 feet or so, I would gain a few extra feet of clearance from the metal tower, and the exact verticality of the tower didn't matter all that much (the contest was fast approaching).

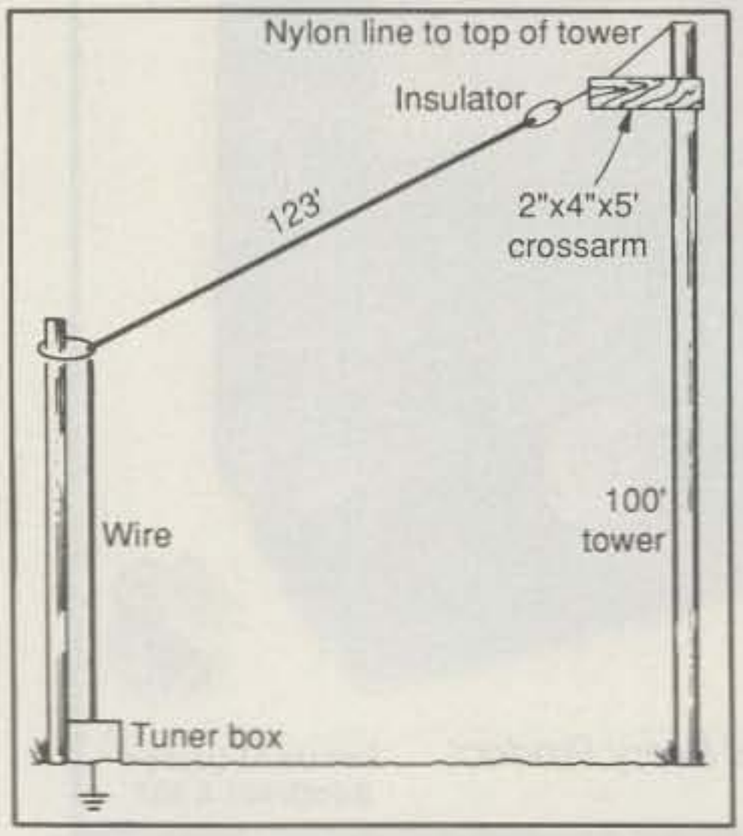

Fig. 1– The basic configuration for the 80 meter antenna.

Therefore, I ran the wire up about 18 feet from the base of the utility pole. The wire was held with about 3 feet of rope and ran up on a diagonal to the neighborhood of the top of the tower. I put a 5 foot 2" × 4" wooden arm out from the tower (in those days I could reach out 5 feet from the tower) and tied a line from the tower to the top of the vertical to support the stress on the 2" × 4".

With the wire erected, how does one feed it? Popular antenna mythology indicates that a half-wave vertical has a very high impedance at the ends. That is reasonably true, unless you are talking about the bottom end of a half-wave vertical which has its feedpoint very close to the ground. My experience indicated that the base impedance of the half-wave vertical would be about 500 ohms in that case. I therefore designed a 50 ohm to 500 ohm L network. The capacitor was a surplus 500 pF, 2000 volt variable. The coil was some 2.5 inch diameter coil stock. A base-fed half-wave vertical such as this needs some sort of grounding point to which the ground side of the network can be tied. I may have overdone it, but I put 144 square feet of 2" chicken wire just under the ground and around the base of the utility pole. Yes, that is a lot of digging and returfing. Then I ran out 30 ground radials varying between 40 and 60 feet long.

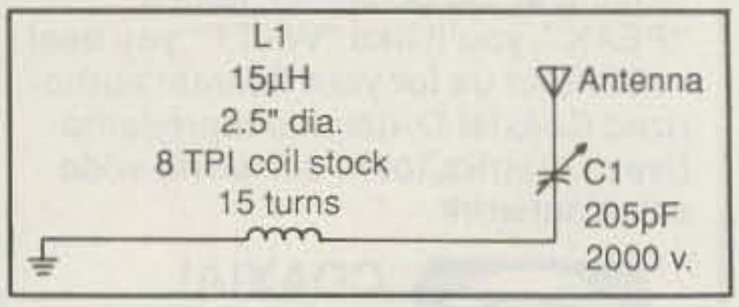

Fig. 2– The simple matching network. The author was also able to tune the capacitor remotely from the shack by means of a selsyn motor.

I set the variable capacitor at about half scale and applied power to the tuner through an SWR bridge. To my great surprise, at a frequency of 3800 kHz the SWR was 1:1. I then tried a signal at 3500 kHz. By retuning the variable capacitor, the SWR dropped to 1:1 again. Next a try was made at 4000 kHz with the same happy results. An old metal box was located. The L network was placed in the box, and a #5 selsyn motor was coupled to the variable capacitor shaft. A feed-through insulator was run out the side of the box, and some rotator cable was run to the operating desk, where rotation of the outside selsyn was controlled by a selsyn at the operating position.

On-the-air tests were equally satisfying. I worked some 30 countries in 6 hours in a CW DX contest at a time before the 5-Band DXCC award caused so much increase in activity on the lower bands. We used the same antenna in a phone contest that year and did well (North Texas high score) despite our lack of experience with phone contests.

I kept the antenna up for three years. A tornado then ripped up the tower, beams, and vertical. The antenna tuner components held up with my rig with a "DC Input" of 1000 watts on CW, and PEP input of 2000 watts on SSB. However, the antenna did give me a great deal of pleasure while it lasted. It was tunable across the entire range of 3500 to 4000 kHz, and it was cheap. I just wonder if I really needed to do all that work on the business end of a shovel in order to provide a ground for the half-wave vertical.

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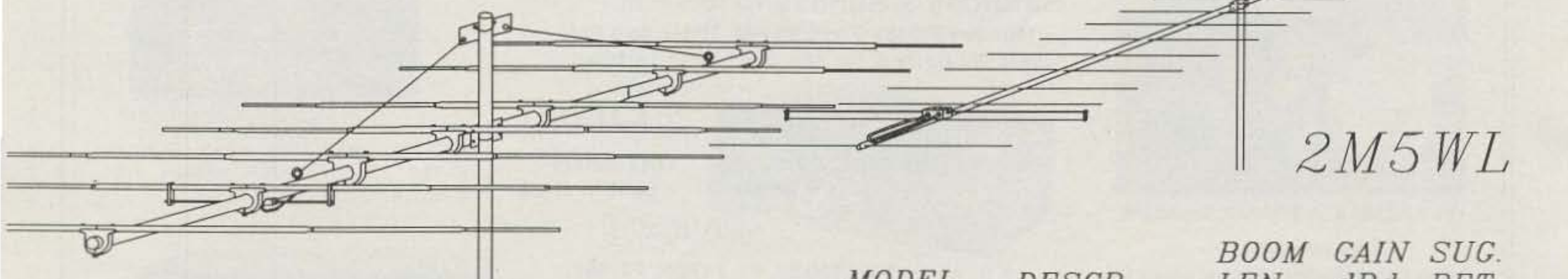

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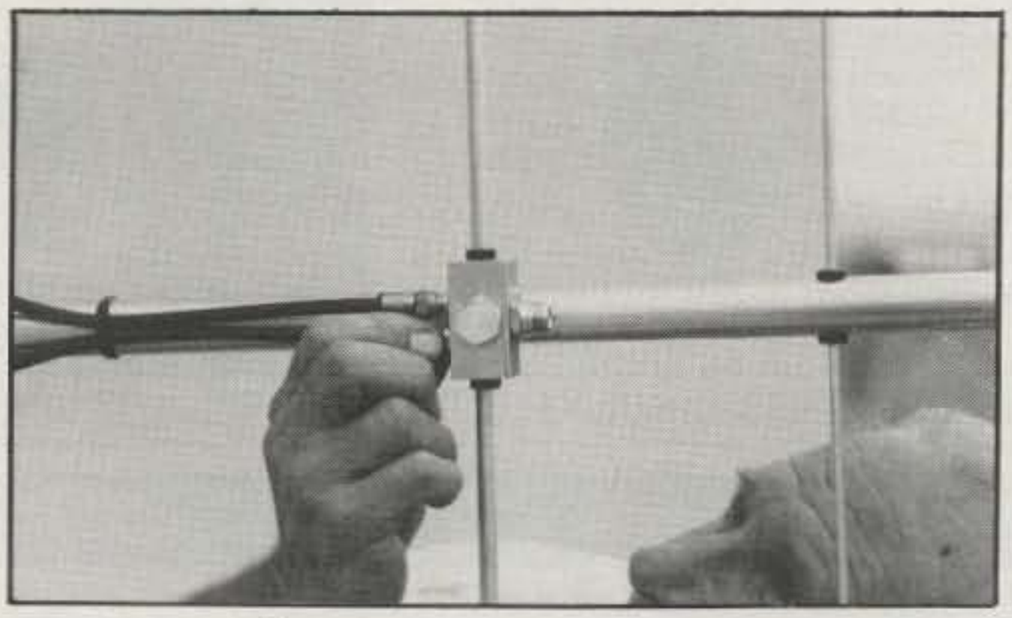

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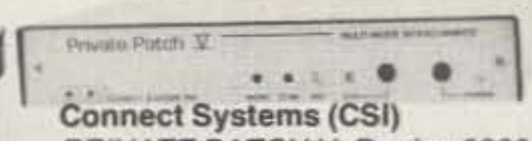

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CIRCLE 41 ON READER SERVICE CARD

Quality

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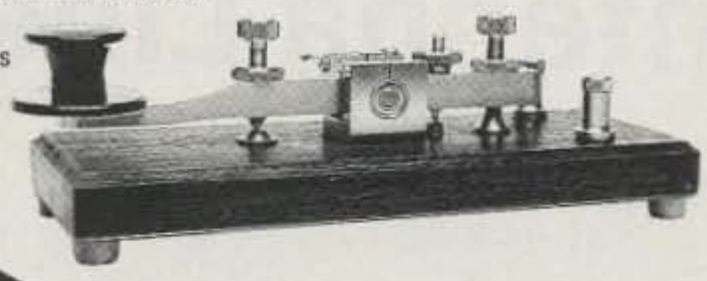
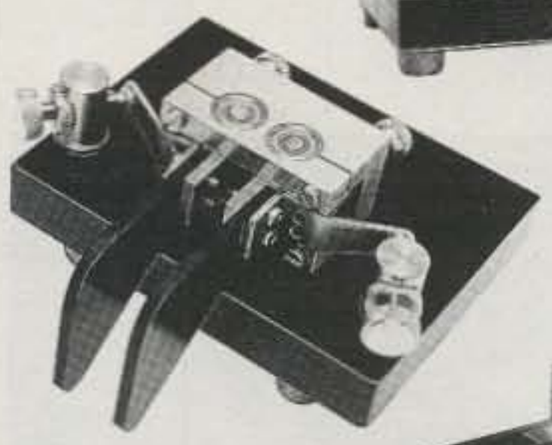
from R.A. KENT ENGINEERS

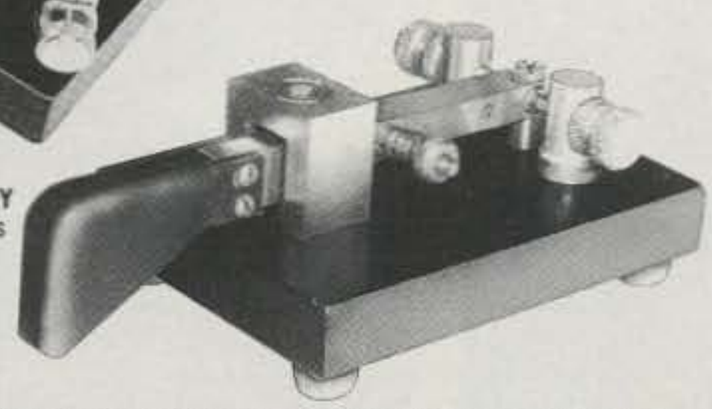
The **LEADING** British manufacturer of top quality Morse Keys — renowned throughout the world for their outstanding performance and reliability.

SOLID BRASS MORSE KEY
Base 8" x 3" Weight 2.2lbs
$75.00 (Assembled)
$60.00 (in kit form)
Airmail P. & P. $15.00





TWIN PADDLE MORSE KEY
Base 4" x 3" Weight 3.3lbs
$85.00 (Assembled)
$70.00 (in kit form)
Airmail P. & P. $18.00



SINGLE PADDLE MORSE KEY
Base 4" x 3" Weight 3.3lbs
$75.00 (Assembled)
$60.00 (in kit form)
Airmail P. & P. $18.00

All Kent keys use shielded ball race bearings which are renowned for their superiority over keys using plain and bush type bearings. Kent keys are available in ready assembled or kit form. The kits take less than an hour to assemble with no special tools required.

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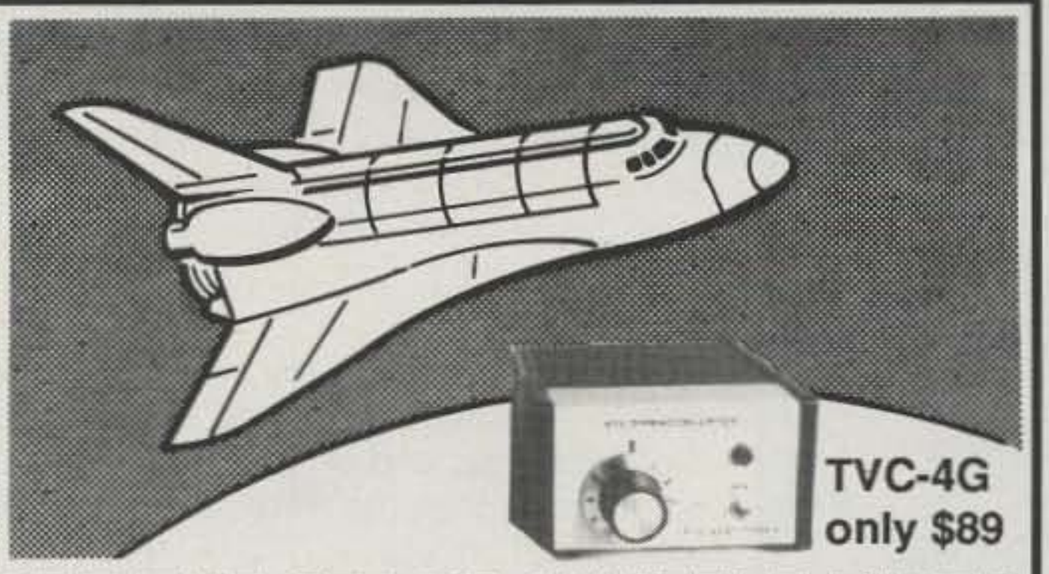
CIRCLE 35 ON READER SERVICE CARD

AMATEUR TELEVISION



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Many ATV repeaters and individuals are retransmitting Space Shuttle Video & Audio from their TVRO's tuned to Satcom F2-R transponder 13. If it is being done in your area on 70 CM, all you need is one of our TVC-4G ATV 420-450 MHz downconveters, add any TV set to ch 3 and 70 CM antenna. Others may be retransmitting weather radar during significant storms. Once you get bitten by the ATV bug - and you will after seeing your first picture - show your shack with the TX70-1A companion ATV transmitter for only $279. It enables you to send back video from your camcorder, VCR or TV camera. ATV repeaters are springing up all over - check page 411 in the 90-91 ARRL Repeater Directory. Call for a copy of our complete 70, 33 & 23 CM ATV catalog.

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CIRCLE 95 ON READER SERVICE CARD

The HD-73 Rotator by Alliance

A precision instrument built to last.

The HD-73 combines Dual-Speed rotation and a single 5-position switch with the clear visibility of a backlit D'Arsonval meter. So you get precise control for fast and fine tuning. And the advanced technology of HD-73 is backed by quality construction. Heavy duty aluminum casings and hardened steel drive gears. Lifetime factory lubrication that withstands -20°F. to 120°F. temperatures. The superior design of the HD-73 mast support bracket, with optional no-slip positive drive, assures perfect in-tower centering with no special tools. Automatic braking minimizes inertia stress. Easy to install, a pleasure to use. The HD-73 is on your wavelength. Write for performance details today.

No Other Rotator Gives You All These Features at Such a Low Price!!

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Philips ECG
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CIRCLE 41 ON READER SERVICE CARD

CQ REVIEWS:

The Diamond Antenna Line

BY LEW McCOY*, W1ICP

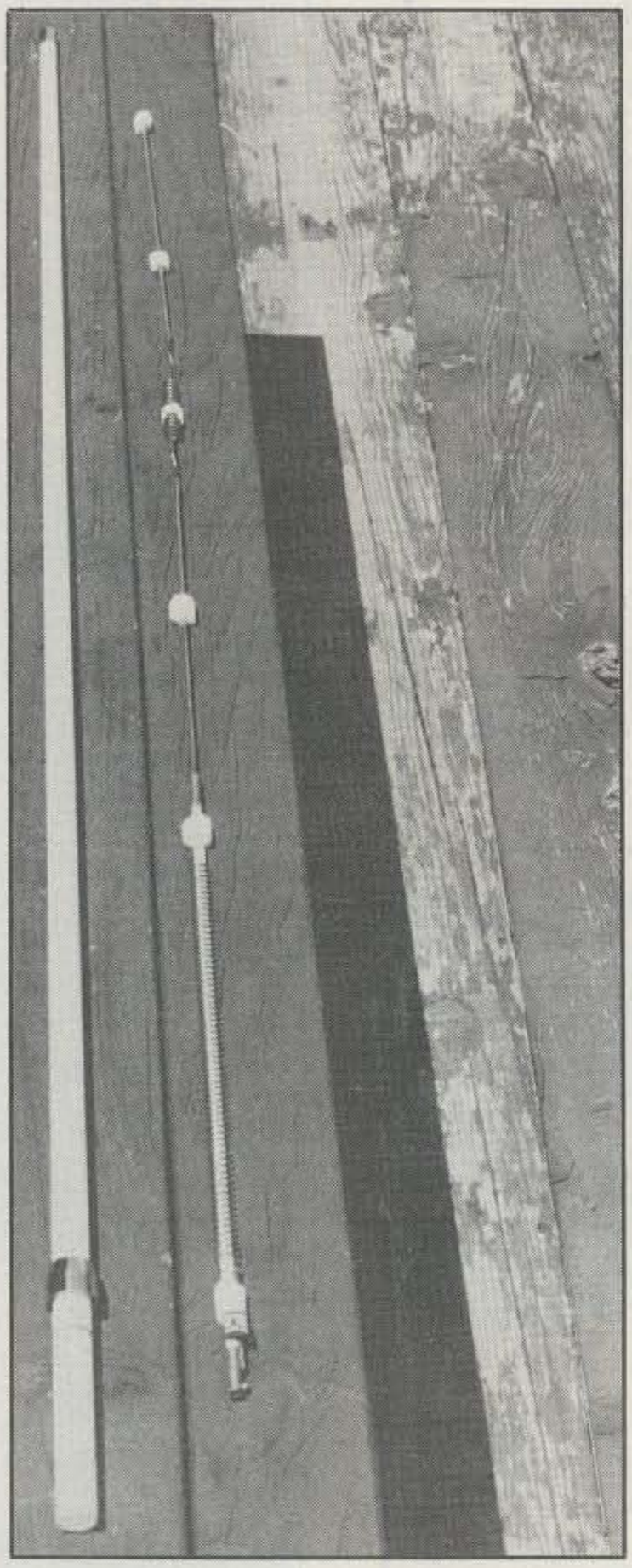
At a recent Dayton Hamvention I had the opportunity to spend some time at the Diamond antenna booth and examine some of their many antennas. I was extremely impressed with both the quality and soundness of their products. The result was my receiving a shipment of the various vertical X and F series antennas and duplexers for a product review in *CQ*.

We have a packet repeater on a mountain (9000-plus feet up), plus in my own location I can link up with a remote on both 2 meters and 450 MHz. I have an excellent location for testing antennas, as I have mentioned in previous product reviews.

In our repeater location we had been having a problem with our link into two other packet stations, one 100 miles away and the other in El Paso, about 125 miles distant. The antenna in use was a vertical half-wave, base-fed dipole. We replaced it with the Diamond Model X-500M, which is a dual-band, 2 meter/70 cm, high-performance gain vertical. This antenna is rated by the manufacturer at 8.3 dB omnidirectional gain on 2 meters and 11.7 dB gain on 70 cm. The overall length is 5.2 meters (204.7 inches). After we installed the X-500M, we were instantly solid lock into both the other repeaters.

I tested the antenna for a month, but then a direct lightning hit took out the antenna (and the repeater, plus a lot more). I have included a photo showing what happens to a fiberglass-covered antenna that takes a direct hit. I agonized a little over showing the lightning-hit photo because some readers might mistakenly think the antenna was at fault. I want to make it clear that no matter what the antenna or who the manufacturer, a direct lightning hit blows things apart.

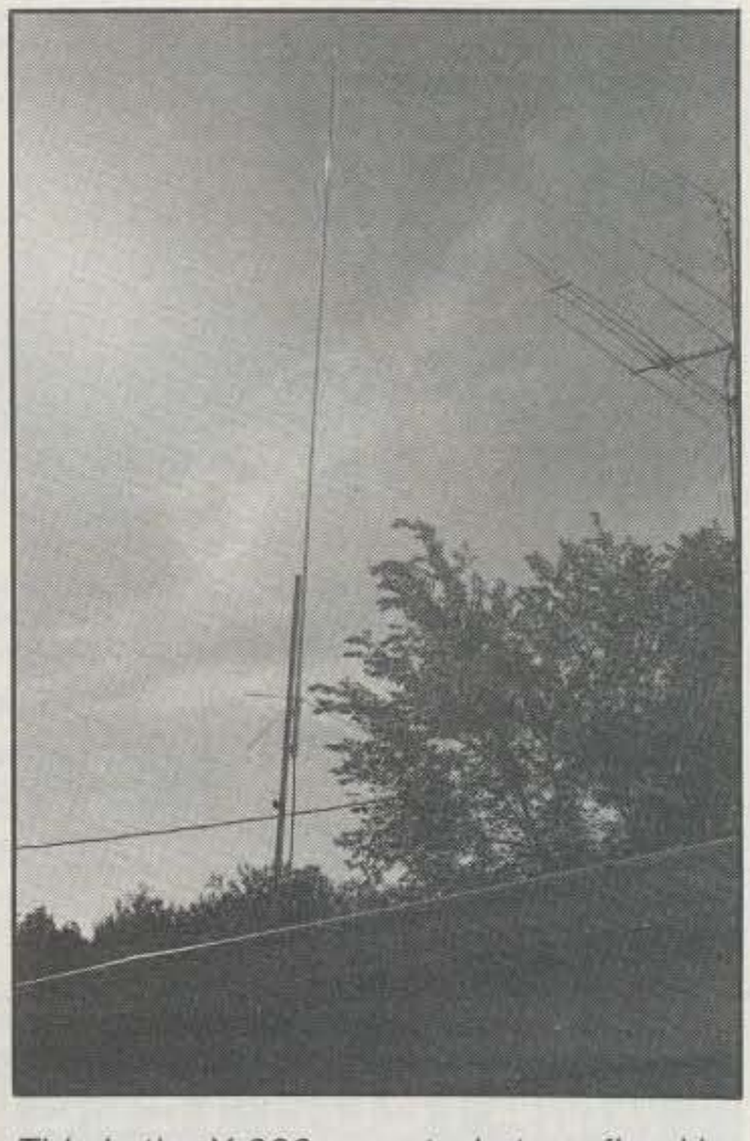
We then installed another model, the X-300, which has slightly less gain—6.5 dB on 2 meters and 9.0 dB on 70 cm. There was no noted difference between this and the previous antenna (and I might add, no more lightning hits!). This vertical is 2.9 meters long (114 inches). The power rating is 200 watts for this (the same for the X-500). The X-300 consists of two



This is the base section of the Diamond X-300 with the antenna proper removed from the fiberglass covering.

⅝-wave stacked elements on 2 meters and five ⅝-wave elements on 450.

I have made numerous empirical tests with this antenna against a Swiss quad that is about 40 feet higher and another 6-element quad at the same height as the vertical. To be perfectly honest, I find little if any difference between the three antennas with reference to getting into distant repeaters or in tests with locals. My



This is the X-300 mounted at my fixed location. The supporting pole is a section of PVC to which the vertical is U-bolted. The Swiss quad, one of the comparison antennas, is barely visible above the beam on the right.

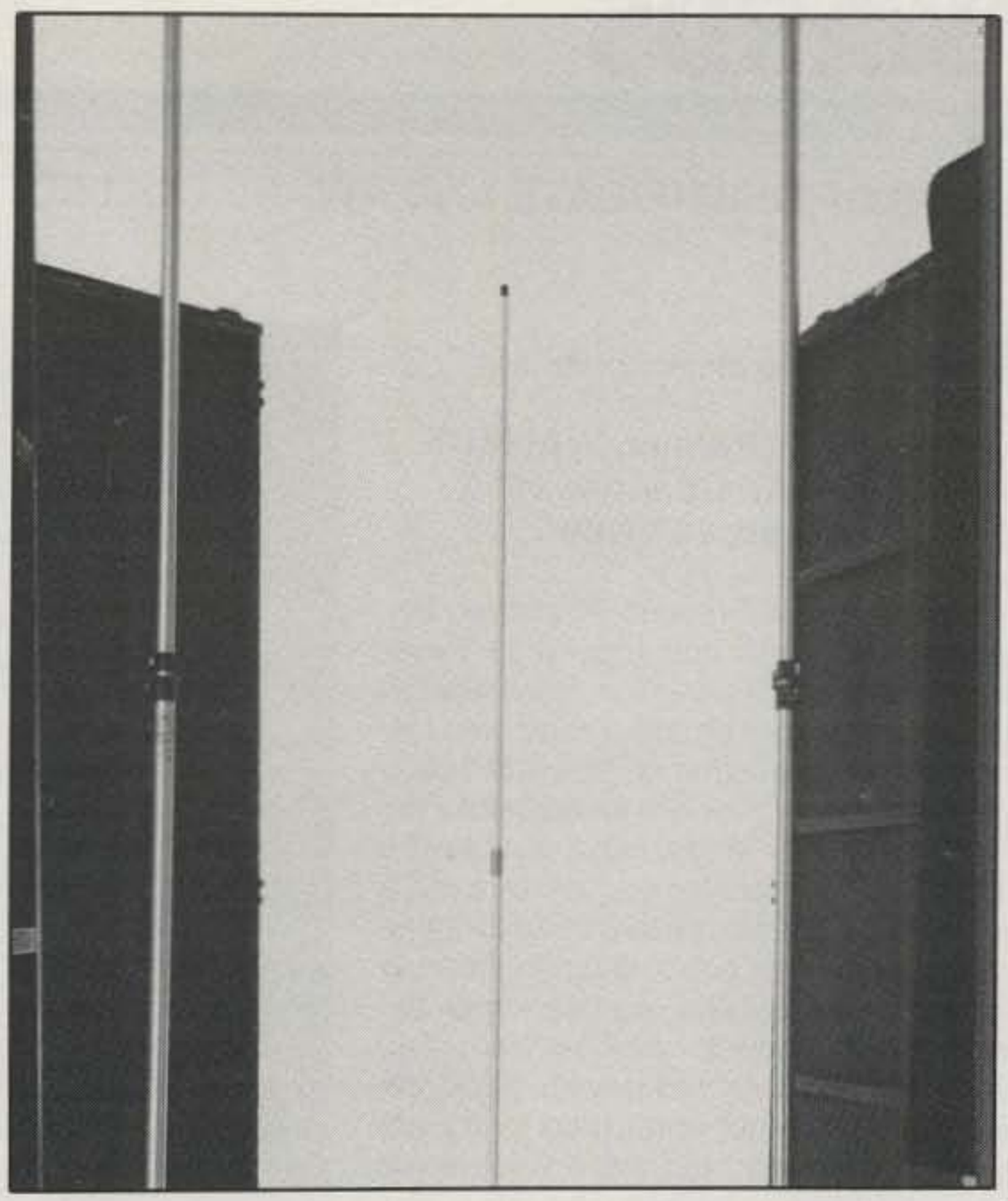
conclusion is that for my own installation the vertical is doing as well as the directional beams, and of course the big advantage is that the vertical doesn't require rotation, etc.

The materials and construction are really first class, and mechanically the antenna has excellent machining of parts. Shown in the photograph is the bottom fiberglass section which protects the antenna proper. The electrical design of the vertical is also excellent. (Of course, this was proven in the tests I made.)

At the base of the antenna a three radial system is employed to isolate the antenna from the feed line. The feed requirement is 50 ohms, and the line is brought up through a short metal pipe to the base feed point (UHF SO-239 type connector). The verticals are shipped (UPS) broken down into two or three fiberglass sections. It only takes minutes to assemble the sections and screw the fiberglass sections together.

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

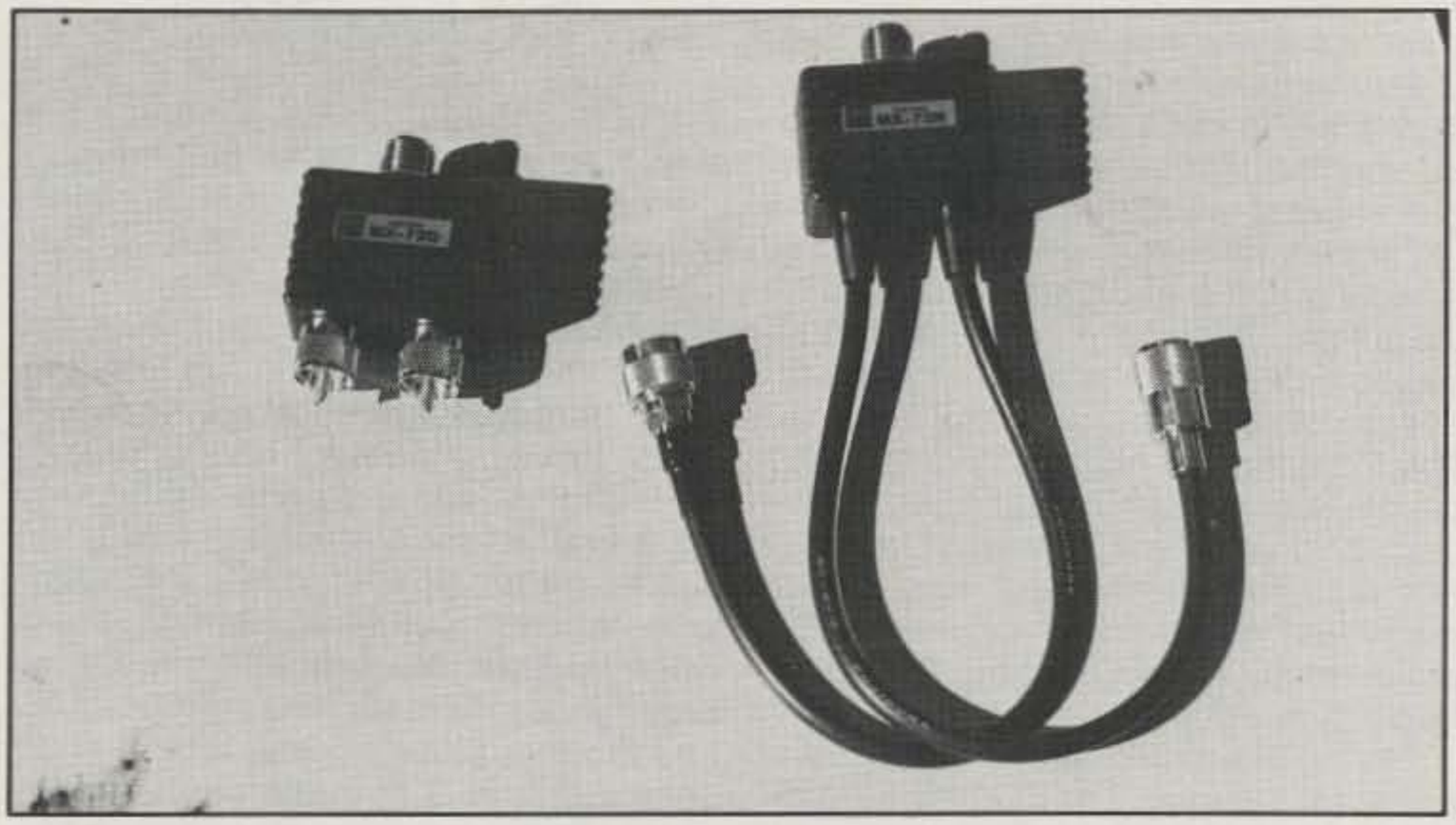
Lightning literally blew the antenna to Hades. The antenna proper, the metal sections, ended up as small balls of metal in parts of the antenna.



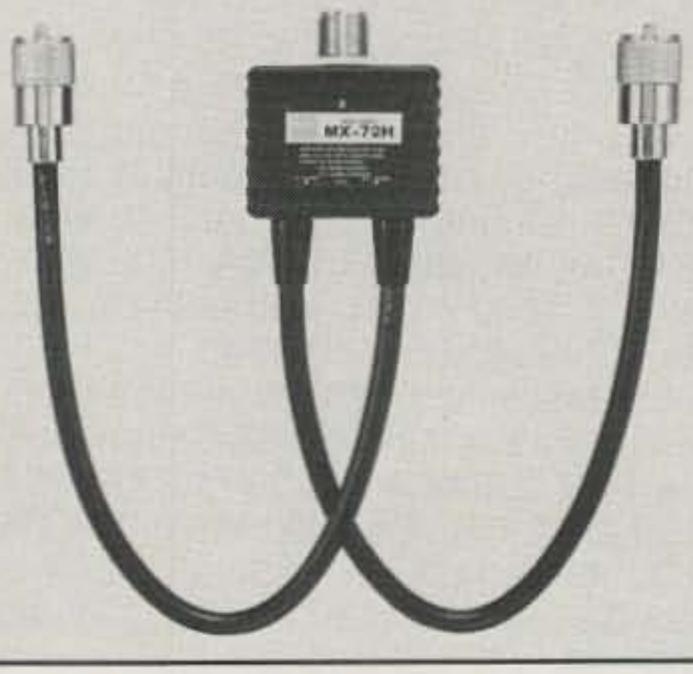
This is a commercial photo showing the vertical types.

The SWR is rated at a maximum of 1.5 to 1 on either band for the dual banders and the same on single bands. My tests showed that figure to be accurate, or even less. One thing I haven't mentioned but I guess I should is the wind rating on the X-500 is 90 MPH and on the XC-300 it is 112 MPH.

In addition to the above antennas, I also received three of the Diamond MX series duplexers (shown in the photos). At present I am using and testing an ICOM 2400A, which is a 2 meter/450 MHz dual-band transmitter with separate outputs for each band. As I am using the Diamond dual-band antenna with single feed, the MX duplexer is ideal for going from the dual feed of the ICOM to the single feed of the antenna.



Two of the other variety of duplexers available.



This is the MX-72H duplexer.

The manufacturer's specs for the MX-72H (and they are very similar for the other models in the series) are as follows:

Passband width
LPF—1.6–470 MHz
HPF—400–460 MHz

Power rating
1.6–30 MHz: 400 watts CW, 1 kW PEP
140–150 MHz: 150 watts CW, 400 watts PEP
400–460 MHz: 100 watts CW, and 250 watts PEP

Insertion loss
Less than 0.1 dB

Input isolation
60 dB minimum

VSWR
Less than 1.2 to 1, 50 ohms impedance

The antennas and duplexers described above, and many more items, are manufactured by Diamond Antenna Corp. in Japan. A full catalog is available from the American distributor, RF Parts, 1330-16 Grand Avenue, San Marcos, CA 92069, or your nearest authorized dealer (call 619-744-0700 for more information). CQ

AWARDS

BY DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for April is:

Theodore E. Palmer, WA6MUK USA-CA All Counties #649 Mixed, 12-26-89

"I was born in Chicago, Illinois on December 30, 1935 and moved to Pasadena, California in 1948. I have always been interested in amateur radio and I almost began operating in the early 1960s when someone gave me an issue of *Popular Electronics Magazine.* I acquired a National 100 receiver and assembled a homemade, medium-wave quad antenna for the broadcast band using the instructions in the magazine. As you know, the medium-wave radio dial is from 540 through 1600 kHz and covers 1060 frequencies. I almost confirmed every frequency and state, but there were some powerful 24-hour stations who rarely shut down to pull in a weak signal. I turned to the international shortwave broadcast bands and confirmed approximately 75 countries. It was around these bands that I heard hams communicating and got the urge to join in, but it was back to working my way through college and doing four years of post-graduate studies.

"Eight years went by while I established a practice and donated my time to the community and my profession. I have served as President of the Los Angeles College of Chiropractic Alumni Association, President Los Angeles County Chiropractic Society, San Gabriel Valley Chiropractic Society, East Pasadena Optimist, and Arcadia Toastmasters; also, chairmanships on a state and national level. I am currently President of the Pasadena Radio Club, Pasadena, California.

"In 1976 I acquired my Novice license and spent a few years on CW only. My prefix was WN6 and then the FCC changed it to WA6. I never changed my callsign through my upgrades to Extra class or serving as a volunteer examiner. When I acquired phone privileges, I stayed clear of the County Hunter's Net because I never listened long enough to find out about it, as I was busy going after DXCC, WAS-RTTY, and qualifying for about 300 Ten-Ten chapter nets with upgrades.

"One day a ham asked me if I wanted his QSL card. My reply was 'No, thanks. I have that state!' He sounded shocked even after explaining to me that he was the only fixed amateur station in the county. He almost begged me to accept it, but I told him to save his stamp.

"About a year later I was thinking about this operator and decided to listen to the County Hunter's Net, never thinking of joining. However, NK8P, Ripley, West Virginia, wrote me an encouraging letter and got me started. He also telephoned me to help me finish All Counties. I am net controller when I can or assist when possible. My only other hobby is collecting credit cards, and it is difficult to find anyone to share ideas with. I have collected over 300 credit cards in my name. Some are from other countries, and some of them are classics which will never be seen again, but I am still looking for new ones.

"My thanks to all who helped me acquire the *CQ* USA-CA Counties award on December 26, 1989.—73, Theodore E. Palmer, D.C., WA6MUK"

333 South Lincoln Ave., Mundelein, IL 60060

Theodore E. Palmer, D.C., WA6MUK, USA-CA All Counties #649.

Awards Issued

Carl Durnavich, WA9PQY, qualified for the All 15M and All 10M endorsements to his USA-CA 500 #2318 on 12-21-90. He now holds USA-CA 500 endorsements for 80, 40, 20, 15, and 10 meters, making him the first to achieve that distinction. Carl received USA-CA All Counties #609 on 2-23-89. Congratulations, Carl!

Clyde Kane, KA0NVT, took a double step to complete his quest qualifying for USA-CA All Counties #683, and USA-CA 3000 #709, Mixed, dated 12-12-90.

John E. Craddock, KX8Z, completed all his paperwork and received USA-CA All Counties #684, USA-CA 3000 #710, USA-CA 2500 #789, USA-CA 2000 #858, USA-CA 1500 #945, USA-CA 1000 #1139, and USA-CA 500 #2471, All SSB, dated 12-15-90.

Alex F. Burr, K5XY, rounded out his good record by claiming USA-CA All Counties #685, USA-CA 3000 #711, USA-CA 2500 #790, USA-CA 2000 #859, USA-CA 1500 #946, and USA-CA 1000 #1140, All 20M SSB Mobile, dated 12-17-90.

