ICD 08241

Amateur Radio

CQ

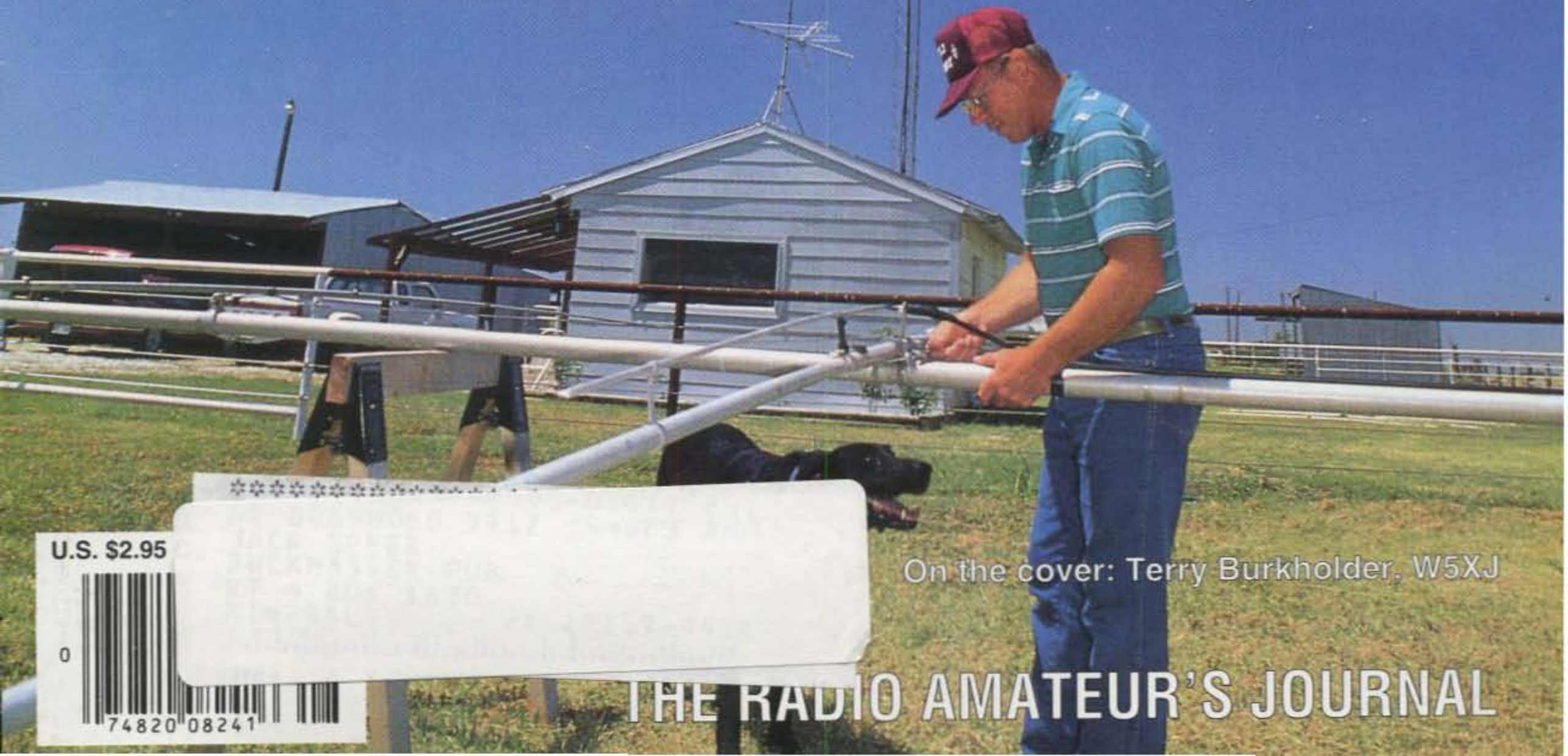
SERVING AMATEUR RADIO SINCE 1945

AUGUST 1994

1945 — Our 50th Year — 1994

In This Issue

- Coaxial Offset Feed Method for Yagis
- An Improved "Long John" Yagi Antenna for Two Meters by W6SAI
- A Dual Polarization HF Antenna System That Reduces QSB
- How to Build a Marine/RV Antenna for Two Meters



On the cover: Terry Burkholder, W5XJ

U.S. $2.95

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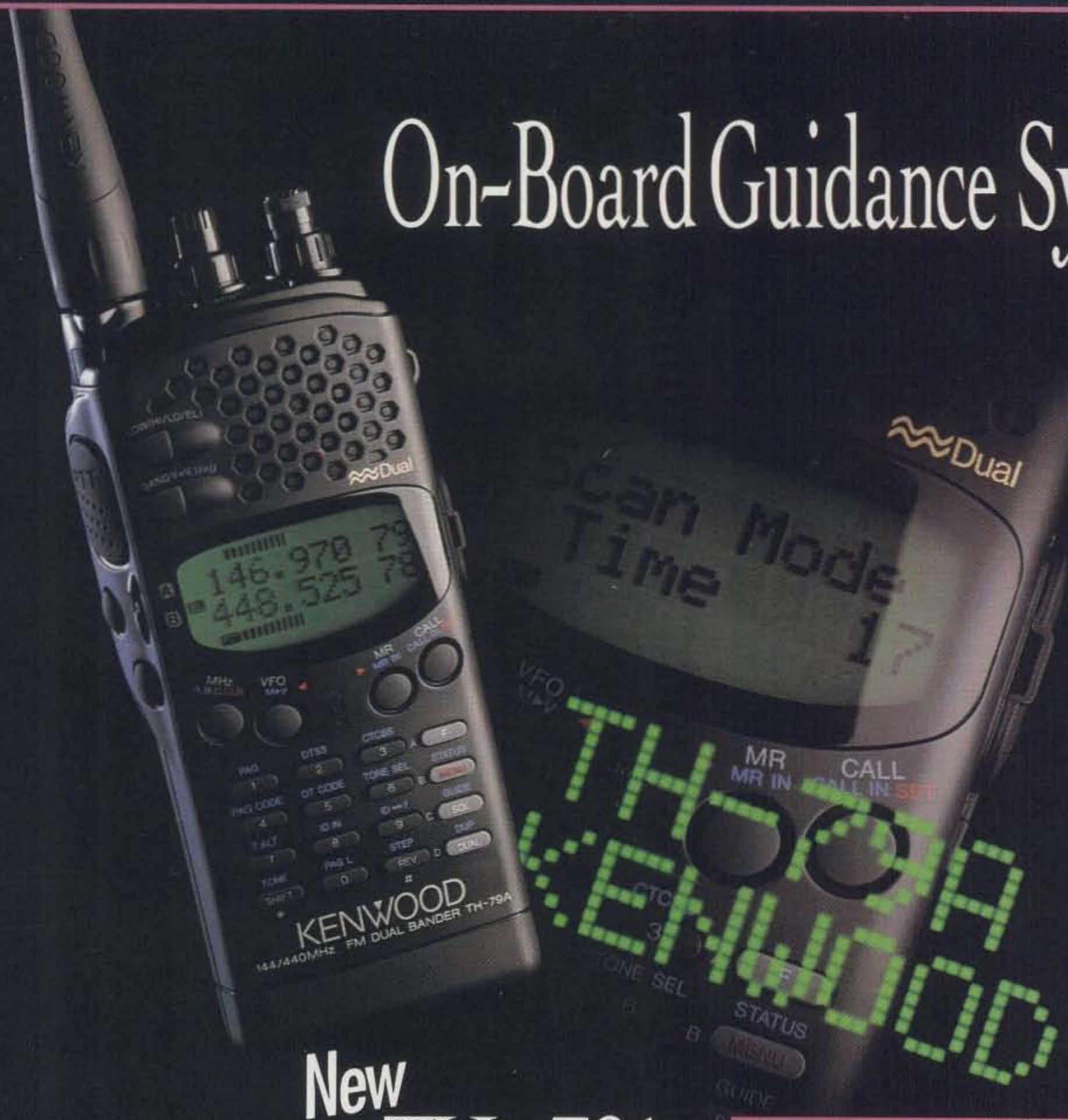
THE RADIO AMATEUR'S JOURNAL

On-Board Guidance System



New TH-79A

FM DUAL BANDER

Information at your fingertips. Everything you need to know about operating the new TH-79A FM dual-bander (144MHz/440MHz) can be viewed in its unique dot-matrix LCD with alphanumeric display. No need for the manual. In addition to this innovative guide function, the TH-79A sports a user-friendly menu system, providing easy access to the many powerful features of this slim-line handheld transceiver. Such as 82 non-volatile memory channels with ID, DTSS and page functions, and a DTMF memory function for auto-dial operation. Full-crossband duplex operation is available, as is the ability to receive two frequencies on the same band (VHF+VHF or UHF+UHF) simultaneously. And thanks to the FET power module, long hours of operation are possible on one charge. With the TH-79A, transceiver technology enters the 21st century.

Features

- 2.7W approx. output (144MHz), 2W approx. output (440MHz) from MOS FET power module and supplied 6V battery; 5W approx. output using optional PB-34
- Dot-matrix LCD with menu/guide system
- 82 non-volatile memory channels with ID
- DTMF keypad with memory function
- DTSS (Dual-Tone Squelch System) with page
- Built-in CTCSS tone encoder/decoder
- Automatic band change ▮ Power-on call sign display
- Auto repeater offset (VHF) ▮ Input overvoltage warning
- 3-position output power control
- Auto power-off and battery save function ▮ Time-out timer
- Multiple scan modes ▮ Cross-band repeater function
- Page answer-back function ▮ Channel display function
- Wideband receiver coverage, including AM receive on the aircraft band*
- Modifiable for MARS/CAP use**

*Specifications guaranteed for Amateur bands only.
**Permits required. Specifications guaranteed for Amateur bands only.

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745
•Customer Support/Brochures (310) 639-5300
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94ARD-0970

KENWOOD

Kenwood's TM-733A -

Faster and Faster!

TM-733A

FM DUAL BANDER

1200 9600 bps packet compatible

Theft Deterrent Faceplate

Features

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

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

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

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KENWOOD

94ARD-0972

DIAMOND ANTENNAS –
THE STANDARD BY WHICH ALL OTHERS ARE JUDGED

DIAMOND ANTENNA

ACCLAIMED AS THE TECHNOLOGICAL LEADER IN SINGLE & MULTIBAND ANTENNAS

●WIDE-BAND PERFORMANCE ●FACTORY ADJUSTED/NO TUNING REQUIRED
●HIGHEST GAIN ●UPS SHIPPABLE ●HIGH WIND RATING ●FIBERGLASS RADOME
●DC GROUNDED ●STAINLESS HARDWARE

X-500HNA

RUGGEDIZED BASE/ REPEATER ANTENNA

COAX CONNECTION AT BASE END

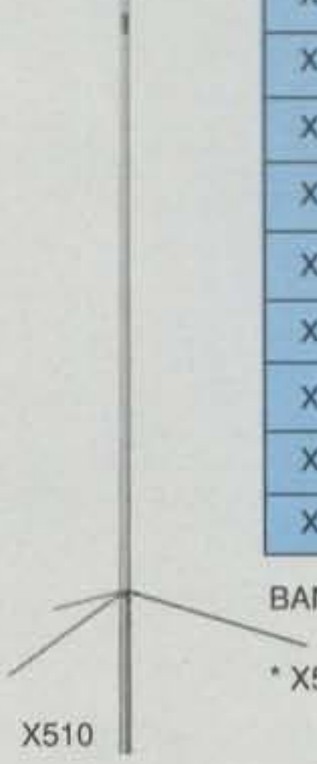
HEAVY DUTY BASE/ RADIAL ASSEMBLY

STRONG JOINT COUPLINGS

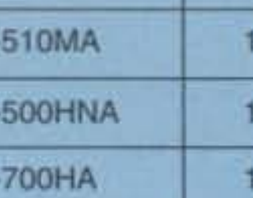
X series

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

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



X510



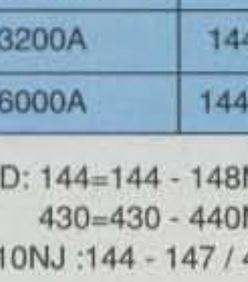
147MHz

445MHz

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

U-300A 440MHz

F-22



U-300A 1200MHz

F22 U5000 GH62

GH/F/U&V series

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

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

MASTHEAD

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The Radio Amateur's Journal

ON THE COVER: If there's one area of Amateur Radio that still inspires the best in home brewing, it's antennas. Terry Burkholder, W5XJ, of Rockwall, TX gets in a little antenna work along with his able four-legged assistant. (Photo by Larry Mulvehill, WB2ZPI)

AUGUST 1994 **VOL. 50, NO. 8**

FEATURES

DEPARTMENTS

ZERO BIAS

EDITORIAL

With summer drawing to a close, the promise of cooler weather starts churning those competitive juices. The contest season is fast approaching, and with the waning sunspot cycle, any sudden abundance of activity will be greatly appreciated. Next month we'll bring you the results of the 1993 CQ WW DX SSB Contest, and we all can look at the numbers we'll have to match or beat in this year's event. The "I Hate Contests" group will have fresh fodder to complain about, and in a sense there will be something for everybody.

In keeping with the spirit of that thought, FC1BJD sent in two pictures which are just about self-explanatory. Evidently, there is a small village in the western part of France called "Contest." It is located about 155 miles west of Paris. With a great deal of ingenuity, FC1BJD presents two variations of that sign, one of which should describe how you feel. I think we should also check out the village as a possible retirement community for aging contesters, and/or a terrific vacation spot where you could "Contest from Contest" (it's also grid square IN98). One thing for certain, though, the food there has to be good.

I'd also like to remind you that if you want log and summary sheets for the CQ WW Contest, please send in early. The in-house Contest Committee (Gail and I) who fills your requests would also appreciate it if you include an SASE. If we have to write an address or fill out a label, those requests get done last when there is time. The same holds true for our awards info; an SASE gets quicker treatment and turn-around time.

This Summer

Even though this appears in August, summer just officially started this morning as I write this. So far, the weather has been too hot, at least for me, to get motivated to work on my antenna. The hamfest season is in full swing, and we're on the road at least one weekend a month. In May we were at the Rochester Hamfest (it was hot there, too). The bad weather at Dayton which caused the demise of that fleamarket brought all of those people and then some to Rochester to create one of their biggest fleamarkets ever. The indoor area was filled with exhibitors and attendees, making it a very busy show. I found some adapters I had been looking for, and managed to coerce one of the fleamarket vendors into parting with a large single-pole, single-throw knife switch.

In June we went south (actually southwest) to Hamcom in Arlington (Dallas) Texas. Yes, it does get really hot there, and humid, too. This annual event seems to get a bit bigger each year, and this year they seemed to be stretching out the walls. It won't surprise me if they move to larger quarters in the next few years. The commercial area seemed to overflow into what had been strictly an indoor fleamarket area, and more of the fleamarket was outdoors in the very bright sun and heat. I made a couple of quick forays outside to check out the good stuff and found a couple of books that I just had to have. It was interesting to find out that I had to travel to Texas to finally meet Jerry Sevick, W2FMI, and his wife. Jerry, who normally can be found in our neighboring state of New Jersey, was there as a guest speaker.

By the time you read this, *CQ* will have been represented by Dick and Arnie at the big one in Germany. When Arnie gets back, he and I will head out to Atlanta (probably more hot weather). In August we'll be in Huntsville and San Diego for their annual events, so the summer still has a lot to go. Somewhere along the line I'll try to work in some time to get my station in order. If I don't succeed, it will wait until next year.

You should free up some time to attend a few of these hamfests. It's still one of the greatest ways to meet some of your fellow amateurs; learn about various aspects of our hobby from the experts; see, touch, and examine all the latest gear; and unabashedly pour through all the junk from several hundred basements with the thought of filling your own. It's the happy feeling of well being called *fun*—you know, the reason why we all got into this hobby in the first place.

There is one thing I'd like to see introduced at more hamfests. I see a lot of single booths devoted to service-type organizations trying to interest attendees in their particular group or service. I'd like to see a similar type booth set up strictly to answer questions about amateur radio, whether it's how to get a license or how to put up an antenna—something to explain the simple, everyday things that most of us take for granted for no good reason.

A very positive thing I've noticed about the newer generation of amateur, or even the prospective amateur, is they are not afraid to ask questions when they don't know something. Many of us from the older generations would find admitting we don't know something a bitter pill to swallow indeed (we should know everything by virtue of our license alone, as if we were born to it). Well, let's face it: Most of us don't know everything, and none of us was born knowing about amateur radio or anything else. We have to learn everything, especially amateur radio.

With a little luck there probably are a number of people in the area of most hamfests who do know and can explain in clear, concise terms the answers to most questions. Obviously, it will take a few people to cover a lot of areas, but it probably isn't that hard to put it together. It's also good PR for a club or organization and can attract new members. It's much better to educate someone than simply to make fun of what may appear to be a dumb question. There are no dumb questions, only dumb answers.

All that is needed is some booth space, a few chairs for folks to sit on, and some blank paper to make notes and draw diagrams—nothing fancy, just people to people, one amateur to another. Don't try to complicate it with elaborate handout packages and literature. Most times when someone asks you what time it is, he or she really doesn't want to know how to either build a watch or buy one.

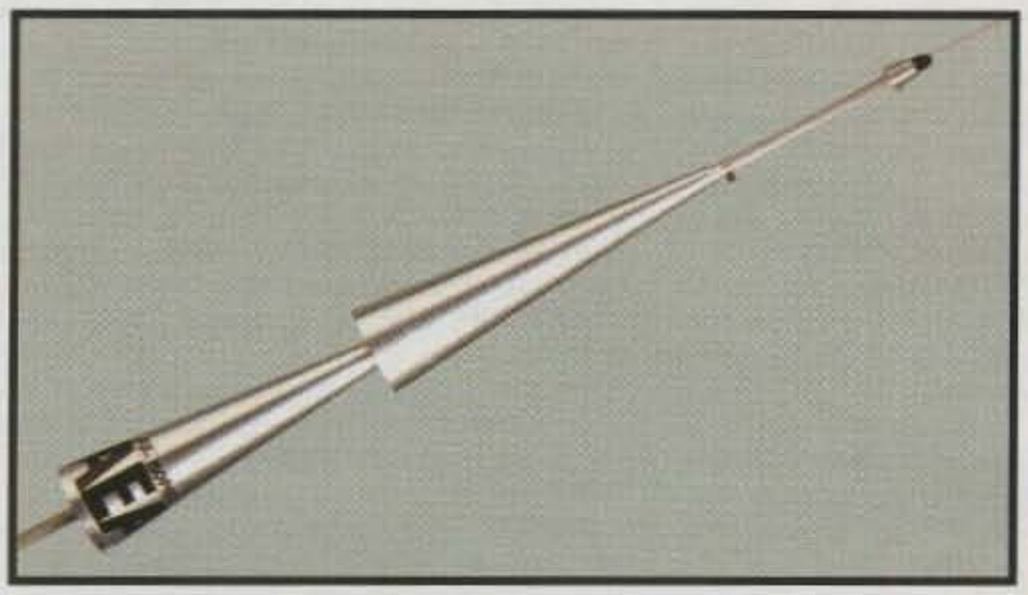
73, Alan, K2EEK

You can take your pick of road signs in your pursuit of what amateur radio has to offer. FC1BJD puts forth the original and a variation to help you find what you're looking for in the French countryside.

Go Far With an Antenna From AEA

IsoLoop

- A 35" loop antenna that performs like a full-wave dipole cut to the length of the frequency being used.
- The ideal compact antenna for amateurs facing antenna restrictions or space limitations.
- Efficiency ranges from 72% on 20m, rising to 96% on 10m.
- High-Q design results in narrow bandwidth.
- Frequency range: 10-30 MHz, continuous.
- Omnidirectional, comes with manual tuner.
- Optional automatic tuner available.

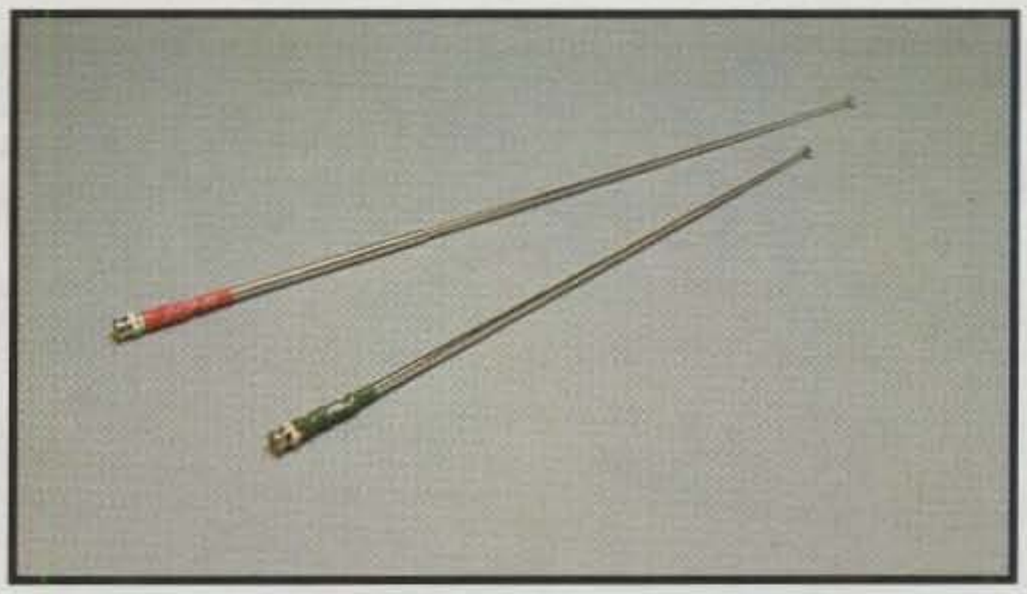


IsoPole

- Patented decoupling cones give you maximum gain possible on the horizon for the length.
- Unique conical shape means lowest feedline pick-up of computer hash noise of any competing antenna.
- Built to withstand the harshest weather.
- Allows broad frequency coverage with full power output over entire band.
- An impedance matching network designed for maximum legal power.
- Available in 144, 220, or 440 MHz versions.

Hot Rods

- High-performance, telescoping handheld half-wave antennas.
- Achieves higher gain than any 5/8 wave, two-meter telescopic antenna for handhelds.
- They can handle over 25 watts of power, making the Hot Rods ideal as a portable base or mobile antenna.
- Collapsed, they perform electrically like helical quarter-wave flexible antennas.
- Available in the HR-1 half-wave 2M and the HR-2 half-wave 220 MHz versions.



SWR-121 Antenna Analyzers

- Digital display of antenna's resonant frequency.
- Graphic display shows the antenna's SWR curve over an entire range, not just one frequency.
- Battery powered—designed for portability.
- Measure the return/loss in a length of coax.
- Digital SWR readout at center frequency.
- Optional software lets you view, save, and print plots to your PC-compatible computer.
- UHF/VHF version covers 120-175, 200-225, and 400-475 MHz.
- HF version covers 1.0-31.999 MHz.

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ANNOUNCEMENTS

•Commonwealth Games Callsign Correction - The call to be used for these games in Victoria, BC, Canada, July 1 to Aug. 31, is **CG7V** (not CG7G as reported last month). For details see July *CQ*, p. 6).

• The following Special Events are scheduled for August:

W1JY, from the M/S Mt. Washington, Lake Winnipesaukee, New Hampshire; Central NH ARC; 1200–1900Z Aug. 13; on 28.333, 21.333, and 14.333 ± 3 MHz; listen on 10 meters on the hour, 15 meters 20 minutes after the hour, and 20 meters 40 minutes after the hour. For certificate send 9 × 12 SASE and QSL to CNHARC, Box 1112, Laconia, NH 03247-1112.

2-land, from Philadelphia, Pennsylvania and Montauk Point, New York; to celebrate the 51st Anniversary of the participation of the USS Eldridge in the Philadelphia Experiment; Aug. 12–14; Novice/General portions of the 10, 15, and 20 meter bands, as well as 2 meters and 70 cm SSB and simplex. For QSL and info send your QSL and SASE to N2LDU, P.O. Box 405, Freehold, NJ 07728.

KC2QV, from Fulton's annual Riverfest, Fulton, New York; Oswego County Amateur Radio Emergency Service, OCARES; 1200–2100Z Aug. 14; middle of the General 80, 40, 20, 15, and 10 meter phone bands, the Novice 10 meters, and 147.75/.15 MHz. For certificate, send QSL and large SASE to KC2QV, 366 South Fifth Street, Fulton, NY 13069.

W2OB, from "Old Barney," the Barnegat Lighthouse in Barnegat Light, New Jersey, to commemorate Nation Lighthouse Day; The Old Barney ARC; 1300–0000 UTC Aug. 6–7; lower 25 kHz of General phone bands; 40, 20, 15, 10, plus 146.52 simplex, 146.835 repeater and other local repeaters. For special QSL, send SASE to Joe Fleishinger, Sr., NU2F, 75 Joshua Drive, Manahawkin, NJ 08050. For a certificate, send 9 x 12 SASE with 2 units of postage.

K2BOG, from Vernon Day, Vernon, New Jersey; Vernon RACES/ARES; 1000–2200Z Aug. 20; General class portion of 40, 20, and 15 meter phone subband. For certificate, send QSL and a #10 SASE to Vernon RACES/ARES, RR #3, Box 803, Highland Lakes, NJ 07422.

NI3Z, from the highest point in Pennsylvania at Mt. Davis, Somerset, Pennsylvania; Somerset County ARC; Aug. 13–14; lower 50 kHz of General class phone bands 10–80 meters. For certificate send QSL and SASE to NI3Z, Lee Day, 311 S. Rosina Ave., Somerset, PA 15501.

KE3DR, to commemorate Barnesboro's centennial, Barnesboro, Pennsylvania; Dividing Ridge ARC; 1500–2300Z Aug. 13; General 40 and 20 meter phone subbands and Novice phone 10 meters. For certificate, send QSL and SASE to Dividing Ridge ARC, Road 1, Box 503-A, Barnesboro, PA 15714.

KE3DR, from Cherry Tree, Pennsylvania, to celebrate anniversary of the Canoe Place monument; Dividing Ridge ARC; 1500–2300Z Aug. 27; lower General 40 and 20 meter phone subbands and Novice phone portion of 10 meters. For certificate, send QSL and SASE to Dividing Ridge ARC, Road 1, Box 503-A, Barnesboro, PA 15714.

WO3C, from 50th anniversary of Smokey Bear, Leonard Harrison State Park, Wellsboro, Pennsylvania; Tioga County ARC; 1300Z Aug. 6 to 1800Z Aug. 7; 80, 40, 20, and 15 meter General phone subbands, Novice 10 meter phone subband. For certificate send QSL and 9 × 12 SASE to Darlene Rahn, WO3C, Road #6, Box 200, Wellsboro, PA 16901.

N3ILC, from the Schuylkill County Fair, Pottsville, Pennsylvania; The Schuylkill Amateur Repeater Association; Aug. 7–13; CW and phone, General and Novice subbands. For certificate, send QSL and SASE to Ed Brennan, N3ILC, 520 Spring Garden Street, Pottsville, PA 17901-1651.

W3TEB, from the 31st annual Das Awkscht Fescht (Pennsylvania Dutch for "August Festival"), Macungie, Pennsylvania; Aug. 5–7; General 80, 40, and 20 meter phone subbands and 146.55. For certificate, send QSL and SASE to Harry Buchin, W3TEB, 21 E. Main Street, Macungie, PA 18062-1308.

AD4FC, from the Georgia Power Co. (Plant Scherer), Centerville, Georgia; employees of Georgia Power Co.; 1200–2400 UTC Aug. 13; lower 25 kHz of 80, 40, 20, and 15 meter General phone subbands and 10 meter Novice phone subband. For a certificate send 9 × 12 SASE to Don Hall, AD4FC, 262 Valencia Cir., Centerville, GA 31028. (VE exams.)

W7AIA, from Evergreen Flying Field, just east of Vancouver, Washington; The Clark County ARC; Aug. 20–21; lower portion of General phone bands on 75, 40, 20, 15 meters, and Novice portion of 10 meters. For certificate send QSL and SASE to CCARC, P.O. Box 1424, Vancouver, WA 98668.

W8BLV, from National Hot Air Balloon Championships, Middletown, Ohio; Dial ARC; July 29 to Aug. 7, evenings and weekends; SSB on or near 3.965, 7.265, 14.265, 28.365, and 147.315+ MHz. CW on 10 kHz from bottom of Novice bands. For a special balloon QSL, send SASE and your QSL to Ernest Howard, AG8Y, 4003 Lewis Street, Middletown, OH 45044.

KA8GOH, from the 32nd annual Tyler County Fair, Middlebourne, West Virginia; Tyler County ARC; 1500–2200Z Aug. 12 and 13; lower portion of General 40 and 20 meter phone bands, and 146.985 repeater. For certificate, send QSL and 9 × 12 SASE to TCARC, P.O. Box 287, Middlebourne, WV 26149.

W8YDK, from the Milford Memories Summer Festival, Milford, Michigan; Milford ARC; 1500–2300Z Aug. 13 and 14; General and Novice 40, 20, and 10 meter subbands. For QSL, send SASE and QSL to Joe Kaminsky, N8PGF, MARC, P.O. Box 301, Highland, MI 48357.

W9WK, from "Picnic Ham," Menomonee Park, Lannon, WI; Aug. 5–7; General phone and CW bands on 75, 40, 20, 15, and 10 meters. For certificate, send QSL and 9 × 12 envelope with two postage units to W9WK, c/o John Leekly, 757 N. Broadway, Suite 306, Milwaukee, WI 53202.

N9EHQ, from Brickyard 400 Race anniversary, Indianapolis, Indiana; Hendricks County ARS; Aug. 4–6; lower portion of the General 80, 40, 20, and 15 meter phone subbands, Novice 10 meter phone subband. For a commemorative QSL card send SASE and QSL to Dan Voils, KB9ABI, 505 Alpha Avenue, Brownsburg, IN 46112-1501.

Ø-land, from 10th annual Trainfest, Milbank, South Dakota; 1400–0200Z Aug. 13–14; General phone 20, 40, 80 meter subbands and Novice 10 meters. For certificate send QSL and a 9 × 12 SASE to NØJUO, P.O. Box 189, Wilmot, SD 57279-0189.

VE3CNE, from the Better Living Center, Toronto, Canada; 1400–0200Z Aug. 19 – Sept. 5; CW 3.645, 3,700, 7.045, 7.145, 14.045, 21.045, 21.145; SSB 3.745, 3.865, 7.065, 7.235, 14.145, 14.245, 21.345, and 145.410.. For more information contact Lionel Tipple, VE3TIP, 125 Wimbleton Rd., Islington, ON, Canada M9A 3S4.

VI4WWA, from the annual Festival of Whales, Queensland, Australia; Aug. 1 – Oct. 31; 3.794, 7.100, 14.235, 21.250, 28.495 MHz and Australian Novice frequencies. For an application for the "White Whale Award—1994" and/or QSL, contact QSL Manager, HBARC Inc., P.O. Box 829, Hervey Bay 4655, Queensland, Australia.

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

Aug. 5–7, **Sky High Hamfest**, Silver Star Mountain, Vernon, BC. Contact Kevin, VE7EGD, North Okanagan Radio Amateur Club, P.O. Box 1706, Vernon, BC V1T 8C3 (545-8340).

Aug. 6, **Macoupin County Hamfest**, Macoupin County Fairgrounds, Carlinville, Illinois. General inquiries, call Aaron, N9UJH (217-854-3698); pre-register/info 217-854-8261; vendor inquiries Doug,

(Continued on page 132)

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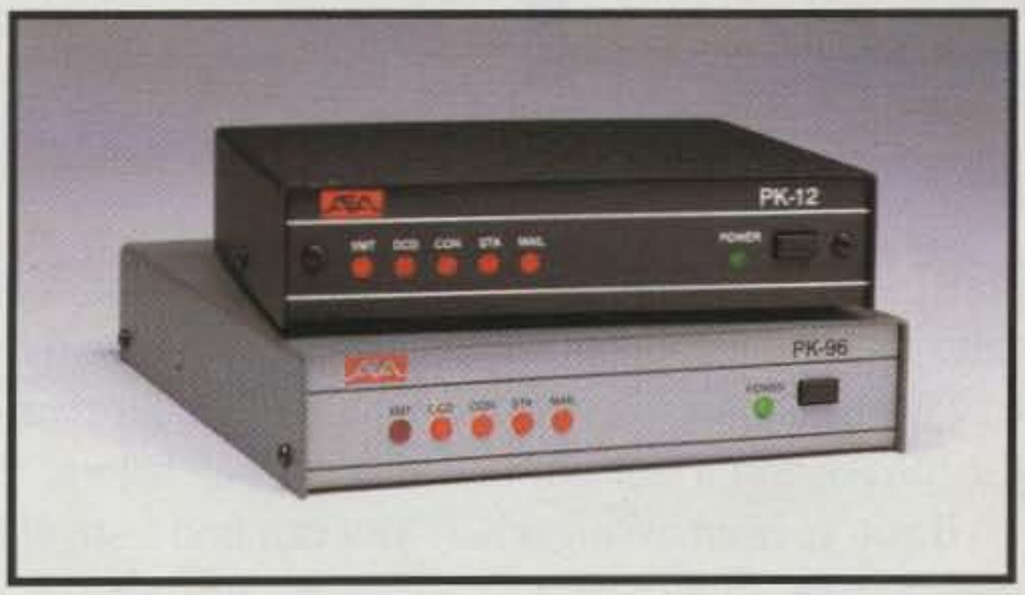

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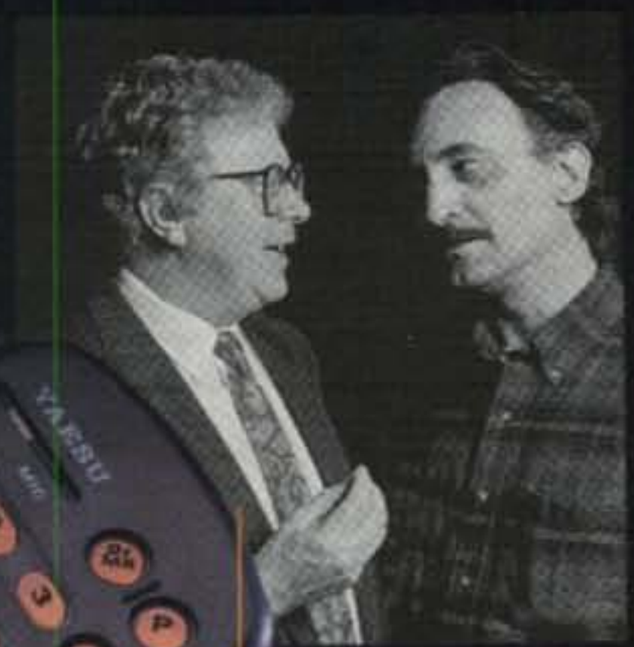

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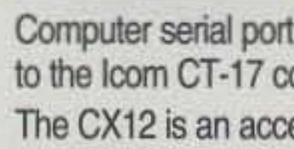

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TM-733A •144MHz/440MHz dual-band operation •Dual receive on same band (VHF+VHF or UHF+UHF) •"6-in-1" programmable memory •72 memory channels •DTSS selective calling with page •1200/9600bps packet terminal •AIP system •Cross-band repeater function

TM-241A/331A/441A/541A
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TM-251A/451A •Single-band operation (TM-251A: 144MHz; TM-451A: 440MHz) •41 memory channels (optionally expandable to 200) •Dual-band receive •Digital recording system •DTSS selective calling with page •1200/9600bps packet terminal

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KF4EZ and AA4TH come up with some interesting ideas on antenna matching. Read about their experiments and how to retrofit your antenna.

A Coaxial Offset-Feed Method For Yagi Antennas

BY MICHAEL G. GULER*, KF4EZ, AND EDWARD B. JOY†, AA4TH

A thin, center-fed, half-wavelength dipole in free space has a radiation resistance of 73 ohms.[1] The half-wavelength dipole has an inductive reactance of about 40 ohms. By shortening the dipole a few percent the input impedance can be made to resonate (zero reactance). The shortening also reduces the radiation resistance slightly, to approximately 70 ohms.

The current distribution on such a thin wire antenna is approximately sinusoidal with a value of zero at the ends and maximum in the center. The voltage distribution is nearly sinusoidal also with minimum (but not zero) value in the center and maximum values at the ends. For such an antenna the ratio of the voltage to current, the impedance, on the antenna is a minimum (approximately 70 ohms) in the center. Moving from the center to either end the current decreases and the voltage increases, increasing the impedance to a very large value (thousands of ohms) at the ends. Moving half way from the center toward one end, the current decreases to a value of approximately 70.7 percent of its center value and the voltage increases to approximately 141 percent of its center value. The impedance, therefore, doubles from 70 ohms to 140 ohms. Thus, we can pick any feed point we wish along the dipole and obtain any value from 70 ohms to several thousand ohms for the input impedance. Offset feeding such a dipole has very little theoretical impact on the dipole's bandwidth or current distribution.

The reflector and directors of a Yagi dipole array, through mutual coupling, cause a large drop in the input impedance of a Yagi. For closely spaced elements, the impedance can drop to as low as 10 ohms. If fed with a 50 ohm coaxial cable with no matching system, a VSWR of 5:1 would result. For this reason, various matching network schemes have been developed to transform the low input impedance of the Yagi driven element to the 50 ohm impedance of standard coaxial cable. The hairpin match, the T match, the gamma match, and the quarter-wave transmission-line match are but a few of the popular matching systems in use today. The current and voltage distributions of the feed element of a Yagi antenna are not the same as on an isolated dipole, but are still nearly sinusoidal. Thus, the low impedance obtained at the center of the driven element of the Yagi can be raised by offsetting the feed point from the center, as shown in fig. 1. By simply offsetting the feed point of the driven element, any input impedance, from the low center value (as low as 10 ohms) to several hundred ohms near the ends, can be obtained with no matching network at all.

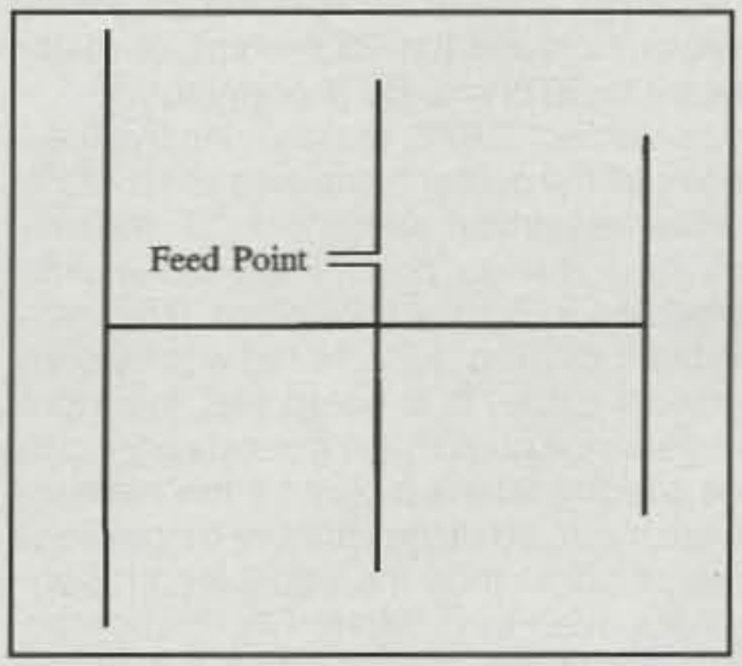

Fig. 1– Diagram of an offset-feed for Yagi antennas.

All antenna feed systems employing coaxial cable as the feeding transmission line must ensure that no current flows on the outer surface of the coax shield conductor. Such current radiates in unwanted directions and often unwanted polarizations, is a great source of RFI, and may even return to the shack. This current also affects the VSWR of the antenna. Some form of current choke must be used to stop such flow of current. A bead balun is used for the current choke in this design. The bead balun, developed by M. W. Maxwell, is formed by feeding the coaxial cable through the apertures of a number of ferrite beads near the driven element.[2] A thorough discussion of other types of solutions to this problem was presented in a recent issue of *CQ*.[3]

Development

Most antenna development work at the School of Electrical Engineering at Georgia Tech is done in the VHF and UHF frequency range so that the antennas will fit through the door openings in our building, laboratories, and dorm rooms. Much of the data presented in this article was

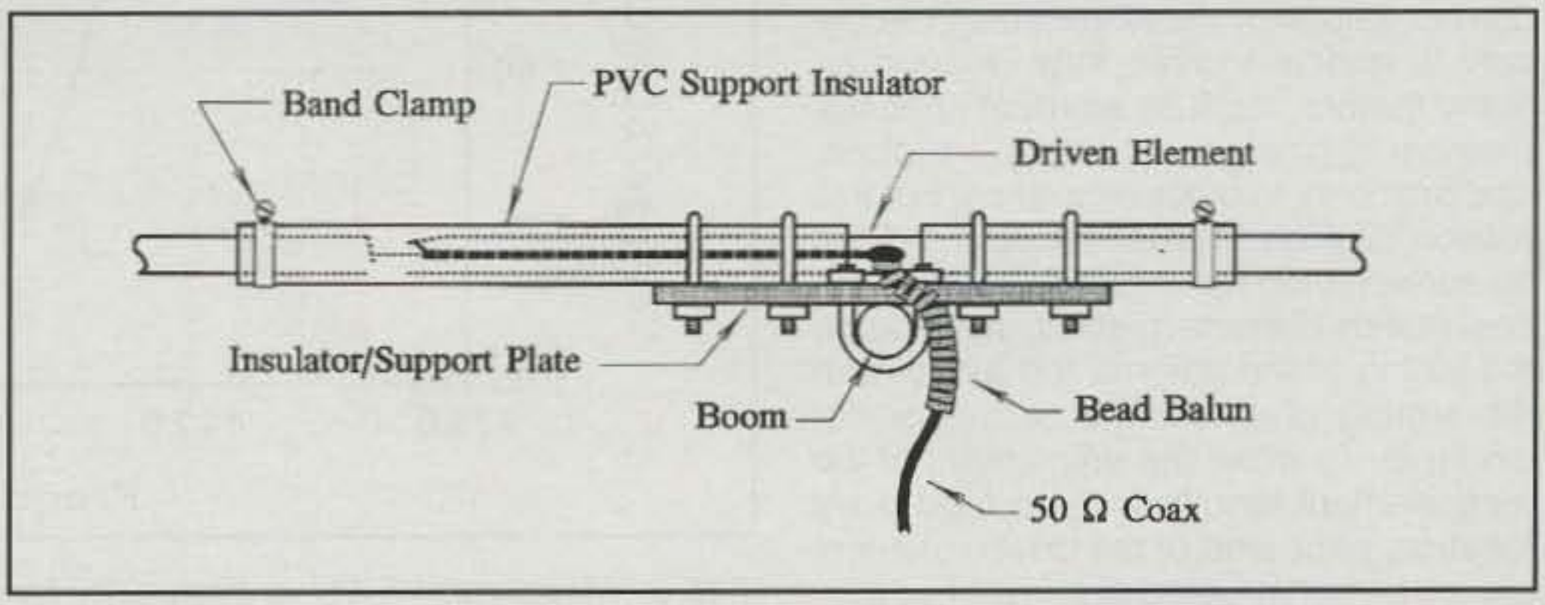

Fig. 2– View of a mechanical support design for the coaxial offset-fed Yagi.

*963 Medina Drive, Lilburn, GA 30247-5437
†School of Electrical Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0250

obtained for a commercially available 11-element, 2 meter band Yagi. The 2 meter band Yagi geometry was measured and then computer analyzed at 146 MHz using a Georgia Tech version of the method-of-moments computer code (GTMom). The theoretical center-fed impedance without any matching network was calculated to be 33.5 + j 16.8 ohms. This antenna is matched with a gamma feed network which transforms the 33.5 ohm resistance up to 50 ohms and cancels the 16.8 ohms of reactance. To match the same antenna using the coaxial offset-feed technique, the driven element must be shortened to cancel the 16.8 ohms of positive reactance (it would have to be lengthened if the Yagi reactance was negative), and the feed point must be offset to increase the 33.5 ohms of resistance to 50 ohms. By shortening the driven element 2.67% and moving the feed point off the center of the element by 25% of the new driven element length, the calculated driving point impedance was modified to 53.1 – j 3.4 ohms. This provides a VSWR of 1.09:1 if fed with 50 ohm coaxial cable. It is noted that the input impedance could have been designed to be exactly 50 + j 0 ohms if the element were modeled using variable-length segments rather than the equal-length segments used in GTMom. Fig. 2 shows a design for the coaxial offset-fed driven element.

The coax feed line enters the driven element at the boom intersection location and runs inside the driven element to the feed point. The coax shield is attached to the long side of the driven element, and the center conductor is attached to the short side of the driven element as shown in fig. 2. The coaxial cable is fed through a number of ferrite beads before entering the driven element. These beads provide a current choke to any currents flowing on the outside of the coax shield.

Tuning The Offset-Fed Yagi

The only variables in the coaxial offset-feed are the length of the driven element and the location of the feed point relative to the center of the driven element. The correct values of these variables necessary to match a given Yagi depend on many factors, such as element spacing, element diameter, mounting structure, and proximity to other structures. For this reason Yagi feed systems should provide for some tuning mechanism to achieve a best match. Gamma match systems allow the tuning of the gamma rod length and the setting of a variable capacitor, for example. To allow the adjustment of the feed element length and the feed point location, each end of the driven element should be constructed of at least two sections of tubing that will telescope to provide length adjustment. The computer design of the antenna and coaxial offset-feed system would hopefully be close enough to the final settings that only minor adjustment would be necessary. The coaxial offset-feed system does not reduce the bandwidth of the antenna, making it even easier to adjust.

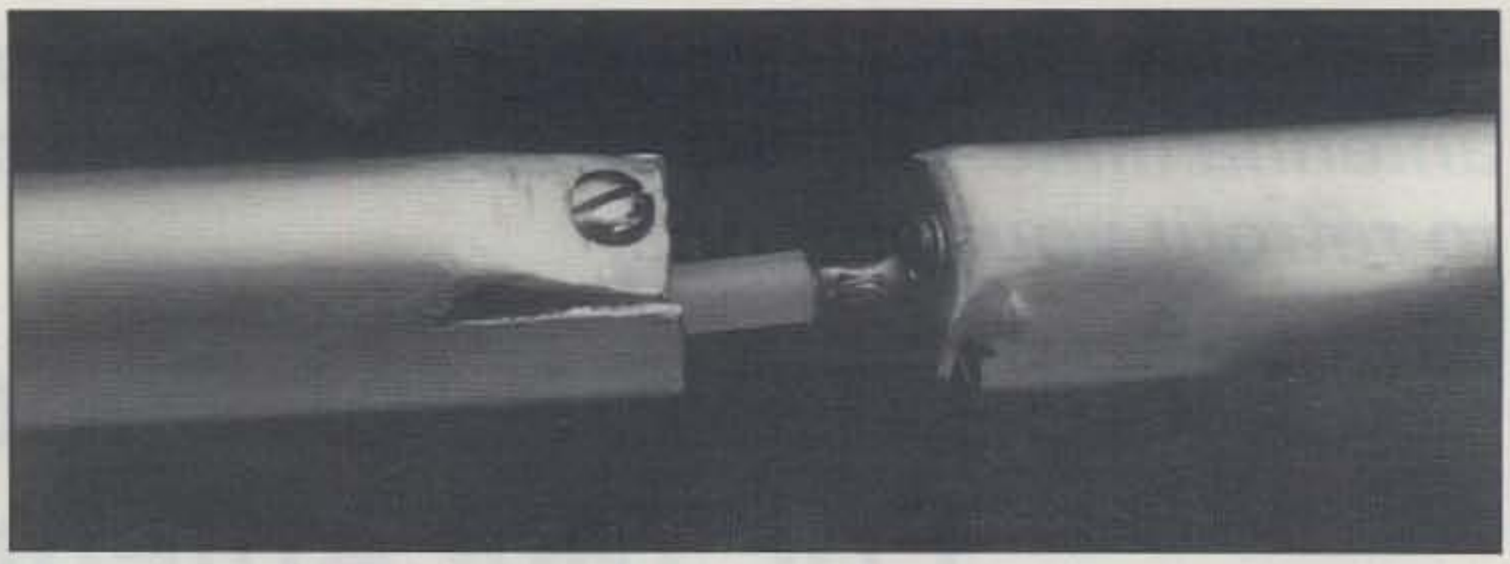

Photo 1– Feed point of the coaxial offset-fed driven element for a 10 meter band Yagi.

Retrofitting The Feed System For An Existing Yagi

Suppose you already have a Yagi antenna and would like to try this new feed system, but don't have the software or computer to do such a design. What follows is a step-by-step process for replacing the feed element on your existing Yagi with a new one, incorporating the coaxial offset-feed system. The new feed element will necessarily have to have more adjustment range than a computer designed one for your antenna. Start with an overall element length of 0.475λ, where λ is the wavelength at the desired center frequency of your operating range. Offset the feed point by 0.04λ from the center of the driven element. Allow enough telescoping action to adjust each end of the driven element by ±0.04λ.

Now construct the driven element, and mount it to the boom in an insulated manner similar to that shown in fig. 2. Tuning with a forward and reflected power meter or VSWR meter is an iterative process. Start with the short end of the driven element. Adjust the length of the short end for best VSWR at the center frequency. Now lengthen the long end and shorten the short end by the same amount (typically 0.005 wavelengths). Adjust the short end for best VSWR. If this VSWR is better than the initial VSWR continue lengthening the long end and shortening the short end by the same amounts followed by a slight adjustment of the short end for best VSWR. If the VSWR is not steadily getting better, then you have passed the best offset position, so shorten the long end and lengthen the short end followed by slight adjustment of the short end for best VSWR. Continue until the VSWR is 1:1 at

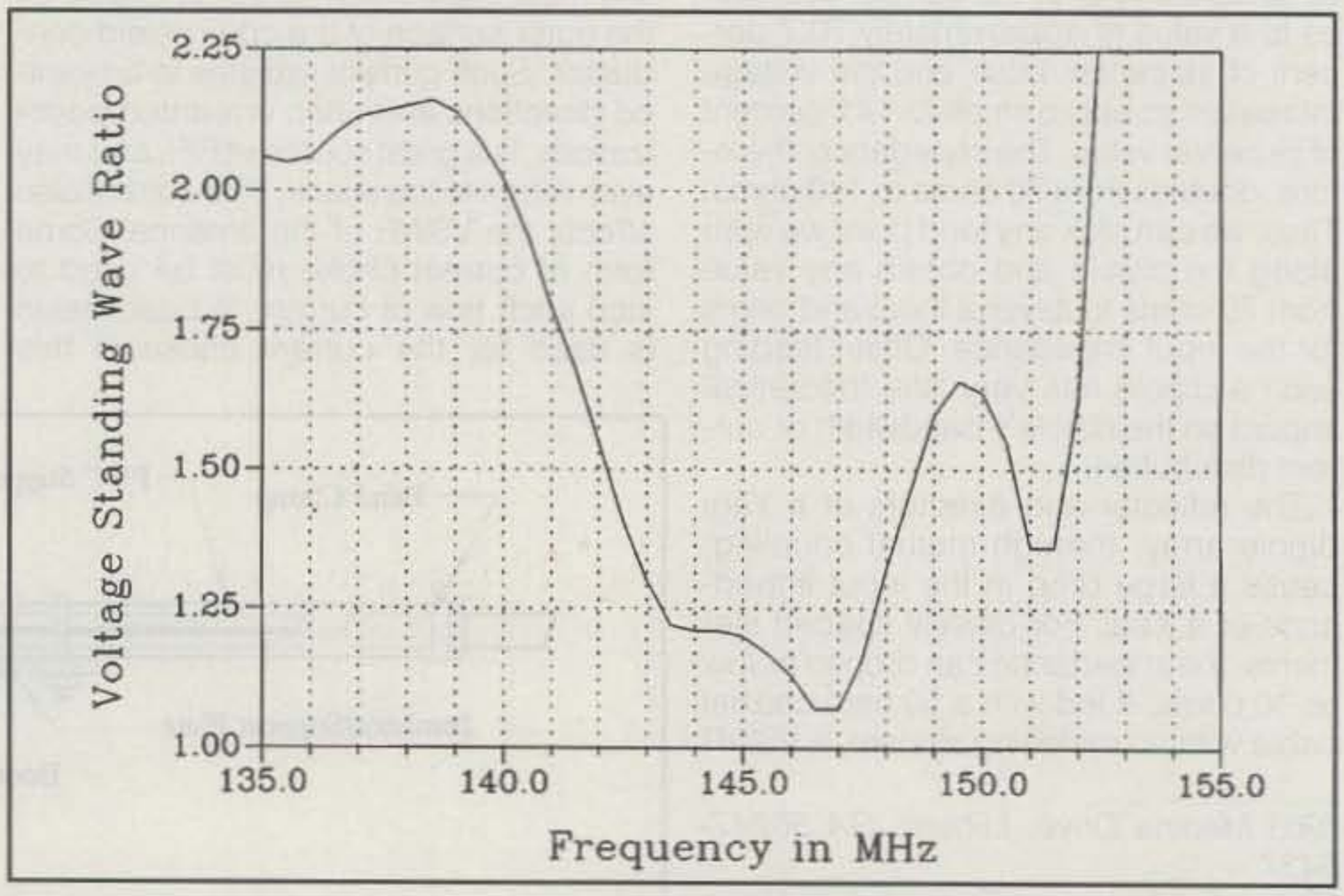

Fig. 3– Measured VSWR vs frequency for an 11-element, 2 meter band Yagi using a coaxial offset-feed.

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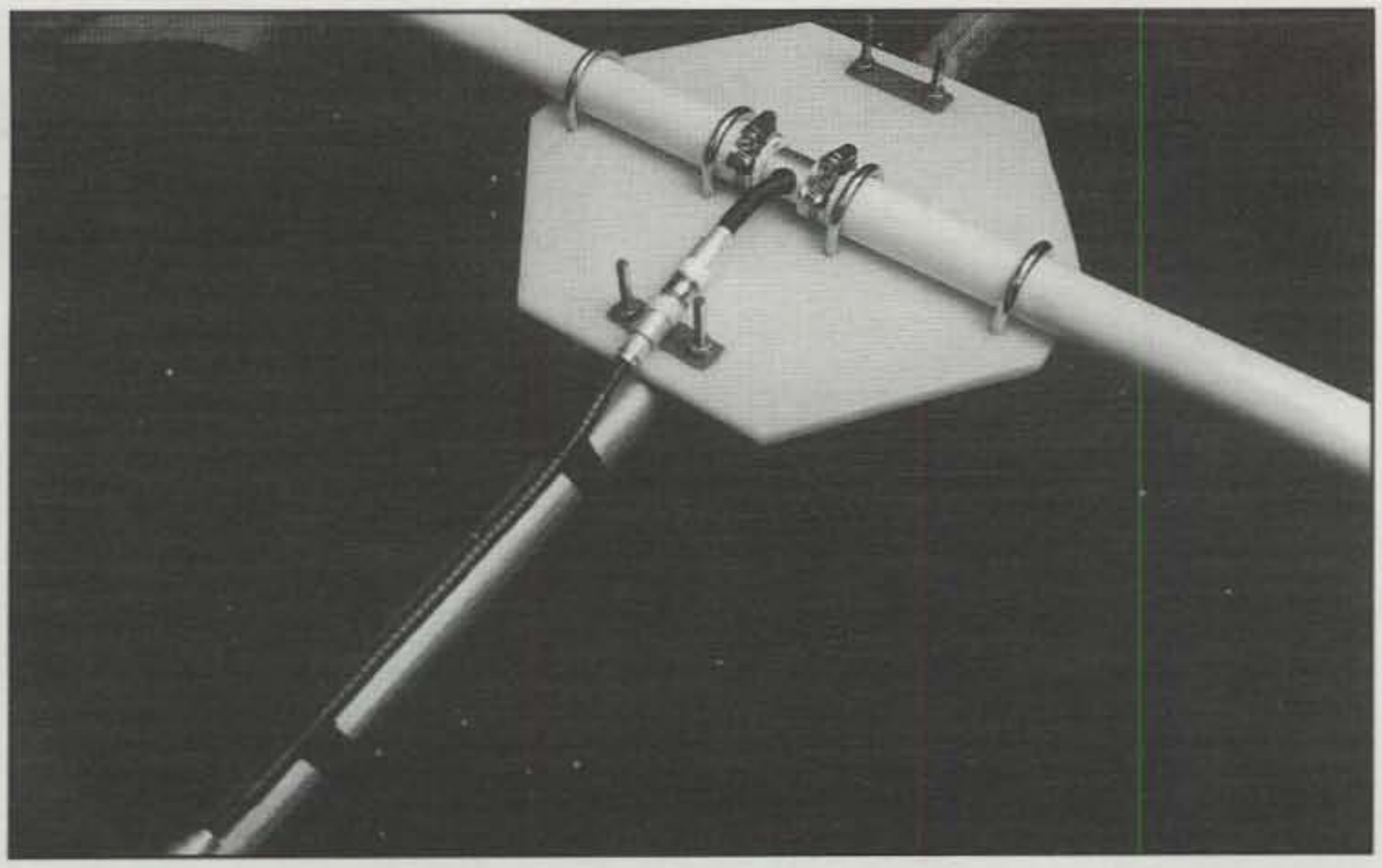

Photo 2– The 10 meter band Yagi antenna, coaxial offset-fed driven element attached to the boom.

the center frequency. If a network analyzer is available, adjust the length of the short end until the element is resonant (reactance = 0). If the resistance is less than 50 ohms, then lengthen the long end and shorten the short end by equal amounts until the resistance is 50 ohms. If the resistance is greater than 50 ohms, do the opposite.

Check the VSWR at several points from band edge to band edge. If one band edge has a VSWR greater than the other edge, then retune for 1:1 at a frequency between that band edge and the center frequency. It should be possible to match the entire band with a VSWR less than 2:1 over any HF, VHF, or UHF amateur band (except 80 meters).

Next the overall element should be centered with respect to the boom. Then secure the element to the boom. Centering the element will slightly offset the point where the coax enters the driven element, which has caused no problems in the offset-fed Yagis built to date. The coax feed line is passed through ferrite beads at the point where the coax enters the feed element.

The coaxial offset-feed system should allow metallic connection of the driven element to the boom; however, such a design would require a different tuning procedure. The driven element connection point to the boom must always be located at the midpoint of the overall driven element to prevent currents from flowing onto the boom. The present tuning procedure would shift the connection

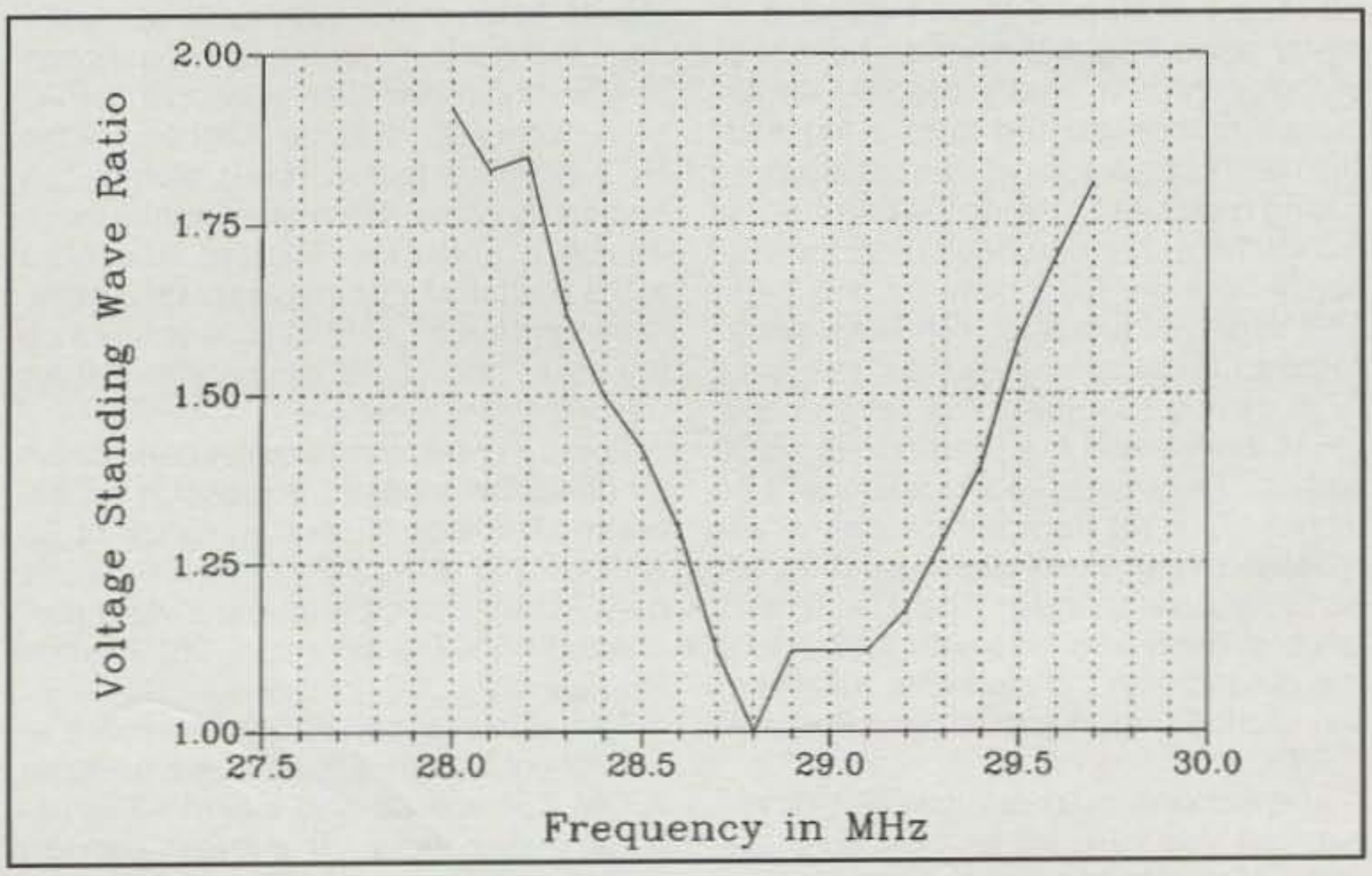

Fig. 4– Measured VSWR vs frequency for a 3-element, 10 meter band Yagi using a retrofitted coaxial offset-feed.

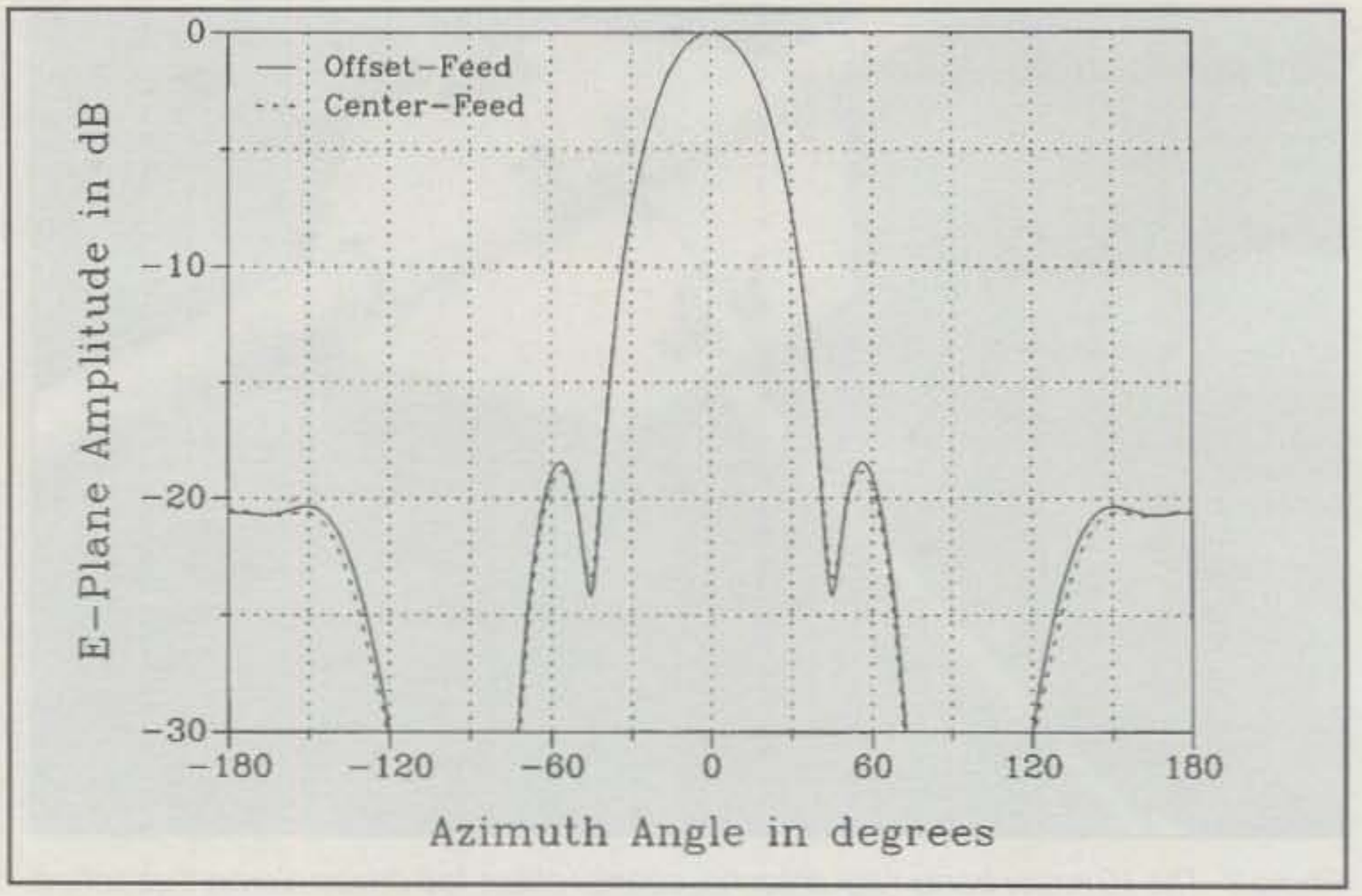

Fig. 5– Computer-generated E-plane radiation patterns for an 11-element Yagi at 146 MHz. The solid-line plot is for the coaxial offset-fed Yagi, and the dashed-line plot is for the gamma matched center-fed Yagi.

point away from the driven element midpoint. A similar problem arises if the insulator/support plate shown in fig. 2 is replaced by a metal plate. The PVC surrounding the driven element provides DC insulation between the driven element and boom; however, it was found that capacitive coupling from element-to-plate and from plate-to-boom caused the antenna to de-tune during the final step of centering the overall element with respect to the boom.

VSWR Measurement Results

Results for coaxial offset-fed driven elements for two existing Yagis are presented. The first Yagi is the 11-element, 2 meter band Yagi mentioned above. For this Yagi, the coaxial offset-fed driven element was constructed from 0.141 inch diameter copper tubing. The small size of tubing prohibited running the coax inside the element. The coax was dropped vertically from the feed point for this Yagi. The Yagi was tuned for 146 MHz, which resulted in an overall element length of 37.8 inches (0.468λ). The long end is 22.24 inches and the short end is 15.56 inches. The offset-feed location is 3.34 inches (0.041λ) from the center. VSWR measurements were taken using an HP 8510 network analyzer. The 11-element, 2 meter band Yagi was held 1.5λ above the ground with the elements parallel to the ground. Fig. 3 shows the measured VSWR.

The second coaxial offset-fed driven element was built for an existing 3-element, 10 meter band Yagi. Each element of this antenna is constructed from three sections of telescoping aluminum tubing. The outer diameter of the center tube is 1 inch, and the end tube sections have an outer diameter of 0.875 inches. The 1 inch outer diameter tubing of the driven element is cut at the offset-feed point. Photo 1 shows this offset-feed point with the coax attached. Connection tabs have been formed at the feed point ends of the 1 inch outer diameter tubing, and solder lugs are screwed to the tabs with machine screws. The coax shield is soldered to the lug on the long side of the driven element, and the coax center conductor is soldered to the lug on the short side of the driven element as shown in photo 1. The tabs must be bent inward such that the solder lugs and machine screws are contained within the 1 inch tube diameter. The feed point is supported by a section of 1 inch inner diameter, schedule 40 PVC pipe. Slots are cut in the outer end of the PVC pipe so that a band clamp can secure the pipe to the aluminum tubing. The boom end of the PVC pipe is secured to the insulator/support plate with u-bolts. A second piece of PVC pipe is used on the other end of the driven element for mechanical symmetry.

Photo 2 shows the 10 meter band coaxial offset-fed element in position on the boom. The bead balun consists of 50 Amidon No. FB-73-2401 ferrite beads over RG-62 coax. Balun parts were purchased from The Wireman, 261 Pittman Rd., Landrum, SC 29356.

The 10 meter band Yagi was tuned at a height of 1λ above the ground, using an ICOM 730 source and a Bird 43 directional power meter. The driven element was tuned for a 1:1 VSWR at 28.837 MHz, which resulted in an overall element length of 182.06 inches (.445λ). The long

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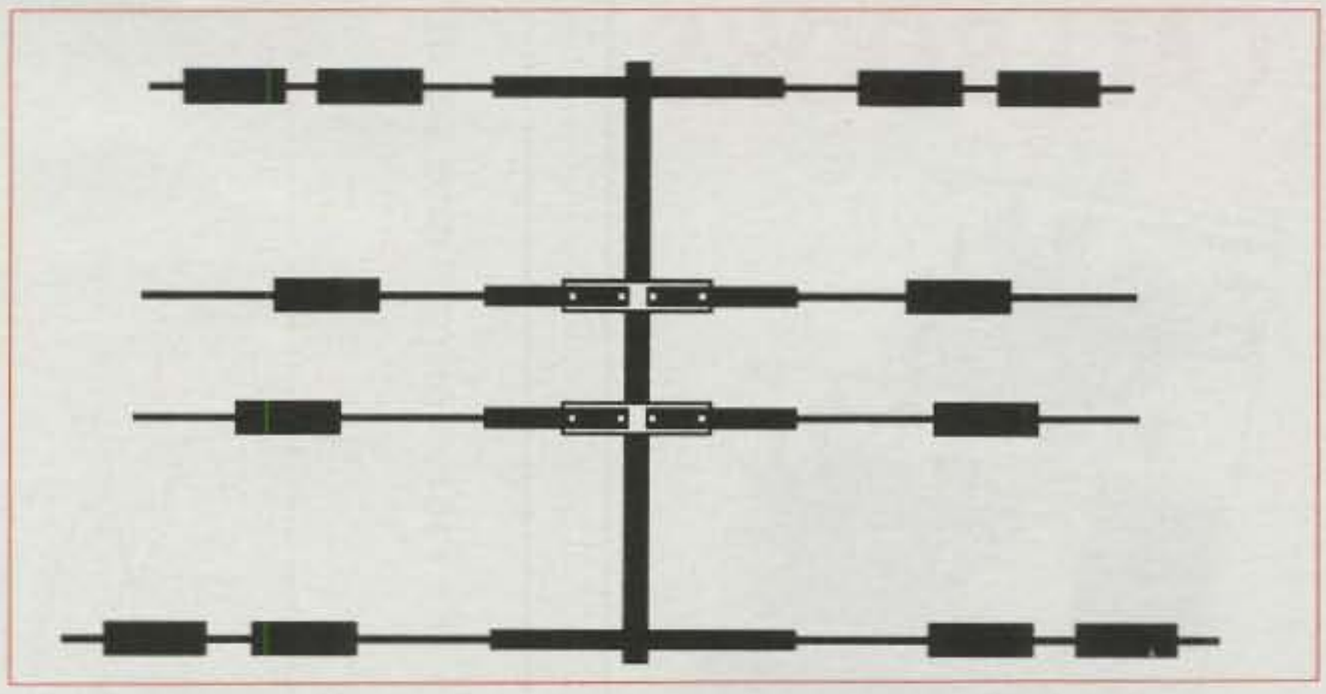

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Forward Gain:	
10 Meter	7.9 dbd.
12 Meter	7.1 dbd.
15 Meter	6.9 dbd.
17 Meter	6.7 dbd.
20 Meter	6.5 dbd.
Front-to-Back Ratio:	
10 Meter	16 db.
12 Meter	5 db.
15 Meter	13 db.
17 Meter	12 db.
20 Meter	10 db
Power Rating:	
CW	1.5 KW
SSB	2.5 KW
Matching System:	"Q" match
Recommended coax: (RG-8-U/RG-213)	50/52 ohm
SWR at resonant frequency:	1.0/1
Boom Length:	14 ft.
Turning Radius:	14 ft. 11 in.
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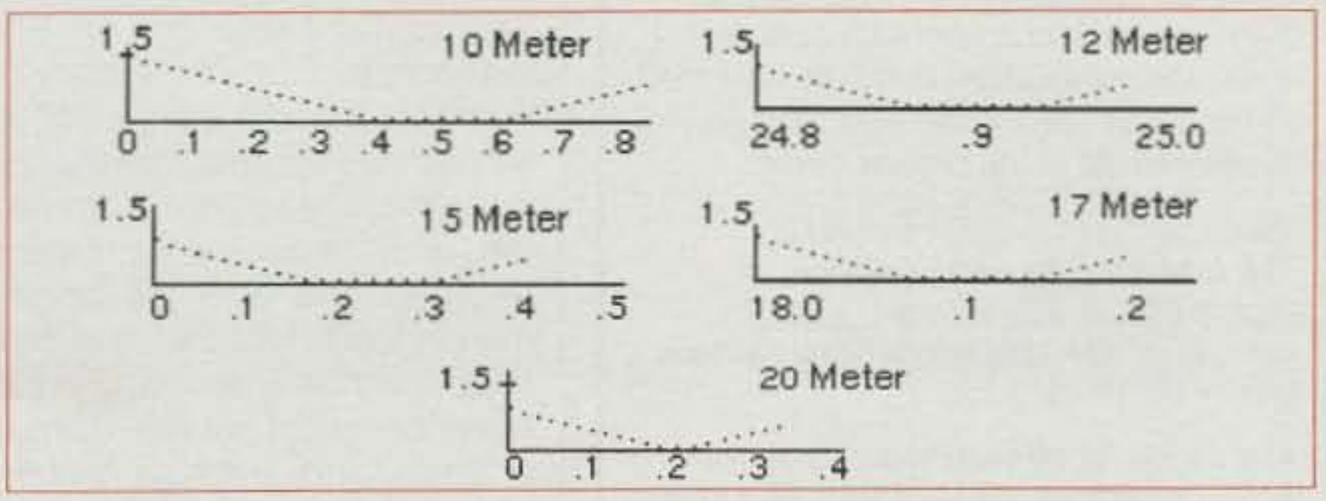

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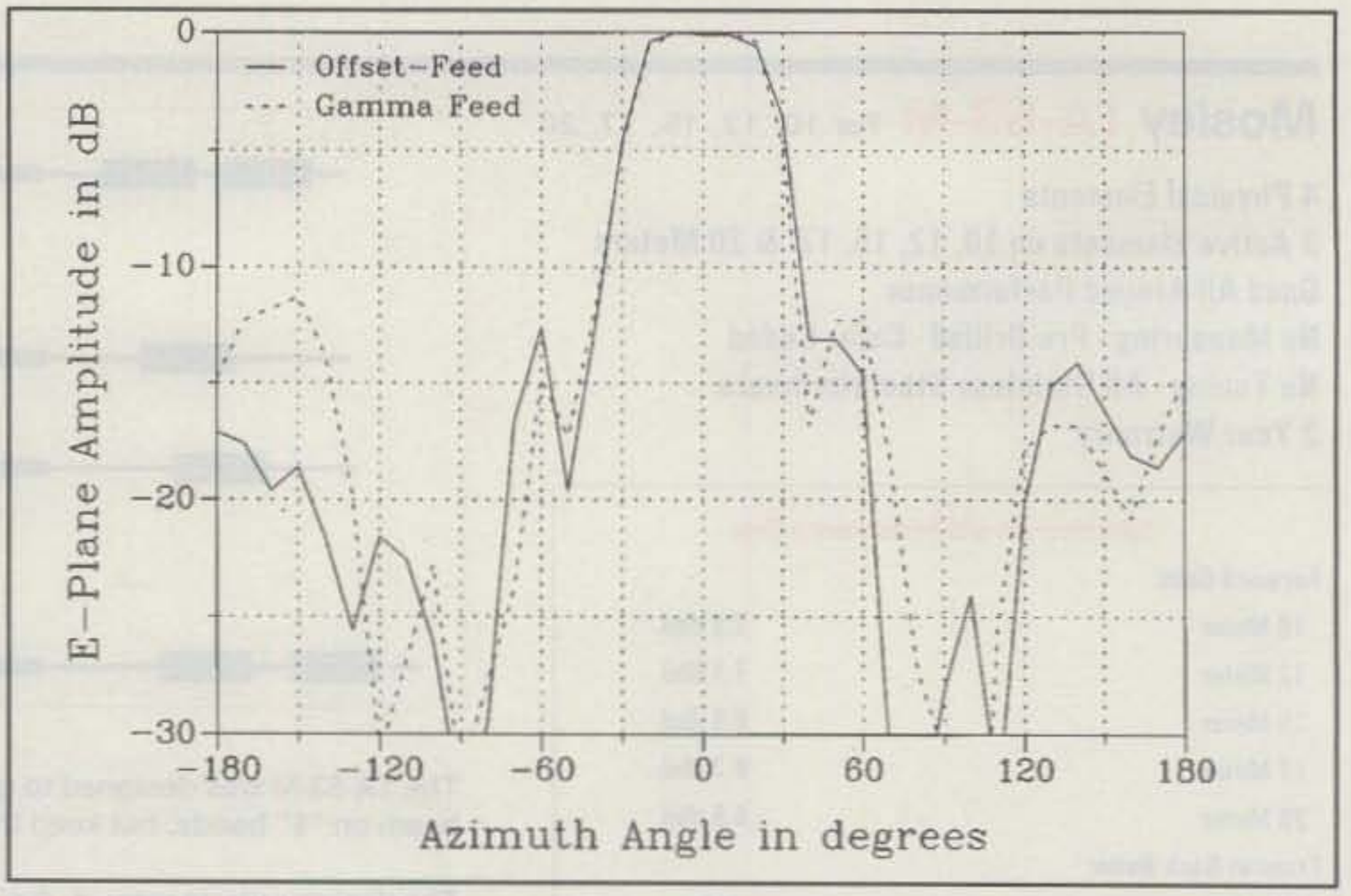

Fig. 6– Measured E-plane radiation patterns for an 11-element Yagi at 146 MHz. The solid-line plot is for the coaxial offset-fed Yagi, and the dashed-line plot is for the gamma match fed Yagi.

end is 102.44 inches and the short end is 79.62 inches, resulting in a feed offset location of 11.41 inches (.028λ) from center. Fig. 4 shows the measured VSWR of the 10 meter band Yagi using the coaxial offset-feed.

The feed element shown in photo 2 is currently in use by George Guler, WØOIR, in a home brew, 5-element, 10 meter Yagi. George uses a bead balun consisting of 12 Amidon No. FB-77-1024 ferrite beads over RG-8 coax.

Pattern Measurement Results

Theoretically, the coaxial offset-feed has very little affect on the Yagi's radiation pattern. Fig. 5 shows the computer-generated E-plane patterns of the 11-element Yagi for the center-fed case and the offset-fed case, at a frequency of 146 MHz. To verify that the coaxial offset-feed has no detrimental affect on the radiation pattern, the 11-element Yagi radiation pattern was measured with the coaxial offset-feed and with the original gamma match feed network. The patterns were measured on open, flat ground at a range distance of 20 wavelengths. The range antenna and antenna under test (AUT) were at a height of 1.5 wavelengths with elements parallel to the ground. The range antenna was a 5-element Yagi. The transmitter was a Kenwood TR 7400A, operating on low power at 146 MHz. The receiver was an HP 8410B Network Analyzer. The AUT was rotated in 10 degree steps in azimuth, from –180 to 180 degrees. Fig. 6 shows an overlay of the pattern with the coaxial offset-feed and the pattern with the gamma match feed network. Fig. 6 shows that the coaxial offset-feed did not disrupt the pattern, and in fact, provided better front-to-back ratio than the gamma match feed network.

Conclusions

The coaxial offset-feed provides a simple matching technique for achieving the full inherent bandwidth of Yagi antennas. The design is simple in both concept and practice. Tuning is simple and not critical. Measurements have demonstrated that the entire 10 meter band can be matched with a VSWR below 2:1 using the coaxial offset-feed. Computer simulations and measurements have shown that the coaxial offset-feed has no detrimental affect on the Yagi's radiation pattern.

Acknowledgments

Special thanks to Richard E. Wilson, Donald N. Black, Beth L. Guler, and George F. Guler, WØOIR, for their suggestions and assistance in measurements, and to James D. Guler for the use of his open, flat land as an antenna pattern range. Also thanks to Georgia Tech for the use of test equipment and facilities and to the Joint Services Electronics Program for continued support of our antenna research.

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2. G. Hall, *The ARRL Antenna Book*, 16th ed. (Newington: ARRL, 1991).

3. Jerry Sevick, "More on the 1:1 Balun," *CQ*, April 1994, p. 26. ■

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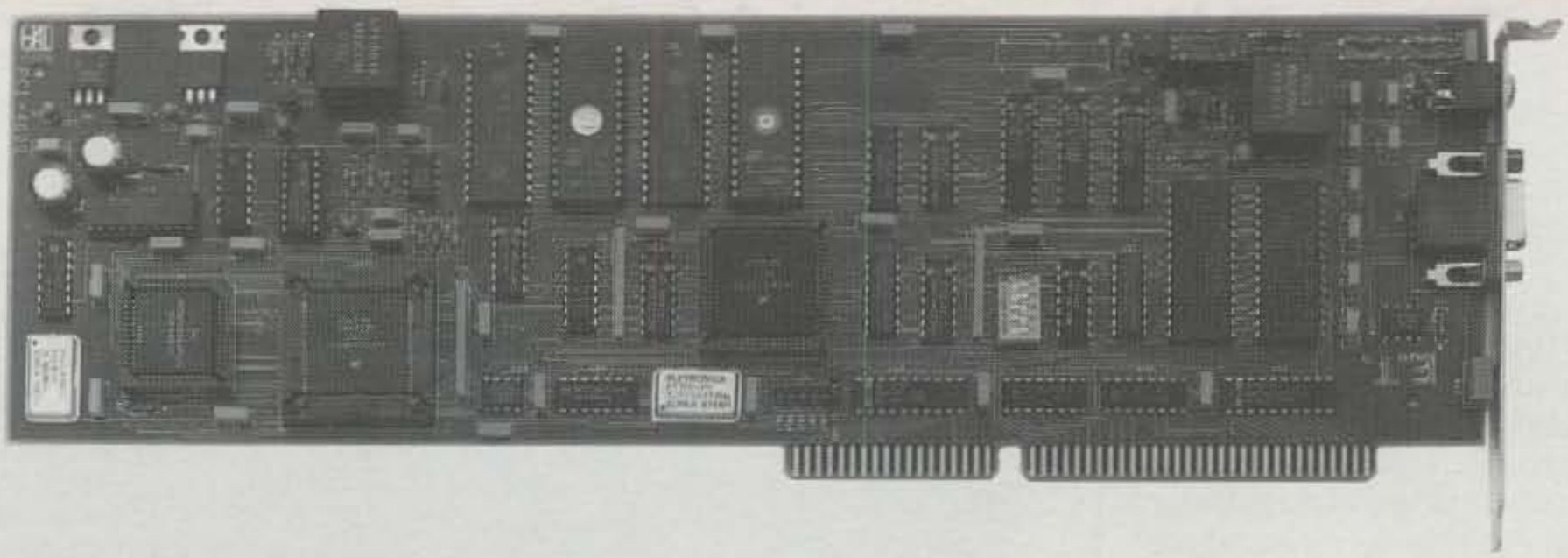

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The Dilemma of "Good Stuff"

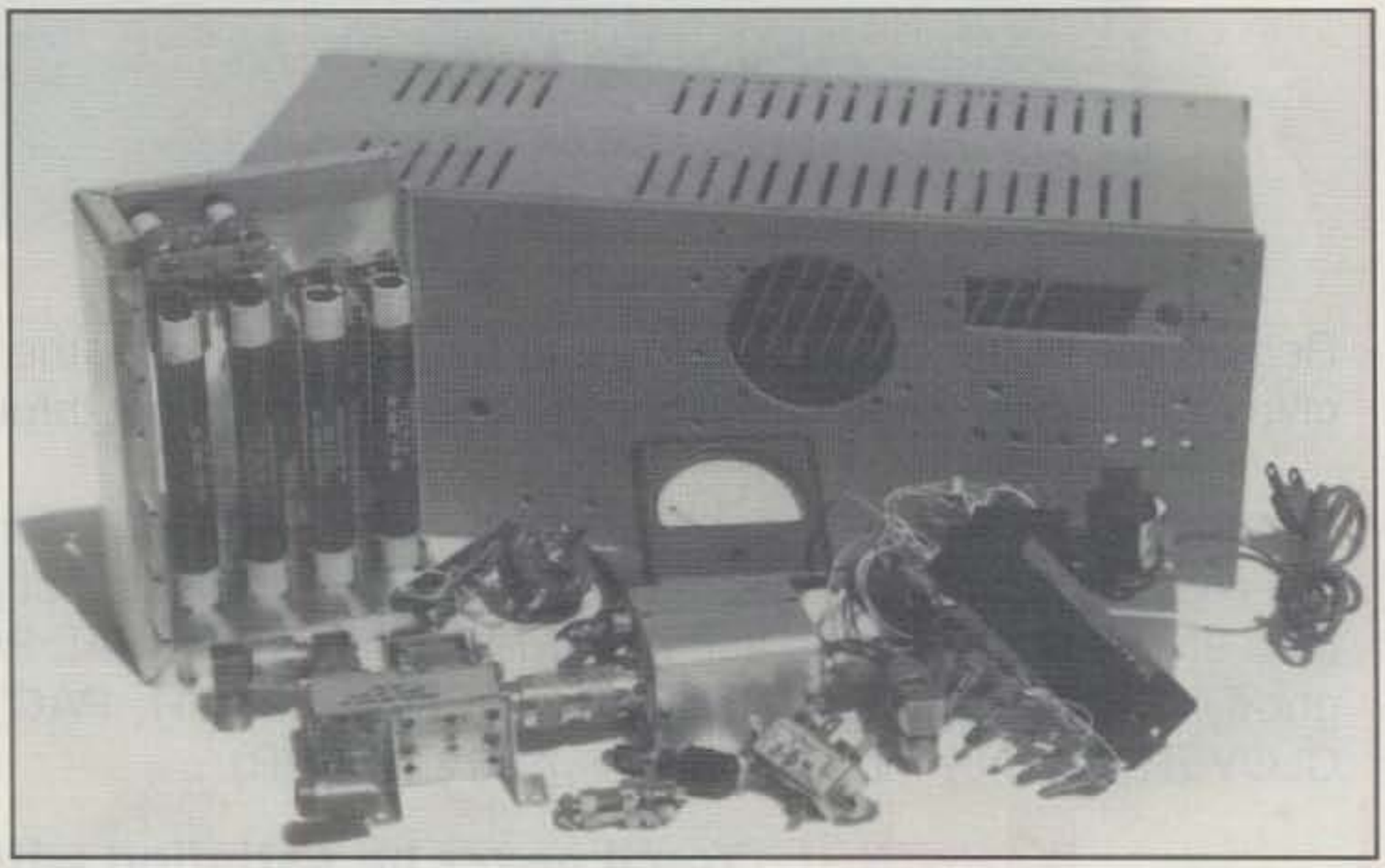
BY DONALD W. RICHARDS*, W7UPF

At one time or another most of us are "encouraged" to take stock of all the "good stuff" we have accumulated and make a decision to swap, sell, toss, or perhaps reuse electronic parts and pieces to build something that adds to our amateur station. Admittedly, cleaning out an overflowing storage room is not always self-motivated. Sometimes it is an accommodation to those who endure our habit of saving things for a possible future use.

I plead guilty to being a saver—buying new electronic parts and pieces with every intention of putting them to good use at some point in time, only to have them gather dust. That, together with hamfest "goodies" that I just could not pass up (including some "boat anchors" such as war surplus electronic stuff), contributes to the crammed storage room. In earlier cleaning-out efforts some such equipment was cannibalized, but nuts, bolts, and other parts (including brackets and panels, etc.) were saved. Much of the remains went into the trash, but as you know, tossing things away is hard to do.

With spring cleaning time at hand, there was the problem of an overflowing storage room and the decision to swap, sell, toss, or build something out of the various electronic parts and pieces. However, swapping would probably result in replacing one thing for another with no gain in storage space. Selling items at a hamfest would likely have the same result; the bucks gained would just be used to acquire another "goodie," it too ending up in the storage room. Tossing out things would be the hardest part of all, so what about building something useful out of parts and pieces, and without spending any more money?

This is all about using long-saved parts to build a needed piece of amateur equipment. It was a project which turned out to be a true recycling effort, since nothing had to be purchased—not a nut, bolt, screw, resistor, transformer, chassis, panel, paint, or what have you. You will note this article is not replete with circuit diagrams or formulas. Rather it describes what one can do using those collected parts and pieces of old equipment.



Some of the great "good stuff" I've collected over the years which finally made its way into a completed project.

At some forgotten swapmeet I had acquired a directional wattmeter with switchable 2000 or 200 watt forward and reflected readings—an item from cannibalized equipment and a real goodie that was going to be used but never got off the storage room shelf. With rediscovery, it became the heart of my recycle effort.

Out of another box of parts and pieces came a dummy load to go with the wattmeter—a bank of carbon resistors arranged to present a 50 ohm load; it too had been a hamfest buy. With these two goodies the project really began to take shape. Not wanting to use a manual switch to select between the dummy load and an antenna, it was back to the storage room to look for an alternative.

I remembered having saved a coax relay for a rainy day, and sure enough, down under a roll of coax cable was a 28 volt relay from some old military use. But what about 28 volts to power the relay? Was there a transformer among the boxes of parts? Sure was. I had saved an old 28 volt transformer, several solid-state rectifiers, and some capacitors.

With all this sort of luck, the thought of winning the lottery came to mind (if only for a moment). Then I came back to reality, wondering what else the storage room could contribute to the project. Maybe it needed some "bells and whistles" or perhaps a panel light to give visual sparkle to the recycle project. There was an odd assortment of old panel lamps that could be used, but there were also a couple of solid-state clocks with LED readouts. A clock might be useful and add color and pizzazz to the project.

Should all these things be "packaged" separately, or was there an enclosure among the stored stuff that would house everything? I had zero luck finding a cabinet or anything like that among the parts and pieces, but I was not inspired to purchase an enclosure. The idea was to

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make do with what I had. Aluminum panels from a past cannibalization could be used to make the front and back of an enclosure. No problem with mounting the wattmeter, dummy load, coax relay, switches, and the clock. They all would fit on the front and back panel. A U-shaped bracket was uncovered, and it would handle the clock and its transformer as well as the power supply for 28 volts.

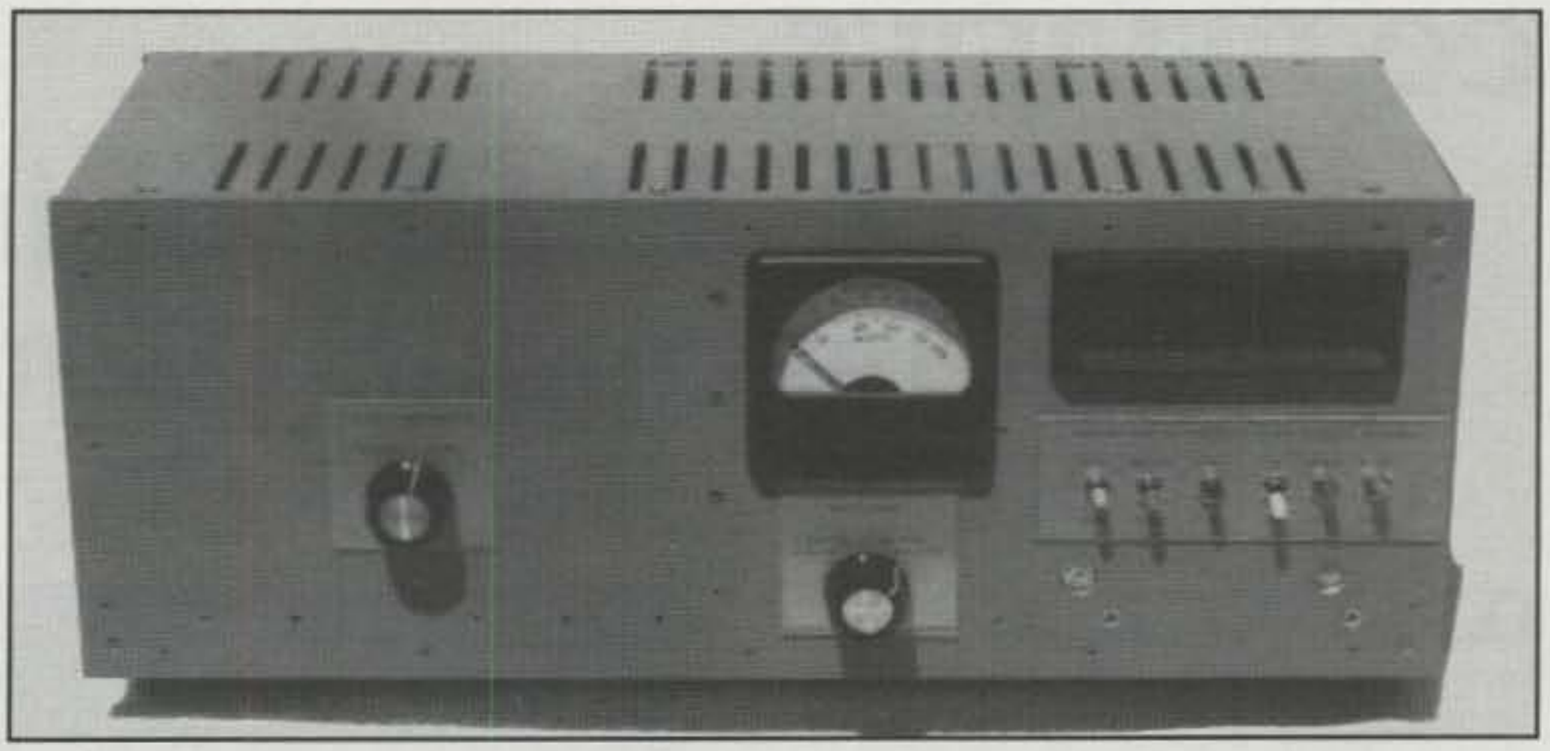
After reading the clock instruction sheet, it was obvious that several switches were needed to fully utilize all the clock features—one to enable the timer (reminding me when to sign my call during a prolonged QSO), one for fast and slow time setting, one to allow display of alarm time or seconds, another to allow precise setting to WWV, one to activate the alarm, another to reset the alarm, and one for selecting either 12 or 24 hour display. So back to the storage room. There were several mini-switches I had purchased for a model train layout in a bygone year. I also found a relay, transistor, photocell, and parts to construct an automatic "dimmer" for nighttime LED readout.

With the innards decided upon and all bits and pieces finally at hand, it was time to look seriously at building the enclosure. If you are like me, metal working tools (at best) consist of an electric drill and bits, a countersink drill, a couple of files, a hole saw or two, a circle cutter, a couple of taps, and a hacksaw. Aside from tools limitation, the trick was to work around all the existing screw and parts mounting holes on the old panels (who ever designed the original panel layout must have been paid by the number of holes). By fitting things in and around existing holes and using a tube of aluminum paste from a past project, unused holes were filled and panel cosmetics taken care of.

Despite limited skill and patience, the job was completed, thanks also to a spray can of gray primer left over from a repair job on the house cooling unit. By the way, did I mention that all the nuts, bolts, and screws to put the enclosure together were from cannibalized equipment? Saving such stuff turned out to be handy—to say nothing of saving a buck or two.

The accompanying photo shows the enclosure and parts that had to fit into it. The enclosure would have been functional without a top, bottom, or end pieces, but there were some old perforated aluminum covers and a couple of solid pieces that could be used if they were cut to size. Not having a metal shear, I opted for the next best thing—sending my wife to a sheet-metal shop and asking them to cut the material. Remember, this recycle project was to be without added expense. With kind consideration for my wife, the shop did the job at no cost.

Another challenging part of the project was labeling the switches. Sheets of decals (for do-it-yourself projects) never



The completed project—not bad looking and totally functional. I was right all along: all of this stuff did come in handy.

seem to have the right words, and the hassle of trying to transfer made-up words onto a panel is a pain, especially if the decals have dried out after lying around for a few years. Therefore, labels were made using a computer, word-processing program, a printer, and covering the labeling on the equipment panel with a thin sheet of acrylic.

Another photo shows the completed project. My conscience is clear, having somewhat reduced the number of amateur parts in the storage room, and in the process creating a piece of usable equipment—not just parts sitting on a storage room shelf. I can now sit back and enjoy my recycle project while waiting for the next swapmeet, where I can buy more "goodies." Oops—did I say that?

Of course, if the past is any indication of the future, there will probably be the need to clear "good stuff" out of the storage room again next year. But looking on the bright side of it, maybe it will ensure "recycling" of other parts and pieces to provide more support equipment for on-the-air hamming. Who knows what else can be made out of stored away and perhaps forgotten "goodies"? Give it a try; you too can become a "recycler." ■

CQ REVIEWS:

S & S Engineering's FC-X Frequency Counter Kit

BY PAUL CARR*, N4PC

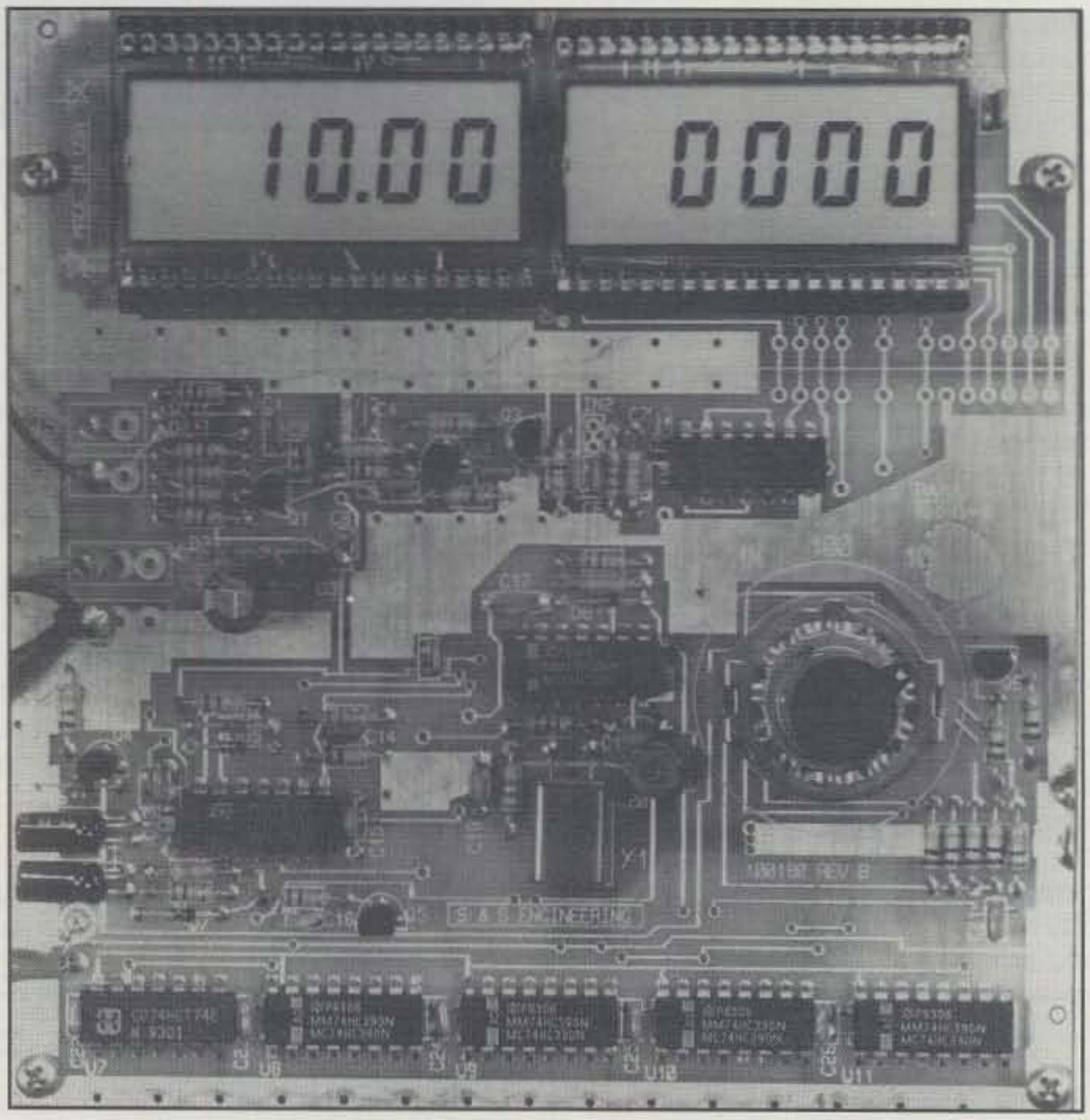
One piece of test equipment that has become a mainstay on our work bench is the frequency counter. Any time we need to align a VFO or other oscillators, we reach for a frequency counter.

I am happy to report that there is a frequency counter available in kit form that is readily affordable and is well within the abilities of the "first time builder." Also, it will perform as well as units costing many times more.

This is the second kit from S & S Engineering that I have had the pleasure to build. The circuit board was of very high quality. In fact, I am sure the board could pass military specifications. The board is double-sided, fully silk-screened and has plated-through connectors. The remainder of the components also leave nothing to be desired.

Construction of the unit is very straightforward. Begin by installing the resistors on the board. To ensure accuracy, I verified the value of each resistor with an ohm meter prior to placement. Install about five or six resistors at a time. Turn the board over and ensure all components are flush with the board and solder the leads. Trim the leads flush with the board and check for any solder bridges that may have occurred and correct any mistakes. In like manner, install the diodes. Be sure to observe the markings for the anode and cathode when installing the diodes. Proceed with the installation of the remaining components following the instructions in the instruction document. The last items to be installed are the liquid-crystal displays. There are two options available—either a four-digit display or an eight-digit display. I chose the eight-digit version. There is no accuracy lost with the four-digit display. It just means that you may have to turn the range switch to get all the information when checking high-frequency signals. The counter is usable on frequencies from 500 kHz to 75 MHz.

The counter is now ready for calibration. If another counter is available, check the crystal oscillator output and adjust the oscillator trimmer until it reads 10.000000 MHz. If a separate counter is not available, you can use a signal from WWV for alignment. Tune WWV on 10.00 MHz. The counter should be off at this time. Adjust the BFO on the receiver for a zero beat with WWV. Apply power to the counter. You should be able to hear the signal from the 10 MHz oscillator in the counter. Adjust the calibration capacitor for a zero beat from the receiver. The calibration process is now complete.



The circuit board of the S & S Engineering FC-X frequency counter.

There is no cabinet supplied with the kit, so you can custom mount in the cabinet of your choice. I must confess that I have been using it as a digital dial for my little "Forty Meter Fun Machine" (*CQ*, July 1993 through December 1993). It is a natural for that application. If the IF strip in a rig is not on an even frequency (4 MHz in the QRP rig just described), there are instructions provided so you can design your own mixing scheme for a direct-reading digital dial. Believe me. It's easy.

There is one thing I must mention about S & S Engineering's guarantee. If you build a kit and it doesn't work, they will fix it. If the fault has anything to do with the kit, they will fix it free. If it is your fault, they will fix it for $25 or less. They make every effort to make the necessary repairs and have the unit on the way back to you within 24 hours. That's hard to beat!

The counter works great. I own a more expensive eight-digit counter, and this unit will do anything the more expensive unit will do. The accuracy of the two units is comparable.

The FC-X counter is available from S & S Engineering, 14102 Brown Rd., Smithburg, MD 21783 (301-416-0661; FAX 301-416-0963). The price is $49.95 for the four-unit display. A four-digit add-on kit is $16.95. ■

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As the song says, "Everything old is new again." Most of us, as WDØP explains, just need the motivation and curiosity, and most of all a problem that needs solving.

A Dual Polarization HF Antenna System That Reduces QSB

BY PHIL MORGAN*, WDØP

Just as the itinerant traveler gets itchy feet when he remains in one place too long, the amateur with antenna experimenting in his/her blood can only stick with one particular antenna for just so long before it must come down and a new, hopefully better, design is put up in its place.

Being terminally afflicted with the foregoing disease, and blessed with an understanding and forgiving spouse, our yard full of trees, prior to our full-time RVing years, was always strung with hundreds of feet of wire and rope. Each new antenna was carefully raised with hopes of a few more dB of signal.

In 1985, while working with directional arrays using vertical, half-wave dipoles, my attention was drawn to two magazine articles on the full-wave horizontal loop. The first, from an issue of *73* of unknown date, coined the name "German Quad" for the full-wave horizontal loop.[1] The author, a German amateur, WD4CPK/DF3TJ, wrote about the versions he and some friends had built and experimented with. The upshot was that the supposedly "high radiation angle" horizontal loop turned out to be an excellent DX antenna on wavelengths shorter than its design frequency.

Then in November of 1985 a *QST* article by Dave Fischer, WØMHS, triggered widespread interest in the horizontal loop, which continues still.[2] Fischer dubbed it "The Loop Skywire" and gave glowing reports of its performance on all HF bands, which essentially agreed with the conclusions drawn by WD4CPK/DF3TJ.

I decided to construct an 80 meter horizontal loop on my property using conveniently located trees as supports. The average height was about 30 feet, and I fed it at one corner with RG8 coax. The positive reports were confirmed by my experiences on all bands. It was one of

*101 Rainbow Drive #3198, Livingston, TX 77351-9300

Fig. 1– The subject of this article—a multi-band W9INN "Space Saver" dipole used in conjunction with an 80 meter horizontal full-wave length loop. →

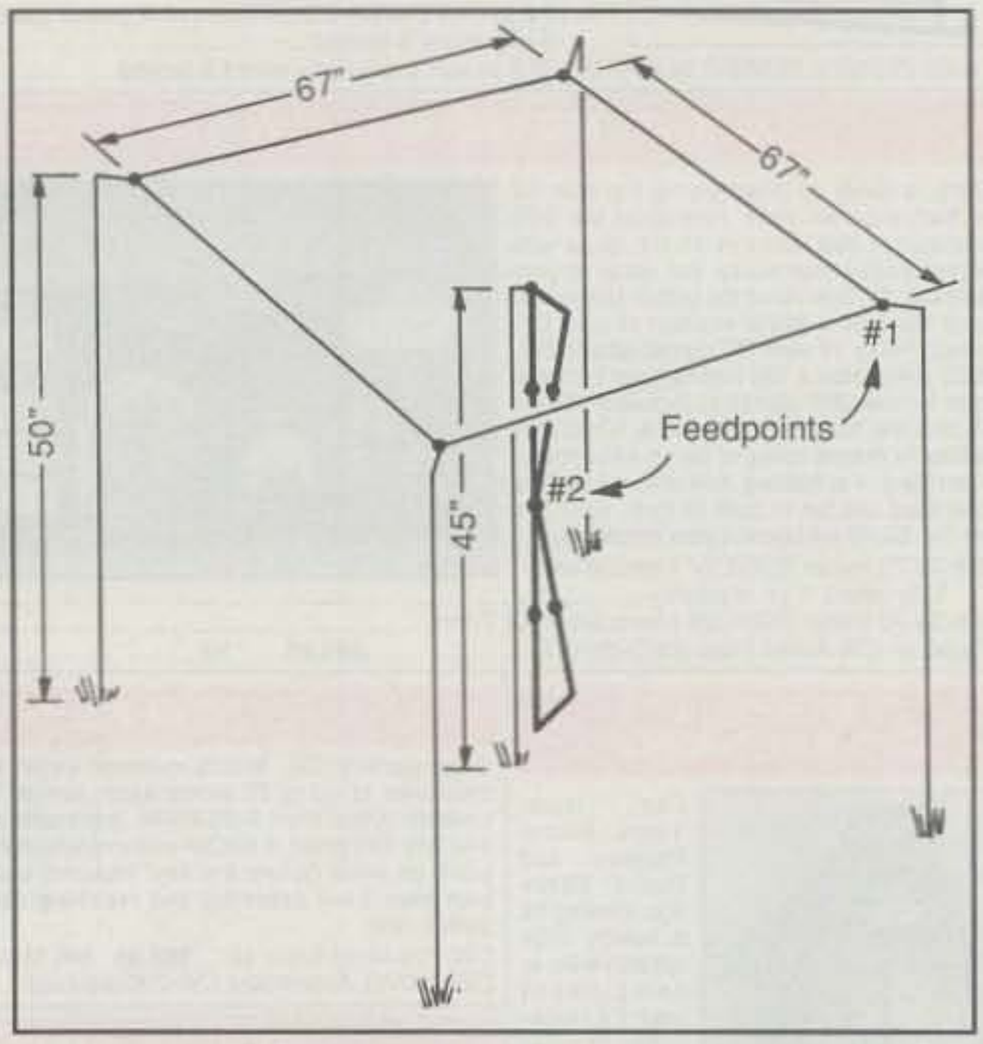
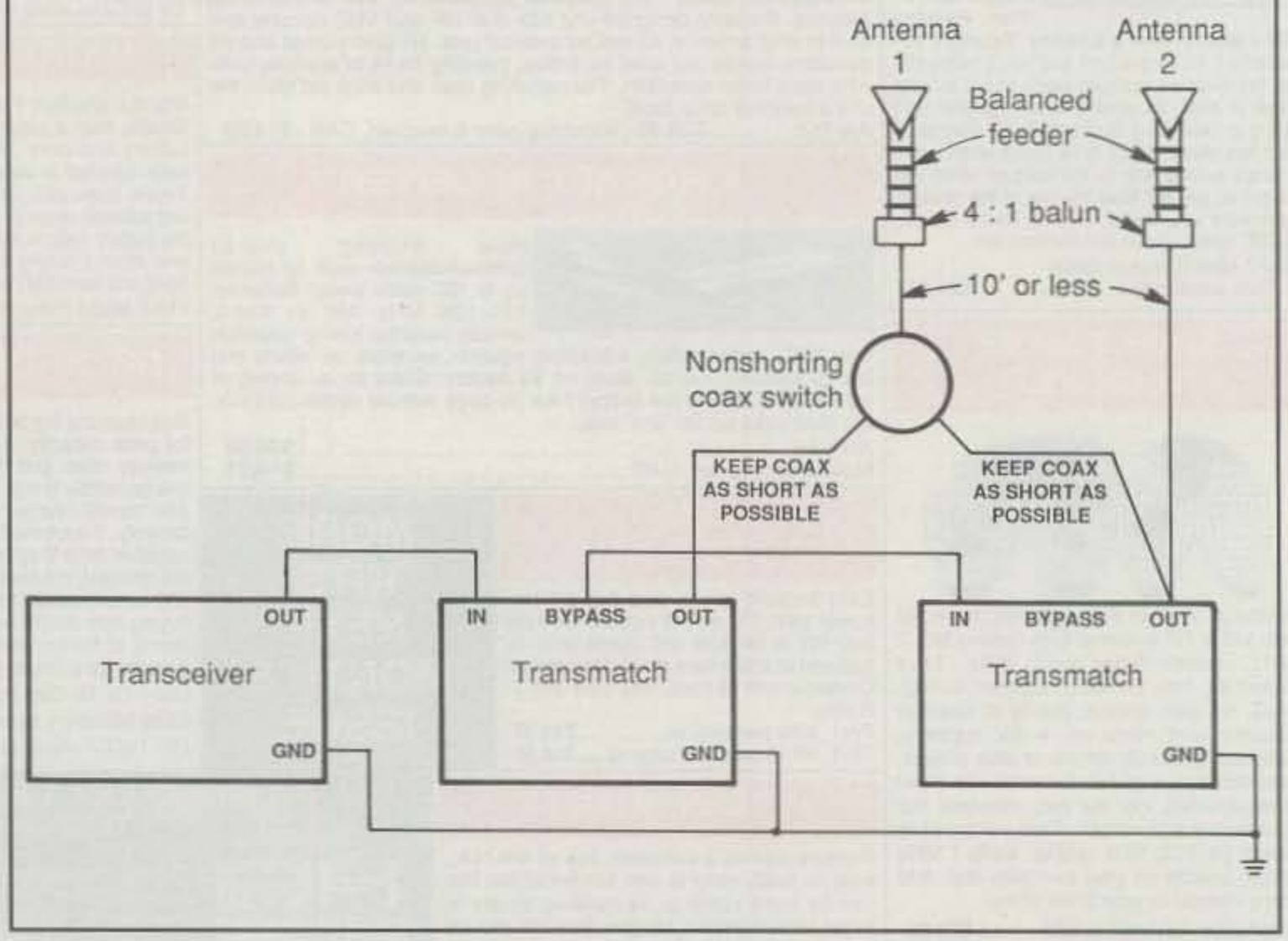


Fig. 2– By throwing two switches, this arrangement allows feeding either antenna singly through its own transmatch or feeding both antennas simultaneously through one transmatch. The baluns can be mounted outside the shack if connecting coax to the transmatch is kept no more than 10 feet long. ↓



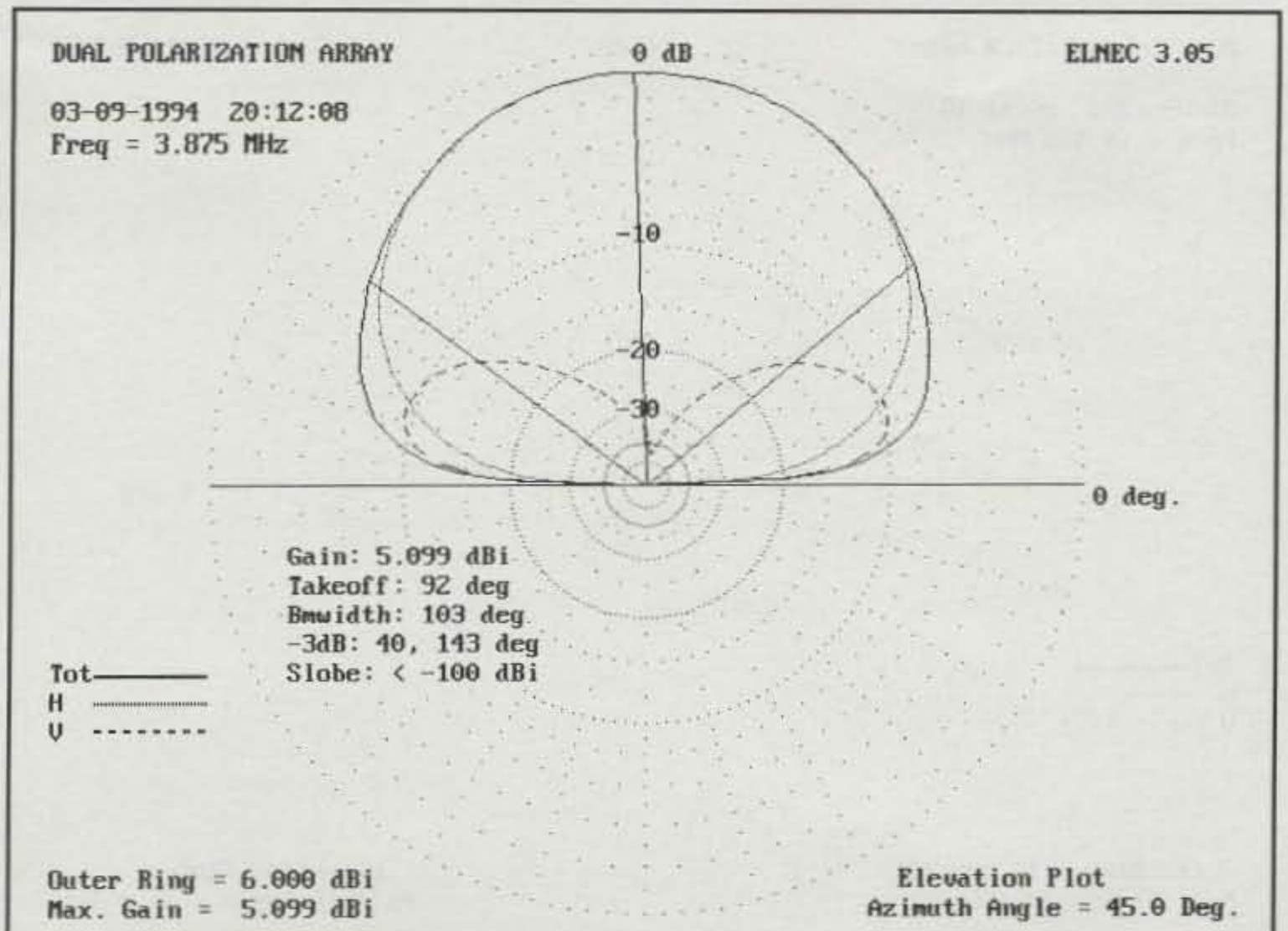


Fig. 3– ELNEC plot of 75 meter radiation angle of fig. 1, dual-polarization array over real ground. Dashed line is vertical radiation. Dotted line is horizontal radiation. Solid line is combined total radiation.

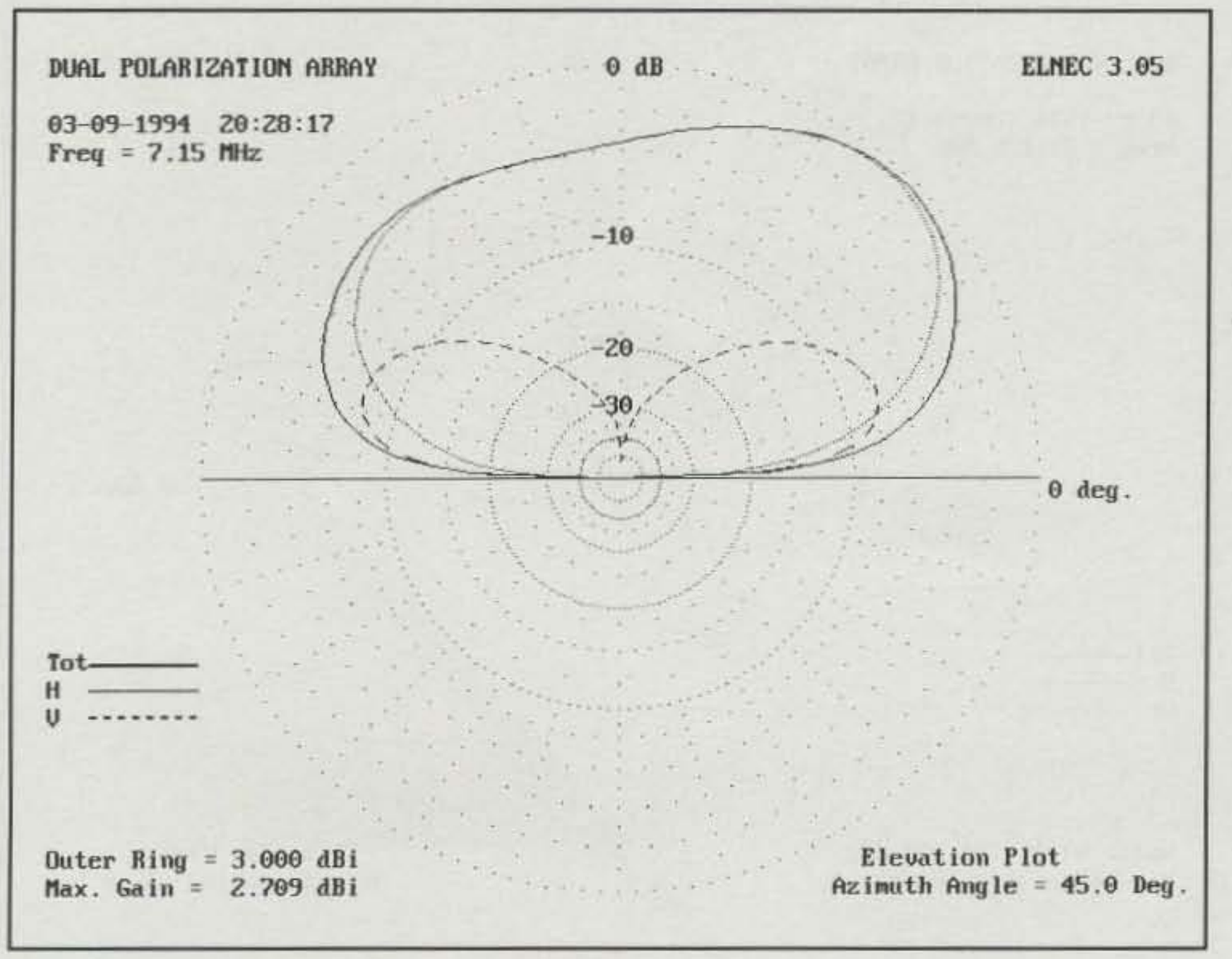


Fig. 4– ELNEC plot of 40 meter radiation angle of fig. 1, dual-polarization array over real ground. Dashed line is vertical radiation. Dotted line is horizontal radiation. Solid line is combined total radiation.

the best general-purpose, all-band antennas I had ever used.

At that same time I had one of my 42 foot long, W9INN, 5-band dipoles suspended vertically from a wood support mast, which just by chance was situated in the center of the horizontal loop (fig. 1). This vertical was fed with 450 ohm ladder line. Both antennas were tuned with a 2 KW transmatch in my shack.

I don't suppose there is an amateur anywhere who at one time or another hasn't tried switching between a vertical and a horizontal antenna for comparison purposes and discovered that in many cases when the signal is weak on the vertical, it will be strong on the horizontal antenna, but when it fades on the horizontal unit a switch to the vertical will reveal that the signal has climbed back up. We believe this effect results from continuous and random shifting of the signal's polarity as it is refracted by the "F" layer. Not all fading is caused by this phenomenon, but some of it definitely is. The above-mentioned antenna comparison is a quick and easy way to observe this effect. This test is not applicable in the case of short-distance, ground-wave communication where polarity would remain constant.

I began to think about the possibility of feeding both vertical and horizontal antennas simultaneously. I hoped for a reduction in QSB, but I wasn't sure just what would happen. Admittedly, my experiment was very unscientific—too many uncontrolled variables such as different types and lengths of feed lines, no control over percentage of power going to each antenna, etc. However, plunging ahead, I rigged a switching arrangement, with two identical transmatches (fig. 2), so that I could feed either antenna by itself and/or simultaneously.There seemed to be virtually no interaction between the two antennas. They both tuned almost exactly the same as they did when not in the presence of the other, as might be expected of two antennas with 90 degree polarity difference. Furthermore, the horizontal full-wave loop seems to be relatively insensitive to other antennas or objects which are located inside the loop. When simultaneously fed, only a slight adjustment of the transmatch was needed, which proved to be very convenient.

The results were astounding. There was significantly less fading on received signals when the antennas were paralleled than when either the vertical or the horizontal loop was operated singly. The effect was most pronounced on 20 meters through 10 meters, but was still noticeable on 40 and 75 meters.

I remember one rather dramatic 20 meter QSO I had simultaneously with two other amateurs, one in Virginia and the other in Oregon (I was living in Missouri at the time). Both stations gave me identical reports; QSB was quite pronounced when the vertical was used by itself and still present, to a lesser degree, on the horizontal loop. It disappeared completely, however, when the antennas were fed simultaneously. The report was "a steady S-9 signal with no QSB." Among my nighttime 40 meter friends I was getting the reputation of being a "big gun." In 1987 I upgraded to Extra class and moved into the DX window on 80 meters, where I

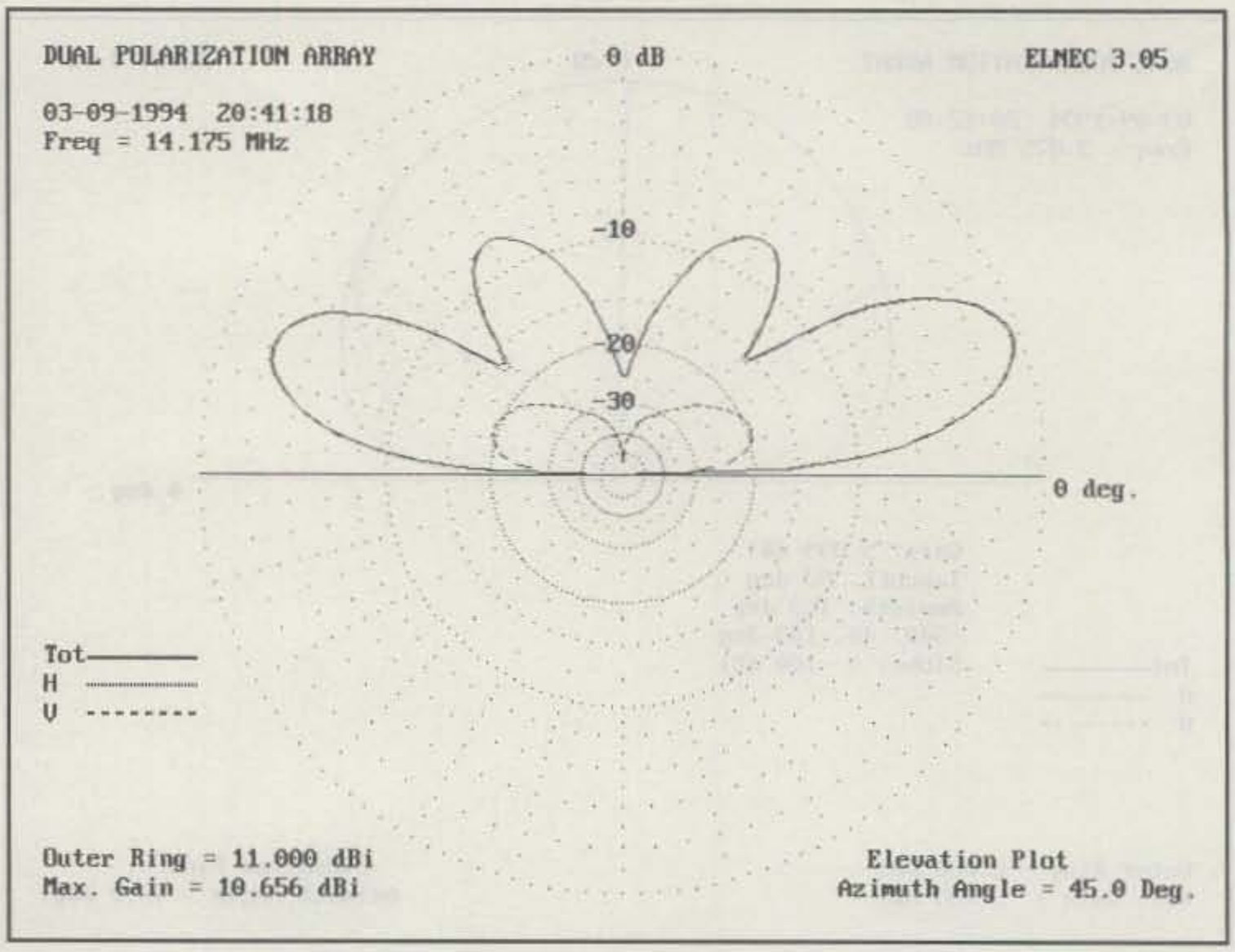


Fig. 5– ELNEC plot of 20 meter radiation angle of fig. 1, dual-polarization array over real ground. Dashed line is vertical radiation. Dotted line is horizontal radiation. Solid line is combined total radiation.

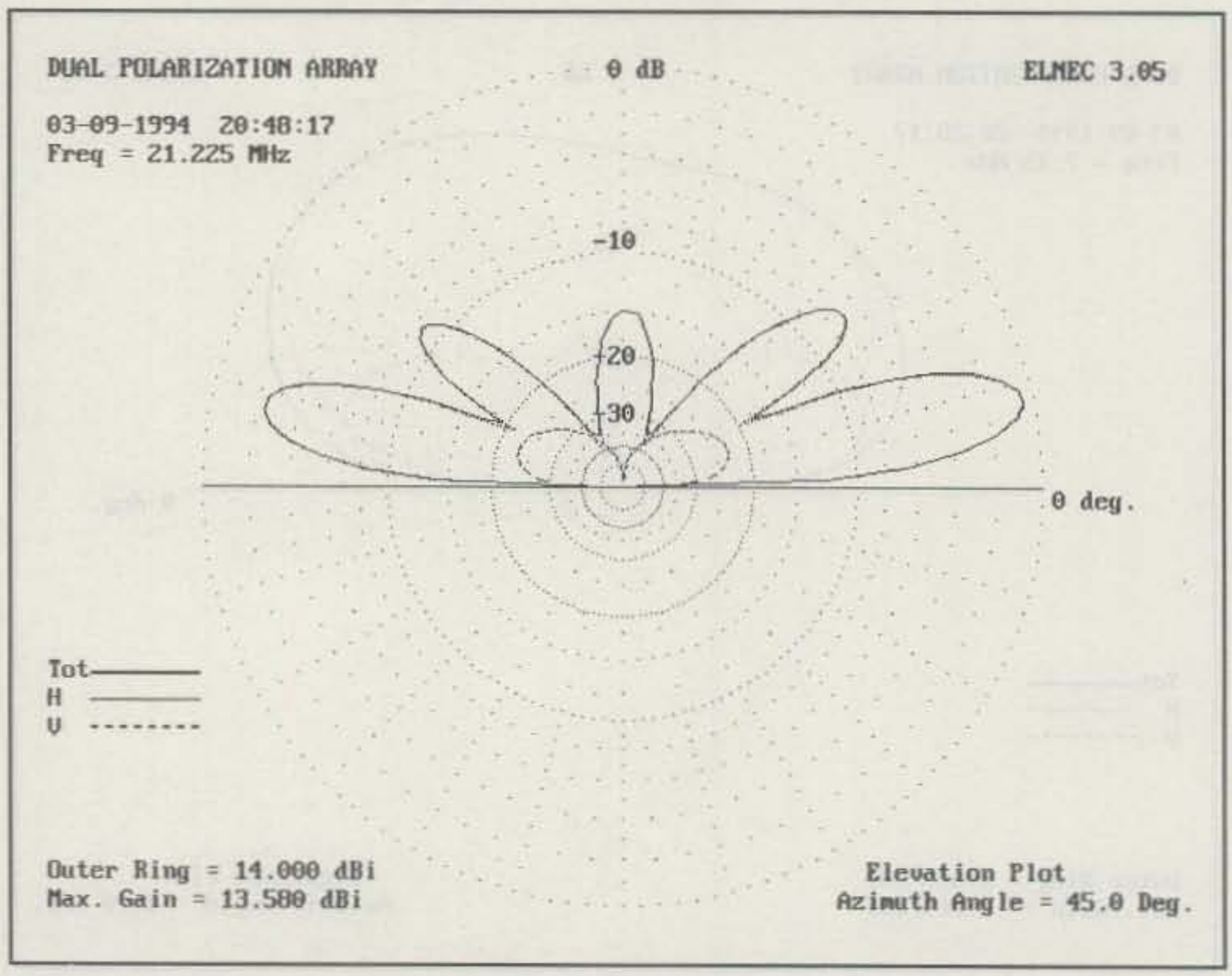


Fig. 6– ELNEC plot of 15 meter radiation angle of fig. 1, dual-polarization array over real ground. Dashed line is vertical radiation. Dotted line is horizontal radiation. Solid line is combined total radiation.

found I could use this system to successfully work the pile-ups right along with the big boys.