Earl G. Gregg, N5AWE, filed his completely filled and certified Record Book and received USA-CA All Counties #686, USA-CA 3000 #712, USA-CA 2500 #791, USA-CA 2000 #860, USA-CA 1500 #947, USA-CA 1000 #1141, and USA-CA 500 #2472, Mixed, dated 12-20-90.

Gus Muchitsch, KD2NN, made a clean sweep of it by claiming USA-CA All Counties #687, USA-CA 3000 #713, USA-CA 2500 #792, USA-CA 2000 #861, USA-CA 1500 #948, USA-CA 1000 #1142, and USA-CA 500 #2473, All SSB, dated 12-21-90.

Donald S. Chamberlain, M.D., W9DC,

USA-CA Special Honor Roll

Clyde Kane, KA0NVT
USA-CA All Counties #683
Mixed, 12-12-90

John E. Craddock, KX8Z
USA-CA All Counties #684
All SSB, 12-15-90

Alex F. Burr, K5XY
USA-CA All Counties #685
All 20M SSB Mobile, 12-17-90

Earl G. Gregg, N5AWE
USA-CA All Counties #686
Mixed, 12-20-90

Gus Muchitsch, KD2NN
USA-CA All Counties #687
All SSB, 12-21-90

Donald S. Chamberlain, W9DC
USA-CA All Counties #688
Mixed, 12-26-90

Annabelle Little, AB4OI
USA-CA All Counties #689
All SSB, 12-30-90

USA-CA Honor Roll

3000		1500	
KA0NVT	709	KX8Z	945
KX8Z	710	K5XY	946
K5XY	711	N5AWE	947
N5AWE	712	KD2NN	948
KD2NN	713	W9DC	949
W9DC	714	AB4OI	950
AB4OI	715		
2500		**1000**	
KX8Z	789	KX8Z	1139
K5XY	790	K5XY	1140
N5AWE	791	N5AWE	1141
KD2NN	792	KD2NN	1142
W9DC	793	KB1AF	1143
AB4OI	794	W9DC	1144
		AB4OI	1145
2000		**500**	
N7LWX	857	HP6AYV	2469
KX8Z	858	VY2YT	2470
K5XY	859	KX8Z	2471
N5AWE	860	N5AWE	2472
KD2NN	861	KD2NN	2473
W9DC	862	KA4GYU	2474
AB4OI	863	W9DC	2475
K6PQA	864	AB4OI	2476
		4X4RE	2477

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

also did it all in one giant step and received USA-CA All Counties #688, USA-CA 3000 #714, USA-CA 2500 #793, USA-CA 2000 #862, USA-CA 1500 #949, USA-CA 1000 #1144, and USA-CA 500 #2475, Mixed, dated 12-26-90.

Annabelle Little, AB4OI, is another who chose to claim it all in one filing and was awarded USA-CA All Counties #689, USA-CA 3000 #715, USA-CA 2500 #794, USA-CA 2000 #863, USA-CA 1500 #950, USA-CA 1000 #1145, and USA-CA 500 #2476, All SSB, dated 12-30-90.

Charles "Bart" Bartlett, N7LWX, added another gold seal to his certificate by claiming USA-CA 2000 #857, All 20M SSB Mobile, dated 12-13-90.

Robert P. Banner, K6PQA, extended his good record and received USA-CA 2000 #864, Mixed, dated 12-31-90.

Wendy D. Kincaid, KB1AF, filed her good application for USA-CA 1000 #1143, Mixed, dated 12-24-90.

USA-CA 500 certificates went to:

Dr. Victor J. Warner, HP6AYV, USA-CA 500 #2469, All SSB, 12-12-90.

Robert Wigmore, VY2YT, USA-CA 500 #2470, Mixed, 12-15-90.

John E. Craddock, KX8Z, USA-CA 500 #2471, All SSB, 12-15-90.

Earl G. Gregg, N5AWE, USA-CA 500 #2472, Mixed, 12-20-90.

Gus Muchitsch, KD2NN, USA-CA 500 #2473, All SSB, 12-21-90.

Dr. William M. Rawlett, KA4GYU, USA-CA 500 #2474, Mixed, 12-24-90.

Donald S. Chamberlain, M.D., W9DC, USA-CA 500 #2475, Mixed, 12-26-90.

Annabelle Little, AB4OI, USA-CA 500 #2476, All SSB, 12-30-90.

Egon Ron, 4X4RE, USA-CA 500 #2477, All CW, 12-31-90.

Awards Available

European World Wide Award. The European World Wide Award represents a new and extensive effort by the Council of Europe Radio Amateurs Club. Their stated objective is to pursue technical development and international communication and understanding. The CERAC with the support of the Council of Europe, the oldest international political organization in Europe, has undertaken the creation of a European World Wide Award (EWWA) to help pursue excellence in amateur radio.

Lengthy discussions were held with well-known and respected DX operators worldwide. The Board of Directors' membership is distributed by continents so as to assure worldwide democratic representation in the establishment of general criteria for the award and in the management of the award and the DX country list so that any future inclusions or exclusions take into account the interests of the amateur radio community as a whole.

Regional checkpoints are available for the award. They are well-known DXers, members of the EWWA Board of Directors, whose job it is to guarantee that everyone who gets the award has fulfilled all the criteria, and also to reduce the cost and the dangers involved in mailing hard-earned QSL cards from all around the world to a central bureau.

Applications for the EWWA will be accepted from January 1, 1991 on. The rules for the award are summarized as follows. For more detailed information and for a copy of the EWWA Countries List, contact F6FQK, the award manager, or a regional checkpoint (listed later in this column).

EWWA Rules. The EWWA is available to all licensed amateur radio stations and SWLs who fulfill the following conditions.

1. HF. The HF award is available for the following modes.

a. Mixed (CW, Phone, RTTY): 200 confirmed contacts with 200 different countries from the official EWWA countries list. Contacts must have taken place from January 1, 1980 on.

b. CW: Same as above in CW mode.

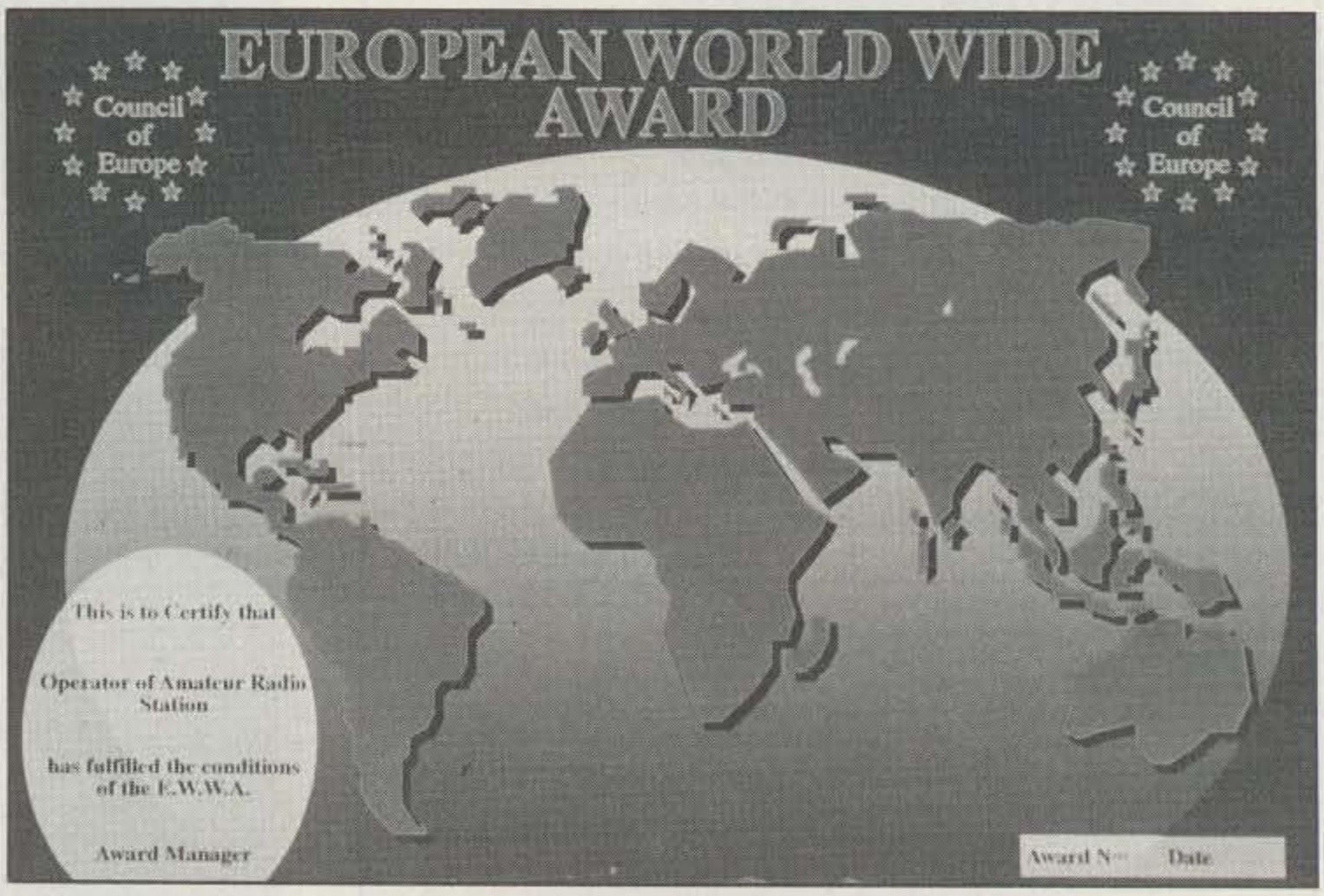
c. Phone: Same as above in Phone mode.

d. RTTY: Same as above in RTTY mode.

e. Five-Band EWWA: Available for working and confirming 100 countries from the EWWA countries list on each of the following bands—80, 40, 20, 15, 10 meters. It is obtainable in Mixed, CW, Phone, and RTTY modes.

f. Nine-Band EWWA: Same as the Five-Band EWWA, but in each of the following bands—160, 80, 40, 30, 20, 17, 15, 13, 10 meters.

g. Top List HF EWWA: A total of 292 confirmed country contacts are necessary as from January 1, 1980 in Mixed, CW, Phone, RTTY.



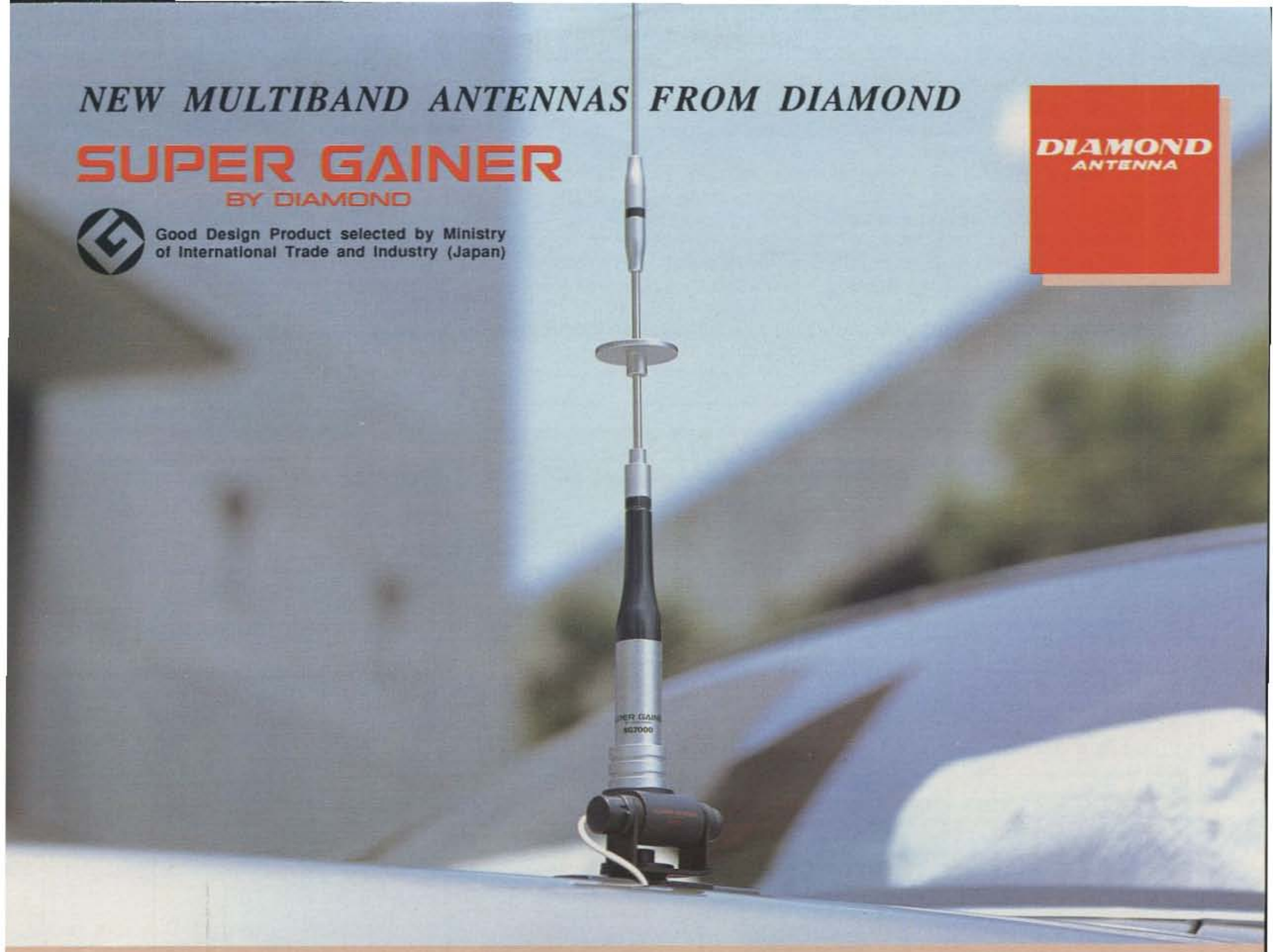
The European World Wide Award, a new offering by the Council of Europe Radio Amateurs Club.

NEW MULTIBAND ANTENNAS FROM DIAMOND

SUPER GAINER
BY DIAMOND

Good Design Product selected by Ministry of International Trade and Industry (Japan)

DIAMOND ANTENNA



SG7500NMO 2m/70cm Dual Band Antenna. NEW
Phasing : 2m 1/2λ, 70cm 2-5/8λ. Rating : 150W. Length : 40.6". Connector : NMO.

SG7200NMO 2m/70cm Dual Band Antenna. NEW
Phasing : 2m 1/2λ, 70cm 2-5/8λ. Rating : 150W. Length : 37.8". Connector : NMO.

K400M
Deluxe Hutch back Trunk lid Mount.

SG7500 2m/70cm Dual Band Antenna.
Phasing : 2m 1/2λ, 70cm 2-5/8λ. Rating : 150W. Length : 41.7". Connector : UHF.

NR2000NA 2m/70cm/23cm Tri-Band Antenna. NEW
Phasing : 2m 1/2λ, 70cm 2-5/8λ, 23cm 5-5/8λ. Rating : 100W (2m & 70cm), 50W (23cm). Length : 39.0". Connector : N.

CR214S 2m/1-1/4m Dual Band Antenna. NEW
Phasing : 2m 1/2λ, 1-1/4m 5/8λ. Rating : 120W. Length : 37.0". Connector : NMO.

NR770HNMO 2m/70cm Dual Band Antenna. NEW
Phasing : 2m 1/2λ, 70cm 2-5/8. Rating : 200W. Length : 38.2". Connector : NMO.

MX-214 2m/1-1/4m Duplexer
(2m/70cm Duplexers also available.)

MX-3000D
2m/70cm/23cm Triplexer

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San Marcos, CA 92069

Each Award may be worked separately—i.e., the Top List EWWA may be obtained directly, without having to qualify first for any of the basic diplomas. Each Top List Award will include a special pennant.

2. VHF. 100 confirmed contacts with 100 different countries from the EWWA countries list in the VHF bands, after January 1, 1980. It is obtainable in FM, SSB, CW, or Mixed modes.

3. Special OSCAR Award. 100 confirmed contacts with 100 different countries from the EWWA countries list via OSCAR satellites, after January 1, 1980.

QSL cards and a copy of the logsheet containing the callsigns of the stations worked, country, mode, frequency and/or band, date, and time should be sent to the Award Manager, F6FQK, or a regional checkpoint (list follows), with the appropriate fee to cover costs (aproximately 10 US dollars) payable in US dollars, French Francs, German Marks, Italian Lire, Spanish Pesetas, or Pounds Sterling, plus sufficient funds or IRCs to return QSL cards.

All QSOs must be made with licensed amateur radio stations working in authorized amateur radio bands, and all stations worked must be land-based stations. All stations must have been contacted from the same country as included in the EWWA countries list. Amateur radio operators portable in other countries must include a copy of their individual licenses, and the official permission of the authorities for the portable operation, with specific mention of the callsign used. These copies must be sent to F6FQK.

The checkpoints for the award are as follows.

South and Central America: LU7HJM, Jose Maria de la Vega, P.O. Box 1401-5000 Cordoba, Argentina (for South America). OA4OS, Natan Sterental, P.O. Box 4147, Lima 1, Peru (for Central America).

US and Canada: VE2PJ, Terrance Lowde, 910 Argyle, Sherbrooke, Quebec J1J 3J4, Canada.

Caribbean: FM5DN, Richer Leonce, 4Km.500 Rte de Balata, 97234 Fort de France, Martinique.

Australia, Oceania, Asia: Open, including the post of Board Member for this area.

Africa: 7X2RO, Afif Benlagha, 11 Rue d'Alembert, 16000 Alger Algeria. 6W6JX, Pipien Jean Louis, Salins de Sine Saloum, BP 200 Kaolack, Senegal.

Europe, USSR: F6FQK, Francis Kremer, 31 Rue Louis Pasteur 67490 Dettwiller, France. DL3MBE, Hans Scharfen, Oytalstrasse 22F-D 8900 Augsburg 1, Germany.

The EWWA Board of Directors requests comments and suggestions for improving the EWWA. Direct all correspondence, including petitions for new country status, to: Conseil de l'Europe, Service Audiovisuel—CERAC, Francis Kremer, F6FQK, BP 431 R6, 67006 Strasbourg Cedex, France. General criteria and exclusions for application for new country status may also be obtained by contacting F6FQK.

Applications for the EWWA will be considered after January 1st, 1991.

EWWA Board of Directors: F6FQK (Award Manager and Acting President), EA4EII (Acting Secretary), LU7HJM, OA4OS, EL2WK, UA3UIN, 6W6JX, 7X2RO, F6FSQ, DJ0UJ/TAS2BK, DL3MBE, HA5WE, OK2QX, VE2PJ, and FM5DN.

Members of the EWWA Board will be elected on a personal basis by the majority vote of the rest of the members. Members are elected for a period of nine years and may be re-elected. Every three years a third of the number of members will be elected by majority vote of the other members, taken from the candidates sent to the CERAC.

Contacts valid for this award must bear a date not before January 1, 1980.

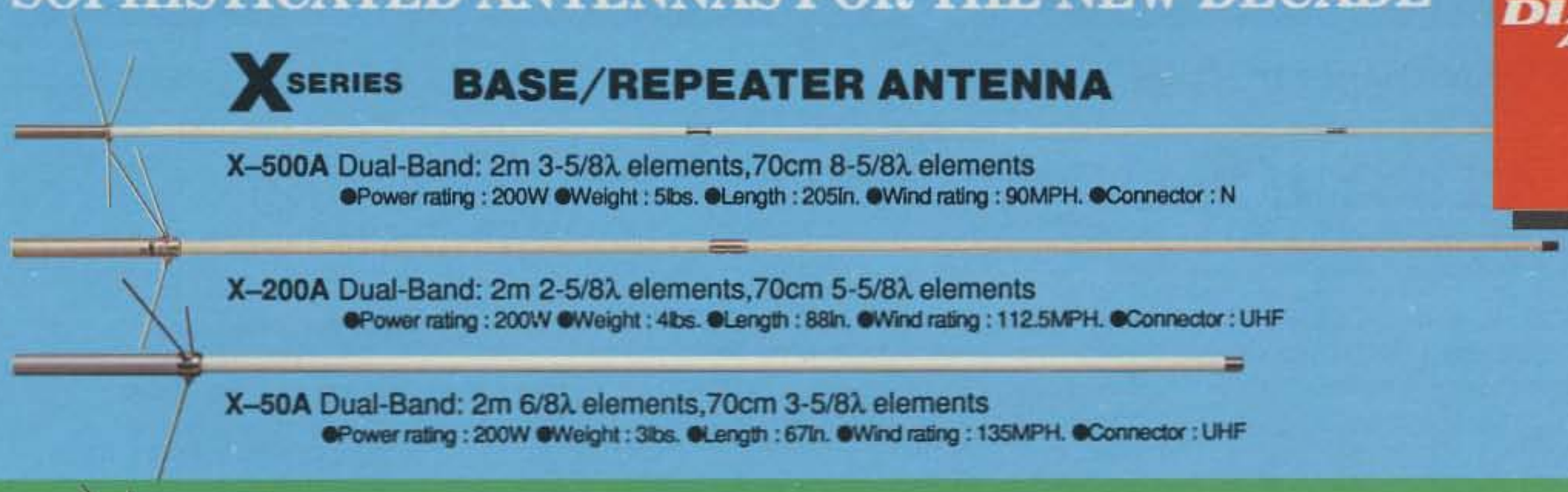
See you next month!

73, Dorothy, WB9RCY

1990 IS A DIAMOND YEAR
SOPHISTICATED ANTENNAS FOR THE NEW DECADE

DIAMOND ANTENNA

X SERIES BASE/REPEATER ANTENNA

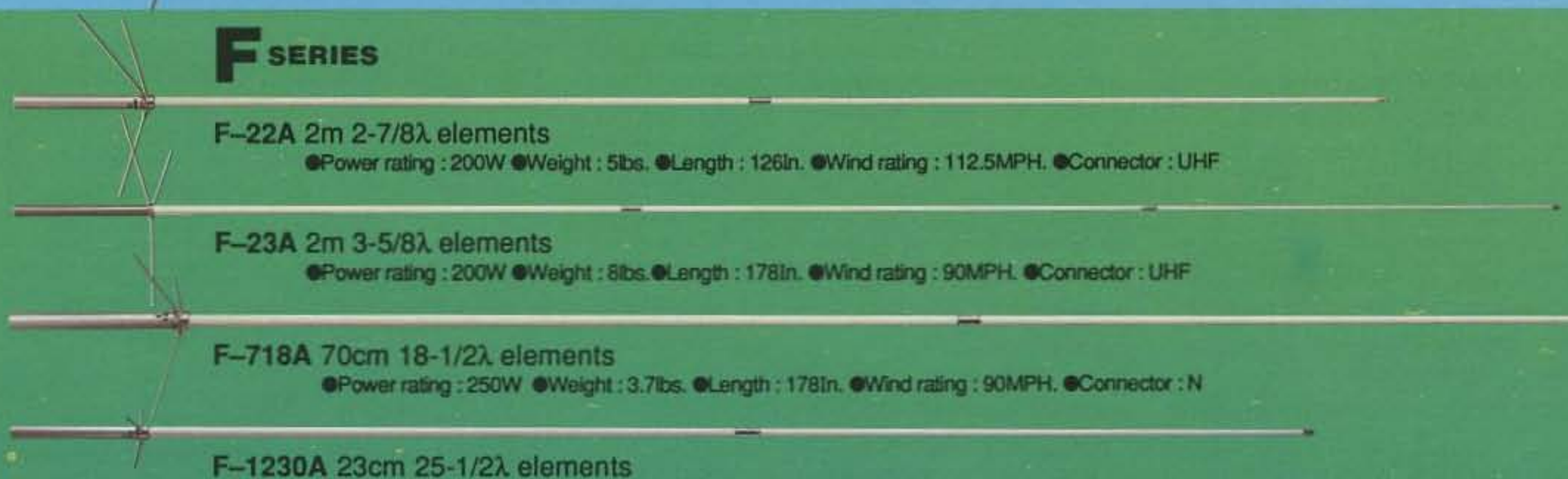


X–500A Dual-Band: 2m 3-5/8λ elements,70cm 8-5/8λ elements
●Power rating : 200W ●Weight : 5lbs. ●Length : 205In. ●Wind rating : 90MPH. ●Connector : N

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

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

F SERIES



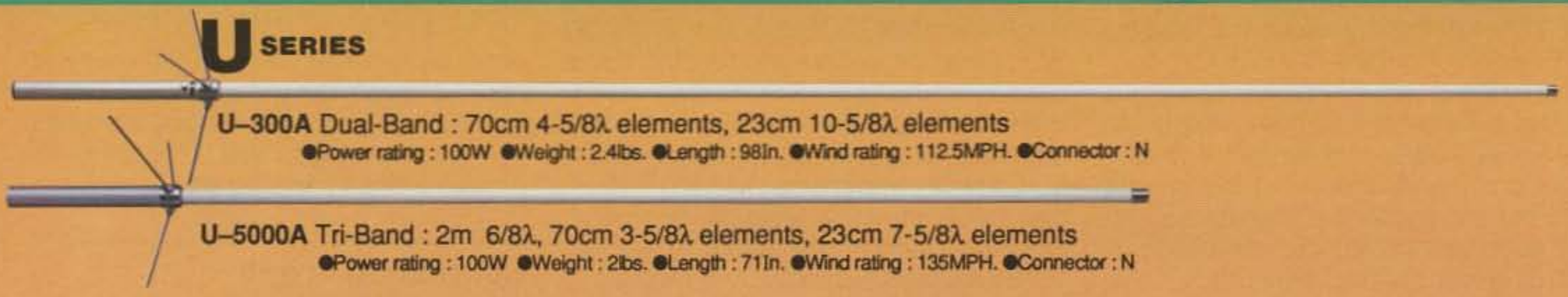
F–22A 2m 2-7/8λ elements
●Power rating : 200W ●Weight : 5lbs. ●Length : 126In. ●Wind rating : 112.5MPH. ●Connector : UHF

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

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

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

U SERIES

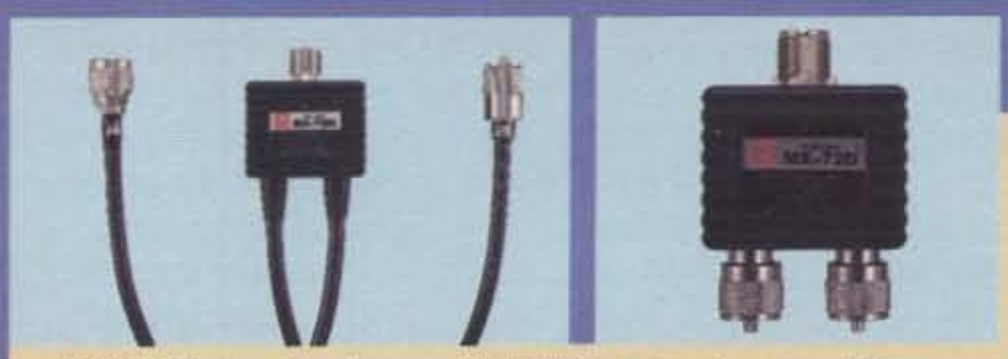


U–300A Dual-Band : 70cm 4-5/8λ elements, 23cm 10-5/8λ elements
●Power rating : 100W ●Weight : 2.4lbs. ●Length : 98In. ●Wind rating : 112.5MPH. ●Connector : N

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

Diamond Antennas are built to Commercial Two-Way Standards. A Special weatherproof fiberglass shell, with plated brass and stainless steel hardware gives these antennas long life in harsh envieronments. All antennas are factory adjusted for U.S. Amateur bands and require no further tuning.

MX SERIES DUPLEXERS AND TRIPLEXERS

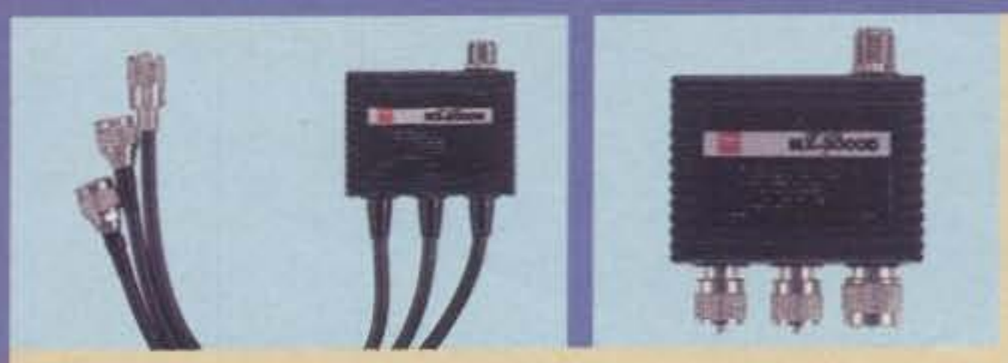


MX-72N Duplexer with UHF connectors and N connector for HF, 2m and 70cm bands
●Coaxial cable : 5D2VS 35cm

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

MX-72H Duplexer with UHF connectors for HF, 2m and 70cm bands
●Coaxial cable : 5D2VS 35cm

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



MX-3000N Triplexer with N connectors and UHF connector for HF, 2m, 70cm and 23cm bands
●Coaxial cable : 5D2VS 35cm

MX-3000DN Direct connection type Triplexer with N connectors and UHF connector for HF, 2m, 70cm and 23cm bands
●Coaxial cable : None

MX-3000 Triplexer with N connectors and UHF connectors for HF, 2m, 70cm and 23cm bands
●Coaxial cable : 5D2VS 35cm

MX-3000D Direct connection type Triplexer with N connectors and UHF connectors for HF, 2m, 70cm and 23cm bands
●Coaxial cable : None

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CIRCLE 16 ON READER SERVICE CARD

CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

A Look at the Highs and Lows of Contesting

Following is Chris Burger, ZS6BCR's story of his participation in the 1988 CQ WW DX Contest from South Africa. As yet he hasn't won a contest from ZS again, and this story remains firmly planted in his mind.

A Contest War Story South African Style

By Chris R. Burger, ZS6BCR

At least 95% of my antenna work gets done in November at ZS6BCR. As a student, I seldom have time earlier in the year, so when my exams conclude in mid-November, it is always a mad rush to get the station ready.

My antenna workload peaked in 1988 as nothing was standing at my station in October. Two weeks of intense work saw three tons of concrete, three towers, and four monobanders rise from nothing. In fact, I literally left my tower at 2330Z on the Friday night of the CQ WW CW contest in a rain storm, having just tightened the last bolts on the system. Ready for battle, the station consisted of 5 elements on 10 and 20 meters, 3 elements on 15 meters, and 2 on 40 meters, as well as a good vertical for the low bands. It was my dream station come true.

After a week of 18-hour days, I decided to miss the first few hours of the contest to get some sleep. Waking up at 0200Z, I felt like a ton of bricks had been lifted off my shoulders while I had been sleeping. At this point, 40 meters was hopping with signals. My new beam really was really working well. There were no particularly interesting multipliers on 40, so I switched up to 20 meters to check for the Caribbean. Twenty meters started producing immediately, as I found KP2A pounding in at 599 + 30 dB. Within seconds my keyer effortlessly sent ZS6BCR. When the receiver came back on, I was stunned by the overwhelming silence in my headphones. After checking, I realized in my numb state that I had forgotten to switch my antenna switch to 20 meters. W2PV's warning about high SWRs and ferrite baluns came to mind immediately as I discovered that I had just destroyed my 40 meter matching system.

Without an antenna for 40 meters, there was no way I could be competitive. As I still had a good antenna on 20 for the first time in my life, I decided to focus my remaining operating time on that band to improve upon my personal records. I worked until the band closed, and then joined with some friends on a trip to the next city for a fleamarket. I slept after that and spent most of the night working "new ones." Sunday morning found me in church, and then a full effort ensued during the final evening runs as the contest ran its course. During that evening slow stateside runs were the order of the day. As I gradually slowed to 20 WPM, I was called by a CE8 station for my only Zone 12. By 2100Z I was surprised to discover that I had worked 38 zones, and 2300Z brought a /MM station and HP1AC in Zone 7 to complete the full house.

I still remember with awe when I first reviewed WØZV's SSB results in the early '80s after he had captured the treasured single-band WAZ achievement in the CQ WW. I was almost overcome that, half a decade later, I had emulated his achievement on CW. Unfortunately, the excitement was tempered slightly by the noticeable lack of any big runs in my log. In fact, only 1900 stations were to be found, which was hardly competitive in my mind.

The log was submitted with a measly 833K (1817/40/114) as the final score. Imagine my surprise when someone sent me a copy of the claimed scores with my tally on the top of the heap! I can only suspect that the tremendous high-band conditions that year drew most of the bigger stations to the higher frequencies, leaving 20 with little competition.

The 1988 CQ WW remains my only win in a contest from ZS and is likely to stay for the foreseeable future. However, I'm not likely to forget it soon. By the way, all my beams are now fed with coaxial transformers. However, given my fortunate change in strategy, maybe the ferrite approach isn't so bad after all!

2 Baldwin Street, Windham, NH 03087

Calendar of Events

Mar.	**30-31**	**CQ WW WPX SSB Contest**
Apr.	1	Poisson d'Avril Contest
Apr.	6	Wrkd All Winnipeg Award Day
Apr.	6-7	SP DX Contest
Apr.	10-11	DX YL-NA YL CW Contest
Apr.	17-18	DX YL-NA YL SSB Contest
Apr.	20-21	Ala.-Ga. QSO Party
Apr.	20-21	Connecticut QSO Party
Apr.	27-28	Swiss Helvetia Contest
May	4-5	ARI International DX Contest
May	4-5	MARAC County Hunters CW
May	18-19	Michigan QSO Party
May	**25-26**	**CQ WW WPX CW Contest**
Jun.	8-10	ARRL June VHF QSO Party
Jun.	15-16	All Asian SSB Contest
Jun.	22-23	ARRL Field Day
July	1	Canada Day Contest
July	6-7	Venezuela SSB DX Contest
July	13-14	IARU Championship Contest

Contesting Loses Another Member

Homer Spence, K7RA, a longtime Seattle, Washington contester, unexpectedly passed away on January 18, 1991. Homer was an enthusiast amateur who gave back much more than he received, including his recent contributions as a member of the CQ WW Contest Committee.

Homer got his start in amateur radio in 1954 as WN8QXH and held many other

Top Scores
1990 World Radiosport Team Championship

Top Single Operator		Top Multi-Single		Top Multi-Multi	
N2IC/Ø	3,103,125	K8AZ	3,361,887	NX1H	1,795,040
NG8D	2,312,834	KW8N	2,371,782	LY2ZO	1,719,630
K1TO	2,275,290	HG5A	1,644,343	N2KW	964,320
KM9P	2,249,394	UL8LYA	1,525,248	UB4CWW	286,884
K3LR	2,090,048	OH1AF	1,465,767	5K3T	269,880
HAØDU	1,805,938	NØAX	1,183,050	W4QO	171,600
K4TEA	1,750,029	UB3IWA	1,175,200	UZ6LXM	149,058
K3WW	1,735,284	UB3JWW	1,168,020		
WB3KKX	1,717,828	AG6D	1,102,177		
KZ2S	1,564,280	UZ4WZA	1,041,323		

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CIRCLE 167 ON READER SERVICE CARD

Homer Spence, K7RA, receiving his World Record Multi-Multi P40V CQ WW Trophy.

DX callsigns, including YN3A, G5AXF, VP2MEX. He was also one of the leading motivators behind the successful trip to the Soviet Union in 1989 as US4P. That operation witnessed one of the first official RadioSport exchanges between the USSR and the West.

Homer was born in 1941 in Canton, Ohio and received his PhD from Ohio State University. He later became an Assistant Professor of Marketing at the Graduate School of Business Administration at the University of Washington (1967–75).

Homer's interests were varied and abundant, reflecting his keen intelligence. From 1975–78 he played the guitar in a Seattle band. In addition, he enjoyed amateur astronomy, actively flew as a licensed pilot, and participated in fluent conversations with experts in advanced physics. Homer's humorous side led him to perform as Homer Heterodyne on the long-running Ham Radio Hour program on KRAB-FM. He was also a baseball fanatic, founding the Belltown, Washington Baseball League. In recent years, Homer was the bartender at The Virginia Inn, where he would engage in daily discussions with friends about politics or other topics of the day. He was known around Seattle as an avid storyteller and teacher with listeners absorbing his every word. To many, Homer was a guru in so many ways.

Needless to say, Homer's real passion was for amateur radio. Homer was a key member of the World Radioteam Championship Committee. Although Homer was not nationally known as a "Top-Gun," he was one of the operators who was always "in there," preferring to operate from his second-story apartment with 100 watts for the sake of the challenge.

Homer passed away as a champion this year, being a participant in the record-setting effort of the P40V M/M effort in 1988. More importantly, Homer held an important position in the lives of his family and friends. He was always there to answer a question, laugh at a joke, or lend an ear. The Homers of this world are a rare breed. We'll miss you!

WRTC Results at Presstime

The first-ever World Radiosport Team Championship has been well covered and regarded as a success by virtually any measure. For the first time, serious contesters were located in one geographic location to slug it out in a battle of willpower and determination (and a little good fortune). As I go to press this month, the top scores per category have just arrived. Space permitting, I will print them in their entirety next month.

The WRTC highlights include a convincing win by N2IC/Ø in the single operator category. Equally impressive was the appearance by single operator HAØDU in a category clearly dominated by North Americans. The multi-single results featured a commanding victory by K8AZ, with significant scores achieved by four Soviet entries. The multi-multi class was led by the team at NX1H in a category that yielded a surprisingly large number of participants.

In total, the committee received 944 logs and will be awarding 198 pins (for working 30 WRTC stations) and 762 certificates in addition to the coveted 500 T-shirts (representing the top 500 final scores). Incidently, the score cutoff for the T-shirt awards was 67,039 points.

Needless to say, the efforts of the WRTC committee led by Danny Eskenazi, K7SS, and its supporters continue to amaze us all. As I mentioned in a previous column, a WRTC video will be available to commemorate this momentous event. You can obtain your copy in VHS format for $25 US ($40 US overseas airmail) by contacting: WRTC Committee, c/o Danny Eskenazi, K7SS, 4821 51st Street, Seattle, WA 98116.

Closing Remarks

As you read this, many of you will be making final preparations for another event-filled weekend at the Dayton Hamvention. As usual, I will be among the thousands and look forward to meeting my old friends and making some new ones. Hope to see you there!

Remember, the deadline for the July column is May 1st.

73, John, K1AR

Poisson d'Avril Contest

0000Z–1954Z Mon., Apr. 1

This is the 42nd running of this old classic, sponsored by the French LIRPA-LOOF Foundation (Legion International des Radio Professionels et Amateurs-Lacrimer d'Oignons en Oeil Fondation). Its purpose is to promote the humorous use of amateur radio throughout the world.

The basic idea is to work as many other stations in the world as possible on any band or mode. Any station may work any other station as many times as possible on each band/mode.

Eligibility: All present regularly issued license holders,friends, or otherwise licensed stations.

Exchange: RS(T), serial number (beginning with any number you want, but numbers may not be skipped), QTH (yours or any one you choose), and your own birthday (month/day). Stations heard signing just the last two letters of their callsign will be disqualified.

Scoring: Count 1 point for each station worked or heard; 105 points for any station whose birthday is the same day as the contest; 142 points for any station whose picture appears on the cover of a major amateur radio magazine; 256 bonus points for making at least one QSO without the use of commercial, generator, battery, solar, chemical, biological, thermoelectric, or similar power sources. Other arbitrary bonus points you choose to claim will be reviewed by the Poisson d'Avril Contest Committee. Final score is calculated by multiplying total points by total number of multipliers.