What was happening here? Obviously, this dual-polarization antenna system had no gain. However, I got repeated reports of "strongest signal I've heard on the band tonight," "steady signal with no fading," etc.

About this same time in 1987, while attending a local hamfest, I purchased a stack of old *QST* and *Ham Radio* maga-

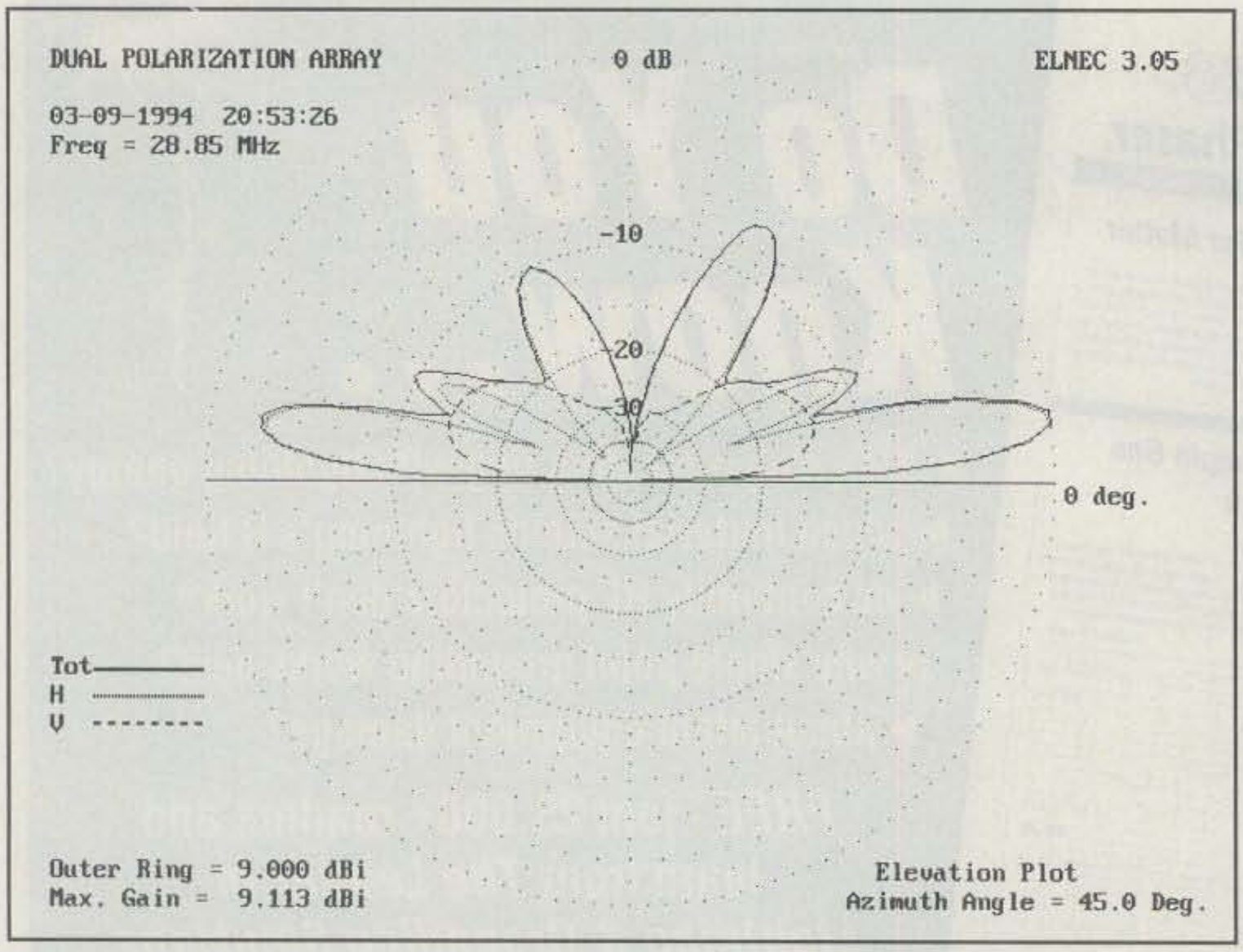


Fig. 7– ELNEC plot of 10 meter radiation angle of fig. 1, dual-polarization array over real ground. Dashed line is vertical radiation. Dotted line is horizontal radiation. Solid line is combined total radiation.

zines dating back well into the early to mid-1970s. In the March 1972 issue of *QST*[3] I discovered an article by Walter J. Stiles, W7NYO, on virtually the same subject matter we've been covering here. However, Stiles used a more carefully controlled test setup than I did. He mounted two Yagi/Uda beams on his tower, one horizontal and the other vertical. He fed them with separate amplifiers in order to control and equalize the power going to each antenna. The most remarkable part of the article was the summation of the results in which his observations on signal strength, readability, and reduction in QSB were exactly the same as mine, the difference being that his installation was much more expensive and difficult to erect than my wire antennas.

Subsequently, other related interesting and informative articles appeared. John H. Mullaney, W3NGJ, wrote about use of variable power splitting to achieve polarization diversity[4] in February 1986 *Ham Radio*, and B. Sykes, G2HCG, related his experiences with enhancement of signals through control of polarization in his article[5] in the November 1990 issue of *Communications Quarterly*. These articles all examine the same phenomenon, but each with a different approach, and they are worth reading if you should decide to experiment.

The W9INN "Space Saver" dipole is ideal for this antenna system. It is only 42 feet long and works very well on all HF bands if fed with ladder line and a good transmatch. Used as a vertical dipole, the feed point is at least 21 feet above the ground. Therefore, a radial system is not necessary to isolate the vertical from lossy earth. I supported this vertical with an ordinary wood mast as described in my 1986 copy of *The ARRL Handbook for the Radio Amateur*.[6] However, any vertical, such as the plain vanilla quarter wave vertical, should work if you use an adequate radial system.

If you are interested in reducing fading of your transmitted and received HF signals, you might want to give the arrangement shown in fig. 1 a try. Construction is simple and straightforward. There is certainly nothing difficult about putting up a horizontal loop, and W9INN's ads can be found in virtually every amateur radio publication, including this issue of *CQ*. It certainly worked for me in a big way.

In conclusion I would like to thank my good friend Harvey Tetmyer, K5LJM, for his advice and assistance, particularly in the preparation of antenna radiation plots using ELNEC version 3.05.

It is my hope that this article will inspire further experimentation by interested readers and that at least some of them will report their results in the pages of *CQ*. Good luck and good DX.

Footnotes

1. Janker, Christoph, WD4CPK/DF3TJ, "The German Quad," *73 Magazine*, date unknown.

2. Fischer, Dave, WØMHS, "The Loop Skywire," *QST*, November 1985.

3. Stiles, Walter J., W7NYO, "Dual-Polarization DX Antennas" *QST*, March 1972.

4. Mullaney, John H., W3NGJ, "Achieve Polarization Diversity Through Variable Power Splitting," *Ham Radio*, February 1986.

5. Sykes, B., G2HCG, "The Enhancement of HF Signals by Polarization Control," *Communications Quarterly*, November 1990. (Reprinted from *Practical Wireless*, November 1989.)

6. "Simple Wooden Mast," *The 1986 ARRL Handbook for the Radio Amateur*, 63rd ed., chapter 37, p. 20. ■

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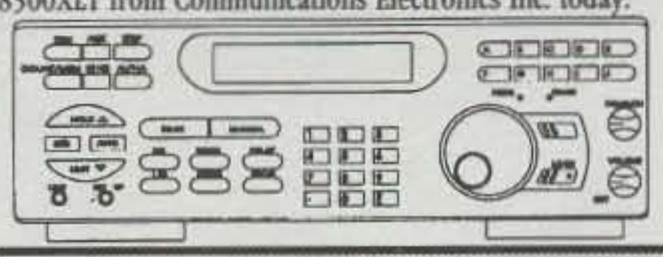

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Gettysburg, PA 17325

BY GEORGE OSTER*, NP2N

The Federal Communications Commission is many things to many amateurs: rule-making authority, enforcer, licenser, political body, policy maker. We amateurs have various contacts with the FCC and hold various views about the FCC. Some have lots of contacts, some have only a few. There are those of us who hold positive attitudes, and others who hold different views.

There is one division of the Federal Communications Commission with which every single amateur has contact, and which directly affects every one of us, offering surprisingly good—and getting better—personalized service! That division is the Licensing Division, Private Radio Bureau. The folks who provide the service are real people, and their address is 1270 Fairfield Road, Gettysburg, PA 17325.

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Gettysburg

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The Licensing Division sits in an idyllic pasture on the western edge of town, with Marsh Creek and meadows across the street. Located in a rented former shoe factory, the division came to Gettysburg 30 years ago. Most of us have sent all of our applications to, and received all of our licenses from, the people in Gettysburg. Walter Boswell, Acting Chief of the Special Service Branch, says that the FCC brought the Licensing Division to Gettysburg to combine a highly motivated, skilled work force with affordable building space.

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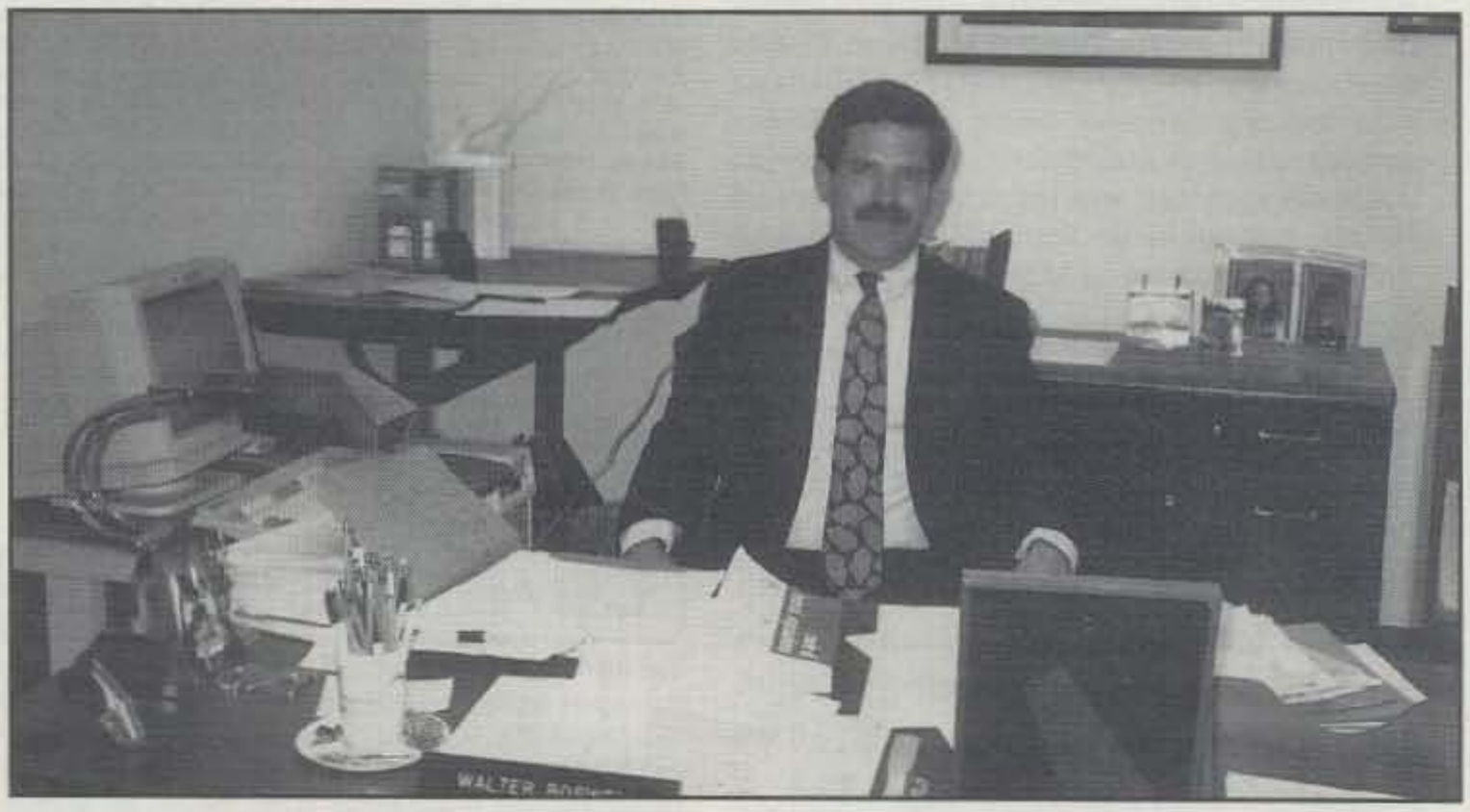

Walter Boswell, Acting Chief, Special Services, at his desk. Walter emphasized his sensitivity to the amateur's desire for self-selected callsigns. This is the person actually responsible for the processing of 100,000 amateur radio license applications each year!

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production facility," with policy, rule-making, and most enforcement managed and centered in Washington.

The "Production Facility"

The Licensing Division is responsible for all processing and licensing of those radio stations regulated by the Private Radio Bureau. These include amateur, aviation (aeronautical and land based), marine (both sea going and land based), private land mobile, private microwave, and common carrier microwave. Recently the facility has also been given the task of licensing broadcast auxiliary stations (the remotes used by TV to broadcast on-the-scene reports) and commercial operators, and jointly administering (with the Federal Aviation Administration) tower clearance, lighting, and painting compliance.

In numbers, the licensing duty adds up to about 600,000 licenses processed and issued each year! Of this number 100,000 are amateur licenses. This feat is accomplished with a staff of 140 people—a staff which wasn't increased when the FCC shipped out the added responsibilities of broadcast auxiliary, commercial operators, and antenna towers!

The effort at Gettysburg is coordinated by Gary Stanford, W4FDP, Division Chief. He has divided this tremendous workload among three processing branches and four support branches.

The processing branches include the Special Services Branch, which handles, among others things, our amateur licensing; the Microwave Branch; and the Land Mobile Branch. In addition, the support branches include the Consumer Affairs Branch; Fees and Mail Branch, receiving all applications and fees; Data Service Branch, managing procedures for handling electronic data; and Support Services Branch, including building supplies and key entry of applications.

Your Amateur License Start To Finish

The day I visited the FCC Licensing Division in Gettysburg history was in the making. As Walter Boswell escorted my tour, he described a new processing system for amateur licensing which was being phased in as I watched.

Currently, when license applications arrive, they are received by the Fees and Mail Branch. All licenses other than amateur are immediately keyed into a computer file. Amateur licenses—because of the details which must be checked on the old 610 forms, with the numerous options (test elements passed, upgrade requests, callsign changes, and address changes)—are reviewed carefully to ensure accuracy and to determine which options are appropriate for the individual application. Only after these manual checks are the applications forwarded to the Support Services Branch, where they are keyed in, and an actual license produced for mailing to you.

A vastly different system is now possible with the latest revised form 610. The new form provides self-checks and information in a format which can be keyed in upon arrival (as with all other types of licenses). Most checks for accuracy and appropriateness of requests (such as callsign changes to match license class and test results matching license class requests) will be performed automatically by computer when keyed in. This will allow the majority of licenses to be issued automatically and without the time-consuming, labor-intensive hand-checking currently used.

Division Chief Stanford stated that the "goal is now day in to day out of 35 days" with a high standard of quality and accuracy. With the new system he expects to see a significantly better turnaround while maintaining the same quality standards.

Tomorrow in Gettysburg

In a long discussion with Acting Chief Boswell of the Special Services Branch it was clear that the future is very much on the FCC's mind. Of course, on most amateurs' minds are the future of vanity calls, temporary operating authority, and electronic filing.

Serving all their clients well and meeting the needs of amateurs is a priority for the people in Gettysburg. They know that

Larry Weikert, the resident "expert" on amateur licensing. That's a copy of the W5YI Report *on Larry's desk.*

MFJ TUNERS

MFJ's world famous 3 KW Antenna Tuner

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

The MFJ-989C is not for everyone.

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

Here's why . . .

Massive Transmitting Capacitors

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

Precision Roller Inductor

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

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

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

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

MFJ-989C **$349.95**

Cross-Needle Meter

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

Super Heavy Duty Balun

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

Ceramic Antenna Switch

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

Plus much, much more

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

Don't settle for less, get yours today!

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

MFJ's *deluxe* 300 Watt Tuner

MFJ-949E **$139.95**

More hams use the MFJ-949E than any other antenna tuner in the world! **Why?** Because you get proven reliability, the ability to match just about anything and a one year *unconditional* guarantee.

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

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

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

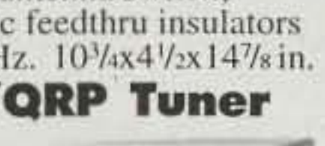
Each MFJ-949E cabinet is chemically treated and has a new tough scratch-proof *vinyl* cladding -- not paint that can scratch or chip off. You won't find a tougher, longer lasting finish anywhere.

MFJ's *versatile* 1.5 KW Tuner

MFJ-962C **$229.95**

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

MFJ's *portable/QRP* Tuner



MFJ-971 **$89.95**

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

MFJ's *super value* Tuner

MFJ-941E **$109.95**

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

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

2 Knob *Differential-T*™ Tuner

MFJ-986 **$289.95**

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

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

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

MFJ's *mobile* Tuner

MFJ-945D **$89.95**

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

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

MFJ's *smallest* Versa Tuner

MFJ-901B **$59.95**

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

MFJ's *random* wire Tuner

MFJ-16010 **$39.95**

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

MFJ's *VHF or UHF* Tuners

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

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

MFJ's *artificial* RF Ground

MFJ-931 **$79.95**

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

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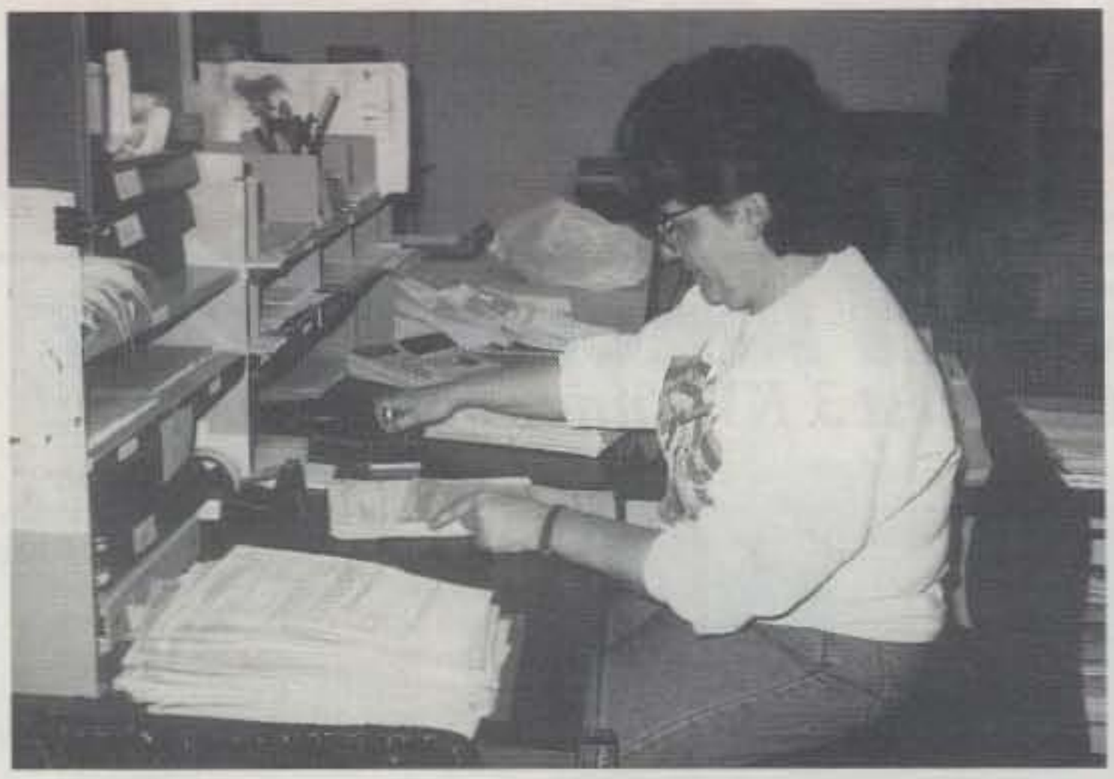
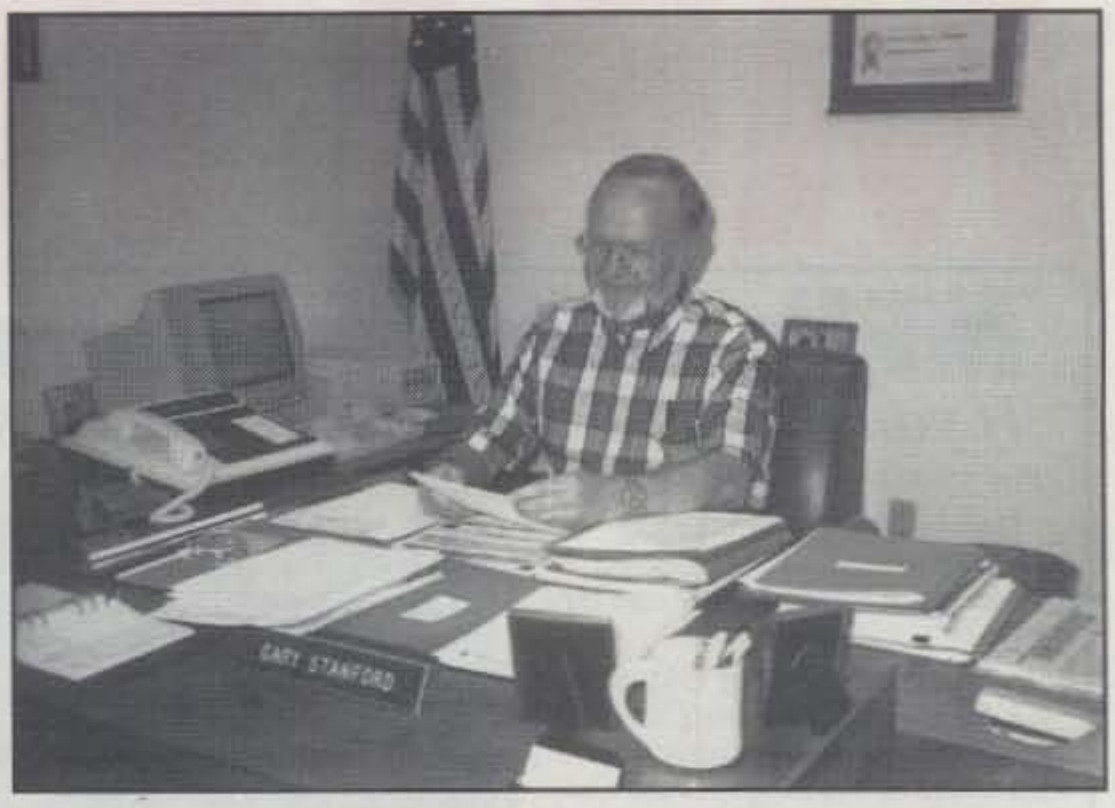


Venessa Kuhn in the Fees and Mail Branch, the first step in the current licensing process. Here Venessa opens, date stamps, and sorts incoming applications.



Gary Stanford, W4FDP, Division Chief of the Licensing Division, sees a quicker turn around for amateur licenses with the new 610 form and processing system in Gettysburg.

a good part of the immediate future lies in the above three important issues. The Licensing Division staff is sensitive to our desire for special calls and our desire for speedy licensing service.

Boswell was emphasized that his first concern is "that the vanity call system be not only perceived as fair, but in fact, be fair to all"! He went on to explain that as originally conceived, the system would be strictly first come, first served. The goal was to provide a simple system with limited labor intensity.

Boswell believes requests for various gates (as used in the 1976–1977 callsign request scheme) will slow down the process. The FCC does not have a totally complete set of records. Some sort of verification may be necessary if a phased-in system with gates is utilized, and this will in effect slow the process.

Boswell emphasized again, however, that he "is sympathetic to the amateur's desire for vanity callsigns," and his staff is ready, willing, and able to process callsign requests based on whatever system is chosen at the policy-making level.

At the same time vanity callsigns are becoming a reality, the discussion of electronic filing has begun. I asked Boswell if the two issues would be linked. He pointed out there could be problems in electronically filing with a fee attached (as most likely with vanity calls). The fee would have to eventually catch up with the electronically filed application. Further complicating electronic filing for vanity calls is the fairness issue. There would need to be a "balance with paper filing" if both systems were used, said Boswell. He conceded that the most likely scenario will be a paper-only application and process established for vanity callsigns. Only after the initial rush and after a working system is well established would electronic filing be available for vanity calls.

The FCC is working with Volunteer Examination Coordinators to develop electronic application filing through the VEC system. It is expected that by the end of the year new applications and upgrades from VECs will be electronically filed, greatly speeding processing time.

Boswell also views another initiative of the FCC as a way to speed licensing—temporary operating authority. He pointed out that this is currently used in other

Kathy Garland manages the Customer Service Branch, which answers 30,000 inquiries from amateur radio operators each year. That smile on her face is typical of the friendly, personal service you receive from Gettysburg.

History in the making: Ann Bean, Barry Bixler, and Beverly Bishop (left to right) examine some of the last 610 applications to be processed in the old system. The new 610s will allow immediate key entry by the Fees and Mail Branch.

MFJ *super* DSP *filter*

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

MFJ-784

$219.95

MFJ's *super* DSP filter automatically eliminates heterodynes, reduces noise and interference *simultaneously* on SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite -- nearly any mode you'll ever encounter.

You get MFJ's *tunable* FIR linear phase filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 60 dB attenuation just 75 Hz away.

Only MFJ gives you *tunable* DSP filters. You can tune each lowpass, highpass, notch and bandpass filters and *vary* bandwidth to pinpoint and eliminate interference. The last tunable filter setting is saved -- it's ready to use when you switch back to it again.

Only MFJ gives you 6 *factory pre-set* filters and 10 *programmable pre-set* filters that you can customize. Instantly remove QRM with a turn of a switch!

You get MFJ's *automatic notch filter* that searches for and eliminates *multiple* heterodynes.

You also get MFJ's advanced *adaptive noise reduction*. It silences background noise and QRN so much SSB signals sound like a local FM repeater.

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

Automatic notch filter

MFJ's *automatic* notch filter searches for and eliminates *multiple* heterodynes in *all* filter modes -- it's so fast interfering CW and RTTY signals are also eliminated.

If you leave the *automatic* notch filter on during a phone contest, you'll never be worn down by the heterodynes of tuner-uppers.

Voice signals aren't degraded. The *narrow* automatic notch is silently working in the background destroying unwanted tones when they appear.

With up to 50 dB attenuation, you'll copy stations that would otherwise be masked by heterodynes. You'll miss fewer calls and be less exhausted when the contest is over.

When you need to *selectively* remove tones -- like when you're enjoying a CW ragchew and a couple of annoying CW stations appear nearby -- you can use the *two* MFJ *tunable* notch filters to completely knock them out.

Adaptive noise reduction

Pressing the "ON" button silences background noise. Some SSB signals sound like a local repeater! It makes noisy FM and AM signals readable and works with CW, Data and other signals.

It works in all filter modes and on all types of random noise including -- white noise, impulse noise, static, ignition noise, power line noise, hiss and atmospheric noise.

The LMS algorithm gives you up to 20 dB of noise reduction depending on the type of noise. You can adjust the amount of noise reduction to prevent distorting some signals.

Reducing random noise reduces fatigue and makes QSOs more fun -- especially, when the band is full of tiring noise.

Tunable highpass/lowpass filters

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

You can *tune* the lower cutoff frequency 200 to 2200 HZ and the upper cutoff frequency 1600 to 3400 Hz.

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

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

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

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

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

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

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in one of MFJ's three *tunable* FIR bandpass filters.

You can *tune* the center frequency from 300 to 3400 Hz. And *vary* the bandwidth from 50 Hz to 680 Hz -- from super tight CW filters to wide razor-sharp Data filters.

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

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

Even with the narrowest 50 Hz bandwidth, you'll never have a problem with ringing.

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

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

With a turn of a switch you can select from *sixteen* convenient *pre-set* filters. You can use them for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any other mode you can think of.

If you don't like our *pre-set* filters, you can define your own filter by programming band-pass center frequency and bandwidth, lowpass and highpass cutoffs. *An MFJ exclusive*!

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

Plus more . . .

A push-button quickly bypasses your filter so you can hear the *entire* unfiltered signal and see if anyone is calling you.

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

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

No Matter What™ guarantee

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

Call your dealer for your *best* price

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

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services licensed by the Private Radio Bureau. The FCC views this as a benefit to new amateurs, since operating would be allowed much more quickly. Also cited as a benefit to all amateurs would be a reduction in telephone requests for status checks, a practice which utilizes considerable resources.

Handling Your Questions

Beyond the process of actually receiving an application and issuing a license, there is one more branch at Gettysburg which amateurs may encounter personally—the Customer Service Branch. Kathryn Garland manages this important function. She and her staff of 6 answer the staggering 122,000 telephone questions and 21,000 letter inquiries made to the Licensing Division each year! (And you big contesters and DXers thought you got a lot of requests!)

Of those 143,000 inquiries, about 20% are from amateurs—nearly 30,000! Generally the calls are license application status reports. If you've never called for a status report, you would be amazed at how quickly and efficiently an inquiry is handled.

The telephone number in Gettysburg is 717-337-1212. You will be greeted in this way: "Thank you for calling the Federal Communications Commission in Gettysburg. . . . " From there you are guided through a number of electronic choices for service. Most interesting, you can discover the callsigns being issued in each block and for each call district at this telephone number. The information is updated around the first of each month, so with a little careful sleuthing and good timing, you can approximate a desired call even without a vanity callsign system.

If you need personalized assistance by phone, you can get this at the same telephone number. Talking with Garland's staff is a real pleasure. I had first-hand experience a while ago, when through no fault of the FCC, my license went astray. When I called for assistance, the customer-service representative tracked down the problem, assured me everything would be corrected, and specially mailed my license so I could continue to operate. If you need FCC forms, Ms. Garland cautioned that all requests should go to the FCC Forms Distributions Center in Washington, D.C. The telephone number there is 202-632-3676. The system in Washington is also an efficient, automated system, with personal backup.

I discovered personally that there are real people at 1270 Fairfield Road, Gettysburg, PA 17325. For 30 years in this small, pastoral town there have been concerned, sympathetic people who are providing service to the amateur community, service that is getting better every day!

10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground or radials

Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters -- with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance gives you high efficiency for more power radiated. The result? Stronger signals and more Q-5 QSOs.

Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

Full size performance is achieved by using separate full size radiators for 2 through 20 Meters and highly efficient end loading for 30, 40 and 75 /80 Meters.

You get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR and it handles 1500 watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

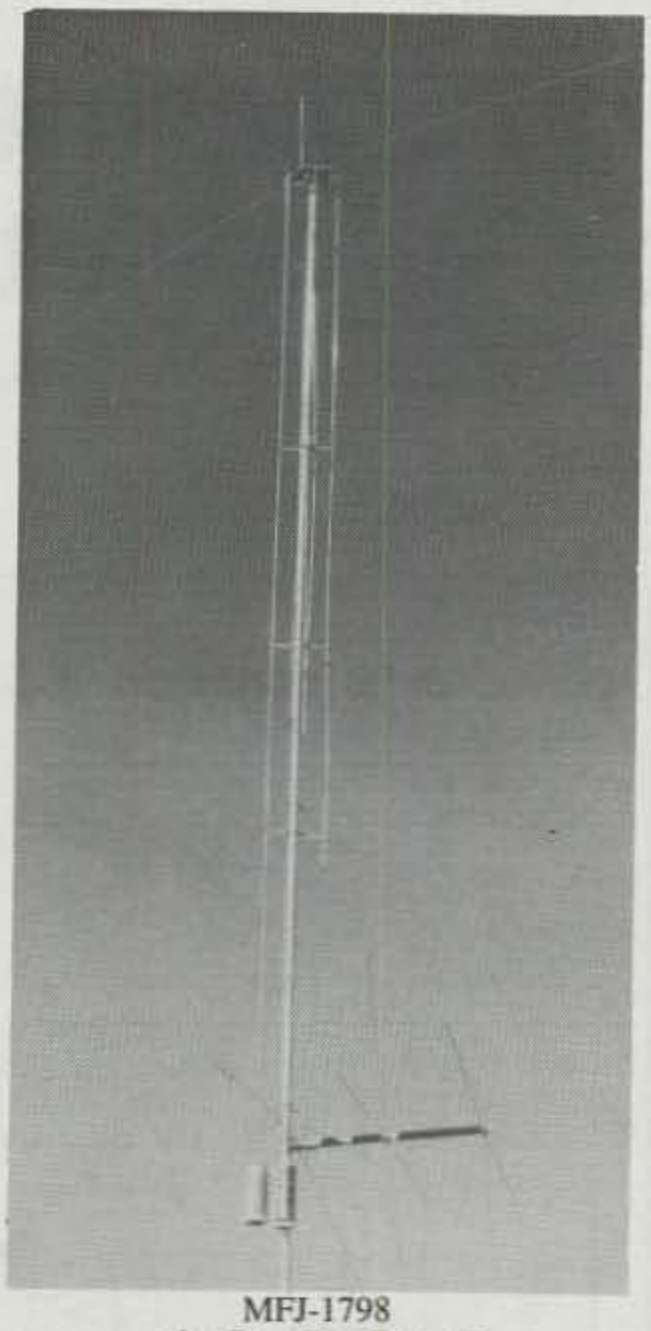
It's easy to tune because adjusting one band has minimum effect on the resonant frequency of other bands.

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- on small lots, backyards, apartments, condos, roof tops, tower mounts.

Separate *Full Size* Radiators

***Separate** full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators.



MFJ-1798

$269.95

This forms a very large equivalent radiator and gives you incredible bandwidths.

These radiator stubs provide automatic bandswitching -- there is absolutely *no loss* due to loading coils or traps.

End Loading

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands.

Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

No Ground or Radials Needed

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

You can mount it from ground level to roof top and get awesome performance.

No Feedline Radiation to Waste Power

The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with Teflon® coax and *can't* saturate, no matter how high your power.

Built to Last

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is used in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant Teflon® covered wire.

Teflon® is registered trademark of Dupont

MFJ *Super Hi-Q Loop*™

MFJ-1786 **$299.95**

MFJ's *tiny* 36 inch diameter *high efficiency* loop antenna lets you operate 10 to 30 MHz *continuously* -- including the WARC bands!

It's ideal where space is limited -- apartments, small lots, mobile homes, attics, motor homes.

Enjoy both DX and local contacts when you mount it vertically. You get *both* low angle radiation for excellent DX *and* high angle radiation for local close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ-1786 *Super* Remote Control has *Auto Band Selection*™. It auto-tunes to your desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune push buttons and built-in two range *Cross-Needle* SWR/Wattmeter lets you quickly tune to your exact frequency.

All *welded* construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter *round* radiator -- not a lossy thin flat-strip -- gives you highest possible efficiency.

Each plate in MFJ's *superb* tuning capacitor is welded for low loss and *polished* to prevent high voltage arcing. It's welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches and a continuous *no-step* DC motor for *smooth precision* tuning.

A heavy duty 1/8 inch thick ABS plastic housing with ultraviolet inhibitors protects it.

MFJ-1782, $269.95. Same as MFJ-1786 but remote control has only fast/slow tune buttons.

Super 80/40M Vertical

MFJ-1792 **$159.95**

Designed as a *high performance* antenna for 80 and 40 Meters, the MFJ-1792 features a *full size* quarter wave radiator for 40 Meters - - that's a full 33 feet of ruthless radiating power.

End loading -- the most efficient form of loading -- is used for 80 Meters. It's accomplished by a virtually lossless 4½ foot capacitance hat and a high-Q coil wound with Teflon® wire on a *low-loss* fiberglass form.

The *entire length* radiates power.

High strength 6061-T6 aluminum tubing, super strong solid fiberglass insulator, *Frequency Adaptive L-Network*™, heavy duty *swing* mount. Handles 1500 watts PEP. Requires guying and radials, counterpoises or ground screen.

MFJ-1793, $179.95. Same as MFJ-1792 but includes *full size* 20 Meter quarter wave radiator.

Box Fan Portable Loop

MFJ-1780 **$229.95**

No, it's not a fan -- it's a high efficiency portable loop antenna that's about the same size and shape as a 2x2 foot box fan, complete with carrying handle.

Carry it like a suitcase, tuck it in a corner of your car or check it as baggage on a plane.

When you get there, set it on a table or desk and enjoy ragchewing or DXing.

All welded construction, covers 14-30 MHz *continuously* including WARC bands, handles 150 watts. Remote control has fast/slow tune buttons. Separate control cable not needed.

MFJ *halfwave* Vertical

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed!

MFJ-1796 **$199.95**

Operate 6 bands -- 40, 20, 15, 10, 6 and 2 Meters -- with this MFJ-1796 *ground independent halfwave* vertical antenna! No radials or ground ever needed!

It's only 12 feet high and has a *tiny* 24 inch footprint! Mount it anywhere from ground level to tower top -- on apartments, condos, small lots, even motor homes. Perfect for vacations, field day, DX-pedition, camping.

Efficient *end loading*, no lossy traps. *Entire length* is always radiating. *Full size* halfwave on 2 and 6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting one band has minimum effect on other bands.

Automatic bandswitching, low radiation angle, omni-directional, handles 1500 watts PEP. Goes together in an afternoon.

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and free instruction manuals
Write or call toll-free . . . 800-647-1800

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CIRCLE 5 ON READER SERVICE CARD

Here's a neat idea to increase your travel fun, whether on the water or in your RV. It also makes a nice construction project, easily completed.

How To Build A Marine/RV Antenna For Two Meters

BY IVAN T. LORENZEN*, W4JC

This antenna is based on the justly venerated "J" antenna. It is scaled for the 2 meter band when enclosed in a protective 3/4 inch, thick-wall PVC pipe. It is simple and easy to make, has wide bandwidth and more gain than a quarter-wave antenna, and best of all it works! Since a "J" antenna is a half-wave radiating element end-fed by a quarter-wave matching section, no ground plane is required.

The so-called "end effect," which requires shortening an antenna when in close proximity to dielectric material such as insulators at the ends, is very noticeable here—more so, because plastic and PVC dielectric completely enclose the antenna Consequently, the dimensions are quite a bit shorter than those for a "J" antenna in open air.

The antenna is made from 300 ohm 20-gauge twin lead, and the protective enclosure is made from 3/4 inch, thick-wall PVC pipe. Dimensions are shown in fig. 1.

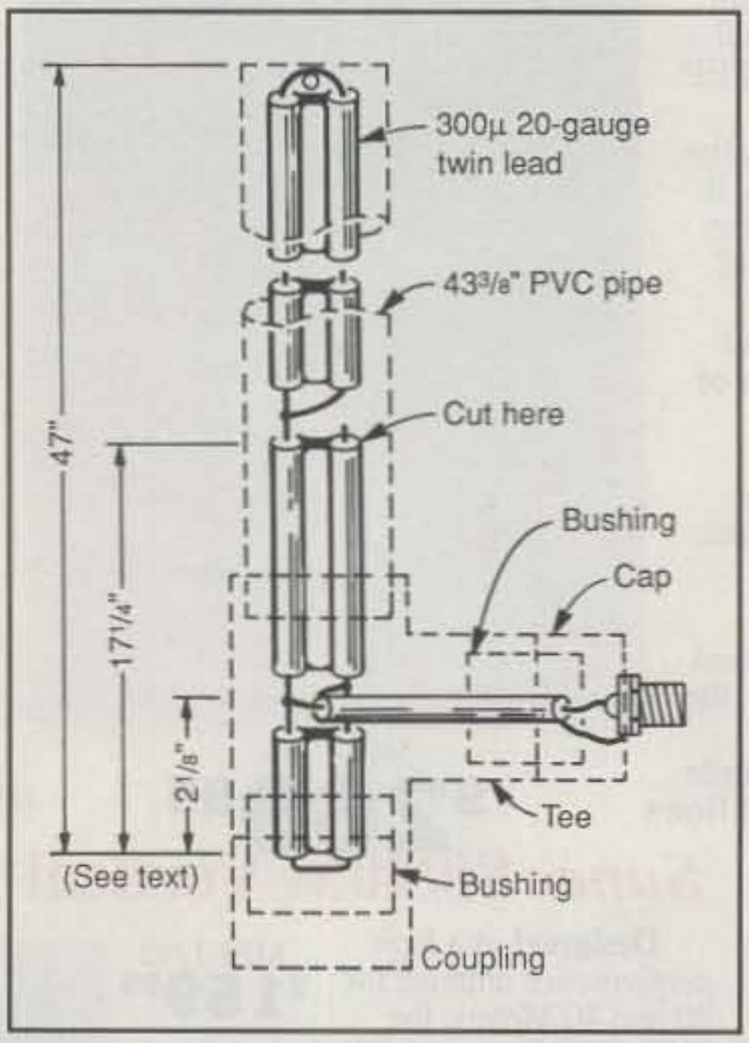

Fig. 1–Construction details for the 2 meter marine/RV antenna.

Parts List
1—10 foot length of 3/4 inch thick-wall PVC pipe
2—3/4 inch PVC end caps
1—3/4 inch PVC tee
1—3/4 inch PVC coupling
1—plastic alignment tool, cannibalized to make the 1/4 inch rod 1 inch long
1—4 foot length of 300 ohm 20-gauge twin lead (Radio Shack #15-1174, or equivalent)
1—Single-hole, rear-mount SO-239 socket (Amphenol #83-878, or equivalent—see text)
1—Short piece of RG-58U
6—No. 6 × 3/8 inch stainless steel, self-tapping screws

Construction

Exposing the wire in twin lead is easily done by stripping the plastic with a knife, taking care not to nick the wire. The wire can then be pried out. At both ends of the antenna snip off the plastic between the exposed wires. At the top end, form the wires into a loop to accommodate the 1/4 inch plastic rod which will go through the loop and rest in the quarter inch slots in the top of the pipe. At the bottom end the two wires are just connected together neatly. Confirm that the overall length is 47 inches before soldering. Press the twin lead flat and straight so that measurements will be accurate.

At exactly 17 1/4 inches from the bottom of the antenna use side cutters to cut through the wire on one side of the twin lead. This dimension is critical in that very small changes in this dimension result in rather large changes in the frequency at which minimum SWR occurs.

Strip away 1 inch of plastic above this cut and bend the wire out of the plastic. Also strip away 1 inch of the plastic on the radiator side of the twin lead. Bend the exposed cut lead diagonally over to the uncut wire and solder them together. From this point upward, the radiator is composed of two wires.

Centered 2 inches above the bottom end, strip away about an inch of plastic on both sides of the twin lead. A little more plastic may have to be cut away here so the wires won't have to be bent out so far for soldering the coax connections.

Cut a piece of RG58/U 2 1/4 inches long. At each end remove 1/2 inch of the outer sleeve, comb the braid out, and twist it together, bringing it out at a right angle. Remove 1/4 inch of the inner insulation from each end. Form a 1/8 inch hook on one end of the center conductor and on the end of a short piece of #18 solid copper wire which connects to the braid stub. This end of the coax will be connected to the twin lead. At the other end of this short coax use a longer piece of #18 wire to form a one-turn loop around the shoulder of the SO-239. Then bend it back to reach the braid stub and solder it. Clip off the excess braid.

A 5/8 inch hole in the end cap for the SO-239 socket can be made either by a 5/8 inch hole saw or by drilling a smaller hole and enlarging it with a reamer.

The only single-hole, rear-mount SO-239 sockets I could find had a threaded sleeve length of 1/2 inch. This is okay for mounting on panels up to 1/8 inch thick, but the PVC end caps available locally are a little thicker. Therefore, a PL-259 does not screw on quite far enough for a tight fit. If a rear-mount SO-239 with a 9/16 or 5/8 inch threaded sleeve is unavailable, the problem can be solved in either of two ways. One way is to insert a 7 mm spring washer (not a lock washer), available at the hardware store, into the PL-259 plug before screwing it onto the SO-239 socket. The 7 mm hole in the washer adequately clears the center prong in the PL-259 and is of the right thickness. The other way is to use a coarse file to remove about 1/16 inch from the top of the end cap after

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SL-11A	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

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RS-4L	3	4	3½ × 6⅛ × 7¼	6
RS-5L	4	5	3½ × 6⅛ × 7¼	7

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

RS-A SERIES

MODEL RS-7A

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

RS-M SERIES

MODEL RS-35M

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

VS-M AND VRM-M SERIES

MODEL VS-35M

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

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

RS-S SERIES

MODEL RS-12S

• Built in speaker

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

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

the 5/8 inch hole is made in the cap. I have used both methods, and they both do the job. End caps come either with a flat top or a rounded dome top. The latter requires less filing.

After the coax is soldered to the SO-239 socket and its #18 jumper wire, slip a 1¼ inch PVC bushing over the coax and into the end cap. Then lay the twin lead flat across a couple of supports and hook the coax onto the twin-lead wires at a point 2⅛ inches from the bottom of the twin lead. The coax must come away from the twin lead at a right angle before the connections are soldered.

A 10 foot length of ¾ inch, thick-wall PVC pipe cut into four pieces will provide a 43⅜ inch length to enclose the antenna, two 1¼ inch pieces for the bushings, and about 6 feet remaining to serve as a mounting mast. The PVC shop can quickly cut the pipe for you, and you will get neat, square ends. Use fine sandpaper on the edges to make an easy fit. The 6 foot piece will fit into the coupling at the bottom of the antenna. Mounting the mast on your boat or RV will depend on your particular situation and ingenuity. It may be possible to fabricate an adapter to fit onto a commercial lift-and-lay mount, or for occasional use it could be lashed to whatever is appropriate. Do the lashing to the mounting mast, not the antenna.

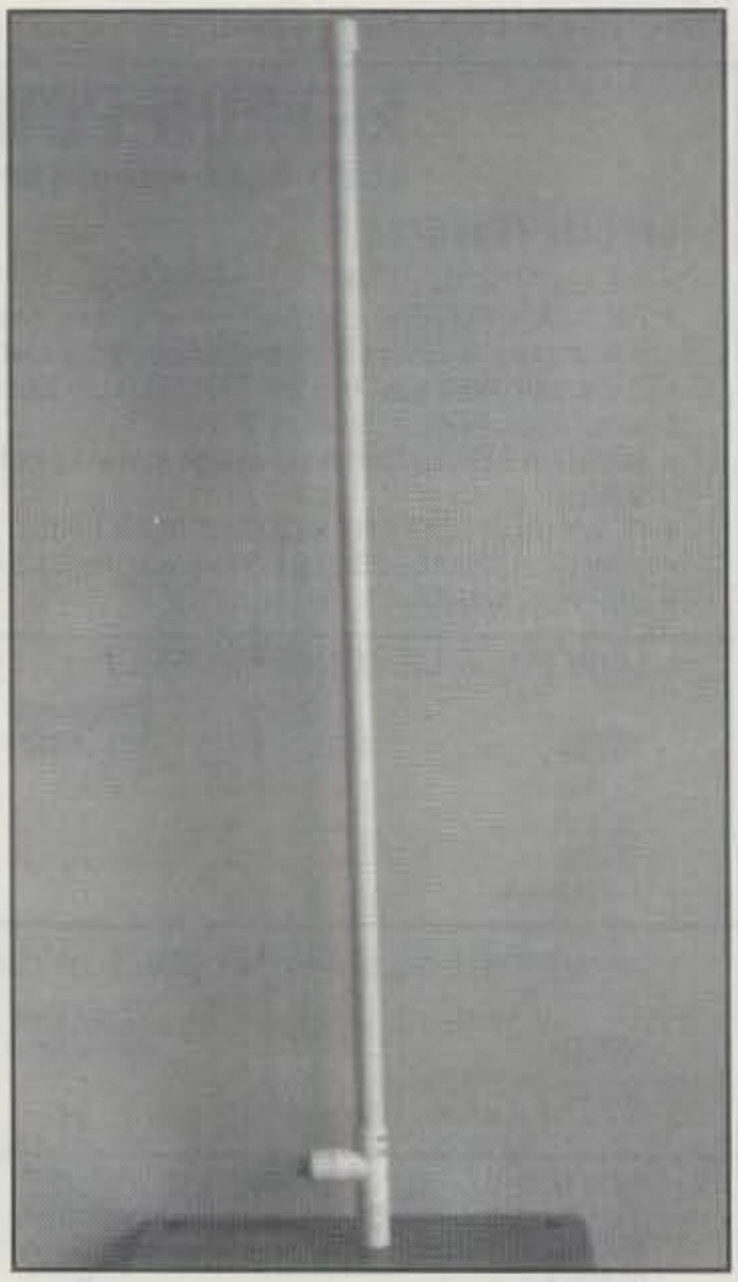
Insert the top end of the twin lead into the side opening and out through the top of the tee. Push the tee down onto the twin lead toward the coax. Bend the 2⅛ inch stub down and back on itself as you feed the tee over the coax. Then pull the stub down into the bottom opening of the tee. Push the PVC pipe onto the twin lead and finish assembly as shown in fig. 1.

A 1 inch piece of ¼ inch plastic rod was made by cutting it out of the center section of a plastic alignment tool. This plastic rod goes through the quarter inch loop at the top of the antenna and rests in the quarter inch slots in the top of the pipe to support the twin lead and keep it from settling and possibly putting a physical strain on the soldered coax connections. Place a little dab of clear silicone caulk on the rod where it rests in the slots and at the center where it supports the antenna. Add a PVC end cap on top of the pipe.

If you find that the SWR is higher at 148 MHz than it is at 144 MHz, the stub is too long. If the SWR is higher at 144 MHz than at 148 MHz, it is too short. If you feel that you really want to trim, and approach the optimum dimension gradually, you can start with a stub length of 17⅜ inches. This will allow two trim cuts of 1/16 inch each before reaching the final dimension of 17¼ inches. If the SWR readings show that the stub is too long, you may not have had the twin lead pressed flat and straight when you measured, and the dimensions may actually be longer than you thought.

Finally, six No. 6 × ⅜ inch stainless steel, self-tapping screws can be used to permanently secure the end caps, coupling, tee, and bushings together.

Dimensions were determined by using an MFJ-249 SWR Analyzer. Transmitting tests were made outdoors well in the clear, away from buildings, trees, etc. A Radio Shack SWR/PWR meter (19-320) was inserted between the transceiver and a 10 foot length of RG58/U which fed the antenna. The SWR was well under 1.5:1 across the 2 meter band, and a 2 watt hand-held transceiver raises a repeater 25 miles away. ■



The completed antenna ready to withstand any and all elements.

The bottom section of the antenna showing the SO-239 connector. At the bottom is a PVC coupling to facilitate mounting.

The top section of the antenna with the cap removed. You can see the loop of the antenna being supported by the ¾ inch plastic rod, which rests in the cutouts.

1994 CQ 160 Meter Contest High-Claimed Scores

The following scores are high-claimed scores only and are subject to verification. M/S indicates M for multi-op or S for single op.

SSB

Call	M/S	Score	QSOs
P4ØJ	S	282,710	346
VE2PK/VE3	M	281,480	454
AB4RU	M	278,944	1278
VE3RM	S	235,224	747
N5OLS	M	230,364	1242
K4JPD	S	205,700	1041
LY3BS	S	185,589	688
WR8C	M	183,375	1077
LX4A	M	172,515	652
K4JRB	S	171,520	921
K4PI	S	165,783	1011
W9UP	M	163,870	1043
KY1H	M	163,450	1020
NXØI	S	159,045	1041
LY3MR	M	158,346	531
KX4R	S	149,723	911
WW2Y	M	149,139	867
KVØQ	S	148,248	919
N8ATR	M	147,774	991
UT5DK	S	145,452	727
I3MAU	S	144,144	468
WD9INF	M	143,581	962
W3GH	S	137,156	876
WY2X	M	136,875	831
KN2T	M	136,125	779
N7DD	M	132,872	860
S5ØA	S	132,691	452
N2LT	S	130,260	877
W3TS	S	129,645	851
ON4AEK	S	125,808	524
SV8CS	S	123,690	437
WB4ZNH	S	120,274	764
NX3A	M	120,265	806
NCØP	M	117,780	819
WT3Q	M	115,368	738
VE3DC	M	114,372	447
9A1A	M	110,754	401
WØBXR	M	109,376	793
W2GD	M	109,269	639
NE3F	S	108,473	714
AA4MM	S	107,529	643
OM3CQR	S	106,604	359
KH6U	M	106,600	222
W9AZ	M	106,061	713
KG8CO	S	105,469	780
K3ANS	S	105,400	735
IO2L	M	105,366	438
F6EZV	S	104,754	417
S59SLO	M	103,896	404
K3MKZ	S	103,068	731
AD1S	S	101,632	727
HB9CXZ	M	94,248	378
W7VNJ	M	91,320	685
W3BGN	S	89,769	543
NW6N	S	86,310	605
KA2DRH	M	85,064	634
NG8D	S	83,762	605
YL1WW	S	83,720	355
S5ØN	S	82,786	317
KI4XO	S	82,179	520
K2BU	S	81,627	516
K2DOX	S	81,585	560
VE5RA	S	80,946	312
LY2ZO	M	80,360	384
OM2I	M	80,135	345
WY3T	M	78,183	552
K5XI	S	76,590	473
NØAXL	S	76,212	600
UA9MA	S	75,706	426
LA7JO	S	75,247	318
PI4COM	M	75,072	332
NOØY	M	74,560	515
S53TK	S	71,376	304
SP5INQ	S	71,344	288
VP5JM	S	70,304	264

CW

Call	M	Score	QSOs
P49I	S	991,230	879
P4ØO	S	871,936	841
VP9AD	S	811,836	1319
P4ØGG	M	803,330	745
VP2EC	S	759,566	1074
OT4O	S	759,115	1044
VE3EJ	M	636,849	1196
CT3FN	S	610,174	436
9A1A	M	516,362	868
EA3KU	M	507,100	785
KP2A	S	498,348	788
WW2Y	M	492,687	1162
K1ZM	S	422,721	1030
KN8Z	M	414,411	1350
OM7A	M	408,510	768
OM7M	M	407,247	746
4X4NJ	S	381,840	503
OZ1LO	S	380,016	812
N2LT	S	379,529	1146
PA3DWD	M	379,288	707
AB4RU	M	354,165	1161
9A3B	M	346,336	758
S59A	S	341,820	643
K1NG	M	337,218	962
I4YSS	M	334,243	612
OK1DXS	S	332,906	707
K3WW	M	326,819	987
KY1H	M	324,168	1041
W3LPL	S	323,238	1040
OK5W	M	321,378	621
I4EAT	M	313,720	592
W3BGN	S	302,292	797
HG6N	M	298,566	650
AA1K	S	297,738	956
PA3FNE	M	289,751	670
IT9ZGY	S	287,364	572
A71CW	S	281,175	440
XE2/AA7IE	M	275,022	826
WB9Z	S	274,900	992
I3JSS	S	273,634	551
DK2OY	S	266,762	577
W7XR	M	266,467	910
N6DX	M	265,520	967
WA2SRQ	S	264,000	897
N4RJ	M	263,538	1018
VE3KP	S	263,092	734
OZ7YY	S	260,520	603
5B4ADA	S	258,894	487
PI4COM	M	258,883	597
S5ØA	S	256,118	587
I2BBJ	M	250,080	552
T93M	S	246,157	646
IK2QEI	M	242,966	523
KH6CC	S	242,340	416
HG5A	M	241,684	594
4X/S53R	S	237,388	380
S59AA	S	234,460	563
G3KDB	S	234,264	467
S59SLO	M	233,026	593
LY3BS	M	232,180	549
KN6M/5	S	226,968	911
KZ3H	S	226,634	920
HA8EK	S	225,975	542
GM3YOR	S	222,120	544
NJ4F	M	221,856	860
W2GD	M	221,700	636
VE3PN	S	217,800	606
N5RZ	S	216,027	943
AA5BL	M	215,520	1036
DKØEE	M	214,734	535
AA4S	S	212,220	924
K4VX	S	203,820	1119
N2NU	M	201,600	534
W3GH	S	201,600	818
F6EZV	S	200,123	436

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Club	Score
Frankford Radio Club	8,750,231
Southeastern DX Club	6,522,532
Slovenian Contest Club	2,743,121
Yankee Clipper Contest Club	2,093,173
Mad River Radio Club	1,859,792

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DR-600T	$20 OFF	EJ-7U (Tone Squelch)	$ 5 REBATE		
		EDC-19 (Sep. Kit)	$15 REBATE	=	$40
DR-130T	$20 OFF	EJ-20U (Tone Squelch)	$ 5 REBATE		
		EJ-19U (100 Memory)	$ 5 REBATE	=	$30
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DJ-180T/TH	$10 OFF	EJ-15U (200 Memory)	$ 5 REBATE		
		EMS-9 (Speaker-Mic)	$ 5 REBATE	=	$20
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2. Send a copy of your invoice(s) dated between May 9 and July 20, 1994 to Alinco Electronics in order to receive your Bonus Coupon rebate check.
3. Purchase of accessories after the initial purchase of the radio still qualifies for the bonus discount provided that all items are obtained between May 9 and July 20, 1994.
4. Manufacturer's coupon is redeemable at any authorized ALINCO dealer.

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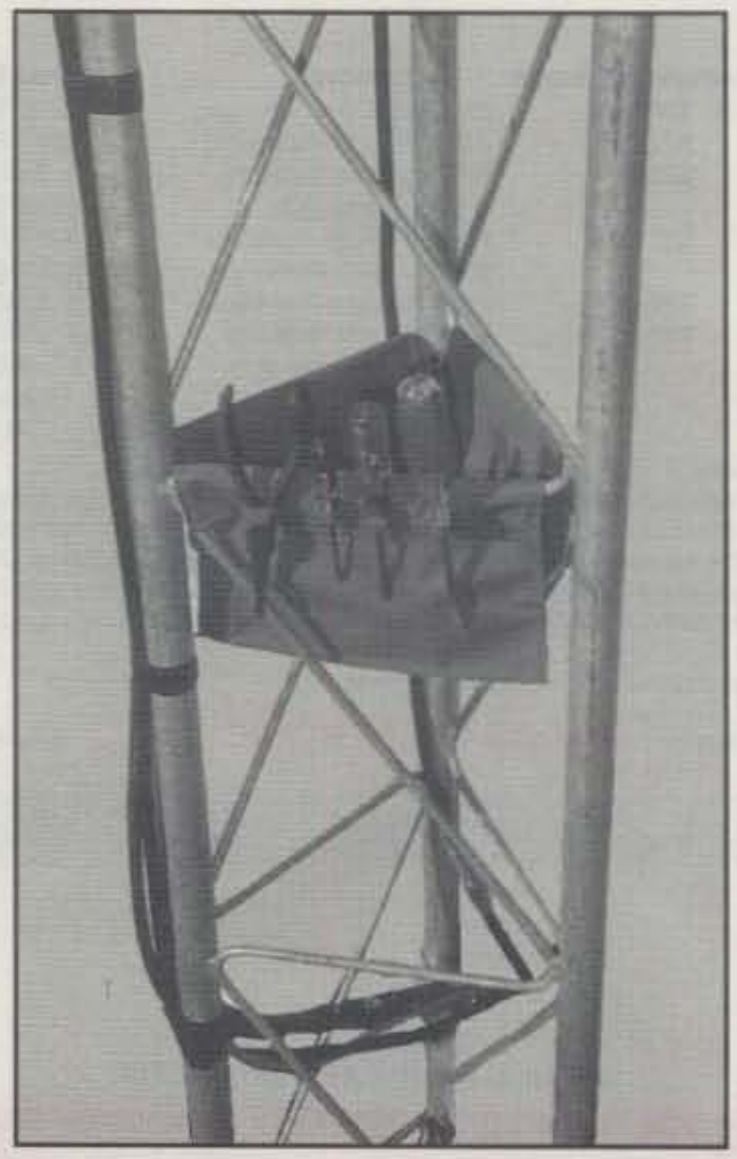
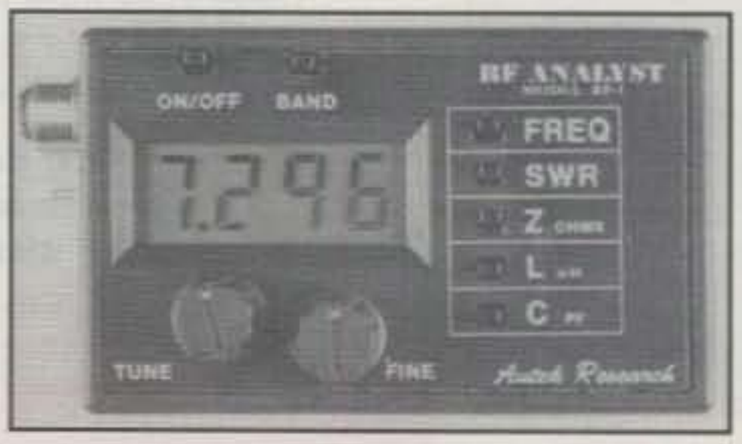


bolts, tools, and other parts. The "Big Pocket" comes in two sizes: Tower-Mate 25, which fits Rohn 25 or similar size towers, and Tower-Mate 45, which fits Rohn 45/55 or similar towers.

The TM25 is priced at $15.95, and the TM45 at $19.95, plus $3.00 shipping/handling stateside. For more information, contact Randy Wagaman, AA6WJ, Tower-Mate™, P.O. Box 601616, Sacramento, CA 95860-1616 (FAX orders 916-481-5381), or circle number 109 on the reader service card.

RF Analyst™ From Autek Research

The pocket-sized RF Analyst is designed to check and adjust antennas, feedlines, and RF networks. It includes a microprocessor, A/D converters, and a low-distortion, leveled, sine-wave generator with 4-digit frequency readout, continuously adjustable from 1.2 to 35 MHz in 5 bands. It measures RF values of impedance, (0–2000 ohms), SWR (1 to 15:1), C (0–9999 pF), and L (<.04 to 300 µH). The instrument connects to any antenna or feedline and reads out impedance and SWR at any frequency in its range. Many antenna and tuner parameters can be measured and adjusted for best performance, even by inexperienced users.



Basic accuracy is 2.5% to 5% over most of its range. The unit fits in a shirt pocket and runs on a standard 9V battery. For more information, contact Autek Research, 4143 W. Waters Ave., #120, Tampa, FL 33614 (813-871-3805), or circle number 102 on the reader service card.

FBenterprises Quick-N-Easy Regional Repeater Map Guides

FBenterprises has announced a new product, the Quick-N-Easy Regional Repeater Map Guides. The 1994/95 edition is now available. The map guides are available for ten different regions, covering all fifty U.S. states. The regional guides each cover six different states, and are spiral bound. They show 2 meter repeaters in full color on the front of the card, and the bands between 220 and 1.2 GHz are

shown on the back. The cards now include information on which repeaters offer autopatch, and also information on CTCSS tones for those repeaters which require them. The guides are laminated in plastic.

A catalog is available for $2, refunded with purchase. For more information, contact FBenterprises, 23801 NW First Ave., Ridgefield, WA 98642-8830 (phone/FAX 800-377-2339), or circle number 104 on the reader service card.

ICOM All-Mode Dual-Band Base-Station Transceiver

Icom has introduced the IC-820H high-performance all-mode dual-band base-station transceiver. The IC-820H features a newly designed DDS capable of resolving 1 Hz tuning steps for fine tuning. Built-in satellite functions include normal and reverse tracking, independent uplink/ downlink control for doppler shift compensation, and separate satellite VFO. Ten satellite memories allow switching from normal to satellite operation. The IC-820H covers from 144 to 148 MHz VHF and 430 to 450 MHz UHF. Both bands have two VFOs.

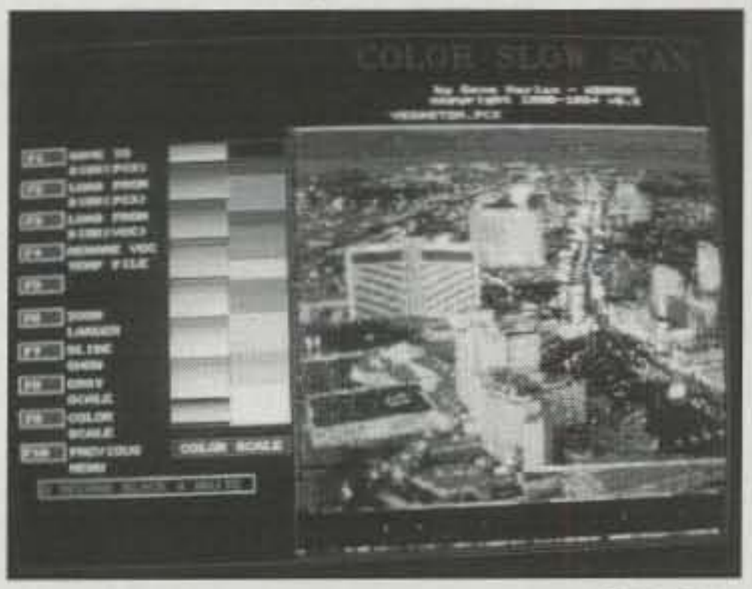
Other features include IF shift that electronically adjusts the center frequency of the receiver pass-band for interference reduction

and a noise blanker to eliminate pulse-type noise. A memory allocation function divides memories between bands. The IC-820H also has an AF speech compressor, auto repeater, and one-touch repeater functions, built-in high stability crystal unit, RIT, CW semi break-in, and side tone.

For more information, contact ICOM America, Inc., 2380 116th Avenue N.E., Bellevue, WA 98004 (206-454-8155), or circle number 105 on the reader service card.

Harlan Technologies Color Slow Scan TV

Harlan Technologies announces Color Slow Scan TV for the Sound Blaster sound card. The new version is an upgrade from Slow Scan II which would copy color modes, but display them in black and white. Color Slow Scan will send and receive Robot 8, 12, 24, 36 second black and white, Robot 36 and 72 second color (displaying in color), as well as Scotty 1 and Scotty 2 (displaying in color). The send mode is accomplished by reading the pixels on the screen and creating a voice file (.VOC), which



can then be transmitted. Appropriate SYNC is added for the mode being used. A larger display area, plus a zoom to full-screen feature, was added. Color Slow Scan will auto track ±150 Hz for the best color pictures. After the picture has displayed, the amount of frequency difference detected is displayed. Pictures can be saved in .PCX format so they can be re-displayed and used in paint brush programs. A slide-show feature was added which will continually show .PCX files saved. Requirements for Color Slow Scan are a PC computer (286 or better) with DOS 3.3 or higher and 640K memory, hard drive, VGA display capable of 640×480–256 colors, and a Sound Blaster compatible card such as Sound Blaster, SB PRO, SB16, Thunder, PAS16, or Fusion.

Color Slow Scan is available for $99.95 plus $5.00 shipping ($10.00 overseas shipping). For more information, contact Harlan Technologies, 5931 Alma Drive, Rockford, IL 61108 (815-398-2683), or circle number 108 on the reader service card.

DOUG'S DESK

BY DOUG DeMAW, W1FB

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORYs

Workshop Tricks For Saving Money

If you're a builder who has slowed down because the cost of cabinets, dials, and related hardware material has diminished your amateur radio "walk around money," you may find these cost-saving methods of interest. Ordinary materials can be used to create equipment boxes, speaker enclosures, and panels. This article highlights a few techniques that I use when constructing homemade gear.

Building Cabinets

One of the high-ticket items today is the ordinary project box. Even the smaller aluminum Miniboxes® have become intolerably high priced, especially if they are to be used to house simple circuits for which the parts cost only one or two dollars. Various approaches may be used to reduce this part of the project expense. For example, small shield boxes can be made easily from sections of single- or double-sided PC board. I use a second-hand, heavy-duty paper cutter for cutting PC board stock. I picked it up for $5 at a used office supply store. I use it also to cut soft aluminum down to 18 gauge. The PC board sections that form the walls of the boxes are soldered together at their joints by means of a 40 watt pencil iron. A U-shaped, press-fit aluminum lid works nicely to enclose the top of the PC-board box. The outer surface of the box may be spray painted with a color of your choice if you like things to be fancy.

Most of the larger enclosures I construct are made of wood. Photo 1 shows a somewhat ugly plywood panel that I fashioned for a receiver. The wood grain of the 1/400 inch plywood was obscured later in the process by masking off the speaker grill bars and the dial escutcheon and spray painting the panel an almond color. The dial escutcheon and speaker bars were painted brown while using a small brush. The outer border of the escutcheon is indented into the plywood. This was done carefully with a narrow chisel blade and hammer to keep the brown paint from flowing onto the surrounding panel area. In other words, the escutcheon is a part of the panel wood. However, a separate escutcheon can be made and affixed as a projection on the panel.

P.O. Box 250, Luther, MI 49656

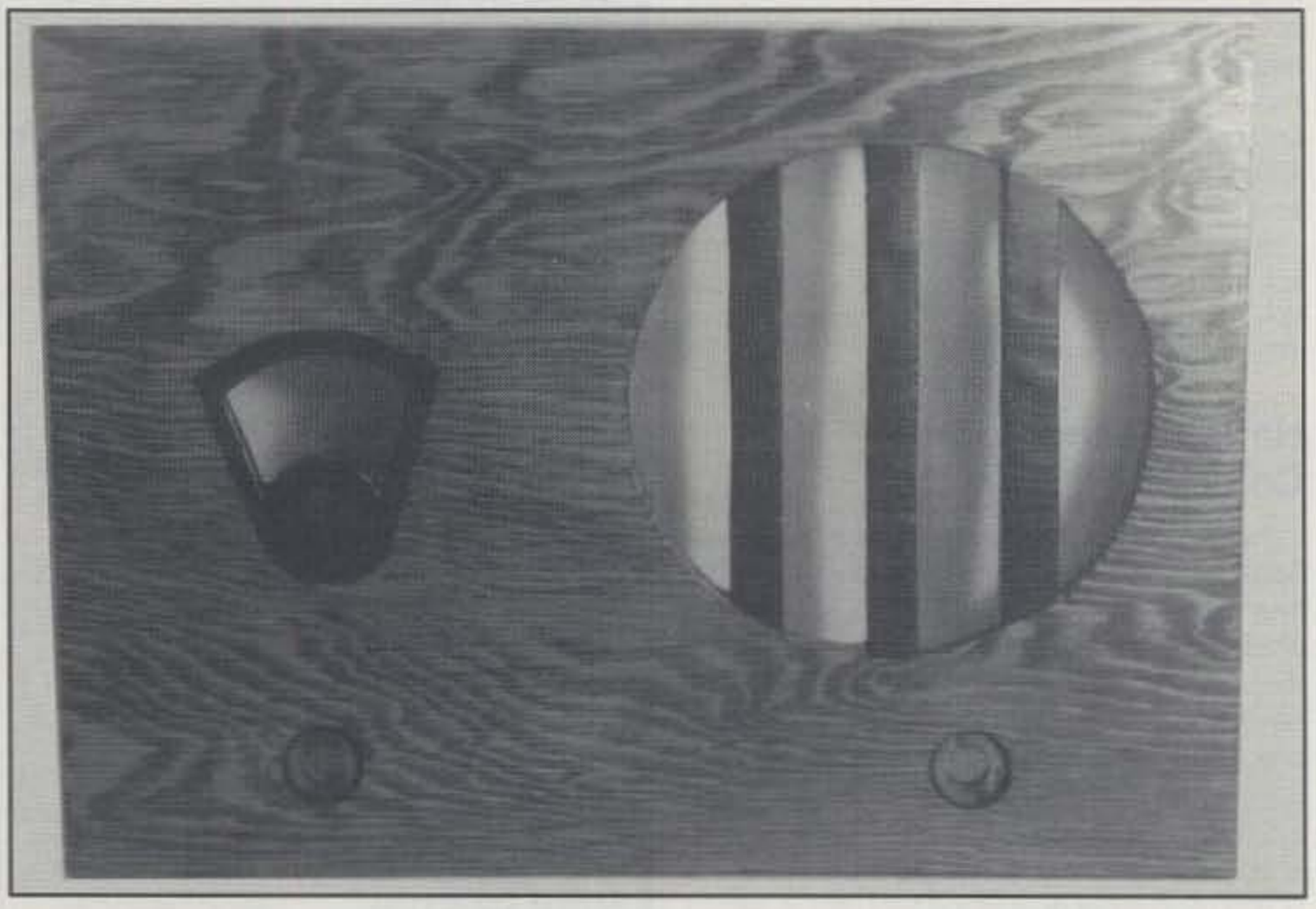


Photo 1– Details of a homemade plywood panel for a receiver. The large holes were made with a scroll saw. The plywood grain was hidden later with almond-color paint.

A scroll saw was used to cut the holes for the dial face and the speaker. A coping saw may be used if you do not have a scroll saw. The two lower holes are for potentiometers. Note that the panel has been undercut with a brad-point drill (a Forstner bit may also be used) to permit the control hex nuts to be flush with the panel when tightened.

Photo 2 shows another from-scratch cabinet and panel. This one houses a homemade receiver designed for AM-band DX reception. Again, 1/4 inch plywood serves as the enclosure material. The panel in photo 2 was fashioned from a plastic cabinet that once housed a junked TV receiver. The surface was abraded lightly with fine-grain sandpaper

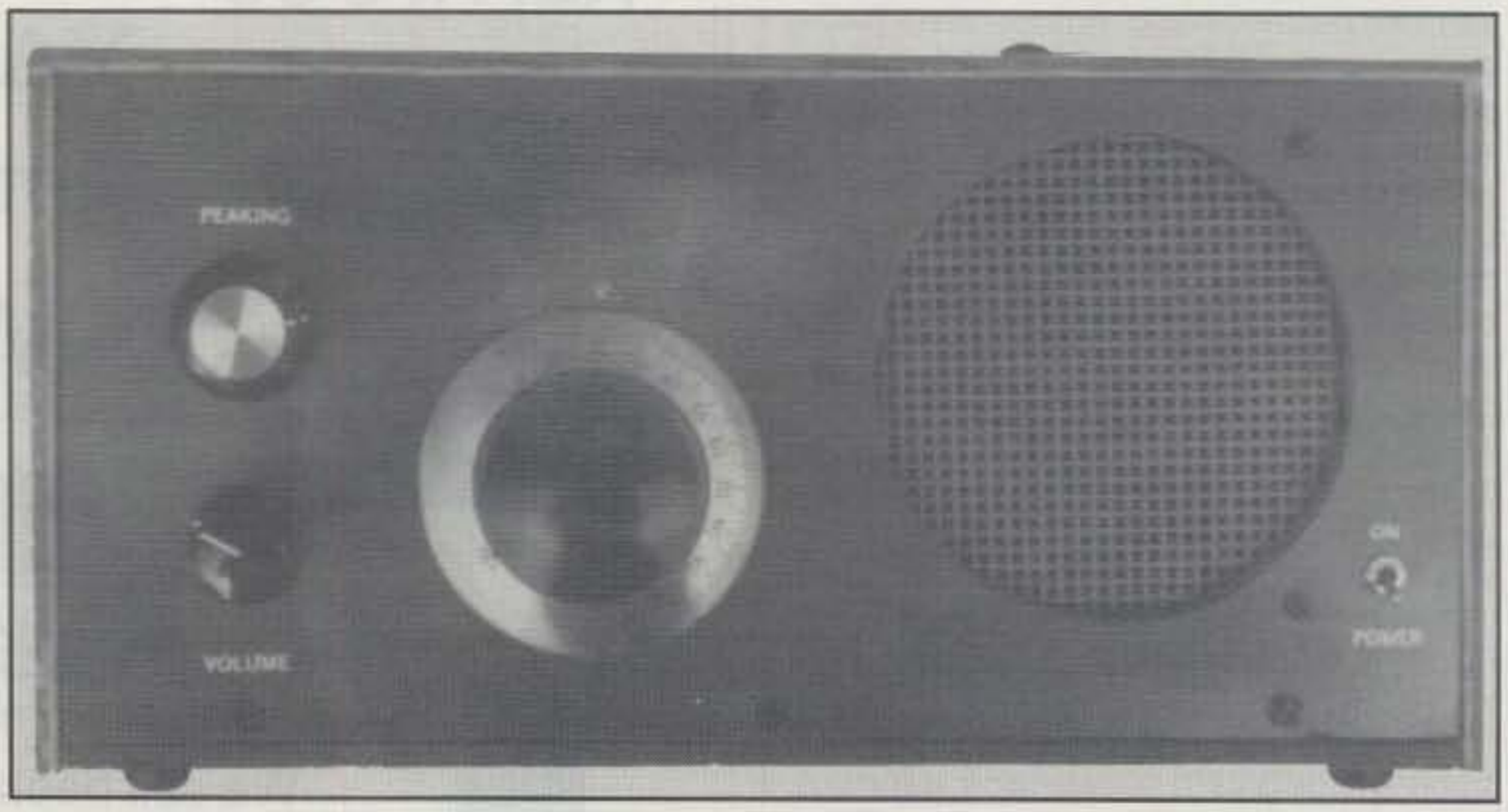


Photo 2– A hand-made plywood receiver cabinet that has a plastic panel which was cut from an old TV receiver cabinet. The protective grill was made from inexpensive plastic material that was purchased at a craft store.

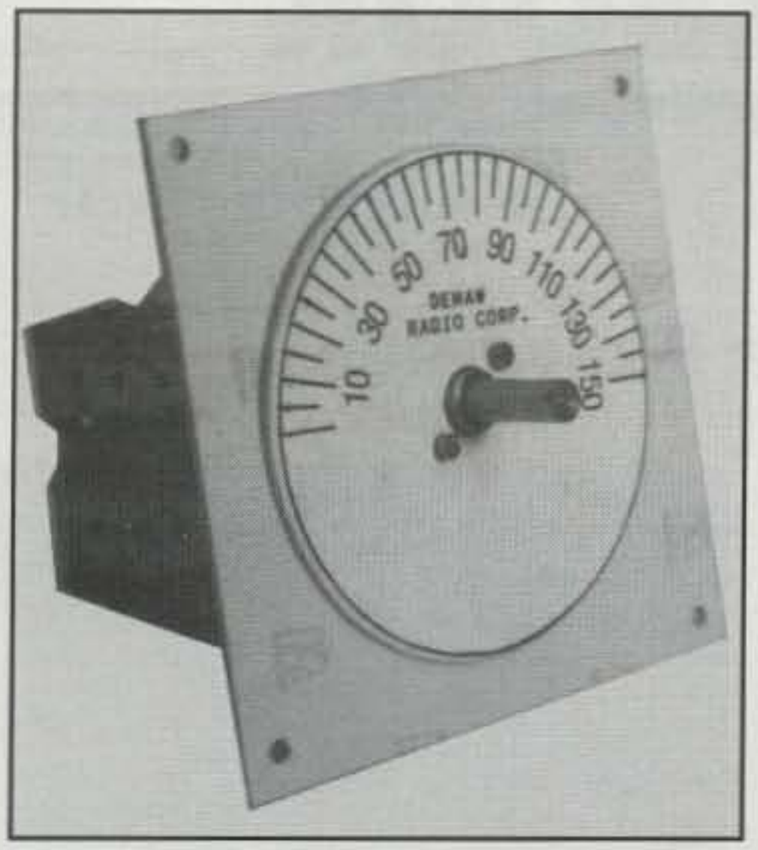


Photo 3– A homemade dial mechanism for panel in photo 1. (See text for details.)

Photo 4– A speaker can be enclosed in a food container at low cost. This photograph shows W1FB's portable speaker housed in a tuna fish can. The grill is a piece of metal window screen.

(to help retain the paint) and spray painted in dark gray. Tempered Masonite® can be used in the same manner. Again, a scroll saw was used provide a hole for the speaker. The protective material for the speaker is a piece of perforated brown vinyl plastic that I purchased at a craft store. A 12" × 12" piece cost 95 cents. The sheets are available in many colors.

Dial Plates

The dial mechanism in photo 3 was built for use behind the panel in photo 1. Direct frequency calibration could have been used instead of the numbers. A piece of clear, 1/16 inch thick plastic was glued to the back side of the photo 1 escutcheon to go between the dial face and the inner panel. A vertical line was scored in the clear plastic with an awl, and the resulting groove was filled with India ink to provide a visible calibration marker.

The variable capacitor in photo 3 is driven by a small vernier drive. The square plate behind the dial face was added to facilitate mounting the assembly behind the receiver panel. The vernier drive is attached to this PC-board plate, under the circular dial. The variable capacitor was affixed later to the main chassis of the radio.

I drew the dial face at 2× scale. It was then reduced to 1× with a copy machine. This helped to minimize the flaws in my printing. I hasten to say that the trade name on the dial was put there with tongue in cheek! The dial face is glued to a circular piece of PC board which is attached to the vernier drive by means of two screws. Dials of this type, and escutcheons similar to that in photo 1, are suitable for numerous amateur radio applications. For example, the variable capacitors in antenna tuners could be equipped with these units to allow logging the settings for various operating frequencies. Wooden cabinets are entirely suitable for antenna tuners, since matching networks do not create TVI (only transmitters do) and need not be shielded. However, a wooden cabinet can easily be shielded by gluing thin copper sheeting to the inner surfaces of the box. Heavy-grade aluminum foil may be used in a like manner.

Small Speaker Enclosures

A small commercially-made speaker and enclosure usually costs in excess of $25. If you need such a unit for mobile or portable operation, you can construct your own assembly for less than $2. An example of a homemade 3 inch speaker is provided in photo 4. I installed a large-magnet surplus speaker in a tuna fish can for use with my portable QRP receiver. The quality of the sound is excellent and my total cost (after eating the tuna) was $1.75. Larger containers may be used for bigger speakers, such as one gallon coffee cans.

The grill material in photo 4 is metal window screen that is soldered to the inner rim of the can. The screen was painted after it was soldered in place, and the speaker was glued to the screen with epoxy cement. Wood-grain contact paper was used to cover the outer surface of the can.

A wooden base was used to permit the speaker to stand upright on the desk. It was cut to the contour of the can on one side and then affixed with two sheet-metal screws.

A 1/4 inch thick wooden ring was cut and glued to the inner-rear perimeter of the can. This serves as an anchor point for a circular aluminum back cover. This was attached to the wooden ring by means of two small screws. A phono jack was mounted on the back cover to provide the electrical connection for the speaker.

Some Closing Thoughts

There is nothing new or exciting about the techniques covered in this article. However, some newcomers to the pastime may be inspired to build rather than buy when it comes to constructing cabinets and panels. Innovation was once the rule rather than the exception in our hobby, but the inrush of commercially-made gear in recent decades has caused many a workshop to become silent. Those who do not combine homebrewing with operating are missing the joys of accomplishment and the fun associated with creating something with one's hands. Even though you may not be a workshop enthusiast, you can save many dollars by constructing your own cabinets and panels.

73, Doug, W1FB

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

A Time To Stop and Smell The Flowers

With the speed at which packet radio is expanding and with the number of new entrants in the packet radio hobby, there comes a point when even I have to stand back a moment and take stock of the ever-expanding ranks of packet radio. The reason why I must take the break is because sometimes I am caught up in the draw of the "moth to the flame" syndrome. By this I mean I become dazzled by the many new happenings within the packet radio hobby.

From time to time I need to digress for a moment to give the new packeteer a fresh look and update on the hobby. At the same time this break provides some reorientation for the seasoned packeteer.

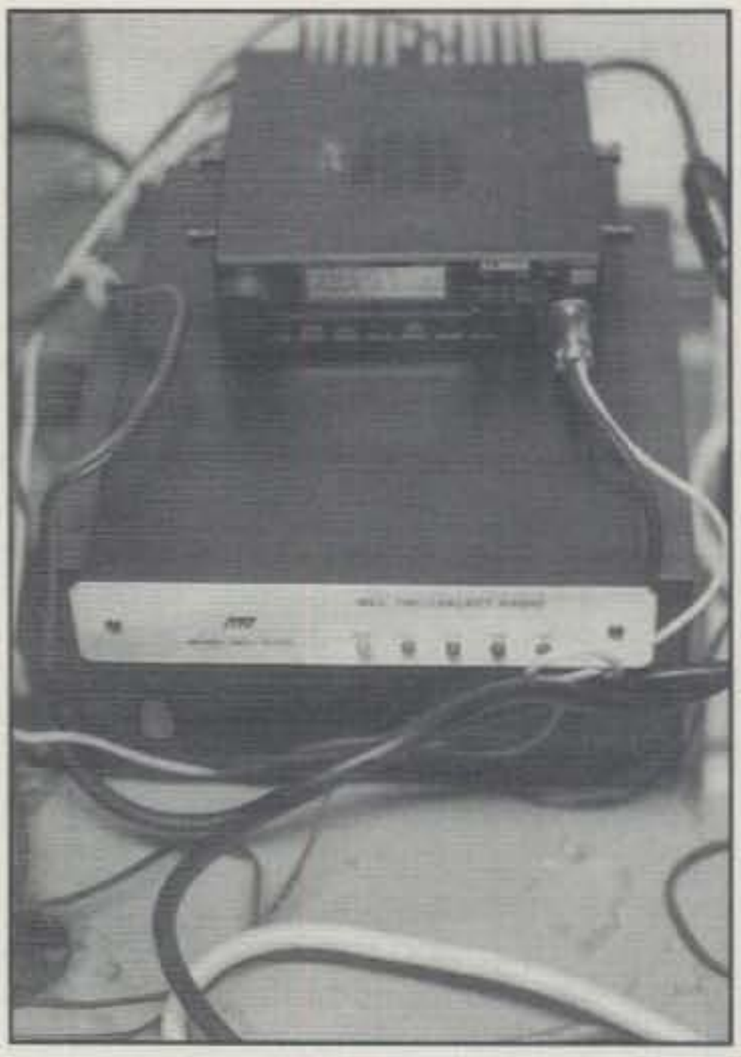
What Is Packet Radio?

Packet radio is a digital communications mode. A stream of data is assembled in a burst or "packet" of information. The "packet" of data includes a "header" that contains the address, route, and callsign of the target or connected station(s). The balance of the (normally 128 bytes) packet contains the data, or intelligence, directed to the target station.

As you take the first step into packet radio, you will discover there are so many facets of this fascinating hobby that your choice is never ending. The user who has been in packet radio for a while soon discovers that all the choices add up to what will soon become his or her "break from boredom."

In some hobbies becoming used to something often means boredom that later leads to dropping out of the hobby for something else. In packet radio this is definitely not the case. There are so many different avenues to take within packet that we often find we do not have enough time to enjoy all the fun it has to offer. Passing binary files and sending and receiving graphics and photo-quality color pictures that appear on the screen as they are received are only a couple of the many fun things that we enjoy in packet radio. And using the bulletin boards to send and receive mail to and from distant packet friends and stations, sometimes on the other side of the world, is another facet of the AX.25 digital mode.

211 Luenburg Drive, Evington, VA 24550



The WB4QOC-8/PSC node at Pageland, South Carolina.

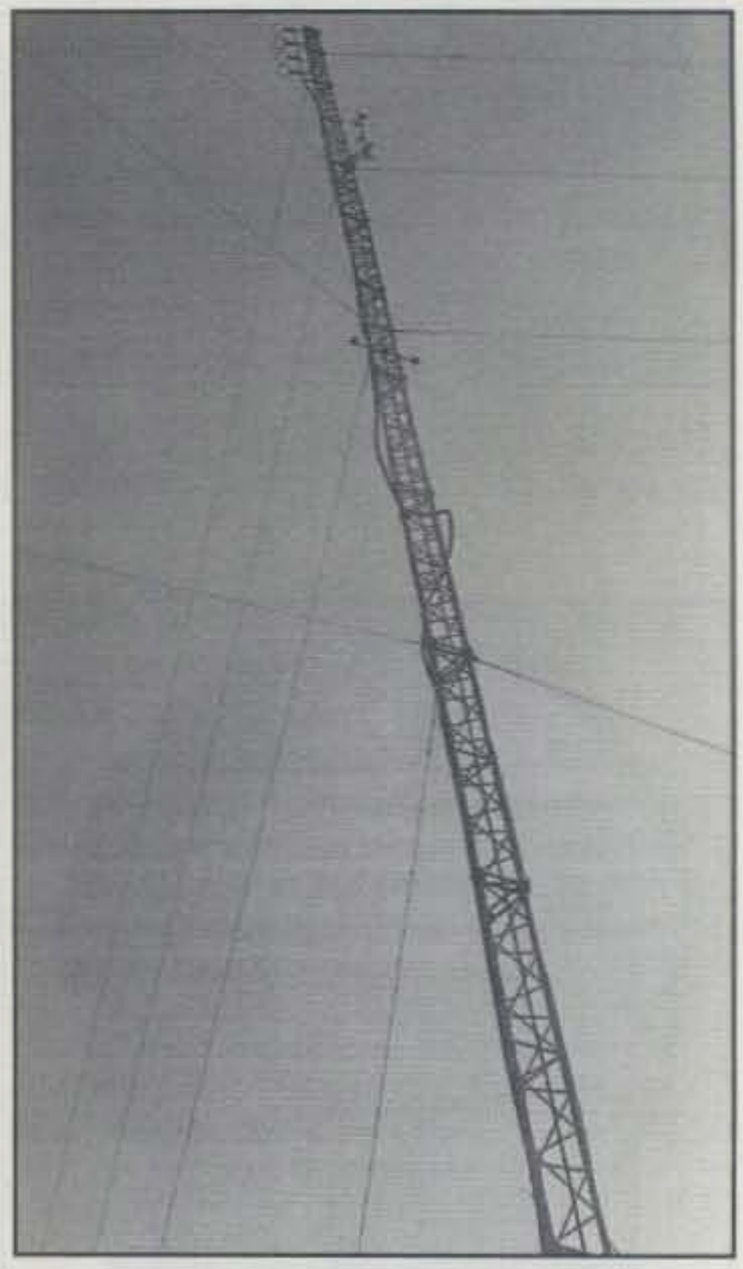
What Is AX.25?

Packet radio AX.25 is the acronym applied to the X.25 protocol. The X.25 packet protocol was largely developed by AT&T for use in switching or branching communications networks. It was later found to be useful in passing data across country to and from mainframe and host computers to terminals in remote areas. The "A" was attached to the X.25 protocol because the protocol needed a minor modification to the acknowledgment flag in order to adapt it for "A"mateur use.

Soon we will move into the world of "high-tech packet," but for the moment we will discuss the good things that make packet work best for you. We will learn the meanings of "labels" such BBS, terminal program, terminal node controller (TNC), TCP/IP, and much more.

Networking Via Packet

A little history is in order here. The database (user accessed information source) was located in the "mainframe" or host, while the terminal was on-line and "time-sharing" the database. Meanwhile, other users awaited their turn at the database.



WB4QOC-8/PSC antenna is side-mounted in an RF environment that would make some SYSOPs cringe. Fred waded in with tuned "jugs" and again made it happen. PSC is a key node of the SEDAN.

Through a need, or better yet a requirement, to serve more customers, an error-checking flag was introduced into each field, and thus we have the beginning of a "packet" network.

This history of packet could go on and on. However, there would be more letters than I could read in a year if I tried to explain who went the furthest in the development of packet. The answer lies somewhere in the area between MIL standard and commercial enterprise (a reasonable deduction). For the moment, let's learn to enjoy packet for what it is without complicating our enjoyment of this wonderful hobby.

The Packet Controller

If you plan to operate packet only but you wish to use both HF and VHF packet, you may want to look for a controller that has a tuning indicator for use on the HF

WB4QOC-6/FSC is taking shape as Fred and his number-one son, Philip, prepare the G-7 antenna support bracket for the SEDAN node at Florence, South Carolina. After this photo was taken, the node WB4QOC-6/FSC went on the air with a signal that is heard from Wadesboro, North Carolina to the shore at Carolina Beach, North Carolina.

bands. Most of these controllers operate both HF and VHF packet.

Almost all terminal node controllers (TNCs) operate both HF and VHF. If you try to operate HF packet without a tuning indicator, you could find that it is like fishing without bait: Your chances of catching anything are little to none. If you just want to operate VHF packet, there are numerous TNCs that will fill your needs.

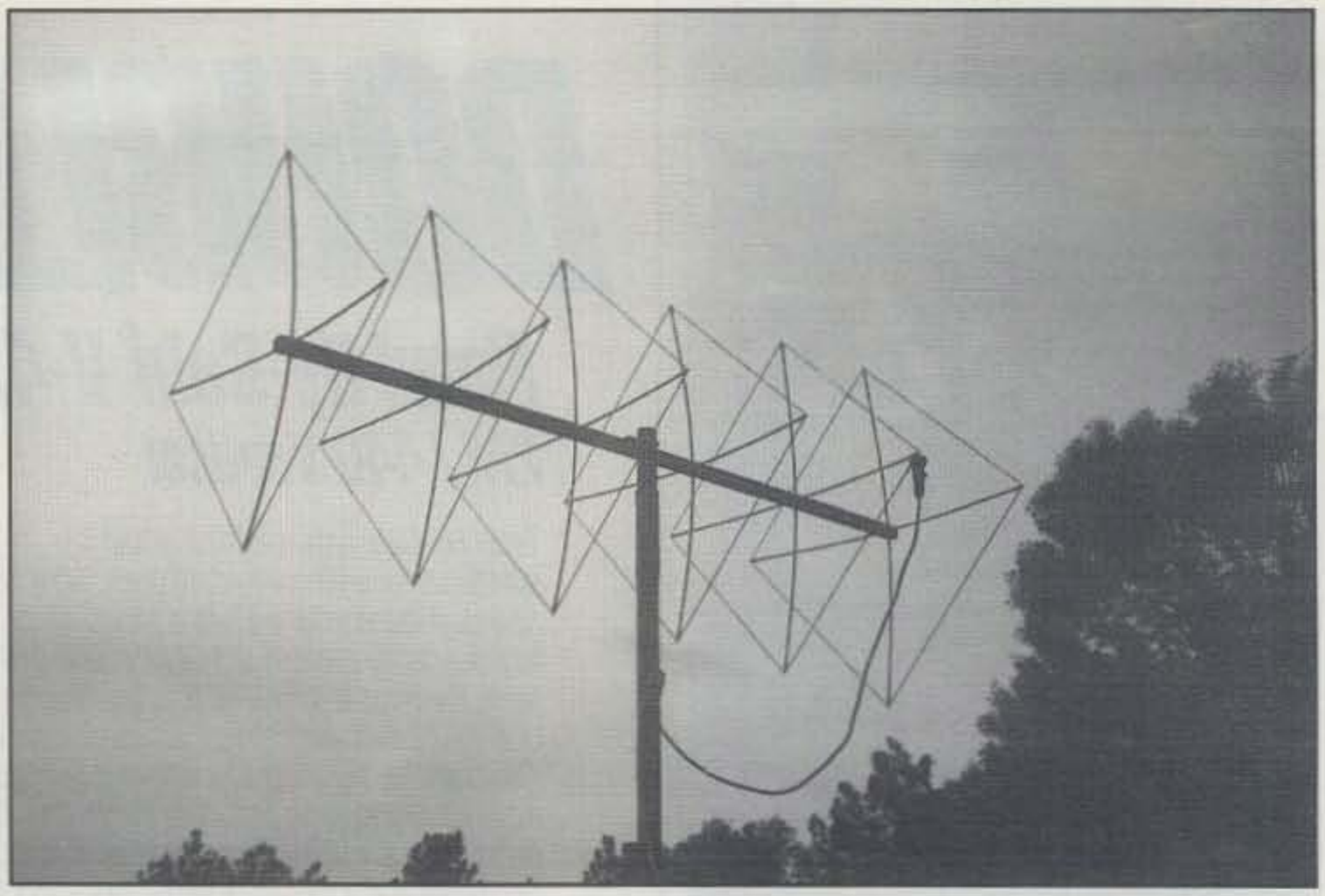
The Packet Mailbox

As of this writing, every TNC manufacturer supports a Mailbox, Maildrop, Personal Mail System, or Personal Bulletin Board System (PBBS) feature. For the balance of this sub-topic I will simply refer to the above-named feature as "mailbox."

This feature allows the user to set the Mailbox command ON. This will enable the user to receive mail while his/her computer or terminal is being used for other tasks such as letter writing and data processing. In other words, the Mailbox will receive and store messages while you are away.

Accessories (Goodies)

If you are interested in getting into the new



KD4JKX-8/ILM antenna near Wilmington and Carolina Beach, North Carolina. The quads look inland to handle traffic into the Southeastern Emergency Digital Association Network's system. When hurricane season begins to threaten the coast, these nodes will become super active.

packet picture transfer trend that is getting so much attention throughout the packet community, then you likely will want to develop your own means of picture generation. Packet picture generation is accomplished similar to the way pictures are made for Slow-Scan Television (SSTV).

The MFJ MultiCom.EXE Program enables transfer of still-frame video (binary) pictures. These pictures appear on the screen as they are being received, and automatically save to disk at the same time. The MultiCom program comes with support programs that you load and allow to "terminate and stay resident (TSR)." If a graphic or picture that you wish to save is displayed on the screen, a **Crtl/Alt G** can be executed to capture the picture to disk for use in packet picture transfers.

Using The Packet BBS

Because there are so many different BBS versions and types, the following commands will address only the BBS instructions that are most used, or those in general use in most packet BBS formats.

If it is your first time on the BBS, you will be asked to enter your **Name, QTH, Zip code,** and **Home BBS**. The format is as follows:

N	**BUCK**
NQ	**EVINGTON, VA**
NZ	**24550**
NH	**KQ4OK**

The **N** command can be used to register your name, and the **NQ** command can be used to enter your QTH. To enter your name type **N your name** (example: **N BUCK**).

To enter your QTH use the command **NQ your QTH** (example: **NQ EVINGTON, VA**).

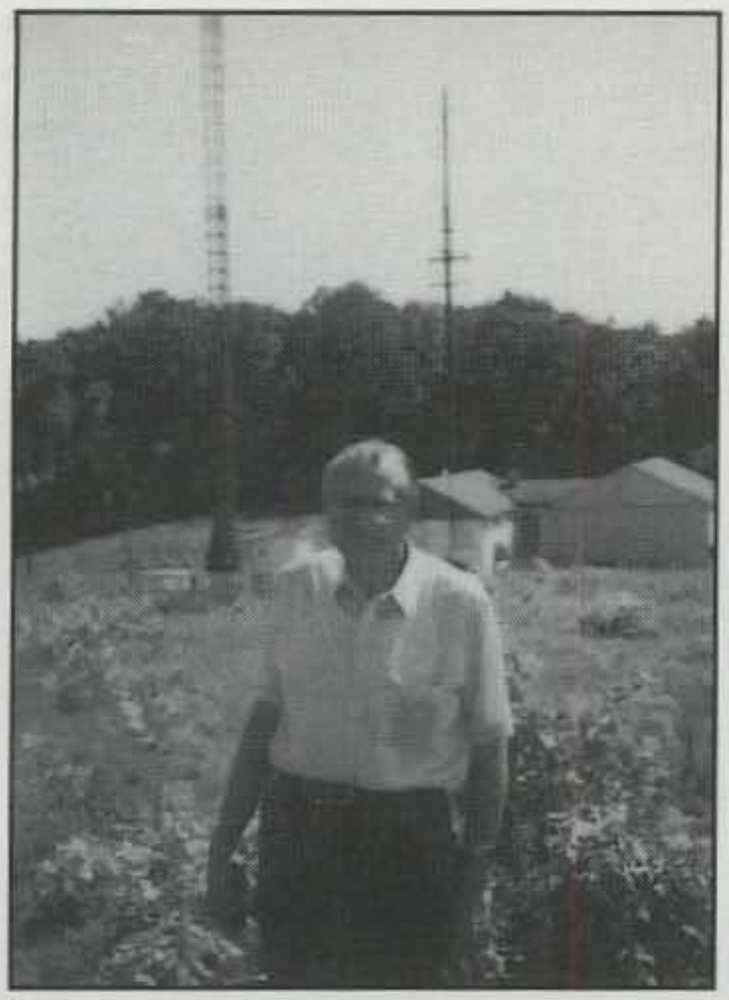
To enter your Zip or postal code use NZ code (example: **NZ 24550**).

To enter the BBS on which you receive mail use **NH callsign** (example: **NH your home BBS**).

The BBS will then greet you using your name. In some cases the BBS greeting will contain both the name and the callsign. After the greeting a list of abbreviated commands will appear on the screen. The greeting may appear similar to the following:

KQ4OK> Hello BUCK, K4ABT Welcome to KQ4OK BBS [BBS type/number]
KQ4OK> **A,B,C,D,G,H,I,J,K,L,M,N,P, R,S,U,V,W,X,?,***

The following is a list of meanings for the abbreviated command letters shown above: **B** Bye, **C** Conference, **D** Download, **G** File search, **H** Help, **I** Information, **J** Calls heard, **K** Kill message, **L** List messages, **M** Message of the day, **N** Enter name/QTH, **P** Path to call, **R** Read message, **S** Send message, **U** Current users, **V** Version/Info about BBS, **W** What files, **X** Expert, **?x** Info about command x, * Comment line. The **A**bort command can be used to abort the output from many of the BBS commands, such as **D**ownload, **L**ist, and **R**ead, for example. The **B**ye command disconnects you from the BBS; use it when you are done!



The site of the N4ZRT-7/CFNC node at Cedar Falls, North Carolina. Due to extremely deep residue (junk), Dwight Ayers, N4ZRT, was unable to get to the node TNC and transceiver. However, he did manage to give us a shot of the WKXR AM antenna farm where the CFNC node resides atop Okie Mountain near Asheboro and Cedar Falls, North Carolina.

The Conference mode or command should not be used on a BBS that is being operated on a Local Area Network (LAN) frequency with high usage. The conference mode of a BBS can present a gridlock situation if the BBS is being accessed by other users at the same time the conference is in use.

The **D**ownload command is used to read a file stored on the system.

The format of the command is **D filename** where "filename" is the name of the file to download. To see what files are available for downloading, use the **W** command. To download a file in a subdirectory, use **D filename**.

I by itself gives hardware configuration of the system. **ID** gives a list of the ports and digipeaters/gateways available.

The **J** command lists stations recently heard on the various ports and stations that recently connected. Use the **P** command for path to stations that have connected recently.

The **K** command is used to kill (delete) old messages from the system. You can kill only those messages that are to or from your station. The format of the command is **K**, space, and then the number of the message to delete. You can also use the command **KM** to delete all messages *to* you that have been read.

Use the command **KT[msg#]** to kill NTS traffic you are going to deliver.

The **L**ist command lists selected mes-

"Quentin's node" KD4IUJ-7/PGNC at Pleasant Garden, North Carolina. It's there, third shelf from the bottom, right side.

sage headers. The following formats are available:

L—List messages since you last used the B command.

LB—List bulletins (all of them; use with care!).

LM—List messages to or from you (List Mine).

LN—List messages with type of N (List New).

LL #—List the last # messages (example: **LL 10**).

L< callsign—List messages from callsign (example: L< K4ABT [this would list all messages FROM K4ABT]).

L> callsign—List messages to callsign (example: L> K4ABT [this would list all messages TO K4ABT]).

For a short description of the commands at your packet BBS use the **H** command. For more information about a particular command type **?x**, where **x** is the letter of the command.

Putting * at the beginning of a line makes it a comment. It also suppresses the next command prompt (but the system will be waiting for another command). * is useful to answer the SYSOP if you get a **MESSAGE FROM SYSOP** . . .

One final note: After you read any messages directed to you, kill that message using the **KM** command.

Packet Radio Offers Something For Everyone

The X1 node is beginning to attract many users, and it is a natural for our LAN frequencies. Not only can it be used as a node to connect out of the LAN, but it also doubles for use as a roundtable packet session when using the **TALK** conference/mode.

In version X1J2 there is an add-on hardware modification that allows the users to examine their deviation (modulation) level, check signal strength, read temperature at the site, or check the voltage to the radio and TNC/node at the node site. This hardware PC-board add-on is available from PacComm and MFJ Enterprises.

In the case of the "**DEV**iation" test, if there is too much or too little deviation, the user may adjust it accordingly. Further connects to the X1J2 node will allow them to determine when the Frequency Modulation (FM) is set to the correct amount. The preferred deviation for 1200 baud packet is **3 kHz.**

cmd:C SEDAN
cmd:*** CONNECTED to SEDAN
SEDAN:K4ABT-7} Welcome to SEDAN node near Evington, Virginia
M
SEDAN:K4ABT-7}

Callsign	Pkts	Port	Time	Dev.	Type
K4ABT	1	0	0:0:0	3.0	(I'm currently connected)
KD4BNQ-7	11	0	0:0:27	3.4	Node
KC4SUE-7	984	0	0:0:28	2.7	Node
KN4UN	6	0	0:3:45	3.4	—
W4FTV	11	0	0:4:8	3.4	Node
KD4JKX-7	5	0	0:6:24	3.4	Node
KD4HVZ-7	10	0	0:18:3	3.4	Node
N4ZRT-15	25	0	1:14:0	3.3	—
WB4QOC-6	7	0	2:37:0	3.6	Node

Fig. 1– An actual MHeard list from the local SEDAN node at Evington, Virginia. Note the deviation readings.

Fig. 1 is an actual **MHeard** list from the local SEDAN node at Evington, Virginia. Notice the **DEV**iation readings shown under the column heading "Dev." The column "Time" lets the user know how long ago a station shown in the list was heard. Because I'm the currently connected station, the node displays the time as 0:0:0. Dale, KD4BNQ's node indicates the time it was heard as 27 seconds ago, or 27 seconds before I connected. Dwight Ayres, N4ZRT-15, was heard 1 minute and 14 seconds before I connected. Port 0 (zero) indicates that we were heard via the radio port. If the "Port" column displays a 1 (one), then a station would have been heard or seen via the data or RS-232 port of the node.

The outgrowth of this node can be used for networking in a network of several nodes. There are many more features, but time and space prohibit explanation here. To find out more about this new networking node see the August, September, and November 1993 or the June 1994 issues of *CQ*.

Advancing From Packet User To Packet Node SYSOP

The X1J2 code is burned into a 27C512 EPROM which fits into the TAPR TNC-2 or clones such as the DRSI DPK-2 and DPK-9600, the Pac-Comm TNC-200 and Tiny-2, and the MFJ-1270B and 1274.

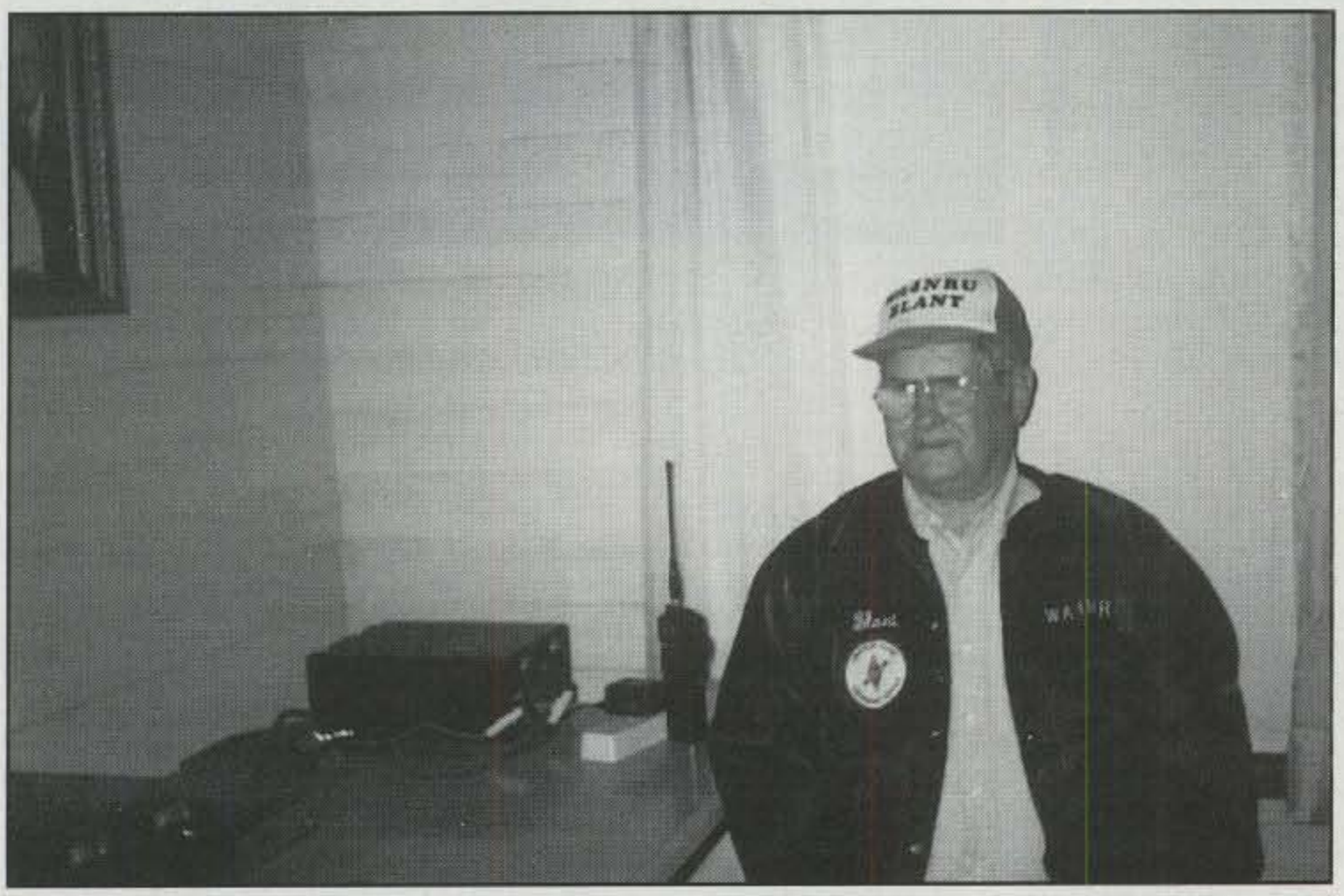
By now you are aware of the need for an EPROM burner. One of the EPROM burners with which I'm most familiar is the PB-10 from Needham Electronics. The Needham PB-10 EPROM burner supports the latest EPROMS and provides a very user-friendly menu-driven program for EPROM maintenance.

The Needham EPROM Programmer I use is $130 from Tucker Electronics in Dallas, Texas. For more information about the programmer and other amateur electronic equipment call Tucker Electronics at 800-527-4642 or FAX 214-348-0367.

As I described in the August 1993 column in *CQ*, the EPROM for the X1 node is burned into a 27C512 EPROM in two parts. The Needham Electronics EPROM burner makes the process easy because we can set the first address to blow the EPROM from 0000 to 7FFF, then burn the second half of the EPROM from address (HEX) 8000 to FFFF. If you have a full 65535 byte image of the X1J2, then all you have to do is load the complete image into the Needham PB-10 and the 27C512 can be cast at one pop.

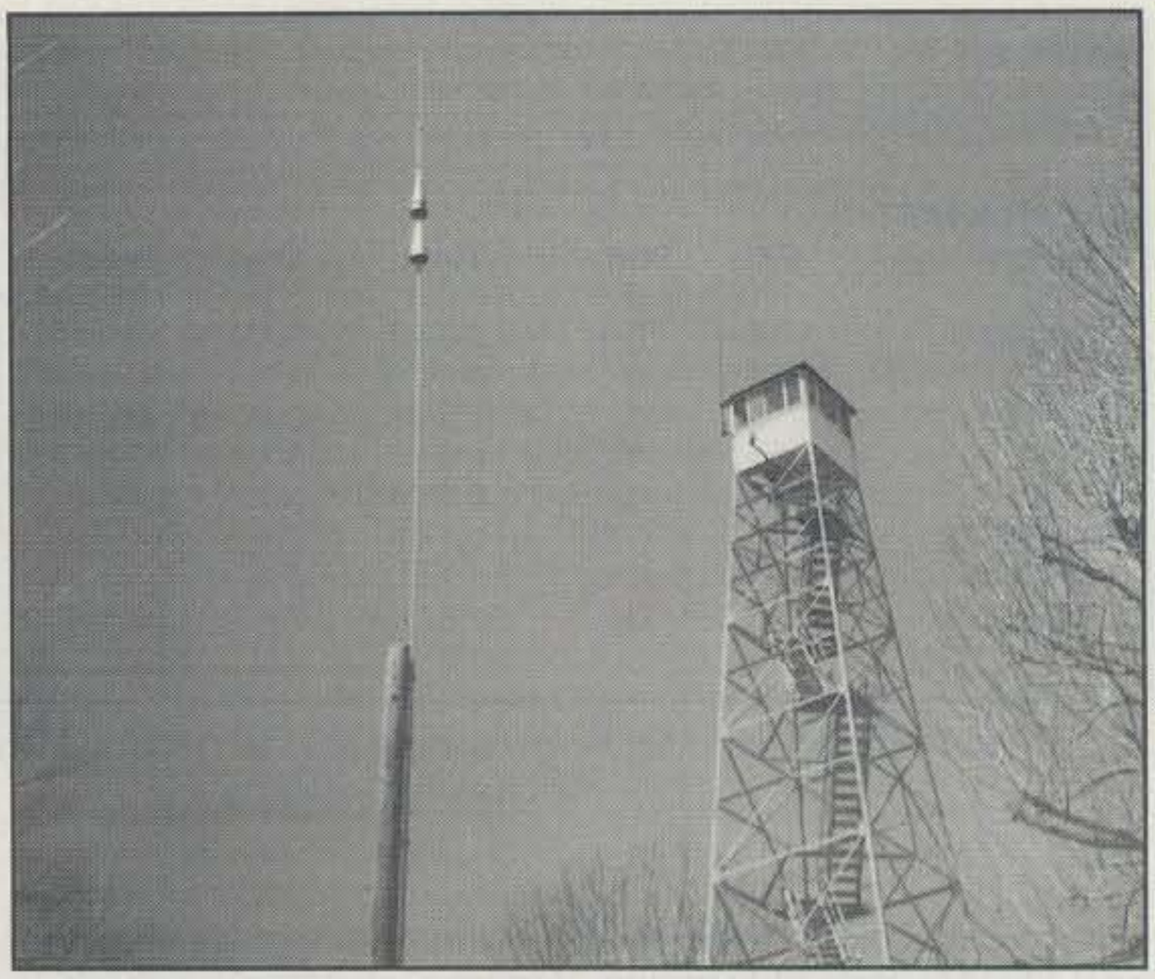
A second way the Needham EPROM programmer makes the job easy is through use of a *Zero Insertion Force* (ZIF) socket. The ZIF socket of the programmer accepts several sizes of EPROM, including the one megabyte EPROMs (27C1001, 27C1010, etc.).

Included this month are photos of a number of X1J2 nodes and node sites of the Southeastern Emergency Digital Association Networks (SEDAN). If you have a node or node site you would like to display, we would like to see it here in the

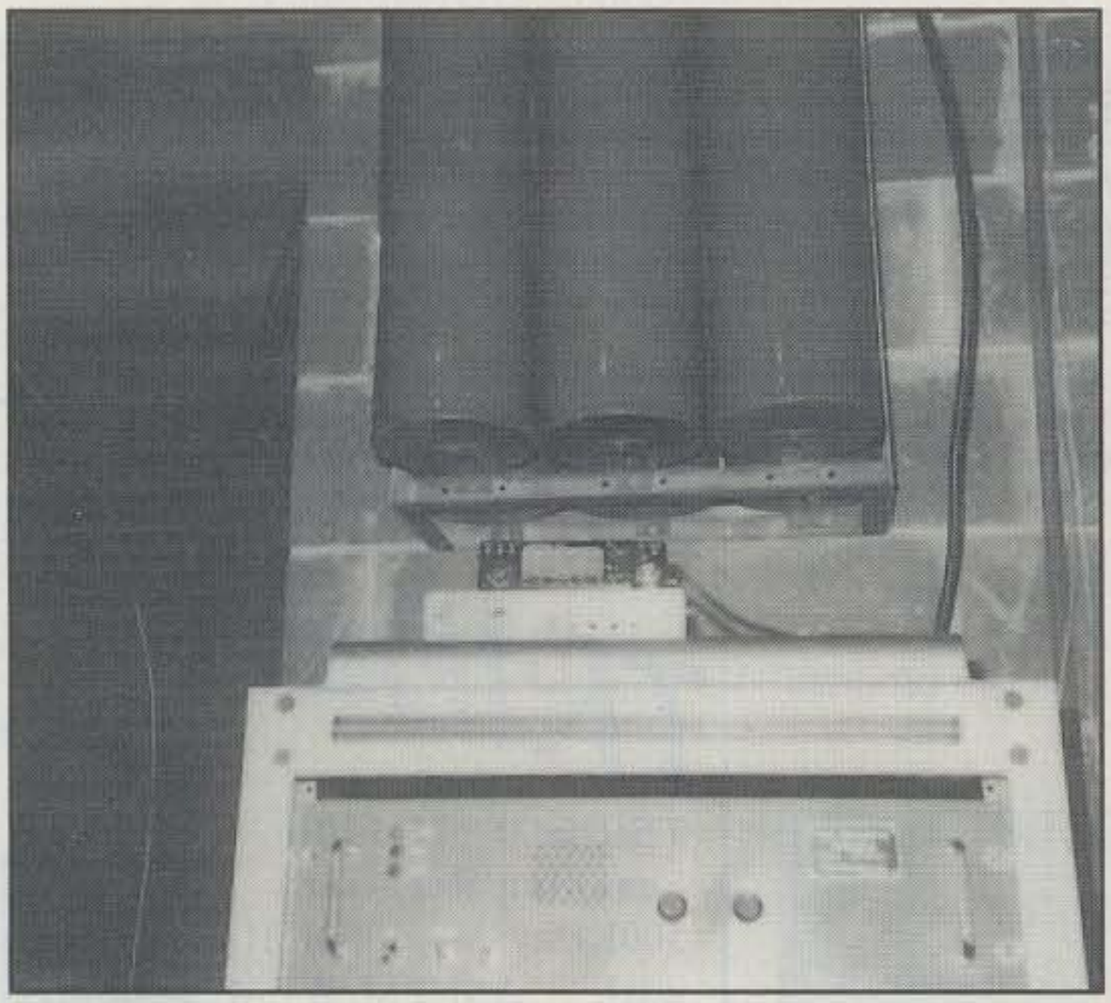


WA4NRU-7/LGA at Lavonia, Georgia is operated by Blant Addison, WA4NRU, of Toccoa, Georgia. Lavonia is a pivot point for K4ZMC-7/MARS, N4TII-7/GVL, KN4WK-7/WKV, and the all-solar-powered W4IXN-7/LULA nodes.

At over 4000 feet, the K4ZMC-7/MARS node at Mars Hill, North Carolina makes itself known in six states. Al Feldman, K4ZMC, brought a jewel to the SEDAN when he built this X1J2 dynamo. The ICOM transceiver and MFJ-1274 are powered by an Astron 35 amp 13.8 VDC supply with full battery backup (not shown).



At 4076 feet, this (MARS) Isopole sees some cold weather and ice when winter comes to western North Carolina and Mars Hill.



WA4GSO-7/WNC at Wadesboro, North Carolina is operated by George Matt-hews, WA4GSO. The node is shown just below the filters (tuned jugs to notch out a nearby voice repeater on 146.235 MHz). Thanks, George. WNC is a real performer in the packet world at 145.770 MHz.

The antenna for SEDAN node "WNC" is atop the hospital at Wadesboro, North Carolina. A well-planned site by the Wadesboro, North Carolina amateur radio group.

Packet User's Notebook column. Send a sharp, clear photo(s), black and white or color, of your node, node-stack, or node site (include an action shot of the node SYSOP, if you like) to: Buck Rogers, K4ABT, 211 Luenburg Drive, Evington, VA 24550.

Shelby, NC Hamfest

The Shelby Amateur Radio Club, in addition to their monthly meetings and civic endeavors, is sponsoring again this year the Shelby, North Carolina Hamfest. It will be held on September 3–4 at the Cleveland County Fairgrounds in Shelby. In addition to the refreshments, fleamarket, prize drawings, and VEC exams (at 2 PM each day; preregistration requested, contact N4NH, No. 7 Skylyn Court, Asheville, NC 28806), at 10 AM Saturday there will be an entry-level packet forum presented by K4ABT that will start with the basics and proceed to an introduction to the more advanced levels of packet radio. A meeting of the Southeast Digital Association Networks will be held at the same location on Saturday at 1:30 PM for additional planning of the SEDAN packet backbone and to elect the 1994–1995 officers.

For additional information on the hamfest contact John Ledford, N4GOQ, 3410 Oakcrest Drive, Shelby, NC 28150 (704-482-4507).

Happy Packeting!

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MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

Switching Inductive vs. Resistive Loads With Relays

Recently my company delivered a fiber-optic sensing system that had as an output the requirement to drive three DC relay coils from a set of isolated relay contacts within our equipment. We were told that the current drawn by each of these relay coils was on the order of 250 ma, and by using common design practices as well as what was in stock, we chose to use a relay with a 5 ampere DC contact rating. Since the total load would only be approximately 750 ma, there seemed to be plenty of leeway. Furthermore, since the relay to be used in our system was a high-quality unit with gold flashed contacts, we did not give this portion of the circuit any further thought.

Surprise! Upon turn-on at the customer's location, our output relay operated a grand total of eight times and then firmly welded its contacts together. Measuring currents did show a maximum steady-state current of 750 ma, but as our relay contacts opened, an arc almost 1/16 inch long was produced. This arc quickly pitted and corroded the gold contacts, which then proceeded to weld. I, as the designer, had forgotten to take into account the basic fact that the load we had to drive was inductive (a coil of wire). Fortunately, the customer was quite understanding (and almost amused, since the most complex portion of the system performed flawlessly), and we proceeded to correct the problem quickly.

Fig. 1 is a schematic diagram of the "problem circuit" and the waveshape of the voltage across the coil. For simplicity the three relay coils have been replaced with one. When applying voltage to the coil, current slowly builds up to the maximum value determined by the resistance of the coil (I = E/R), as one would expect. When breaking the circuit, however, the abrupt collapse of the magnetic field within the coil causes a large voltage to be induced across the coil. This voltage (called the back-EMF) is often large enough to jump a small air-gap and "cook" the contacts along the way, as happened in our case. If you have a high-resistance DC relay in your junk box, you might wish to try the circuit to see what I mean. Just be careful. If you accidentally connect yourself across the relay coil, you can get a nasty shock.

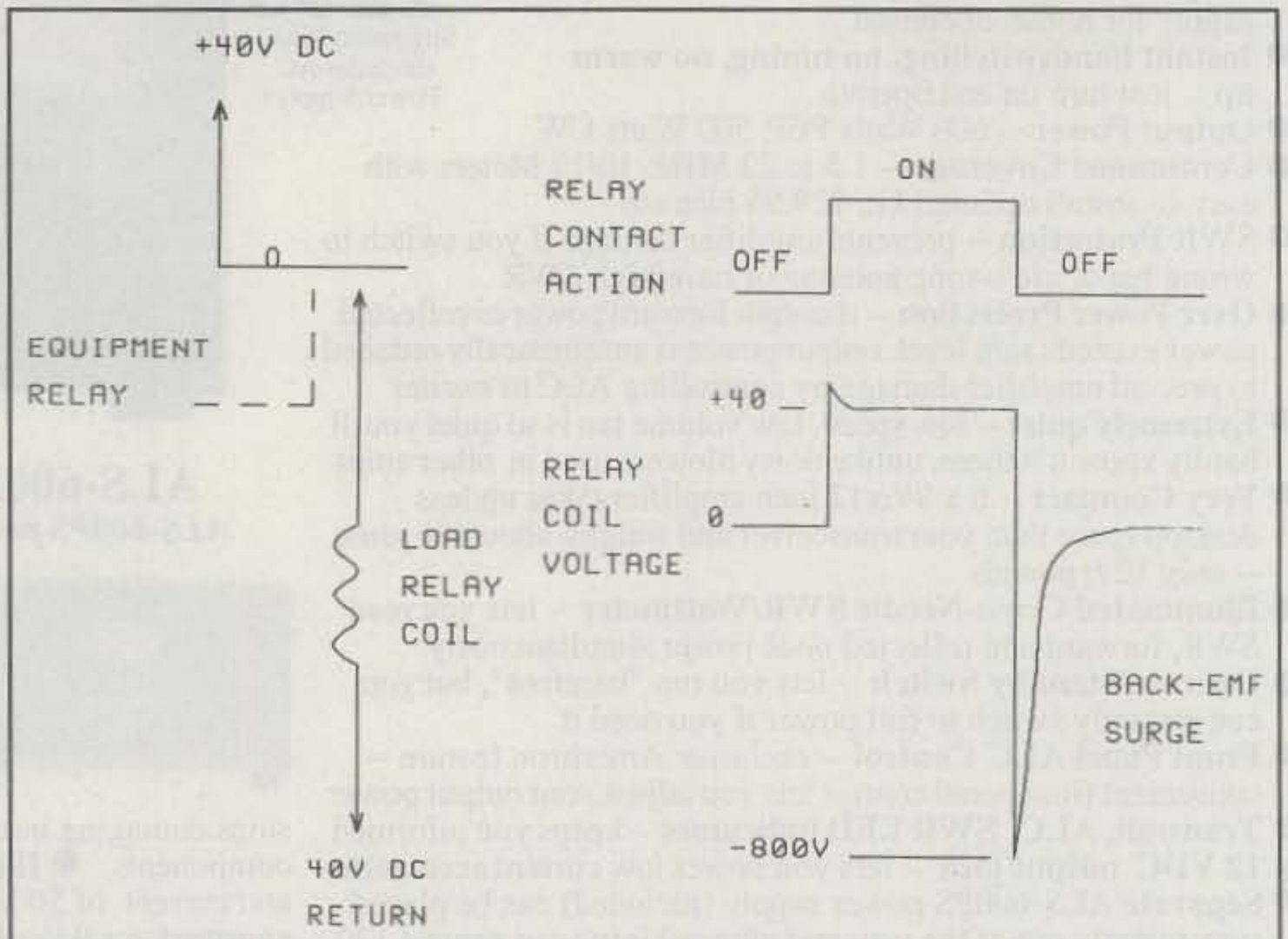

Fig. 1– Problem circuit and wave shape.

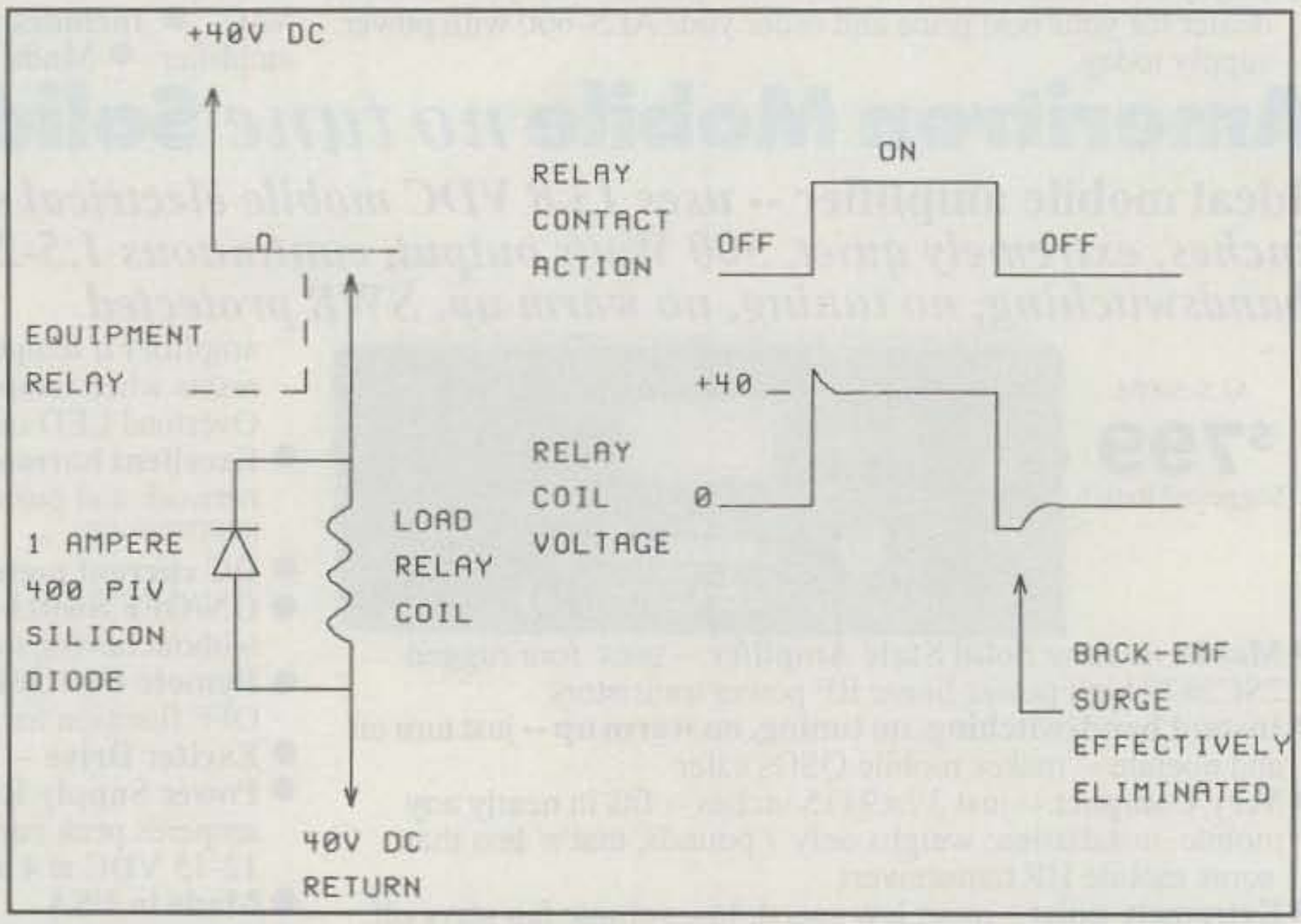

Fig. 2– Using a diode to clamp back-EMF.