Multipliers: Every station worked or heard counts as a multiplier, but only once per QSO. Exception—stations located in the District of Columbia do not count as multipliers unless they are employed by the U.S. Government. Be sure to ask!

Frequencies: CW—1825, 3525, 7025, 10125, 14025, 18075, 21025, 24875, 28085; SSB—1850, 3799, 3830, 7204, 14159–14165, 14178, 14220, 14300, 14313, 21325, 28888; SSTV, RTTY, FM, Packet, AMTOR, HECTOR, Telepathy—usual frequencies.

Entry Categories: Single operator unassisted, single operator assisted, single operator incapable, multi-operator indivisible, telephone operator, living legend, and just fooling around categories.

Logs submitted on computer disk will be accepted provided they are submitted on either a CP/M 8-inch EBCDIC formatted floppy disk or a 5¼ inch 100 MB hard drive.

Club Competition: Any club or non-club group may enter a club aggregate score. The club secretary must submit a list of all eligible members, and all club members must operate from the same continent unless on a DXpedition specifi-

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215WB Boomer 15 el	95.95
A147-4 FM yagi	36.95
A449-6 FM yagi	35.95
AOP-1 Oscar pkg	183.95
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A4S TriBand 4 el	373.95
AP8 HF Vert	172.95
R5 HF Vert	239.95

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NLA220 + NLA450	28.95
LM150 2M, Mobile	25.95
LM220 + LM450	25.95
NMO2/70 Dual	39.95
NLA2/70 Dual	38.95
NMOMM Mag. Mt	20.95
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NMOK Perm. Kit	12.95
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RM10S/RM15S super resonator	17.95
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RM30 20mt. std. resonator	17.95
RM40/RM40S std. and super resonator	18.95/26.95
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PHF20 20m resonator	18.95
PHF40 40m resonator	18.95
PHF75 75m resonator	19.95
PHF160 160m resonator	69.95
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CR2AM 2M mag. mt	$44.95
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AS25G access shelf	28.00
AS45G access shelf	70.00
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M200 10' mast	18.00
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SB45G short base	70.20
EF2545G gin pole	396.00

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RG8X (9091) Mini	.22 cts.
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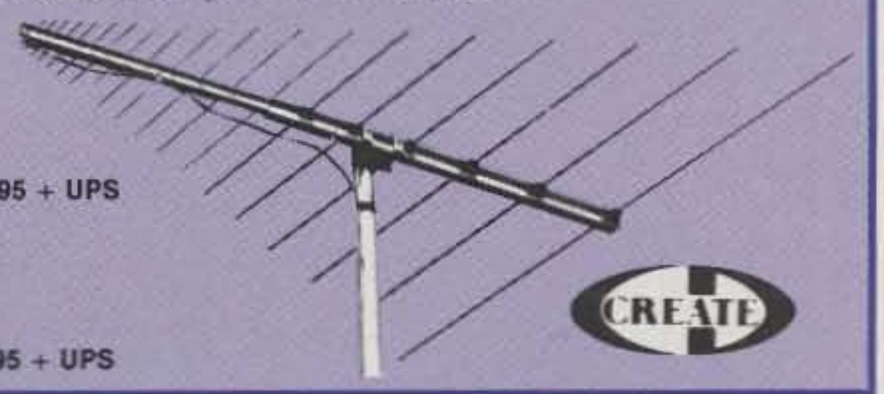
CreateRoof Towers Constructed Of High Grade Aluminum With Galvanized Steel Bracing For Added Stability And Strength. Will Easily Accommodate Your Antenna Requirements. Three Sizes Of Roof Towers Will Support VHF Antennas. HF Tri-Banders. And Oscar Systems. Rotators Easily Mount Inside The Tower. An Optional Thrust Bearing (CK46) is Recommended. Specifications Are Subject To Change Without Notice Or Obligation.
*Subject To Availability

Model	Height	Maximum Antenna Wind Load in FT 2	Base Width	Max. Vert. Load Lbs.	Tower Weight Lbs.	CALL FOR PRICES
CR-18	5'10"	21 @ 90 MPH	31⅛"	440	28	
CR-30	9'10"	27@ 90 MPH	39"	1,322	39	
CR-45	14'9"	23@ 90 MPH	39"	881	55	
CK-46	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2⅛"					

For Safety's Sake All Towers Should Be Guyed. *U.P.S. Not Included

CLP 5-130-1
- 50-1300 MHz
- 23 Elements Longest 9'10"
- Boom 5'9" **$239.95 + UPS**

CLP 5-130-2
- 108-1300 MHz
- 19 Elements Longest 4'6"
- Boom 4'6" **$139.95 + UPS**



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- **80% Of All Hams In Japan Use Emoto**
- **Highest Quality—Special Features—Compare**

Model	Sq. Ft.	Roto TQ	Brake TQ	Note	CALL FOR QUOTE
105TSX	10.9	37 ft.#	215 ft.#		
747SRX	21.8	50	502	H.S.	
1105MSX	27.3	57	717		
1105MSAX	27.3	57	717	P.S.	
1200FXX	27.3	143	1290	H.S.	
1300MSAX	32.7	215	1792	P.S.	
1800FSX	38.2	287	2150	P.S.	

H.S. HiSpeed P.S. Pre-Set #10 SASE Full Line Details

DATONG

FL3 Multi Mode Audio Filter w/Audio Notch
FL2 Multi Mode Audio Filter
ANF Automatic Notch Filter
AD270 Indoor Receiving Antenna 200 kHz-30 MHz
AD370 Outdoor Receiving Antenna 200 kHz-30 MHz

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IC735 HF Xcvr	IC781 HF Xcr
IC751A HF Xcvr	IC228H VHF Mobile
IC765 HF Xcvr	IC2SAT 2m HT

AND MUCH MORE!

KENWOOD

TS140HF Xcvr	TM231 VHF Mobile
TS440S HF Xcvr	TM731 VHF/UHF Mob.
TS950S/D HF Xcvr	TH25AT 2m HT

AND MUCH MORE!

YAESU

FT747GX HF Xcvr	FT212RH VHF Mobile
FT57GXII HF Xcvr	FT411E 2m HT
FT767GX HF Xcvr	FT470 VHF/UHF HT
FT1000 HF Xcvr	

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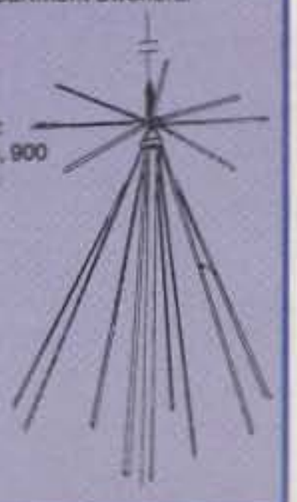
The ultimate wide-band omnidirectional antenna for hours of listening pleasure. Not only a great receiving antenna, it can transmit on 50 MHz, 144 MHz, 430 MHz, 900 MHz and 1200 MHz. Stainless steel materials complete with mounting hardware. Type "N" connectors. Only 5'6" tall which enables indoor installations for apartment dwellers.

WB 1300
Frequency:
Receive—25-1300 MHz
Transmit—50, 144, 430, 900 & 1200 MHz
Max. Pwr.: 200 W
Length: 5'6"
Connector: "N" Type
Mast Dia.: .98"-2"
Weight: 2.2 lbs.



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- PRICES DO NOT INCLUDE FREIGHT
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- RETURNS SUBJECT TO 20% RESTOCK FEE

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The dual banders of the future are here! ICOM's IC-24AT dual band handheld and IC-3220 dual band mobile provide you all the advantages with the most feature packed, power packed dual banders available.

Whether your needs require the mobility of the IC-3220 or the convenience of the IC-24AT mini-handheld, ICOM has the dual bander fit for you.

The IC-24AT mini-handheld and the IC-3220 mobile give you full operation on the 2-meter and 440MHz amateur bands with outstanding flexibility and performance!

The IC-24AT offers 40 memories, 5 watts, programmable scanning, priority watch, a battery saver, plus a DTMF pad for autopatching...the list is endless. Among the many features of the compact IC-3220 are a built-in duplexer, simultaneous dual band receive, auto dialing and a memory transfer function. For full details and specs on the IC-24AT and IC-3220, call the ICOM Brochure hotline at 1-800-999-9877. See them today at your quality ICOM amateur dealer.

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IC-765

HF TRANSCEIVER

Selected as the official radio of the World Radiosport Team Championships, a cultural exchange event of the 1990 Goodwill Games™, the IC-765 exemplifies ICOM's commitment to excellence in performance. The IC-765 incorporates the finest technology with the best designs to produce unbeatable HF operation for competitors worldwide.

The IC-765 sports: **Band Stacking Registers**. Each band's VFO's retain the last selected frequency, mode and filter choice when changing bands. Produces the equivalent of 20 VFO's; two per band. Great for multiband DX'ing! **99 Fully Tunable Memories.** Store frequency, mode and filter selections. **Direct Digital Synthesizer (DDS).** Assures ultra-fast PLL switching and lock-in for excellent PACKET, AMTOR and CW QSK operations.

Unlimited Operating Capability! The three step attenuator cuts multi-station overloads. Additional features include a **Built-in AC Supply, 100 percent duty cycle** for consistent high quality operation, **Fully Automatic Antenna Tuner, Iambic Keyer, Narrow 500Hz CW Filters** and **CW Pitch Control.**

The IC-765 general coverage receiver covers all bands and all modes.

Backed by ICOM's full **one-year warranty**, the IC-765's world class performance and superb reliability make it . . . the Choice of Champions!

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CIRCLE 165 ON READER SERVICE CARD

cally for this contest. Club members should clearly indicate their club affiliation on their summary sheet.

Awards: There is an extensive awards program for this contest, including certificates and an opportunity to win $10 million in the Publishers Clearing House Sweepstakes. All awards will be awarded to whomever the committee feels deserves them. Both actual score and entry creativity will be considered. The decisions of the judges are arbitrary and final.

Logs must be postmarked by April 15, 1990, the same day as your income tax return. Make sure you send the right forms to the right place! Logs go to P d'A Contest Committee, 144 Kendall Pond Road, Windham, NH 03087, with SASE and substantial compensation for results. Tax forms go to the Internal Revenue Service.

Worked All Winnipeg Award Day

1700Z–2359Z Sat., Apr. 6

This operating event is sponsored by the Winnipeg Amateur Radio Club and is designed to help participants achieve the Worked All Winnipeg Award. This award is a beautiful certificate on parchment paper stock with drawings along its border of many of the buildings that represent the attractions of Winnipeg, Manitoba, Canada. During the day, at least 15 Winnipeg stations will be activated. To win your operating award, stations outside of Manitoba (but within North America) must work 15 different Winnipeg stations. Stations outside of North America need only work 10 Winnipeg stations to be eligible. QSL cards are not required, but a certified log signed by two other amateurs is required together with $2.00 or 6 IRCs. Send your log data to: Worked All Manitoba Award, Dick Maguire, VE4HK, P.O. Box 352, Winnipeg, Manitoba Canada R3C 2H6.

Polish "SP" DX Contest

1500Z Apr. 6 to 2400Z Apr. 7

Sponsored by the Polski Zwiagek Krotkofalowcow (PZK), this one is held the first weekend of April, and generates a good level of activity by the SPs.

Classes: Single operator, single and all band. Multi-operator, single transmitter (all band only), and SWL.

Exchange: Signal report plus a three-digit serial number. SP stations will include a two-letter province abbreviation.

Multiplier: Polish provinces (total of 49).

Scoring: 3 points per QSO times the number of Polish provinces worked (maximum 49).

Bands: 160–10 meters (no WARC bands).

Awards: Certificates to winning stations in each class in each country.

Mailing deadline for logs is 30 days after the end of contest. Mail to Polski Zwiazek Krotkofalowcow, Contest Committee, P.O. Box 320, 00-950 Warsaw, Poland.

DX-YL to NA-YL Contest

CW: April 10–11 SSB: April 17–18
1400Z Wednesday to 1359Z Thursday

This is a YL activity in which DX YLs will be contacting YLs on the North American Continent. (KH6 and KL7 are DX.)

All bands may be used. However, cross-band, nets, and repeater contacts do not count. Likewise, contacts with OMs do not count. The same station may be worked on each band and mode for QSO credit. SSB and CW are separate contests and require separate log sheets. You may only operate 24 hours out of the 36 hours and off times must be clearly indicated in the log.

Exchange: Station worked, QSO no., RS(T), and US state, VE province, or DX country.

Multiplier: US state, Canadian province, or DX country. The multiplier is counted once only, not once per band.

Scoring: One point per QSO. Multiply total by sum of states, provinces, and countries worked. There is a power multiplier for stations running 150 watts or less on CW and 300 watts or less on SSB. If you qualify, multiply your final score by 1.5 for your final score.

There is a penalty of 3 additional QSOs for each duplicate QSO removed from your log for which credit was taken.

Frequencies: CW—3555, 7055, 14055, 21195, 28195. SSB—3955, 7255, 14295, 21395, 28595 (plus or minus 15 kHz, and other frequencies used by DX stations.)

Awards: Four cups will be awarded to first-place winners, DX and NA, on both SSB and CW. Two plaques will be awarded to the highest combined CW/SSB score (both DX and NA winners). Certificates will be awarded to the second- and third-place winners.

Submit separate logs for each contest, including a summary sheet showing the scoring, transmitter power, and other essential information. The usual signed declaration is also requested. Entries with more than 200 QSOs should use a separate sheet for each band and include a dupe sheet.

Entries must be postmarked no later than 30 days after the contest and should be sent to Dana Tromba, N0FYQ, RR 1, Box 213, Peck, KS 67120.

Connecticut QSO Party

2000-0200Z Sat., Apr. 20 to Sun., Apr. 21
1200-2000Z Sun., Apr. 21

This is the annual running of the Connecticut classic sponsored by the Candlewood Amateur Radio Association. Each station can be worked once per band and mode, and may be worked again in different counties.

Exchange: RS(T), Serial number (starting with 001), and QTH (CT county, state/province, DXCC country).

Scoring: Count 1 point for SSB QSOs; 1.5 points for CW, RTTY, AMTOR, Packet, and 2-way ATV; 5 points for OSCAR; and 10 points for working the CARA club station, W1QI and W1AW.

Multipliers: CT counties for stations outside of Connecticut. Inside Connecticut, use CT counties, states/provinces, and a single DX multipler credit (regardless of the number of DXCC countries you work).

Frequencies: SSB—1860, 3927, 7280, 14280, 21370, 28370, 50150, 146550; CW—band edge plus 40 kHz, Novices use their band edge plus 25 kHz.

Awards: Certificates will be awarded to the high scorers in each state/CT county. In addition, certificates are available to the highest CT club and participating member. A special certificate will be awarded to any station working all Connecticut counties.

Logs must be postmarked no later than May 31, 1991. Please send your results to: Candlewood Amateur Radio Association, Box 143, Bethel, CT 06801.

MARAC County Hunters SSB Contest

0001Z Sat. Apr. 20 to 2400Z Sun., Apr. 21

The Mobile Amateur Radio Awards Club is sponsoring the 20th running of this event. Mobile and fixed operation from every county in the United States is welcome. Mobiles and portables may be worked each time they change counties or bands.

Exchange: QSO number, RS(T), U.S. county and state (province/country for others).

Scoring: 1 point for fixed stations; 15 points for mobiles; US/VE contacts with DX countries are worth 5 points. Final score is computed by the total QSO points times U.S. counties worked.

Frequencies: 3880, 7240, 14270, 21340, 28340. Fixed stations should operate above the suggested frequencies and allow mobiles to operate below.

Awards: Certificates will be awarded to winning fixed stations in each state/province/country (with 1000 or more points); mobiles in each state operating in 3 or more counties with a minimum of 10 QSOs per county. MARAC plaques to the highest scoring first- and second-place mobile stations in the U.S., North American fixed station, and DX station who scores at least 50,000 points.

Completed logs, summary sheets, and check sheets must be received by May

20, 1991 and go to: WA5DTK, Barry Brewer, 5518 12th Street, Lubbock, TX 79416. Include an SASE for final results.

Swiss Helvetia Contest

1300Z Apr. 27 to 1300Z Apr. 28

This is a good chance to build up your Canton total for the Swiss Helvetia Award which requires confirmation of all 26 Cantons.

Frequencies: 1.8–28 MHz (no WARC bands). Phone and CW.

Exchange: RS(T) plus a 3-digit serial number. Swiss stations will also include a two letter abbreviation for their Canton.

Scoring: Only contacts with Swiss stations count. Each contact with an HB station is worth 3 points. You may only work a station once per band regardless of the mode.

Multiplier: The sum of the Cantons worked on each band (26 per band).

Final Score: Total QSO points multiplied by the sum of Cantons worked.

Awards: Certificates to the top scorers in each country and each USA and VE call area.

Logging: Indicate a Canton in a separate column for each band the first time it is worked. Check your log for duplicates and include a summary sheet showing the scoring and your name and mailing address in block letters. Also include the usual signed declaration.

Mailing deadline for contest logs is June 1, 1991. All logs to: USKA Traffic Manager, Walter Schmutz, HB9AGA, Gantrischweg 1, CH-3114 Oberwichtrach, Switzerland.

Alabama/Georgia QSO Party

1800Z Sat., May 12 to 2200Z Sun., May 13

This QSO party is jointly sponsored by the Birmingham Amateur Radio Club (Alabama) and the Dixie DX'ers Contest Club (Georgia). Stations can be worked on each band and mode. Mobile and portable QSOs are valid each time they change counties. Stations operating on county lines will be counted as only one QSO. Alabama and Georgia stations may work each other for QSO and multiplier credit.

Classes: Operating categories include mobile, portable, fixed stations, CW and SSB, single and multiple operator.

Exchange: Serial number and QTH (county for AL/GA stations plus state; state, province, or DXCC country for others).

Scoring: Two points for each SSB QSO; 4 points for each CW QSO except on 80 and 160 where CW contacts are worth 8 points. Final score is total QSO points times multiplier (AL/GA counties for non-AL/GA stations; states, provinces, DXCC countries (5 maximum), AL/GA counties for others). Mobiles in AL/GA may add 200 bonus points for each county from which they operate (10 QSOs minimum).

Frequencies: CW—1810 and 40 kHz from bottom of band; SSB—1840, 3850, 7230, 14250, 21300, 28400, 50110, 144200, 144500 kHz (use of repeaters is not permitted). Try 160 meters at 0300Z and CW on the half hour.

Awards: Certificates will be awarded to high scores in each operating class. A trophy will be given to the highest scoring Georgia station.

The mailing deadline is June 1, 1991. SSB-only logs are sent to: Bill Levey, WA4FAT, 3164 Cahaba Heights Road, Birmingham, AL 35243. CW and mixed logs go to: Alfred Roloff, N4UZ, 755 Waddell Road, Bremen, GA 30110. Include the usual summary sheet and a large #10 SASE for your certificate and contest results.

DAIWA

DEALER LIST

Ack Radio Supply	Atlanta	GA	404-351-6340
Ack Radio Supply	Birmingham	AL	205-322-0588
Air Waves	Mattapoisett	MA	508-672-0823
Allied Appliance & Radio	Englewood	CO	303-761-7305
Amateur & Advanced Comm.	Wilmington	DE	302-478-2757
American Electronics	Greenwood	IN	317-888-7265
Associated Radio	Overland Park	KS	913-381-5900
A-Tech Electronics	Burbank	CA	818-845-9203
Barry Electronics	New York	NY	212-925-7000
B.C. Communications Inc.	Huntington Sta.	NY	516-549-8833
Bobs Electronics	Spotswood	NJ	908-251-1444
Burghardt Amateur Center	Watertown	SD	605-886-7314
C-Comm Inc.	Seattle	WA	800-426-6528
CW Electronics	Denver	CO	303-832-1111
Delaware Amateur Supply	New Castle	DE	800-441-7008
Denny's Technical Service	Lemars	IA	712-546-6625
D J Systems	Riveira Beach	FL	407-845-7021
Electronic Equip. Bank	Vienna	VA	800-368-3270
Eli's Amateur Radio	Ft. Lauderdale	FL	305-525-0103
Flash Electronics	Porterville	CA	209-781-5011
Ham Radio Outlet	Woodbridge	VA	800-444-4799
Ham Radio Outlet	Salem	NH	800-444-0047
Ham Radio Outlet	Atlanta	GA	800-444-7927
Ham Radio Outlet	Phoenix	AZ	800-854-6046
Ham Radio Outlet	San Diego	CA	619-560-4900
Ham Radio Outlet	Anaheim	CA	800-854-6046
Ham Radio Outlet	Van Nuys	CA	818-988-2212
Ham Radio Outlet	Burlingame	CA	415-342-5757
Ham Radio Outlet	Oakland	CA	415-534-5757
Hamtronics Electronics	Trevose	PA	800-426-2820
Hardin Electric	Ft. Worth	TX	817-429-9761
H.C. Van Valzah Co.	Downers Grove	IL	312-852-0472
Henry Radio	Los Angeles	CA	800-877-7979
HR Electronics	Muskegon	MI	616-722-2246
International Radio	Miami	FL	305-594-4313
Jun's Electronics	Culver City	CA	213-390-8003
Kalmus Engineering	Woodinville	WA	206-485-9000
K-40 Electronics	Warren	MI	313-939-3700
K Comm	San Antonio	TX	800-344-3144
Lentini Communication	Newington	CT	203-667-3561
Lett Electronics	Topeka	KS	800-835-0250
Madison Electronics	Houston	TX	713-520-7300
Mar Vac	Costa Mesa	CA	714-650-2001
Memphis Amateur Electronics	Memphis	TN	901-683-9123
Michigan Radio	E. Detroit	MI	313-771-4711
Mike's Electronics	Ft. Lauderdale	FL	305-491-7110
Milbert Co.	So. St. Paul	MN	612-451-2241
N & G Distributing	Miami	FL	305-592-9685
North Olmstead Amat. Radio	N. Olmstead	OH	216-777-9460
N4EDQ Radio Sales	Mount Dora	FL	904-589-0222
Omar Electronics	Loganville	GA	404-446-3241
Omni Intl. Trading	Seattle	WA	206-628-2923
Portland Radio Supply	Portland	OR	503-233-4904
Quad Electronics	Pensacola	FL	904-438-3319
Radio Place	Sacramento	CA	916-441-7388
Radio Works	Portsmouth	VA	804-484-0140
Rays Amateur Electronics	High Point	NC	919-883-6038
RF Enterprises	Merrifield	MN	800-233-2482
Rivendell Electronics	Derry	NH	603-434-5371
Ross Distributing	Preston	ID	208-852-0830
R & L Electronics	Hamilton	OH	513-868-6399
Soundnorth	So. Int. Falls	MN	218-283-9290
Super Sound	San Fernando	CA	818-361-1339
Tel-Comm, Inc.	Littleton	MA	617-486-3400
Texas Towers	Plano	TX	214-422-7306
The Ham Station	Evansville	IN	800-729-4373
Universal Amateur Radio	Reynoldsburg	OH	614-866-4267
VHF Communications	Jamestown	NY	716-664-6345
Western Radio	San Diego	CA	619-268-4400
Westside Comm. Supply	St. Petersburg	FL	813-345-0739

POWER SUPPLIES

MODEL PS140II

MODEL:		
PS304	**24A**	**18 lbs.**
PS120M	**9A**	**11 lbs.**

Daiwa power supplies consist of quality IC's, transistors and diodes. Each model contains a over-current limiting protection circuit. This protects the power supply circuitry when shorting positive and negative line or when over current flows through the power supply circuitry.

Input Voltage	117 VAC ± 10%
Output Voltage	13.5 V
Output Current	12A
Volt Fluctuation	Less Than 1%
Ripple Voltage	Less Than 3 mv
Protection Circuit	When 14-2A
Pwr Consumption	350W Max.
Dimensions	128 × 104 × 225 mm
Weight	11 lbs.

Cross Needle SWR/Power Meters for All Bands

NS-660PA

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

All models back lit *Average Power Reading Only

MOBILE/BASE CROSS NEEDLE SWR/POWER METERS

CN-460M

CN-520

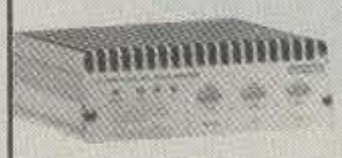
Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-410M*	3.5-150 MHz	15/150 W	SO-239
CN-460M*	140-450 MHz	15/150 W	SO-239
CN-465M*	140-450 MHz	15/75 W	SO-239
CN-520**	1.8-60 MHz	200 W/2 Kw	SO-239

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

LINEAR AMPLIFIERS

80W

This Model is Available with Commercial Frequency Band—Special Order



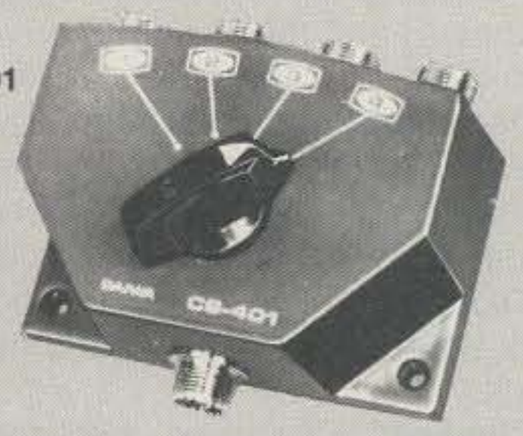
LA2080H

Model	LA2080H	LA2065R	LA2155H	LA2035R
Freq	144-148 MHz	144-148 MHz	144-148 MHz	144-148 MHz
Preamp Gain	15 dB	15 dB	15 dB	15 dB
Input Pwr	1-5W	1-14W	Low - 1.5W High - 25W	1-5W
Output Pwr	1.5Win-30 out 5Win-80out	10W-60out	1.5Win-150out 25Win-150out	1.5 in-30out
Power Consump	13.8VDC/ 12A Max	13.8VDC/ 8A Max	13.8VDC/ 27A Max	13.8VDC/ 5A Max
Dimension	122-45-175mm	122-45-175mm	170-79-250mm	100-35-140mm
Accessory	W/RX	W/RX	W/RX	W/RX

Coaxial Switches

PAT. No. 59-0003803

CS-201



CS-401

	CS-201 2 Position	CS-201G II 2 Position	CS-401 4 Position	CS-401G 4 Position
Frequency:	500 MHz	1.3 GHz	800 MHz	800 MHz
Connectors:	SO-239	N type	SO-239	N type
Isolation:	+60 dB	+60 dB	+ 50 dB	+ 50 dB
Power Rating:	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW

Insertion Loss: All models less than 0.2 dB

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DAIWA CN101

- **Cross Needle Meter Reads Forward Power, Reflected Power & VSWR Simultaneously**
- **PEP Monitor Function**
- **High Performance-Low Cost**

Frequency	1.8-150 MHz
Pwr Range: Forward	15/150/1.5 kW
Pwr Rating	1.5 kW (1.8-60 MHz) 1 kW (144 MHz)
Accuracy	±10% (of full scale)
SWR Detection Sensitivity	4 W minimum
Input/Output Connectors	M (SO-239)
Dimension (W × H × D mm)	155 × 80 × 100 mm
Weight	1.5 lbs.

DP830

- **Digital VSWR/Pwr Meter**
- **Presents Forward Pwr/SWR By Bar Graph**
- **Beep Tones To Confirm SWR**
- **Clock Function-Displays 4 Different Time Zones**

Frequency	1.8-150 MHz & 140-525 MHz
Power Range	0-1.5 kW & 0-150W
Input/Output Connectors	S0-239/N or N/N
Dimensions (W × H × D mm)	150 × 65 × 110 mm
Weight	2.3 lbs.
Batteries Supplied*	Yes * DP830 only

PS140II

- **DAIWA Brings You A Quality 12 Amp Power Supply**
- **Features A Over-Current Limiting Protection Circuit**
- **Available In 230 VAC For Special Orders**

Input Voltage	117 V AC ±10%*
Output Voltage	13.8 V
Output Current	12 A
Volt. Fluctuation	Less Than 1%
Ripple Voltage	Less Than 3 mV
Circuit Protection	14.2 A
Pwr Consumption	350 W max.
Dimensions (W × H × D mm)	128 × 104 × 225 mm
Weight	11 lbs.
*230 V AC Available For Special Orders Only 2-3 Month Delivery	

NEW!

PS304

- **Compact And Lightweight Designed For Efficiency**
- **Maximum Output Current 30A**
- **Volt/Amp Meter**
- **Cigarette Lighter Socket**
- **Quality ICs, Transistors And Diodes**

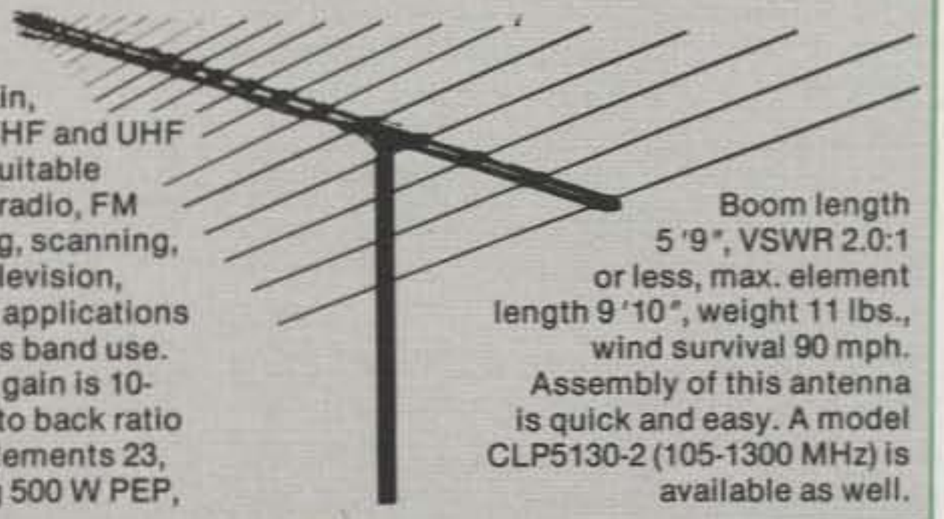
Output Voltage	1-15 V DC Variable
Output Current	24 A
Circuit Protection	32 A
Pwr Consumption	600 W max.
Dimensions (W × H × D mm)	175 × 150 × 225 mm
Weight	17.5 lbs.

CREATE

High Grade Aluminum Roof Towers For Your Antenna Requirements. Available In Three Heights To Maximize Your Installation. Guying Is Required To Insure Safety.

Model	Height	Base Width	Max. Wind Load FT²	Max Vert. Load Lbs.	Weight
CR18	5'10"	31½"	21 @ 90 mph	440	18
CR30	9'10"	39"	27 @ 90 mph	1,322	33
CR45	14'9"	39"	23 @ 90 mph	881	57

CLP5130-1 Log Periodic 50-1300 MHz



This high gain, wide-band VHF and UHF antenna is suitable for amateur radio, FM broadcasting, scanning, VHF/UHF television, government applications and business band use. The forward gain is 10-12 dB, front to back ratio 15 dB, # of elements 23, power rating 500 W PEP,

Boom length 5'9", VSWR 2.0:1 or less, max. element length 9'10", weight 11 lbs., wind survival 90 mph. Assembly of this antenna is quick and easy. A model CLP5130-2 (105-1300 MHz) is available as well.

EMOTO ROTATORS

Model	Wind Load	Max. Load	Stat. Torq.
201SAX	7.6	660	108
105TSX	10.9	660	215
747SRX	21.8	1100	502
1105MSAX	27.3	880	717
1200FXX	27.3	1760	1290
1300MSAX	32.7	1760	1792
1800FSX	38.2	2200	2150

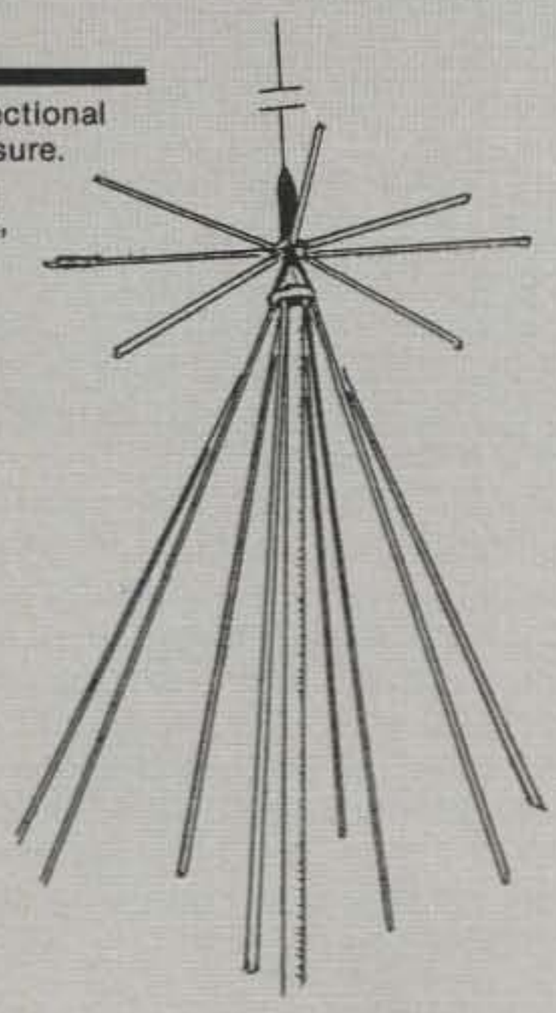
1105 MSAX

DATONG ELECTRONICS LIMITED

FL3-Multi Mode Audio Filter With Auto-Notch
FL2-Multi Mode Audio Filter (Same As FL3 w/o Auto-Notch)
ANF-Automatic Notch Filter
AD270-Indoor Active Antenna, 200 KHz-30 MHz
AD370-Outdoor Active Antenna, 200 KHz-30 MHz

NEVADA

The ultimate wide-band omnidirectional antenna for hours of listening pleasure. Not only a great receiving antenna, it can transmit on 50 MHz, 144 MHz, 430 MHz, 900 MHz and 1200 MHz. Stainless steel materials complete with mounting hardware and short mast section. Only 5'6" tall which enables indoor installations for apartment dwellers.



WB 1300

Frequency:
Receive—25-1300 MHz
Transmit—50, 144, 430, 900 & 1200 MHz
Max. Pwr: 200 W
Length: 5'6"
Connector: "N" Type
Mast Dia.: .98"-2"
Weight: 2.2 lbs.

Call Your Favorite Dealer To Place Your Order Today

Radio FUNdamentals

BY BILL ORR, W6SAI

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

What To Do About Telephone Interference

Wall Street has its junk bonds. Amateur radio has its junk telephones. Have you noticed how sensitive to RF some of the new touch-tone phones are? My next-door neighbor has a winner. All it needs is a BFO and it will make a good SSB receiver!

There's a lot of fine information in the *ARRL Handbook* and in the *Interference Handbook*[1] by Bill Nelson, WA6FQG, concerning various types of household phones and how you can add chokes and capacitors inside the unit to fight RFI. That's good information, but I don't like the idea of digging into a neighbor's telephone. I would have to disconnect it and bring it to my shop to work on it, and even if I was successful in cleaning it up, I'm sure my neighbor would blame me in the future if anything went wrong with the phone! That's human nature.

I think a better idea is to leave the phone alone and prevent RF from getting to it. The telephone line acts as a gigantic antenna, feeding nearby RF into the phone. If I could isolate the telephone from the line, with regard to RF, the problem might be solved the easy way.

What Not To Do

Since one of my own phones was jammed when I went on the air, it served as a test-bed for my experiments. I also enlisted the help of Tiff, W6GNX, who had a laboratory-type signal generator and spectrum analyzer. Also providing support and helpful suggestions was Marv, W6FR, who had good success suppressing phone RFI with a high-Q tuned filter in the line.[2] He concluded from his tests that at least 30 dB of signal attenuation is required to successfully decouple the phone from the line.

The first step was to check out the easy solutions. A lot has been written about wrapping the phone cord around a ferrite rod or toroid, or buying the AT&T telephone Z-100A filter (expensive!). Between Tiff and me we had three Z-100A units and a bunch of toroids and rods at hand. We decided to check out the Z-100A filters first, making measurements on all amateur bands between 3.5 and 50 MHz. The first two Z-100As were ineffective, providing less than 3 dB attenuation in the HF range! The third Z-100A filter, however, performed remarkably well. Under the same measuring conditions, filter number three (which looked just like the first two) provided over 40 dB attenuation from 3.5 to 14 MHz. The attenuation dropped to 30 dB at 29.7 MHz and to 22 dB at 50 MHz. Not bad at all!

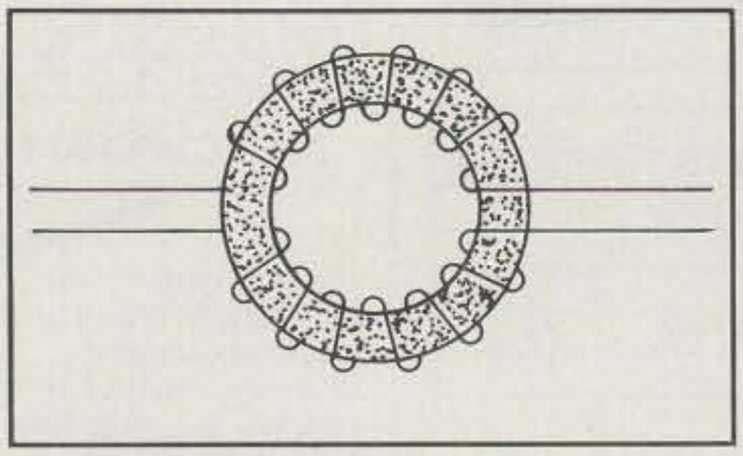
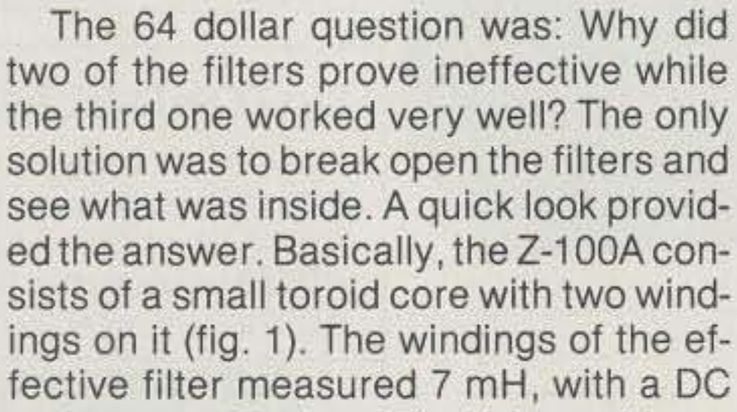


Fig. 1– Z100-A filter consists of two windings on a small ferrite core.

The 64 dollar question was: Why did two of the filters prove ineffective while the third one worked very well? The only solution was to break open the filters and see what was inside. A quick look provided the answer. Basically, the Z-100A consists of a small toroid core with two windings on it (fig. 1). The windings of the effective filter measured 7 mH, with a DC resistance of 8 ohms. The little toroid was stamped with the identification 1715AM and 85NR4. The toroid was about the size of a dime.



C1 = C2 = .0047 uFd, 500V
L1 = L2 = 470 uH toroid
P2 = Standard modular plug with cable
Note: Confirm polarity (red-to-red, green-to-green).

Fig. 2– In-line filter mounted in the Gemini box.