Reducing this back-EMF to a level that is acceptable is actually quite easy, and fig. 2 shows a commonly accepted method. The diode does not interfere with normal operation of the relay coil, but effectively shorts out the back-EMF. The only drawback with this method is that while the diode is shorting out the back-EMF, current resulting from that voltage continues to flow and causes the relay to hold in longer than it normally would without

c/o CQ magazine

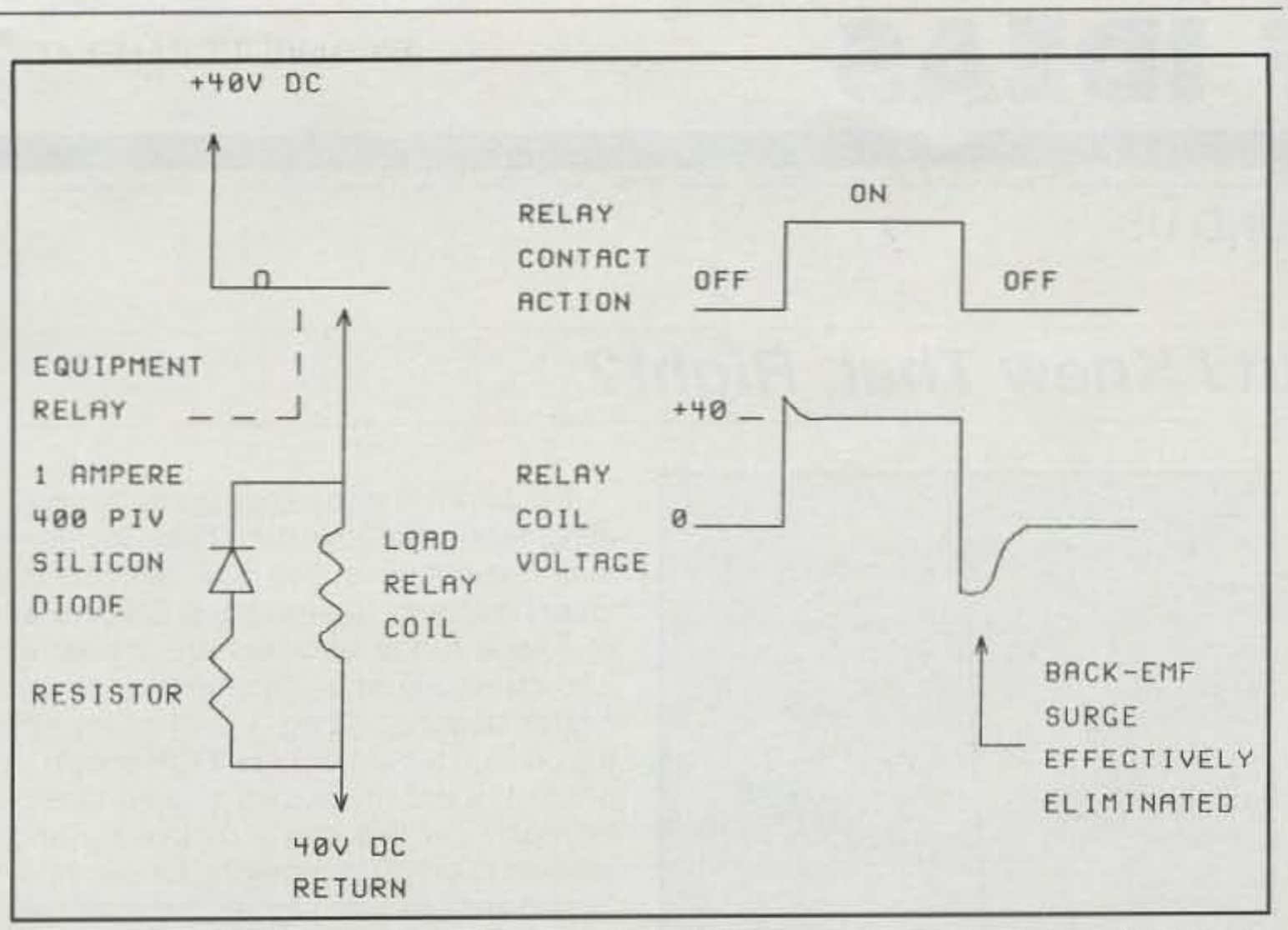

Fig. 3– Diode/resistor back-EMF clamp. Note: Value of resistor determined by experiment (330 ohms typical).

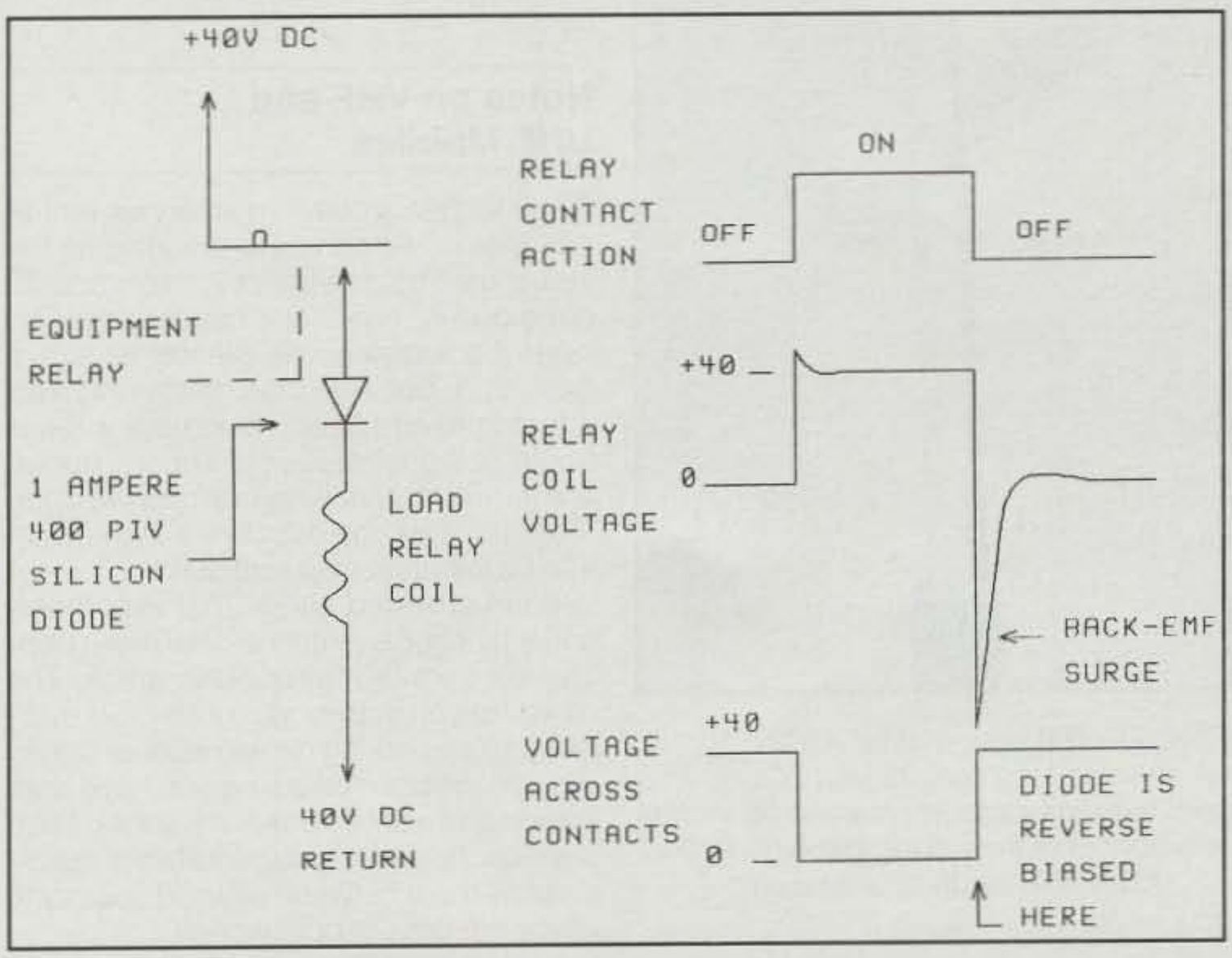

Fig. 4– Using a diode to protect contacts.

the diode. If this is not a problem in your application, you need not go any further. If release time is a consideration, a resistor in series with the diode, as shown in fig. 3, will reduce the drop-out time at the expense of an increase in the back-EMF value. Experiment until you have a situation you can live with.

In cases where the inductive load is not available, the circuit of fig. 4 may be used. Here a diode is connected in series with the contacts to be protected. When the load is energized, the diode conducts in the normal manner. When the load is de-energized, the back-EMF is blocked, since it reverse biases the diode. In this circuit the diode has to have a reverse rating that is greater than the expected level of the back-EMF voltage.

In any event, don't make the mistake I did. Back-EMF voltages from inductive loads such as relay coils, solenoids, motors, and virtually anything that has a coil in it can often rise to levels that not only pit and weld contacts, but can damage sensitive solid-state peripheral circuitry.

73, Irwin, WA2NDM

WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

But I Knew That, Right?

This month's column was inspired by recent conversations with new licensees. It covers a variety of topics somehow overlooked or assumed known and omitted from most present-day amateur books and magazines. If the material presented this month helps you over a stumbling block or clarifies an area of confusion, let us know so future columns can feature more information in this direction. I may be inviting a new flurry of additional mail with that invitation, so please remember to include a self-addressed, stamped envelope (SASE) with any brief "special questions" that cannot be answered directly through this column and be patient for a reply. My mailbox continues to overflow, and time limits the number of letters I can answer.

I should also point out much of our upcoming information is beneficial not only to newer licensees, but also to more experienced amateurs investigating new areas of interest, as the same ground rules apply to both. You are joining an in-progress activity, and a few tips from a friend who has been down the same road are always helpful. Looking from that standpoint, we can thus say a question need not be technical or complex to warrant an answer. You need advice, and we are here to help. It's that simple, so let's get started with the advice!

FM Handheld Tips

An FM newcomer recently asked us why his handheld's signal-strength indicator always read full scale when using an outdoor or mobile antenna, but worked normally (?) with its supplied "ducky" antenna. He was also perplexed as to why that full-scale reading did not drop back to zero after a station stopped talking on a local repeater. How could he determine which repeaters were within usable range or when to call another station through the repeater? Two good points/questions!

A handheld's meter is indeed good for finding strong-signal spots when using a stubby antenna, but a larger antenna mounted above and clear of obstructions helps make all signals stronger (no "hot spot hunting" needed). A "pegged" indicator (one with all LCD segments showing) usually signifies you can reach that tuned-in repeater in fine style. Enjoy!

4941 Scenic View Drive, Birmingham, AL 35210

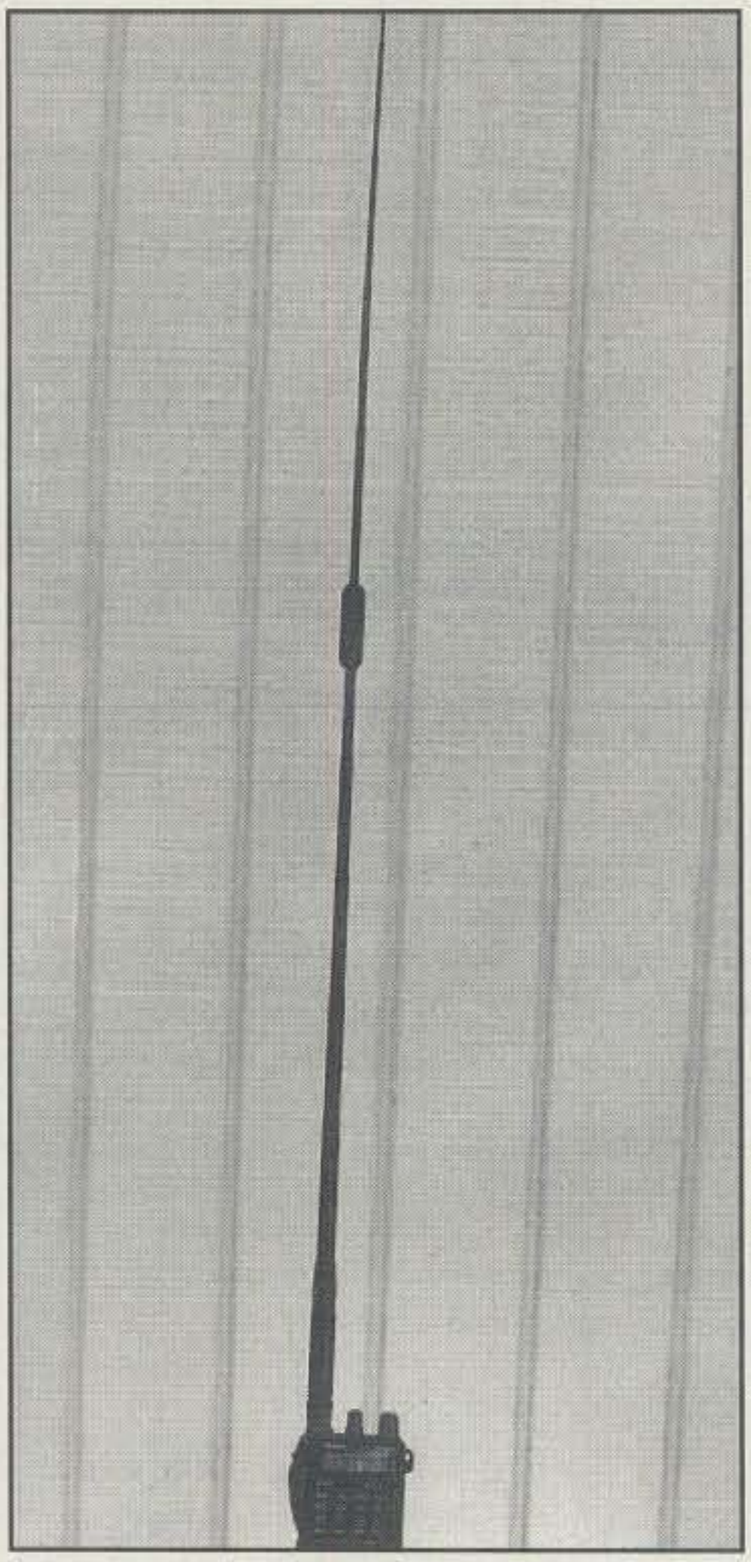

Photo 1– The new Maldol AH-210R pull-up antenna for 2 meters and 70 cm. This gem extends to an impressive 36 inches in height and truly adds big signal clout to an FM handheld transceiver.

Most repeaters also stay in their signal-relaying mode several seconds after each station stops transmitting to minimize equipment wear. Some have a courtesy beeper that sounds at each (user) transmission's end (your chance to call and join the conversation!). Otherwise you will hear a squelch drop (quissh). A few seconds later you will hear a second "quissh" as the repeater switches off/back to quiet mode (your rig's signal indicator then drops back to zero). Listen to a couple of repeaters a few minutes to clarify this explanation.

If you want to enjoy a real portable operating treat with your handheld, incidentally, snap one of the new tall pull-up antennas on its top-mounted BNC socket. These range boosters are a blast of fun, especially when vacationing, camping, or beachcombing. I particularly like the 36 inch tall Maldol AH-210R shown in photo 1. It lets my pocket-size transceiver reach out like it is a mobile rig and retracts to only 9 inches long for carrying. Stated another way, signals that read only two or three "S bars" when using a ducky antenna are increased all the way to full scale with the AH-210R. Try one; you'll love it!

Notes on VHF and UHF Mobiles

Since longer is better in antennas for FM handhelds, we can naturally assume the same logic holds true for 2 meter and 70 cm mobiles, right? Not necessarily. The taller the antenna, the greater its signal gain, true, but antennas measuring over 4 feet from end to end also have a lower angle of signal radiation. These "storks" are terrific for reaching out from the open road, but they can direct your signal right into (rather than over) tall buildings when used in crowded cities. That is one reason why shorter antennas are more popular on cars in metropolitan areas. The other reason is they slip under low overhangs (like parking decks) without breaking into pieces. Assuming you have both a short and a tall antenna with similar base threads, however, you can always quick-change them between city and country to enjoy the best of both worlds.

Look at various types of 2 meter and 70 cm mobile antennas, and you will notice a wide selection of models available in the "under 4 foot tall" (city) category. Here again the taller jobs (36 to 48 inches) "get out" a mite better than their shorter (19 to 32 inches) counterparts. In fact, most amateurs find the "four footers" quite acceptable for both city and freeway use. How do they dodge garage roofs? Again, Maldol has a clever answer with their motorized tilt-over trunk lid mount (see photo 2). Just press a button that mounts below the car's dash, and the antenna leans over. When clear of the overhang, press the button again and the antenna rotates back upright. Neat!

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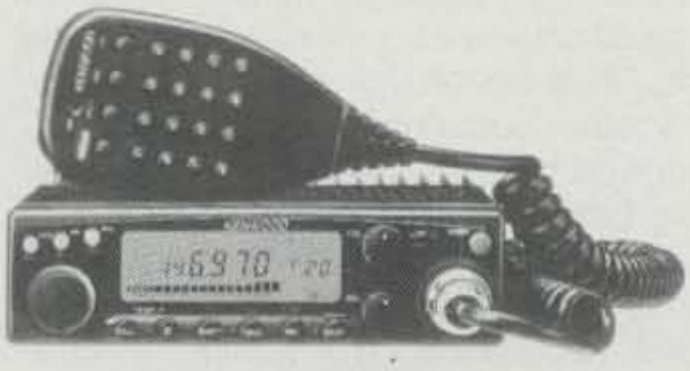


TM-241A

TS-50S

TR-751A

Photo 2– Maldol's MK-30 motorized tilt-over trunk-lid mount with ARD-12B gain antenna for 2 meters and 70 cm installed. Unit is remote-controlled from car's dash and works great!

Photo 3– Main equipment used for crossband repeating: a good 2 meter/70 cm mobile FM transceiver and a trim FM handheld for 70 cm or 2 meters/70 cm. Handheld shown is Standard's new C-108, which is incredibly small (1" × 2" × 3") and available in 2 meter or 70 cm versions.

While on the subject of mobiling, I must include some time-proven tips for minimizing RF interference and/or RF feedback in today's computerized cars. This phenomena is usually recognized by flashing instrument lights, automatic locking doors, changes in engine speed, etc., when transmitting with more than 10 watts of power. Its level of "seriousness" often varies between cars, diligence of rig installation, and efforts devoted to system grounding.

The most common mistake mobileers make (VHF and HF!) is depending on the negative wire in their rig's power cord for proper grounding. The cable routes several feet to the battery and then depends on additional wiring to reach the car's frame, thus becoming a phantom antenna. Another common habit is using a non-grounded mag-mount antenna (its coax cable becomes another phantom antenna, and it too connects to your rig). Both of these potential problem areas can be "cut down to size" by installing a separate ground strap from your rig's cabinet (or rear ground screw) to the car's frame. Use your ohmmeter to find an under-dash grounding screw actually connected to the car's body rather than just securing to plastic. Alternately, check out one of the shiny bolts under the car's front seat; they attach the seat to the frame, and make superb ground points. No ohmmeter handy? Use two clip leads with your code practice oscillator to find "read ground" connections on your car. Touch one clip lead to the ignition switch or a seat bolt, then touch the other lead to various bolts until you hear a tone.

Use that same procedure to ensure that your antenna cable's shield is grounded. No connection or tone? Double check the antenna's mount to ensure its clamp tips or set screws are cutting through paint and contacting body metal. If necessary, scrape off some paint or body coating where set screw ends touch or add a separate ground strap from the mount to the frame. Ground straps can be made quickly, incidentally, using the flexible shield/braid removed from an old piece of coax cable (RG8-size preferred, as it has more surface area than RG-58). Carefully slit and remove the rubber outer jacket, slightly push the shield's ends toward each other to produce some slack, then slide off the shield. Add alligator clips to one or both ends if desired, install, and check for good ground connections with your ohmmeter or code practice oscillator.

The previous steps usually solve 90 percent of all mobile RFI/RF feedback problems. They also explain why two mobileers with exactly the same make and model car (and even rig!) experience completely different results. In 9 percent of the remaining cases unexpected entanglements can be cleared by use of toroid cores. Round, stubby cores like the ones fitted on computer monitor cables are ideal if you can find them. Alternately, MFJ's (larger) snap-on toroids are fine. Install the toroids near your transceiver by winding three or four turns of each cable going to the rig (power, antenna, speaker, etc.) around each core. The toroids "let your setup work normally"; they just minimize cable radiation. Remember this tip. It also helps reduce stray RF problems in home and portable stations.

Crossband Repeating

This unique feature is being included in new-style dualband FM mobile transceivers, and it can prove a real treat when visiting fringe areas or vacationing. A real-life example best describes what crossband repeat is and how you use it, so here are the details. Refer to photo 3 and fig. 1 as we continue.

Let's say you are enjoying a weekend at the beach and area repeaters are beyond your FM handheld's range but quite accessible with your high-power mobile rig. You dial up an unused/open 70 cm simplex frequency such as 446.05 MHz, tune in a desired 2 meter repeater's frequency (such as 146.01/146.61 MHz), then switch on the mobile rig's crossband repeat function. The exact keypunch sequences vary between rig models. Check your manual for specific details here. My description is necessarily "generic."

Next you tune your FM handheld to 446.05 MHz and listen to the 2 meter repeater (which is being relayed from 146.61 to 446.05 MHz by your mobile rig). After the repeater's squelch drops, you

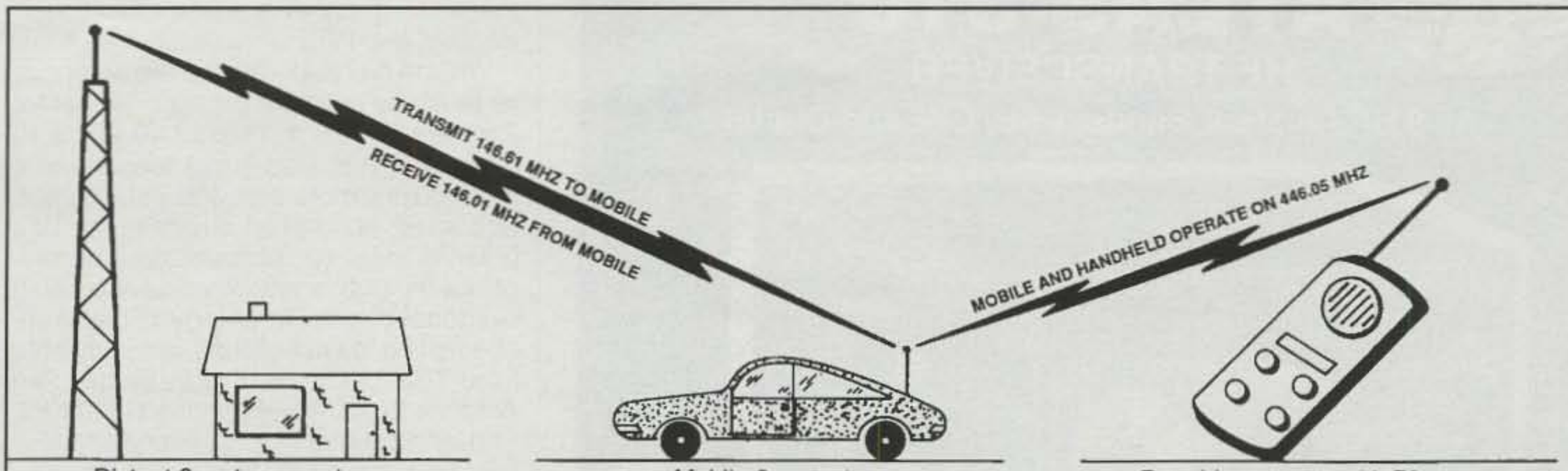


Fig. 1– Basic operational concept of crossband repeating and remote-controlled mobile setup. (Explanation in text.)

transmit back with your handheld (which sends your signal to the mobile rig on 446.05 MHz, and the mobile rig relays it to the repeater by transmitting on 146.01 MHz). Bingo! You just communicated over a 50-mile-plus path while sunning or scouting souvenir stands. Still with me? Okay, now let's add some fine points.

Referring back to the previous example, let's say you could copy the distant repeater fine on your dualband FM handheld and only needed a "power boost" from the mobile rig for reaching back to the repeater. In this case, you set the mobile dualband transceiver to transmit on 146.01 MHz but receive on a known-quiet 2 meter frequency. (Yes, there are still quiet/unused frequencies in fringe areas; just hunt for them.) You also tighten the 2 meter squelch to avoid falsing by DX. The mobile rig then only relays your signal to the repeater, and you copy the repeater directly on your handheld (a nice "rest period" for your mobile rig!).

Many dualband transceivers with crossband repeat capabilities also include remote-control operation. This feature lets you switch their repeat function off, select various memories, change power levels, then switch the repeat function back on—all from your handheld FM rig. Some of the fancy dualbanders can even be fitted with an optional voice synthesizer that will verbally announce a selected memory's frequency back to your handheld rig—a neat "finishing touch." Once again, refer to your mobile rig's manual or ask the company's technicians for details on this feature.

The applications for crossband repeating are limited only by your imagination, but remember it must be used in a conscientious and responsible manner to remain acceptable and legal. Also remember other amateurs should not experience interference from or unexpectly access your "remote mobile." Security and control are vitally important!

Assuming your mobile rig can be set for low power on 70 cm and high power on 2 meters, an in-car placed 70 cm ducky antenna can restrict remote access range. Alternately, using medium power for both bands and a trunk-mounted dualband antenna will pump out a great signal on both 2 meters and 70 cm. (In other words, you want long range on 2 meters and short range on 70 cm, but hit a "happy compromise.")

Mobile transceivers can become quite warm during long periods of crossband repeating (because one transmitter is always "on"), and some repeaters stay busy almost all day (whew!). What to do? Always stay within quick-walking distance of your "remote mobile" so you can manually switch off its crossband repeat mode when necessary. Notice that stipulation also coincides with (70 cm) access range of a well-planned "remote mobile."

Finally, notice my discussion of crossband repeating had as an example using your handheld rig on 70 cm to operate 2 meters rather than vice-versa. This is not a law, but it is the preferred and socially accepted policy: Don't "push it"; just enjoy the fun of crossband repeating.

Quick Tidbits For Home Stations

We are running short on column space, and the list of helpful ideas is still long. I will thus shift into fast forward and race to the wire. (Reminds you of those forums that run overtime at hamfests, doesn't it?) Occasionally, a mast supporting an outdoor TV antenna is pressed into double duty, also supporting a 2 meter or HF antenna connected to a quick-assembled station. The amateur rig usually works out fine, but TVI can be severe, and traditional low- or high-pass filters will not eliminate the interference. Naturally not! The problem is not related to harmonics or spurious radiation (modern rigs are quite "clean" in signal purity). The problem is sheer RF overloading (the rig's

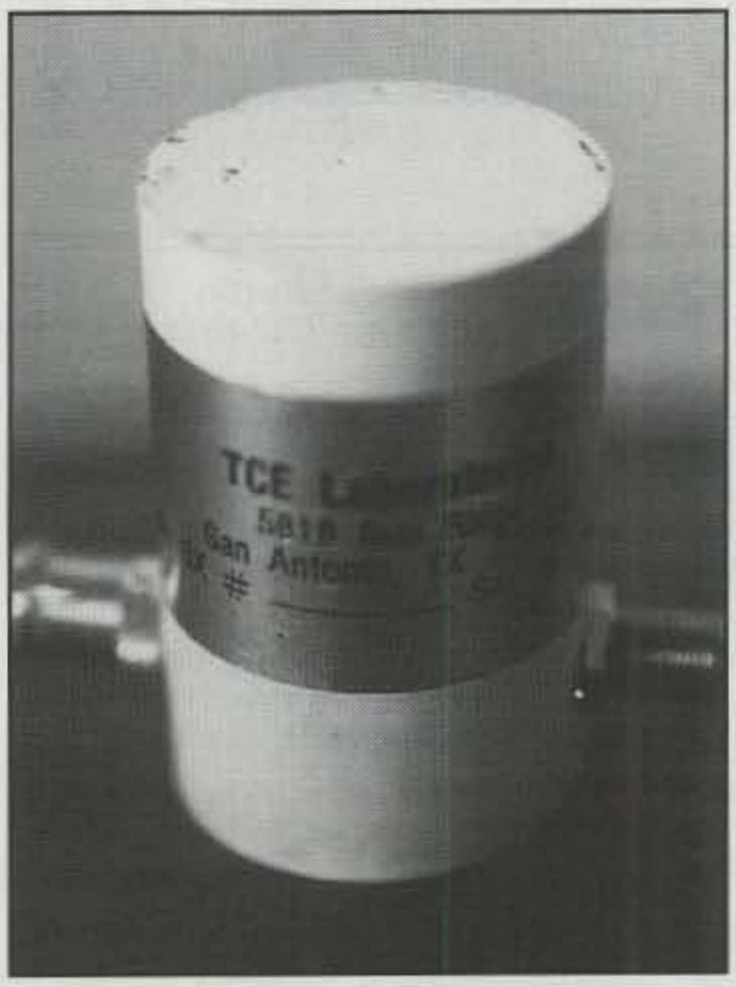


Photo 4– RF absorption device made by TCE Labs. Unit is a blessing for eliminating "impossible to cure" TVI cases.

CIRCLE 75 ON READER SERVICE CARD

transmitted signal is electrically "overloading" the TV).

What to do? Separate the two antennas as much as possible (at least 10 feet for 2 meters; 60 feet or more for 40, 20, or 15 meters). If that step is not feasible or if your rig runs more than 300 watts output, add an RF absorption device to the TV's antenna input (or stereo's input or telephone's input, or any other device being overloaded with RF energy!). These RF absorption devices/filters are available from TCE Labs, 5818 Sun Ridge, San Antonio, TX 78247 (telephone 1-800-KILL TVI), and they work where everything else fails (see photo 4). Honest! In my own case of running 1000 watts output (occasionally, not always!), my TV is absolutely cremated and totally "TVIed" when using usual filters, but clean and perfectly clear after adding a TCE device on its cable input. Try one. You will be delighted with the results!

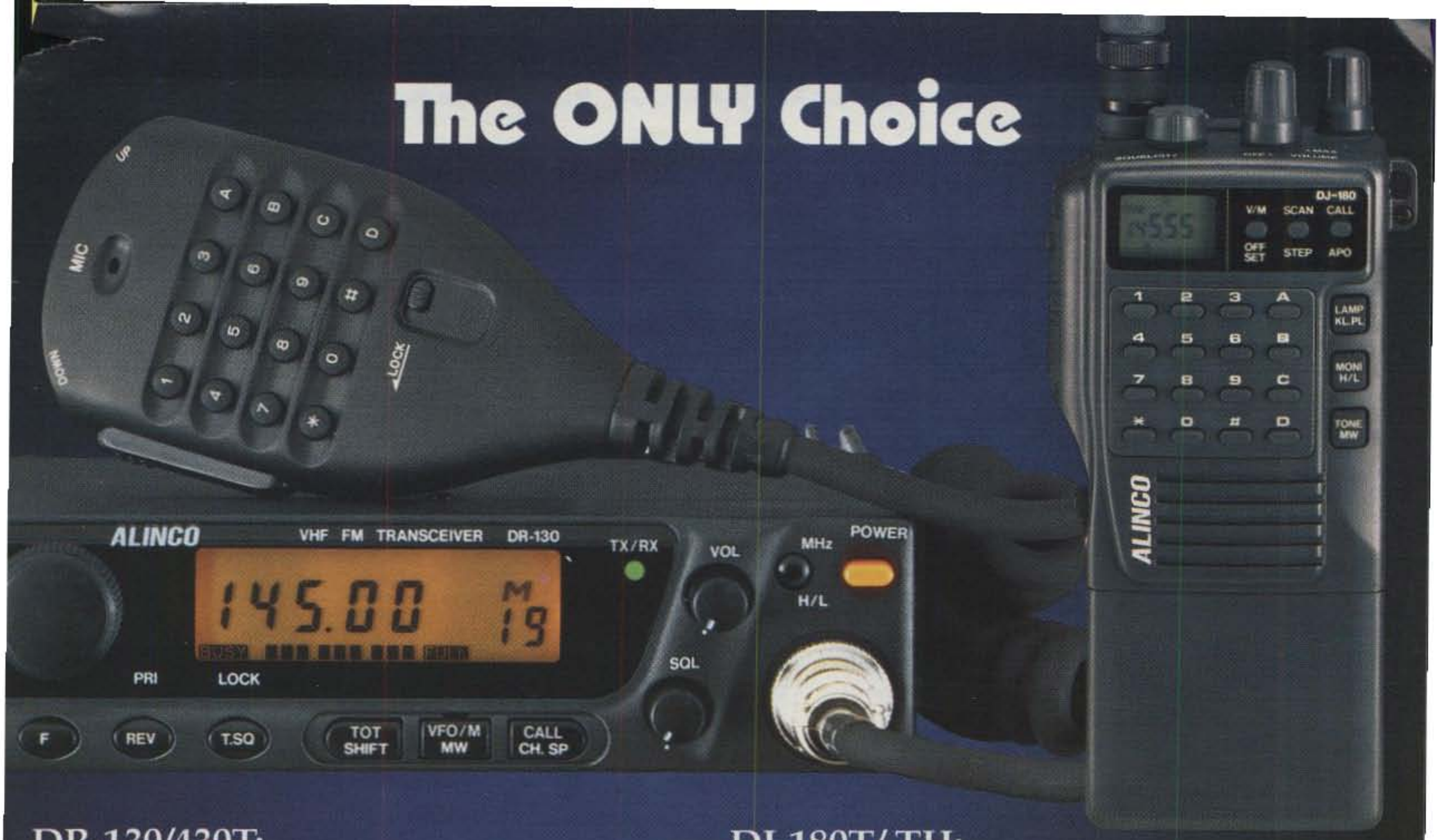
Let's now wind down with some additional quick notes on home antennas for both VHF and HF bands, beginning with the popular question "What is the difference between using a long boom beam and a stacked pair of shorter boom beams." Case in point: Should you install an 8- or 11-element ("long John") Yagi for 2 meter DXing or a pair of 5- or 7-element Yagis to get 3 dB additional gain (approximate) over a smaller size beam? The longer boom beam will be easier to mount on a support mast and will not require a (optional) phasing harness (to feed two antennas). Stacked antennas are a mite challenging to mount, but they provide a wider signal beamwidth. In other words, the longer the beam's boom, the more it must be pointed exactly at a desired station, whereas stacked antennas need only be pointed in the general direction of communications. Interesting, eh?

Multiband vertical antennas are always popular for HF operations, yet many amateurs say their performance is rather poor. What is the story? When used with 12 or more radials and mounted clear of nearby obstructions (atop a roof or hill rather than in a ravine), a vertical can perform very well. Since this antenna is small, however, some amateurs squeeze-fit it between houses, trees, and carports where its radiation is totally blocked by obstacles. Give a vertical "breathing room," or opt for a dipole or Delta Loop. Finally, remember to weather-protect outdoor cable ends and connections with Coax Seal®, not just electrical tape (which allows moisture to seep in and be drawn through coax, increasing signal loss and turning prized antennas into wimps six months after installation).

That's it for this month, but tune in next time. We have a real treat in store: collecting, reworking, and using classic old-time FM handhelds. You'll love it!

73, Dave, K4TWJ

The ONLY Choice



DR-130/430T:

Power Play

The DR-130T packs a big punch. This compact radio delivers 50 Watts of cool running power, and offers the durability and reliability that Hams have come to expect from ALINCO. The DR-430T is a 70-cm version of the same radio, and can supply 35 watts of output power.

These rigs offer 12 additional CTCSS tones (50 total) for compatibility with any repeater system. 20 memory channels are included, but if more channels are needed, simply plug in the optional EJ-19U module, and 100 memory channels will be available. All memory channels can store 'odd split' frequencies, and also store CTCSS encode/decode status.

A 1750Hz tone burst feature is included, and the LCD display has two modes: 'Commercial Display' which shows only the channel number, and 'Amateur Display' which shows channel numbers and frequency. The simple layout of the front panel offers maximum operating efficiency with no confusion, and a built-in Time Out Timer (TOT) can be programmed from 30-450 seconds.

DJ-180T/ TH:

Survival of the Fittest

The rugged DJ-180T features an ergonomics design that fits in your hand like a glove. Excellent sensitivity and great sound make this the radio of choice for demanding operators. The DJ-180TH (High power version) comes with a 12V battery and delivers 5 watts of solid output power.

Ten memory channels come standard, and the unit can be upgrade to 50, or even 200 memory channels with the optional plug-in chips. The DJ-180T comes standard with CTCSS encode and decode, and also has an Automatic Power Off (APO) feature that extends battery life.

Odd Splits! This radio can store repeater offsets from 0 to 15.995 MHz. A different offset can be stored in each memory channel, and most other functions can also be stored independently in each memory channel.

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53rd Annual Convention Mexican Federation of Radio Experimenters

The Mexican Federation of Ham Radio Experimenters (Federación Mexicana de Radio Experimentors invites all amateur radio operators to our 53rd Annual Convention, which will be held in the beautiful paradise of Puerto Vallarta, Jalisco, Mexico, from October 6th thru 9th.

The Vallarta Casa Grande Hotel will host this event in its main convention center and exhibit room. Your purchase includes 3 nights and 4 days (if you wish to extend your stay, more days are available—just contact the hotel), free beverages from 11 a.m. to 11 p.m., as well as daily breakfast and lunch throughout the duration of the convention. To top it off, on the first evening, you will enjoy a Mexican Night Dinner; on the closing evening, dine and dance at the Gala Dinner. Early reservations will give you a preferred rate, as indicated.

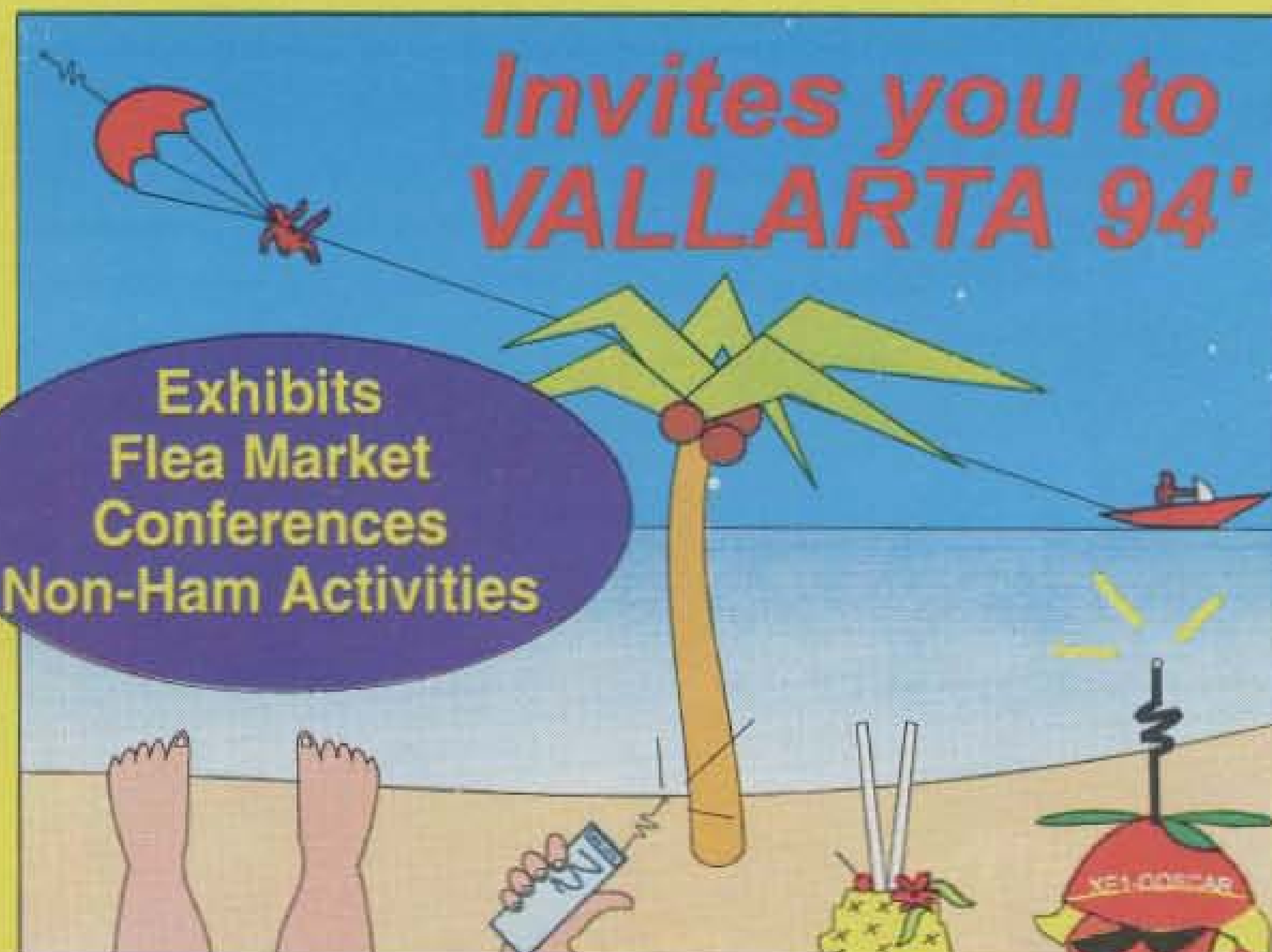
If you plan to attend with your family, great! Two children can stay for free in each room and children's programs are offered. There will also be special entertainment programs available for spouses, so everyone can have fun.

Guided tours of Vallarta are available for anyone who is interested in purchasing Mexican arts, crafts, and souvenirs. Also we'll provide a free shuttle from the hotel to the beach all day long.

During this celebration, the "Ham of the Year," as well as the "Azteca de Oro" and "Azteca de Plata" awards will be presented.

Don't miss the opportunity to enjoy Mexico's most beautiful vacation resort, Puerto Vallarta, and have fun joining our Ham Group from all over the nation!

For further information, please write to:
FEDERACION MEXICANA DE RADIOEXPERIMENTADORES, A.C.
Molinos 51, Desp. 307 y 308,
Col. Mixcoac México D.F. CP 03910
Or send us a fax to:
+ 011 (525) 273-1019



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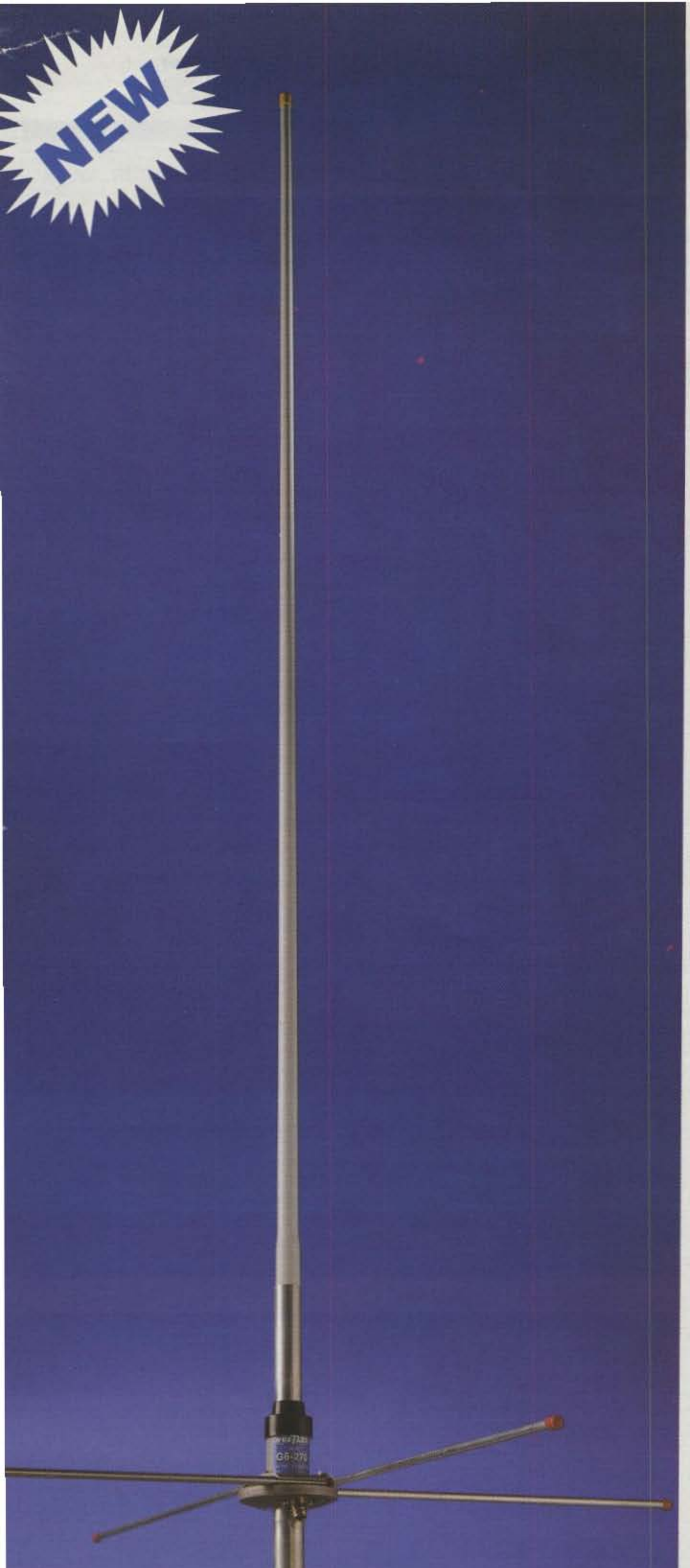

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Made in the U.S.A. of high quality American materials, the G6-270R offers
6 dBd gain (8.1 dbi)on both bands for outstanding fringe area performance.

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The G6-270R is factory tuned for quick and easy installation.

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ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Antenna Notebook

This month we'll touch on a potpourri of current antenna, accessories, and software topics. There's a good deal to cover this time, so let's begin. We'll start with antennas.

Antenna Notes

Unadilla Antenna Accessories. Unadilla has for some time offered several product lines of HF dipole and mobile antennas, W2VS™ "Old Reliable"™ antenna traps, W2AU™ and W2DU™ medium- and high-power baluns, Inline™ coaxial antenna relay switching systems, insulators, and other accessories, many of which were formerly offered by the Microwave Filter Company. Lesser known is that Unadilla also offers a custom line of low-cost, light-weight antennas for VHF and UHF field use. Both beams and vertical groundplanes are offered.

For a flyer, contact Unadilla Antenna Manufacturing Company, P.O. Box 4215, Andover, MA 01810-4215 (508-475-7831).

Down East Microwave Products. Down East Microwave (DEM) is a small company in central Maine that manufactures a broad line of RF products for UHF and SHF amateurs. DEM and its proprietor, Bill Olson, W3HQT, specialize in high-performance amateur radio and commercial antennas, linear power amplifiers, preamplifiers, and transverters. Down East Microwave also distributes products made by others and stocks microwave components, including transistors and specialized cables and connectors.

A unique Down East product is the loop Yagi, as pioneered by G8AZM, G3JVL, and others for weak-signal work at 900 MHz and above. High gain, light weight, ruggedness, and low wind load make them good all-mode antennas in the 900–3500 MHz range. Power dividers and mounting and stacking frames also are available.

A 16-page catalog is available from Down East Microwave, RR 1, Box 2310, Troy, ME 04987 (207-948-3741).

ANT FARM Antennas. This small, two-person Pennsylvania company, operated by Ike Kerschner, N3IK, and XYL Fran, offers several wire antenna kits for radio amateurs and SWLs. For several years the ANT FARM sold only at hamfests and radio shows, with about 200 amateur and SWL antennas a year being produced.

Recently they expanded their direct-mail-order business to feature their mainstay product, the MB-1A, a 94 ft. multiband antenna for all HF amateur bands including 160 meters. The antenna can be erected as a flattop, sloper, inverted Vee, L, or vertical. On all bands, feedpoint impedance is said to be close to 50 ohms. Some gain is achieved on bands higher than 40 meters, and no traps are used. The antenna is sold complete and ready to erect, less only coaxial feedline, for $42 postpaid. A SWL-optimized version of the MB-1A is available at the same price.

In addition, the MB-2A is available for restricted space, being one side of the MB-1A, worked against ground and used in conjunction with a counterpoise, which is supplied. It is $40.

Contact The ANT FARM, P.O. Box 3196, Wescosville, PA 18106.

Svetlana Electron Devices Tubes. Rather quietly, over the past few years Russian power grid tube technology has become available in the United States. Svetlana is Russia's leading designer and manufacturer of such tubes, offering a line of rugged tubes for original equipment manufacturers and end users.

It's an interesting story. The company was founded in St. Petersburg in 1889 and was granted a patent for an incandescent light bulb in 1913. Svetlana, which means "light" in Russian, established a laboratory for developing vacuum tubes in 1928 and won a major award for power transmitting tubes from the International Exhibition of Art and Technology in Paris in 1933; in the same year Svetlana introduced its first X-ray tubes. Svetlana was reorganized as a privatized stock company in 1992 and is the largest power grid tube manufacturer in Russia.

In 1992 Svetlana Electron Devices, Inc., was formed to market the technology in the West. The U.S.-based company is working with the newly privatized Svetlana in St. Petersburg to introduce tube types widely used in Russia but new to Western equipment designers. The companies are also providing a growing line of exact replacement, plug-compatible Western tube types, manufactured to high standards and competitively priced.

For further information, or if you would like spec sheets on any of the company's tubes, contact Svetlana Electron Devices, 3000 Alpine Road, Portola Valley, CA 94028 (1-800-239-6900).

Optoelectronics Frequency Counters Update. Optoelectronics, which recently celebrated its 20th anniversary, has added several new frequency counters and add-on accessories. Prominent among the new products are the several high-sensitivity handheld frequency counters in their HandiCounter® series.

Because the new counters are more sensitive than conventional counters, they often are used in frequency-finding applications and for picking up transmitters and other RF sources at relatively great distances, besides making classic frequency and time measurements. The new counters claim a useful response to frequencies that are only 10 to 15 dB greater

A Unadilla mainstay for over 20 years, the W2AU "Big Signal"® broadband ferrite core transformer baluns are designed for dipole and beam applications. They feature medium power (1000 watts RF) handling capability and broadband operation. (Photo via Unadilla)

In keeping with W2AU balun manufacturing principles, Unadilla also offers its An-sulator™ for dipole or beam coaxial connections. The unit is weatherized to avoid breakage or flashover due to ice or dust accumulation. (Photo courtesy Unadilla)

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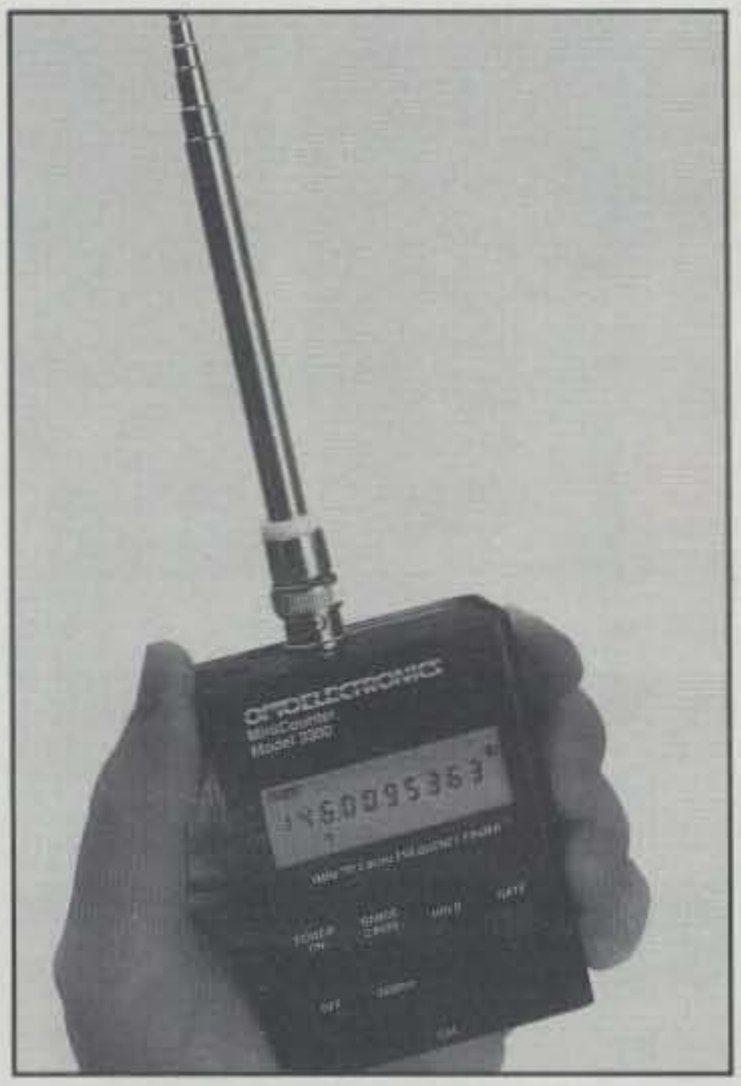

The Model 3300 MiniCounter has a ten-digit display and so has excellent viewing characteristics outdoors and in direct sunlight. The unit, which has a 250 MHz direct count range, covers 1 MHz to 2.8 GHz. (Photo courtesy Optoelectronics, Inc.)

than the background RF level.

The Model 3300 MiniCounter, one of the HandiCounters, is a pocket-size LCD frequency counter. The 3300 has a ten-digit display and so has excellent viewing characteristics outdoors and in direct sunlight. The unit's counter IC has several advanced features including direct counting of frequencies to 250 MHz; the 250 MHz direct count range allows high-resolution measurements that are difficult to equal even with many lab-quality bench instruments. The 3300 covers 1 MHz to 2.8 GHz; it's $129.

An illustrated catalog of frequency measuring and finding equipment is available from Optoelectronics, 5821 N.E. 14th Avenue, Ft. Lauderdale, FL 33334 (1-800-327-5912).

C.A.T.S. Rotor Repair Update. We've mentioned this rotor repair service and parts supplier several times, most recently in June 1990. Over the years we have received several complimentary reports from amateurs pleased with C.A.T.S. service.

C.A.T.S. has expanded its traditional repair services to also include offering several unique accessory products: a special QUIK-CONNECT™ locking connector to replace the "infamous" terminal strip in CDE/Hy-Gain rotors and the "Brak-D-Lay" PC board to provide a seven-second delay time for brake engagement on CDE/Hy-Gain rotors.

A recently introduced product is AUTO-MATE, a preset for Hy-Gain and CDE rotors that can be installed in all controls manufactured since 1974. The device lets you select the desired beam heading by turning only one control knob, at which time the rotor automatically moves the antenna to the selected heading and then stops. The AUTO-MATE also includes the seven-second "Brak-D-Lay," which is available separately.

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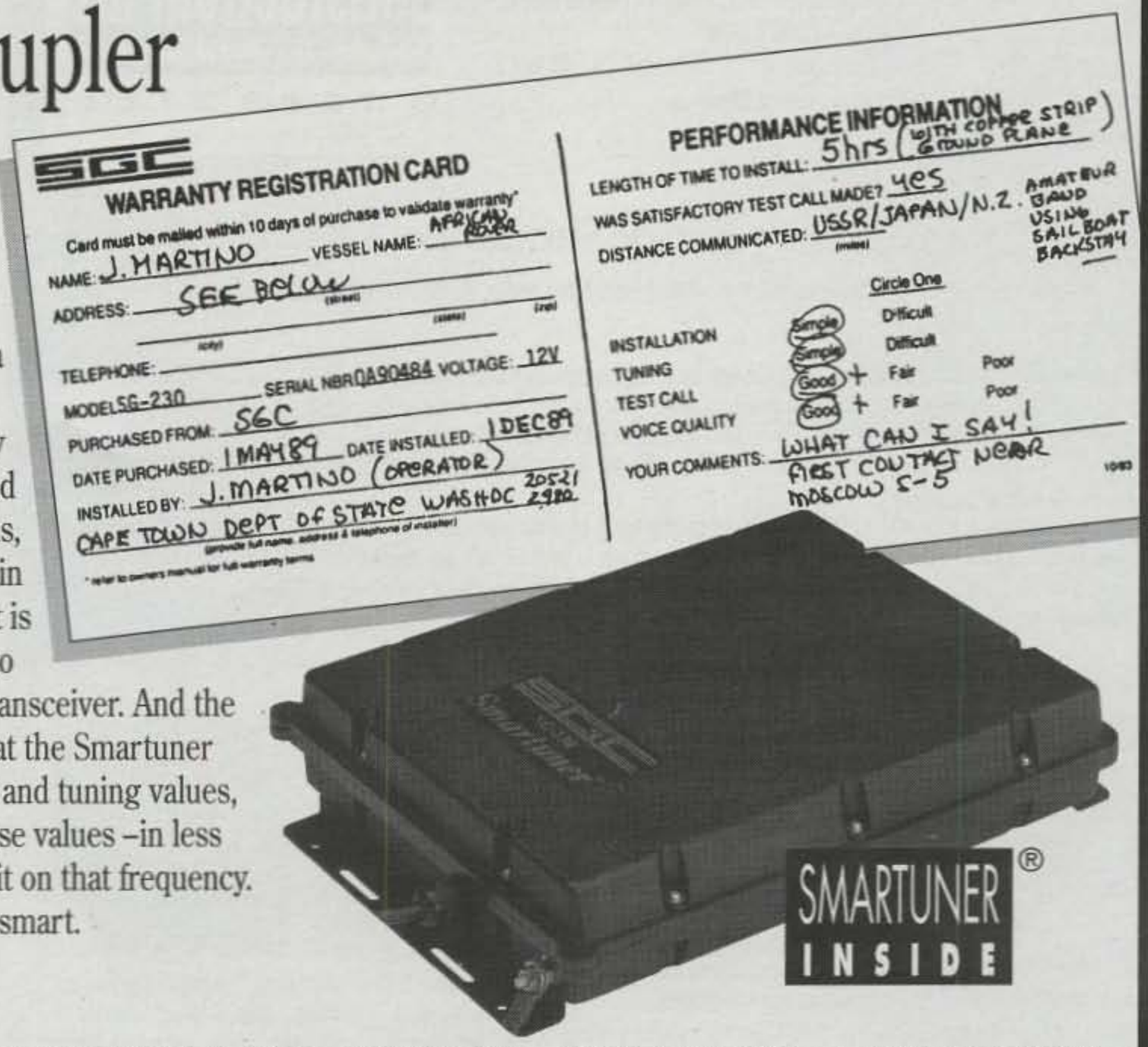

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Transmitter/Antenna Tuning:	Continuous rotation capacitors
Inductance:	12-position switched inductor
Antenna Selector:	Six positions: COAX 1 tuned and DIRECT, COAX 2 tuned and DIRECT, bypass and balanced antenna
Power Switch:	High and low (300 W/30 W)
Dimensions:	10.2" (259 mm) W x 9.4" (239 MM) D x 3.5 (89 mm) H 259mm x 239mm x 89mm
Weight:	3.4 lbs (1.5 kg)

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Over the next several months, we will be introducing more and more Tucker Brand products like the ones on this page. All of our new products will share the same great characteristics like:

1. Quality— All Tucker Brand Products are built using the finest components and construction techniques. They are built to last for years!
2. Innovation— We will strive to bring innovative products with new and better features than those currently available. Our staff is composed of hams, shortwave listeners and scanner enthusiasts and we know what you like.
3. Technical Support— If you have a question or problem with any Tucker Brand Product, call us anytime TOLL FREE at 1-800-527-4642 for a quick answer or solution.
4. 1 Year Warranty— Although, you'll probably never need to use it, all of our products are covered by our 1 year parts and labor warranty.
5. Our Exclusive Tucker SatisfactionPlus Guarantee— We want you to be more than just satisfied with our products. We are so confident you will find these to be the finest you have owned, if you are not satisfied with any products performance, return it to us ANYTIME WITHIN 30 DAYS of purchase for a full refund...NO QUESTIONS ASKED!

Tucker T-275
2500 Watt Fan-Cooled Dry Dummy Load
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The new T-275 is the highest-power rated dummy load on the market today! It will handle 2500 watts average for a full minute! Its quiet fan keeps the load cool for longer life. The resistor used in our T-275 is of a special ceramic construction which has stronger composition and offers better performance than the carborundum resistors used in most dummy loads. Operates from DC-150 MHz with and SWR of 1.3:1 or less. SO-239 Connectors. Compact and lightweight. Attractive blue and gray finish. One year warranty and our Tucker SatisfactionPlus guarantee. Built to last in the USA.

Tucker T-250
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If you need a full 1500 W dummy load the new T-250 fits the bill. This air-cooled load will handle 100 watts continuously and 1500 watts for up to 10 seconds at a time from DC-650 MHz. Our T-250 utilizes a special ceramic constructed resistor which has stronger composition and offers better performance than the ordinary carborundum resistors used in most dummy loads. VSWR is 1.3:1 or less and it is compact and lightweight. Attractive blue and gray finish. SO-239 connectors. One year warranty and our Tucker SatisfactionPlus guarantee.

Tucker T-100
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Every shack should have a low-pass filter to insure against TVI from harmonic interference. The new Tucker T-100 Low- Pass Filter is the finest 1500 W filter available. It utilizes a nine-pole Chebyshev design with a cutoff frequency of 35 MHz. Includes additional attenuation to TV IF frequencies above 40 MHz. 1500 Watts continuous. Comes with a 1 year warranty and our exclusive SatisfactionPlus warranty. Made in USA to last for years.

Tucker T-150
2500 W Lowpass Filter
$109

This is the FIRST 2500 W continuous low-pass filter for the Amateur market. Perfect for use with linear amplifiers, this filter provides the ultimate protection against TVI caused by harmonics. As in our T-100, a nine pole Chebyshev filter is utilized. Additional attenuation to TV IF frequencies above 40 MHz is provided. As with our other Tucker Brand Products, construction is solid, American built-to-last quality. 1 year warranty and our SatisfactionPlus guarantee.

Tucker T-200
300 W Dry Dummy Load
$29.95

Our new T-200 makes tuning up a breeze. It handles 300 W with an SWR of less than 1.5:1 from DC-600 MHz. The resistor used in our T-200 is of a special ceramic construction which has stronger composition and offers better performance than the carborundum resistors used in most dummy loads. SO-239 connectors. Quality construction, with an attractive blue and gray finish that looks good in any shack. Built in the USA to last. 1 year warranty and our Tucker SatisfactionPlus guarantee.

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These are pre-owned units which have been processed through a complete operational verification by our laboratory. Includes our 90 day warranty and customer satisfaction that is unsurpassed in the industry, guaranteeing you the highest quality instrument possible! Complete with AC probe and operations manual, the 410C will deliver years of dependable service.

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CIRCLE 173 ON READER SERVICE CARD

For more information and a flyer, contact C.A.T.S., 7368 S.R. 105, Pemberville, OH 43450 (419-352-4465). The flyer also includes a tabulation of manufacturers' claimed specifications on the most popular currently available rotors.

RadioKit QRP Central Update. RadioKit, long a leader in QRP-related products, offers small parts, electronic kits, components, dials, capacitors, chassis, chokes, toroidal inductors, PC boards, insulators, coil stock, rods, plate and filament transformers, and other electronic parts and components. Several QRP amateur transceiver kits, including designs by Rich Littlefield, K1BQT, are offered. RadioKit also specializes in HF, VHF, and UHF amplifier repairs and is blessed with a large inventory of often difficult-to-find replacement parts.

As this column is written, RadioKit was reorganizing its product line and developing a new catalog to describe it. For more information, contact RadioKit, Box 973, Pelham, NH 03076 (603-635-2235).

Software Notes

PROLOG QSL Manager Database. If you need instant QSL route management information for that DX station you just worked, or if you enjoy assisting friends with route information, PROLOG may be for you. Datamatrix proprietor Edward Longhi, KI5OG, recently introduced the PROLOG QSL Route Management System.

The new program is supported by a database containing over 35,000 call records listing either the direct route or the manager's address. An additional feature is the display of prefix information relating to the displayed call including country, ITU and *CQ* zones, bureau and third-party status, short- and long-path bearings, and the distance in miles and kilometers. The program has a menu-driven, graphical interface, a browsing feature to scroll through records, wildcard search, and much more.

Unlike some programs that restrict or do not allow you to add to or modify database entries, the PROLOG QSL manager editing program lets you modify or add new routes to the database. Datamatrix also offers an optional bimonthly update service to help ensure that your database is kept up-to-date with the latest changes and new routes.

The MS-DOS based program requires 8 MB of hard disk space. It's $20 domestic ($22 for international orders). The annual update subscription, consisting of six bimonthly issues, is $36 domestic and $48 international.

For more information, contact Datamatrix, 5560 Jackson Loop N.E., Rio Rancho, NM 87124-1504 (505-892-5669).

SmartBridge. One of Palomar Engineers' most popular products is the RX-100 R-X Noise Bridge. Modern noise bridges such as the RX-100 contain both a broadband noise generator and an RF impedance bridge. The known leg of the bridge has a calibrated variable resistor and variable capacitor, controlled by front-panel knobs. The antenna is connected to the unknown leg of the bridge, while a calibrated communications receiver determines frequency. When adjusting your antenna for a specific impedance and resonant frequency, you set your receiver to the operating frequency and the bridge for the desired impedance. You then make antenna adjustments that result in a pronounced noise "null."

The Palomar RX-100 R-X Noise Bridge lets you learn more about your antenna system than does the ratio-reading SWR bridge. Unlike the SWR bridge, the noise bridge gives you important clues on "which way to go" to adjust your antenna. The text has details on SmartBridge, a computer program that works in tandem with the bridge to let you conveniently measure antenna impedance at the hamshack end of the transmission line rather than at the antenna terminals. (Photo courtesy Palomar Engineers)

In practice, using the bridge can be a little tedious, especially if you use the instrument at the shack end of the coax. Now, however, there's a companion computer program you can use with it. SmartBridge, developed for Palomar Engineers by Carey Fisher, WB4HXE, is designed to help you get the best results from the R-X Noise Bridge when using it to measure antenna impedance. Using the software, you can easily measure the antenna impedance at the input end of the transmission line.

The program first takes you through a "characterization" of the transmission line. You can then take antenna impedance measurements inside your shack, with SmartBridge using its built-in transmission line equations to compute the impedance and SWR of the antenna. Noise bridge measurements are entered in a spreadsheet-like format, and the measurements can be graphed on the computer screen and printed. Different transmission lines can be characterized and saved for future use (see fig. 1).

SmartBridge is $29.95 and is available from Palomar Engineers, P.O. Box 462222, Escondido, CA 92046 (619-747-3346).