Breaking open the ineffective Z-100A filter revealed a much smaller toroid. It measured 14 mH, with a DC resistance of 4.5 ohms. The identification numbers were 1722B and 88NR11.

Only AT&T knows why two filter designs exist with the same Z-100A identification number. About the only way the prospective purchaser of a Z-100A filter can make sure he gets the better one is to measure the DC resistance from input to output terminations. This is not easy to do, as the filter is sold encased in a bubble-pack container. Caveat Emptor!

Ferrite Rods and Cores

Our attention next was turned to the scheme of wrapping the telephone line around a ferrite device. We took a ferrite rod 7.5 inches long and ½ inch in diameter (No. 33 material with a permeability of 800) and wrapped about 40 turns of the telephone line around it. The line was held in position with plastic tie-wraps. The assembly measured 170 uH end to end.

Results of this test were discouraging. Attenuation ranged from 4 dB at 3.5 MHz to 6 dB at 50 MHz. This small amount of attenuation was hardly worth the effort! We assumed that the capacitance between turns of the windings degraded the effectiveness of the choke. The next test was to wrap the phone cord through a snap-together, square ferrite core. Since the center hole was small, only 15 turns of the phone cord could be passed through the core. Inductance measured 28 uH. Attenuation ranged from 4 dB at 3.5 MHz to 6 dB at 50 MHz—not very good, and a long way from the figure of 30 dB, or more, that we were shooting for!

The Homemade In-line Filter

The next experiment was with an in-line filter. This necessitated cutting into the phone line. Marv, W6FR, suggested a neat way of doing this. We purchased several in-line "Modular Jacks." These inexpensive snap-apart plastic boxes have a standard phone jack on one end and plenty of room inside to build a filter (fig. 2). The particular box recommended by W6FR was a "Gemini Modular Jack Assembly TA-61K" distributed by Gemini Industries Inc. (215 Entin Rd., Clifton, NJ 07014). The box can be found in many

*48 Campbell Lane, Menlo Park, CA 94025

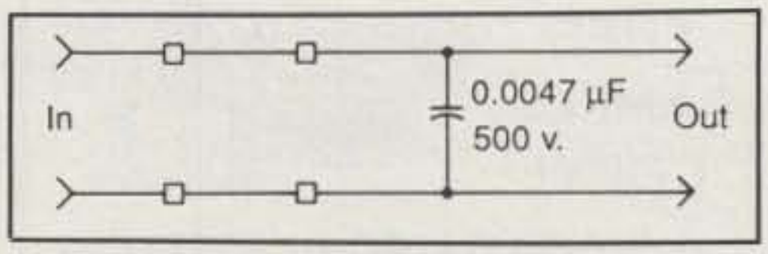


Fig. 3– Two ferrite beads on each phone line plus shunt capacitor provided 12 to 18 dB attenuation.

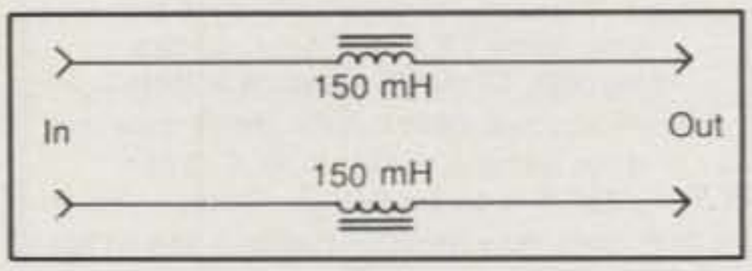


Fig. 4– Two small ferrite inductors provide 26 to 32 dB attenuation.

hardware stores and home-improvement centers.

The first test was to place three small ferrite beads (No. 73 material) on each phone line inside the box. Results were poor, with only 1 dB of attenuation at 3.5 MHz and 7 dB attenuation at 50 MHz. A combination of two beads on each line with .0047 uF capacitors across the line did much better (fig. 3). Attenuation was 12 dB at 3.5 MHz, peaking at 18 dB at 14 MHz, and dropping to 12 dB at 50 MHz—better, but not good enough!

The next step was to place two small 150 mH toroids in series with the phone wires (fig. 4). Much better! Attenuation was 26 dB at 3.5 MHz, rising to 32 dB at 50 MHz. This simple filter came within a cat's whisker of meeting the minimum 30 dB attenuation suggested by W6FR.

The Final Filter Design

A simple pi-section filter had been suggested by Rich, AG6K, and Bill, WA6EED. Armed with the information gained thus far, we decided to try a Butterworth design, having a cutoff frequency of 100 kHz (fig. 5). Filter charts show this configuration had a roll-off of 18 dB per octave, so the attenuation in the amateur bands should be well over 70 dB!

That's the theoretical value. We quickly found out that coupling between the two capacitors of the filter could seriously reduce filter rejection. With maximum spacing (about 2 inches between the capacitors) filter attenuation was better than 70 dB from 3.5 to 29.7 MHz. But when the filter was placed in the Gemini box, spacing between the capacitors was cut to about ⅝ inch. Filter attenuation dropped by about 10 dB across the passband! There was no problem of coupling between the inductors; both toroid and conventional solenoid-style inductors were tried. But capacitor placement was critical. It was possible to move the capacitors together and apart and watch the filter attenuation change on the screen of the spectrum analyzer.

Placing the capacitors at each end of the Gemini box compartment was the best solution to this problem of unwanted coupling. Attenuation of better than 60 dB from 3.5 to 30 MHz seemed enough to do the job.

A final attempt was made to place a two-section filter in the Gemini box. Attenuation was only slightly better than that of the single section filter, due no doubt to the close proximity of the capacitors in the filter.

Building A Practical Filter

The single section filter fits nicely in the Gemini box (see fig. 2). Components are mounted directly to self-tapping screws in the box. Try and find tiny, ferrite toroid inductors having a DC resistance of 6 ohms or less. An alternative choice is encapsulated solenoid-type inductors that resemble a half-watt resistor.

Once the components are mounted in the box, the filter is completed by attaching a short length of phone cord with a male plug to the free end of the filter. You can epoxy the cord to the walls of the box. The fragile copper wires of the phone cord require a steady hand to cut and tin. (Reminds me of trying to solder the tinsel wire in an old pair of Brandes headphones.)

The final test was to place the filter in the phone line directly at the instrument. It completely eliminated the interference from my transmitter. A second filter, placed at my neighbor's phone, also did the job. In both cases the interference was gone without having to dig into the innards of the telephones.

Thinking The Unthinkable

If line filtering doesn't clean up a particular phone, you'll probably have to go directly into the unit and add bypass capacitors across various varistors and other devices. The aforementioned books discuss this last resort in detail. I have never had to do it, so I can't offer any suggestions. My only thought is that if you find yourself in this difficult situation, buy your neighbor a new phone that you have tested and present it to him, along with a filter, with your compliments.

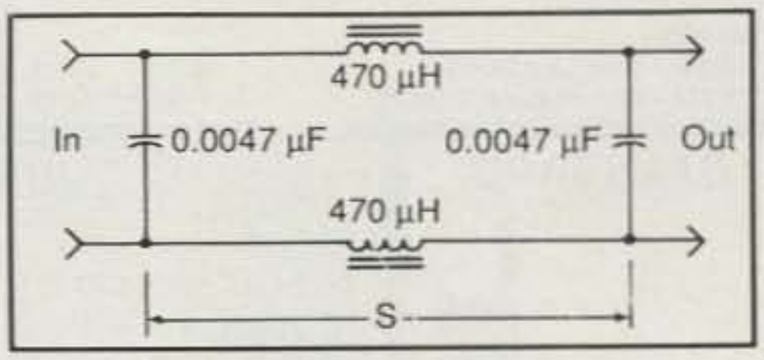


Fig. 5– Butterworth filter provides over 70 dB attenuation when S is greater than 2 inches. Use 500 volt capacitors, as ringing voltage is quite high.

Telephone Answering Machine

"Hi, I'm not at home now. Please leave your name and message when you hear the tone and I'll get back to you." . . . Beep!

Another invention of the devil. However, you can mount a good attack on the machine. If you are lucky, placing the line filter before the machine and the telephone will cure both problems, provided cord length between the machine and the phone is short.

However, the answering machine has a power line and your signal may be picked up by this "antenna." However, many houses are either wired with "knob-and-tube" wiring or "Romex." Some lucky amateurs live in residences where the AC line is placed in metal conduit. Line pickup is minimal in this happy situation. The poor souls (such as myself) who live in homes with exposed wiring can easily be victims of RF powerline pickup.

The simplest solution, and a good one, is to wrap the power line around a ferrite rod. Try to get about 40 turns or more on the rod. Hold the winding in place with cable ties or heat-shrink tubing. The low impedance of the power line (in contrast to the higher impedance of the phone line) allows this simple filter to do an acceptable job. If this does not provide sufficient attenuation, add .01 pF, 1.6 kV ceramic capacitors across the line at the input and output ends of the filter. A last resort is to place a bypass capacitor across sensitive circuits of the answering machine, a prospect that does not appeal to me.

Good luck, and if you come up with any other solutions to these vexing problems, please let me know so we can spread the good word!

The Dead-Band Quiz

The Dead-Band Quiz is designed to titillate your mind during those melancholy periods when the DX bands are dead. I must apologize for the time lag between the quiz and recognition of your replies to it. There's about a four month lag between writing the column and publication. Hence, the results of a particular quiz don't show up as fast as some readers might wish. Bear with me.

First, thanks for the kind words and best wishes from Phil, W0JHS; Bill, K6HV; Keats, W3QOM; Phil, K4COF; Steve, WD8NPL; Hollis, WF6U; Bob, W7GXX (Bob, weren't you portable on Tinian in the closing days of WW II?); Mike, WA8MCQ; Shel, W6EL; and Dave, W6CUB. Thank you all!

A late entry to the *Hound of the Baskervilles* quiz was Bob, WD4CNZ, who knows his Sherlock Holmes.

The January quiz ("Love to Ann") was a quote from the popular book and miniseries on TV *Tinker, Taylor, Soldier, Spy*.

Correct solutions are starting to come in. Congratulations to the following who correctly identified the incident: Jim, AA4UA; Bob, N3EFF; Steve, KM7U; Cal, W4YJV; and Hal, W6ZVV. Good work, people!

The New Dead-Band Quiz

Name the 1947 movie in which one of the leading stars never appeared in person. The award-winning picture featured Joseph Cotton as Holly Martins in post-war Vienna. Holly was looking for his old friend, Harry. Hint: the "invisible" star's name was Anton Karas.

Send your answer to me on a QSL card via my address at the beginning of this column. I'll print the names of the knowledgeable amateurs who know all about Holly and his adventures while staying in Sacher's Military Hotel. 73, Bill, W6SAI

Footnotes

1. Nelson, W.R., *Interference Handbook*, Radio Publications, Inc., 925 Sherwood Drive, Box 247, Lake Bluff, IL 60044.

2. Gonsior, M., "Telephone Susceptibility to RFI," *Communications Quarterly*, Fall 1990, CQ Communications, Inc., 76 North Broadway, Hicksville, NY 11801.

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Swing into Spring

While the scent of spring is still fresh in the air, this month we'll focus on some new antennas and accessories, yet we'll save room for some more "PC stuff" before closing out the column. Let's start with antennas.

Swing into Spring

Carolina Bug Katchers. George Shira, WD4BUM, of the Lakeview Co., has introduced his own version of a heavy-duty mobile antenna, the Model CBK-40 Carolina Bug Katcher (George operates from South Carolina, of course).

The new mobile antenna is priced at $79.50 and offers continuous coverage of all amateur, MARS, marine, and other bands in the range 7–30 MHz (an optional whip section is required for 10 meters). George says that the "ultra hi-Q" coil used represents a considerable efficiency improvement over his own single-band "hi-Q" Ham Stick HF mobile antennas, as well as over other brands of HF mobile loading coil.

The antenna consists of a Fiberglas™ base section, an air-wound hi-Q coil, a base fitting, a 47 inch adjustable stainless-steel tapered whip, coil clips, a matching coil, and a quick-disconnect connector. Optional equipment includes a short whip for 10 meters, a corona ball, additional coil clips, and aluminum base extensions.

The antenna is about 7½ feet long; storage length is 50 inches. It presents a "reasonable" wind load, though guying with 20 lb. monofilament fishing line is recommended. The bandwidth varies from a low of 30 kHz on 40 meters to full band coverage on 30, 12, and 17 meters. After initial setup, tuning from band to band requires only the moving of an alligator clip from one coil tap to another. Power-handling capacity is rated at 1000 watts DC. Although we've not had the opportunity to give the Carolina Bug Katcher a try, we've tried out many of George's products and can attest to their overall quality and performance.

George offers a free catalog of his antennas and supplies, which includes several novel products. One is the new "Super Quad Magnet," an assembly of four 5 inch powder-coated magnets to hold down even the heaviest of mobile antennas; another is a fender-mount ⅝-wave mobile antenna for 2 meters or 220 MHz; and a Discone base station vertical that offers coverage of 100 MHz to 2.5 GHz.

Lakeview's flyer also includes an interesting one-page technical paper entitled "What You Need to Know About Mobile High Frequency Antennas" that makes for very good reading. It's mostly about the important stuff, such as loading coil "Q," impedance, standing wave ratio (SWR), and efficiency. The main point it conveys is that when comparing center-loaded mobile whips of equal length, the center loading coil with the highest Q will present the feedline with the lowest impedance, the highest SWR, the narrowest bandwidth, and the greatest efficiency with the most radiated power.

For more information, contact George Shira, WD4BUM, at the Lakeview Co., Rt. 7, Box 258, Anderson, SC 29624.

Lindsay Amateur Radio Antennas. Lindsay is a Canadian firm that has specialized in custom-designed antennas since 1952. The company offers TV, FM, commercial and business, CB, and other antennas, in addition to amateur antennas. When I received their 33-page catalog, I frankly was surprised to discover the wide range of amateur antennas they offer.

One of their product lines is the 4Q and 6Q 2 meter Quagi series—with antennas having four and six elements, respectively–which offers claimed 11.5 dBd and 12.8 dBd gain. Another series is the TZU-A "low power TV transmit antennas" which feature omnidirectional horizontal polarization over the range 424–440 MHz. Another is the 5Q and 10Q series of Loop Yagis; these antennas are designed to yield maximum gain in the shortest possible length and are available for 220, 420, and 902 MHz.

Another, fairly unusual antenna offered by Lindsay is the Model 16-AC 16-element cross-polarized antenna for point-to-point communications on 2 meters. Still another is the 2ZZ and 4ZZ series "zig zag" antenna which borrows on commercial TV antenna designs for horizontal polarization on 144, 220, and 420 MHz. Lindsay also sells the LAC series antenna power dividers and combiners, available in several models for use on 144–2450 MHz, and especially suited for arrays of two, three, or four antennas.

For an illustrated catalog and spec sheets on their amateur products, contact Lindsay Specialty Products, 50 Mary Street, Lindsay, Ontario, Canada K9V 4S7.

GAP Challenger DX-V and DX-VI Update. In the December 1989 column we discussed the Challenger HF multiband vertical antennas and the patented GAP "elevated launch technology."

To briefly recall, the 31.5 foot verticals have no traps, coils, impedance transformers, baluns, or resistors. The antennas are unique in that they are not fed at the base, but rather at a point that is 16 feet up from the base. According to the manufacturer, with this design vertical antenna resistance is no longer fixed at 36 ohms, but can now be preselected. The reasoning is that since the base impedance of a vertical is normally about 36 ohms and the top is several thousand ohms, then somewhere in between is 52 ohms. It's at about this point where the antenna is fed. On a single band this point would be exactly 52 ohms, but with multiband operation there is some compromise. The high feedpoint is said to significantly reduce earth loss, normally a major problem with verticals. The Challenger verticals are largely ground independent as a result of this design, and use three short (25 foot) radials primarily for 75/80 meters.

What's new is that 6 and 2 meter coverage has been added to both antennas, making the Challengers into antennas that the fellow who operates both HF and VHF but can erect only one skyhook might well consider. The DX-V ($199) covers all of the 40, 20, 15, 10, 6, and 2 meter bands and 80 kHz of 80 meters. The DX-VI ($219) is similar, but also covers 12 meters and offers 130 kHz bandwidth on 80 meters. (The antennas also offer good performance as SWL antennas over the 3.5–30 MHz range as noted by Richard Morrow, K5CNF's comprehensive review of the DX-VI in the October 1990 *73 Amateur Radio Today*, p. 36.)

For more information, write to GAP Antenna Products, 6010 Bldg. J, N. Old Dixie Highway, Vero Beach, FL 32967.

Mosley Amateur Antennas. Mosley Electronics, Inc. (MEI) is now selling factory-direct only. For over 45 years Mosley has had a dealer network as its main method of distribution, but this method has become inefficient and costly for both the company and customers. With the ability to purchase anywhere in the country by phone and the ease with which products can be shipped, the company feels that the changed antenna marketing and distribution method is more cost effective and beneficial for customers.

A new Mosley catalog lists a variety of beams, dipoles, and verticals that it now sells factory direct. New to the product line-up is the TA-34-XL, a "true" four-active-element, directly-fed multiband Yagi for 10, 15, and 20 meters that offers from 8.2 dBd to 9.5 dBd claimed forward gain, depending on band. Another new product is the RV-6-WARC, an under 10 foot, heavy-duty multiband vertical that sports coverage of 10, 12, 15, 17, 20, and 40 meters. Similar models are available that add 30 and 75/80 meter coverage—the RV-7C-WARC and the RV-8C-WARC, respectively.

Some accessory parts are also listed in the catalog. One very useful chemical Mosley offers is the A-1123 anti-corrosion compound designed to prevent oxidation and assure electrical conductivity of all antenna metal parts. Another is the 1746 "Antenna Weather Guard," a brush-applied, clear coating compound that protects aluminum and ferrous metal surfaces from the corrosive action of salt-laden air, moisture, and ultraviolet radiation.

For a catalog, contact Mosley Electronics, Inc., 1344 Baur Blvd., St. Louis, MO 63132.

Yaesu Antenna Rotors. The Yaesu name is usually associated with transceivers rather than antennas. However, Yaesu also offers at least seven rotor models for amateur, com-

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Our RELM two-way radio transceivers were especially created for government agencies. When you need to talk to police, fire, ambulance, or state, federal and international response forces, RELM transceivers may be quickly programmed for up to 48 frequencies. Listed below, are some of our most asked about transceivers. For additional assistance, call CEI at 313-996-8888.

NEW! RELM® RSP500-A

List price $465.00/**CE price $319.95/SPECIAL**
20 Channel • 5 Watt • Handheld Transceiver
Frequency range: 148-174 MHz. continuous coverage. Will also work 134-148 MHz. with reduced performance.
The *RELM* RSP500B-A is our most popular programmable 5 watt, 20 channel handheld transceiver. You can scan 20 channels at up to 40 channels per second. It includes CTCSS tone and digital coded squelch. Snap on batteries give you plenty of power. Additional features such as time-out timer, busy-channel lockout, cloning, plug-in programming and IBM PC compatability are standard. It is F.C.C. type accepted for data transmission and D.O.C. approved. We recommend also ordering the **BC45** rapid charge 1½ hour desk battery charger for $99.95, a deluxe leather case **LC45** for $48.95 and an external speaker microphone with clip **SM45** for $59.95. Since this radio is programmed with an external programmer, be sure to also order one **PM45** at $74.95 for your radio system.

NEW! RELM® UC102/UC202

List price $128.33/**CE price $79.95/SPECIAL**
Now...Handheld gear you can afford.
CEI understands that all agencies want excellent communications capability, but most departments are strapped for funds. To help, CEI now offers a special package deal on the RELM UC102 one watt transceiver. You get a UC102 handheld transceiver on 154.5700 MHz., flexible antenna, battery charger and battery pack for only $79.95. If you want even more power, order the RELM **UC202** two watt transceiver for only $114.95.

NEW! RELM® RH256NB-A

List price $449.95/**CE price $299.95/SPECIAL**
16 Channel • 25 Watt Transceiver • Priority Time-out timer • Off Hook Priority Channel
The *RELM* RH256NB is the updated version of the popular RELM RH256B sixteen-channel VHF land mobile transceiver. The radio technician maintaining your radio system can store up to 16 frequencies without an external programming tool. All radios come with CTCSS tone and scanning capabilities. This transceiver even has a priority function. A 60 Watt VHF 150-162 MHz. version called the **RH606B** is available for $429.95. A UHF 15 watt, 16 channel similar version of this radio called the **LMU15B-A** is also available and covers 450-482 MHz. for only $339.95. An external programming unit **SPM2** for $49.95 is needed for programming the LMU15B.

NEW! RELM® LMV2548B-A

List price $423.33/**CE price $289.95/SPECIAL**
48 Channel • 25 Watt Transceiver • Priority
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mercial, and TV use. These range from the Model G-250, designed to handle light to medium TV-size antenna arrays, to heavy-duty models such as the G-1000SDX. Yaesu's line also includes elevation and azimuth-elevation rotors for satellite and other space communications antennas. All Yaesu rotors are housed in weatherproof, die-cast aluminum enclosures that are permanently lubricated to ensure maintenance-free operation under all climatic conditions. Various accessories are available, including mast clamps and thrust bearings.

For specifications, contact Yaesu USA, 17210 Edwards Rd., Cerritos, CA 90701.

Phillystran Update. We've covered Phillystran nonmetallic tower guys, which have been around since 1973, on several previous occasions. To review, nonmetallic guys provide an effective alternative to troublesome steel guys. The nonmetallic guys are "electrically transparent" to completely isolate the tower-guy system from the antenna field, improve signal coverage by eliminating distortion caused by signal reradiation, offer maintenance-free tower installation, and help present a neater tower appearance without corroded steel guys.

However, the requirement for potted end fittings for these electrically transparent guys was inconvenient and messy. The new field-installable guy systems with the new HPTG I material make these fittings a thing of the past. The new tower guy is terminated using standard, inexpensive wire rope clips. These wire rope clips are available in two basic designs—U-bolt and fist grip. End caps are used on all exposed ends to maintain the dielectric properties of the HPTG I material.

Four types of HPTG guys are available in sizes equivalent to "extra high strength steel" diameters of 3/32 inch to 1/4 inch. These range in price from $0.37 to $1.20 per foot. Wire rope clips, heavy-duty thimbles, and caps are available at nominal prices.

For a specification sheet and price list, contact United Ropeworks (U.S.A.) Inc., 151 Commerce Drive, Montgomeryville, PA 18936-9628.

Voyager Structures. A new catalog from Glen Martin Engineering describes the Voyager series of triangular towers. These are heavy-duty aluminum structures that claim to be the strongest aluminum towers made. A feature of the "easy up" Voyagers is that they don't require any special equipment to assemble, erect, or service them. When used with their Hazer Transit System (which works like an elevator to provide vertical or horizontal mobility of payloads), the towers can easily be "walked" into an upright position and secured, without any tower climbing. The towers are packaged so as to minimize the cost and difficulty of shipping and storing.

The Voyager structures are 13 or 18 inch equilateral triangular structures with angular side rails and Z-braces spaced every 15 inches, including across section joints where an inside bolted clip holds the joint solid. Structure sections come in three different lengths (7 ′ 6 ″, 8 ′ 9 ″, and 10 ′). Since all parts are bolted together, you can interchange damaged parts. The M-13 is freestanding to 38 feet, while the M-18 is freestanding to 48 feet.

For a catalog, contact Glen Martin Engineering, Route 3, Box 322, Boonville, MO 65233. (For more information the Hazer, dig out your old *CQ*s and look for our coverage of this unusual device in the May 1986 and April 1990 columns.)

MFJ HF SWR Analyzer. MFJ, which perhaps should be nicknamed "amateur accessory city," has come up with yet another nifty RF accessory, the MFJ-207 HF SWR analyzer. It can be used to give a complete picture of your antenna's SWR over an entire band, without firing up the transmitter.

Bearing some electrical and physical resemblance to the classic "grid dip meter," the handheld device is actually several RF instruments in one. There is a built-in RF generator that covers 10–160 meters, an SWR bridge, and a computing circuit that automatically computes and displays the SWR. The MFJ-207 also has a frequency counter output so you can connect your frequency counter for precise digital readout.

Operation is automatic. All you need do is to plug your antenna into the coax connector, set the analyzer to the frequency of interest, and directly read SWR. Since the unit is battery operated, you can take the unit to the antenna and measure SWR directly, thereby avoiding the often confusing and distorting effects of the coaxial transmission line. Some practical uses for the unit include instant monitoring of beam or vertical adjustments, mobile whip tuning, observing SWR variation over a band, and even checking the SWR of your linear amplifier's input circuitry.

The MFJ-207 is priced at $99.95; an optional accessory AC adapter is available for $12.95. For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762.

The new MFJ-207 HF SWR Analyzer is reminiscent of the popular grid-dip oscillator. It is actually three RF instruments in one: RF generator, SWR bridge that gives forward and reflected components, and a computing circuit that computes and displays SWR. The unit is battery operated and portable so that it can be taken directly to the antenna for making checks. It is priced at $99.95. The firm also offers the MFJ-208, which is designed for the 142-156 MHz VHF user. (Photo courtesy MFJ)

Software Notes

YO and MN Enhancements. We've described Brian Beezley, K6STI's antenna analysis software in several previous columns (September 1988, June and August 1989, and April 1990). Recently Brian has been very busy bringing out new and expanded versions of his MN, YO, and related analysis programs.

According to Brian, MN 3.5 is the fastest, most powerful, and most advanced MININEC-based program. It displays three-dimensional views of antenna geometry and wire currents, does sophisticated polar and rectangular plots, calculates near-fields for TVI and RF hazard analysis and far-fields for repeater coverage, does current feed for phased arrays, has automatic frequency sweep, and provides simple definition of feeds and loads, among many other features. It's priced at $85.

MNjr 1.5 offers inexpensive analysis that does most everything you need for most amateur antenna analysis projects. It models antennas in free space or over ground, has automatic frequency sweep, provides simple definition of feeds and loads, and displays and prints standard ARRL polar plots. It's priced at $35 with full credit toward the purchase of MN 3.5.

YO 3.0 is a Yagi Optimizer program that optimizes Yagi dimensions for maximum forward gain, best pattern, and minimum SWR. The program is very fast: it can compute several trial designs per second. YO plots radiation patterns at the central design frequency and band edges during optimization. A scale drawing of the Yagi changes shape as the design proceeds. After optimization you can plot or print high-resolution patterns in several formats. The program includes models for gamma, T, hairpin, and beta matching networks, and a library of Yagi designs is included. YO 3.0 is priced at $130; a smaller version, YOjr 1.0, with a basic set of features that can model Yagis with up to 10 elements, is $65. (MN and YO were reviewed in the August 1990 *QST* "New Products" section, p. 41.)

MNC and YOC are available as $40 high-performance options for the MN 3.5 and YO 3.0 programs. The new MNC and YOC programs use optimized assembly language to maximize analysis speed, especially with coprocessor-equipped PCs.

For spec sheets showing the most current versions and pricing, contact Brian Beezley, K6STI, 507½ Taylor, Vista, CA 92084.

Note: As this issue went to press, we found that Brian has raced ahead of our reporting. He has further upgraded YO even further. Release 3.5 has been out for several months now, sporting many new enhancements. And release 4.0, which has been in Beta test for some time, was scheduled for introduction at the Visalia International DX Convention in April. There is new pricing: YO 4.0 is $100, while YOC is $140. Also, YOjr. 1.5 is now available at $50. Our apologies to Brian for not being able to report on the new versions at presstime, and we hope that we've been able to keep all the new versions and prices straight!

WB2OPA LogMaster. Recently Alan Yorinks, WB2OPA, sent us a copy of his very professional WB2OPA LogMaster computerized HF logging system for the IBM PC, introduced at the 1990 Dayton Hamfest.

I found LogMaster to be a full-featured logger that has a number of advanced features. There is, for example, a built-in QSO alert indi-

cator that tells you if you need a QSO as you're logging it. There also is a DXCC list editor, excellent logbook statistics, a program to convert other computer logbooks to the LogMaster format, fast searching and sorting of logbook entries, pop-up menus, and a help line at the bottom of the screen.

The program includes online dupe checking; beam heading, zone, and distance information; dual clock and calendar display; an out-of-band alarm; determination of transmission mode via the transmit frequency; postal information; appending of sequential numbers to the RST report for contests; a 1000-character notepad for each QSO; search and sort on full or partial keys; QSL card printing; and a 50-page manual on disk.

LogMaster uses the computer to good advantage. When printing QSL cards or labels, for example, they are printed in callsign order so that you don't have to sort them when sending them to the QSL bureau. Also, LogMaster is complete, there being no extra modules required to make the program fully functional.

LogMaster requires 512K RAM and a hard disk drive or dual floppy drives; it is available either on 5.25 or 3.5 inch diskettes. Price is $59.95. (A "free" demo is available for $2.00 postage and handling.)

For more information, contact Sensible Solutions, P.O. Box 474, Middletown, NJ 07748.

Fig. 1 shows the LogMaster Main Menu.

Two from Diamond Systems. In last October's issue we mentioned the Diamond Systems amateur radio license study courses, available in five different versions (Novice through Extra). Roger Wayman at Diamond Systems recently has introduced two inexpensive new programs, Ham Shack Pro and Log-Book, both distributed through the Heathkit® catalog.

Ham Shack Pro is a general-purpose, simple-to-use database manager that is geared to amateur radio but can be used in other information-management contexts. It is billed as an "information gofer" that keeps track of people, places, and things. Included is a pop-up calendar for the current month, several printout options, and a telephone dialing capability.

Log-Book is a similarly structured, straightforward database manager and computer logbook that organizes callsign, name, frequency, emission type, signal quality, date and time, address, and up to 100 lines of comments per record. There also is a pop-up calendar and a choice of several print capabilities. The program stores main records in RAM for fast searching and sorting of records. Either of the programs is priced at $29.95 from Heathkit.

For more information, contact Diamond Systems, P.O. Box 48301, Niles, IL 60648, or check out the programs in the Heathkit catalog (contact the Heath Company, Benton Harbor, MI 49022 for a copy).

World Prefix Utility Program. Robert Payne, N5KUC, has developed a program to keep up with the CQ WPX Award. His program is designed to log and maintain records for all the prefixes confirmed for application for the award and all its endorsements.

Some of the program's features include a log for each endorsement (continental, band, mode, and general award), a contact sorting routine, a dupe checker, complete editing capabilities, complete rules and regulations for the various awards and endorsements, a printout with the contacts in alphabetical order, and an application form to send in with your

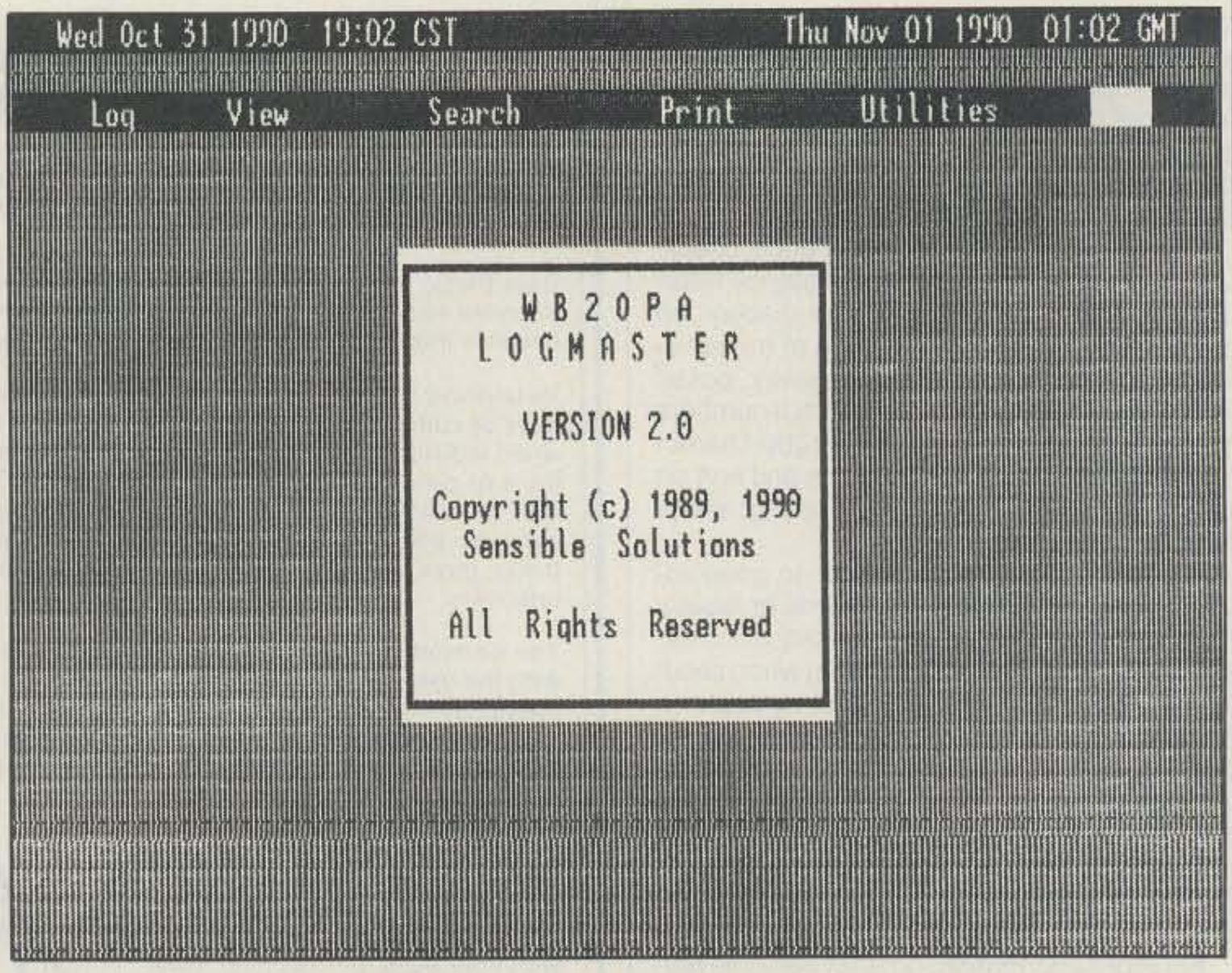

Fig. 1–Here's the Main Menu from LogMaster by Alan Yorinks, WB2OPA. The IBM PC program is easy to use, provides excellent logbook statistics, generates QSL cards and labels, and has a number of convenience features such as a conversion calculator and dual clock calendar. The program is priced at $59.95. (The menu bar item at the far right is "Quit," which is not visible here due to my choice of screen colors.)

log. The program is simple to use and is menu driven.

The IBM PC utility is priced at $20. For more information, contact Robert Payne, N5KUC, 2712 Halifax, Odessa, TX 79762.

QQSL V3.0. In last May's issue we covered QQSL, a program written for the contester, DX-peditioner, award hunter, and anyone else who sends a lot of QSL cards. Unfortunately, printer gremlins crept into our write-up, with the description of QQSL getting mixed in with our comments on other programs. This made for a very confusing description of several programs in that column!

To review, the early versions of QQSL, which is short for "Quick QSL," were designed to do just one thing—rapidly print labels for QSL cards. It seems Bill had found many different label-generating programs, but none used a format that he cared for. Too, most other programs required a full computerized log to drive the label-making program. Although he stores most of his log information on a computer, he found it inconvenient to tie together all of the logs, format them into whatever the particular labeling program required, and then tag the lines that required a QSL label. He actually found it much faster to just compare received QSLs to computer and/or written logs, and then type in the required information for the applicable label.

The new version 3.0 (it may be higher by the time this appears in print) is miles ahead of the early versions we originally examined. The new version has menu bars, pop-up windows, input forms, extensive editing capabilities, sound, function key support, full color, and much more.

QQSL is shareware and is available on many amateur-oriented bulletin boards, including RadioSport (619-279-3921). You also can obtain the latest version by sending Bill a formatted 360K, 5.25 inch floppy disk and a postage-paid mailer. The suggested registration fee is $14.95, which you should remit if you continue to use the program.

For more information, contact Bill Mullin, AA4M/6, 3042 Larkin Place, San Diego, CA 92123-3026.

DXbase. At last year's Atlanta Hamfest I was treated to a demo of a sophisticated new software product, the DXbase DX Software System, which initially appeared to be just another first-class logger. This logger has a twist, however, as it attempts to fully integrate your computer, VHF packet, and your HF transceiver, making use of the new system of packet alerts for DXing.

DXbase has all of the standard features and "bells and whistles" that you've come to expect in a sophisticated logging program. There's a user-friendly interface, a powerful indexed relational database design, provision for extensive DXCC and WAZ statistics, automated QSO logging, QSL and print manager label printing capability, support of dot matrix and laser printers, a full-featured text editor used as a notepad reminder, intelligent file import and export, and much more.

What is unique about DXbase is its comprehensive packet integration. With this capability, the program automatically intercepts a VHF packet DX alert, checks your database, and automatically sounds a distinctive alarm for countries you need, based on your own set of rules. If you decide to work the station, you can simply press a key and the program will change your HF transceiver to the frequency and mode of the alert and place the callsign into the logging window. When you've made the

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TELEX®

contact, all you need do is press another key; your transceiver is then reset to its original frequency and mode.

The DXbase DX Software System is priced at $129 and is available on 5.25 or 3.5 inch diskettes. For more information on its capabilities, contact Scientific Solutions, Inc., 736 Cedar Creek Way, Woodstock, GA 30188.

DOME Accounting Programs. Okay, you're thinking, what do business accounting programs have to do with a column in *CQ*? Well, nothing directly, but there is a link. We receive a great deal of correspondence from "cottage shop entrepreneurs" who are designing, building, or otherwise offering antennas, software, books, and the like to the amateur community. This suggests that there are many businessmen/amateurs out there who are faced with the problem of keeping track of part-time business income and expenses—both for their own records and for income tax reporting purposes. I've found several easy ways to keep a handle on these things, and I'd like to share those ways with you.

If you're more at home with pencil and paper, but don't want to set up a complicated, double-entry accounting system for a sideline enterprise, I've found that an excellent way to go is with the DOME Simplified Weekly or Monthly Bookkeeping Records. These are complete, simple (single entry) bookkeeping systems that can handle most any type of business. The DOME books let you focus on profit and loss figures, and they can be used to record your income and expenses adequately for the tax man. I've been successfully using these books for years to handle my "Schedule C" enterprise for federal and state income taxes.

A few years ago DOME Publishing came out with its "Accounting by Computer" software, which was, almost literally, the *Simplified Bookkeeping Records* books on disk. You could hardly imagine a simpler accounting program, but the program was fairly powerful. Included were various accounting registers, a profit-and-loss statement, ability to customize account headings, maintenance of accounts on a weekly or monthly basis, and a handy set of pop-ups (calculator, calendar, and notepad). However, early versions of the program were specially copy protected and designed to only hold a single year's worth of data. You "filled up" your data disk each year and had to repurchase the software in subsequent years, much like tax-preparation software. The program also was intended primarily to run on floppy disks.

Version 2 of Accounting by Computer program retains all the simplicity of the earlier versions, is not copy protected, may be reused each year, and works fine on a hard disk. I like it and have successfully made the transition from paper records to computer management, keeping my part-time business records using the $59.95 program. It's all the accounting horsepower I need to keep track of my one-man freelance writing "enterprise." (I use the IBM version, though DOME provides the Commodore 64 version on the reverse side of the program disk.)