SAM '94. In the August 1993 column we described SAM '93, or "Search for AMateur," an amateur radio callsign database. The fast, menu-driven program has an attractive user interface. SAM lets you look up amateurs by callsign, name, city, state, or ZIPcode; browse by call or name; and print labels. SAM accesses data by callsign or name directly from the screen, and it lets you export data in several different ways to create mailing lists, regional directories, tables, dBASE™ compatible databases, or other custom-printed or disk outputs.

The SAM '94 version has several new features, including a new and greatly enhanced data export capability using sophisticated "export filters"; mouse support; the ability to find an "old" callsign when the previous calls option is installed; and considerably more.

The disk based version is $39.95, and subscription update plans are available. Various data display options also are available includ-

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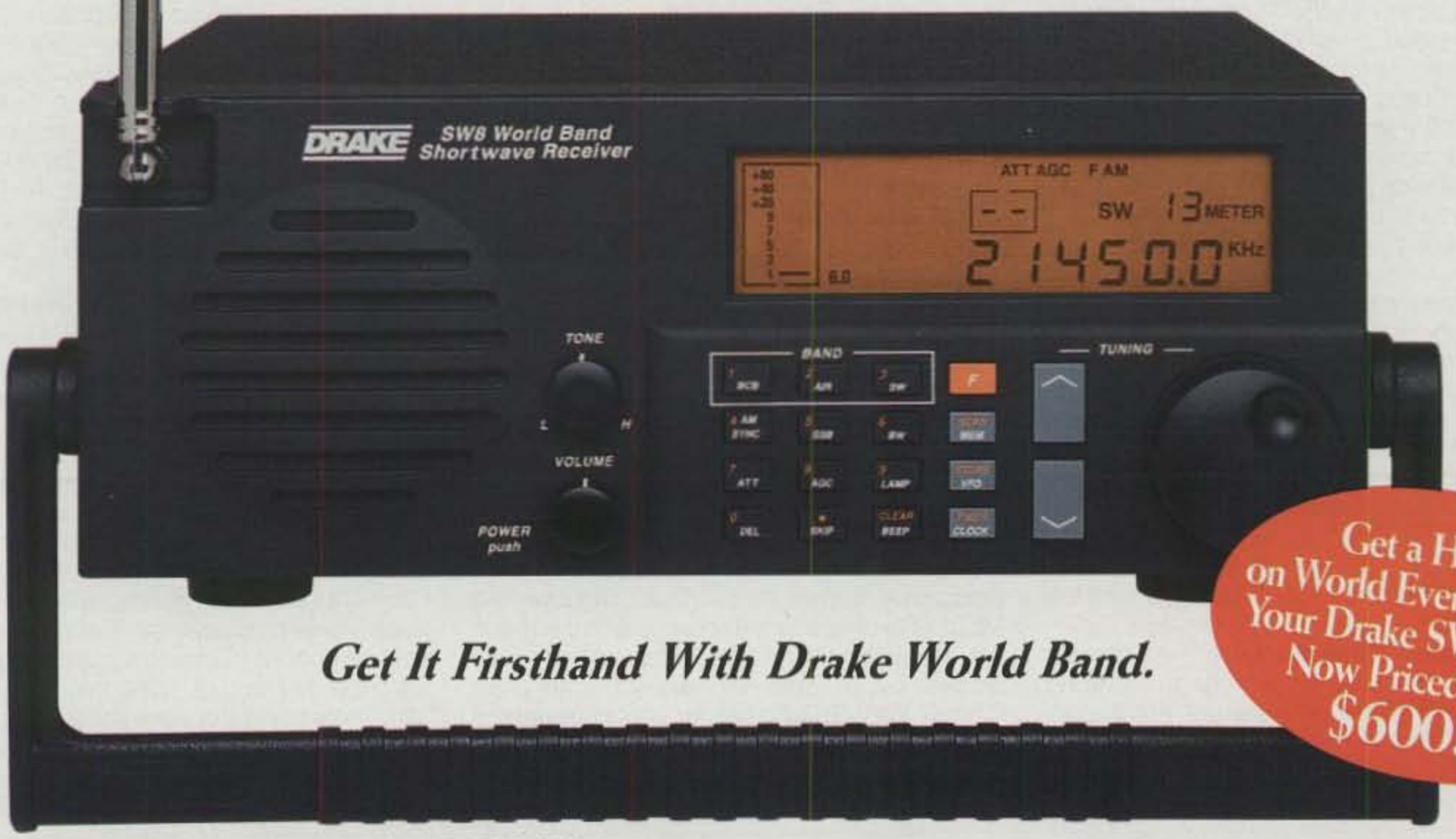

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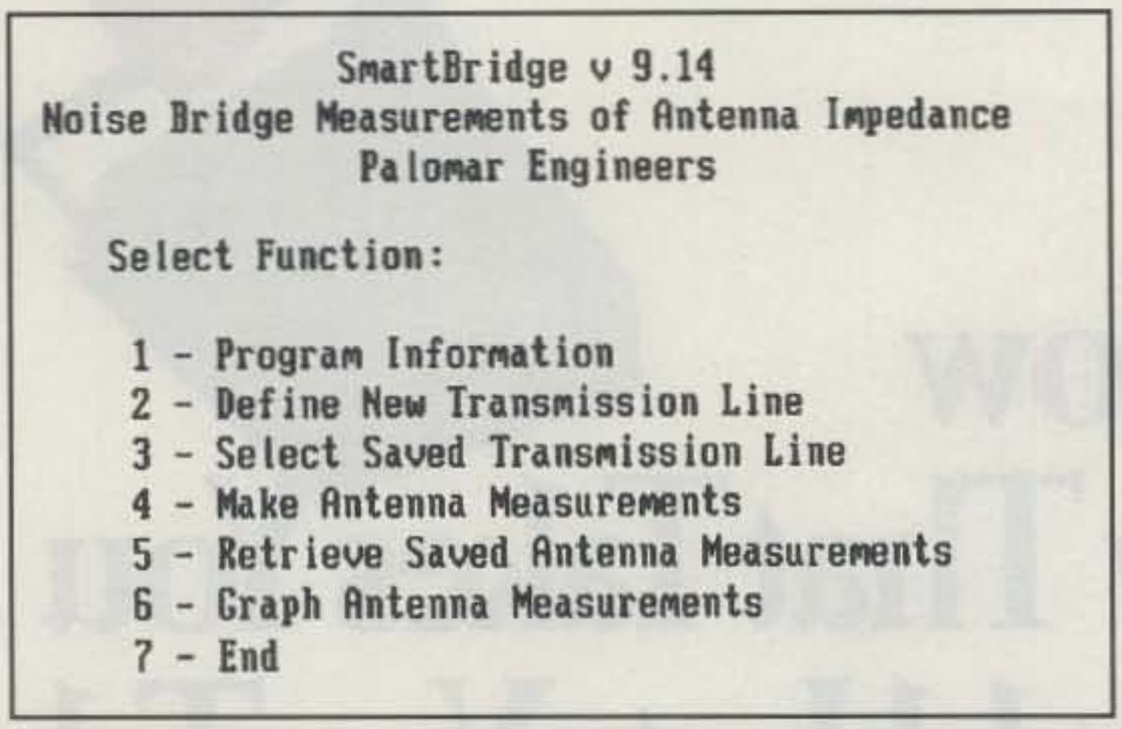

Fig. 1– SmartBridge, the main menu of which is shown, is designed to be used with a noise bridge such as the Palomar Engineers RX-100 R-X Noise Bridge. The program lets you measure the impedance of an antenna at the transmitter end of a transmission line, instead of having to connect the bridge directly to the antenna. It also graphs resistance, reactance, and SWR on the computer screen or printer. Developed by Carey Fisher, WB4HXE, the program is distributed by Palomar Engineers. (See text for details.)

ing county cross-reference; license expiration data; full date of birth; previous call; and year first licensed.

This year there's another new wrinkle: you now can obtain SAM on CD-ROM if that's your preference, freeing up the roughly 17 to 24 MB of valuable hard disk space occupied by the database. Using the CD-ROM, I was surprised to find that the program was fast, even with my slow CD-ROM.

The CD-ROM is also priced at $39.95, and by the time this appears in print, a Windows version of SAM may be a reality. For more information and a free flyer, contact RT Systems, Inc., P.O. Box 8, Laceys Spring, AL 35754 (1-800-723-6922).

ClickBook. One of the most useful Windows utility programs I have encountered is ClickBook™. This little gem can turn practically any Microsoft Windows 3.1 document into a neat-looking, double-sided booklet.

It takes just a couple of mouse clicks and a fold to transform, say, a typical four-page wordprocessing document into a booklet printed on one sheet of paper. The program automatically and intelligently reduces the pages and then positions them for perfect double-sided printing. While it's doing this, it also prints out an instruction sheet with a large guide arrow that shows exactly how to reinsert paper for double-sided printing on any laser printer or on dot-matrix printers with a sheet feeder.

Most business users will easily recognize the savings the program can generate in time, paper, and money. But there are advantages and benefits for practically everyone. If, for example, you struggle to print out long pages of shareware program documentation, you can replace all that hassle with small booklets. You also can carry a database of names, phone numbers, addresses, and callsigns with you in the form of a small address book. And if you're traveling, you can carry your full itinerary in a pocket-sized booklet. Of course, there are limits to most good things: booklets greater than about 50 pages become unwieldly, and you also would need special stapling equipment.

ClickBook is $69.95 from BookMaker Corporation, 625 Emerson St. #200, Palo Alto, CA 94301 (1-800-766-8531).

PC Tools for Windows 2.0. In the February column we reported on a truly outstanding Windows enhancement, Central Point Software's PC Tools for Windows (PCTW). As we noted, PCTW was a fundamental extension to the operating environment presented by DOS and Windows, to make Windows much easier to organize and use. We described PCTW's many basic features then, so we won't repeat them.

Now, however, Central Point Software has done it again. PCTW Version 2.0 focuses on giving users more control of their system and improving performance, while adding features that help improve Windows' reliability and data protection.

New features include CrashGuard™, which monitors memory, system resources, and disk space for dangerous conditions; an enhanced System Consultant that can implement its configuration recommendations; INI-Consultant™, which offers line-by-line, plain English explanations of .INI and boot-file contents; a beefed-up MultiDesk with file folder and desktop synchronization capabilities; a replacement File Manager with over 100 file viewers; better compressed volume support; and improved anti-virus and backup capabilities.

The new version is a worthwhile update to an already first-class product. It's $179.95, but Central Point offers a $49.95 "universal" upgrade from any other Central Point product as well as several competitors' products.

For more information on PC Tools 2.0, contact Central Point Software, 15220 N.W. Greenbrier Parkway, Beaverton, OR 97006 (1-800-964-6896).

Book Notes

LF/MF Scrapbook de W2IMB. Interest in the low and very low frequencies—generally below around 300 kHz—is increasing, and not just for listening. For example, the ARRL has made approaches to the government regarding a shared amateur radio band in the 190 kHz region, and reportedly the proposal is being considered seriously by the FCC and other interested government agencies.

For many years there have been hobbyists who focus on the so-called FCC Part 15 bands (160 to 190 kHz and 510 to 1705 kHz); they are sometimes known as LOWFERS (short for Low Frequency Experimental Radio Station) and MEDFERS (those who experiment on the medium frequency bands). These terms were coined by LF and MF experimenter Ken Cornell, W2IMB, who has for years operated a Part 15 longwave beacon station "KEN" on 187.5 kHz.

Cornell has published the *Low and Medium Frequency Scrapbook* for 20 years; it's a 107-page compendium of information on these interesting bands, dedicated to the experimenter. His scrapbook provides basic low-frequency information and equipment designs for both reception and transmission. The book has a useful introduction for would-be beacon operators, an introduction to the 1750 meter band, and several resource lists.

The latest (8th) edition is the 20th anniversary *Scrapbook*, available for $17.50 postpaid book rate or $18.75 via first-class mail. Checks should be payable to Ken Cornell, 225 Baltimore Ave., Point Pleasant Beach, NJ 08742 (908-899-1664).

Two Listener Titles from Universal Radio. While we're on the subject of MF and LF radio, we would suggest *The World Below 500 Kilo-Hertz*, by L. Peter Carron, Jr. The 64-page mini-book provides a good introduction to the longwave spectrum and offers some insights into conventional monitoring topics. It also describes unusual pursuits such as solar flare monitoring, earthquake precursors, underground and underwater transmissions, military communications, and more. It is $5.95 postpaid.

A second listener-oriented text from Universal Radio is more broadbased. The 52-page mini-book is *Discover DXing!—An Introduction to AM, FM and TV DXing*, by John Zondlo. The book is mostly about mediumwave (broadcast band) DX listening, but it also covers equipment and techniques for VHF/UHF TV and FM band DXing. It's also $5.95 postpaid. Both titles are from Universal Radio, Inc., 6830 Americana Pkwy., Reynoldsburg, OH 43068-4113 (1-800-431-3939).

The Code Book. Bob Butt, N1KPR, recently released *The Code Book: Morse Code Instruction Manual*. The 54-page manual is a combination instruction book and course-of-study manual for entry-level Morse students and upgrade candidates.

The first chapters of the book are philosophical and psychological in character. The author takes the student through comprehensive "thought process conditioning" lessons. Later chapters offer the framework of a structured Morse study course. The student is given several options to create a custom course that fits his or her way of doing things. The author also offers several options to combine the book with commercial Morse audiocassette or computer program courses.

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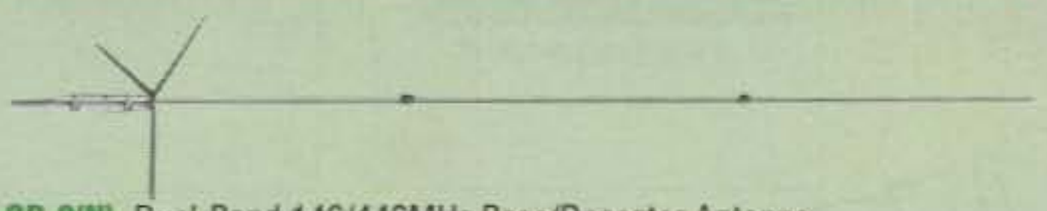
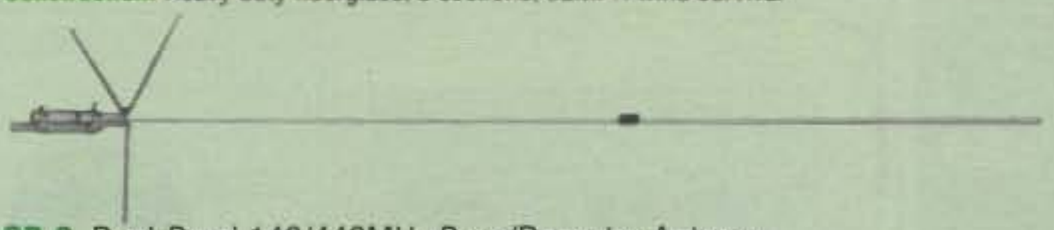


GP-9(N) Dual-Band 146/446MHz Base/Repeater Antenna

NEW!

Gain & Wave: 146MHz 8.5dBi 5/8 wave x 3 **VSWR:** 1.5:1 or less **Max Power:** 200W PEP
446MHz 11.9dBi 5/8 wave x 8 **Length:** 17' 8" **Weight:** 5lbs. 11ozs.
Connector: SO-239 (GP-9), N-type (GP-9N) **Mounts to Mast Size:** 1.25"-2.50"
Construction: Heavy duty fiberglass, 3 sections, 92MPH wind survival



GP-6 Dual-Band 146/446MHz Base/Repeater Antenna

NEW!

Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 **VSWR:** 1.5:1 or less **Max Power:** 200W PEP
446MHz 9.0dBi 5/8 wave x 5 **Length:** 10' 2" **Weight:** 3lbs. 8oz.
Connector: Gold-Plated SO-239 **Mounts to Mast Size:** 1.25"-2.50"
Construction: Heavy duty fiberglass, 2 sections, 112MPH wind survival

GP-3 Dual-Band 146/446MHz Base/Repeater Antenna

NEW!

Gain & Wave: 146MHz 4.5dBi 5/8 wave **VSWR:** 1.5:1 or less **Max Power:** 200W PEP
446MHz 7.2dBi 5/8 wave x 3 **Length:** 5' 10" **Weight:** 2lbs. 9ozs.
Connector: Gold-Plated SO-239 **Mounts to Mast Size:** 1.25"-2.50"
Construction: Single piece fiberglass, 130MPH wind survival

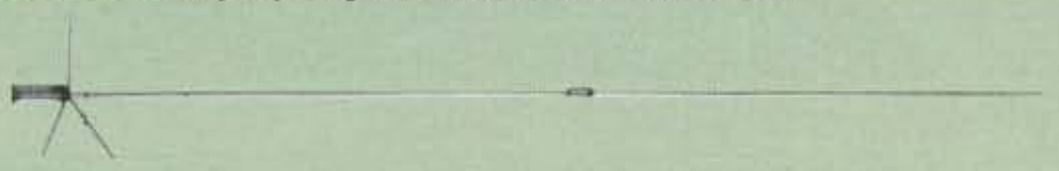
COMET MONO-BAND

CA-ABC23 Mono-Band 146MHz Base/Repeater Antenna

Gain & Wave: 146MHz 7.8dBi 5/8 wave x 3 **VSWR:** 1.5:1 or less **Max Power:** 200W PEP
Connector: SO-239 **Length:** 14' 12" **Weight:** 3lbs. 8 ozs.
Mounts to Mast Size: 1.25"-2.50"
Construction: Thick-wall aluminum, 3 sections, 70MPH wind survival

CA-712EF Mono-Band 446MHz Base/Repeater Antenna

Gain & Wave: 446MHz 9dBi 1/2 wave x 12 **VSWR:** 1.5:1 or less **Max Power:** 200W PEP
Connector: N-type **Length:** 10' 5" **Weight:** 2lbs. 12ozs.
Mounts to Mast Size: 1.25"-2.50"
Construction: Heavy duty fiberglass, 2 sections, 105MPH wind survival



CA-62DB Mono-Band 6 Meter FM Antenna

Gain & Wave: 52MHz 6.5dBi 5/8 wave x 2 **VSWR:** 1.5:1 or less **Max Power:** 500W PEP
Connector: SO-239 **Length:** 21' 8" **Weight:** 5lbs. 11ozs.
Mounts toMast Size: 1.25"-2.50"
Construction: Thick-wall aluminum, 5 sections, 100MPH wind survival

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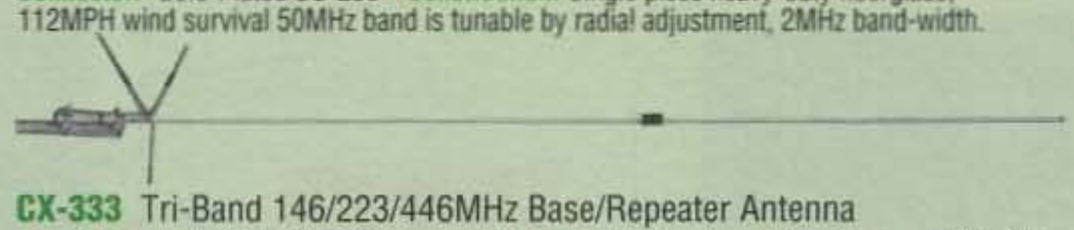
COMET TRI-BAND

GP-15 Tri-Band 52/146/446MHz Base/Repeater Antenna

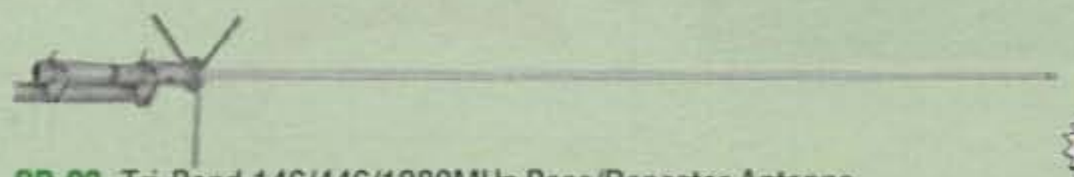
NEW!

Gain & Wave: 50-54MHz 3.0dBi 5/8 wave **VSWR:** 1.5:1 or less **Max Power:** 300W PEP
146MHz 6.2dBi 5/8 wave x 2 **Length:** 7' 11" **Weight:** 3 lbs. 1 oz.
446MHz 8.6dBi 5/8 wave x 4 **Mounts to Mast Size:** 1.25"-2.50"
Connector: Gold-Plated SO-239 **Construction:** Single piece heavy-duty fiberglass, 112MPH wind survival 50MHz band is tunable by radial adjustment, 2MHz band-width.



CX-333 Tri-Band 146/223/446MHz Base/Repeater Antenna

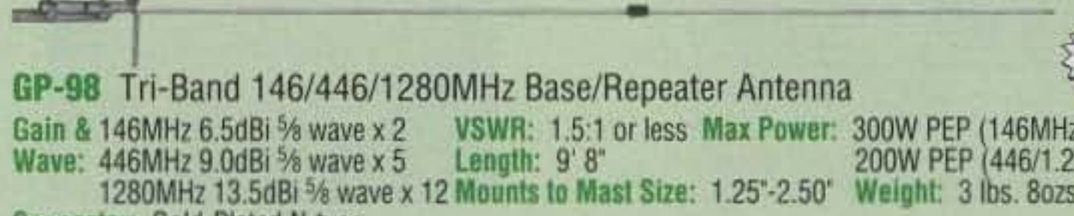
Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 **VSWR:** 1.5:1 or less **Max Power:** 120W PEP
223MHz 7.8dBi 5/8 wave x 3 **Length:** 10' 2" **Weight:** 3 lbs. 10 ozs.
446MHz 9.0dBi 5/8 wave x 5 **Mounts to Mast Size:** 1.25"-2.50"
Connector: Gold-Plated SO-239
Construction: Heavy duty fiberglass, 2 sections, 112MPH wind survival



GP-93 Tri-Band 146/446/1280MHz Base/Repeater Antenna

NEW!

Gain & Wave: 146MHz 4.5dBi 5/8 wave **VSWR:** 1.5:1 or less **Max Power:** 300W PEP (146MHz)
446MHz 7.2dBi 5/8 wave x 3 **Length:** 5' 7" 200W PEP (446/1.2)
1280MHz 10dBi 5/8 wave x 6 **Mounts to Mast Size:** 1.25"-2.50" **Weight:** 2 lbs. 8ozs.
Connector: Gold-Plated N-type
Construction: Single piece heavy duty fiberglass,112MPH wind survival



GP-98 Tri-Band 146/446/1280MHz Base/Repeater Antenna

NEW!

Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 **VSWR:** 1.5:1 or less **Max Power:** 300W PEP (146MHz)
446MHz 9.0dBi 5/8 wave x 5 **Length:** 9' 8" 200W PEP (446/1.2)
1280MHz 13.5dBi 5/8 wave x 12 **Mounts to Mast Size:** 1.25"-2.50" **Weight:** 3 lbs. 8ozs.
Connector: Gold-Plated N-type
Construction: Heavy-duty fiberglass, 2 sections, 112MPH wind survival

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- Separate Meter and RF Sensor allows for convenient placement of the meter.
- Cross Needle Meter provides FWD, REF, and VSWR simultaneously.
- The RF-Sensor is a compact design, and has an extremely low-loss circuit.
- Beautifully illuminated when connected to power supply.
- 6 foot cable standard.
- Optional EKS-3 10 foot extension cable for a total of 16 feet between the sensor and meter.
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CMX-1	CMX-2	CMX-3
1.8-60MHz	1.8-200MHz	140-525MHZ
0-2KW	0-200W	0-200W
30/300/2KW	20/50/200W	20/50/200W

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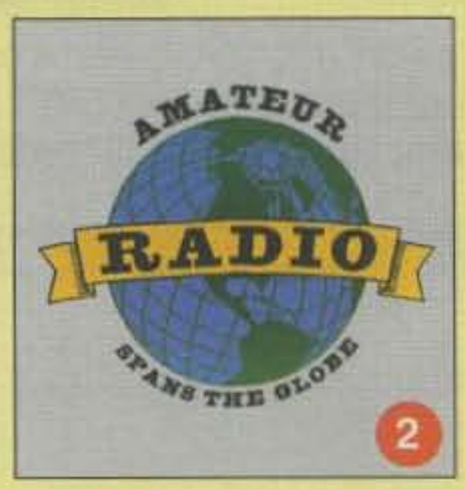

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$17.95
per shirt
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3

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Item # 13

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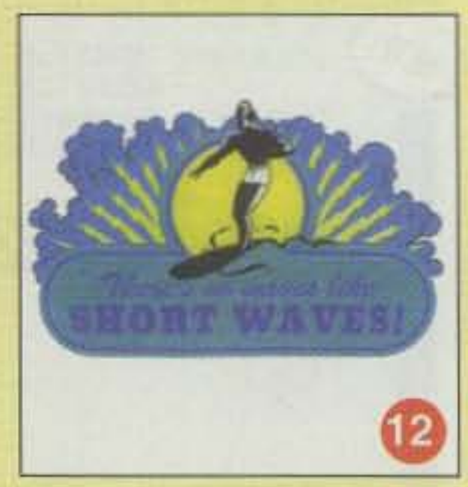
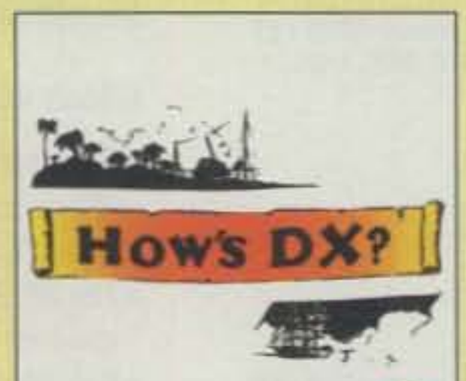


12

Here are some new additions to our T-Shirt Library! →



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15

16

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Please allow 4-8 weeks delivery

Qty	Item #	Size	Price	S & H	Total
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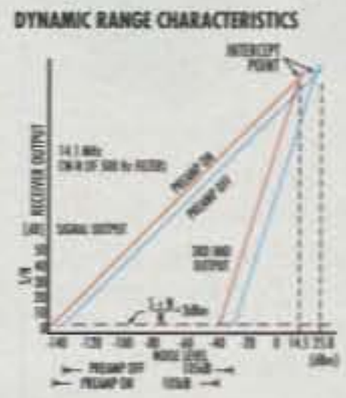
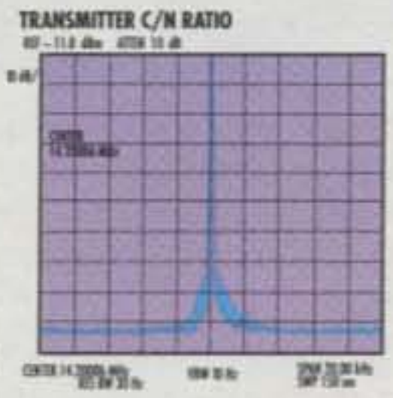
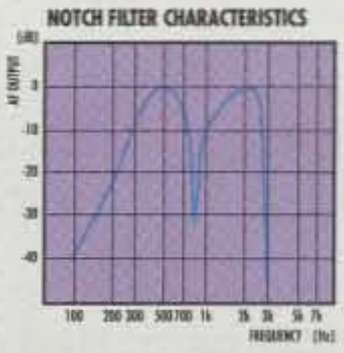
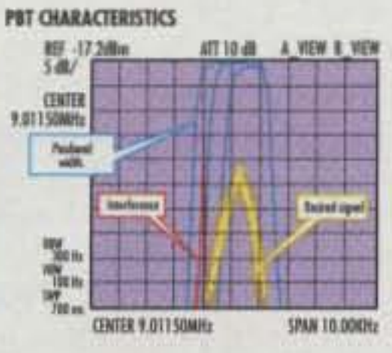
Pass Band Tuning – Electronically narrows the IF passband to eliminate interference signals (more effective than IF shift offered on competitive models).





Notch Function – Tune out an interfering signal frequency to eliminate unwanted CW or AM carrier tones, while preserving the desired signal's audio response. The combination of PassBand Tuning and Notch Function is very effective on crowded bands.





100% Duty Cycle – Large cooling fan and heatsink provide a stable 100 W in SSB, CW and FM modes (40 W in AM).

More High Performance – With full break-in (QSK), built-in electronic keyer, speech compressor, noise blanker, fast/slow AGC, preamp, attenuator, many tuning functions (including direct keypad entry) and dual CW filters (optional).

BEST FEATURES

Auto Antenna Tuner – Fast, quiet and smart, *"Spot checks showed that it could match loads with indicated SWRs as high as 10:1"* (February 1993 QST review). Auto-preset memories for each band, **including 160 M.**

Quick Split Function – Transmit and receive frequencies are **displayed simultaneously**. Both can be tuned independently. Call DX stations operating split frequency faster than any of your competition operating a single frequency display model.

Auto Antenna Selector – Two antenna connectors let you select the best antenna for band and conditions from the front panel. Stores to both band memory and memory channels.

Double Band Stacking Register (DBSR) – Memorizes two frequencies and modes **in each band**. Can be used like extra VFOs in one band. Use one register for CW and the other for SSB if you like.

10 Memo Pad Memories – Push "Memo Pad–Write" to quickly store a frequency & mode, for example, if you find a piled-up DX station. Recall just as quick with "Memo Pad–Read."

Large LCD Display – Easy to read in all lighting conditions. Won't "wash out" in direct sunlight.

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- Voice Activated Transmit (VOX)
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- All Mode Squelch
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New from Que/Prentice Hall. I'll bet that the new PC you just bought includes a CD-ROM drive, right? Responding to the surge of PCs equipped with CD-ROMs, computer book publishers are cranking out CD-ROM "how-to" books left and right. One of these is Que's *The CD-ROM Book*, by Steve Bosak and Jeffrey Sloman. The 402-page book includes a CD-ROM sampler disc and is designed to be a complete resource for the world of PC-based CD-ROMs. Included are facts on drives, interfaces, and connections. It's $34.95 from Que Books/Prentice Hall Computer Publishing, 201 W. 103rd St., Indianapolis, IN 46290 (1-800-858-7674).

New from Osborne McGraw-Hill. Several books from this publisher have crossed our desk the past few months. One is another good CD-ROM book/disc package: *BYTE Guide to CD-ROM*, by Michael Nadeau. The 405-page, $39.95 combo discusses everything the curious PC user needs to know to become familiar with CD-ROMs. Both hardware and software aspects are covered.

Many PCs today also sport sound cards, and among the most popular are the Sound Blasters. Capitalizing on this trend is *Sound Blaster: The Official Book, Second Edition*, by Peter M. Ridge and others. The 659-page, $34.95 book/disk package covers practically everything you need to get the most from a Sound Blaster board, from troubleshooting your installation to mastering all aspects of Sound Blaster software.

Do you use your PC for wordprocessing? If you do, it's a good bet that you may be using Microsoft Word for Windows. If so, whether you're using Version 2 or 6, you'll likely want a copy of *Microsoft Word for Windows: The Complete Reference*, by Mary Campbell. In common with other books in the "complete reference series," the 858-page, $29.95 book is intended to provide all of the information you need to use a given software application, in this case Word for Windows.

Saving my favorite book on this list for last, I'll mention John C. Dvorak's *Dvorak Predicts: An Insider's Look at the Computer Industry*. Never to be shy about his opinions on anything, the popular computer columnist makes some rather astounding crystal-ball-style prophecies about the computer industry's future. Some of the prophecies he makes include the "death" of the desktop computer, the demise of Microsoft, and multimedia as the "Edsel of Computing." Saying more would spoil the fun, so spend $16.95 for provocative reading.

Most titles are available in bookstores, or contact Osborne McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710 (1-800-227-0900).

The Windows Internet Tour Guide. Users of the world's largest communications network deserve an interface that reflects Windows' simplicity and intuitive qualities; Windows users know what they want, and in most cases it isn't UNIX commands. This new Ventana Press book by Michael Fraase, subtitled "Cruising the Internet the Easy Way," offers hope for Windows Internet users, letting them cruise the net with familiar icons, menus, and mice. Fraase offers informative tips and tutorials to help you navigate Internet with point-and-click convenience.

Included in the package are step-by-step instructions for sending, receiving, searching, retrieving, and discovering Internet's treasures; a roadmap to Internet's vast information resources; and two free electronic updates with tips, tricks, and software reviews and insights on the network's landscape.

The book/disk package also comes with an introductory edition of Chameleon, a powerful graphics-based communications program complete with e-mail, file transfer, news reading, and international search capabilities. One free month of full access connect time via MRNet is included in the package.

The 344-page book is $24.95 and is published by Ventana Press, P.O. Box 2468, Chapel Hill, NC 27515 (1-800-743-5369).

624 Kits 1994 Catalog. Hugh (Pat) Bunn, N4LTA, supports the QRP enthusiast and homebrewer with quality RF parts and PC boards for transmitter, receiver, transceiver, and QRP accessory projects. A free catalog is available from 624 Kits, 171 Springlake Drive, Spartanburg, SC 29302 (803-573-6677).

A & A Engineering Kits. This southern California company offers PC boards, kits, and assemblies. Products include QRP CW transceivers, weather FAX and color SSTV adapters, spectrum analyzers, keyers, and frequency synthesizers. Most are offered in kit and assembled versions. Contact A & A Engineering, 2521 W. LaPalma, Unit #K, Anaheim, CA 92801 (714-952-2114).

1994 Tiare Book Catalog. Gerry L. Dexter, proprietor of Tiare Publications, offers a good selection of books on SWLing, scanner and utility monitoring, broadcasting, and related pursuits; most are unique titles published by Tiare. Recently a number of amateur radio titles have been added. The 20-page 1994 "Great Radio Reads" catalog is $1 from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147 (414-248-4845).

Short Bursts

A Look at the Internet. As suggested from our review of *The Windows Internet Tour Guide* (above), the big online buzzword today is the Internet, a worldwide web of more than 14,000 computer networks. It's a cooperative effort between various government agencies, educational institutions, and other organizations. With well over 10 million users in these organizations (no one knows exactly how many), it's the fastest growing online resource. In fact, some parts of Internet are growing 5 to 10 percent a month.

Internet was designed originally for research and technical uses and users, so it's not user-friendly. But that's changing as more casual communicators seek access through work or school, some BBSes, online communications utility services, and specialized Internet access providers.

There's no directory of everything on Internet, but some of the things you can access include e-mail; government documents, library catalogs, and databases; White House press releases; weather maps and forecasts; sports schedules; ZIPcodes; and much, much more. Many of the online communications utility services have Internet forums where you can learn a great deal about Internet and its intricacies before trying it directly.

For more information and a list of Internet access providers, contact InterNIC Information Services, P.O. Box 85608, San Diego, CA 92186-9784 (1-800-444-4345).

Delphi. Many computer users have started on Internet by connecting through one of the online utilities that offers significant Internet access. Delphi is particularly well regarded as providing a low-cost connection to Internet that also offers the usual functions of a major online communications utility.

The 100,000-member Delphi claims it is the only major utility that offers full access to Internet, including Telnet for host-to-host connections, FTP (file transfers), Usenet news and discussion groups, and Internet Relay Chat (IRC). There also are over 150 information and communications services on Delphi.

For more information, contact Delphi/General Videotex Corp., 1030 Massachusetts Avenue, Cambridge, MA 02138 (1-800-695-4005).

Wrap-Up

That's it this time. Next time more antennas, accessories, and software topics of current interest. See you then.

Overheard: Software bugs usually can be fixed only *after* the software becomes obsolete.

73, Karl, W8FX

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Novice-Technician Licensing Course—Part IV

This month we continue on in our amateur radio licensing course. We begin this time with operating procedures.

Tiger Den One of Cub Pack 133 is shown here visiting the Warminster Amateur Radio Club, WA3DFU. George Brechmann, N3HBT, and his seeing-eye dog, Nicole, are at the left side. Amateur radio is particularly interesting to Tiger Scouts, since their motto is "I promise to love God, my family , and my country—and to learn more about the world."

Operating Procedures

A1A Code (CW)

Do not transmit faster than you can copy.

A suitable CQ call is "CQ" sent three times, "DE" sent one time, and your callsign sent three times, followed by "K."

- CQ is a call to all stations
- DE means *from*
- K is the invitation to transmit

When responding to a CQ call, send the other station's callsign two times, send "DE" once, send your own callsign two times, and send "K" once.

Three-letter Q-signals are used to make statements and to ask questions. Adding a question mark after a Q-signal changes it from a statement to a question. As an example, QTH (My location is —) becomes QTH? (What is your location?).

- QRS means send slower
- QRT means stop sending
- QTH means my location (city/town and state) is —

Procedural symbols (work signs)

AR means end of message/transmission
BT means paragraph/break (text separation)
DN means slant/fraction bar
BT means end of contact

Signal Reporting System (RST System)

Readability

1. Unreadable
2. Barely readable/occasional words distinguishable
3. Readable with considerable difficulty
4. Readable with practically no difficulty
5. Perfectly readable

Strength

1. Barely perceptible weak signals
2. Very weak signals
3. Weak signals
4. Fair signals
5. Fairly good signals
6. Good signals
7. Moderately strong signals
8. Strong signals
9. Extremely strong signals

Tone

1. 60 Hertz or less—very rough and broad
2. Very rough AC—very harsh and broad
3. Rough AC tone—rectified but not filtered
4. Rough note—some trace of filtering
5. Filtered rectified AC—but strongly ripple modulated
6. Filtered tone—definite trace of ripple modulation
7. Near pure tone—trace of ripple modulation
8. Near perfect tone—slight trace of modulation
9. Perfect tone—no trace of ripple or modulation of any kind

RST report can include the following added indicators:

- Decibels over S-9, such as 599 plus 10 dB
- C for chirp, such as 579C
- K for key clicks, such as 579K
- X for extremely stable frequency, such as 589X

The A1A code (CW) distress signal is SOS

- An overscore or underline means that the indicated letters are not sent separately; they are run together forming a single symbol.

VOICE

A general call to all stations consists of saying "CQ" three times, "this is" once, and one's own callsign three times.

When answering a CQ call, state the other station's callsign one time, "this is" once, and your own callsign twice.

The voice distress signal is "MAYDAY."

When operating voice, just the R and S portions of the RST signal reporting system are used. Typical R/S signal report:

5 by 7 = perfectly readable/moderately strong
3 by 3 = readable with considerable difficulty/weak
5 by 9 plus 20 dB = perfectly readable with signal strength 20 decibels over an S-9 S-meter reading.

When stating callsigns, it is advisable to use the ICAO (International Civil Aviation Organization) phonetics to minimize errors. The ICAO phonetic alphabet is Alfa, Bravo, Charlie, Delta, Echo, Foxtrot, Golf, Hotel, India, Juliett, Kilo, Lima, Mike, November, Oscar, Papa, Quebec, Romeo, Sierra, Tango, Uniform, Victor, Whiskey, Xray, Yankee, Zulu. (Example: W6JEP is Whiskey Six Juliett Echo Papa.)

Q-signals are not intended to be used when operating a voice emission; they are intended to be used during A1A code (CW) contacts. As an example, do not ask an operator for his QTH; as her/him what the location is.

MISCELLANEOUS

Before transmitting, check the frequency you intend to use to make sure it is not already in use.

When conducting transmitter tests, a dummy load (pseudo antenna) should be used to preclude any possibility of causing interference to other stations.

Use the minimum amount of power that is needed to communicate

45527 Third Street East, Lancaster, CA 93535-1802

satisfactorily with another station. If the other station tells you that your signal is very strong, it is advisable to reduce your transmitter's output power.

If you hear an emergency call for help on a frequency you have been using, immediately cease your contact and listen for information about the emergency; you may be able to provide assistance.

QSL cards provide written proof of two-way radio communications.

The 10 and 15 meter bands are optimum for use in working a contact of about 1500 miles during a summer afternoon.

DX means a distant station (foreign country).

73 means best regards.

VHF (20–300 MHz) and UHF (300–3000 MHz) bands should be used to conduct local communications to avoid possible interference to distant (DX) stations, which could occur on the HF (3–30 MHz) bands.

REPEATER

The function of a repeater is to increase communication ranges between weak (including mobile and hand-held) stations.

A repeater consists of a receiver and transmitter, plus an antenna system that is located at a high clear point where it can "see" (and be seen) over a large portion of the surrounding area.

Repeaters employ duplex operation with separate receive and transmit frequencies.

The repeater's input frequency is its receive frequency; its output frequency is its transmit frequency. Both of these frequencies must be known to use a repeater.

Typical input/output separations are as follows:
2 meters—600 kHz
1.25 meters—1600 kHz/1.6 MHz
70 centimeters—5000 kHz/5.0 MHz

An "open" repeater is available to everyone, whereas a "closed" repeater requires members to use special access methods.

A CTCSS (Continuous Tone Coded Squelch System) is used to gain access to a "closed" repeater. This CTCSS is a sub-audible tone which is added to the carrier; it causes the repeater's receiver to accept a member's signal. Motorola calls this a PL (private line) tone.

If you are interested in becoming a member of a closed repeater group, you should contact that repeater's control operator.

When calling a specific station through a repeater, state her/his callsign one time and state your own callsign one time. Make sure the repeater is not in use before you initiate this calling sequence.

To break into a contact in progress through a repeater, state your callsign once during a pause between the transmissions of the other stations.

Repeater operators should pause between their transmissions to give other amateurs a chance to break into their contact.

Keep transmissions short. Other amateurs may be waiting to use the repeater, and they might have emergency traffic.

The transmission of "break break" indicates that the operator has distress traffic.

During peak commuting times, third-party traffic net operation is discouraged on repeaters; leave repeaters to the commuters and their mobile stations.

Repeater transmitters are often designed to cease transmitting after a predetermined period of time. This feature is referred to as repeater time out. It activates automatically when an operator makes an excessively long continuous transmission.

A signal report of "full quieting" means that the received signal overcomes all receiver noise. State the amount of signal quieting noted.

Autopatch enables repeater users to complete telephone calls from their mobile stations and/or hand-held transceivers.

A repeater coordinator is a person or group that recommends pairs of frequencies to minimize possible interference between repeater groups.

Simplex operation involves using the same frequency for both receiving and transmitting.

If simplex operation suffices, use it; it is unwise to tie up the two frequencies of a repeater if this is not necessary.

If you are working another station through a repeater, and you want to determine if you could work it by simplex, listen on the repeater's input frequency; if you hear the other station okay, it can be worked directly on simplex.

Simplex should be used whenever the longer range of a repeater is not needed.

Do not operate simplex on either of a pair of frequencies assigned to a repeater. It is easier to move a single (simplex) frequency than it is to move the two frequencies (duplex) of a repeater.

RADIOTELETYPE (RTTY)

When answering a RTTY CQ call, do so at the same speed as the CQ call was received.

RTTY is a system of sending and receiving code messages by machines.

A typical RTTY CQ call consists of CQ sent 3 to 6 times, DE sent once, and your own callsign sent one time.

Connected means sending RTTY transmissions to be received directly by the intended destination station, plus having these transmissions acknowledged by the receiving station.

Monitoring is a receiving station displaying received information that may or may not be intended for the monitoring station, with no acknowledgment made of the correct receipt of the transmission.

PACKET RADIO

Networking is the system of interconnecting packet radio stations to transfer information long distances.

A digipeater is a packet station that is used to retransmit only data that is marked to be retransmitted, and to just the specified station.

Connected means the transmitting station is just sending data to one receiving station, with confirmations sent to acknowledge correct receipt of the data.

Monitoring means that a station is receiving/displaying messages which may not be addressed to it and is not replying to them.

RADIO AMATEUR CIVIL EMERGENCY SERVICE (RACES)

The local civil defense organization controls operator registrations and on-the-air drills.

RACES drills are limited to a maximum of one hour per week.

Drill messages must be identified on the air as test or drill messages.

Tactical callsigns may be used to help coordinate public-service communications. Typical tactical callsigns could include "headquarters," "shelter," "motor pool," "warehouse," etc.

People-condition messages in and out of a disaster area are called "health and welfare traffic."

Emergency traffic messages in and out of a disaster area concern the immediate safety of lives.

You must have the ability to operate without AC house power, if you are to be able to operate during emergencies when no AC house power is available.

Several sets of fully charged batteries should be kept on hand for possible use in any emergencies which might occur in the future.

Dipole antennas are easy to assemble, erect, and use during an emergency. A dipole provides satisfactory performance.

RADIO-WAVE PROPAGATION

Ionosphere layers are regions of ionized gases above Earth. Most of this ionization is due to ultraviolet rays from the Sun.

More sunspots mean more ionization.

The length of an average sunspot cycle is about 11 years.

Ionosphere layers E and F_2 return sky waves back to Earth, providing long-distance communications.

Sky-wave propagation provides much longer range contacts than ground-wave propagation provides.

The skip zone is the area between where ground-wave reception dies out and where the first sky wave returns to Earth.

Ground-wave propagation travels along the surface of the Earth between transmit and receive antennas, including over hills.

A metallic mass, such as a metal building, can reflect VHF and UHF signals.

Line-of-sight (straight line) propagation is common when using VHF and UHF hand-held transceivers.

Amateur Radio Practices

GROUNDING & PREVENTING UNAUTHORIZED USE OF STATION

Ground rod should be copper-clad steel or copper, and it should be at least 8 feet long.

An indoor metal cold water pipe can serve as the station's grounding point.

Ground each piece of station equipment and each accessory to achieve lightning protection, plus to provide protection from electric shock for people.

Disconnect station equipment and accessories from AC power and disconnect antenna cables to guard against possible damage from lightning strikes.

When the station is not in use, ground all antennas and antenna cables to protect equipment and building from possible lightning damage.

Removing the microphone from a vehicle-installed transceiver prevents unauthorized voice transmissions.

Installing and using a key-operated on/off switch between the input power and the equipment eliminates the possibility of unauthorized station operation.

SAFETY

When working on a tower, wear a safety belt to prevent the possibility of a fall and to increase freedom in the use of one's hands.

When on the ground helping someone working atop a tower, wear a hard hat and safety glasses to prevent the possibility of being hurt by items dropped from above, such as hardware and tools.

When erecting a wire antenna, put it high enough that it cannot be touched by anyone standing under it on the ground.

When using a hand-held VHF or UHF transceiver, position the antenna away from your head to minimize your exposure to radio frequency energy. Take extra care to avoid exposing your eyes to RF energy.

When erecting a UHF antenna, mount it where no one can be near it when transmissions occur.

Before removing shielding from a VHF/UHF RF power amplifier, make certain it cannot be turned on.

An interlock switch opens the AC power to the high-voltage power supply when the equipment/cabinet is opened to protect people against the possibility of electric shock.

The radiation from a microwave oven is similar to the radiation from a 1270 MHz transceiver.

Use good coaxial cable and properly assembled good connectors to minimize RF loss.

STANDING WAVE RATIO (SWR)

SWR is the ratio between the maximum and minimum voltages existing along a transmission line (fig. 1).

An SWR meter is used to measure the impedance mismatch between a transmission line and an antenna. The SWR meter is connected between the transmission line and the antenna to measure SWR most accurately.

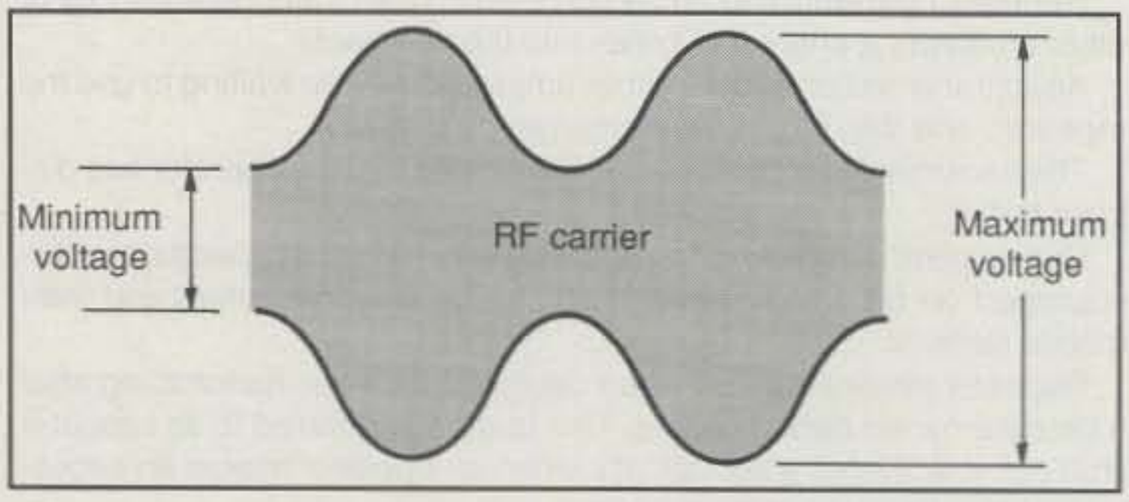


Fig. 1– Radio frequency carrier with example of standing wave ratio.

An ideal SWR is one-to-one (1:1), which occurs when the maximum and minimum voltages are the same.

SWR readings of 1:1 through 3:1 are acceptable.

SWR readings of 4:1 and higher are unacceptable.

Erratic (jumpy) SWR readings are usually caused by poor electrical contacts in the antenna system. Erratic readings are most noticeable in high winds.

Unusually high but steady SWR readings are usually due to electrical short circuits or electrical open circuits in the antenna system, including the feedline.

If the SWR is good/low at the low-frequency end of a band, and it is

bad/high at the high-frequency end of the same band, this indicates the antenna is too long. If the antenna is too short, these SWR readings are reversed.

RADIO FREQUENCY INTERFERENCE

Strong RF signals being transmitted from a nearby transmitter can cause receiver overload and resultant interference. This type of interference is independent of the frequency/channel selected.

A harmonic is a whole number multiple of a fundamental (basic) frequency. As an example, 14,250 kHz is the second harmonic of 7125 kHz.

Harmonic radiation can cause interference to other stations.

Harmonics can be outside the amateur bands.

If TV interference (TVI) occurs on just one or two TV channels when you are operating, it is probably due to harmonic radiation.

Harmonic radiation is likely to occur when feeding a multiband antenna from a poorly tuned transmitter.

A low-pass filter is installed at the output of a transmitter to oppose harmonic energy from being radiated by the antenna system.

A high-pass filter is installed between the television antenna and the TV receiver to oppose reception of lower (3–30 MHz) amateur signals.

If you are told that your amateur station is causing TVI, check each TV channel for any sign of TVI, using each TV set in your home.

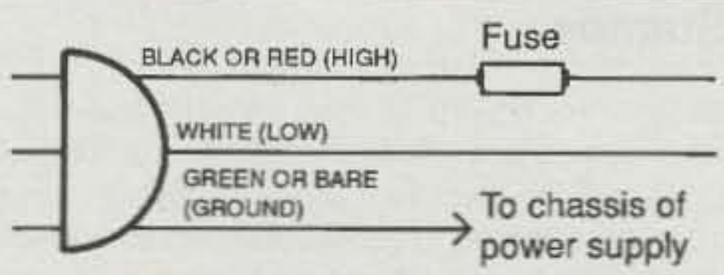


Fig. 2– AC power cord connections.

Transmitters and amplifiers are shielded to minimize possible emissions of unwanted spurious emissions.

AC power cord connections are shown in fig. 2.

Wall socket screws: brass is high side of AC input; silver or white is low side of AC input.

Fuses should be installed in series with the red and black input power wires of a mobile transceiver's DC power cable.

Most cities use the National Electric Code to specify wiring requirements. Libraries usually have them.

Family members should know where the house input electrical power shutoff switch is located, plus how to use it.

If someone is suffering from electrical shock, turn off the power, call for emergency help, and (if you know it) give CPR if it is needed.

A station's high-voltage switch should be located where it can be seen and reached easily.

When leaning over a power amplifier to make repairs or tuning adjustments, make certain loose jewelry cannot come in contact with high voltage.

Voltages of 30 volts or more are dangerous to humans. 1/500 ampere (2 milliamperes) current flow through a person can be painful. 1/10 ampere (100 milliamperes) current flow through a person can be fatal; it can stop a person's heart from beating.

METERS

Voltmeters are connected in parallel/shunt (across) the circuit under test. The range of a voltmeter can be extended by connecting a resistor in series with it, which is what happens when the range switch of a multimeter is moved to a higher voltage position.

Ammeters are connected in series with the circuit under test. The range of an ammeter can be extended by connecting a resistor in series

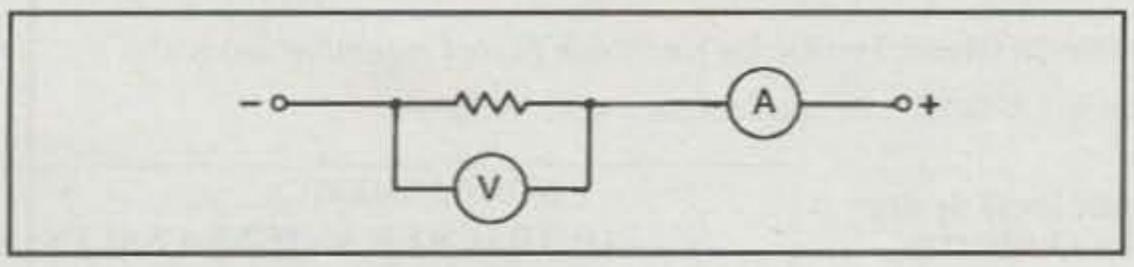


Fig. 3– Voltmeter and ammeter circuit connections.

with it, which is what multimeter switching accomplishes.

Multimeters are used to measure several ranges of voltage (E), current (I), and resistance (R).

The most accurate measurement of transmitter output power is obtained by connecting the power meter to the transmitter's output connector. Most RF wattmeters are designed to match the 50 ohm transmitter output impedance.

Directional wattmeters are used to measure forward and reverse RF powers.

- 90W forward and 10W reflected indicates 80W output.
- 96W forward and 4W reflected indicates 92W output.

Marker generators are usually referred to as crystal calibrators.

- They are high-stability oscillators used to generate reference signals at exact desired frequency intervals, such as 100 kHz.
- Commonly used to check receiver dials for band-edge accuracy.
- Accuracy checked against NBS stations WWV or WWVH.

Signal generators produce low-level signals over a range of frequencies. They are commonly used to align tuned circuits.

The most accurate measurement of the impedance mismatch between a feedline and an antenna is achieved by connecting a reflectometer between the two of them.

A high-frequency (3–30 MHz) power meter should not be used to make VHF (30–300 MHz) or UHF (300–3000 MHz) measurements, since such readings would be inaccurate.

An HF standing wave ratio (SWR) meter is probably okay to use at VHF and UHF if it can be adjusted to a full-scale forward reference setting.

A dummy load is also called a dummy antenna.

- It is used to make transmitter tests without radiating a signal on the air, thus reducing the possibility of interference to other stations.
- Transmitter output power is dissipated in the form of heat by a noninductive resistor, which does not radiate RF energy.
- The power dissipation rating of the dummy load should at least equal the maximum output power capability of the transmitter.

The S-meter in a receiver provides relative strength readings of received signals.

- It is not a device which has laboratory standard accuracy.

RF energy exposure heats body temperature.

- Eyes are most susceptible to RF damage.
- Maximum RF exposure guidelines have been established by the American National Standards Institute (ANSI).
- The 30–300 MHz VHF range is most dangerous to humans; consequently, ANSI standards are strictest in this range, with the lowest allowable exposure levels.
- The maximum allowable exposure level for handheld VHF/UHF transceivers is 7 watts.

After repairs and/or tuning adjustments have been completed, make certain that all RF shielding has been secured on a VHF or UHF power amplifier before turning it on.

HamAdventures Newsletter

Frank Anderton intends to publish "HamAdventures" about ten times per year. This is not a *technical* newsletter; it is a collection of interesting true stories submitted by people who are (or were) active in radio communications. If you have a story you are willing to share with others, or if you want to subscribe to this newsletter, the address to use is Rusprint HamAdventures, 26037 West 220th Terrace, Spring Hill, KS 66083.

Postage Stamps

James E. Mackey offers several unique services to amateurs. He is a good source of telecommunications theme stamps, including amateur radio stamps. He has an excellent stock of foreign airmail postage stamps which can be adhered to self-addressed envelopes being sent to DX amateurs. He also sells DX logs, envelopes (outgoing DX and return), and rubber address stamps. His address is P.O. Box 270569, West Hartford, CT 06127. If you want information regarding his products, please send a business-size (#10) SASE with 52¢ postage attached to it.

73, Bill, W6DDB

OUR READERS SAY

Heisseluft Article Addendum

In the article "Ionospheric Propagation Possible on Mars" (E. Heisseluft, *CQ*, April 1994) the following footnote was inadvertently omitted: Fry, C. D. and R. Yowell, "Over-the-Horizon Communications on Mars via HF Radio Propagation," Case for Mars V Conference Proceedings, Boulder, June 1993. Drs. Fry and Yowell probably were the first to suggest the possibility of HF communications on Mars. Interested readers are referred to their recent paper "HF Radio on Mars," *Communications Quarterly*, Spring 1994.—*ed.*

DSP-9 Review Correction

Editor, *CQ*:

I noted one mistake on the second page of my DSP-9 article ("*CQ* Reviews: The Timewave DSP-9," May 1994 *CQ*, p. 50). Specifically, the date of the next sunspot minimum should have been August 1997 (not 1994). Given everyone's interest in when the cycle will end, I felt we should let the readers know of this typo.

Ted Cohen, N4XX
Alexandria, VA

More From Dave and Bill

Editor, *CQ*:

I just thought I'd drop you a note to let you know how much I enjoy several of the columnists in *CQ*. Although I am not a contester or DXer, and don't really read much of your magazine, I subscribe to be able to read the columns by Dave Ingram, K4TWJ, and Bill Orr, W6SAI.

I especially enjoy reading Dave Ingram's column in your magazine. Perhaps I'm a nostalgia buff, but I enjoy reading about old radios and keys. The first thing I do when *CQ* arrives is see what Dave has written about. If it's an article on keys, forget anything until I have read the article. I used to tear out his articles and save them, but when he came out with his book, I just bought it *(*Keys, Keys, Keys, *available from CQ's Book Shop—ed.)*. Hopefully, he will have many more articles of this type in the near future.

Another columnist I enjoy is Bill Orr. I'm glad you picked up his column after the demise of *Ham Radio*. I get a lot of good technical information out of his columns, especially when he discusses linear amplifiers or antennas. I'm looking forward to many more good columns from him.

In all, thanks for putting out a fine magazine for the amateur community, and especially for including Dave and Bill as contributors.

Bill L. Turini
Washington, MI

PS: I just realized that I also enjoy your comments on hamfests. Along with the food, my biggest complaint is the admission price. It seems to have risen a dollar per year for the past two years. It's now $5 in the Midwest, which I feel is exorbitant, based on the quality and size of the hamfests here. If you ever need an assistant hamfest editor, please give me a call!

What's It All About?

Editor, *CQ*:

I have a simple question. What is amateur radio all about? I hear one person talking about his recent DX contact saying "that's what it's all about"; I hear another person talking about using the autopatch to call in an emergency situation saying "that's what it's all about." I have heard people discussing the communication services we provide to local events such as bike rides and boat races saying "that's what it's all about," or another group talking about working packet to some far away QTH and saying "that's what it's all about."

To someone new to ham radio it sounds like everyone is in a different hobby.

So what is it all about? The answer: All the above and more.

The amateur radio hobby is so large and encompasses so many variations that it is many things to different people. Some like HF, some stay strictly on 2 meters, some are on VHF and UHF. Some prefer the art of CW, while others have to keyboard their QSOs with packet.

I have heard those who talk DX more than local and vice versa, some who only use their gear in emergencies, some only for the auto patch, and others only to talk to certain people on schedules.

Participating in the different emergency nets is very important to some, while others prefer to monitor or "read the mail." I have met people who are very active in the local radio clubs and some who prefer the sidelines. I know people who consider constructing, repairing, and experimenting with different equipment highly fulfilling.

Who is operating correctly and getting the most out of their hobby? They all are. Everyone has found the niche that they find enjoyable and are comfortable operating in.

Is the amateur radio hobby too large? *No way!* A major part of its appeal is the fact that we can be individuals and explore the areas we want to, not be tied down to one operational practice. We can progress at our own rate and in any direction we want to move in. Maybe that's what it's all about?

I have been in the hobby only a short time and continue to be amazed at the different things an amateur operator can do now and am anxious to see what the future holds for my favorite hobby. Who knows? Maybe digital voice transmissions will use 2 meters to cross the globe. Maybe there will be palm-sized high power HF rigs that won't fry your hair when you key. The point is, the future is wide open and it is up to us to pick which direction we go in and how far we progress.

What is it all about? It's about whatever you want it to be, and I am glad of it.

Bob Alderman, KB5VQV
Point Comfort, TX

Repeater Freqs For 6 Meters?

Editor, *CQ*:

Okay, now that I've gotten my No-Code ticket, where can one go to find out what the repeater frequencies are for 6 meters? The repeater directory doesn't help except to give the number of channel pairs there are in each section, but little else.

I'm sure there are many more out there who would like in on this well-kept secret. How about an article explaining the fine points of this obscure band?

No-Codes unite. Six meters is ours. Use it or lose it. I hope to be able to take full advantage of 6 meters as soon as someone can give me more information on this little known band. I prefer it for the long-range simplex it affords. Only 222 MHz has better range versus power, but that's another story for another time.

Wesley Glenn Johnson, KD4YUR
Waycross, GA

CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Using Foreign Languages in Contesting

As contest operators we're always looking for a new angle to put us ahead of each other in the final standings. Most often we focus on additional dBs, equipment choices, or superior QTHs. While touring the hospitality rooms at Dayton this year, I was handed a very useful article written by Fred Hopengarten, K1VR. I want to share it with you this month.

Before we get into Fred's comments, let me add a few thoughts of my own. As sun activity continues to decline through this current cycle, successful contest operating will require taking new initiatives to maximize scores. The old adage of sitting on a frequency and running Europeans or JAs will be replaced with more creative methods of finding multipliers. Methods will need to be re-deployed to increase QSO rates (as well as total QSO numbers) into less traditionally QSOed geographic areas of the world.

An old concept that seems to be coming back of late is the idea of contesters becoming proficient in the use of foreign (in this case non-English) languages when operating. I'd be less than truthful if I said I have always believed in this operating technique. For years, I've thought that the use of a foreign language when running JAs, for example, was more to satisfy the ego of the English-speaking operator than to generate truly incremental QSO totals. And to some extent this is true. Unless you are truly conversant in a difficult language such as Japanese, there historically has been little advantage to its use, in my opinion. When the responding station asks you to repeat a contest exchange in English (after a first attempt in their native language), you probably should get the message.

There does seem to be one significant exception to the scenario described above. For whatever reason, in some recent contests the use of Spanish has generated incredible numbers of QSOs that would not have been worked any other way. This, in fact, has been an old tactic of the larger multi-op stations for many years. Within the past year or so, as 10/15 meter activity declined to Europe, this strategy has become a remarkably important factor. Believe it or not, it has become possible to work 100 to 200 additional Spanish speaking stations over the course of a weekend simply by learning the basics of the language and utilizing them in a rudimentary fashion over the air. Now instead of simply combing the bands and calling in the typical LU, CX, or YV pile-ups, it has become possible to actually run these stations at rates that sometimes approach 50 to 60 QSOs/hour. There have even been some success stories of using this same technique on 40 meter SSB during the late evening hours (0700+ UTC).

c/o CQ magazine
Internet: p00259@psilink.com
Compuserve ID: 71301,424

Calendar of Events

July	30-31	RSGB IOTA Contest
July	30-31	Connecticut QSO Party
Aug.	6-7	ARRL UHF Contest
Aug.	6-7	YO DX Contest
Aug.	6-7	North American CW QSO Party
Aug.	13-14	Worked All Europe CW Contest
Aug.	20-21	SEANET SSB Contest
Aug.	20-21	SARTG RTTY Contest
Aug.	20-21	North American SSB QSO Party
Aug.	20-22	New Jersey QSO Party
Aug.	27-28	TOEC Field Contest
Sept.	3-4	Bulgarian DX Contest
Sept.	3-4	All Asian SSB DX Contest
Sept.	4	Radio Club Panama XXIII Contest
Sept.	5	Michigan QRP Club Sprint
Sept.	7-9	YLRL Howdy Days
Sept.	10-11	Worked All Europe SSB Contest
Sept.	10-11	ARRL VHF QSO Party
Sept.	**24-25**	**CQ WW RTTY Contest**
Oct.	12-14	YLRL CW Anniversary Party
Oct.	15-16	JARTS WW RTTY Contest
Oct.	26-28	YLRL SSB Anniversary Party
Oct.	**29-30**	**CQ WW DX SSB Contest**
Nov.	5-7	ARRL CW Sweepstakes
Nov.	19-21	ARRL SSB Sweepstakes
Nov.	**26-27**	**CQ WW DX CW Contest**

With these thoughts as a backdrop, we introduce Fred Hopengarten's Contest Phrases.

Contest Phrases

By Fred Hopengarten, K1VR

Looking down the road just a bit toward the fall contest season, there is still time to do something I've been meaning to do for several years—learn the few critical phrases necessary to get through a CQ WW Contest or an ARRL DX Contest (in the spring) on phone. After a little research, I've been able to distill a few of the necessary expressions below.

English: Callsign please?
French: Indicatif, s'il vous plait?
Spanish: Llamada, por favor?
German: Ihr Rufzeichem, bitte?
Italian: Tuo nominativo per favore?
Japanese: kOru sain mo ishi do? -or- kOru sain o onegai shimasu?
Russian: vash po ziv noy?

English: What is your transmitter power?
French: Votre puissance, s'il vous plait?
Spanish: Que es la potencia de su transmisor? —or— Potencia, por favor?
German: Wieviel Power haben Sie?
Italian: Tuo potenza per favore?
Japanese: sOshinki no shutsuryoku wa dore gurai desuka?
Russian: Dai tya moishnist piridatchika?

August's Contest Tip

One of contesting's most difficult strategic decisions is determining when to stop calling a station in a pile-up that you cannot work. Fortunately, most modern logging programs tell you specifically how many QSOs a new multiplier is worth. In the future, if your goal is to achieve the highest score possible, try to avoid wasted time calling an unworkable multiplier just (a) for that 40th Zone, (b) to obtain a clean sweep in the ARRL SS, (c) out of sheer stubbornness that may make a nice contest QSO, but a lower final score!

(And for the fall . . .)

English: Your zone please?
French: Votre zone, s'il vous plait?
Spanish: Sua zona, por favor?
German: Ihre Zone, bitte?
Italian: Tua zona per favore?
Japanese: zOn o onegai shimasu.
Russian: vash nomir zone?

English: The frequency is in use, please QSY.
French: Le frequence est occupe, QSY s'il vous plait. *(Note: QSY pronounced "Ku Ess Ee-grec")*
Spanish: La frequencia es occupada. QSY por favor. *(Note: QSY pronounced "Koo Ess Ee-greca")*
German: Die Frequenz ist besetzt, bitte QSY! *(Note: QSY pronounced "Koo As Oooopsilon [Uepsilon])*
Italian: Il frequencia es occupado. QSY per favore.
Japanese: Tsukatte masu. QSY shite kudasai.
Russian: Chastota zeinyita.

English: Thank you.
French: Merci bien.
Spanish: Gracias.
German: Danke.
Italian: Grazie.
Japanese: dOmo arigatO.
Russian: Spaciba.

English: Please put me out on packet (Packetcluster).
French: Si vous plait, pouvez-vous me mettre sure le packet.
Spanish: Por favor, ponga me en el packet.
German: Bitte geben Sie mich als DX in den Packetcluster ein!
Italian: Per favore, mettimi sul packet.
Japanese: Paketto kurasuta ni watashi no shu hasu o appu shite kudasai.
Russian: Saab sheetya obo mnyer na pakyetye.

Although this list may prove to be very useful for certain contest situations, never forget

that English is still the standard for contest operating (and amateur radio operation in general). However, the judicious use of foreign phases to help the casual non-English speaking operator through a contest QSO, to assist in maintaining a clear frequency, or countless other examples makes this operating strategy something for everyone to consider. So, to my comrade friend UA3AAA, I say, "The next time you hear me on 20 meters, saab sheetya obo mnyer na pakyetye and spaciba!"

Final Comments

When I tune across the bands in this year's CQ WW and hear no more English being spoken, I'll know that maybe we went too far on this foreign language thing. You may recall that I've been talking about an upcoming analysis on packet use versus single operating. Hopefully, we'll get to it next month. Also, you may recall that we're rapidly approaching the time of the year when I conduct my annual Contest Survey. There's plenty of good information coming in the next few months.

As always, please remember that the deadline for the November issue is September 1st.

73, John, K1AR

ARRL UHF Contest

1800Z Sat. to 1800Z Sun., Aug. 6–7

Activity on this one starts at 220 MHz and goes all the way up to 2.3 GHz and higher.

Exchange: Grid square locator.

Points: Take three points for 220 or 432 MHz contacts, six for 902 or 1296 MHz. Credit 12 points for 2.3 GHz or higher.

Multiplier: Total number of different grid squares worked on each band. Final score is the total QSO points from all bands times the sum of the grid-square multiplier from each band.

An award pin program is available for this contest for making 5 QSOs. Details including the full rules were published in the July issue of *QST*. It is suggested you send a large SASE to the ARRL for official log and summary sheets.

Send logs to ARRL UHF Contest, 225 Main Street, Newington, CT 06111.

YO DX Contest

2000Z Sat. to 1600Z Sun., Aug. 6–7

This is the annual running of the YO DX Contest sponsored by the Romanian Amateur Radio Federation. This is a worldwide contest with everyone working each other on SSB and CW.

Classes: Single Operator All Bands/Single Band and Multi-Operator/Single Transmitter.

Frequencies: CW: 3510–60, 7010–40, 14010–60, 21010–60, 28010–60 kHz. SSB: 3700–75, 7040–90, 14150–250, 21200–300, 28400–600 kHz.

Exchange: RS(T) plus ITU Zone. YO stations will substitute their two-letter country abbreviation for their zone.

Scoring: 8 points for YO QSOs, 4 points for QSOs outside your continent, and 2 points for QSOs within your continent. Final score is computed by multiplying your total QSO points times the sum of YO counties and ITU Zones worked on each band.

Deadline for logs is September 6, 1994 and they should be mailed to: RARF, P.O. Box 05-50, R-76100 Bucharest, Romania.

North American QSO Party

CW: 1800Z Sat., Aug. 6 – 0600Z Sun., Aug. 7
SSB: 1800Z Sat., Aug. 20 – 0600Z Sun., Aug. 21

This is a short but fun QSO party that can have some fast rates at times. Any licensed radio amateur may enter, with the object being to work as many North American stations (and/or other stations if you are in North America) as possible during the contest period.

Classes: Single operator and multi-operator, two transmitter. Multi-operator stations shall keep a separate log for each transmitter. Multi-operator stations must have at least 10 minutes between band changes. Single operator entrants may only have one transmitted signal at a time. Output power must be limited to 150 watts for eligible entries. Multi-operator stations may operate 10 out of 12 hours. Off times must be at least 30 minutes in length and must be clearly marked in the log.

Mode: CW only in CW parties. Phone only in phone parties.

Bands: 160, 80, 40, 20, 15, and 10 meters only. You may work a station once per band. Suggested frequencies are 1815, 3535, 7035, 14035, 2135, and 28.035 (20 kHz up from band edge for Novice) on CW; and 1865, 3850, 7225, 14250, 21300, and 28.600 (28.450 Novice) on phone. Try 10 meters at 1900Z and 2000Z, 15 meters 1930Z and 2030Z, and 160 meters at 0430Z and 0530Z.

Exchange: Operator name and station location (state, province, or country).

Scoring: Multiply total valid contacts by the

sum of the number of multipliers worked on each band. Multipliers are states (including KH6 and KL7), Canadian call areas (VE1–VE8, VO1, VO2, VY1, and VY2), and other North American countries (do not count USA, Canada, KH6, or KL7 as countries). Non-North American countries do not count as multipliers, but may be worked for QSO credit.

Team Competition: Team competition is limited to a maximum of five single operator stations as a single entry unit. Groups having more than five members may submit more than one team entry. To qualify as a team entry, the name, callsign of each operator, and callsign of the station operated, should the operator be a guest at a station other than his own (e.g., N4RJ op by KM9P), must be registered with K8CC. The team registration information must be in written or telegraphic form and must be received before the start of the NAQP. There are neither distance nor meeting requirements for a team entry.

Awards: A total of five trophies will be awarded for the high score for the Single Operator CW, Single Operator Phone, Multi-Operator CW, Multi-Operator Phone, and Single Operator Combined score categories. Certificates of merit will be awarded to the highest scoring entrant with at least 200 QSOs from each state, province, and North American country. T-shirts will be awarded to each member of winning teams.

Contest logs must be sent to John Golomb, KZ2S, 107 Baily Corner Road, Wall, NJ 07719.

Entries must be postmarked not later than 30 days after the party to be eligible for trophies and awards. Logs may be submitted by K8CC's NA program or MS-DOS ASCII files if generated from another logging program.

European DX Contest

CW: Aug. 13–14 SSB: Sept. 10–11
0000Z Saturday to 2400Z Sunday

This is the 40th annual contest sponsored by the DARC. The activity will be between European countries and the rest of the world on all five bands, 3.5–28 MHz (IARU Region I regulation of frequencies for contest operation).

There are several rule changes in this year's contest. Beginning in 1994, the WAEDC is returning to a 48 hour format for all operating classes. In addition, there is no longer a multi-multi category. Finally, take note that UA1N has been deleted from the WAE country list.

Only 36 hours of operating time is permitted for single operator stations. The 12 hour off time may be taken in one, but not more than three, periods any time during the contest and must be indicated in the log. The minimum operating time on a band is 15 minutes. This rule does not apply to new multipliers.

Classes: (a) Single operator, all band; (b) Multi-operator, single transmitter. Only one signal on any band at the same time; (c) SWL. Note: DX packet cluster spotting is allowed for all classes.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Points: One point per QSO and 1 point for each QTC reported.

Multiplier: The multiplier for non-Europeans is determined by the number of European countries worked in each band (see WAE country list). Europeans will use the ARRL DXCC list of non-European countries.

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 by 3, and on 10/15/20 by 2.

Final Score: Total QSO points plus QTC points times the sum total multiplier from all bands.

SWL: Only the single operator, all-band class may be used. The same callsign, European or non-European, may only be logged once per band. The log must contain both callsigns and at least one of the control numbers. Each QSO logged counts 1 point, each complete QTC 1 point (maximum of 10 per station). Multiplier is determined by the DXCC and WAE country lists.

QTC Traffic: Additional point credit may be earned by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that took place earlier in the contest and was later sent back to a European station. It can only be sent by a non-European station back to a European. The general idea is that after a number of Europeans have been worked, a list of these stations can be reported back during a QSO with another station. An additional, one point credit can be claimed for each station reported.

A QTC contains the time, call, and QSO number of the station being reported (e.g., 1300/DL2DN/134, which means that at 1300Z you worked DL2DN and received #134).

A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to a station is allowed. The same station may be worked several times to complete this quota. Only the original contact, however, has QSO value.

Keep a uniform list of QTCs sent; 3/7 indicates that this is the third series of QTCs sent and that 7 are being reported.

If more than 100 QTCs are claimed, a check list must show that the maximum quota of 10 per station is not exceeded.

Club Competition: This rule requires the club to be a local group and not a national organization. Eligible club members must operate within a 500 km diameter. To be listed, a minimum of three logs must be received from a club. Entries must clearly indicate their club name on the summary sheet. A special trophy will be awarded by the DARC to the winning clubs from Europe and non-Europe.

Awards: Certificates will be awarded to the top scorers in each class in each country. Each participant with at least half the score of the continental leader will also receive a certificate. Plaques will go to continental winners in the single- and multi-operator classes and the winning EU and non-EU clubs.

Logs: It is suggested that you use the official DARC or equivalent log form. Logs may also be sent on MS-DOS disks ASCII files. Use 40 contacts to the page and a separate sheet for each band. Submit a dupe sheet for each band with 200 or more contacts. A summary sheet showing the score and a signed declaration are also required (sample log forms are available with an SASE and/or IRCs).

WAE Country List: C31, CT1, CU, EA, EA6, EI, F, G, GD, GI, GJ, GM, GM Shetland, GU, GW, HA, HB, HBØ, HV, I, IS,IT, JW Bear, JW Spitsbergen, JX, LA, LX, LZ, OE, OH, OHØ, OJ0, OK, OM, ON, OY, OZ, PA, S5, SM, SP,

SV, SV5 Rhodes, SV9 Crete, SY Athos, T7, T9, TA1, TF, TK, UA1346, other EU-CIS republics, YU1267, ZA, ZB2, 1AØ, 3A, 4J1M–V, 4N5, 4U1 Vienna, 9A, and 9H1.

Mailing deadline is September 15th for CW entries and October 15th for SSB to: WAEDC Contest Committee, P.O. Box 1126, D-74370 Sersheim, Germany.

SARTG RTTY Contest

Three Periods GMT
0000–0800 & 1600–2400 Sat., Aug. 20
0800–1600 Sun., Aug. 21

This is the 24th annual contest sponsored by the Scandinavian Amateur Radio Teleprinter Group. Use all bands 3.5 through 28 MHz. The same station may be worked on each band QSO and multiplier credit.

Classes: Single operator all band, single operator single band, multi-operator single transmitter, and SWL.

Exchange: RST and QSO number.

Points: QSOs with own country 5 points. With other countries on same continent 10 points. With other continents 15 points.

Multiplier: Each DXCC country and each W/K, VE/VO, and VK call area.

Final Score: Sum of QSO points from all bands times the sum of the multiplier from each band.

SWLs use same scoring but based on sum of stations and messages copied.

Awards: Certificates to the top-scoring stations in each class in each country and each call area of the U.S., Canada, and Australia.

Use a separate sheet for each band, and include a summary sheet showing the scoring, comments, and other essential information, and your name and address in block letters.

Logs must be received by October 10th and go to: SARTG Contest Manager, Bo Ohlsson, SM4CMG, Skulsta 1258, S-710 41 Fellingsbro, Sweden.

New Jersey QSO Party

2000Z Sat. to 0700Z Sun., Aug. 20–21
1300Z Sun. to 0200Z Mon., Aug. 21–22

This is the 35th annual party sponsored by the Englewood ARA. Phone and CW are part of the same contest. The same station may be worked on each band and mode, and NJ stations may contact in-state stations for QSO and multiplier credit.

Exchange: QSO number, RS(T), and QTH. County for NJ, ARRL section for others.

Scoring: NJ stations score 1 point for W/K and VE/VO contacts, and 3 points for DX. Multiply total by ARRL sections worked. KP4, KL7, KH6, are 3-point contacts and section multipliers.

Out-of-state stations multiply total NJ QSOs by number of NJ counties worked (maximum of 21).

Frequencies: 1810, 3535, 3950, 7035, 7135, 7235, 14035, 14285, 21100, 21355, 28100, 28400 kHz, and 50-50.5, and 144-146 MHz. Suggest phone on even hours, 15/10 meters on odd hours, and 160 at 0500Z.

Awards: Certificates to the top scorers in each NJ county, ARRL section, and DX country. Second-place awards if four or more logs are received from that section. Also Novice/Tech and mobile awards. There are four plaques donated by the section managers for NNJ and SNJ to the winning stations in those sections.

Use UTC time and indicate the multiplier only the first time it is worked. Be sure to include a QSO check sheet, and a summary sheet showing scoring, etc. Send a large SASE if you wish a copy of the results.

Stations planning activity in NJ are requested to advise the EARA by August 1st so that coverage in all counties may be planned.

Logs must be received no later than Sept. 18th and go to: Englewood ARA, P.O. Box 528, Englewood, NJ 07631-0528.

TOEC Field CW Contest

1200Z Sat. to 1200Z Sun., Aug. 27–28

This event is sponsored by the Top Of Europe Contesters (TOEC) in Sweden. It is intended to focus interest to the field-award, issued by the Swedish National Amateur Radio Society and is open to operators worldwide.

Classes: (1) Single Operator, All Band, Single Band, Low Power (100 watts maximum). (2) Multi-Single, Multi-Multi; all stations must be located within 500 meter diameter. (3) Mobile. Packet cluster spotting is allowed in all classes.

Bands: 160–10 meters (no WARC bands). Keep the following frequencies free from contest traffic: CW—3500–3510, 7000–7010, 14000–14010, 21000–21010, 28000–28010; SSB—3600-3650, 3790–3800, 7040–7045, 14100–14125, 21100–21175, 28200–28300.

Exchange: RST and field letters according to the Maidenhead-system (e.g., 599JP).

Multiplier: Each field worked gives one multiplier per band.

Scoring: Fixed stations—each QSO with station outside your continent counts as 3 points. QSO within your own continent (including QSO with same country) counts for 1 point. QSOs with /MM stations are worth 3 points regardless of QTH.

Mobile stations—All QSOs are worth 3 points. Each station can be contacted once per band. Exception: Mobile stations (both /M and /MM) may be contacted again, provided that the mobile station has changed field location since the previous QSO. These additional QSOs are worth zero QSO points but may be used for multiplier credit. (Note: Mobile stations may credit QSO points for additional QSOs.)

Final score: Multiply the total QSO points by the number of fields worked on all bands.

Logs may be submitted on MS-DOS formatted disks. Use ASCII, CT, or N6TR style files. Name the file with your callsign (e.g., SM3SGP.LOG).

Enclose a signed summary sheet. Send an SASE or an SAE plus one IRC if you want to receive a confirmation that the log has been received. Logs can also be submitted via e-mail (Internet or X.400) c/o Internet: I.j.silvergran@telub.se or X.400: I=LJ; S=Silvergran; P=Telub; A=400Net; C=se. Mailed logs must be postmarked no later than 30 days after the contest and should be sent to: TOEC, Box 2063, S-831 02 Ostersund Sweden.

All Asian SSB Contest

0000Z Sat. to 2400Z Sun., Sept. 3–4

The same rules for the CW Contest on June 19–20 apply here. See June Contest Calendar for complete rules. Logs for this one must be **received** by the committee no later than October 15th. They go to: JARL, P.O. Box 377, Tokyo Central, Japan.

VHF PLUS

BY JOE LYNCH, N6CL

ALL ABOUT THE WORLD ABOVE HF

First Ever Joint Cuba-USA Amateur Operation

This past June amateur radio operators from Cuba and the U.S. conducted the first ever joint operation on Cuban soil. Using the premise of the ARRL June VHF QSO Party, a team of U.S. operators consisting of Lauren Libby, KXØO, Chip, K7JA, and Janet Margelli, WA7WMB, and your editor, joined with a team of Cuban operators consisting of Oscar Morales, CO2OJ, Piro Pirole, CO2PL, Pedro Hernandez, CO2KG, Jose Amador, CO2JA, Mario Rodriguez, CO2YY, and Arnie Coro, CO2KK, to operate the contest. What follows is a description of how this magical event came about.

During my February trip to Cuba as part of the Methodist work team, I had the good fortune of being able to meet with President Pedro Rodriguez of the Federacion Radioafectionadios de Cuba, the national amateur radio organization of that country. During the course of the meeting, Pedro extended an invitation to me to bring a team of amateur radio operators to Cuba for the June VHF contest.

Upon my return to the United States, each side formed its teams. Each team then went to work on the logistics of the trip. A major factor in the communications between the two countries was the fact that I was able to establish a fairly reliable Internet connection with their team leader, Oscar, and a backup connection with Arnie.

Over the next three and a half months several dozen FAXes and e-mail messages were exchanged among all of us and between the U.S. State Department and me. Additionally, many long-distance phone calls were made between various members of the U.S. team.

On the Cuban side, Oscar worked tirelessly to make sure that every special permission from every government agency and all of the equipment, transportation, and lodging requirements were handled.

Finally, on 1 June we all took air transportation to Mexico City. Chip and Janet, coming from the west coast, arrived first. Lauren and I had joined up in Houston and arrived an hour later. Accompanying Lauren was a friend of his, Larry Blake, who, as a journalist for Latin American publications, was interested in the story of the historic event.

That evening, over dinner, our team had its first in-person planning meeting since its formation. What we noticed immediately was that we all seemed to click together. This seemed remarkable, because some of us barely knew others of the team. We seemed to sense that this was an omen of the way things were going to occur for us once we were in Cuba.

The next day we flew to Havana. After clearing the initial customs entry, we were met by Oscar and a couple of Ministry of Communications (their FCC) officials. We were asked to separate all of the transmitting equipment from our luggage and give it to these officials so that they could check it against the list I had previously e-mailed and make a record of the equipment's entry into the country.

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

VHF PLUS CALENDAR

July 28–30	Central States VHF Society Conference, Memphis, Tennessee.
July 31	Apogee and last quarter moon. Poor EME conditions.
August 6–7	ARRL UHF contest, 1800 UTC 6 August to 1800 UTC 7 August.
August 7	New moon. Very poor EME conditions.
August 12	Perigee. *Perseids* meteor shower predicted peak.
August 14	First quarter moon. Moderate EME conditions.
August 20–21	First weekend of the ARRL 10 GHz Cumulative Contest, 0800–2000 local time, both days.
August 21	Full moon. Moderate EME conditions.
August 28	Apogee and last quarter moon. Poor EME conditions.
September 1	Canada UHF Sprints, 1900–2300 local time.

Within a half hour all the equipment was returned to us and we were on our way to Bellomonte, a site on a bluff overlooking a tourist area about 15 miles east of Havana. Our transportation was a flat-bed truck and a Dutch Dodge Ram Van, two vehicles borrowed for the occasion. The flat-bed truck belonged to a Castrol oil dealer who lent it to us because he wanted the publicity from the company truck being driven all over Havana. The van and its driver, Pedro, were graciously loaned to us by the head of the long-distance department of the national telephone company out of gratitude for the help that the amateurs had given in backup communications for the telephone company over the years.

On the way out I discussed various aspects of the operation with Oscar and then threw him a challenge. I told him that I thought we had enough equipment to mount a Rover operation for the contest. Oscar, with a bit of a worried look, replied that they hadn't discussed that type of operation with the government.

I then said, "Oscar, in the States we have a saying: 'It is sometimes better to ask for forgiveness than to ask for permission.'" Oscar scratched his head and hesitated for a moment longer. Finally he said, "Why not!"

On our way to Bellomonte we checked into our hotel, the Itabo Hotel, a three-star facility that is within walking distance of the beach. Because it was during the off-season, we nearly had the facility of almost 200 rooms to ourselves. We found the hotel on-par with any in the States of its caliber.

After checking in, we rested until dinner. We enjoyed a well-prepared buffet in the cafeteria. Following dinner, President Pedro Rodriguez, CO2RP, Oscar, Piro (the official photographer of the team), and Arnie (the translator) met with us to discuss our itinerary for the week of our stay. During the course of the meeting I learned just how much planning had gone into making this trip successful and enjoyable for the U.S. members of the operation. Among the items discussed were the various permissions received for our operation. Of particular importance was the permission for the operation to use the COØFRC call, the permission for us to use our callsigns preceded by the CO2 prefix, and that our operating privileges would be on-par with our Extra class license.

One other item discussed was just how much publicity would be sought for our trip by the FRC. We found that their interest in publicity was exactly as ours, trying to put amateur radio in a favorable light in the public's eye. However, citing their concerns for me over the negative publicity I had received from certain segments of the amateur radio community in the U.S. following my trip in February, President Pedro asked me just how much publicity I would feel comfortable with. I told him that I was initially concerned with international publicity (the national TV often feeds stories to CNN for worldwide distribution) but that I had no objections to internal publicity. We came to an agreement that national radio coverage and local TV coverage would be acceptable by all of us.

I also learned how deeply concerned they were with wanting to make me feel very, very welcome back in Cuba when they told me that they had made arrangements for me (and the members of our team) to meet with the Methodist bishop and to make the 180 mile trip to Cifuentes to meet with the amateur radio and church friends I had made in February. Following our meeting we went the one mile to Bellomonte.

Upon arrival, we were enthusiastically met by the remaining members of the Cuban team. We were also immediately impressed with the enormous amount of work that had already taken place to make the site ready for the contest. A military tent, two crank-up towers, and a 2 KW generator had been borrowed from the military. A four-element quad for 6 meters, designed by Jose, had been constructed and was installed. Two 14-element Yagis for 2 meters were awaiting installation on one of the crank-up towers. A tape dipole for HF had been installed on a rebar tower. Tables and chairs had been acquired from the nearby cafe/bar for operating locations. And, most important-

The entire team of COØFRC and CO2OJ Rover. From left to right, standing: Piro Pirole, CO2PL; Chip Margelli, K7JA; Janet Margelli, WA7WMB; Oscar Morales, CO2OJ; Jose Amador, CO2JA; Pedro Hernandez, CO2KG; Mario Rodriguez, CO2YY; Arnie Coro, CO2KK; your editor, and Lauren Libby, KXØO. Seated: Pedro, the van (rover) driver. (Photo courtesy CO2PL)

ly, electricity had been acquired by tapping into one of the light circuits from the cafe.

We unloaded our equipment from the van and stowed it in the tent for the next day's installation. We were then invited to try out our CO2/ callsigns on HF. While Chip and Janet were busy making QSOs on HF and Lauren and Larry were becoming acquainted with our counterpart team members, President Pedro asked me how I felt about the negative publicity mentioned above.

I told Pedro that following the publicity, I identified leaders of it and attempted to make contact with them. In particular, I made contact with Rafael Estevez, WA4ZZG, who heads SIRA, the Sociedad Internationale de Radioafecionados, a U.S. amateur group composed primarily of ex-Cuban amateurs. I advised Pedro that Rafael had expressed concerns over Cubans who had lost their licenses in what Rafael said was simply performing humanitarian work of asking for medical supplies over the air. I also told Pedro I had advised Rafael that if I found the right opportunity to do so, I would voice Rafael's concerns with the proper authorities.

Pedro told me that he did not know the full story, but that Curlos Martinez, the director of frequency allocation for the Ministry of Communications (essentially the head of the amateur radio division of their FCC) would be at a meeting for us at the FRC headquarters on Monday night and he invited me to ask Martinez my questions at that time. Because Pedro was the one to broach the subject, I was impressed that there was a willingness, indeed an eagerness, to have me hear their side of the story.

After reluctantly returning to the hotel, we talked for a couple more hours before exhaustion made all of us go to bed.

The next morning, after a leisurely breakfast of a choice between omelettes and boiled eggs, plus potatoes, and pancakes, we went back to the site to help with the installation of some of the equipment.

About an hour later we headed off to Expo-Cuba, a trade center/amusement park that reminded me of the Oklahoma County fairgrounds. Within the facility are permanent displays of different parts of the country, amusement-park rides, and restaurants. We were welcomed by the director of the park and then given an escorted tour of the facility.

Following our initial tour we had refreshments in the tower restaurant, which has a rotating dining floor, thereby affording us an opportunity for a panoramic view of the park while we relaxed. Following refreshments we visited the broadcast studio, where I was interviewed for the national radio network. After the tour we enjoyed baked fish in an open-air restaurant. We then concluded our tour with a visit to the on-site club station, CO2BTA.

Upon returning to Bellomonte we finished assembling the COØFRC station. Chip put together his satellite antenna and assembled his FT-290 and FT-790 radios in an OSCAR configuration. Upon pointing the antennas at the right azimuth and elevation, he found that he could easily hear himself on OSCAR 13. However, the footprint was covering South America, so Chip could find no takers for his "CQ OSCAR" calls.

A bit later in the afternoon Oscar found the 6 meter Yagi that had been replaced by the 4-element quad, cracked a wide grin, and stated, "This will be our rover antenna." I knew then that we were in for some great fun.

We discussed the details of the rover operation. Without having to get further permission, we would be able to operate within close proximity of the Jiba Coa (COØBGG) and the COØFRC stations. This would put us on from two different grid locators—EL93 and EL83. The one restriction was that the van would have to return to the Bellomonte site in time for supper, because it was the source of transportation for the food from the hotel's kitchen. Because gas was so expensive and it was my idea for the rover operation, I agreed to pay for it. Gas is almost $4.00 per gallon! However, it was the best money I had ever invested in a rover operation!

Oscar initially wanted me to use my call, but I told him that CO2OJ Rover, with the phonetics "Orange Juice," was far easier to say and far more attractive than CO2/N6CL Rover. Be-

Oscar Morales, CO2OJ, works 2 meters simplex from EL82.

sides, I told him that he would be able to increase his grid locator totals, thereby putting him that much closer to VUCC.

Later that Friday night, pleased with our plans for the rover operation, I dug out the cables that I had made up for my operation during the 1993 6 meter Sprint contest that occurred during the West Coast VHF Conference. I made some modifications for them to use more than one amplifier and radio simultaneously. I then went to bed with visions of many contacts dancing in my head.

Murphy was a constant companion before and during the contest. And he played no favorites. For example, the power transformer on the utility pole servicing the Jiba Coa site was hit by lightning Friday afternoon. Not to worry. CM2WZ hopped on his motorcycle, went to town, and returned with a spool of No. 12 wire. Having only enough wire for one run from the valley below, he drove a ground rod in the ground at the pole where they found electricity still available. He then rode his motorcycle, in the dark, up the cliff, unspooling the wire as he went. At the site at the top of the cliff, they drove another ground rod in and found that they had about 105 volts, enough to power the two radios for their operation.

After breakfast Saturday we went back to Bellomonte to put the finishing touches on the site. Upon arrival, we discovered that Jose was making contacts on OSCAR 13. Nothing was going to keep the enthusiasm of these operators down!

Before the contest we each had some time to use our own calls and make contacts on the bands. Janet became our marketing director by getting on 14.207 MHz and announcing that we were on the air from Bellomonte for the contest. Janet's activity kept up throughout the contest, netting her several hundred contacts and the COØFRC operation a number of additional unexpected contacts from people looking for the VHF and UHF stations.

After lunch Oscar and I loaded up the van with the 6 meter equipment and Arnie's TS 700. Shortly before the contest we headed to Jiba Coa to set up our site. When the contest started, we were ready to go as CO2OJ Rover. The 6 meter band was hot. The sun was hot and the mosquitoes were as ferocious as the contacts on the band. When the band finally closed, our driver, Pedro, brought back some oranges that he had found at the COØBGG site. We, the "orange juice" rover, then relaxed with some real "orange juice."

Upon returning to Bellomonte we discovered that the operation was inching close to 175 contacts on 6 meters, plus plenty more on 2 meters and 70 cm. We also learned that two different officials of the Communist Party had paid the site separate visits. Both of these officials were quite impressed with the operations. At around midnight we went back to the hotel.

The next day after breakfast we returned to Bellomonte to a cheering Jose. He had just a few minutes earlier completed a contact with Ott Fiebel, W4WSR, on 1296 MHz for the first ever contact from Cuba on this band.

A few minutes after our arrival Oscar and I loaded the van for our trip down the hill to operate from EL83. While doing so, Oscar informed me that we might be able to operate from EL82 after lunch. While outwardly remaining calm about the possibility, inside I was cheering.

After getting in position alongside the highway, Oscar and Pedro started assembling the antenna. About that time the TV crew from the local station spotted us setting up. They made a "U" turn across all four lanes of traffic and pulled in behind us. After filming Oscar and Pedro putting up the antenna and Oscar and me making a couple of contacts, the TV crew was off to the top of the hill.

After making a dozen or so contacts on 6 meters I switched to 2 meters. About a half hour into working stations in Florida the TS 700 died. We decided then it was time to get the van back for the lunch run.

Following lunch, Oscar, Pedro, and I headed the rover operation for EL82. On the way Oscar used his handheld to make simplex QSOs. Additionally, on the way we picked up Lorenzo, CO2LE, who said that he knew the perfect spot in EL82 for QSOs. I found out later that also while we were on our way, back at the COØFRC site Pedro Rodriguez, CO2RP, was making arrangements for permission for us to operate the rover from EL82. It seems that the group had some concern about the possibility of an American being seen in the back seat of a van with a set of headphones on while traveling through the streets of Havana.

Upon arrival at the "perfect spot," I found the 6 meter band open, so I started making noise. However, it was also raining at that perfect spot! That didn't stop Pedro and Oscar. They jumped out of the van, hauled out the Yagi, and started putting it together. Meanwhile, I continued to operate using the 2 meter 5/8-wave whip. By the time I had made my ninth contact, the guys had the Yagi up and ready for me *and* the band was dead.

That didn't deter Oscar. He picked up the handheld and started working everyone he had worked from EL83 all over again. Occasionally he would grab the mic of the 6 meter radio and "move" someone up to 2 meters. Oscar was quickly learning to be a true rover.

Unfortunately, this initial burst of activity lasted all of five contacts before Oscar's handheld battery died. With no spare, Oscar began to get a bit discouraged. Remembering the plight of the COØBGG operation and how they solved their lack of electricity by a single wire, I thought of a solution. Beginning to think like a Cuban (salvage and save everything), I remembered that I had picked up some No. 22 insulated wire that I found near our EL83 site. I had tossed it in the back of the van thinking that I might use it for something. I removed the battery from the handheld and discovered that the contact terminals on the bottom of the handheld were clearly marked "+" and "–" to indicate their polarities. I also noticed that there was enough space between the plastic and where the terminal protruded to jam a No. 22 wire into the space. I grabbed a piece of the wire, stripped it with my wire stripping teeth, and jammed it into the space near the terminal. Next I secured it with a piece of electrical tape.

I then took the other end of the wire, stripped it, and jammed it into the back of a connecting lug so that it made contact with the positive line to the 2 meter linear. Assuming that the return would come through the shield connection to the antenna, I turned on the handheld and it worked! Upon handing the handheld to Oscar, he remarked, "I sure love working with intelligent people." Oscar went on to make fifteen more contacts before working the band dry.

Around 9 PM we decided to call an end to the rover operation. We took down the antenna in the dark (sound familiar?), packed up, and headed back to Bellomonte. I doubt that W2SZ could top the reception we received from our fellow operators upon our return by anything they would show their captive rovers!

Upon our return we learned that Jose had made the first ever Cuba-U.S. 222 MHz contact by working Charles Barber, WA4CHA, and that Chip had completed an EME contact with Dave Blaschke, W5UN.

The contest ended for Bellomonte with Jose making a third 222 MHz contact, this time with an amateur who had found a 220 MHz handheld and reprogrammed it for 222.100 MHz. Making this two-way FM contact also added a third multiplier to that band's score.

After the contest all the participants stuffed themselves with dinner and a special cake made just for the occasion. The Americans went back to the hotel and got to bed around 2:30 AM. The Cubans, however, stayed awake until nearly 4 AM talking about the success of the operation.

The next day Chip and Janet left for the airport; Lauren, Larry, and I went on a tour of the Young People's Computer Club, met with the Methodist bishop I had become friends with

Jose Amador, CO2JA, shows the 1296 MHz log sheet containing a QSO with Ott Fiebel, W4WSR, the first ever contact from Cuba on that band. Surrounding him are Pedro Hernandez, CO2KG, Arnie Coro, CO2KK, Janet Margelli, WA7WMB, and Lauren Libby, KXØO.

on my previous trip, and attended a special meeting of the officers of the FRC.

At that meeting they had made arrangements for Curlos Martinez, the director for frequency allocations (essentially the FCC's equivalent of the Private Radio Bureau) of the Ministry of Communications to also be in attendance so that I could ask my questions about license suspensions in Cuba.

In answer to my questions Martinez explained that a total of 36 Cuban amateurs have had their licenses suspended between 30 days and two years for handling traffic for compensation, which, as he pointed out, is against ITU regulations. He said that his concerns were that amateur radio is a hobby and that it is to remain a hobby and not be used for commercial communications.

Martinez stated that he was not concerned with the one-time use of amateur radio to request medicines. However, there were documented cases where amateurs had either received "in kind" compensation from the person sending the material from the States or actually received compensation in dollars from the Cuban requesting the assistance.

It is important to note, though, that Martinez used his contact with me, a U.S. amateur radio operator, as an opportunity to level criticism against the FCC for its "lack of enforcement" of south Florida amateurs, particularly Cuban exiles known to them, who cause deliberate interference to internal Cuban communications. He stated that he had sent "countless numbers of telexes" to the FCC when he would monitor these offending amateurs.

The next day, as a way of demonstrating how much the amateurs wanted me to feel welcome back in Cuba, we took a trip to Cifuentes so that I could visit his amateur radio and church friends. Upon arrival, Larry, Lauren, and I were treated to a reception by many of the local amateurs. Following visits with my friends and a meeting with a municipal official, our entourage went to Santa Clara for lunch hosted by Julio Perez, CO6JP, the president of the regional amateur radio club, and Joel Carrazana, CO6JC, the deputy vice-president.

After lunch we made a spontaneous decision to go to Falcon, a small town south of Santa Clara, to visit Francisco Rodriguez, CO6RL, the manager of the national traffic net. Panchito, as he is called, is known by most amateurs in the country for his dedication to the hobby. Despite being blinded fifty years earlier by a lye explosion at the age of seven, he maintains an optimistic attitude toward life. Among his many amateur radio accomplishments is being the Elmer to 21 amateurs in his town. It was reported the next day following the group's visit to his home that Panchito took seven minutes of net time to tell about the visit of those "very important Americans."

Wednesday morning Larry and Lauren went into Havana to visit some friends of Larry's and I stayed behind to try to get a start on writing this portion of the column. Being too overwhelmed with all the wonderful thoughts of the trip and a bit exhausted for the lack of sleep, I found it very hard to write. I finally ended up taking a nap.

After lunch Oscar, Arnie, and Pedro came by the hotel to pick me up for the afternoon tour of historical Havana. Upon arrival at the Palace we were met by Larry and Lauren. From there we received a guided tour of many of the historical buildings and museums. I was impressed with the pride the Cubans have in their heritage. I was also impressed with the influence Abraham Lincoln had on the Cuban slave owners who decided in 1868 to free them. I also found out that two elementary schools are named after American heroes, one for George Washington, and one for Lincoln, and that these names remain in spite of the strained relationships between our two countries.

The next day it was time to go home. On our way to the airport we were scheduled to make a quick second visit with the Methodist bishop. While driving to his office, we began hearing reports of 6 meters being wide open. After dropping off Larry, Lauren, and me, Oscar, Arnie, and Pedro headed for Oscar's house to pick up the 6 meter radio.

Upon arrival back at the bishop's office, they started working stateside stations. After our visit with the bishop we joined in on the fun. It was a delight for me to make my final contact using the CO2/ callsign with Ted Goldthorpe, WA4VCC, who started the whole chain of events that led to this trip by Americans.

It was Ted who notified me that Arnie was in the country last May attending a conference at the University of North Carolina. And it was Ted

who planted the idea in my mind of inviting Arnie to the Central States VHF conference last year, when Arnie and I became fast friends. For me it was a fitting end to a wonderful trip that accomplished so much for the future of amateur radio diplomacy and for future (non-amateur) people-to-people contacts between our two countries.

Ed Ladd, W2IDZ, Silent Key

A pioneer in 6 meter communications joined the Silent Key ranks on 8 June. Ed Ladd, W2IDZ, who gave so much to so many in the development of 6 meters succumbed to a brief illness following unsuccessful surgery. He is survived by his wife, Leta, WA2QCE.

On the eve of opening the 6 meter band, Ed stayed up until 3 AM to make the first contact on that band. He was the author of a series of articles on 6 meter TVI and how to cure it. He, along with a friend of his, designed the "Little Lulu" 6 meter rig.

In 1958 he operated portable from VE8 during a business trip to the Northwest Territories, making many 6 meters ops very happy with making a contact above the Arctic Circle.

Over the years he provided so much encouragement for across-the-Atlantic contacts on 6 meters. He provided many a "G" station with his first "W" contact on that band.

He will be deeply missed by all his friends in the VHF community.

On The Air

Because so much space has been taken up with the lead story of the Cuban operation, I must postpone on the air reports until next month. However, I must say that I have received a number of reports of 2 meter sporadic-E openings and of stations who worked VP5/W6JKV, the CY9 station and 5T5JC on 6 meters, plus a report on the 10,000 km 6 meter contact between Dave Gaytko, WD4KPD, and JY7SIX. It has been an exciting early June.

Current Conferences

The 20th Eastern VHF/UHF Society Conference is to be held 26–28 August at the Quality Inn and Conference Center, 51 Hartford Turnpike, Vernon, CT 06066. For room reservations, call 800-235-4667.

The schedule of activities is as follows: Friday is hospitality room night. Saturday's slate includes technical talks, band sessions, noise-figure measuring, and the dinner/prize-drawings/trivia contest. As there is adequate dining close by, you need not attend the banquet to participate in the prize drawing/trivia contest. Sunday's activities include the fleamarket and antenna-measuring range.

For details and pre-conference registration (before 15 August) contact: Byron Blanchard, N1EKV, 16 Round Hill Road, Lexington, MA 02173; phone (evenings) 617-862-1380.

Fees: Preregistration, $20.00; at the door, $25.00; first time, $17.00; Sunday only, $5.00 (for dealer and swapmeet area access).

Conference speakers to date include Paul Wade, N1BWT, on parabolic dishes; Jeff Klein, WA2TEO, on contesting strategies and comparative results; Larry Filby, K1LPS, on inexpensive 10 GHz wideband FM gear; Peter Traneus Anderson, KC1HR, on digital receiver design; David Upton, WB1CMG, on practical solid-state amplifier design; Emil Pocock, W3EP, on a VHF topic to be determined; and Chip Taylor, W1AIM, on 2 meter sessions.

CM2WZ operates 2 meters from Jiba Coa using the special callsign COØBGG. Not pictured here are the other operators: CO3JA, CO2PX, and CM3CD.

Current Contests

The annual UHF contest is scheduled for 6–7 August. The contest period is for 24 hours beginning 1800 UTC Saturday. There are sev-

FRC President, Pedro Rodriguez, CO2RP, and your editor cut the cake for the last night celebration of the successful operation. Surrounding us are many club members and their wives, all of whom participated at some level in the success of the contest.

eral categories for entry. Scoring: Count three points for 222 or 432 MHz contacts, six points for 902 and 1296 MHz contacts, and 12 points for contacts on 2.3 GHz and above. Exchange is your four-digit grid square. Again this year is the availability of pins, such as those also available in other ARRL contests. The minimum number of contacts necessary for a pin is five. Submit your log by 8 September to the League to be eligible for awards. For complete rules, see July *QST*.

The dates for the first weekend of the seventh annual ARRL 10 GHz cumulative contest are 20–21 August (the second weekend is 17–18 September). The operating times are 8:00 AM to 8:00 PM, local time each day. The exchange is the *six*-digit Maidenhead grid locator. Scoring is adding the sum of the distances in *kilometers* of each station worked to the sum of each unique callsign worked multiplied by one hundred. For example, if you work four unique stations (two of which operated from two separate locations) that are 97, 107, 154, 205, 157, and 147 km apart (for a total of 867 km) then your final score would be 1267 (867 + 400). To be eligible for contest awards, submit your log by 18 October. For complete rules, see June *QST*.

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

Current Meteor Showers

As usual, the big meteor shower for this month is the *Perseids*. While many in North America were disappointed in the production of the shower, many in Europe enjoyed outstanding conditions.

What about this year? Two different meteor shower prediction programs offer two different peak times. The program offered by Michael Owen, W9IP, indicates a peak time around 1830 UTC, while the Meteor Scatter Software developed by OH5IY predicts a peak time at around 0600 UTC. Also, the International Meteor Organization (IMO) states that the shower should favor North America visually.

As mentioned last month, activity for this shower starts appearing around mid-July. The most intense period is the four days leading up to the predicted peak.

Current DXpeditions

Plenty of activity will take place surrounding the predicted peak of the *Perseids*. Among the ones that have come to my attention are the following:

Ken Ramirez, KH2F, and Terry Price, WD8ISK, plan to go to **EM98**. Call Ken at 301-869-6436 to set skeds.

Donn Baker, WA2VOI; Rich Westerberg, NØHJZ; John Palmer, WAØNTT; Ron Bergantzel, KAØRYT; Dave Odden, WDØCJM; and Bruce Richardson, KE9QT, plan to go to **EN15** for four days beginning 11 August. To set skeds, call Rich at home at 612-934-7580 on or after 23 July between 1200–1800 UTC. They are taking skeds all the way to 432 MHz.

Notes on Newsletters and Other Publications

"The 50 MHz DX Bulletin" appears to have found a permanent home with **Victor Frank, K6FV.** You can subscribe by sending $20 for U.S. surface rate to Victor at 12450 Skyline Blvd., Woodside, CA 94062-4541. Send Victor news via Internet at frank@marie.sri.com.

Tim Marek, NC7K, has announced that his *North American VHF Directory* is priced one third off during the months of July and August as a way of promoting activity during the *Perseids* meteor shower. Send $6.00 to Tim at 6360 Prestige Ct., Reno, NV 89506.

Ken Neubeck, WB2AMU, has published *Six Meters, a Guide to the Magic Band*. It is available from Worldradio Books for $12.00,

plus shipping. Send to P.O. Box 189490, Sacramento, CA 95818.

And Finally . . .

Amateur Radio and Politics: It was particularly sad for me when I returned from my first trip to Cuba to see so much criticism of amateurs in Cuba, particularly of Pedro Rodriguez, CO2RP, and Arnie Coro, CO2KK.

Now that I have spent a week with them and their families, I find myself even a bit sadder. These two gentlemen and the many other amateurs I met are among the most sincere individuals I know.

Pedro and I had long talks about the future of amateur radio in Cuba. He was a sponge as I described the infrastructure of the League to him, and at one point he remarked that with regard to emergency communications, he was quite interested in using the League's infrastructure as a model for developing their emergency communications plans.

I found Pedro sincerely and deeply interested in the hobby. My MBA training alerted me to his leadership style. He is a hands-on leader, involved at all levels. He has a lot of hard work ahead of him in convincing the government and the public of the importance of amateur radio as a national resource (sound familiar?). I wish him well with his goals.

One very important thing that Pedro did for me was to give me a copy of *Castro and Religion,* a book written by Frei Betto, a Dominican friar, and which is based on interviews he had with Fidel. Pedro went to great lengths to find an English language version of the book. To me it demonstrated his deep respect for my religious convictions and his attempt to bridge a friendship between us through the gift of the book.

My friendship with Arnie deepened. We both remarked to each other how each side exchanged information on the skills we had learned in developing our interests in the VHF world of the hobby.

I also had deep technical discussions with Jose Amador, CO2JA, about computers and other subjects. I was quite impressed with his broad knowledge of a number of subjects despite his not having the resources readily available to him to learn these subjects.

Oscar Morales, CO2OJ, was the linchpin of the whole operation. He spent tireless hours coordinating all aspects of the trip. Without his work, it would never have been possible.

Spending some part of every day with Oscar caused me to regard him as my brother. We shared happy times and disappointing times. We laughed and cried together. We respected each other's differences, but had healthy discussions about each other's views on life.

Because of my involvement with these gentlemen and their families, I find it even more incredible that anyone should, in the name of politics, make personal attacks on anyone else. I hope this is a passing fancy in our hobby and that this fine hobby of amateur radio will soon rid itself of such destructive behaviors.

My thanks go to all of you who have sent me material for this column and shared your kind thoughts about the success of the Cuban operation. As always, you can contact me by phone 405-528-6625; FAX 405-528-0746; and e-mail, via Internet at 72124.2734@compuserve.com.

Until next month . . .

73, Joe, N6CL

Radio FUNdamentals

BY BILL ORR, W6SAI

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

An Improved "Long John" Yagi for 2 Meters

Building VHF antennas is fun and inexpensive. You can build a high-gain Yagi for 2 meters on a 12 foot boom. In fact, one of the most popular "store-boughten" 2 meter Long John Yagis is the Cushcraft A147-11, which has 11 elements on a 12 foot (1.76 wavelength) long boom.

Modern computer-aided antenna design and optimization programs provide accurate long Yagi arrays, and it is interesting to reverse-engineer the A147-11 beam to find out if its excellent characteristics can be improved. This antenna, in fact, was the jumping off point for this adventure.

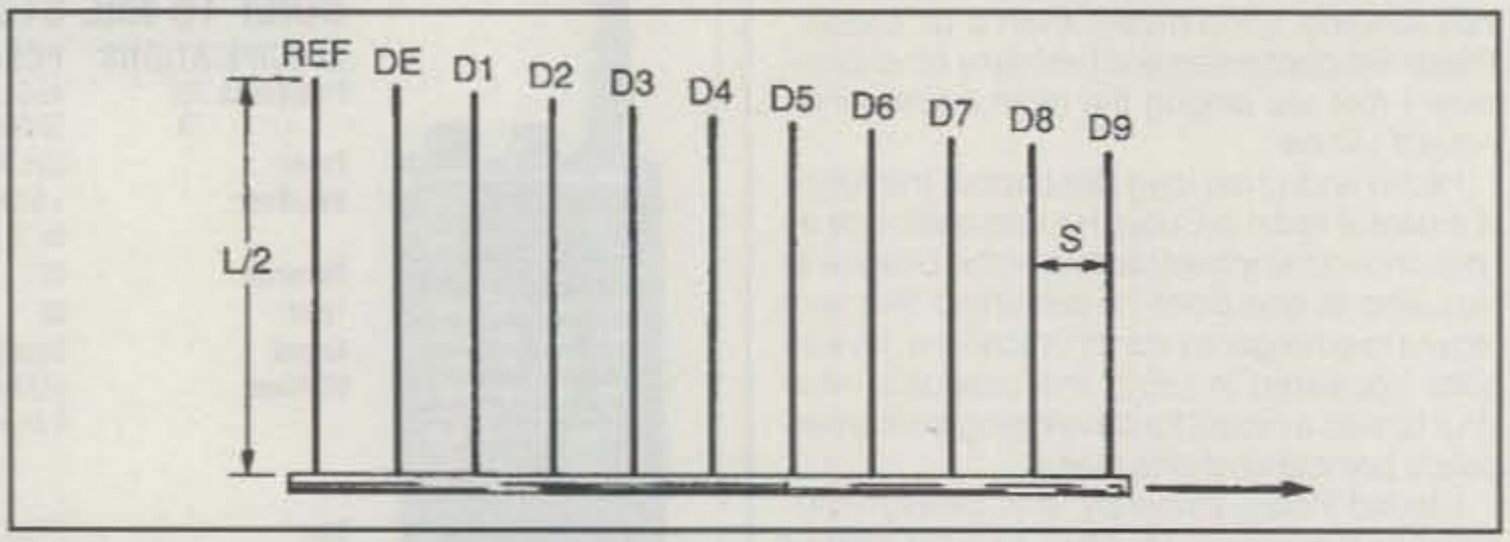


Fig. 1– Half-elements of Cushcraft A147-11 beam. Spacing(s) is about 14 inches between adjacent elements. Directors are similar in length within a half inch. Elements mounted atop the boom.

Reverse-Engineering The A147-11 Yagi

To begin with, the A147-11 dimensions are taken from the original design and input to an antenna analysis program. In this case, the YO.5 Yagi Optimization Program of K6STI is employed. Only half-element lengths are used for analysis, as the beam is symmetrical along the boom axis. Element diameters, lengths, and spacings are listed in Table I.

Explanation of this table is in order, as it is the input format for the optimization sequence discussed in this column. The first line is the name of the antenna file, Cushcraft A147-11. The second line lists the four frequencies in MHz at which the design is to be optimized, in this case 144.0, 146.0, and 148.0 MHz. The frequencies are arbitrary and are selected by the investigator. The third line states the total number of elements (eleven), and the dimension used for the measurements—inches.

Below this introductory material are two columns. The left-hand column indicates element spacing, starting with the reflector and proceeding through the directors. Thus, the driven element is 14.25 inches in front of the reflector, and the first director element (counting from the reflector) is spaced 28.437 inches away. The spacing picture is given in fig. 1.

One-half length of each element is given in column 2, which also provides element diameter on separate lines. Thus, the actual reflector half-length is 19.75 inches, and directly above this dimension, reflector diameter is specified as 0.1870 inch.

The next element is the driven element, the half-length of which is 17.4581 inches. On the line above it is element diameter of 0.5 inches. "Fat" driven elements are often used in VHF Yagis if a Gamma match is to be used, as the Gamma rod must be much smaller in diameter than the driven element. *(Note: For construction, dimensions are rounded to the nearest tenth-inch.)*

The directors all have a diameter of 0.1870 inch, and this figure is listed on the next line. Since all succeeding directors have the same diameter, only one diameter call-out is required.

Note that the elements have a uniform spacing of about 14 inches. Uniform spacing has long been used in VHF arrays, as it provides very good gain and a clean pattern. Modern computer programs allow the operator to experiment with various element spacings, which can sometimes provide interesting results.

CUSHCRAFT A147-11

144.000 146.000 148.000 MHz

11 elements, inches	
	0.1870
0.0000	19.7500
	0.5000
14.2500	17.4581
	0.1870
28.4370	17.7500
42.6240	17.6880
56.8110	17.6250
70.9980	17.5620
85.1850	17.5000
99.3720	17.4380
113.5590	17.3750
127.7460	17.3120
142.0580	17.2500

Table I– These dimensions were taken from an old Cushcraft design and are used only as an example. They are not given for duplication as a state-of-the-art antenna.

Graphs of The A147-11 Yagi Beam

Graphs of the antenna characteristics are shown in fig. 2. Maximum gain is close to 10.93 dBd near 145 MHz. Front-to-back ratio peaks at 21 dB, and VSWR, when the antenna is matched, is unity near 145.6 MHz, rising to less than 2 at the band edges.

This is a well-behaved array, providing good characteristics and moderate SWR across the band. The polar plot of the antenna is shown in fig. 3. Beamwidth at the "–3 dB" points is 36 degrees.

To see if the overall antenna performance can be improved a bit, the optimizer is run through 903 iterations, searching for an improvement in gain, SWR, or front-to-back ratio. The results are shown in fig. 4. Maximum gain is 10.97 dBd at 145.8 MHz, which is a gain of 0.04 dB; front-to-back peaks better than 26 dB at 146 MHz; and SWR is less than 1.42 across the band, with unity near 146 MHz.

The computer is able to hold gain nearly constant while increasing the front-to-back ratio and lowering the SWR. Switching between the two antennas would result in little noticeable difference in performance, however, except for the im-

48 Campbell Lane, Menlo Park, CA 94025

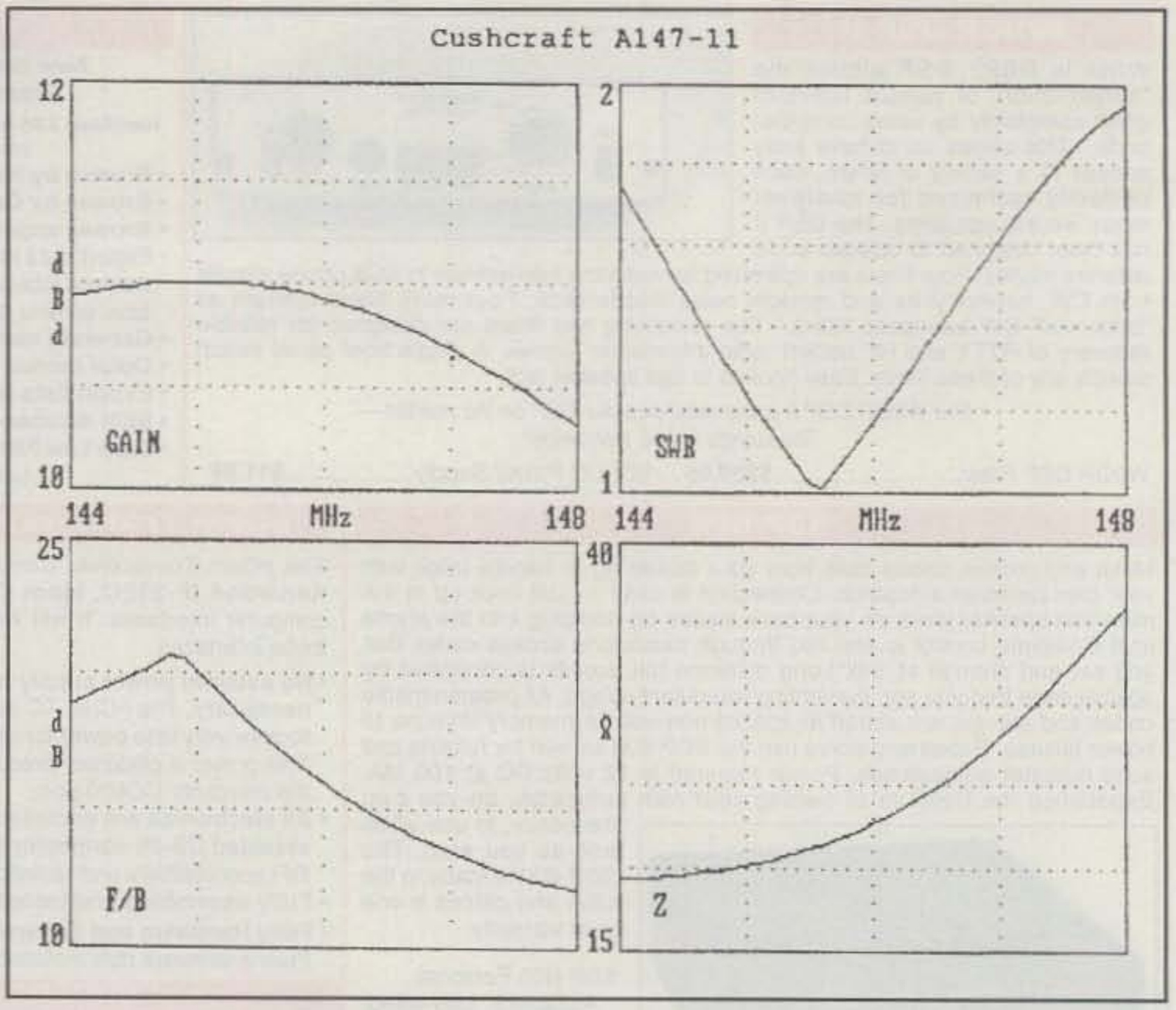


Fig. 2– Gain, SWR, front-to-back ratio, and feedpoint impedance of Cushcraft A147-11 two meter Yagi.

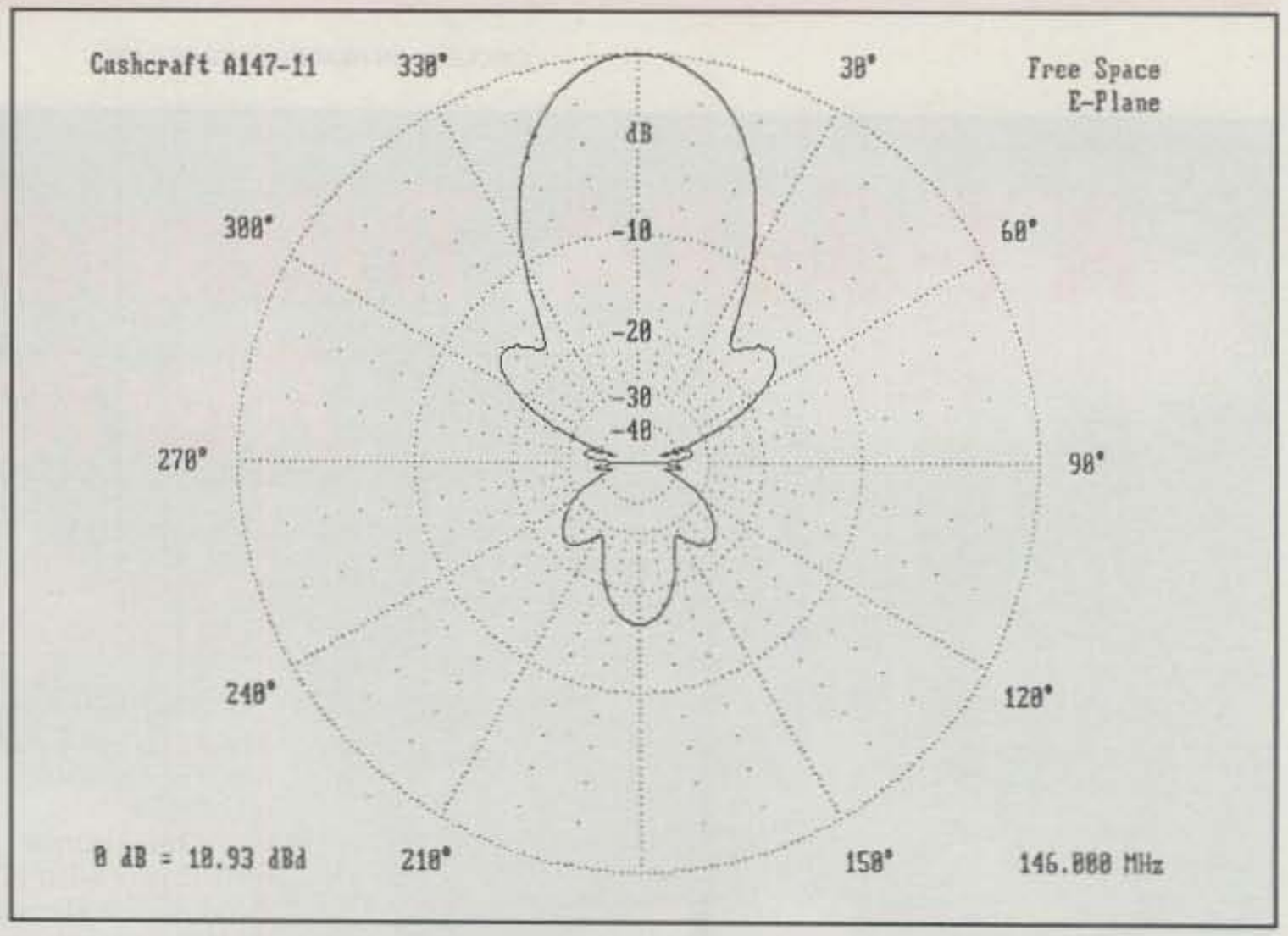


Fig. 3– Polar plot of the Cushcraft Yagi. Compare with simplified beam in fig. 11.

proved front-to-back ratio. Squeezing more gain out of the array would drop the front-to-back ratio and worsen the SWR curve, and we would be back to where we started.

This exercise shows the A147-11 is about the best all-around design obtainable on a 12 foot boom, given this number of parasitic elements.

Odd Director Spacing of The Optimized Yagi

The Yagi Optimizer program provides an

CUSHCRAFT A147-11
144.000 146.000 148.000 MHz
11 elements, inches

	0.1870
0.0000	19.8942
	0.5000
15.2064	17.7726
	0.1870
26.5230	18.0103
39.6191	17.5768
56.6303	17.5949
68.9608	17.3937
84.9786	17.3829
97.5335	17.2518
115.2141	17.3132
124.2586	17.2608
142.0580	17.1787

Table II– Note unusual element spacings.

overview of antenna performance and also prints a sketch of the elements, as mounted on the boom (fig. 5). The three polar plots show antenna response at the three design frequencies. Embedded in the plots are operating parameters.

The first line shows the frequency of measurement, the second the gain in dBd, the third the front-to-back ratio. The fourth line described the feedpoint impedance, and the fifth line the SWR when the beam is matched to a 50 ohm line. The final line is a figure of merit, indicating how close the beam performs against a theoretical "perfect" equivalent at that frequency.

The Yagi sketch below the plots shows a simplified top view of the antenna, which is aimed left-to-right (reflector at left, directors to the right). A close examination of the illustration shows the director elements are roughly grouped in pairs, according to spacing. This is most noticeable as one progresses along the boom from left to right. The computer has been allowed to move the elements about. The final spacings and half-element lengths are listed in Table II. The original constant spacing of 14 inches for the elements no longer exists. The computer program has chosen different element spacings, providing cause for speculation.

Element Bunching Into "Cells"

In "Yagi Antenna Design," by James Lawson, W2PV, the statement is made that an element can be removed from a Yagi, causing a readjustment of parasitic currents in such a manner that loss of an element is not disasterous, and that the Yagi "really wants to work".

After noting the element grouping into cells, and not finding a ready answer for this phenomena, I called Brian, K6STI, on the twisted-pair and queried him about what I had found.

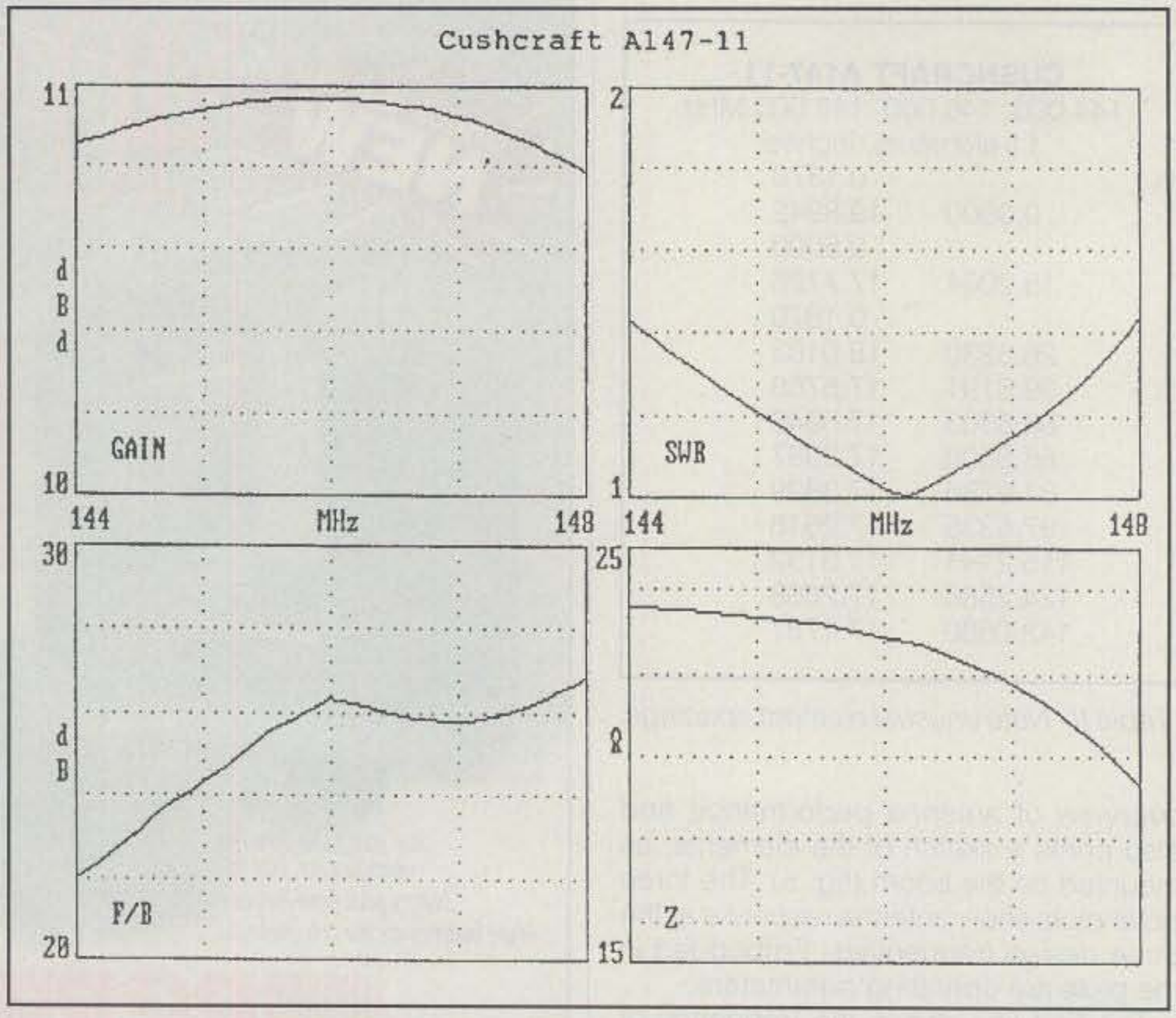


Fig. 4– "Optimized" Cushcraft Yagi. This shows original design, about the best all-around characteristics for this number of elements on a 12 foot boom.