If your business outgrows the "cottage industry" stage and becomes a full-fledged, full-time small business, Dome's new product, DOME PLUS, may be what you need. The new program retains much of the simplicity of the earlier programs but adds enhancements required by more involved business enterprises. Some of the major features include budgeting, financial reporting, checkwriting, invoicing and billing, payroll and tax information tracking, sales tax calculation and reporting, credit card tracking, mailing label generation, and even personal financial management. You'll probably be interested in managing the affairs of a single enterprise, though the software can handle up to 99 different companies.

With DOME PLUS, you don't need any special accounting knowledge. You enter checks and receipts onto a computer screen that looks like a check or receipt form; you have immediate access to your financial statements, tax information, and reports. You can, for example, quickly write checks and record receipts; pay employees, manage cash flow; gather key tax information, generate reports; review your income and expense account balances; evaluate your vendor and customer accounts; and print invoices as you need them. The new product is priced at $89.95. Frankly, though easy to use, DOME PLUS represents more accounting power than I need; but I would enthusiastically recommend this software package for enterprises more complex than mine.

You can purchase the DOME books and software programs from most office-supply houses and stationery stores, or directly from the manufacturer. For more information, contact DOME Publishing Co., Inc., Ten New England Way, Warwick, RI 02887.

Grammatik IV Update. In last October's issue we reviewed Reference Software's Grammatik IV, a very capable grammar and style checker, one we found quite suitable for checking technical documents and articles. Grammatik IV proofreads your writing for mistakes in grammar, style, punctuation, and spelling at the touch of a "hot key." It's compatible with about 38 (at latest count) of the most popular IBM PC wordprocessors and even works directly within several of the most popular ones.

Recently, Reference Software sent me a minor update to Grammatik IV which isn't sufficiently different from the version we reviewed in the October issue to make note of here. However, we should let you know that Grammatik is now also available as Grammatik Windows. The new version, with its graphical user interface (GUI), lets you take full advantage of the power and convenience of Microsoft's Windows 3.0. It works directly within several popular Windows-compatible wordprocessors and still supports a host of DOS-based wordprocessors and the files they produce.

Grammatik Windows is priced at $99. For more information, contact Reference Software International, 330 Townsend St., Suite 123, San Francisco, CA 94107.

Wrapping It Up

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

Overheard: Contentment is the reward that's collected by those folks who feel that what they have is better than what they are missing.

73, Karl, W8FX

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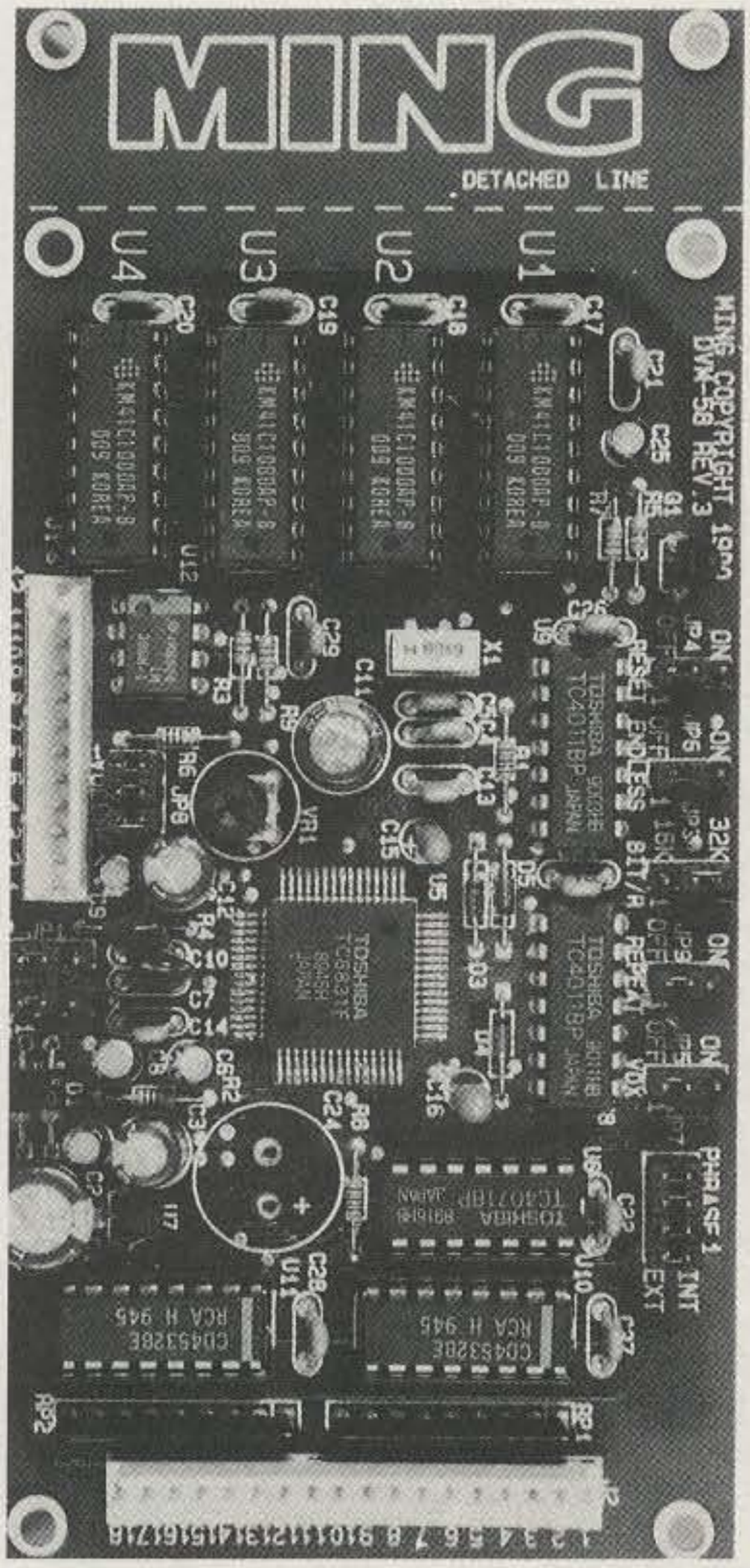

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- "ENDLESS RECORDING" option allows continuous recording that can be stopped at any time to review past conversation.
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This book appeals to all levels of packet radio enthusiasts from novices to experts alike. Full of illustrations and written in a simple, easy-to-understand style. Topics covered include: a basic primer, home computers and data communications terminals, a survey of equipment available, how to set up a station plus much more. Great compliment to the other packet books available. 208 pages ©1988 1st edition

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WASHINGTON READOUT

BY FREDERICK O. MAIA, W5YI

REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

Getting Into Amateur Radio Is Now Easier Than Ever!

We recently received a letter from Valerie Roberts, a reader from Miami, Florida. She said she has had a long interest in amateur radio, but had no idea where to start. "I have a vague conception that the FCC fits in somewhere and no conception at all about equipment."

"How do I get started in amateur radio? Where do I find the information I need? How do I navigate the jungle of products, models, and terminology? What kind of information do I need?"

Her letter is a sample of the dozens we have received asking about amateur radio and the recent changes that have taken place. Unless you are a ham, amateur radio remains pretty much a secret hobby. Admittedly, we have done a poor job in publicizing its many features and benefits.

While the pastime might not be common knowledge to many, there are indeed more of us than you might suppose. Some half a million U.S. citizens are FCC-licensed amateur radio operators. That means about one in every 600 Americans holds an FCC amateur radio ticket!

The procedures one must go through to become an amateur radio operator are in many ways not too much different from those associated with becoming a pilot of a private airplane. In telecommunications as in aviation you have both amateurs and professionals. The basic difference is that the pros make their living at the activity while amateurs take part to satisfy their personal needs. Both activities enjoy worldwide participation.

The amateurs and the professionals both navigate in the same medium. All pilots share the same air space; all radio communications take place in the radio spectrum. It is very important that you know the rules of what you can and can't do. You can cause a lot of problems and interference if you fly in the wrong air space or communicate on the wrong frequencies.

Testing of Ham Operators

The Federal Aviation Agency oversees aviation, while the Federal Communications Commission (FCC) controls telecommunications. To ensure that participants are qualified, both government agencies have an examination program to test applicant proficiency.

The FCC used to require a practical examination on Morse code sending as well as receiving and passing a written examination to become an amateur radio operator. However, times have changed. Radio equipment has gotten more reliable and easier to operate, and improved methods of communications have eliminated the need for all amateur operators to be code proficient.

It used to be that one had to travel to the nearest FCC field office to be administered a written test of unknown questions and a Morse code exam, but no more. In 1984 the FCC turned the testing of all amateur radio operators over to the amateur radio community and appointed administrators called Volunteer Examiner Coordinators (VECs). They act as the liaison between the government, which issues the required amateur operator licenses, and the volunteer examiner (VE), who administers the tests. Your author, Fred Maia, W5YI, heads up a very large VEC operation.

In turn, VECs certify volunteer examiners to administer written and Morse code examinations. The W5YI-VEC has over 8000 accredited volunteer examiners who administer amateur radio examinations all over the United States. In 1986 it was decided that all VE Cordinators (and there are eighteen different VEC organizations) would use exactly the same questions, multiple choices, and answers. All questions appearing on amateur radio operator examinations are known and widely published.

Amateur Licensing Structure

Amateur radio exists in nearly every country of the world—and on basically the same frequencies. This allows amateurs to freely communicate worldwide. The purpose of amateur radio is to provide emergency communications in times of need, to train radio operators, and to contribute to the advancement of the radio art. Much of today's modern telecommunications technology got its start in a ham shack.

There are five different amateur operator levels. You merely have to pass examinations administered by other senior-level ham operators to become a Novice, Technician, General, Advanced, or top-of-the-line amateur Extra class operator. The higher the amateur radio class, the more difficult the examinations and the more radio privileges you are allowed. You advance at your own rate. Most do it by self-study.

The tests consist simply of answering a certain number of multiple-choice questions correctly. The questions are selected from a known question pool arranged by topic. There are nine different topics. As a general rule, the beginning classes emphasize regulations and proper amateur radio operation, while the higher classes are more technical in nature. Most tests have questions which relate to the radio privileges you will enjoy after you pass the exam. There are five written tests—one each for each amateur class and three Morse code speed requirements.

Code-Free Tech Class

The FCC gave us a Valentine's Day present on February 14, 1991, when the entry-level amateur radio licensing requirements were amended. There are now two entry levels, the Novice and code-free Technician class. After that day, a person may join the amateur radio fraternity without the necessity of learning the Morse code. This is indeed a major change for amateur radio, and traumatic for many. Every one of the current 500,000 licensed amateurs in the US has had to negotiate Morse code to become a ham, and it has been that way since the first amateur was licensed decades ago!

Instead of passing a 5 word-per-minute Morse code test and a 30 question Novice written exam, applicants now may become Technician class operators simply by passing the first two multiple-choice written examinations.

The new cdoe-free Technician class yields some first-rate operating privileges. Entry-level Techs may operate on all amateur bands above 30 MHz using any mode at full amateur power—up to 1500 watts!

The two qualifying tests are the 30 question Novice/Element 2 and the 25 question Technician/Element 3(A). You

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101

need to answer 22 questions correctly from Element 2 and 19 from Element 3(A) to become a Technician class operator. That is 41 out of 55 questions (about 75%). If you only pass one exam and not the other, you still have a year to complete the failed portion.

How Do You Get Started?

You have to have an amateur radio license in your possession before you may transmit on the ham bands. That means you must complete the necessary examinations before a volunteer examiner team. Most applicants pass these tests at exam sessions located right in their own city. There is bound to be a VE team nearby, and just about any licensed ham or amateur equipment store can tell you where the nearest test session is located.

We believe that most newcomers will now opt to acquire the new no-code Technician license. That means you should study the questions contained in the Element 2 and 3(A) question pools. There are now a total of 370 questions in the Element 2 pool and 325 questions in the 3(A) pool—a total of 695 questions. The pools were reworked slightly by the Question Pool Committee (QPC) so they would conform to the new rules.

As mentioned earlier, all of the word-for-word choices and correct answers are known. You will probably have to buy two manuals covering both the Novice and Technician classes. Purchasing only the Technician study material will help you pass Element 3(A), but not the Element 2 Novice questions. You should be able to find license preparation material at any amateur radio equipment store or through ads in this or other amateur radio publications. We also have up-to-date amateur radio license preparation material available for purchase via mail order. You may telephone toll free 1-800-669-W5YI (9594).

It is anticipated that many computer hobbyists will now elect to exchange data over the free amateur radio waves rather than the expensive telephone lines. In view of this, we have developed IBM-compatible license preparation software that covers all amateur radio examination elements. You will find this advertised elsewhere in this issue.

Another option for finding the information you need is to contact a local amateur radio club. Many clubs offer amateur radio licensing classes. Again, any licensed amateur in your neighborhood should be able to tell you the location of the nearest amateur radio organization.

Your new amateur radio operator license will arrive from the FCC about six to eight weeks after you pass the required examinations. Your VE team will send your results and Form 610 application to their VEC, who will approve and forward the material to the FCC for license issuance.

What About Equipment?

There is no shortage of amateur radio gear! It comes in all configurations, price points, and frequency levels. A small hand-held radio or a mobile transceiver for your car will probably be your first purchase if you enter at the Technician level. By far the most popular amateur frequency for beginners is the 2 meter amateur band.

The price of a 2 meter rig starts anywhere from about $100 for used equipment on upward. Generally, the more bells and whistles, the higher the price! Two meters is also a good place to meet most of the local operators. You will want to consider HF amateur radio gear once you upgrade further by passing a 5 word-per-minute code test.

The best way to locate good new or used ham equipment is to visit your local amateur radio store and have a talk with one of their salespeople. If one does not exist, telephone one of the mail-order amateur radio equipment stores listed in this or any other amateur publication. Many have toll-free 800 numbers.

So there you have it, Valerie. A general overview on how to enter the great world of amateur radio. It is a very rewarding and satisfying hobby indeed!

Ham Radio News

Novice CW Subband Relocated. The FCC has moved the 80 meter Novice subband down 25 kHz to 3675–3725 kHz (it was previously 3700–3750 kHz). The objective was to relieve interference stemming from Canadian voice transmissions in the top 25 kHz of the 80 meter Novice telegraphy segment. The ARRL simply had wanted the Novice subband expanded by 25 kHz, but the FCC declined to adopt this option. The newly relocated Novice CV subband was effective March 16, 1991.

Fines Issued for Improper Transmissions. The FCC has been taking a very hard look at violations of prohibited amateur radio transmissions—especially on the 20 meter amateur band. Several amateurs have been issued fines, some for thousands of dollars! The Commission is especially concerned about improper telephone calls, questionable bulletins, broadcasting, improper third-party traffic, and facilitating business affairs on the amateur bands.

Ham Spectrum Protection Legislation. Congressman Jim Cooper (D-TN) has introduced the *Amateur Radio Spectrum Protection Act of 1991*. The bill seeks to amend the Communications Act to prevent the agency from squeezing amateurs out of frequencies without compensating them with additional spectrum. Cooper wants the following sentence added to Section 303(c) of the Communications Act: "The Federal Communications Commission shall not diminish existing allocations of spectrum to the amateur radio service after January 1, 1991. The FCC shall provide equivalent replacement spectrum to the amateur radio service for any frequency reallocation after January 1, 1991."

73, Fred, W5YI

Announcing

(from page 9)

(plus or minus 5 kHz). For certificate send 9 × 12 SASE with 3 units of postage/IRCs to Olympia RAC, WA3BAT, P.O. Box 928, Philadelphia, PA 19105.

WA3DFU/3, from Delaware; Warminster ARC; April 21 *(no times given)*; freq. 7.275, 14,275, 21.375, 28.375 MHz; CW on request. QSL with SASE to Warminster ARC, Box 113, Warminster, PA 18974.

KJ4YK, from Trail Ride of Florida Cracker Trail Assn., Fort Pierce, Florida; Fort Pierce ARC; 1400–2100Z April 13; on 40, 20, 15, and 10 meter phone bands, Novice portion of 10 meters. For certificate send QSL and large SASE to FPARC, P.O. Box 0004, Fort Pierce, FL 34954.

W4UCJ, from 70th Annual Rose Festival, Thomasville, Georgia; Thomasville ARC; 1830Z April 26 to 0200Z April 27 and 1530 to 2300Z April 27; lower CW portion of General bands and Novice SSB portion of 10 meters. For certificate send QSL and SASE to Thomasville ARC, P.O. Box 251, Thomasville, GA 31799-0251.

W4MBD, from Coast Guard station, Cape Lookout, North Carolina (IOTA NA-67); April 12–14 from 2100–1700Z *(no frequencies given)*. For QSL send SASE to Robert McNeil, W4MBD, P.O. Box 843, Morehead City, NC 28557.

KK4VN, from Appamattox Courthouse, Virginia to celebrate end of Civil War; Southside ARA; for 24 hours beginning 1400Z April 9; CW 7.110 and 21.150; SSB 28.400 and 14.230 (plus or minus). For QSL send QSL and SASE to KK4VN, Rt. 3 Box 221, Cumberland, VA 23040.

W4NJA, from American Quilters Society Convention, Paducah, Kentucky; Paducah ARA; April 25–28 *(no times given)*; CW 7.125, 14.050, 21.150 MHz; phone 3.875, 7.250, 14.250, 21.375, 28.450 MHz; packet 145.010. For QSL send QSL and large SASE to Paul Smith, N4FFO, 229 Nickell Hts. Rd., Paducah, KY 42003.

KK5W, from Golden Jubilee Celebration of University of Texas M.D. Anderson Cancer Center, Houston, Texas; M.D. Anderson Cancer Center ARC; 2200Z April 12 to 2400Z April 14; General portion of 80, 40, 20, 15 meters, and Novice portion of 10 meters. For certificate send SASE and QSL to KK5W, M.D. Anderson Cancer Center ARC, 1515 Holcombe Blvd., Houston, TX 77030.

W5VDQ, from 100th Anniversary of Panola County Jail/Museum, Carthage, Texas; Panola County Historical and Genealogical Assn.; 1500–220Z April 6 and 1900–2300Z April 7; lower 25 kHz of General and Novice phone bands. Send QSL, contest number, and SASE to 213 North Shelby St., Carthage, TX 75633 or W5VDQ Callbook address.

KB9NG, from West High School Fine Arts Week, Madison, Wisconsin; West High School ARC; 1300–2200Z each day April 22–26; lower 30 kHz of General 20 and 15 meter phone bands and 10 meter Novice phone. Send QSL and SASE to WHARC, 30 Ash St., Madison, WI 53705.

W0DCW, from 44th anniversary of Suburban ARC, St. Louis, Missouri; 1800–2400Z April 21; lower portion of General bands and 28.425 MHz, plus Novice 10 meter band. For QSL send SASE to KA0AWS, Henry G. Schaper, Sr., 241 Tapestry Dr., St. Louis, MO 63129.

VE1IMD, VO1IMD, K1VV/IMD, from International Marconi Day; coordinated by Cornish RAC: 14 or 15 stations around the world, most site stations using suffix "IMD" or "/IMD"; 0000–2400Z April 27; CW, RTTY, SSB, and packet. Certificate to those who work most Marconi stations. More info from Cornish Radio Amateur Club, P.O. Box 100, Truro TR1 1RX, Cornwall, England.

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

Apr. 6, **Rochester Area Hamfest/Computer & Electronic Show,** John Adams Junior High School, Rochester, MN. Contact RARC, c/o N0HZN, 2824 NW 24th St., Rochester, MN 55901 (507-285-9236).(VE exams Friday, Apr. 5; call 507-280-8345 for info.)

Apr. 6, **Columbus ARC Hamfest,** Bartholomew County 4-H Fairgrounds Women's Building, Columbus, IN. Contact Marion Winterberg, 11941 W. Sawmill Rd., Columbus, IN 47201 (812-342-4670).

Apr. 6–7, **Great Plains ARC NW Oklahoma Eyeball & Swapmeet,** Mooreland, OK. Contact Gerald Bowman, WG5Z, Box 356, Mooreland, OK 73852 (994-5453). (VE exams 2 PM.)

Apr. 6–7, **Inland Empire Hamfest,** Spokane Youth Sports Assn. Building, Spokane, WA. Contact Inland Empire Hamfest, S. 1405 Crestline, Spokane, WA 99203. (VE exams Saturday, Apr. 6 at 1 PM.)

Apr. 7, **Charleston, WV Area Hamfest & Computer Show,** Charleston Civic Center, Charleston, WV. Contact Jimmie Hewlett, WD8MKS, P.O. Box 8364, South Charleston, WV 25303 (304-768-1142). (VE exams.)

Apr. 7, **Blossomland ARA Hamfest,** Berrien County Sportman's Club, St. Joseph, MI. Contact BARA, P.O. Box 175, St. Joseph, MI 49085. (Handicapped accessible.)

Apr. 13, **Appalachian Repeater Group Hamfest & Computer Show,** Lebanon Area Fairgrounds, south of Lebanon, PA. Contact Ron, WB3HNX, 717-345-8667. (VE exams at 10 AM, preregistration requested; handicapped accessible.)

Apr. 13, **Tenth Annual Durham Region Amateur Radio & Computer Fleamarket,** Pickering High School, Pickering Village, Town of Ajax, Ontario, Canada. Contact Ron Brown, VE3WZ, 839-3711.

Apr. 13, **Oak Ridge Hamfest,** National Guard Armory, Clinton, TN. Contact Gene Muncy, KB4UMM, 615-435-1588. (VE exams 10 AM, preregister by Apr. 12, contact Ray Adams, N4BAQ, 4325 Felty Dr., Knoxville, TN 37918; limited walk-ins.)

Apr. 13, **Largo, Florida Hamfest,** Faith Community Church, Largo, FL. Contact George, N2LNU, 813-531-3891.

Apr. 13, **Lake Region ARC Hamfest,** Otter Tail County Fairgrounds, Hockey Arena, Fergus Falls, MN. Contact Keith McKay, N0FKF, Rt. 1 Box 46, Battle Lake, MN 56515, or call 218-826-6274. (VE exams at 9 AM, preregistration to Tom Shubitz, Box 157, Fergus Falls, MN 56537; walk-ins first come basis.)

Apr. 13, **Lawton/Fort Sill ARC Hamfest,** County Fairgrounds, Lawton, OK. Contact Bob Morford, 1415 NW 33rd, Lawton, OK 73505 (405-355-6120).

Apr. 14, **Framingham ARA Fleamarket,** North High School, Framingham, MA. Contact Jon, K1VVC, 508-877-7166. (VE code exams at 11 AM, written at 12, preregistration suggested, as walk-ins only until 10:15 space available, info call Dick, WA1KUG, 508-877-0563.)

Apr. 20, **Ottawa Valley Mobile Radio Club Fleamarket,** Canterbury High School, Ottawa, Ontario, Canada. Contact Ken Barry, VE3KJB, 613-746-4823.

Apr. 20, **Joplin ARC Hamfest,** National Guard Armory, Joplin, MO. Contact Joplin ARC, c/o Larry Hendrix, 107 Hillview, Joplin, MO 64804.

Apr. 20, **Kentucky Colonel's ARC Hamfest,** National Guard Armory, Bowling Green, KY. Contact Denver Eadens, N4WWA, 502-777-3681.

Apr. 21, **MIT Radio Society & Harvard Wireless Club Tailgate Electronics, Computer, and Amateur Radio Fleamarket,** Albany and Main Streets, Cambridge, MA. Contact Nick, W1MX, 617-253-3776.

Apr. 21, **28th Annual Sullivan Hamfest,** Lovington, IL. Contact Ralph Zancha, 502 E. State St., Lovington, IL 61937, or call 217-873-5287 evenings. (VE exams from 9 AM to 12, walk-ins accepted.)

Apr. 21, **Wellesley ARS Hamfest & Fleamarket,** Wellesley Senior High School, Wellesley, MA. Contact Gerry Driscoll, NV1T, 617-444-2686. (Handicapped accessible.)

Apr. 21, **North Coast ARC Spring Hamfest,** L.D.A. of Cuyahoga County, Cleveland, OH. Contact Ron Nichols, N8LZA, 5402 Velma Ave., Parma, OH 44129 (SASE), or call 216-351-7787 after 6 PM.

Apr. 26, **QCWA Banquet, Dayton Hamvention,** Neil's Heritage, Dayton, OH. Contact Bob Dingle, KA4LAU, 657 Dell Ridge Drive, Dayton, OH 45429 (513-299-7114).

OUR READERS SAY

Zones in Numerals

Editor, *CQ*:

This is the first contesting I've done in recent years (1990 *CQ* WW DX CW Contest). I used a computer logging program and really enjoyed the time I spent in the test. Sure beats the pencil and the dupe sheet mess. Why some contesters use letters for zone numbers I'll never know . . . then to speed their delivery up in the exchange makes for poor copy. The few seconds saved are wasted in the requests for repeats. I recommend that the rules specify that zones must be transmitted in numerals!

Gee Gwaltney
Portsmouth, VA

From Saudi Arabia

Editor, *CQ*:

I found the December issue of your magazine in a Safeway Supermarket in Al Khobar, Saudi Arabia. The price was a little steep, so I renewed my subscription again. The mag was $6.24 American, or 24 Saudi Riyals. Well worth it. It's amazing to see your magazine in a country with a total of about 5 hams. No one in this country seems to know who's in charge of ham radio, but they all know that it isn't easy to get someone to talk licenses.

The Army has been little or no help in getting reciprocal licenses, nor have the MARS channels. I guess I'm on my own over here. The guys at ARAMCO have been a help in getting some stuff, but now that I am nowhere near their area, I can't go into HZ1AB anymore. When I call the Wireless Communications Bureau, I can't break through the language barrier. I'll keep trying, but I don't think I'll have much luck until I find an interpreter. Too bad the Army has yet to realize that amateur radio is a form of recreation just like basketball, football, and all that other stuff they spend tens of thousands of dollars on or maybe we'd already have a Third Party Agreement in time for Christmas (1990).

Maybe by the time this is printed, I'll be trying to get a license in Kuwait or Iraq. Of course one should never leave any job unfinished, so if all really goes well, I'll have the permission of the Shah's son to operate from a tank in Tehran.

Bert Godlewski, W2USA/KA4SBE
APO New York

Start At The Beginning

Editor, *CQ*:

I just read the letter from KB4CPB and just had to respond to it (January 1991).

First of all, if someone wants to learn about something, you certainly don't pick up a book and turn to chapter 10 and start reading. You have to start at the beginning. Picking up a magazine on *any* hobby, the beginner/curious will be lost. Do you change the magazine? I doubt it. The interested party should know (or at least ask) where to start. I'm sure in all (or most) magazines they have ads for the new or interested to get this "foundation" information; they just have to look for it. I don't think a magazine will turn off someone from joining in on a new hobby. My first response would be, "What are they talking about here and where can I find out?"

Second, " . . . we may someday soon be a very small society of ex-hams." do you mean that hams are going to drop out of the hobby because they still speak and understand "hamspeak"? Huh?

Glenn Yerby, ND9Y
Chicago, IL

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PACKET USER'S NOTEBOOK

BY BUCK ROGERS, K4ABT

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

More on Mac Interfacing

We are overrun with Mac-Nuggets, Mac-Biscuits, Mac-Hines (machines), and Mac-Apples. . . . Mac-Apples? There must be some mistake! Nope, the Macintosh is real, and it has become a popular and bullish choice for the computer user who wants an alternative to the IBM-PC or PC compatible.

In the January 1991 issue of *CQ* this column addressed the topic of computer-to-TNC interfacing. Some of the first illustrations that were given in this article covered the interface of the Mac to the TNC. These illustrations opened a flood of inquiries regarding the interfacing of the latest release, or versions, of the Macintosh II computers. In fig. 1, I've drawn the pin-out of the Macintosh II serial connector and listed the pin numbers and assignments.

In addition to the illustrations and text regarding the Macintosh interfacing, excerpts from a noteworthy letter from Dr. James Galm, WB8WTS, in Chardon, Ohio follow.

"Thank you for featuring information regarding the connection of Apple Macintosh computers to TNC devices in your *CQ* "Packet User's Notebook" column of January 1991. Macintosh computers are definitely becoming popular systems for home and hobby use, especially in view of the recent introduction of the low-cost models.

"As stated in your column, full hardware handshaking is the preferred mode for character flow control in TNC-to-computer interfaces. Apple provides one input and one output line in the mini-DIN connector, **HSKi** and **HSKo**, for this purpose. These lines are RS-232 compatible as they exit the connector. The logical behavior of these lines is under the control of the program running on the computer. However, most terminal emulation programs that support hardware handshaking use these lines to implement the familiar **DSR** and **DTR** functions.

"With the available lines of flow control," Jim continues, "it is therefore possible to build a DB-25 to mini-DIN cable that conforms to (a form of) RS-232 standards by implementing full hardware handshaking with the DB-25 end wired as either DTE or DCE.

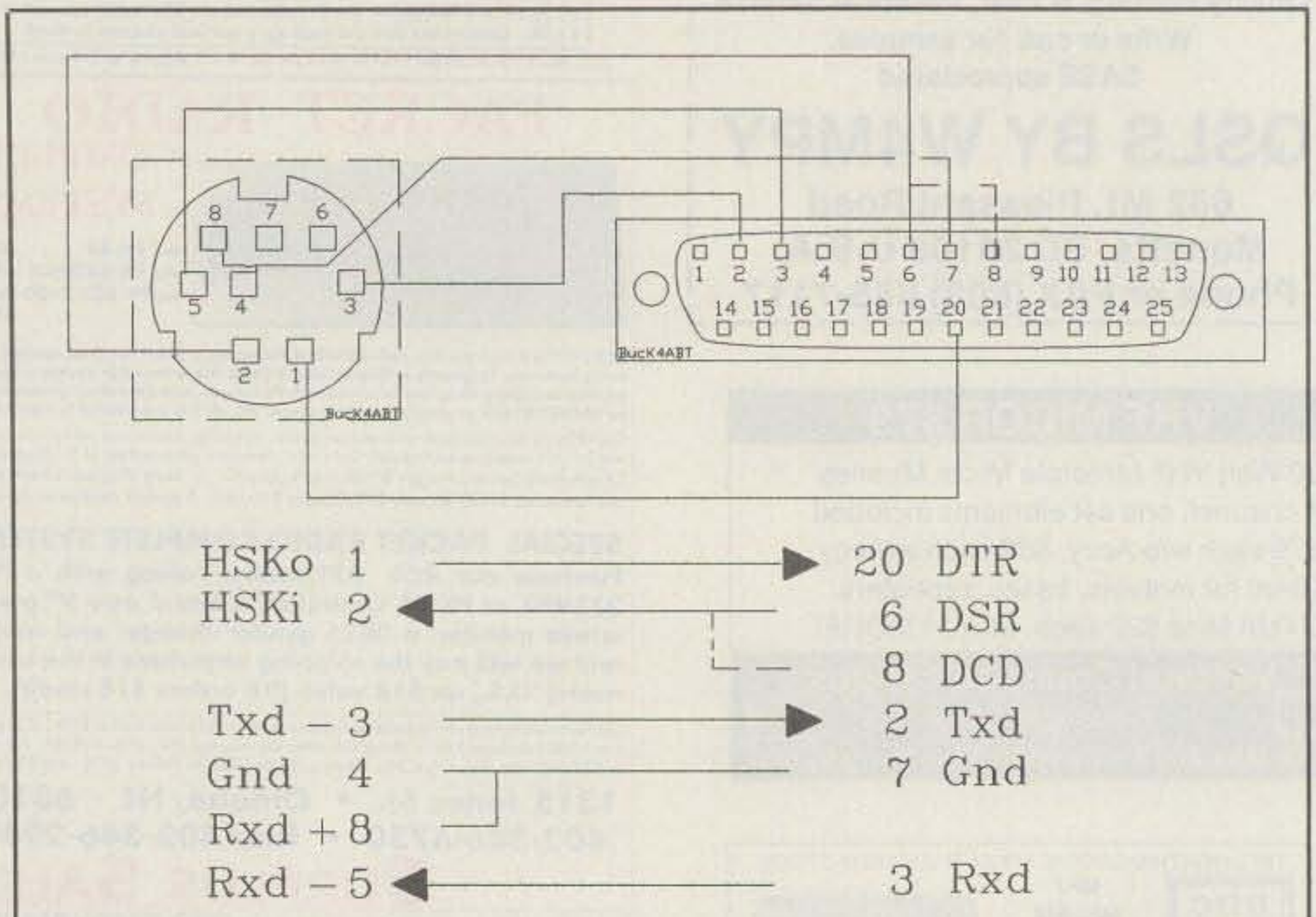

Fig. 1– Late-model Macintosh to TNC 2. The illustration shows implementation of hardware handshaking.

"In the flow diagram shown in fig. 1, the broken (dashed) line in the drawing denotes that either pin 6 or 8 of the DB-25 is to be connected to the **HSKi** line, depending on which line is used for the **Clear-To-Send** (CTS) or **Data-Set-Ready** (DSR) logic function from the connected DCE device. Pin 7 of the mini-DIN con-

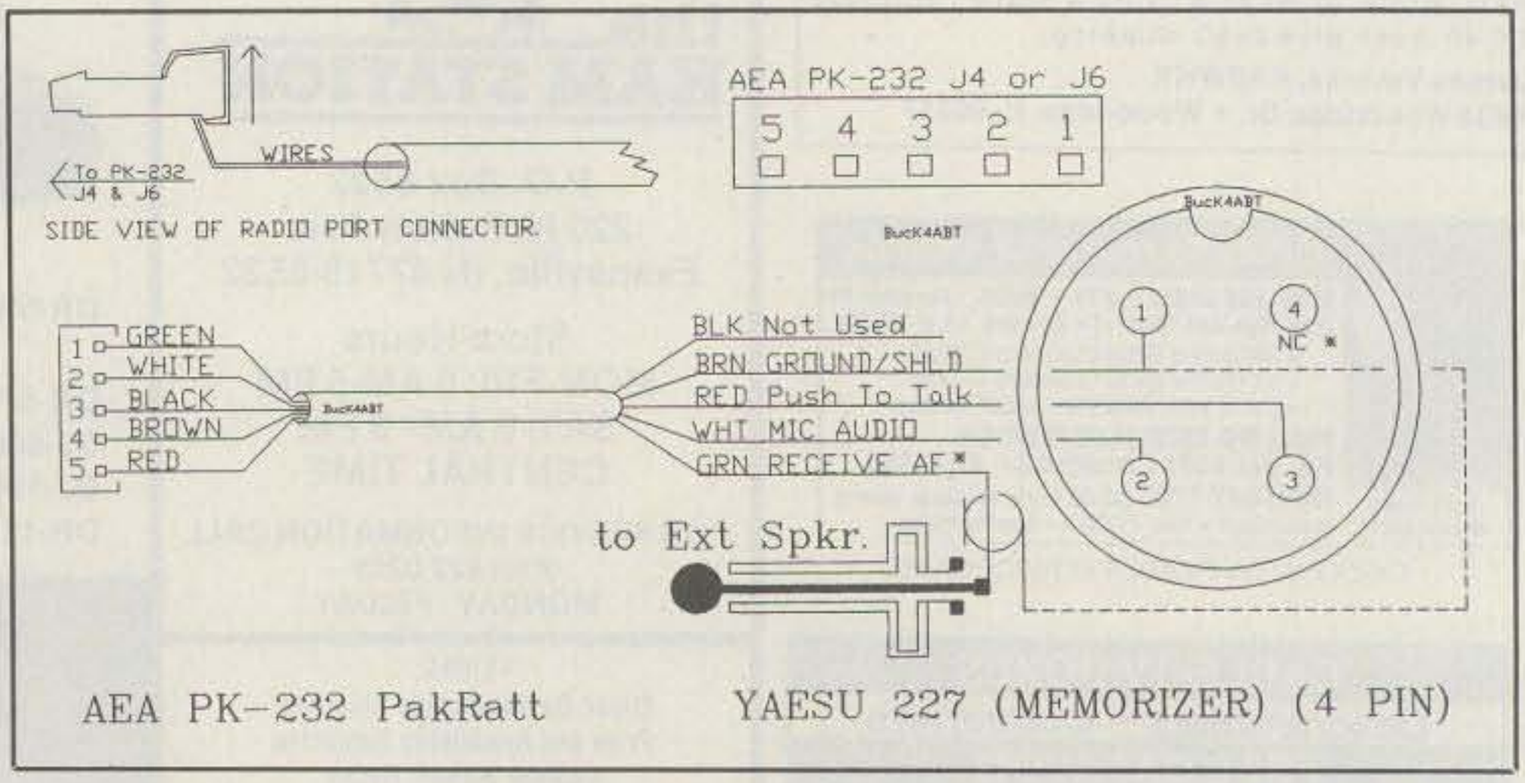

Fig. 2– AEA PK-232 PakRatt to Yaesu 227 (memorizer 4 pin). Note that pin 4 of the mic connector could be modified to accept receive AF. This would enable receive AF via one connector.

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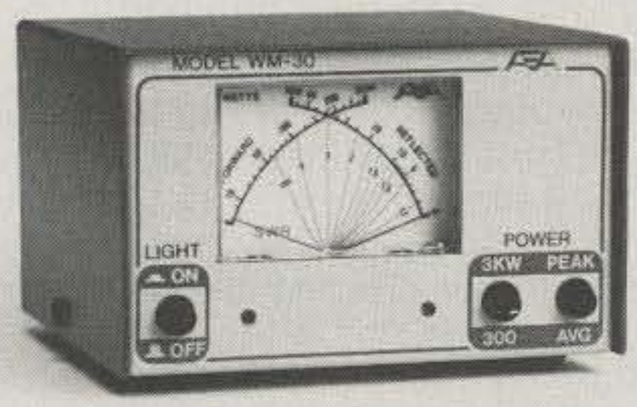

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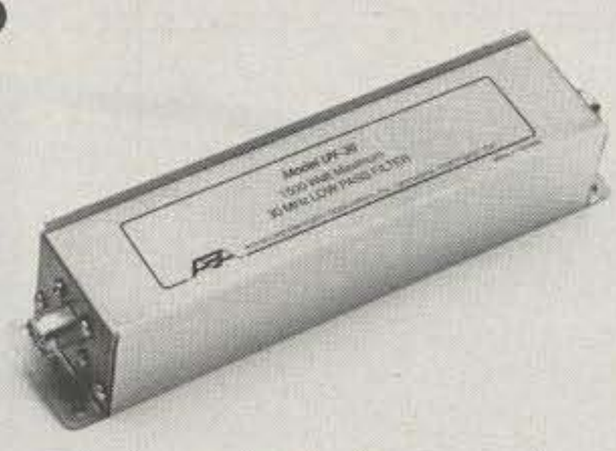

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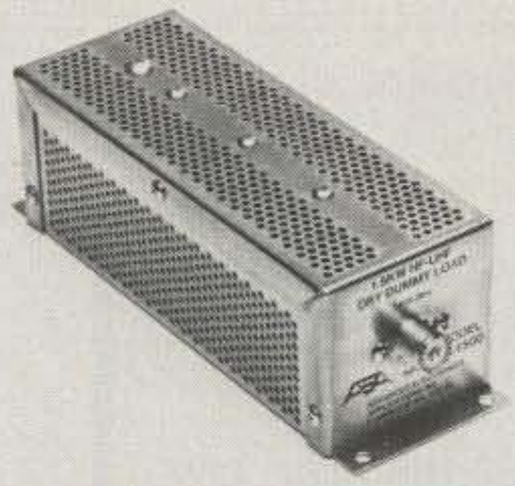

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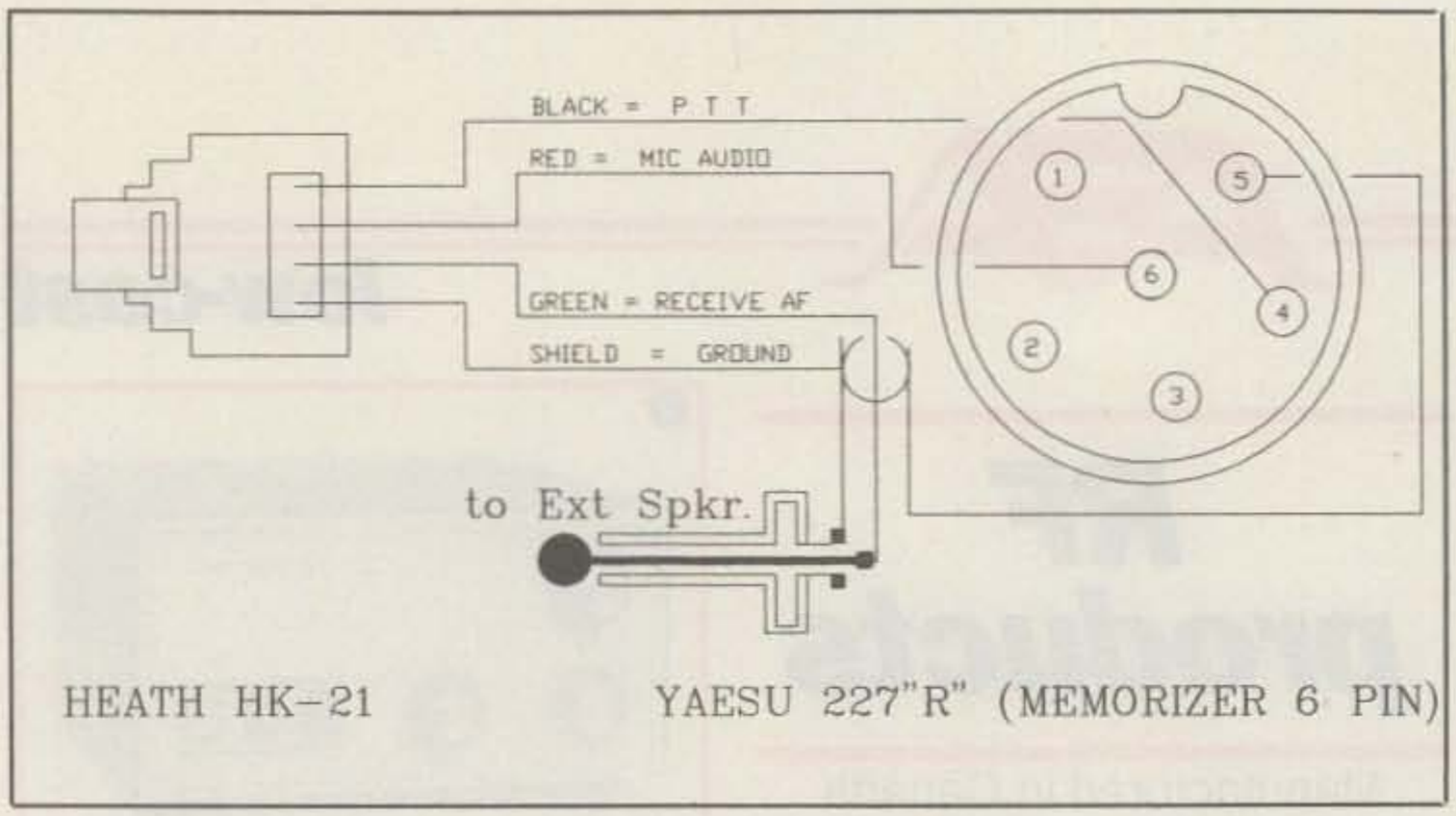

Fig. 3– Heath HK-21 to Yaesu 227"R" (memorizer 6 pin).

nector should not be connected, as it is an 'external clock input' to port **A** of several models of Macintosh computers."

As noted in the January 1991 "Packet User's Notebook" at fig. 3, the shield of the cable should be connected at one end of the cable *only*. This ensures that currents in the shield do not cross series resistances to cause noise spikes within the data lines. Signal and chassis grounds are not to be confused, as they perform very different electrical functions.

Signal ground provides a voltage reference for driving and reading the data and handshake lines, while the chassis ground provides a low-impedance return for capacitive or inductive induced shield currents.

Jim adds this final note:

"Failure to observe the difference in these two grounds can result in poor noise immunity or possible damage to associated equipment. A low-impedance shield path is particularly important in TNC connections, since high electromagnetic field density is a standard environmental factor in the amateur station design."

More Good News

Recently I've received several letters from readers asking for more information about the application of solar power for remote-location or mountaintop packet installations. Watch this column as we begin addressing this timely topic in future issues. It is time we began looking into alternative energy sources to power our packet switches, nodes, and stations.

Our failure to utilize the power from the sun and implement other alternative fuels has contributed to the reason we are involved in the Persian Gulf war. I don't plan a 20/20 hindsight session, but I do have some interesting ideas and concepts that will whet your appetites with regard to constructing a solar-powered packet system.

Until next month, God bless our troops, and happy packeting.

73, de BucK4ABT WA4BRO

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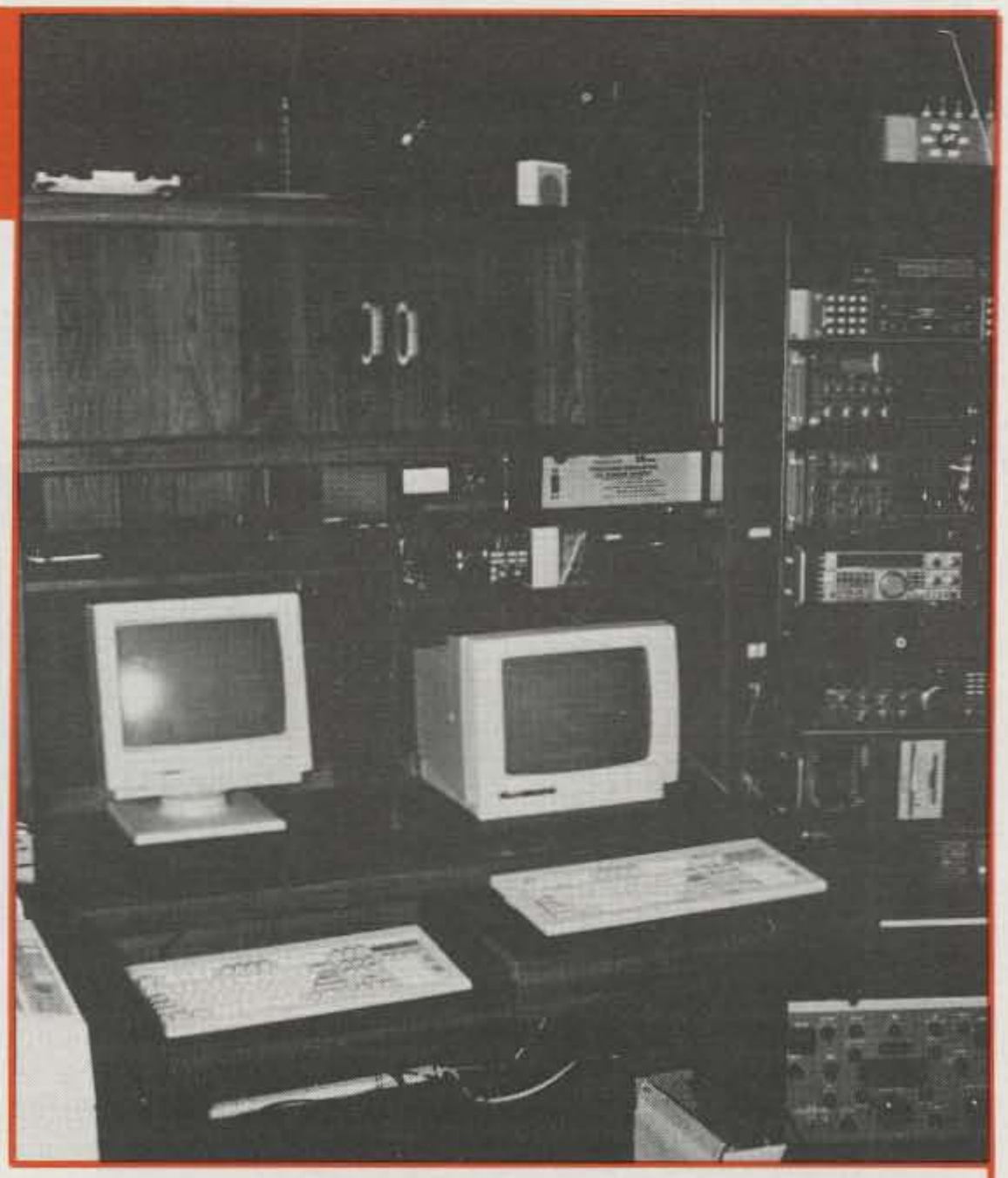

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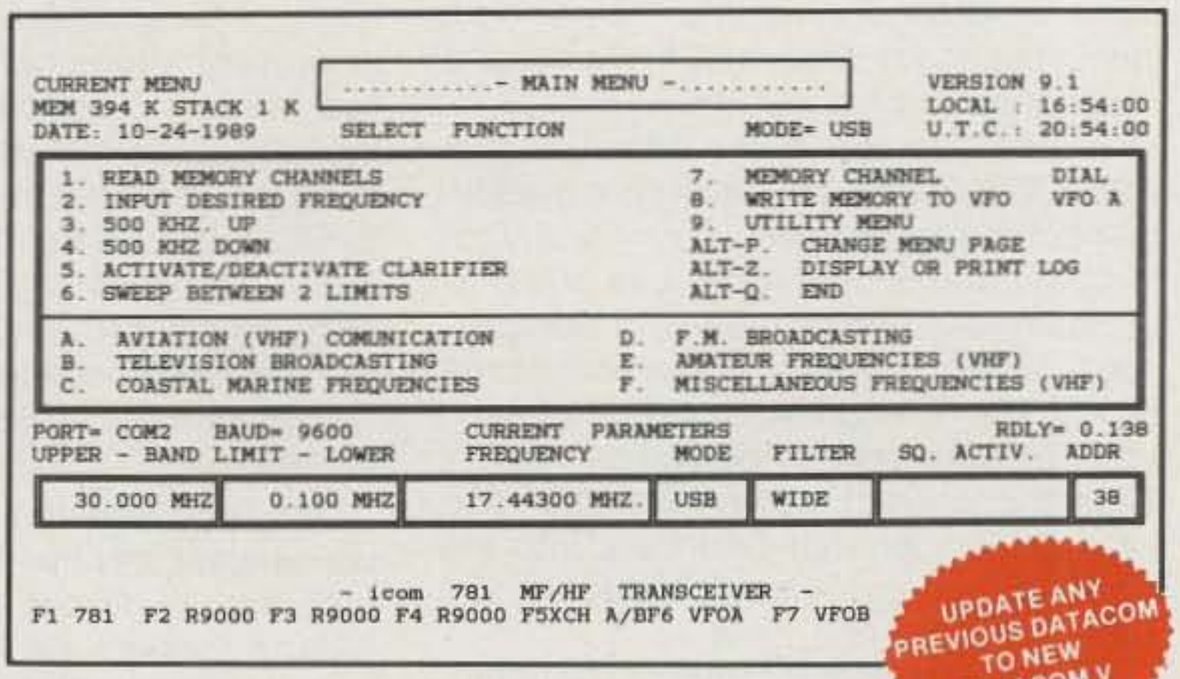

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CIRCLE 5 ON READER SERVICE CARD

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

When Is A Contact Not A Contact?

Last night I had the following exchange with a station I hope was XQ0X, on San Felix Island.

XQ0X (?): "QRZ Twos only."

WB2CHO: "Whiskey Bravo Two Charlie Hotel Oscar."

XQ0X (?): "Charlie Hotel Oscar, 59."

WB2CHO: "Whiskey Bravo Two Charlie Hotel Oscar, QSL. You're also 59."

XQ0X (?): "QSL. QRZ Twos only."

Did I work that station? He never repeated my complete call, nor did he acknowledge my prefix. I couldn't hear the other Twos calling; my beam has a good null to the side. There may have been another 2CHO calling at about the same time. Is this a valid QSO? (On another matter, that station never did send his callsign during the 25 minutes I listened to him. However, he was on 14236 kHz, spoke with a Spanish accent, and was very popular with DXers. This information, plus a PacketCluster DX spot, suggests to me that I worked XQ0X.)

What is the definition of a valid QSO for DX purposes? The generally accepted definition is that a QSO is a mutually acknowledged exchange of information between two stations. There are two parts of this definition. First, the two stations must exchange some piece of information. This is often their callsigns, but may be a signal report, or as in some contests, some location information, name, age, etc. In the above case, XQ0X (I hope) and I exchanged signal reports.

The second part of the definition of a valid QSO is the mutual acknowledgement of the exchanged information. This is most often done through use of the Q-signal "QSL," which means "I acknowledge receipt." In the above exchange both XQ0X (?) and I acknowledged each other's signal reports by saying "QSL." Thus, this contact met the definition of a valid QSO. I will put San Felix into the "worked, not confirmed" category and send CE3ESS a QSL card.

Although this contact meets the generally accepted definition of a valid QSO, I won't know about the most important consideration (for me) of whether the QSO is indeed valid until I receive my QSL card back from CE3ESS. Then I will know that not only did I exchange some information with the DX station, and we mutually acknowledged that exchange, but also that I am *in the log*.

P.O. Box 50, Fulton, CA 95439

Jim Dionne, K1MEM, is the new WAZ Award Manager. He maintains that the real proof of a valid QSO is that the information appears in the log of the DX station.

Not all DXers are 60-plus years old. Susan Babcock, KB8KYD, broke the pile-up to work VP2ML from this well-equipped station in Grosse Point, Michigan. Susan is 12 years old.

This is the real proof of a valid contact: the DX station's log shows my callsign at about the right time, on the right band. Even if I had met the other requirements for a contact, if that contact did not appear in XQ0X's log, it is *not* a valid contact.

Since XQ0X did not give my entire callsign, nor acknowledge my prefix, I don't know that I'm "in the log." However, instead of an insurance contact (which might cheat another DXer out of a San Felix contact altogether), I logged the next five stations XQ0X worked. Then in the unlikely event that my QSL card comes back marked "not in log," I can go back to CE3ESS and explain that I heard my suffix, repeated my prefix (without acknowledgement), and logged the following five stations after my contact. This should allow CE3ESS to find my contact in the log.

The requirement that a contact is not valid unless it is "in the log" is an important one to DXers shooting for *CQ*'s 5-Band Worked All Zones award. WAZ award manager K1MEM is using this requirement to maintain high standards for the 5-Band WAZ award. In most cases, an unaltered QSL card is proof of a valid contact. However, there are cases in which a QSL card is not enough. Should the information on a QSL card not "ring true" to Jim, he may write to the DX station in question to ask if the reputed contact was indeed "in the log." Only if the contact is "in the log" of the DX station is the QSL card considered proof of a valid contact for the 5-Band WAZ award.

Unfortunately for award managers, many DX stations and QSL managers are careless about distributing blank QSL cards. I have several hundred blank QSLs, representing more than 120 DXCC countries, that have been sent to me unsolicited. An unscrupulous DXer might take advantage of such a blank QSL to "verify" a contact. Here is one example where an unaltered QSL card is *not* proof of a valid QSO; the real proof lies in the log of the DX station.

Honest DXers should applaud this high standard for the 5-Band WAZ award. The award is probably the single most difficult award to earn in DX, and those who have earned it should be grateful that less-than-honest DXers cannot claim that they have "earned" 5-Band WAZ. The very high standards of the DXCC program helped propel that award program to the forefront of DX; DXers everywhere should appreciate that 5-Band WAZ has an even higher standard than DXCC.

WAZ Rules Corrections

Speaking of the WAZ award, Jim Dionne, K1MEM, points out a few minor errors in the WAZ zone list that was published with the WAZ rules in the November 1990 issue. First, "Antarctica" is the correct spelling of the southernmost continent. On Antarctica, 4K1H is listed as being in Zone 12. Even their QSL card says so.

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2217	W5LLU	2222	EA7BYM
2218	DK4MO	2223	IK2JEX
2219	KE4BM	2224	IV3JDD

CW

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2666	I3CRW	2669	JI1CQA
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SSB: 350 KA2CC, KE4BM, W1VXV, EA7BYM, WB4UHN. 400 KA2CC, W1VXV, EA7BYM. 450 KA2CC, EA7BYM. 500 KA2CC, KW0U, EA7BYM. 550 KA2CC, EA7BYM. 600 KA2CC, EA7BYM. 650 KA2CC, W5LLU, EA4KD, EA7BYM. 700 KA2CC, W5LLU, KB8DAE, EA4KD. 750 KA2CC, W5LLU, EA4KD, WB4UBD. 800 KA2CC, W5LLU, WB4UBD. 850 KA2CC, W5LLU. 900 KA2CC, W5LLU. 950 W5LLU, KA0ZFX. 1000 W5LLU. 1050 W5LLU. 1100 W5LLU. 1150 W5LLU, KS3F. 1200 W5LLU, FE6FNA. 1250 W5LLU, K9LJN, F1HWB. 1300 W5LLU, L9LJN, N2AC, F1HWB. 1350 W5LLU, K9LJN, F1HWB. 1400 W5LLU. 1450 W5LLU, KL7AF. 1500 W5LLU. 1550 W5LLU. 1600 W5LLU. 1650 W5LLU. 1700 W5LLU. 1750 W5LLU. 1950 I1EEW. 2000 I1EEW.

CW: 350 I3CRW, YU2DM, KS7V, KI1CQA. 400 I3CRW, I0PJQ, KS7V, JI1CQA. 450 I3CRW, I0PJQ, KS7V, JI1CQA. 500 K9LJN, I3CRW, I0PJQ, KS7V, JI1CQA. 550 K9LJN, I3CRW, I0PJQ, KS7V. 600 K9LJN, JF6TUU, I3CRW, I0PJQ, KS7V. 650 K9LJN, N3KR, KS7V. 700 NS2H. 800 JG2LGM. 1000 I1EEW. 1350 G4SSH. 1400 W8IQ.

10 Meters: KA0ZFX
15 Meters: JI1CQA
20 Meters: WB4UHN, I3CRW
40 Meters: I3CRW, IK8BMW
160 Meters: NJ1T, I1EEW, I3CRW

Asia: KA2CC
Africa: I3CRW
No. Amer.: KA2CC, I3CRW, IK8BMW, OK3TAY
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Oceania: KA2CC, IK2JLH, I3CRW, JI1CQA

Award of Excellence Plaque Holders: K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2**, AB9O, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, VED7WJ, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K9BG, AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, K9QFR, NN4Q, W4UW, NX0I, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

However, 4K1H is located at 137 degrees west, which puts it in Zone 32. A second correction is that UAOT and UAOV are now UA8T and UA8V. Some additions to the Zone list: add UA9M to Zone 17; add UAOD and UAZX to the Zone 19 list; and add IH9 Pantelleria island to the Zone 33 list.

DXCC News

The DX Advisory Committee (DXAC) has received two more petitions to add new countries to the DXCC list. The Northern California DX Club (NCDXC) has sent the DXAC a detailed petition describing the relationship between North and South Korea. The petition points out that these two entities meet most of the requirements for separate DXCC country status and should count as separate countries. Given the obvious separate nature of the two entities, the DXAC will probably go along with the addition of North Korea to the DXCC list, with a start date depending on when an accredited operation takes place from North Korea. Several Soviet amateurs await the DXAC determination that North Korea will count as a New One before finalizing their plans to operate from there.

The NCDXC's petition also suggests that the present country of Korea should be deleted, and South Korea added as a new DXCC country. The DXAC might add North Korea, and simply rename the existing listing for Korea to South Korea, as all operations from Korea since WW II have come from South Korea. (A summary of the NCDXC's petition about the DXCC status of the Koreas appears in the February issue of *The DX Magazine*.)

Another possible new DXCC country is the Tatar SSR, in the USSR. On August 30, 1990 the government of Tartaria proclaimed state sovereignty, with all the rights of other Union Republics of the USSR. Since the other Republics are separate DXCC countries, the Zilan DX Club is petitioning the DXAC to make the Tatar SSR a New One for DXCC.

There are two problems with this petition. First, the rest of the Soviet Union has not acknowledged the sovereignty of the Tatar SSR. As far as the Russian Republic is concerned, Tatar remains under their jurisdiction. Second, the DXAC recently evaluated the justification for existing DXCC countries, under current DXCC rules. The separate DXCC status of the Soviet Republics was among the many that do not qualify for separate status under today's DXCC rules. This does not mean that the DXAC has any thoughts of deleting existing DXCC countries that don't meet current requirements. Such countries are "grandfathered" onto the list, and will not be deleted except under the DXCC deletion criteria. However, the point of the DXAC determining which countries meet present rules is to use this as a basis for evaluating petitions for new DXCC country status. Even if the DXAC has no thought of deleting the existing Soviet Republics, they probably won't add another such Republic under the current rules. We'll have to wait and see what the DXAC does.

DX News

The Norfolk Island Philatelic Bureau is issuing a set of amateur radio stamps on April 9. The three stamps, with denomina-

5 Band WAZ

As of December 30, 1990, 300 stations have attained the 200 zone level.

New recipients of 5 Band WAZ Award with all 200 zones confirmed:

N4VZ
A92BE
K5UC

The top contenders for 5 Band WAZ are:

N4WW, 199	RT5UY, 199
W7OM, 199	NA0Y, 198
SP9PT, 199	K7UR, 198
K6YRA, 199	I8IGS, 198
LA4HW, 199	VE7DX, 198
PY7ZZ, 199	W0PGI, 198
DL9WW, 199	VE7AHA, 198
K0CS, 199	SM6AHS, 198
KB0G, 199	K1ST, 198
ZS6BCR, 199	ZS6BCR, 198
HA8XX, 199	VE6OU/6, 198
UA4RZ, 199	WB9Z, 198
KB8DB, 199	W1JR, 198
AA4KT, 199	

694 Stations have attained the 150 zone level as of December 30, 1990.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4½ × 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 De Marco Rd., Sudbury, MA 01776. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is $4.00 for subscribers and $10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

The walls of JA8EAT's impressive shack are covered with awards and honors. But he still finds time to be a father to his two sons.

tions of $0.43, $1.00, and $1.20 feature maps of Norfolk Island and the Pacific, with the callsigns of Norfolk Island amateurs in the background. DXers can order the set of three stamps for $2.63 each in Australian dollars, or charge them to their VISA or MasterCard. First Day Covers are available for $2.83 each. Order your stamps from the Philatelic Bureau, Norfolk Island, South Pacific 2899, Australia.

New DX Club Officers: The Salt City DX Association of Syracuse NY has elected Dick Lyle, KA2AJT, President; Gary Todd, KB2DM, Vice-President; Roger Rovall, WB2KCI, Treasurer; and Wil Parker, KB2G, Secretary. The North Jersey DX Association's 1991 officers are Stan Owens, W2MT, President; Harry Westervelt, NA2K, Vice-President; Bill Hudzik, WA2UDT, Secretary; and Gene Ingraham, N2BIM, Treasurer. Congratulations to all!

April Events

John Sklepkowycz, VE3IPR, editor of *Long Skip*, reports that Canadian amateurs may use the following special prefixes during the months of March and April 1991 to celebrate the 100th anniversary of Ukrainian settlement in Canada (listed are location followed by regular

JA8EAT has crammed five large antennas on three towers onto his small lot. The big tower supports a 6-element 40, 20, and 15 meter triband beam at 132 feet, with an 80 meter rotatable dipole above that. Other antennas include a 4-element 20 meter monobander and a 5-element 15 meter monobander at 66 feet, and a 5-element 10 meter monobander also at 66 feet.

The WAZ Program

Single Band WAZ

10 Meter SSB

371	WB2OJL	375	WO6R
372	K5FUV	376	SP1EYI
373	WA3CGE	377	KN2N
374	EA4KD		

15 Meter SSB

366	JH@XSW	368	EA4KD
367	WA3CGE	369	JH2QYI

20 Meter SSB

829	KA1EKR	830	EA4KD

40 Meter SSB

66	TI2KD	67	SP1EYI

10 Meter CW

99	JF3LOP	100	N4KG

15 Meter CW

197	JI1CQA	198	LA6MFA

RTTY

57	W6OTC	58	JA2LA

15 Meter RTTY

3	JE2GAL

All Band WAZ SSB

3683	EA5BW	3687	WB4UHN
3684	EA3GBU	3688	JQ1ALQ
3685	EA7BVI	3689	WD8KND
3686	KA9YMV	3690	SM5SVL

CW/Phone

6934	KA9YMV	6936	W9EVI
6935	SM4ASI (CW)	6937	K6GCF (CW)

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4½ × 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Rd., Sudbury, MA 01776. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all *CQ* awards is $4.00 for subscribers and $10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

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

4056	YU2AA	2324	YT7DX	1843	KL7AF	1405	VE1RJ	1075	NX9H
3627	F9RM	2308	I6SF	1809	I2DMK	1393	NV9S	1064	G4SDJ
3509	K2VV	2302	IT9TQH	1752	K9QFR	1392	AC2J	1055	YU1PJ
2992	VE3XN	2288	W1BWS	1740	N7JM	1390	G4OBK	1040	W9IAL
2976	EA2IA	2270	SM7TV	1712	K8LJG	1382	W7CB	1035	VE3NUP
2967	K6JG	2261	IN3ANE	1680	HAØIT	1380	DF6EX	1032	IK2FCZ
2955	YU2TW	2249	I1EEW	1664	WE2L	1351	YU7DR	1032	K9BQL
2850	W4BQY	2246	KA5W	1660	W8UMR	1329	F1HWB	995	YU4BR
2761	PY1APS	2228	YU2NA	1649	K2OLG	1318	YU7RU	983	I5ZTC
2752	N6JV	2219	K9BG	1645	W6OUL	1279	YBØTK	974	F6CDJ
2740	N4NO	2178	YU7BPQ	1640	WA1JMP	1276	IØAOF	931	NJ1T
2704	K6XP	2177	4X4FU	1627	DK5AD	1259	WB2YQH	901	W5ASP
2651	N4MM	2131	HAØDU	1606	I2EOW	1236	AKØG	860	WMØG
2638	WA8YTM	2064	IT9QDS	1589	YU2CQ	1230	PY2DBU	848	IK2BHX
2630	W9DWQ	2058	I2MQP	1584	I1ZEU	1195	JA1WJ	827	YU7FT
2606	I2PJA	2052	I2UIY	1557	I1WXY	1185	VE7EIK	823	W4USW
2570	YU1AB	2035	SMØAJU	1550	YT7WW	1179	WD9IIC	816	RB5MP
2546	KØBLT	2031	K5UR	1544	WB8ZRL	1174	WB3DNA	792	N6IBP
2505	N9AF	2004	KF2O	1533	YU3NU	1162	DF4ZL	786	WKØB
2485	PAØSNG	1994	HA8XX	1507	KBØG	1158	LZ2JE	765	W6LC
2475	SM3EVR	1988	WØSFU	1503	SM6CST	1155	K3UA	732	N3KR
2387	PY4OD	1982	UA3FT	1496	VE3FXR	1155	I2EAY	658	VE3OMM
2375	I8YRK	1979	YT3AA	1470	W9IL	1146	YU3PG	656	IK2BLA
2374	YU7SF	1955	I1POR	1463	WB4RUA	1140	KI3L	638	DL6UQ
2357	N2AC	1943	W2FXA	1438	4N7ZZ	1125	KSØZ	636	5Z4BH
2325	YU7BCD	1843	W4UW	1435	LA7JO	1095	5H3RB	602	W9GCH

SSB

3553	F9RM	1977	I1EEW	1537	PY4OD	1121	IK2AVH	907	N6CGB
3485	IØZV	1942	W9DWQ	1493	KD9OT	1115	DK5WQ	902	NG9L
3000	K2VV	1884	WF4V	1479	XE1OX	1108	LU7HJM	899	KC2FC
2989	ZL3NS	1858	YU7BCD	1448	KL7AF	1106	IK7DBB	891	NE6I
2782	VE1YX	1851	KA5W	1418	4X6DK	1090	AG2K	888	K9BQL
2689	K6JG	1844	WA4QMQ	1385	IK5ACO	1083	K8LJG	881	VE3FXR
2647	K2POA	1822	HA8XX	1381	CT1BY	1076	WØULU	859	KBØG
2496	WD8MGQ	1770	EA8AKN	1357	N6FX	1075	WN5MBS	849	KF7RU
2458	I2PJA	1766	I5ZJK	1354	EA2AOM	1070	I8LEL	844	IT9ONV
2405	N4MM	1746	I2UIY	1352	KKØL	1067	IT9JKY	805	K3UA
2397	K6XP	1744	EA3AQC	1349	I2TZK	1056	G4SDJ	803	KB2DE
2388	IØAMU	1738	YU2NA	1332	F1HWB	1049	WA2FKF	800	IK2AEQ
2303	CT4NH	1734	K5UR	1324	YU7SF	1046	I2WZX	799	K8MDU
2287	WØYDB	1713	KF2O	1318	CT1AHU	1038	FE6FNA	773	5Z4BP
2267	ZP5JCY	1711	W4UW	1309	KE6KT	1025	W3GXK	766	K2EEK
2234	I6ZJC	1690	W3ARK	1267	N2AC	1010	EA1AK	762	WMØG
2215	I8YZP	1673	EA4KK	1260	K2POF	1010	CT1DIZ	749	EA3FHT
2166	W4BQY	1654	I8KCI	1233	K9LJN	1004	K3IXD	699	KA9MOM
2153	EA2IA	1635	K9QFR	1219	WB8ZRL	999	IK2DUU	697	A41JV
2150	I4ZSQ	1627	CT4UW	1211	CX6BZ	988	W5LLU	695	NM5Y
2119	PAØSNG	1622	K5RPC	1204	I8WYD	983	I3ZSX	649	I6KYL
2114	IT9TQH	1617	PY4OY	1201	YV1CP	969	HP6AYV	646	KB8DAE
2103	OZ5EV	1606	I2EOW	1190	AB9O	962	W5ILR	643	SVØFC
2096	N4NO	1603	SMØAJU	1179	IK8GCS	944	LU8DY	627	KA5RNH
2070	I4CSP	1572	I1POR	1167	KBØC	944	W5AWT	610	JH6WMJ
2068	WA8YTM	1555	LU8ESU	1162	HK6BER	926	K8ZZU	609	VK5NVW
2067	I8YRK	1551	HR1KAS	1145	PY4VX	922	G4OBK	607	YU1PJ
2039	I2MQP	1541	WE2L	1125	HAØIT	914	WB6SRK	605	TU2UI
2021	NJØC								

CW

2883	WA2HZR	1758	N4MM	1342	F6HKD	1121	G3EZZ	874	N4IR
2865	K2VV	1667	VO1AW	1338	G4UOL	1088	DL3HBX	867	KA1CLV
2732	N6JV	1633	IT9VDQ	1329	HAØIT	1086	OZ5UR	837	NE6I
2714	ON4QX	1613	K5UR	1321	KF2O	1075	AK9Z	837	JJ1FSK
2497	N4NO	1571	KA5W	1321	G4SSH	1046	NF5Z	808	WE2P
2340	VE7CNE	1567	KA7T	1295	I8YRK	1043	G4OBK	805	W9IAL
2282	W3ARK	1515	N4YB	1259	I7PXV	1042	W5AWT	793	YU1PJ
2225	K6JG	1510	DJ4XA	1243	G4MVA	1035	SM5DAC	741	ISØFIC
2218	EA2IA	1509	VE7DP	1227	G3VQO	1033	KQ8J	729	JAØBSL
2208	YU7SF	1471	YU2NA	1222	YU2CQ	1012	YU3PG	720	AH6JF
2201	W4BQY	1444	KL7AF	1206	W6OUL	1012	IK3GER	712	PY4WS
2166	W9DWQ	1442	TI4SU	1205	I2IWM	1000	I2EAY	707	W4UW
2123	N2AC	1438	YU3NU	1204	LA9XG	999	HA5LZ	699	IK2ECP
2063	IT9TQH	1433	N6FX	1194	VE3FXR	992	I1EEW	695	RB5MP
2063	I6SF	1419	SMØAJU	1192	KBØG	988	VE4CE	595	WB5MTV
2025	K6XP	1404	VE1RJ	1190	HA8XX	979	AI6Z	646	JO1QUB
2024	I1YRL	1389	W9PWM	1187	OK1CZ	965	VS6UW	633	K9QFR
1974	WA8YTM	1382	SM6CST	1186	DJ1YH	959	WB8ZRL	629	W8LRY
1926	4X4FU	1369	K9LJN	1183	LA9XG	933	K3UA	628	AA6AY
1922	LZ1XL	1369	I2UIY	1177	K8LJG	910	NJ1T	603	NU7V
1918	PY4OD	1358	W8IQ	1161	ZS6BCR	885	N4RNR	600	VE3OMM
1852	YU7BCD	1348	W1WAI	1124	N2AIF	876	YU4BR		

Will the real Chod Harris, VP2ML, please stand up. WB6ITM (I Teach Music) on the left has been known to masquerade as your DX editor (the handsome one on the right) at the Visalia International DX Convention. Beware of cheap imitation DX editors.

prefix and then special prefix): Newfoundland VO1, VO7; Labrador VO2, VO8; Yukon VY1, VC1; Prince Edward Island VY2, VC2; Nova Scotia/New Brunswick VE1, VA1; Quebec VE2, VA2; Ontario VE3, VA3; Manitoba VE4, VA4; Saskatchewan VE5, VA5; Alberta VE6, VA6; British Columbia VE7, VA7; Northwest Territories VE8, VA8; DOC Communications VY9, VC9. In addition, the special-event station **VA1U** will be active on 80–10 meters. QSL VA1U direct, with sufficient return postage (US stamps are *not* valid in Canada) to VE3IPR, 300 Deloraine Ave., Toronto, Ontario, Canada M5M 2B3, or via the VE3 bureau.

Tony Spino, WF1N, will lead a team to

The staff at the Azimuth booth at the Dayton Hamvention always attracts a big crowd. Nobody knows what Azimuth is selling, but everyone knows where their booth is located.

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Range	10Hz-2.6GHz	10Hz-2.6GHz	1MHz-2.6GHz	1MHz-2.6GHz	10Hz-2.4GHz	1MHz-1.3GHz	1Hz-2.4GHz
Display	10 Digit LCD w/Function Annunciators	10 Digit LCD w/Function Annunciators	10 Digit LCD	10 Digit LCD	8 Digit LED	8Digit LED	14 Digit Monitor
RF Signal Strength Indicator	16 Segment Adjustable Bargraph	16 Segment Adjustable Bargraph	16 Segment Adjustable Bargraph	•	•	•	•
Price	**$579.**	**$375.**	**$325.**	**$225.**	**$239.**	**$179.**	****$339.**

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* *Price includes on board 50ohm, 2.5MHz to 2.4GHz input. Companion model AP10H, Dual High Impedance Amplifier is an additional $299.

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CIRCLE 173 ON READER SERVICE CARD

CQ DX Awards Program

SSB

1831	AA4KT	1836	WB3FQY
1832	AA4AH	1837	KE5PO
1833	WB4TGB	1838	RA3YA
1834	EA3FDX	1839	OA4ED
1835	EA3EFF	1840	K2OP

CW

814	AA4KT	817	K3BMI
815	WA4FTM	818	KE5PO
816	KA7T	819	WB4TGB

RTTY

3	KE5PO

SSB Endorsements

320	K2TQC/322	300	W4BQY/308
320	K4MQG/322	300	KD5ZM/304
320	EA4DO/322	300	VE6PW/301
320	AA4KT/320	275	WD0BNC/298
320	WB4UBD/320	275	KB9LN/298
320	TI2CC/320	275	VE2GHZ/291
320	I4EAT/320	275	YU1TR/280
320	TI2CC/310	275	WB4TGB/275
320	I8KCI/317	275	WA4PGM/275
320	K2JF/316	275	KE5PO/275
320	AA5NK/314	250	RA3YA/264
320	KI3L/312	150	EA3EFF/151
320	TI2KD/312	28 MHz	AA4AH
320	AA4AH/311	28 MHz	WB4TGB
310	K9TI/310	28 MHz	WB3FQY
300	OA4ED/308	QRPp	TI2KD

CW Endorsements

320	ON4QX/321	300	K9TI/302
310	W4BQY/308	300	I4EAT/302
310	AA4KT/317	275	KA7T/277
300	W1WAI/309	150	WB4UBD/168
300	N7RO/303		

Total number of active countries is 322. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

the island of Martha's Vineyard April 12–15. They will operate in the General class SSB subbands of 10, 15, 20, 40, and 80 meters, as well as some RTTY. This is NA-46 for Islands On The Air hunters, and Dukes County for county hunters. QSLs go to WF1N (ex-KA1HBV) direct or via the bureau. Other members of the team are Rich, NT1I, San, K1SCN, and Lou, KA1DIG.

The two biggest DX events of April are the International DX Convention in Visalia, California April 12–14, and the Dayton Hamvention April 26–27. Your DX editor will be at both. At Visalia stop by the Friday evening cocktail party hosted by *The DX Bulletin* (but beware of cheap imitations; see photo). At Dayton I'll be in Booth 442. If I'm not there, try the Azimuth booth, where I will be conducting an in-depth interview of the sales staff (see photo). See you there!

73, Chod, VP2ML

QSL Notes

US postage rates will go up soon. This has several ramifications for DXers. First, include extra postage when sending a self-addressed, stamped envelope (SASE) to a stateside QSL manager. With delays in printing QSLs and receiving logs from overseas, the QSL manager may be stuck with lots of 25¢ stamps when the postage is 29¢. (Sometimes the USPS will deliver mail postage due if the envelope has the old minimum of 25¢ on it, but don't count on this.) Second, send some extra stamps to your ARRL in-coming QSL bureau, if you usually provide envelopes and stamps to your bureau. (If your incoming bureau sells postage credits, as the W2 bureau does, they will simply adjust your account to compensate for the postage increase.) Third, stock up on International Reply Coupons (IRCs), as they will cost more than US$1. Look for the price of second-hand IRCs to approach 75¢, and more DXers to use "green stamps" (US one dollar bill) instead of IRCs. Finally, the undenominated F stamps the USPS issues right when postage rates increase *cannot* be used outside the US, not even to Canada. Use stamps with numerical values on them.

J6A in the ARRL 160 Meter Contest December 1–2 QSLs via W8OK.

CU3LF is on a two-year tour of duty in the Azores. QSL with US postage to Mike Lazaroff, PSC Box 1687, APO New York 09406.

EA8RCT in the 1990 CQ WW CW test was operated by, and QSLs via, Olli Rissanen, OH0XX, Cerro del Castanar 72, 28034 Madrid, Spain.

QSL **9M8ZR, 9M8ZR/2,** and **9W2ZR** from last November to Dave Church, AW2HZR, Box 592, Mexico, NY 13114, direct only. Dave reports that **9M8SEA** and **9M8ULU** were the SeaNet convention stations; QSL to MARTS, Box 725, 93714 Kuching, Sarawak, Malaysia. However, the **CW** operation of 9M8ULU can be confirmed via Dave, at the above address.

AK1E, QSL manager for **TR8JLD,** awaits logs. Don't send duplicate requests, please.

QSL **A22AA** via his 1990/91 Callbook address only, with SAE and return postage.

Mail service to Pitcairn Island is slow and erratic, so don't expect a quick turnaround from Brian **VR6BX.** Also, he prefers US$1, as IRCs are worth only 20¢ on Pitcairn.

If you worked **FR7ZL/T** 20 years ago and don't have a QSL card, you aren't likely to get one now. Neither FR7ZL nor QSL manager F8US respond to requests for confirmations.

V73AZ reports from the Marshall Islands that **KX6TY** is no longer in the Marshalls. His home call is KS5H. And **V73AQ/KX6OI** has also left. His home call is AB5K.

Members of the **4S7 DX Association**

QSL Information

3C1EA to EA4CJA
3W4VL to UA3DK
3X1AU to ON6BV
3X1SG to ON6BV
4B1PAX to XE2BCS
4C1RCA to XE1RHZ
4K1A to UZ1PWA
4K2BDU to UA9MA
4K2OIL to UA9MA
4K2PGO to RA9LA
4K4QQ to RA1QQ
4S7WP to 9V1JY
4Z8Ø to 4X6LV
5B3ØJE to 5S4JE
5B4AAL to WB8HWO
5R8GN to IK2GNW
5R8JD to F6FNU
5T3ØMTN to 5T5HH
5T5/N5JRC to WA5ZIJ
5V7DP to KA1DE
5W1RA to W6RQ
6FXBCS to VE7DP
6W1QB to DK3NP
6W1QC to JA8KJH
6W6JX to F6FNU
7P8EN to ZS5BK
7Q7EC to DF3EC
7Q7JA to JH8BKL
7X2CR to IS0LYN
7X4AN to DJ2BW
8P9EM to G3VBL
8P9HT to K4BAI
8Q7AJ to K9AJ
8Q7BQ to K9AJ
8Q7BX to I4ALU
9L1US to WA8JOC
9M6/JH1ROJ to JH1ROJ
9M6OO to N2OO
9M8AJ to AA5AZ
9N1HMB to JA6CBG
9N1MM to N7EB
9V1YQ to K2QBV
9X5SW to DL1HH
A61AD to WB2DND
A71BK to KI4GV
A71CD to WA4JTK
AHØF to JA2NQG
AH3C to K9UIY
BV2A to K2CM
C3ØCAG to F6GIN
C31UA to EA3AOC
C6AFP to KR8V
CN2JO to F3MZ
CN2JP to AE6H
CN2LX to F9LX
CO3JA to I0WDX
CQ6RB to CT1RB
CQ9M to G3PFS
CR7DNP to DJ0MW
CT3T to CT1BOH
CU2DX to CU2AA
CU3LF to KB3RG
CXØCW to CX8BBH
D68GA to N6ZV
D68JM to WU4F
DKØAP to DF6XJ
EA8/GØKPW to G4BAH
FJ/FG5ED to FG5ED
FK8FU to NA5U
FL5/XE1L to WA3HUP
FM4WN to WA4JTK
FM5WD to W3HNK
FOØCC to K1CC
FOØIGS to F6EEM
FO8AA to N6VO
FT4WC to F6GVH
FY5EW to F6BFH
FY5YE to W5JLU
GU6UW to G3XTT
HA4EHQ to HA4XH
HE7CSY to HB7CSI
HFØPOL to KB6GWX
HH7PV to N2AU
HI1XBH to W4YC
HI8DMX to JA1ELY
HKØ/K1WGM to K1WGM
HKØHEU to HK0BFF
HV3SJ to I0DUD
IJ4R to I4USC
J28NU to F6FNU
J37H to KJ4VH
J49G to SV9ADH
J6LNN to KB6ZBI
J6LRR to W8PR
J6LRU to W8ILC
J82A to K3IPK
JD1/JH1MAO to JA1GUC
JW1QCA to LA1QCA
JW8XM to LA8XM
JX7DFA to LA7DFA
KA3B/C6A to KA3B
KD7P/NH7 to KD7P
LU7FJD to LU9FHF
LZ15ØL to LX1DA
OD5MM to HB9CYH
OM5KWW to OK3LL
OM7CBU to OK3CED
OM7CQR to OK3CQR
OM7EY to OK3EY
OT7XT to ON5GK
OX3KM to F6FNU
OX3XR to OZ3PZ
OZ8BV to OZ3FC
P29PL to VK9NS
P29SC to WB1GWB
PA3DOR to KA8TGK
PJ2/DL5XX to DK5MQ
PJ9A to OH6XY
RFØFWW to UF6FFF
RG17ØØGW to RG6GW
SO5MFA to LA7MFA
SV2ASP/A to SV2UA
T2ØAA to N4FJL
T3ØWW to SM7PKK
T32Z to N7YL
T33R to OH3GZ
TA3F to DL5YCQ
TE5E to TI4SU
TF1MM to TF1PS
TF3EJ to TF3IRA
TF3XK to AB4ST
TJ1MR to F6FNU
TK/DL7HZ to DL7HZ
TL8SC to K4UTE
TL8WD to DL8CM
TP5HA to F6FQK
TR8XX to F2CW
TU2UI to WA8ZWR
TZ6CX to NP2CX
UAØKBA to RA3YG
UC5A/UA6EO to UC2AHZ
UD6DKW to W3HNK
UG17ØØGAW to UG6GAW
UH8EA to W5BWA
UI8IF to UI8IAF
UJ8KA to UJ8ZDH
UL7ACI to K2OVS
UL7NW to WA2CBU
UM8TBE to UM9TWA
UTØU/UB4MM to RT5UY
UZ2FWA to UA2FM
V29A to W4FRU
V29W to KD6WW
V31DX to KA6V
V63NW to DF6FK
V73AS to KK4QY
V73BY to KX6BU
V85DA to VK1DA
V85OM to N2OO
VK7JH to W3UM
VK9LE to VK3OT
VO2/G8PP to G8PP
VP2EXX to KC8JH
VP2ML to K1RH
VP2VCW to N6CW
VP5N to WB8GEW
VP5VDH to WD8MQJ
VP5VDK to NY8E
VP5VKS to WM2C
VP8CEG to G1NAN
VP8CEL to G4PVM
VP8X to G4YIU
VQ9CQ to KA6V
VS6WO to K9EC
VU2WAP to W3HNK
XQ0X to CE3ESS
XT2BW to WB2TQH
XT2PS to DL1HH
XUØAA to JA1NUT
XW3UB to JA3UB
XW3YL to JA3UB
Y9ØANT to Y21RO
YB8ASX to KØIEA
YL1XX to UQ1GXX
YN1MF to I0WDX
YQ3R to YO3CD
YU3PR/4U to YU3PR
YW1A to YV1AVO
YW6W to YV6CAX
ZD7CW to N4CID
ZD8CUE to G4ZVJ
ZD8DX to WB2K
ZD9BV to W4FRU
ZF2AG to N8AG
ZF2NM to K1MD
ZF2PS to KQ1F
ZF2PW to N7LGI
ZK1XX to TF3CW
ZLØAAD/ZL7 to DJ1ND
ZS9Z to ZS6BCR
ZS9Z/1 to OH2BH
ZU1B to ZS6RF

3W4DX to RW3DX, P.O. Box 145, Dubna 141980 USSR

4K3ODX to RA1OA, Serge Sadakov, P.O. Box 48, Arkhangelsk 163040 USSR

4L4F to Box 2345, Penza 440028 USSR

4S7WP to P.O. Box 80, Colombo, Sri Lanka

5N8HKC to P.O. Box 105, Kano, Nigeria

6W2EX to P.O. Box 981, Dakar, Senegal

A45ZO to P.O.Box 987, Muscat, Oman

CE2NFT to P.O. Box 8260, Vina del Mar, Chile

CX4PA to P.O. Box 64145, Rivera, Uruguay

ES4AA to Box 33, Kohtla, Jarve, Estonia, USSR

FH4EH to B.P. 123, F-97640 Sada, Mayotte, via France

UC1WWW to Yuri, Box 12, Vitebsk 210024 USSR

UFØF/UV3HD to UV3HD, Box 1, 141200 Pushkino, USSR

UG7GWG to Box 54, Yerevan 10, Armenia USSR

UV1AD to Box 320, Kronstadt 189610 USSR

V85GA to P.O. Box 222656, Brunei

ZS7ANT to P.O. Box 17118, Cogella 4013, RSA

receive their cards via the Association's address: Box 80, Colombo, Sri Lanka. Members include 4S7s: EA, WN, SX, KG, CR, VJ, GW, PB, GV, EK, JA, and WP.

OK8ALU is operated by, and QSLs via, Alex Korda, G4FDC, 5 Windmill Court, North Street, Royal Tunbridge Wells, Kent TN2 4SU, England.

Eddie DeYoung, **ex-VK8XX** is now VK2KS. Eddie has logs for **VK8XX, VK8MM, C21XX, FW8DY, VR3DY, VS5AA, 3D2XX,** and **KH6GLU.** His new address is 27 David Ave., North Ryde 2113, New South Wales, Australia. WB6GFJ reports that all **3D2XX** cards received as of September 1, 1990 have been answered (via the bureau if no return postage was enclosed). If you still need a Rotuma card, try via VK2KS.

Paul Meacham, VP2EXX, says that DXers should QSL his September 14 to October 4, 1990 operation as **V47NXX** to Ken Poucher, KB2XR, RFD 1 Box 225-A, Allagany, NY 14706. QSL his **VP2EXX** and **VP2E** operations to his usual QSL manager: George Lee, KC8JH, 15290 Hannon Trace Road, Crown City, OH 45623.

Ron Oates, **AA4VK,** handles cards for his operations as: **5W1VK, P40VK, P40DX, AA4VK/VP9, /C6A, /CT3, /PJ7, /FS7, /J6L,** and his Soviet operations as **U0K/AA4VK, UA3A/, UI8Z/,** and **UI8L/.** His address is 9908 Waterview Road, Raleigh, NC 27615.

The Jamaica Amateur Radio Association (JARA) says they will dispose of all 6Y5– contest-call QSLs soon. The JARA does not forward these cards to the appropriate managers. So don't QSL via the bureau, or to Jamaica. Some recent operations: **6Y5V** via AI6V; **6Y5X** via KN5X; and **6Y5L** via WD8LLD.

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Potpourri

Since I receive many requests for the same information, this month's column is intended to cover a few of the more popular subjects, plus some odd bits of information.

Mobile Transceiver Installation

General Motors offers a free four-page brochure which provides information about the correct way to install two-way radios in cars. The name of their booklet is "Radio Telephone/Mobile Radio Installation Guidelines." Requests can be sent to the Electromagnetic Compatibility Department, EMC Building 40, General Motors Proving Ground, Milford, Michigan 48024-2001. Improper installation can result in several different malfunctions, some of which can be life-threatening. Naturally, GM offers this flyer to people who own General Motors vehicles.

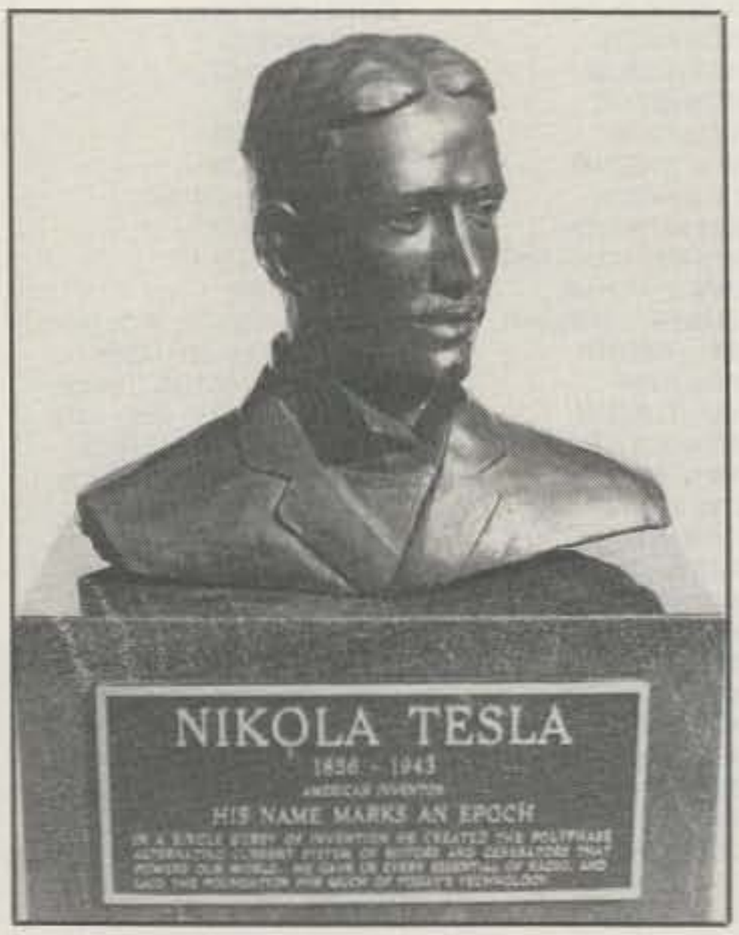
Simple Antenna For The Novice High-Frequency Bands

One of the more common questions I receive is a request for information about a simple (but good) wire antenna for use in the Novice high frequency (3–30 MHz) bands. There are many good antennas on the market, and several of them are probably advertised in this issue of *CQ* magazine. The July and August 1989 issues of *CQ* contain my article about antennas. It provides a simple introduction to antennas in very few words. Reprints can be purchased from *CQ* for $2.50 each. The August issue covers some of my favorite suppliers of wire antennas.

If you are in the market to buy a wire antenna, I advise you to request sales data from the dealers or manufacturers who advertise in *CQ*. You can also check out *CQ*'s *Equipment* or *Antennas Buyer's Guides*.

I use a Carolina Windom/2 with an MFJ-989C Versa Tuner V at my home station, and I recommend that combination to anyone who wants excellent results on the 40 through 10 meter bands using a single antenna with a single feedline. This antenna is the same length as a standard

45527 Third Street East, Lancaster, CA 93535-1802



This bust of Nikola Tesla is on display in the University of Michigan's Engineering Library.

40 meter dipole, and it is sold by the Radio Works.

Joseph J. Carr, K4IPV, is the author of the *Practical Antenna Handbook* published by TAB Books. This 439-page book provides good introductions to all of the common antennas. It is written in such a way that it should easily be understood by amateurs with very limited knowledge of antenna theory. If you are just getting ready to install your station, I advise you to learn a lot about antennas before you decide which ones you will erect. You do not have to mortgage your kids to purchase an effective antenna system.

Transceivers

It is advisable to select a transceiver in the middle to upper price range. I do not know a bad one in that price range. Modern amateur radio transceivers are excellent.

At the present time Heathkit is selling its line of amateur radio gear at significant price reductions. Their SB-1400 transceiver is an excellent choice for both beginning and advanced amateurs. The wired (assembled) SB-1400 is selling for $799.95. The matching SBA-1400-4 AC Power Supply/Loudspeaker regularly sells for $329.95; it is presently being included with the SB-1400 at no extra charge. The rest of the extensive Heathkit line of amateur radio equipment is also being sold at reduced prices. The address to use to request a free Heathkit catalog is Heath Company, Benton Harbor, Michigan 49022.

ICOM, Kenwood, Yaesu, and all other current manufacturers of amateur radio gear offer equipment that is far superior to what was available as recently as a decade back. In summary, you get what you

Third-grade students of the Bates Elementary School sell T-shirts and sweatshirts honoring Tesla. (See text.)

This is seven-year-old Marc Harvey, KB8KPL, of Apple Creek, Ohio. His dad is KA8YNW and his grandfather is KA8PGV. His operating has increased his interest in geography. I recently had a nice contact with his proud grandfather.

pay for. I advise you to purchase the best gear your financial situation allows you to buy.

The only American outfit manufacturing amateur radio transceivers is Ten-Tec, Highway 411, Sevierville, Tennessee 37862. Their equipment is excellent, and we have used it for decades with good results. I believe that Ten-Tec service is among the best that is offered by any amateur radio equipment manufacturers. I regularly use a Ten-Tec Argonaut, Corsair II, and Omni V; all three transceivers are very good.

QSL Cards

My January through March 1979 columns provide a thorough introduction to QSL cards. I have a few reprints of that article. If you want one copy of that QSL article, send a large (10 by 12 inches) self-addressed, stamped (52¢) envelope with your request to my California address. My December 1989 column includes an article about getting QSL cards without sending them. If you are a relatively new amateur, I advise you to read both of these articles about QSL cards.

I also advise you to purchase a reasonable quantity (at least 500) of QSL cards as soon as you know your callsign. You can always mark your new callsign on cards when you upgrade, if you change your callsign. If you do not keep a station log, you may have to extract information from received QSL cards when you are filling in the cards you will send in response to those you have received. If you are an amateur with no cards, be advised that most experienced amateurs are glad to send their cards even though you cannot send one in return. If you want a card from someone you have contacted, offer to send your mail address during the contact. Do not assume that every amateur has a copy of the latest *Callbook*, because that is not the situation.

Exchanging QSL cards is an interesting facet of amateur radio. Cards will be very important if you become interested in obtaining operating awards.

This issue of *CQ* lists several QSL printers. If you are in the market to buy cards, it is advisable to obtain sets of sample cards from several QSL printers. There are many types of cards available in a wide range of prices. Naturally, per-card costs decrease as the size of the order increases. It is advisable to store received QSL cards in the sequence used by the *Callbook*.

Steve Sellers, N5GZP, of San Diego has been an amateur since the age of 12. His hobby led him into the broadcasting profession. Steve recently won two broadcasting awards from United Press International for documentaries he produced and reported.

Magazines

Amateur radio magazines commonly include advertisements showing issues for sale from other amateurs. Basically, the oldest and newest issues are most in demand. Amateur Radio Club W6LS has provided a used magazine service since about 1961. If you want a data sheet, send your SASE and request to my California address. W6LS only handles *CQ*, *Ham Radio*, *QST*, and *73* magazines.

New Postage Rates

The domestic (U.S.A.) first-class postage rates for letters is 29¢ for the first ounce and 23¢ for each additional ounce. First-class letter postage rates to Mexico and Canada are 35¢ and 40¢, respectively. The first-class postage rate for a letter being sent to other countries is 50¢ (½ ounce) or 95¢ (up to one ounce). First-class postage rates for cards are 19¢ to domestic (U.S.A.) addresses and 30¢ to Canadian or Mexican addresses. Sur-

face and airmail card rates to other foreign countries are 35¢ and 40¢, respectively. Please remember to send 4¢ stamps to your ARRL incoming DX QSL Bureau to be added to your envelopes.

Pavek Wireless Museum

If you are in the Minneapolis area, you could visit the Pavek Wireless Museum. Joseph Pavek, WØOEP, founded this unusual museum. If you are interested, you can request a copy of their foldout flyer. The address is The Pavek Wireless Museum, 3515 Raleigh Avenue, St. Louis Park, Minnesota 55416 (telephone 612-926-8198). St. Louis Park is a suburb of Minneapolis. This museum contains thousands of items, including many pieces of antique amateur radio gear.

Tesla

My February 1990 column includes an item about the Tesla Coil Builders Association (RR-6, Box 181, Amy Lane, Glens Falls, New York 12801). Nikola Tesla was a remarkable inventor. Among other things, he paved the way for the use of alternating current, despite opposition from other inventors (such as Edison) who championed direct-current power. Marconi is generally recognized as the inventor of radio, but the U.S. Supreme Court struck down Marconi's rival patents 21 June 1943; they decided that Tesla's patents 645,576 (20 March 1900) and 649,621 (15 May 1900) hold priority over Marconi's radio patents. Despite these facts, our Smithsonian Institute honors Marconi and Edison as the respective fathers of radio and electrical power distribution. Similarly, the Smithsonian Institute had a 45-year dispute with the Wright Brothers, promoting the ill-fated Langley over the Wright Brothers successful airplane.

Third-grade students of the Bates Elementary School (2704 Baker Road, Dexter, MI 48130) sell T-shirts and sweatshirts promoting Tesla for $18 and $25 each, respectively, which includes shipping costs. Orders can be sent to the Tesla Memorial Society, Inc., c/o Mr. John W. Wagner (Director), 3890 Tubbs Road, Ann Arbor, MI 48103 (telephone 313-663-7031). Tesla Memorial Society membership applications and data can be requested using the same address. An I.R.S. tax deductible number exists. These shirts are printed front and back in color.

The Tesla Memorial Society has had a bust of Tesla made which is valued at $6,000. A heavy-metal rock band named Tesla contributed most of the money that was required to pay for this bust. The band adopted the Tesla name because they share Tesla's underdog role. The Smithsonian Institute contains no recognition of Tesla, and the Tesla Memorial Society is trying to remedy this situation by (at least) having the Tesla bust displayed there. This bust is presently displayed in the University of Michigan's Engineering Library. Petition forms are available from the Tesla Memorial Society to anyone who is willing to gather signatures.

Many books have been written about Nikola Tesla. The book which I found to be most informative is *Tesla—Man Out of Time* written by Margaret Cheney. It is a Laurel book which should be available throughout the country. If you want to purchase a copy but cannot locate one, you can request purchasing information from Dell Publishing, 666 Fifth Avenue, New York, NY 10103. This 320-page book is fascinating. Tesla was a remarkable man; he was truly a man out of time, as Margaret Cheney wrote. Many amateur radio operators have intense interest in the history of radio and I believe they will find this subject to be intriguing.

There is no connection between Bates Elementary School, Tesla Coil Builders Association, and Tesla Memorial Society. I thank John Wagner, W8AHB, for providing the information used in this item.

Encouragement

I frequently receive comments from experienced amateurs who read this column. Almost without exception, they ask me to wish new amateurs the best of luck on the air. I will mention two such items herein. Both were received in today's mail.

Trond Olsen, LA8XM, has 313 countries confirmed, and he holds the ARRL 5-Band DXCC award, which means he has at least 100 countries confirmed on each of five bands. Trond says he always reads this column to make sure the information being supplied to new amateurs is correct.

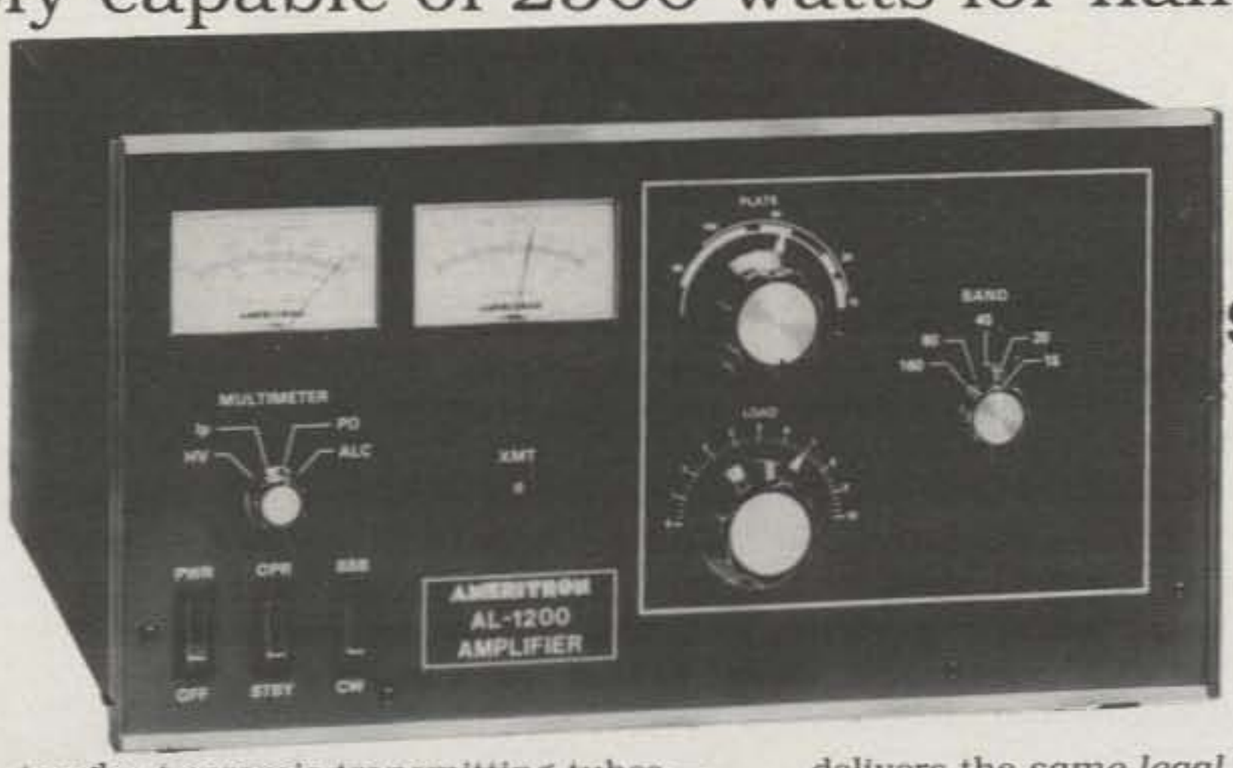
Fred Eikamp, NØCFS, advised me that he spends a lot of time in the Novice bands providing South Dakota contacts and cards to newer amateurs. Many higher class (General and up) American amateurs and DX (foreign) amateurs are glad to provide contacts and cards to Novices and Technicians. However, they cannot work you if you do not get on the air. As any tom cat knows, you have to make calls if you want to get results!

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, contrast, 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 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.

Ameritron linear loafs at full legal limit . . .

massive power supply capable of 2500 watts for half hour!



AL-1200
$2045
Suggested Retail

What makes the Ameritron AL-1200 stand out from other legal limit amplifiers?

The answer: a super heavy duty power supply that loafs at full legal power - it can deliver power for more than 2500 watts PEP two tone output for a half hour!

The heart of the AL-1200 power supply is a highly efficent Peter Dahl tape wound hypersil® transformer weighing 32 pounds. — it's equivalent to a 45 pound transformer using standard E-I laminations.

High current computer grade capacitors

You get genuine high current, full height *computer grade* capacitors with screw-on terminals — not short stubby, light duty soldered in "capacitors" that can't dissipate the heat generated by high current.

Why some filter capacitors explode

The failure of *carbon* equalizing resistors — used in most linear amplifiers — is the primary cause of filter capacitor failures.

When a *carbon* resistor gets hot its resistance drops, causing more current to flow, causing the resistor to get hotter.

This destructive cycle repeats until the *carbon* resistor opens and causes excessive voltage on the capacitor — the capacitor can explode.

Carbon equalizing resistors *can't* fail in the AL-1200. Why can't they fail? Because no-compromise *wire wound* SEVEN WATT 50 K ohm equalizing resistors — not the 2 watt 100K resistors others use — safely protect each filter capacitor. Plus, the lower value gives you better voltage regulation.

A direct short won't blow these rectifiers

The AL-1200 rectifier board uses diodes rated for a massive surge current of *200 amps* — you can accidentally short the high voltage supply and the diodes won't blow!

Will the amplifier you're considering withstand a direct power supply short?

Eimac® 3CX1200A7: the durability of glass and the power of ceramic

The AL-1200 uses one of Eimac® 's toughest ceramic transmitting tubes — the high gain 3CX1200A7. It has the durability of glass tubes and the power dissipation of ceramic tubes.

3CX1200A7: 12 times tougher than the 3CX800A7

A 3CX1200A7 has a 50 watt control grid dissipation — that's more than 12 times tougher than the delicate 4 watts grid dissipation of a 3CX800A7.

If you accidentally drive a 3CX1200A7 with your 100 watt exciter when your amplifier is off, you won't fry your control grid. But don't make that mistake if you have a pair of 3CX800A7s — unless you're ready to buy another pair.

Full legal power at half the price

A *single* 3CX1200A7 in the AL-1200 delivers the *same legal limit* as a *pair* of 3CX800A7s that cost nearly twice as much. What do you get for paying twice as much? Twice as many parts to fail.

Plus more . . .

The UPS shippable AL-1200 also gives you . . . all mode, all band coverage including WARC and MARS, Pi-network tuned input, Step-Start Inrush Protection™, multi-voltage primary, Pi-L output tank with silver-plated components, separate filament transformer eliminates poor regulation and surges, adjustable ALC, SSB/CW switch for best linearity and efficiency, operate/standby switch, transmit indicator LED, 12 VDC auxiliary output, 35% safety factor for tuning capacitors and bandswitch virtually eliminates failures, shielded RF compartment, quiet die cast blower has 4 speeds, two illuminated meters show continuous grid current, peak RF watts out, drive power/ALC, plate voltage and plate current, ball bearing vernier reduction drives on plate and load controls, optional QSK board, one year limited warranty and more.

Call your dealer for your best price

Even at $2045 list it's a bargain. For your best price, call your favorite dealer and order today!

Pair of Eimac® 3-500Zs give you full legal output for . . . $1995

AL-82
$1995
Suggested Retail

Want a pair of tough 3-500Z workhorses?

The AL-82 is the **same** amplifier as the AL-1200 except it uses a pair of Eimac® 3-500Z tubes. It has the same super heavy duty power supply to give you full legal output. Some amplifiers With a pair of 3-500Zs can't deliver full legal output because they use a lighter duty power supply.

That's why the AL-82 costs a little more -- and why it's well worth it. Call for your best price today!

Legal limit antenna tuner

ATR-15
$399
Suggested Retail

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WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

Future Views

Approximately four years have passed since I discussed future views in this diverse *CQ* column, and requests for another sequel have been accumulating throughout that time. We thus take another look into the electronic crystal ball to share more fact-supported views and educated speculations I am sure you will find interesting. Understand this is a friendly "lunchtime chat" with "napkin note sketches" for illustration rather than a description of completed and ready-to-duplicate projects. New concepts begin life as shared ideas. I am simply providing that food for thought.

Next month, if all goes as planned, watch for another blowout keys special and details on my new book, *Keys, Keys, Keys!* which will soon be available from *CQ*'s Book Shop. Yes, that is why this column has been slightly eclectic lately. I have been writing my fingers off about hand keys, bugs, paddles, fingerpieces, and classic rigs guaranteed to rekindle everyone's love of CW. Being pent-up, overworked, and underappreciated *(sic!),* I now plan to take several fun breaks this spring and summer. I will be mobiling and working the WARC bands often, and I have a large box of Mobile Marauder bandanas and Wild Woody WARC Keys to pass out as "special event awards" (beats paper certificates, eh?). The keys really WARC . . . er . . . work, and the bandanas make great rig covers. Give us a call, tell us how you like our new mobile or keys book, and I will get a bandana or key headed your way. Let's have some real fun in 1991!

Reflections and Predictions

If looking back on past predictions reveals fortune-teller accuracy (reference May 1986 *CQ*), we are batting a high score. Fuji OSCAR 12 and the microsatellites are now in orbit, and these flying mailboxes are relaying packet messages worldwide. Our long-range Phase III/OSCAR 13 also went into orbit, and it is working great. Major funding came from Europe, however, so daily operations slightly favor that area. The Triple Launch/Phase IV concept designed to place ground-interlinked satellites over the Atlantic, Pacific, and Indian Oceans has fallen behind schedule, but it is still forthcoming. These facts are encouraging, and they also point out the significant role OSCAR and AMSAT will play in our future. Enough emphasis cannot be placed on the importance of supporting AMSAT—today and tomorrow.

Amateurs traditionally have considered HF as the mainstay of long-range communications, but I see the bands above 30 MHz as the wave of the future. Interlinked repeaters/digipeaters and satellites operating in this upper range will establish a completely reliable and predictable medium of global communications accessible via shirt-pocket/wrist transceivers.

Looking from this point of view, code-free licensing has been implemented in the best possible way. New-generation amateurs are free to use and expand futuristic computer-related technologies to fit tomorrow's lifestyles, while veteran amateurs have a choice of joining the progression or enjoying status quo on HF. Let's just hope no-code licensing holds enough glamour to attract new amateurs and perpetuate our great hobby. Otherwise we can proudly and slowly fade in the annals of time like the American buffalo, or become an endangered species like the bald eagle. What good is an all-band DXCC plaque or CQ DX award if there is no one to understand or appreciate it—today or tomorrow? As ICOM points out in their new video *More Than Radios*, Elmering is one of our most infinitely rewarding assets. Don't shun prospective onlookers or new amateurs. Encourage them with future-molding guidance and friendly assistance. They will be tomorrow's leaders relaying our heritage to their followers.

Well, that's enough soapboxing about next-generation operators. Now let's talk about equipment evolution of the future!

Remotable HF Transceivers

Increasing antenna restrictions and zoning ordinances are creating a pressing need for a new-style HF setup, and we all know need is the father of invention. I vis-

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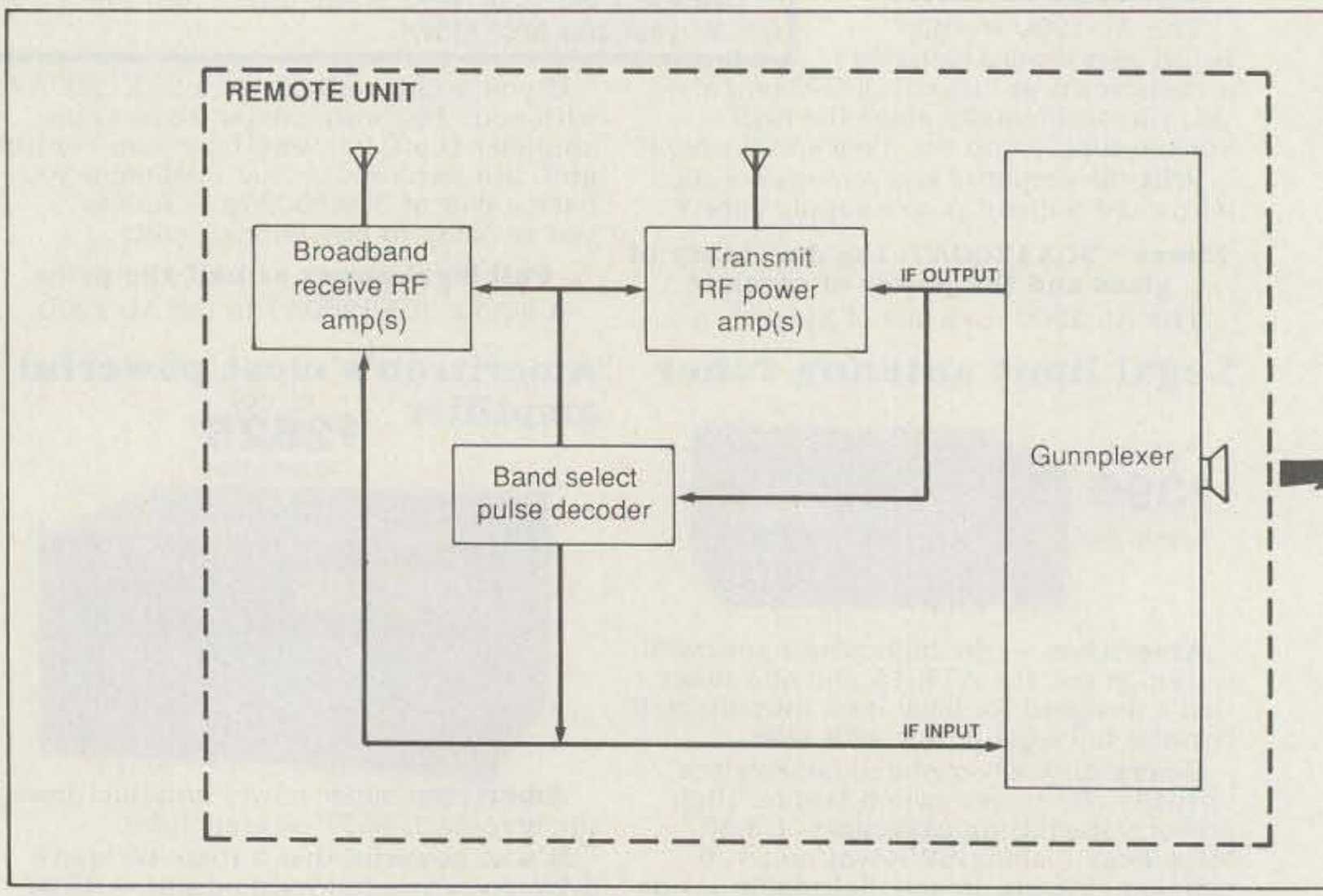


Fig. 1– Basic design of a remotable/microwave-linked HF setup. Remote unit and antennas install on a mountaintop, and all tuning is via a main unit at the home QTH. (Details in text.)

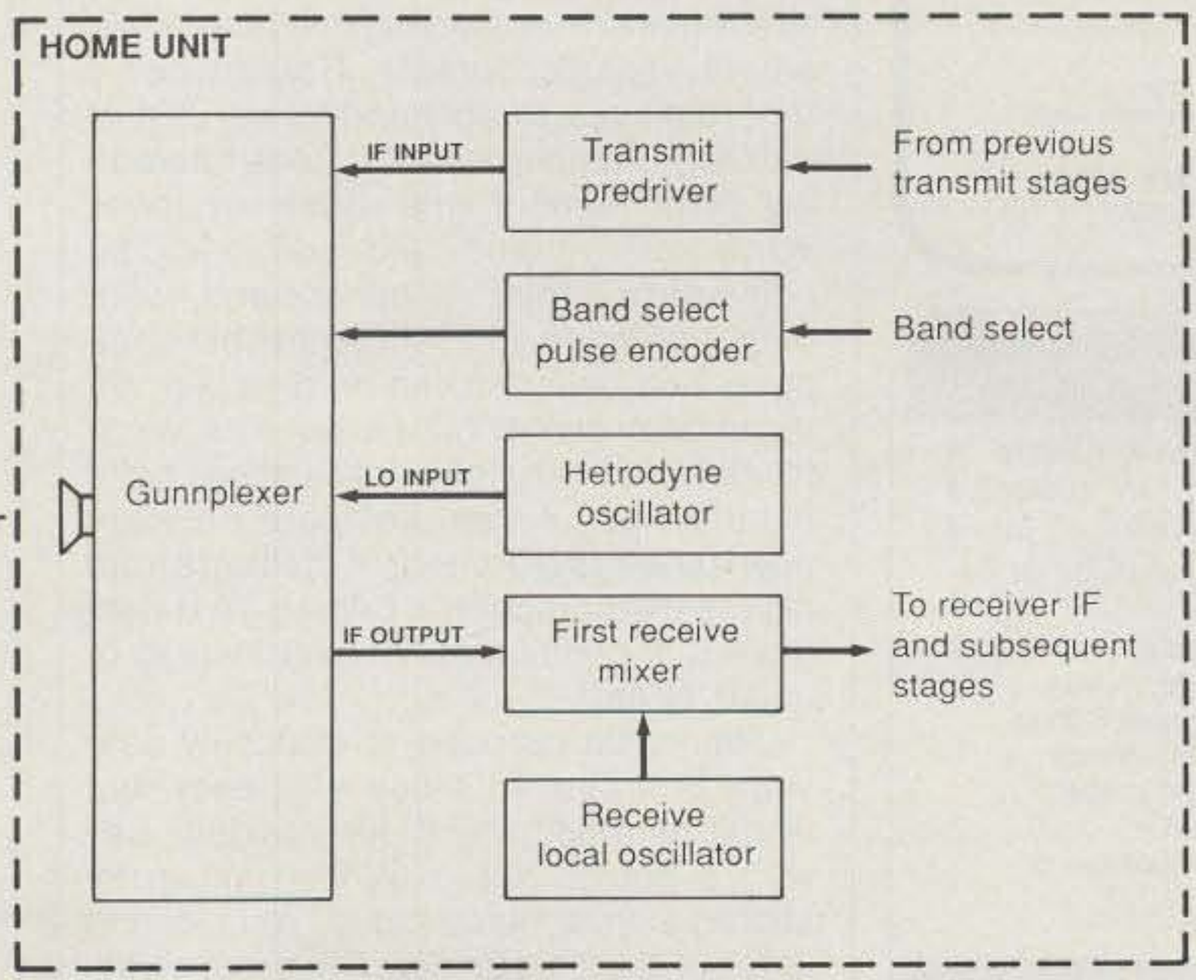
ualize that new-concept transceiver as a break-apart setup with its transmit and receive "front ends" and antenna farm placed atop a nearby mountain and connected to its home-located main unit via a wideband 2.3 or 10.5 GHz link. This arrangement would be ideal for aspiring big guns and DXers living in environmentally sensitive neighborhoods, apartments, or condos. They could enjoy operating like a bandit any time, and everyone would live in harmony. The setup's general design is shown in fig. 1.

Received signals from, and transmit signals to, the remote-located unit's broadband RF amplifiers are connected to the IF input of a Gunnplexer and relayed to/from the home unit. A similar Gunnplexer at the home unit outputs/inputs those signals to its receive/transmit mixer stages. Frequency selections are made at that point, and all subsequent stages function like a regular HF transceiver. In other words, a low-power and full-duplex microwave link is used to replace a couple of signal-transferring wires in a conventional-design transceiver so its "front" and "rear" sections can be separated a few miles—simple, but effective. The components needed to turn this idea into reality, incidentally, are presently available from several microwave suppliers at reasonable cost.

There are two possible paths of system design. One transfers the full spectrum of 1 to 30 MHz between home and remote units (quite feasible for 10 GHz equipment), and the other stacks 160 through 10 meter amateur bands "end to end" for relaying in a 4.5 MHz bandwidth. Band selection is accomplished on the home unit, which in turn sends digitally coded pulses to the remote unit for switching in related RF amplifying stages. That full band of signals is transferred to the first mixer stage, just like rigs function today. Commercial versions of this microwave-linked rig could be loaded with frills such as Gunnplexer PLL auto-locking/tracking, automatic antenna selection according to band activated, etc. Optional remote units for installation with various antennas at different sites would be more than appealing; they would be the last word in location diversity for reception and transmission. A microwave-linked transceiver is not far fetched, but it is different, and manufacturers often follow tried-and-proven concepts rather than gambling on new trends. It will indeed be interesting to see whether homebrewers or commercial firms are the first to pursue this design.

VHF/UHF Expansions

Hand-held VHF and UHF transceivers are continuing to get smaller and more feature-packed as I predicted in 1985 and 1986, and we can look forward to this miniaturization process continuing. Future-generation units may consist of a very thin shirt-pocket-carried "electronic section" and a "wrist rig" with speaker/mike, keypad, and LCD readout. Their flexible interconnecting cable's shield will double as an antenna. Battery size



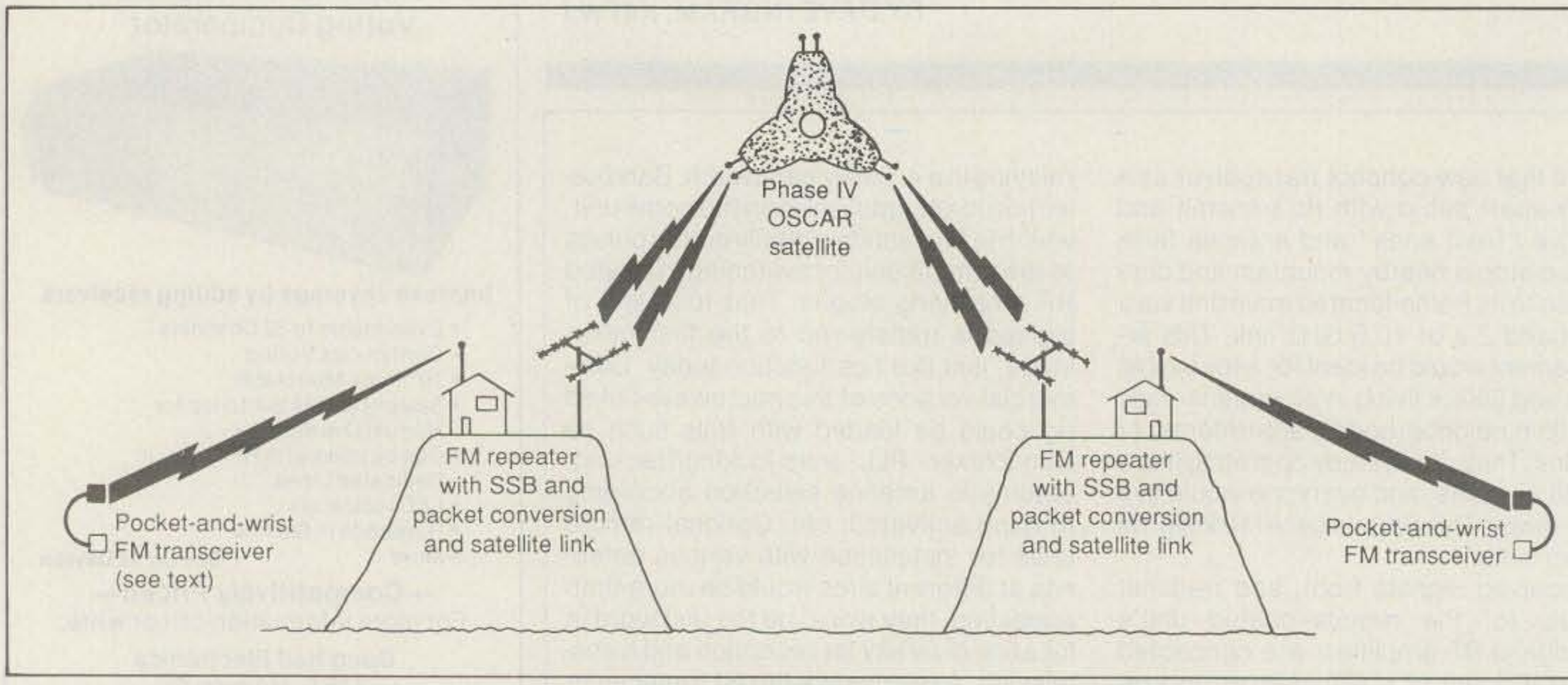


Fig. 2– VHF/UHF communications system using pocket and wrist transceivers linked via mode-converting and interlinked re – peaters. (Details in text.)

and weight may limit power output, but that is not a drawback with modern high-performance repeaters. That also brings another view into focus.

An impressive number of future VHF/UHF repeaters will include OSCAR satellite interlinks, or interface to new-style gateway systems with that capability (see fig. 2). Wideband FM-to-SSB or packet conversion (a concept developed several years ago in Germany) will be integrated into the system before uplinking to one of our Phase IV satellites. Selecting a frequency above or below a "reference frequency" (manually or via tone codes) will let you select if your satellite-relayed signal interlinks with another Phase IV satellite east or west of your QTH for worldwide coverage. Some of these operations will be conducted in real time; some will be via voice mail using low-orbiting packet satellites. That brings yet another view into focus (I think we are on a roll!).

Voice Packeting

At the risk of being strung up by my beam's coax, I must ask why we are still using computer keyboards rather than voicing our messages via packet. "How else?" you ask. I will cite an existing example to answer that question.

A substantial number of companies nationwide are presently adding voice mail to their telephone system. Some are simple "incoming call recorders" such as a telephone answering machine, while others include remote (Touchtone®) record/playback/reply and forwarding of messages among system users. Interesting point number one: Some of these voice mail systems use analog-to-digital converters at their "telephone end," with output going to an IBM-compatible computer and being stored on a regular 5¼ inch floppy disk or hard drive. Yes, voice to data conversion! Interesting point number two: A new software package now transfers stored voice mail data from disk to the computer's printer. That confirms it is genuine ASCII data instead of audio. Great!

The basic purpose of that new software is improved office efficiency, but visualize modifying it for resident use with a packet setup. Whew! When installed at your home setup, you talk and listen in good old English while messages are converted to/from packet for relaying

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through digipeaters and/or packet-supporting satellites. Install a voice mail system with its own 2 meter FM transceiver at a Bulletin Board System, and operators can pass packets by voice. Interface it with an area's repeater, and the game really gets exciting!

Looking forward from the previous viewpoint, voice packet could easily become a standard mode on future HF and VHF transceivers. "Intelligent" rigs could even feature voice-lock/auto-ID sections for adding headers before transmission and recognizing your replies on receive. No QRM! Everything now in use for data packeting is compatible with voice packeting: HF and VHF links, digipeaters, BBS, and microsats. Does that make sense? Sure! The only time we need speech is at a speaker and microphone. Transmitted RF can be SSB, CW, FM, or PSK. It merely conveys the intelligence! Can you visualize talking on a used but not updated voice packet transceiver? You give your own call, but it adds the previous owner's ID in the header. That's theft insurance plus!

Voice packeting is too good an idea to overlook. Someone will develop this system and sell thousands worldwide very soon. I would go for it myself if financial backing was available. Alternately, I will ask you to remember where and from whom you first heard of voice packet when (not if—when!) it becomes superpopular.

Holographic Video and Transporters

Our present flat-screen television system is another area wide open to expansion, and creative SSTVers are perfectly suited to starting the ball of innovation rolling. The first evolution I foresee is holographic video using a split-beam laser firing into a fogged area produced by heating dry ice and concentrating its vapors with fans. The laser's visible interference patterns would then reproduce stationary images in three dimensions. You could view them from the front, side, or rear, as if they were actually present, yet you could pass a hand right through them. Then by simultaneously modulating the split beams with video information while sweeping them across a display area, moving holograms would result. Imagine using that setup for watching a football game. Players would seem to run right through prized sofas and coffee tables while you looked along the walls and checked for friends in the stands!

Subsequent refinements would eliminate the need for a fogged display area, and integrate simultaneous transmit/receive of both video and audio to synthesize electronic transportation. This system would be only one step short of full electronic transportation. That concept may seem far-fetched from our present viewpoint, but it is quite feasible if we look back from 2091 rather than looking forward from 1991. We only need transducers today; all other electronics are in place. By comparison it is akin to having a transceiver but needing a mike and speaker to communicate.

Closing Thoughts

That wraps up this version of future views, and I trust it inspired your creative thinking for the good times ahead. There is no question that our world of amateur radio is constantly changing, and that is always a favorable sign. Change is synonymous with progress, and progress keeps us on the cutting edge of technology.

Personally, I see today as our second golden age of radio with unlimited areas of enjoyment for newcomers and oldtimers alike. During our original/1930 golden age, youngsters could join our ranks with some friendly guidance and a couple of junked radios to build a rig (spare time was plentiful, but money was an unknown commodity). Existing amateurs strived to expand their own setups with new items such as filtered AC supplies, screen grid tubes, and quartz crystals. Fortunately, we can now buy equipment ready to use and "assemble the boxes" (rather than the pieces) to make futuristic stations of unbelievably high performance. We also have the option of reliving the "good old times" with basic CW transmitters and warm vacuum-tube receivers before they fade in the annals of time. What else can we say except enjoy the present and look forward to a glamorous future!

73, Dave, K4TWJ

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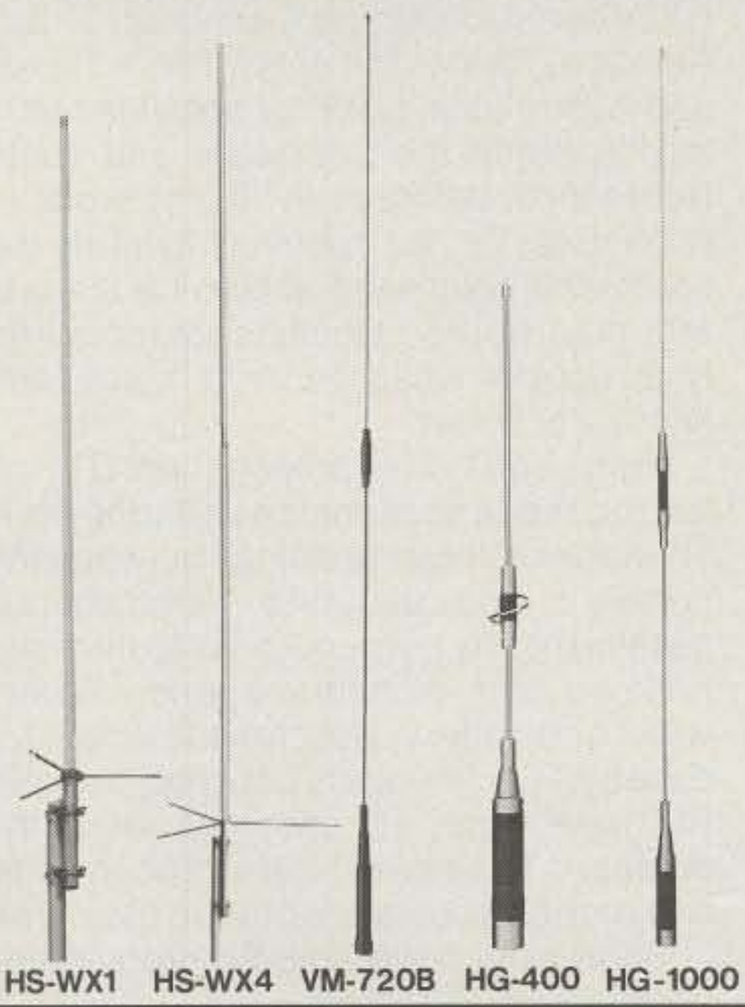

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HS-WX4(N)	146/446MHz	7.8/10.8dB	13'9"

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HG-800	146/446MHz	2.7/5.1dB	2'6"
HG-1000	146/446MHz	3.0/5.5dB	2'11"
HG-1100	146/446MHz	3.5/6.0dB	3'5"
HG-1500	146/446MHz	4.5/7.2dB	4'10"
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CIRCLE 75 ON READER SERVICE CARD

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot cycle 22 continues its slow decline. The Royal Observatory of Belgium reports a mean count of 129 for December 1990. This results in a 12-month running smoothed sunspot number of 143 centered on June 1990. This is a drop of 4 numbers from the previous month's level. A smoothed sunspot number of 122 is forecast for April 1991 as the cycle continues its slow decline.

A corresponding small decline was reported in the 10.7 cm solar flux. The Algonquin Radio Observatory, Ottawa, Canada, reported a monthly mean of 204 for December 1990. This results in a smoothed value of 190 centered on June 1990.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for April 1991

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 8, 14, 21, 26	A	A	B	C
High Normal: 3, 6-7, 9-10, 13, 25, 30	A	B	C	C-D
Low Normal: 1-2, 12, 15-16, 19-20, 24, 28-29	B	C	D	D-E
Below Normal: 4-5, 11, 17, 22, 27	C	C-D	D-E	E
Disturbed: 18, 23	C-D	D	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9 +, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected.
3 dB per S-Unit.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on April 1st and 2nd, good (B) on the 3rd; fair-to-poor (C-D) on the 4th and 5th, good (B) on the 6th and 7th, etc.

April Conditions

With the sunspot cycle still at a relatively high stage, the *10* and *12* meter bands should remain very much alive during April and the spring months. Expect good DX openings to most areas of the world during the hours of daylight. While normal seasonal changes in propagation will result in fewer east-west openings, conditions towards southern and tropical areas are expected to hold up very well. Look for peak signal levels to most areas of the world during the late afternoon hours.

Expect *15* and *17* meters to be the best bands for DX during most of the daylight hours in April and the spring months. Both bands should be loaded with DX signals from just after sunrise to well beyond sunset. Signals should be strongest to most areas of the world during the afternoon hours, but look for good, solid openings towards southern and tropical areas well into the early evening hours.

Twenty meters is expected to be a near 24-hour DX band during April and the spring months. Strongest signals, with DX openings to just about every area of the world, should occur during a two hour window after local sunrise and again during the late afternoon and through the evening hours to as late as midnight.

Shorter hours of darkness and increasing static levels in the northern hemisphere will result in somewhat poorer DX conditions on the *30*, *40*, *80*, and *160* meter bands during April and the spring months. Nevertheless, strong, stable signals should be possible to many areas of the world on *30* and *40* meters during the hours of darkness. Signals should peak from an easterly direction about an hour or two before midnight, and from most other directions about an hour or so before local sunrise at the USA end of the path. Some fairly good DX should also be possible on *80* meters during the hours of darkness. Propagation patterns on *80* meters should be similar to those observed on *40* meters, but openings will be weaker and noisier. There is a chance for some DX openings on *160* meters during the hours of darkness, but expect to encounter increasingly high static levels.

The favorable equinoctial propagation conditions discussed in last month's column should continue through most of April. Check both long- and short-path openings during the sunrise and sunset periods on all bands between *10* and *80* meters for paths between the northern and southern hemispheres.

For *short-skip* openings up to approximately 250 miles, use *80* meters during the day and *160* meters at night. For distances between 250 and 750 miles, *30* and *40* meters should be best during the day, *40* and *80* meters from sundown to midnight, and *80* meters from midnight to sunrise. For openings between distances of 750 and 1300 miles, try *20* meters during the day, with *30*, *40*, and *80* meters best during the hours of darkness. Between 1300 and 2300 miles check *15*, *17*, and *20* meters during the day; *20*, *30*, and *40* meters from sundown to midnight; and *40* meters from midnight to sunrise. Short-skip openings beyond 1300 miles should also be possible on *10* and *12* meters during during most of the afternoon hours.

The DX Propagation Charts in this month's column contain DX propagation predictions for each amateur band between *6* and *160* meters for the period April 15 to June 15, 1991. Beginning this month and continuing through the summer and fall months, the times shown in the charts will be *local daylight* time (EDT, CDT, MDT, and PDT). For detailed predictions of short-skip openings between distances of 50 and 2300 miles, see the Short-Skip Propagation Charts, which appeared in last month's column.

VHF Ionospheric Openings

Fewer DX openings are expected on *6* meters this month as a result of expected seasonal propagation changes. Some openings may still be possible, however, from the USA towards southern and tropical areas such as the Caribbean, South America, Africa, the south Pacific area, and Australasia. Look for possible openings towards the southeast and south from shortly before to an hour or two after noon. Best bet for openings towards the south and southwest should be the late afternoon hours. Openings are more likely to ococur when conditions are High Normal or better.

Trans-equatorial propagation (TE) often reaches a seasonal peak during April. These are difficult openings between the northern and southern hemispheres, passing nearly perpendicular to the magnetic equator. Signals are generally very weak and fluttery. Best time to check for *6* meter TE openings is between 8 and 11 PM local time. TE openings favor the southern tier states, but an occasional one may be possible farther to the north.

Short-skip, sporadic-E propagation

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 somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. wetc. Appropriate *daylight* time is used, *not* GMT. T 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 c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level for each 10dB loss, it will lower by one level.

6. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado, 80302.

April 15-June 15, 1991
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	10-13 (1) 13-17 (2) 17-18 (1)	07-09 (1) 09-11 (2) 11-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-21 (1)	09-13 (1) 13-15 (2) 15-17 (3) 17-21 (4) 21-01 (3) 01-04 (2) 04-07 (3) 07-09 (2)	19-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 20-21 (1)* 21-22 (2)* 22-00 (3)* 00-01 (2)* 01-02 (1)*
Northern Europe & European USSR	10-15 (1) 15-17 (2) 17-18 (1)	08-10 (1) 10-13 (2) 13-16 (3) 16-18 (2) 18-19 (1) 22-00 (1)	06-09 (2) 09-13 (1) 13-16 (2) 16-20 (3) 20-22 (4) 22-02 (3) 02-03 (2) 03-06 (1)	19-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*
Eastern Mediterranean & Middle East	14-17 (1)	10-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	12-16 (1) 16-18 (2) 18-21 (3) 21-00 (4) 00-02 (3) 02-03 (2) 03-06 (1) 06-08 (2) 08-09 (1)	20-22 (1) 22-00 (2) 00-01 (1) 21-23 (1)*
Western Africa	10-11 (1) 11-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-21 (1) 10-13 (1)**	07-08 (2) 08-10 (3) 10-13 (2) 13-16 (3) 16-20 (4) 20-23 (3) 23-04 (2) 04-07 (1)	07-14 (1) 14-16 (2) 16-18 (3) 18-02 (4) 02-05 (3) 05-07 (2)	20-22 (1) 22-02 (2) 02-03 (1) 22-02 (1)*
Eastern & Central Africa	16-17 (1) 17-19 (2) 19-21 (1)	08-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	14-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 22-01 (3) 01-04 (2) 04-06 (1) 06-08 (2) 08-09 (1)	21-01 (1) 22-00 (1)*
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1) 01-03 (1)	12-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 00-01 (1) 01-02 (2) 02-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-09 (1)	21-22 (1) 22-00 (2) 00-02 (1) 22-01 (1)*
Central & South Asia	19-21 (1)	09-12 (1) 15-18 (1) 18-20 (2) 20-22 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-00 (1) 05-06 (1) 06-08 (2) 08-09 (1)	05-07 (1) 19-21 (1)
Southeast Asia	18-21 (1)	08-11 (1) 18-20 (1) 20-22 (2) 22-23 (1)	06-07 (1) 07-09 (2) 09-10 (1) 16-17 (1) 17-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	05-07 (1)
Far East	18-20 (1)	08-10 (1) 15-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-10 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-08 (1)
South Pacific & New Zealand	15-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1) 15-18 (1)**	09-11 (1) 13-15 (1) 15-17 (2) 17-18 (3) 18-21 (4) 21-23 (3) 23-00 (2) 00-01 (1)	19-21 (1) 21-22 (2) 22-23 (3) 23-04 (4) 04-08 (3) 08-09 (2) 09-10 (1)	00-02 (1) 02-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 02-07 (1)*
Australasia	17-19 (1) 19-21 (2) 21-22 (1)	09-10 (1) 10-11 (2) 11-12 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	23-00 (1) 00-03 (2) 03-05 (3) 05-08 (4) 08-09 (3) 09-10 (2) 10-11 (1) 17-19 (1)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 11-14 (1)**	07-08 (1) 08-09 (2) 09-14 (3) 14-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	02-06 (2) 06-07 (3) 07-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-23 (4) 23-02 (3)	19-20 (1) 20-21 (2) 21-05 (3) 05-07 (2) 07-08 (1) 21-02 (1)* 02-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-10 (1) 10-14 (2) 14-17 (3) 17-19 (4) 19-20 (2) 20-21 (1) 11-15 (1)**	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-16 (3) 16-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	05-06 (1) 06-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-00 (4) 00-02 (3) 02-05 (2)	20-21 (1) 21-04 (2) 04-06 (1) 23-03 (1)* 03-04 (2)* 04-06 (1)*
McMurdo Sound, Antarctica	17-19 (1)	16-18 (1) 18-20 (2) 20-21 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-07 (2) 07-08 (1)	20-01 (1) 01-05 (2) 05-06 (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	11-15 (1) 15-16 (2) 16-17 (1)	07-09 (1) 09-11 (2) 11-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-09 (2) 09-14 (1) 14-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-01 (2) 01-05 (1)	19-21 (1) 21-23 (2) 23-01 (1) 00-01 (1)*
Northern & Central Europe & European USSR	14-16 (1)	08-10 (1) 10-13 (2) 13-16 (3) 16-17 (2) 17-18 (1) 21-23 (1)	01-07 (1) 07-09 (2) 09-14 (1) 14-19 (2) 19-23 (3) 23-01 (2)	19-21 (1) 21-23 (2) 23-01 (1)
Eastern Mediterranean & Middle East	15-18 (1)	10-13 (1) 13-17 (2) 17-18 (1) 20-22 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-22 (4) 22-00 (3) 00-01 (2) 01-03 (1)	20-00 (1)
Western Africa	10-12 (1) 12-14 (2) 14-17 (3) 17-18 (2) 18-19 (1) 10-12 (1)**	09-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	12-15 (1) 15-17 (2) 17-19 (3) 19-23 (4) 23-00 (3) 00-01 (2) 01-03 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	08-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1) 01-03 (1)	12-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 00-01 (1) 01-02 (2) 02-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-09 (1)	21-22 (1) 22-00 (2) 00-02 (1) 22-01 (1)*
Central & South Asia	19-21 (1)	09-12 (1) 15-18 (1) 18-20 (2) 20-22 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-00 (1) 05-06 (1) 06-08 (2) 08-09 (1)	05-07 (1) 19-21 (1)
Southeast Asia	18-21 (1)	08-11 (1) 18-20 (1) 20-22 (2) 22-23 (1)	06-07 (1) 07-09 (2) 09-10 (1) 16-17 (1) 17-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	05-07 (1)
Far East	18-20 (1)	08-10 (1) 15-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-10 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-08 (1)
South Pacific & New Zealand	15-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1) 15-18 (1)**	09-11 (1) 13-15 (1) 15-17 (2) 17-18 (3) 18-21 (4) 21-23 (3) 23-00 (2) 00-01 (1)	19-21 (1) 21-22 (2) 22-23 (3) 23-04 (4) 04-08 (3) 08-09 (2) 09-10 (1)	00-02 (1) 02-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 02-07 (1)*
Australasia	17-19 (1) 19-21 (2) 21-22 (1)	09-10 (1) 10-11 (2) 11-12 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	23-00 (1) 00-03 (2) 03-05 (3) 05-08 (4) 08-09 (3) 09-10 (2) 10-11 (1) 17-19 (1)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 11-14 (1)**	07-08 (1) 08-09 (2) 09-14 (3) 14-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	02-06 (2) 06-07 (3) 07-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-23 (4) 23-02 (3)	19-20 (1) 20-21 (2) 21-05 (3) 05-07 (2) 07-08 (1) 21-02 (1)* 02-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-10 (1) 10-14 (2) 14-17 (3) 17-19 (4) 19-20 (2) 20-21 (1) 11-15 (1)**	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-16 (3) 16-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	05-06 (1) 06-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-00 (4) 00-02 (3) 02-05 (2)	20-21 (1) 21-04 (2) 04-06 (1) 23-03 (1)* 03-04 (2)* 04-06 (1)*
McMurdo Sound, Antarctica	17-19 (1)	16-18 (1) 18-20 (2) 20-21 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-07 (2) 07-08 (1)	20-01 (1) 01-05 (2) 05-06 (1)

Eastern & Central Africa	14-16 (1) 16-18 (2) 18-19 (1)	12-14 (1) 14-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-01 (2) 01-03 (1) 07-09 (1)	20-23 (1)
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	09-11 (1) 11-13 (2) 13-14 (3) 14-15 (2) 15-16 (1) 00-02 (1)	14-16 (1) 16-19 (2) 19-22 (1) 22-00 (2) 00-02 (3) 02-04 (2) 04-05 (1) 05-07 (2) 07-08 (1)	20-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Central & South Asia	18-21 (1)	16-18 (1) 18-21 (2) 21-22 (1) 09-11 (1)	05-07 (1) 07-09 (2) 09-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-00 (1)	06-08 (1) 19-21 (1)
Southeast Asia	18-20 (1)	09-11 (1) 11-13 (2) 13-15 (1) 17-19 (1) 19-21 (2) 21-23 (1)	23-03 (1) 03-07 (2) 07-09 (3) 09-11 (2) 11-12 (1)	05-07 (1)
Far East	17-18 (1) 18-20 (2) 20-21 (1)	08-11 (1) 15-16 (1) 16-17 (2) 17-21 (3) 21-23 (2) 23-00 (1)	23-02 (1) 02-04 (2) 04-06 (3) 06-08 (4) 08-09 (3) 09-11 (2) 11-13 (1)	03-05 (1) 05-06 (2) 06-07 (1) 05-06 (1)*
South Pacific & New Zealand	11-14 (1) 14-16 (2) 16-20 (4) 20-21 (2) 21-22 (1) 14-18 (1)**	08-09 (1) 09-11 (2) 11-14 (1) 14-17 (2) 17-18 (3) 18-21 (4) 21-23 (3) 23-01 (2) 01-03 (1)	16-19 (1) 19-20 (2) 20-21 (3) 21-03 (4) 03-07 (3) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (1)	00-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1) 02-04 (1)* 04-05 (2)* 05-06 (1)*
Australasia	15-17 (1) 17-19 (2) 19-21 (3) 21-22 (1) 15-18 (1)**	08-09 (1) 09-10 (2) 10-11 (1) 16-18 (1) 18-20 (2) 20-22 (4) 22-23 (2) 23-00 (1)	05-07 (3) 07-08 (2) 08-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (3) 01-05 (4)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Caribbean, Central America & Northern Countries of South America	09-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 11-14 (1)**	07-09 (1) 09-11 (2) 11-14 (3) 14-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	03-06 (2) 06-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-23 (4) 23-03 (3)	19-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 21-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-10 (1) 10-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 11-15 (1)**	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-16 (3) 16-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	05-06 (1) 06-09 (2) 10-15 (1) 15-17 (2) 17-19 (3) 19-00 (4) 00-02 (3) 02-05 (2)	21-22 (1) 22-00 (2) 00-02 (1) 02-05 (2) 05-07 (1) 01-05 (1)*
McMurdo Sound, Antarctica	18-20 (1)	15-17 (1) 17-19 (2) 19-21 (3) 21-23 (2) 23-00 (1)	16-18 (1) 18-19 (2) 19-02 (3) 02-04 (2) 04-06 (1)	20-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-06 (1)

April 15-June 15, 1991
WESTERN USA TO:
Time Zone: PDT (24-Hour Time)

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	09-12 (1) 16-17 (1)	08-11 (1) 11-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	01-07 (1) 07-10 (2) 10-13 (1) 13-17 (2) 17-19 (3) 19-21 (2) 21-23 (3) 23-01 (2)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Central & Northern Europe & European USSR	14-16 (1)	11-14 (1) 14-16 (2) 16-17 (1) 22-00 (1)	02-07 (1) 07-09 (2) 09-13 (1) 13-16 (2) 16-18 (3) 18-22 (2) 22-00 (3) 00-02 (2)	19-23 (1) 21-22 (1)*

Eastern Mediterranean & Middle East	NIL	09-11 (1) 11-15 (2) 15-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (3) 17-20 (2) 20-22 (3) 22-23 (2) 23-03 (1)	20-23 (1)
Western Africa	10-14 (1) 14-17 (2) 17-19 (1)	08-12 (1) 12-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	02-06 (1) 06-08 (2) 08-15 (1) 15-17 (2) 17-18 (3) 18-22 (4) 22-00 (3) 00-02 (2)	20-23 (1)
Eastern & Central Africa	15-18 (1)	10-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-21 (1) 21-23 (2) 23-00 (1)	11-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-23 (3) 23-00 (2) 00-02 (1)	19-22 (1)
Southern Africa	09-11 (1)	07-09 (1) 09-11 (2) 11-12 (1) 12-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-18 (2) 18-22 (1) 22-23 (2) 23-01 (3) 01-02 (2) 02-03 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	17-18 (1) 18-19 (2) 19-20 (1)	08-09 (1) 09-11 (2) 11-16 (1) 16-17 (2) 17-19 (3) 19-21 (2) 21-23 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1) 18-21 (2) 21-23 (1)	05-08 (1)
Southeast Asia	13-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	08-09 (1) 09-12 (3) 12-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-23 (1)	04-07 (2) 07-10 (3) 10-11 (2) 11-13 (1) 22-00 (1) 00-02 (2) 02-04 (3)	04-07 (1) 05-06 (1)*
Far East	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (1) 15-18 (1)**	08-10 (1) 10-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	04-07 (2) 07-08 (3) 08-09 (4) 09-10 (3) 10-11 (2) 11-12 (1) 12-14 (2) 14-21 (1) 21-23 (2) 23-00 (3) 00-03 (4) 03-04 (3)	01-03 (1) 03-07 (2) 07-08 (1) 03-06 (1)*
South Pacific & New Zealand	11-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-22 (2) 22-23 (1) 12-18 (1)**	09-10 (1) 10-12 (3) 12-16 (2) 16-17 (3) 17-21 (4) 21-00 (3) 00-02 (2) 02-03 (1)	06-08 (2) 08-11 (3) 11-12 (2) 12-17 (1) 17-19 (2) 19-21 (3) 21-02 (4) 02-06 (3)	22-00 (1) 00-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 01-02 (1)* 02-06 (2)* 06-07 (1)*
Australasia	13-14 (1) 14-15 (2) 15-17 (3) 17-19 (4) 19-20 (2) 20-21 (1) 14-18 (1)**	13-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 22-00 (3) 00-02 (2) 02-03 (1)	05-07 (2) 07-09 (3) 09-10 (2) 10-12 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-03 (4) 03-05 (3)	01-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1) 02-03 (1)* 03-05 (2)* 05-06 (1)*
Caribbean, Central America & Northern Countries of South America	10-12 (1) 12-14 (2) 14-15 (3) 15-18 (4) 18-20 (2) 20-21 (1) 11-14 (1)**	07-08 (1) 08-09 (2) 09-13 (3) 13-19 (4) 19-20 (3) 20-22 (2) 22-23 (1)	00-03 (3) 03-05 (2) 05-06 (3) 06-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-00 (4)	19-20 (1) 20-21 (2) 21-00 (3) 00-02 (4) 02-03 (3) 03-04 (2) 04-06 (1) 21-00 (1)* 00-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-11 (1) 11-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 11-15 (1)**	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-16 (3) 16-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	00-02 (3) 02-03 (2) 03-05 (1) 05-09 (2) 09-15 (1) 15-17 (2) 17-18 (3) 18-00 (4)	19-22 (1) 22-03 (2) 03-04 (1) 20-03 (1)*
McMurdo Sound, Antarctica	15-19 (1)	15-16 (1) 16-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-01 (4) 01-03 (3) 03-05 (2) 05-07 (1)	21-22 (1) 22-00 (2) 00-05 (1) 05-07 (2) 07-08 (1)

*Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a Propagation Index of (2) or higher.

**Indicates best times to listen for F-2 layer openings on 6 meters.

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.

generally begins to pick up during April and intensifies during the spring and summer months. Occasional short-skip openings should be possible on *6* meters during April, ranging between approximately 750 and 1300 miles. As its name implies, sporadic-E ionization may occur at any time, but there is a tendency for it to peak between 8 AM and noon and again between 5 and 9 PM local time. Check *2* meters for possible sporadic-E short-skip openings as well.

There is a good possibility for meteor-scatter-type ionospheric openings on *6* and *2* meters during the *Lyrids* shower. This is a major shower expected on April 22–23. A maximum of up to 15 large-sized meteors may enter the earth's atmosphere hourly when this shower is at its peak.

April is a month in which widespread auroral activity can occur, producing unusual ionospheric short-skip openings on the VHF bands. Check for auroral activity on those days shown in the Last Minute Forecast at the beginning of this column as Below Normal or Disturbed.

73, George, W3ASK

HAM SHOP

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CUSHCRAFT, Barker and Williamson, Power Supplies, Rotors, Baluns, Center Insulators, Ladder line, Coax, Connectors, Surplus tubes. ATKINSON & SMITH, INC., 17 Lewis St., Eatontown, NJ 07724 (1-800-542-2447).

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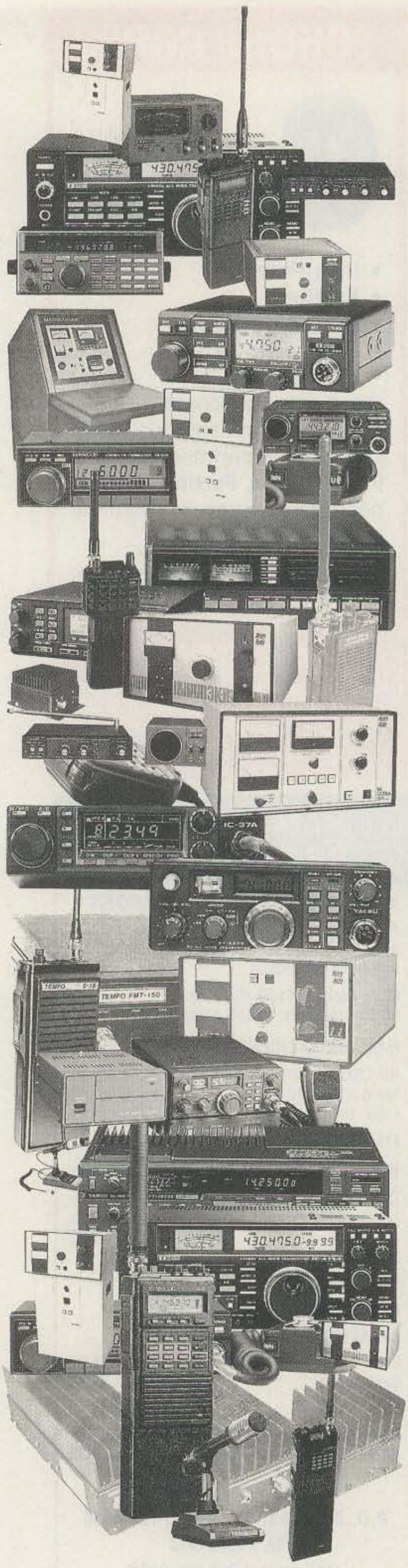

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Advertiser's Index

(continued on page 131)

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If you're looking for a flexible all-mode, if you're looking for a TNC to operate both HF and VHF digital modes, if you'd like one unit to operate RTTY, AMTOR, WEFAX, CW and Packet on HF, yet be keystroke switchable to VHF for packet, then you've found it, the Kantronics All Mode (KAM). Just ask a user!

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And the KAM is tops in flexibility. The HF demodulator is user programmable, allowing keystroke selection of tone pairs. You can select any of the standard shifts (170, 425 or 850 Hertz - handy for MARS ops!) or you can set the MARK SPACE tones to any desired value within the unit's range, in one Hertz steps! You can program baud rate too, allowing for the operation or listening to off-rate baudot or other HF digital transmissions.

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On packet you can operate on both HF and VHF simultaneously, enabling a host of new possible modes of operation. For example, you could have a QSO on HF packet while leaving your VHF channel available for mail or connect. Or, you could set your station up as a gateway, allowing other stations to digipeat from VHF to HF or vice-versa. Or, you could have an RTTY QSO while leaving your VHF packet mailbox active. And more, with firmware update 3.0, your personal packet mailbox (PBBS) is enabled to allow reverse forwarding of messages to a larger BBS, such as RLI. And on and on!

And the unit is PC or C-64 friendly: an internal jumper allows TTL or RS-232 serial port operation without the additional need for a TTL/RS-232 adaptor for the C-64 serial port, saving you money.

The three-manual set is outstanding too, consisting of installation, operation and commands. All are indexed and cross referenced to each other for quick access to related information. The Operation's Manual contains information for beginners too.

Specs: size 1-3/4" by 6" by 9", weight 2-1/2 lbs, power requirements nominally 12 VDC at 300 ma. Input sensitivity 20 mvpp (FM), 100 mvpp (AM). Audio drive jumper selectable from 100 mv to 1.6 vpp.

Options: a 2400 baud QPSK modem for VHF/UHF operation, an MSK modem for advanced HF use, and a battery backup or SmartWatch for preserving mailbox contents/time during a power interruption.

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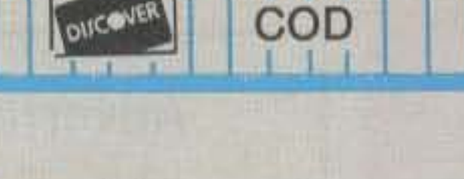

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Case Size: 5.5 (W) x 1.6 (H) x 6.3 (D) in.

Weight (Approx.): 2.8 lbs.

(Shown Actual Size)

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