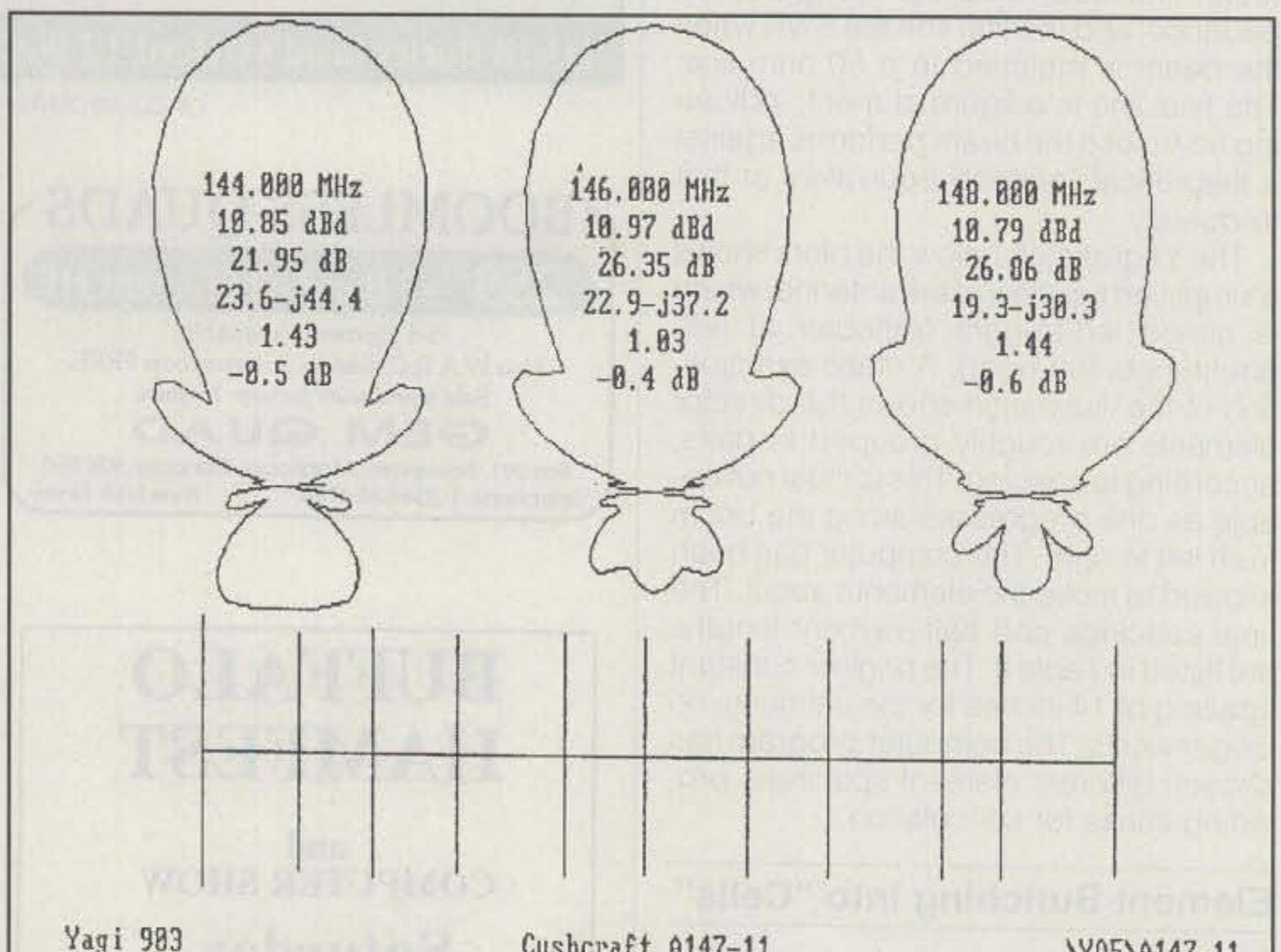


Fig. 5– Polar plots show response of optimized Yagi at three frequencies. Sketch of array layout is given. Notice "bunching" of directors. (See text for details.)

He mentioned he had noticed this effect. His thought was that a long Yagi is composed of progressive "cells," and if enough cells exist for a given boom length, the number of parasitic elements in a cell is unimportant.

This immediately gave rise to the supposition that the A147-11 design could be simplified vastly by removing half the number of parasitics, but leaving the same number of cells!

Starting from the left end of the boom,

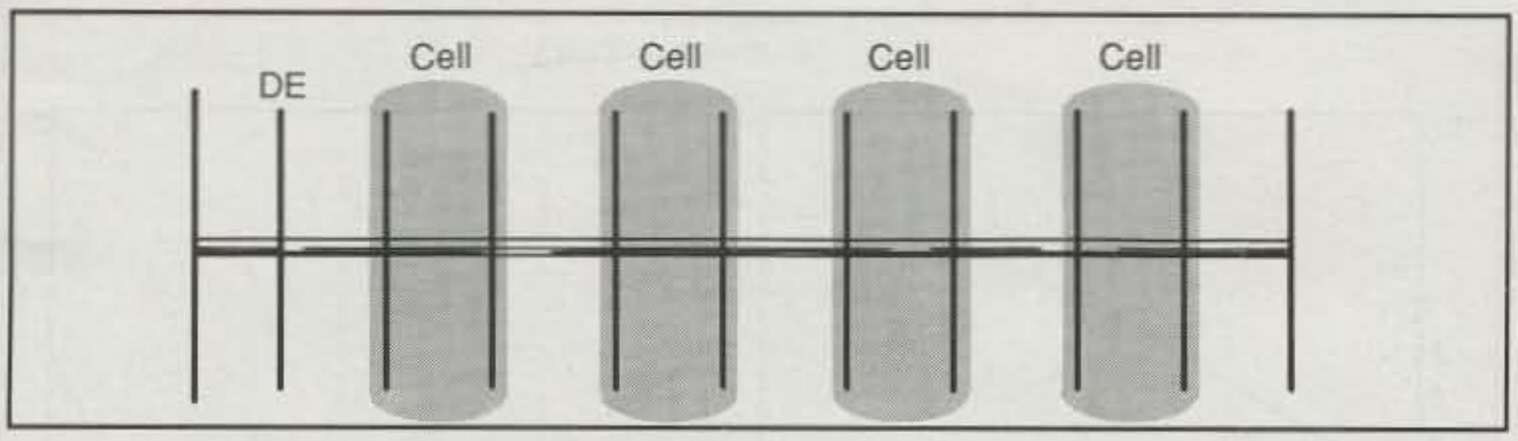


Fig. 6– Computer optimization spaces directors into "cells" with greater spacing between cells than between elements in the cell.

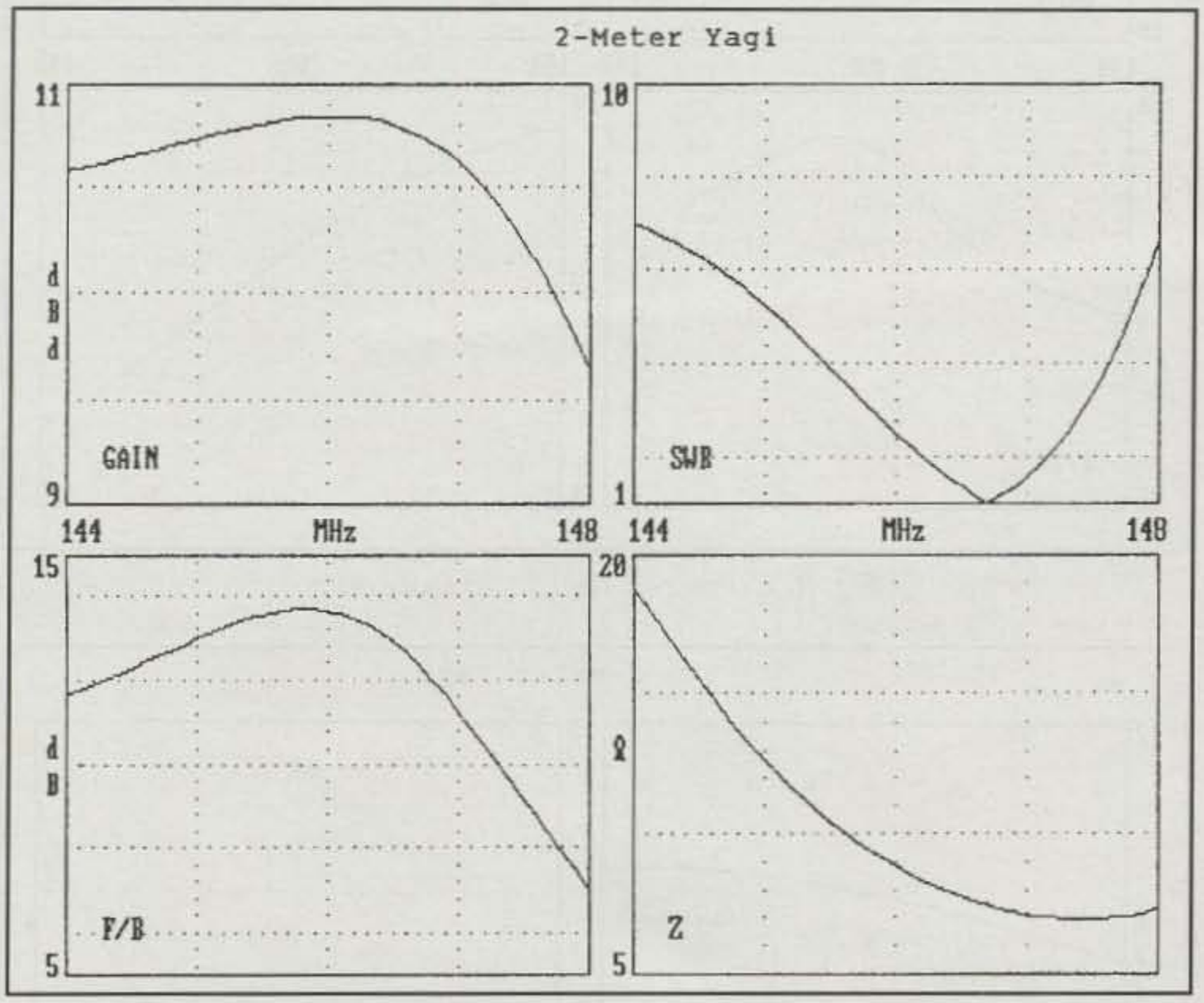


Fig. 7– Gain, SWR, front-to-back ratio, and input impedance of Yagi on 10 foot boom. Not optimized.

2 METER YAGI

144.000 146.000 148.000 MHz

8 elements, inches

	0.1870
0.0000	20.0739
	0.5000
14.8516	18.0375
22.4849	17.9289
38.5489	17.3315
61.9605	17.2888
89.2224	17.0986
119.0465	17.1873
142.0000	16.8330

Table III– Extra director added and boom lengthened to 12 feet.

the first two directors are considered one cell, the next two directors, a second cell, followed by two more cell groups. One director falls outside the last cell group. The cells become more distinct as they progress away from the driven element (fig. 6).

Simplifying The Cells

If the idea of parasitic cells has merit, it should be possible to remove a cell having two directors and replace it with a substitute cell having a single director without materially affecting performance. The new cell would have the director placed near the mid-point of the original cell.

This is easy to do with the Yagi Optimizer program. A new design using the same 12 foot boom but with only five directors can be quickly generated. Even without running the Optimizer, it is seen that the simplified (fig. 7) Yagi compares favorably with the original design. Gain at 146 MHz is now 10.85 dBd, as compared to 10.97, a slight loss of 0.12 dB. Front-to-back, however, is quite poor. SWR is very poor, indicating that the removal of parasitic elements has a drastic effect on

the driven element.

In any event, a run with the Optimizer program seems in order. After iteration, the results are shown in fig. 8. Gain had dropped a bit to 10.62 dBd at 146 MHz, rising to 10.8 dBd at 148 MHz. Front-to-back has picked up immensely at 146 MHz, and the SWR response is about the same as the original design. Clearly, the new design compares favorably with the original Cushcraft beam.

One interesting fact is that in the optimization process, the overall length of the new array has shrunk from 12 feet to a little under 10 feet! The net result of this investigation is that elements can be removed from a "generic" Long John Yagi, and the boom can be cut in length, while still retaining the general characteristics of the antenna.

Using A 12 Foot Boom

Well, why not go back to a 12 foot boom and toss in one extra director while maintaining the present spacing? This will result in an 8-element Yagi on a 12 foot boom. Accordingly, the Optimizer program is modified to accommodate this new design. After a series of iterations, the array of Table III is derived. The vital data is shown in fig. 9.

Gain varies from 10.85 dBd at 144 MHz to 11.30 dBd at 148 MHz. It peaks at 11.31 dBd at 147.5 MHz. This is an improvement over the original A147-11 array. Front-to-back ranges from 24.13 dB at 144 MHz to 29.8 dB at 144 MHz, with a cusp in the curve near 145.5 MHz. A big boost over the original design!

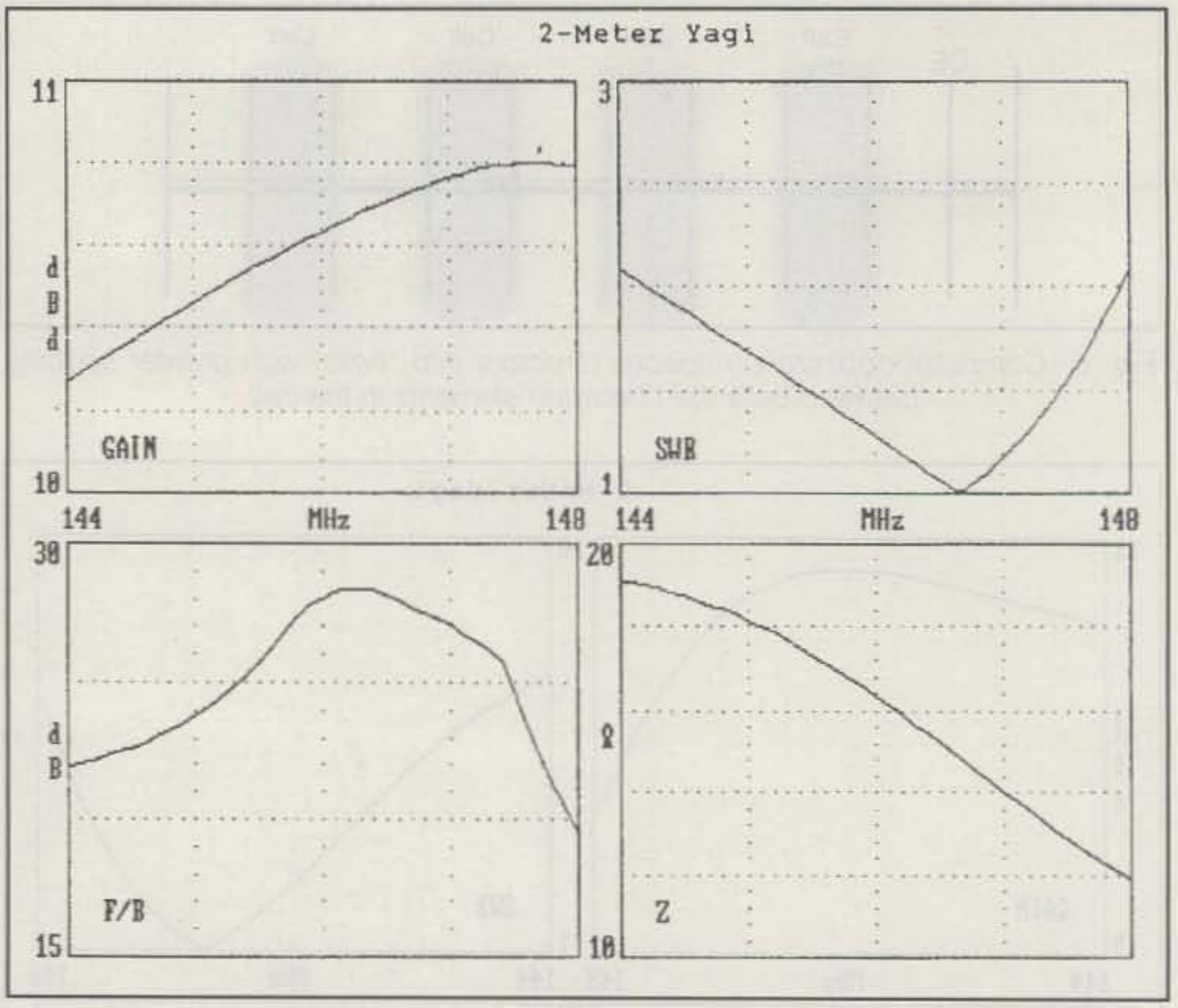


Fig. 8– Optimized Yagi on 10 foot boom.

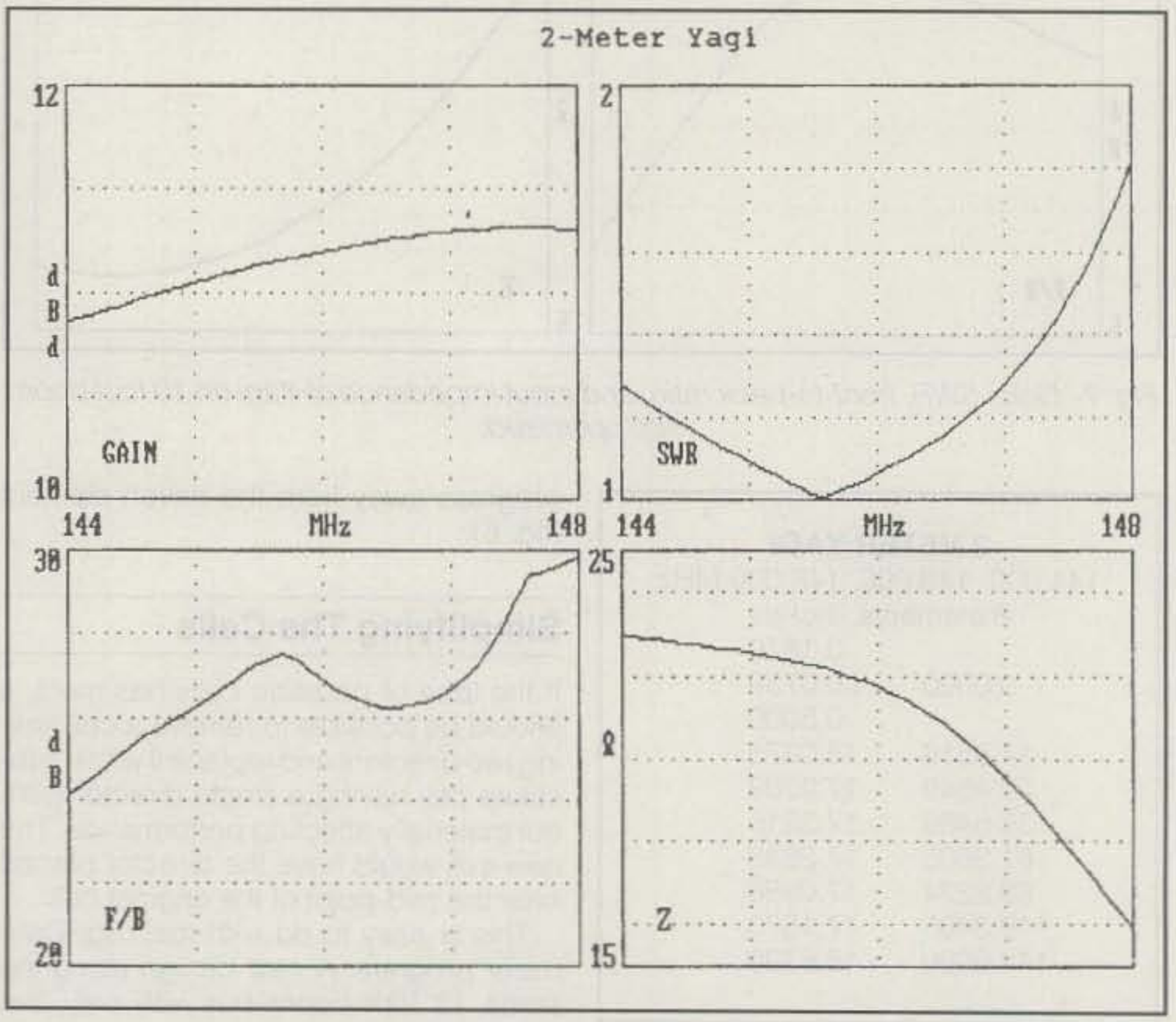


Fig. 9– Eight elements on a 12 foot boom. Compare with fig. 2.

The SWR response, especially at the low end of the band, is greatly improved. Using the Matching portion of the Optimizer, a Hairpin match is selected and the dimensions are shown in fig. 10. Feedline balance is achieved by the use

HAIRPIN MATCH	
Rod diameter:	0.125 inch
Rod spacing:	1.000
Lead length:	0.500
Shunt cap.:	2.0 pF
Feed Z:	50 ohms
Match freq.:	146.773 MHz
Short rods:	1.99 inches
Inductance:	0.058 uH

Fig. 10– Data for hairpin match of 8-element array.

of ferrite cores slipped over the coax at the feedpoint. The polar plot is shown in fig. 11. Compare this plot to the original Cushcraft plot of fig. 3. A better plot with less aluminum up in the air!

What Have We Learned?

Reviewing this exercise indicates that a long Yagi array can be visualized as having directors bunched in cells along the boom. There have to be a sufficient number of cells for a given boom length, but having more directors in the cells accomplishes nothing and may even degrade beam performance. It boils down to the fact that in a well-designed Yagi, gain is proportional to boom length and not to the number of directors, as long as enough are used.

In every case examined, the first director is positioned very close to the driven element, compared to director spacing along the beam. This driven-element-director spacing is quite critical. If it is too small, feedpoint impedance of the array drops rapidly. If it is too great, array gain suffers.

In this design power gain equates to about 0.9 dB per foot of boom! (That is, 11.3 dB divided by 12 feet gives 0.9.) Would this relationship apply to a longer boom? Could a designer slice off a boom section like a piece of salami and predict the gain of the resulting antenna? I doubt it, but it would be fun to try the Optimizer on a 20 foot or even a 30 foot boom. Who knows what the results would be? Only The Shadow knows!

Feedback From Readers

I recently wrote about very-long wave reception without the use of a receiver. Harry, W7IV, writes me that in the "fifties," when he lived in Owings Mills, Maryland, he could hear the VLF signals from NSS in Annapolis (about 50 miles away) on his telephone before the operator came on the line. He conjectured that some rectification in the phone system was responsible for this.

Bob, VE7BS, tells me that when he was working for Northwest Telephone in Vancouver he could hear the VLF station in

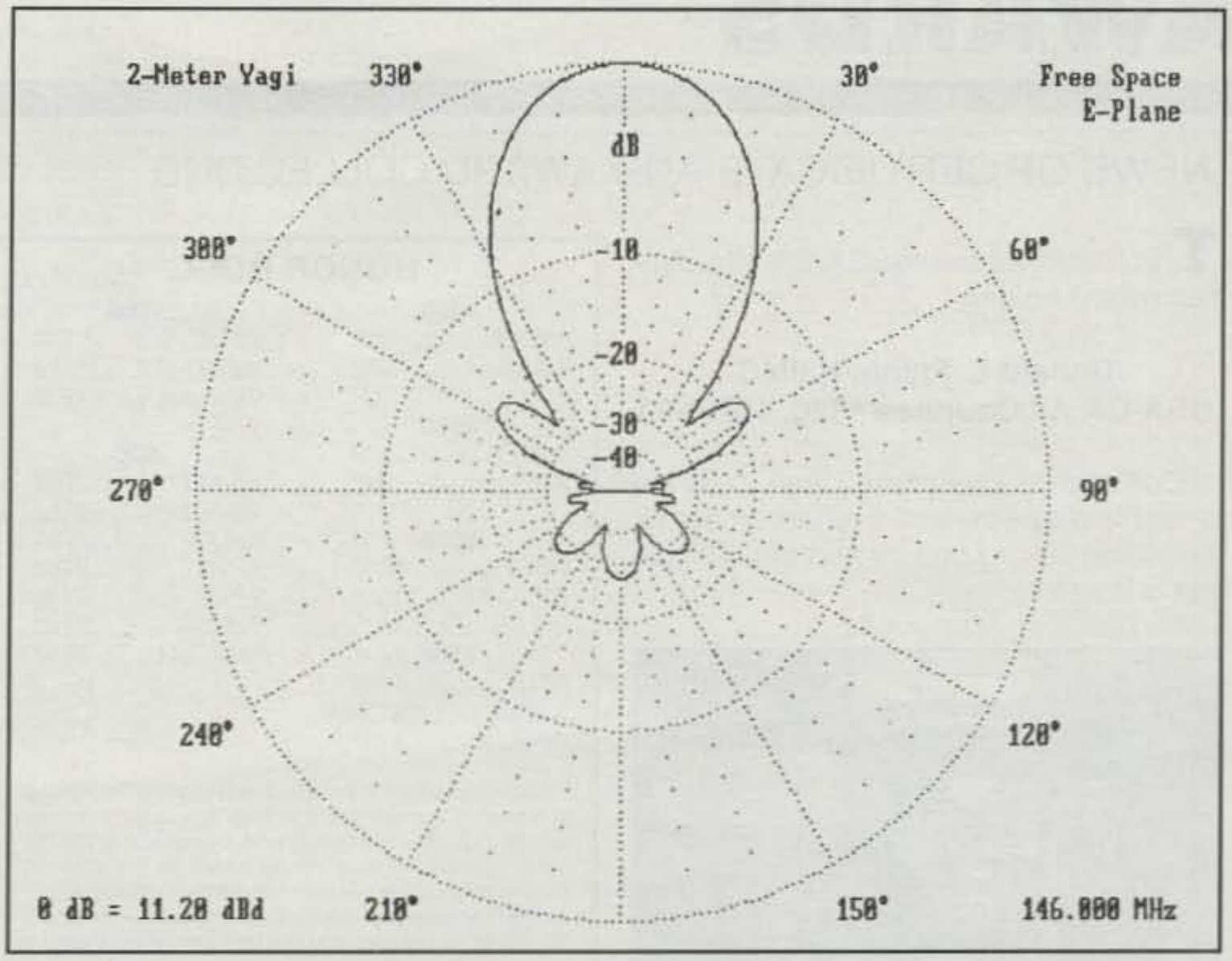


Fig. 11– Polar plot of optimized 8-element array. Compare with fig. 3.

Jim Creek, Washington by merely touching the tip of his earphone plug with his finger! No antenna required!

Stan, N6ANV, recounts that in 1960 he was working a remote mobile pickup at KING-TV in Seattle, and he placed the microphone on the ground during a break. He immediately heard Jim Creek (NPG), which was about 60 miles away.

Who says a receiver is necessary for VLF reception?

Thanks to the following for their interesting letters to me. I appreciate your input very much: VE7DKQ, KA7WDH, N5ZIH, KA1SM, KZ1H, KC7APQ, K4IKR, W4FRR, WB2NQT, and ZL3AAU. Thanks, guys.

73, Bill, W6SAI

AWARDS

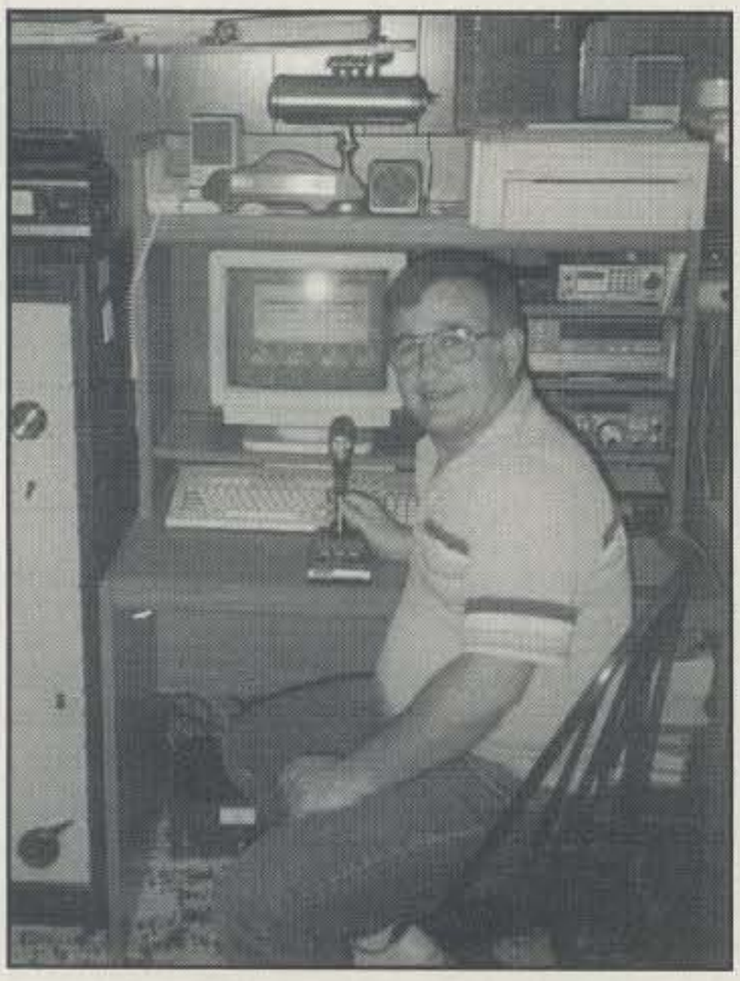
BY NORM VAN RAAY, WA3RTY

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we salute USA-CA All Counties award holder:

Donald L. Flynn, K3IMC
USA-CA All Counties #820, 10-10-93

Don and his lovely wife, Jean, paid me a visit last month, and we had an enjoyable time talking county hunting. Following is his story.



Donald L. Flynn, K3IMC, USA-CA All Counties award holder #820.

"I was born and raised in Baltimore, Maryland. I got my Novice and General amateur tickets while I was still in high school. My best buddy, K3IIZ, and I got our licenses together while we were in the Boy Scouts. One of the leaders knew a little code and had a code practice oscillator. We thought it would be fun to be amateurs, and had dreams of working people around the world. Money and antenna room made it difficult for me on any band but 40. I do remember getting up in the middle of the night and working Kansas, my longest distance for some time. . . . Those were the days.

"I soon went off to college and majored in electrical engineering, most likely because of my amateur radio license. I took my rig to college and operated from my room with a low-profile antenna to a nearby tree. It never worked very well, so I did most of my operating from the college amateur station. I graduated after the required four years and started my real life. By the way, I did learn in college that I hated the design side of engineering, but I really enjoyed the mathematical analysis I had learned. Therefore, I have never worked as a practicing EE, but I have been involved in engineering studies all my life. I now work for a small (six people) software firm writing realtime data acquisition and processing code for instrumentation radars.

"After college life got in the way of amateur radio for a while, what with a wife and children. You know how it is. However, I did manage to do just enough operating to keep my license valid. In the mid '70s I was bitten by the contesting bug. I slowly built up my station from the original DX-20 and SX-38D I had used for years to a respectable station. I even built a homebrew linear that worked (almost). I got my WAS and the DXCC. I even heard about the county hunters, but I never was able to find the net. After a while I lost interest primarily because of the rudeness of some 'big' DXers. Besides, life again got in the way of my radio.

"In the late '80s I again got active. I tried some contests again, but the operating practices of the majority of the contesters was just too much. I worked for and got my WPX, but I wanted something more. I remembered the county hunters and saw an article in *CQ* that told where I could write for information. I also had a whole box full of QSL cards. My fate was sealed, but I found I had only about 300 confirmed counties. I had a long way to go.

"On November 26, 1989 I made my first contact on 14.336 with Dick, KB3WN, in Westmoreland County, Pennsylvania, with many more to follow. I thought it was great that there were so many amateurs out there, but I felt they were crazy for driving around so much.

"At Christmas that year I went to my brother's home in Columbus, Ohio. I used his station, KE8FD, and made some contacts. In fact, I spent so much time on his rig that he had to forbid me to operate so that he could get me to dinner. However, that was after some guy pulled me off frequency to find out who I was. It turns out that Bill, WA3ZMY, lives near me in Maryland. He had heard me and tried to call me at home. He wanted to know who I was and where I was. I explained the situation, and he condescended to say that I was operating legally. Despite this introduction, Bill has been a great Elmer and was instrumental in getting me to become a mobile operator.

"My experiences with county hunting have been many and varied, but a couple stand out in my memory:

"The gentle but firm encouragement from Dave, N7BKW, to take over as net control. His guidance has lead to many rewarding hours running the net.

"The time when Scotty, AA4LY, first remembered my name on a trip from Florida to his home. He knew I was new at the sport and made sure I worked the somewhat rare counties on the Georgia/South Carolina border as he was going through.

"Meeting Dennis, KK7X, on a lonely interstate in Nevada for dinner last year; it was a thrill to see the 'big signal,' and someday I hope to get his award.

"I still want to find the state of 'Misery' that Bernard, VE2MS, keeps talking about. I think that it is just east of Kansas, but it could be the state that most mobiles find themselves in when band conditions are terrible.

"Chasing Clark, WA4NBC, and his wife,

Box 76, Pleasant Mount, PA 18453-0076

HONOR ROLL

3000
W0DFK.....861
WA2UJH.....862

2500
W0DFK.....839
WA2UJH.....840

2000
W0DFK.....1017
WA2UJH.....1018

1500
WN3C.....1105
W0DFK.....1106
WA2UJH.....1107

1000
WN3C.....1318
W0DFK.....1319
WA2UJH.....1320

500
KB4JR.....2761
WA5QNH.....2762
K4UOH.....2763
KP2N.....2764
WN3C.....2765
W0DFK.....2766
WA2UJH.....2767

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.00. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

SPECIAL HONOR ROLL

Robert R. Roth, W0DFK
USA-CA All Counties #837
Mixed Bands All SSB, 5-19-94

Arthur M. Blank, WA2UJH
USA-CA All Counties #838
Mixed Band/Modes, 5-19-94

Ann, AB4OI, halfway across the state of Maryland trying to catch up to them during a recent trip. They were too close to work direct, and I didn't know their route. We finally met up and had a nice (but quick) lunch.

"Just missing Ed, WAØSBR, in Buffalo, South Dakota. I had worked all night at a radar site near San Diego. Because I had to work an extra ten minutes overtime, I missed a schedule with Ed. I had to wait another six months, but he went back for my last in South Dakota.

"Waiting all day for Ron, KA32DRO, to drive around the flooded rivers in the central part of the country last year to give Grant, my last in North Dakota. He had to go well out of his way under difficult road conditions with almost no help from the net control.

"Driving around the parking lot at work trying to find the correct angle to hear Jack, WA9QNI, in Bee, Texas. It was my last in Texas and my second to last for everything. I did a lot of driving around as the number remaining got small. My bosses would give me confused but understanding looks as I ran out of the office to the parking lot.

"Going to the Mini in Murfreesboro, specifically the lunch at Mary BoBo's organized by Herb, WB9GBH. There I was able to put faces with many of the voices I have grown to recognize.

"And most important, having Jerry, WD9JGS, take the time to drive back 100 miles to give me my last county for everything in St. Francis, Arkansas. That was on October 10, 1993.

"While the last county from Jerry was important after almost four years of listening and waiting, my most outstanding memory is a Saturday morning in May 1993 when I heard Al, N1API, ask if anyone was going to Giles county in Virginia, near Roanoke. That was his last one for the 'whole ball.' My wife looked at me and said, 'Why not?' It's only 250 miles. The weather was beautiful, so my trusty logger and I had a wonderful two-day trip sightseeing in central Virginia. We gave out a lot of counties, including the last to Al. The plaque I received from him holds a very special place near my rig. To me that trip was important because I was returning to others the benefits given to me from the county hunters who have helped me. Despite their differences, both N7BKW and WA3ZMY would agree with me in saying that the best part of county hunting is helping others.

"County hunting is a lot of fun, and it give me a good excuse to do what I really enjoy—driving around and seeing the sights. I cannot begin to thank all the people who have helped me, both the net controls and the mobiles. I hope to continue hearing you all on the net.—73, Don, K3IMC."

Awards Issued

Robert R. Roth, WØDFK, and Arthur M. Blank, WA2UJH, both submitted complete Record Books and received their USA-CA All Counties numbers.

WØDFK received USA-CA All Counties #837, USA-CA 3000 #861, USA-CA 2500 #839, USA-CA 2000 #1017, USA-CA 1500 #1106, USA-CA 1000 #1319, USA-CA 500 #2766 All SSB, Mixed bands.

WA2UJH received USA-CA All Counties #838, USA-CA 3000 #862, USA-CA 2500 #840, USA-CA 2000 #1018, USA-CA 1500 #1107, USA-CA 1000 #1320, and USA-CA 500 #2762.

Richard L. McNeeley, WN3C, gained USA-CA 500 #2765, USA-CA 1000 #1318, and USA-CA 1500 #1105.

The following received USA-CA 500 awards:

Bernie John Jackson, KB4JR, USA-CA 500 #2761.

Rudy J. Dughan, WA5QNH, USA-CA 500 #2762.

Barry R. Garner, K4UOH, USA-CA 500 #2763.

Ronald A. Hall, KP2N, USA-CA 500 #2764. KP2N has some nice QSL cards with terrific views of the scenery down in the Virgin Island.

Award News

We have been informed that Fred Handscombe, G4BWP, has been appointed HF Award Manager for the Radio Society of Great Britain (RSGB). For an information packet on the RSGB's very fine set of awards send £1.50, $3.00, or 5 IRCs to cover airmail postage. The address is Sandholm, Heath Farm Road, Red Lodge, Bury St. Edmunds, Suffolk IP28 8LG, England.

On A Personal Note

Last April I visited my daughter and grandchildren in Sterling, Virginia. It gave me the chance to visit and pay my respects at the Vietnam Memorial. It was a moving experience. I urge anyone who gets to our nation's capitol to visit this moving tribute to our brothers and sisters, husbands and wives, sons and daughters, and friends who sacrificed their lives in Vietnam.

73, Norm, WA3RTY

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

FCC Study On Radio Interference To Telephones

The FCC receives some 25,000 complaints per year from individuals who are unable to use their telephones because nearby radio stations interfere with their proper operation. Whenever the radio stations are on the air, the telephones pick up the radio transmissions which then override any ongoing telephone conversation.

The FCC's Field Operations Bureau (FOB) recently conducted a study to obtain information about telephone interference from radio stations. Given the enormous numbers of instances in which this type of interference is experienced by consumers, it is the FCC's hope that the survey will serve as a catalyst for affected parties to productively address and resolve this problem. The FOB has now released the findings of that study.

The principal findings of the study are that although most residential telephones are susceptible to receiving interference, manufacturers can design telephones to be interference free.

During this study the FCC tested two models which the manufacturers claimed were immune from interference, and in virtually all cases they eliminated the interference. The telephones were the Western Electric/AT&T Desk Model available from Pro Distributors of Lubbock, Texas (2811 74th St. Suite B, Lubbock TX; toll-free telephone 800-658-2027), and the TPXL-D Desk Model available from TCE Laboratories, Inc. (2365 Waterfront Park Drive, Canyon Lake TX 78133; telephone 210-899-4575). Interestingly, the study also found that filters cannot be relied upon to eliminate telephone interference. In two out of three cases in which they were tried during the study, they did not work.

FCC Telephone Survey

To obtain information for the study, 35 FCC offices across the country each investigated three recent complaints of telephone interference. At the transmitting station the offices determined the type of station and the power used by the station. At the complainant's location the offices catalogued which telephones received interference and which did not.

The FCC engineers then connected commercially available filters to determine if these filters would eliminate the interference. The filters were connected to telephones while the interfering station was transmitting. Finally, the offices tested the telephones claimed by the manufacturer to be "interference free."

The FCC's Field Offices inspected 108 transmitting stations which were involved in the telephone interference complaints. The radio stations most likely to be involved in interference complaints are citizens band, broadcast, and amateur. Citizens-band stations accounted for half the interference, and broadcast and amateur stations accounted for the other half.

Interference caused by:
- Citizens Band—47
- Amateur Radio—27
- AM Broadcast—23
- FM Broadcast—10
- International Broadcast—1

The power levels of the radio transmitting stations varied from 2 watts to 500,000 watts. One-third of the transmitting stations operated with less than 10 watts, and one-third of the interfering stations were broadcast stations using between 3,000 and 500,000 watts.

Of the 241 telephones tested by the FCC's Field Operations Bureau at the homes of complainants, 68 percent of these telephones received interference.

The effectiveness of the AT&T Z100B1 filter was tested on 138 telephones receiving interference. After connecting the filter to the telephones, 62 percent of the telephones continued to receive interference. The filter did eliminate interference on 38 percent of the telephones. A number of other filters were also tested on 82 telephones receiving interference. As a group, these filters eliminated interference on 29 percent of the telephones. They did not eliminate interference on 71 percent of the telephones.

The FCC conclusion: "Filters cannot be relied upon to eliminate telephone interference: in two out of three cases in the test sample, they did not work."

"Interference free" telephones were tested at 52 locations where the individuals were receiving interference to their telephones. The "interference free" telephones eliminated interference at 96 percent of the locations. FCC finding: "Manufacturers can design telephones to be interference-free. The 'interference free' telephones were immune from interference virtually all of the time."

In setting forth the results of its informal survey, FOB emphasizes that because this survey is based on a random sample, it cannot be claimed that identical results would be derived under scientific surveying and testing, nor should the results be construed as FCC endorsement or criticism of any particular manufacturer's product. Rather, FOB believes these results to be a good "first look" at the problem.

Bureau Chief's Comments

Richard Smith, Chief of the Field Operations Bureau, revealed more about telephone interference in a trade magazine, *Telecom Exchange*, published by Industrial Telecommunications Association. He used the term "bullet-proof" to describe the special phones, and seemed impressed by their performance.

"There are a lot of inexpensive phones being produced and sold everywhere," Smith said. "The telephone industry has made a decision. The majority of manufacturers take the position that it is not economically justifiable to put devices in all of their telephones to shield out the unwanted interference. The only thing I fault the telephone industry for not doing is that they don't offer shielded telephones as an option. I understand why they don't put filters and shielding in all of their telephones, but why don't they offer shielded telephones as an option? As far as I know, no significant manufacturer of telephones does that.

"When testing a house that is prone to radio frequency interference, we unplug one of the house phones and plug in one of the bullet-proof phones we bought down in Texas," he said. "Then we have the amateur licensee transmit. We pick up another house phone, and we hear the interference. Then we pick up the bullet-proof phone, and there is no interference. It is perfectly clear, no interference at all."

Smith explained that his staff advises consumers experiencing interference to buy at least one "bullet-proof" phone, but

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FNB-12(S)	12v @	600 MAH
equiv. to FNB-11 (¼" shorter)		
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*Same size case as FNB-12		
*FNB-25	7.2v @	600 MAH
FNB-26	7.2V @	1000 MAH
**FNB-26-S	7.2v @	1500 MAH
*FNB-26A	9.6v @	800 MAH
*Same size as FNB-26 case		
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**(¼" longer than FNB27)		

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consumers reply that the amateur should bear the cost. "It's not like the amateur is on the wrong frequency," he said. "A telephone has no 'right' frequency. It has no frequency at all. It is not like the amateur is operating incorrectly."

What About Television Interference?

Simply stated, radio frequency interference is the presence of unwanted signals that obstruct the operation of radio, telephone, television, or other home-entertainment equipment. The most common type of interference caused by radio transmitters is TVI—television interference. A viewer's first reaction is that the fault lies with the radio transmitter and its operator. Actually, this is usually not the case! This is especially true if other television receivers in the area are not experiencing the interference. Probably 90 percent of all TVI complaints can only be cured at the TV receiver. The only thing you can do at the transmitter is radiate the narrowest possible bandwidth.

Be aware that fluorescent lighting, neon signs, mercury-vapor street lights, doorbell transformers, electric blankets, home computers, and brush-type motors (such as found on electric shavers) are also common sources of radio frequency interference. Sparking at the motor's brushes can create broadband impulse noises way up into the VHF range. (The cure here is to use 0.01 uF capacitors to by-pass RF currents.)

Radio amateurs are allowed transmitter powers of up to 1500 watts continuous, and these power levels can cause interference for quite a distance from the amateur transmitter. This interference is caused by front-end overload, harmonic radiation, spurious emissions, or "spillover" (that is, a radio signal adjacent to the television channel frequency).

The symptoms of overload are a distorted or negative picture, especially on TV channels 2 through 13. Installation of a high-pass filter on the back of a TV set at the antenna terminals (or better still, at the TV tuner) will frequently eliminate the interference caused by a nearby amateur station. A high-pass filter readily passes TV frequencies located above its cut-off frequency. Lower frequencies are attenuated.

Many television set manufacturers will supply high-pass TV filters at low (or no) cost for their receivers. Call the customer-service department of the manufacturer and advise them of the set's model and serial number.

Several turns of the 300 ohm twinlead around a toroid core between the TV antenna and the set will also help get rid of the overload. TV receiver overload can always be identified by operating the offending transmitter into a dummy load.

Harmonic radiation or "spillover" is usually seen as a number of diagonal lines (or "cross hatching") on the TV picture. The closer the herringbone lines on the screen, the higher the interfering frequency. Most amateur interference due to harmonic radiation or 6 meter spillover is picked up by the TV antenna. Harmonic TVI is interference to television reception caused by the radiation of a multiple of the fundamental radio frequency. The second harmonic is twice the fundamental carrier frequency. Harmonic radiation interference is best resolved at the transmitter by adding a low-pass filter in the transmission line.

The 6 meter amateur band is located at 50–54 MHz and is immediately adjacent to TV channel 2. To resolve spillover, install a high-pass filter with a cutoff frequency set to 54 MHz at the TV set tuner input terminals.

An outdoor TV antenna with a high front-to-back ratio and deep nulls is effective in reducing interference when the TV station and the amateur transmitter are located in different directions. The best rejection is when the TV antenna is broadside (at a right angle) to the interfering station. The TV antenna should be rotated slightly to determine minimum pickup. Moving the television antenna to a different location also can be helpful.

If the interfering amateur station and the desired TV station are located in the same direction, a high-pass filter with good 45 MHz attenuation installed at the TV set antenna terminals can be very helpful. The third harmonic of the 20 meter amateur band, and the second harmonic of the 15 meter band can fall in the TV set's IF stage region.

Harmonic radiation and 6 meter fundamentals may be picked up on the TV twinlead (300 ohm transmission line). In this event, the twinlead should be replaced with a good-quality 300 ohm shielded transmission line or 75 ohm foil-and-braid coaxial cable. Again, a high-pass filter should be installed as close to the TV set as possible.

If 75 ohm coax is used, be sure to use a matching transformer (called a balun) at each end to match the 300 ohm output of the balanced TV antenna to the 75 ohm unbalanced coaxial transmission line. When the receiver has a receptacle for 75 ohm coaxial cable, the balun at the receiver end of the coaxial cable isn't required.

A coaxial cable is an unbalanced transmission line in that its outer conductor is grounded and the inner conductor is above ground potential. Twinlead cable, on the other hand, is a balanced transmission line with neither side grounded.

It is not recommended that "rabbit ear" antennas be used in an RFI environment,

since the TV signals are weaker when an indoor antenna is used. When a TV receiver is located extremely close to a radio transmitter, or is poorly shielded, radiation can enter the circuitry directly. The result is cross-modulation that is difficult to cure.

Power cords pick up RFI either as conductors of signals present on the power line or house wiring, or may act as antennas themselves. Line-conducted interference can be eliminated by a low-cost AC filter mounted on the wall outlet. Sometimes changing the length of the TV power cord will cure the problem. If high-pass or power-line filters do not eliminate the interference, then try moving the television set to a different location.

Radio frequency interference can often be reduced by connecting the chassis of each audio/television component with heavy wire (such as a No. 12 copper or No. 8 aluminum) to an earth ground, such as a cold-water pipe. If a pipe is not available, attach the ground wire beneath the screw that holds the cover plate on an AC wall outlet.

Interference to cable television is rare unless the cable drop-line has been damaged or its connectors leak RF. This is because the TV signal is completely enclosed within the coaxial cable. A high-power beam antenna aimed at a cable drop line has been known to cause difficulty, however, if the installation is old or the cable does not contain enough shielding. Your local cable company has a legal responsibility to correct faulty systems.

Another annoying type of TVI is called external rectification of non-linear electrical junctions. A nearby conductor picks up a radio signal, and a poor or rusted joint rectifies the energy, causing harmonic signals to be radiated. Downspouts, metal gutters, power lines, metal fences, even bed springs have been known to emit unwanted signals after being excited by RF. Your author had a particularly troublesome experience with a neighbor who had an old, galvanized TV mast that had become corroded. The mast picked up the amateur signals and radiated them to the TV antenna just a few inches away, causing unbelievable interference! The cure? Find and get rid of the non-linear junction. A wave or grid-dip meter is very helpful in locating the trouble spot.

At The Transmitter Site

Radio amateurs may find it advisable to operate at reduced power levels. Keep in mind that there is actually very little difference at the receiving site between a 100 and a 1,000 watt signal, but a big difference in the amount of RFI you can cause! Remember the FCC rules (see Part 97.313[a]) require radio amateurs to use the minimum power necessary to carry out the desired communications.

Amateur radio transmitters operating in the high-frequency (below 30 MHz) range should have an external low-pass filter installed in the transmission line. Modern transceivers should come from the factory with a low-pass filter already installed. Actually, present-day SSB equipment is relatively TVI free.

You may even wish to install two filters—one between the transmitter exciter and the input to the amplifier, and the other at the output of the amplifier. And don't always assume your transmitter is clean. You may be radiating unwanted (spurious) emissions.

The purpose of low-pass filters is to eliminate or reduce the transmission of harmonics. They will not prevent overload TVI. Overload interference is the result of TV receiver design deficiencies. Its tuner is not selective enough to reject the interference, and it may not be adequately shielded.

Precautions should also be taken to avoid injecting RF into the power lines. A "brute-force line filter" is a form of low-pass filter that has a cut-off frequency of approximately 500 kHz. Installed in the power line as close as possible to your transmitter, it will prevent higher frequency signals from flowing into the AC line. The 60 cycle AC line frequency passes right through. Power-line filters are most effective when installed at the source of the interference rather than at the device receiving the interference.

Amateur operators should consider changing their antenna if they develop RFI which cannot be corrected in any other way. A directional high-gain antenna is almost certain to cause interference if it is aimed directly at a neighbor's TV antenna! Reduced operating power and a non-directional antenna could solve your problems and restore harmony to the neighborhood. If all else fails, you may have to stay off critical bands during peak viewing hours. Hopefully that won't be necessary.

Enough cannot be said for having a good "ground" at the transmitter site. Ground the transmitter and the chassis of all components to a metallic cold-water pipe or a ground rod driven at least 8 feet into the ground. Never operate a transmitter with its case or cover removed.

If your own television screen is free from interference, it is generally a good bet the problem does not lie with your equipment. Handling interference complaints is more of a public-relations issue than an RFI problem. It is important that you deal with the difficulty in a friendly, helpful manner, even if the fault is not yours. And it normally isn't.

73, Fred, W5YI

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Is French Polynesia Really THREE DXCC Countries?

In late May and early June two Japanese DXers operated from two of the five island groups that make up the widely spread territory of French Polynesia FO. CQ DX Hall of Famer Kan Mizoguchi, JA1BK, operated as FOØMIZ from both Rurutu Island in the Australes Group and Nuku Hiva Island in the Marquesas Group. ARRL Headquarters staffer Nao Akiyama, NX1L, accompanied Kan on the latter operation as FOØAKI.

In their announcements about this operation both DXers stated that they believe these island groups should count as separate DXCC countries from French Polynesia, potentially adding two new countries to the DXCC list. They base this belief on Point 2 of the DXCC country criteria, which refers to islands.

They point out that the Marquesas group is more than 225 miles from the rest of French Polynesia, physically qualifying under Rule 2(a), which states that "islands . . . separated by a minimum of 225 miles of open water" are considered as separate DXCC countries. Further, the Australes group is also more than 225 miles from the rest of French Polynesia, and more than 500 miles from any island in the Marquesas, meeting the physical separation requirements of point 2(b) of the country criteria. (This latter rule is how Banaba [Ocean] Island T33 and Conway Reef 3D2 were added to the DXCC countries list.)

Given the accuracy of modern maps and well-established procedures for determining the distance between two points on the earth's surface, these separation distances will probably be accepted at face values by those whose job it is to determine if these are new DXCC countries—the members of the DX Advisory Committee (DXAC).

There is one point that will be in dispute, however. In order for Country Criteria Point 2 to be invoked, the "parent" DXCC country must be a Point 1 country—that is, a country by means of *government*. Some DXAC members will argue that French Polynesia is a separate DXCC country from France based on its distance from other French possessions. Thus, French Polynesia is itself a Point 2 country, and the 500 miles of Point 2(b) must be used for any other island groups. Since the Marquesas are too close to the rest of French Polynesia to meet this requirement, the DXAC would vote against adding the two new countries. In 1990 a subcommittee of the DXAC decided that French Polynesia is in fact a Point 2(b) country, based on its separation from the one French Point 2(a) country—St. Pierre and Miquelon. If this determination is upheld by the current DXAC, the petition to make Australes and Marquesas separate DXCC countries will be denied.

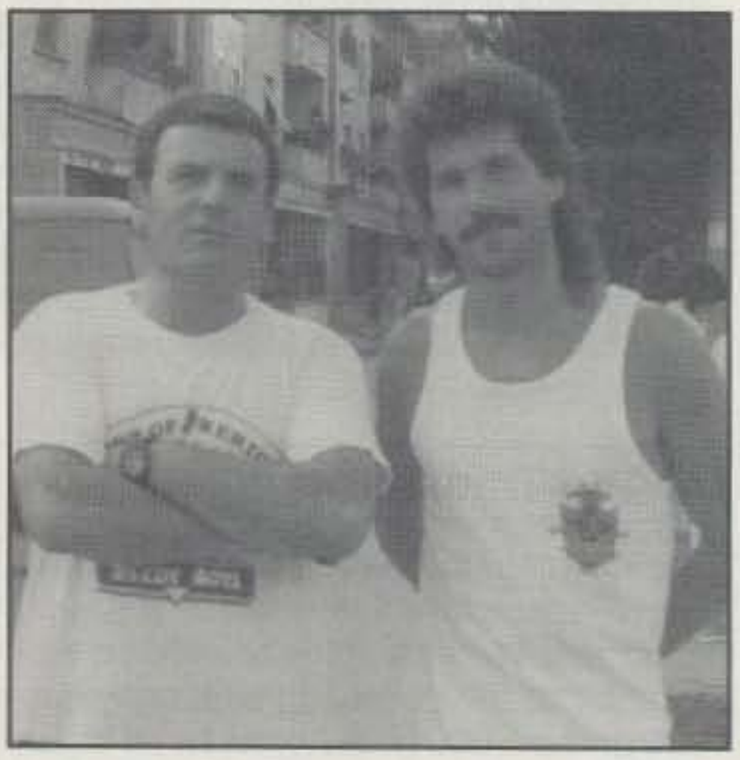
Why then do the two Japanese DXers think they have a ghost of chance in creating two New Ones? Kan and Nao provide a hint of their arguments that French Polynesia is indeed a Point 1 country in their DXpedition announcement. They state that French Polynesia issues its own currency and stamps, has its own telecommunications authority, issues amateur radio licenses, and has its own amateur radio society separate from that of mainland France. They further cite precedent in granting Point 1 status to obvious self-governing territories, prior to true independence, such as the recent decision to accept Eritrea from May 24, 1991. (While the official independence day of Eritrea is May 24, 1993, the ARRL Awards committee "felt that sufficient evidence of sovereignty existed to justify the 1991 reinstatement date.")

While we are jumping the gun a bit by discussing a DXCC country petition before seeing it, this recent operation, and the promise of such a petition, provides an opportunity to examine the pertinent parts of the DXCC country criteria and the possible arguments pro and con within the DXAC.

Point 1, Government, of the DXCC country criteria has two parts. The first concerns sovereign nations that are members of the United Nations or at least recognized as separate countries by member-nations of the UN. This obviously does not apply to French Polynesia. It is neither a member of the UN nor is it recognized as an independent entity by any such member nation.

The second part of Point 1 may be applicable to this case, as it specifically refers to "other entities which are not total-

Taiwanese amateurs erect antennas on Pratas Island, a potential DXCC New One.



Gena, ZA1B, and Ron, AA5DX, compare DX notes in Tirana, Albania.

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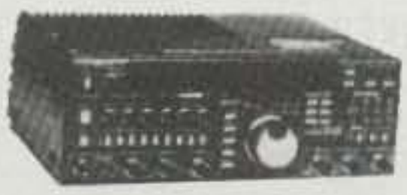

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ly independent . . . Included are Territories . . . " The criterion states that "In making a reasonable determination as to whether a sufficient degree of sovereignty exists for DXCC purposes, the following characteristics . . . are taken into consideration:" Four items follow. We'll look at each in turn and see how each might apply, or not apply, in the case of French Polynesia.

"(a) Membership in specialized agencies of the UN, such as the ITU." French Polynesia is not a member of *any* specialized agency of the UN. According to the CIA Factbook, French Polynesia is not independent, but is instead an overseas territory of France. Point 1(a) clearly does not apply.

"(b) Authorized use of ITU-assigned callign prefixes." According to the ARRL DXCC Countries List, all F prefixes are assigned to France. No prefix is assigned to French Polynesia. Again, Point 1(b) does *not* apply.

"(c) Diplomatic relations . . . and maintaining a standing army." Again checking the CIA Factbook, we learn that "as an overseas territory of France, French Polynesian interests are represented . . . by France," and "defense is responsibility of France." There is no French Polynesian embassy or consulates. Again, nothing in Point 1(c) supports a claim of sovereignty for French Polynesia.

"(d) Regulation of foreign trade and commerce, customs, immigration, and licensing (including landing permits and operating permits), and the issuance of currency and stamps." Aha! Now we're getting somewhere! As Kan and Nao point out, French Polynesia does indeed issue its own postage stamps and currency. Its currency is the Comptoirs Francais du Pacifique franc, worth about 1/18th of the French franc. French Polynesia also issues its own amateur radio operating permits, another point in favor of sovereignty.

However, note that many other territories that are clearly *not* sovereign in any way issue their own stamps and currency, and handle their own amateur radio licensing. Montserrat VP2M, for example, has its own amateur licensing, stamps, and uses EC currency not usable in England, but Montserrat is still a crown colony of Great Britain. Likewise, St. Maarten PJ7 has its own currency and stamps, and the Netherlands Antilles issues its own amateur licenses, but St. Maarten is still a component of the Kingdom of the Netherlands and is not sovereign to any significant degree in its own right.

Further, according to LOI 84-820 of September 6, 1984 (the paper that establishes the rights and government of the territory of French Polynesia), many other functions of sovereignty are retained by France. Article 3 says that the following

The WPX Program

SSB

2458	K9XR	2461	ZS6AOO
2459	DJ9SZ	2462	DL3JSW
2460	KA4VGE		

CW

2818	K9XR	2820	YU1JU
2819	DL3JSW	2821	JA3TBT

MIXED

1657	WS1A	1662	DL3JSW
1658	WD8CKT	1663	JA3BSH
1659	KZØX	1664	KE7VO
1660	K9XR	1665	WO3Z
1661	WM4U	1666	WA1LNP

Mixed: 450 WD6CKT, KZØX, K9XR, DL3JSW, KE7VD, WA1LNP. 500 WD6CKT, KZØX, K9XR, DL3JSW, WN1LNP. 550 WD6CKT, KZØX, K9XR, DL3JSW. 600 WD6CKT, KZØX, K9XR, DL3JSW. 650 WD6CKT, K9XR, DL3JSW. 700 WD6CKT, K9XR, DL3JSW, IK6BSN. 750 WD6CKT, K9XR, DL3JSW, IK6BSN. 800 WD6CKT, K9XR, DL3JSW. 850 K9XR, DL3JSW. 900 K9XR, VE3OMM, DL3JSW. 950 K9XR, DL3JSW. 1000 K9XR, HA9PP, DL3JSW. 1050 K9XR, HA9PP. 1100 K9XR, HA9PP, WA3HUP. 1150 K9XR,HA9PP, WA3HUP, HP2CWB. 1200 K9XR, HA9PP, WA3HUP, HP2CWB. 1250 K9XR, HA9PP, WA3HUP. 1300 HA9PP, WA3HUP. 1350 HA9PP. 1400 HA9PP. 1650 JH8BOE. 1700 JH8BOE. 1750 JH8BOE. 1800 JH8BOE. 1850 JH8BOE. 1900 JH8BOE. 1950 WE2L, WB4RUA, JH8BOE. 2000 WB4RUA, JH8BOE. 2050 JH8BOE. 2100 JH8BOE. 2150 JH8BOE.

SSB: 350 KA4GYU, K9XR, HA9PP, ZS6AOO, DL3JSW, KAØCKN. 400 KA4GYU, K9XR, N1KCE, HA9PP, ZS6AOO, DL3JSW. 450 KA4GYU, K9XR, N1KCE, HA9PP, ZS6AOO, DL3JSW. 500 KA4GYU, K9XR, N1KCE, HA9PP, ZS6AOO, DL3JSW. 550 KA4GYU, K9XR, HA9PP, ZS6AOO, DL3JSW. 600 KA4GYU, K9XR, HA9PP, ZSa6AOO, DL3JSW. 650 KA4GYU, K9XR, ZS6AOO, EA8BWW, EA8BGY. 700 KA4GYU, K9XR, ZS6AOO, EA8BWW, EA8BGY. 750 KA4GYU, K9XR, ZS6AOO, EA8BWW, EA8BGY. 800 KA4GYU, DF7HX, K9XR, ZS6AOO, EA8BWW, EA8BGY. 850 KA4GYU, K9XR, ZS6AOO. 900 KA4GYU, K9XR, ZS6AOO. 950 K9XR, ZS6AOO. 1000 K9XR, ZS6AOO. 1050 ZS6AOO, HP2CWB. 1100 ZS6AOO, HP2CWB. 1150 ZS6AOO. 1200 ZS6AOO. 1300 HP6AYV. 1350 JR4NUN, HP6AYV. 1850 WE2L. 2200 LU8ESU. 2250 LU8ESU. 3700 ZL3NS.

CW: 350 K9XR, DL3JSW, YU1JU, JA3TBT, HP2CWB. 400 K9XR, DL3JSW, JA3TBT, HP2CWB. 450 K9XR, DL3JSW, JA3TBT. 500 KF7JF, K9XR, DL3JSW, JA3TBT, IK5TSS. 550 KF7JF, K9XR, DL3JWS, JA3TBT, IK5TSS. 600 KF7JF, K9XR, DL3JSW, K2LUQ, JA3TBT. 650 K9XR, DL3JSW, JA3TBT. 700 K9XR. 750 WJ7H, K9XR. 800 WJ7H, K9XR, VE3OMM. 850 WJ7H, NN7A. 900 WJ7H, NN7A. 950 WJ7H. 1000 LA3GI.

10 Meters: K9XR, NG9L, IK2DUW.
15 Meters: DF7HX, K9XR, NG9L, DL3JSW, EA6AA, IK2DUW.
20 Meters: K9XR, NG9L, DL3JSW, EA6AA, IK5TSS, IK2DUW.
40 Meters: K9XR, DL3JSW, HP2CWB.
80 Meters: K9XR, NG9L, DL3JSW, KV1M.
160 Meters: K9XR, DL3JSW.

Asia: K9XR, DL3JSW, KA4GYU, EA6AA, IK2DUW.
Africa: K9XR, KA4GYU, IK2DUW.
No. Amer: K9XR, VE3OMM, DL3JSW, KA4GYU, KA6CKW, EA6AA, IK2DUW.
So. Amer.: K9XR, IK2DUW.
Europe: K9XR, N1KCE, DL3JSW, KA4GYU, EA6AA, IK2DUW.
Oceania: K9XR, KA4GYU, IK2DUW.

Award of Excellence: S51NU.

Award of Excellence with 160 Meter Bar: none.

Award of Excellence Plaque Holders: I8YRK, W4CRW, SMØAJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, IØJX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, KØJN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KBØG, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YBØTK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NXØI, W9NUF, N4NX, SMØDJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWB, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DEØDAQ, LU1DOW, N1IR, IK4GME, WX3N, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SMØDJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SMØAJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KBØG, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YBØTK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, NXØI, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DEØDXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCV, I2MQP, IØRIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB.

Complete rules and application forms may be obtained by sending a business-size self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to: "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

IOTA DXpeditioner Larry, K5MK, eyes the Costa Rican island Islas Huevos, which became NA-191 upon his successful operation.

The WAZ Program

Single Band WAZ

15 Meter SSB

469 ..... WN9P

17 Meter SSB

8 ..... N4KG

20 Meter SSB

947 ..... JA6YG
948 ..... KB8I
949 ..... AA7KE

80 Meter SSB

62 ..... K5OVC

10 Meter CW

143 ..... ON4ALW

12 Meter CW

12 ..... N4KG

17 Meter CW

13 ..... N4KG

30 Meter CW

4 ..... N4KG

40 Meter CW

173 ..... K5NW

80 Meter CW

41 ..... JH2TPI

12 Meter Mixed

15 ..... N4KG

17 Meter Mixed

25 ..... K9APW

All CW

48 ..... K9APW
49 ..... IKØREH

WNZ

56 (10M SSB) ..... KE6AGR (25 zones)

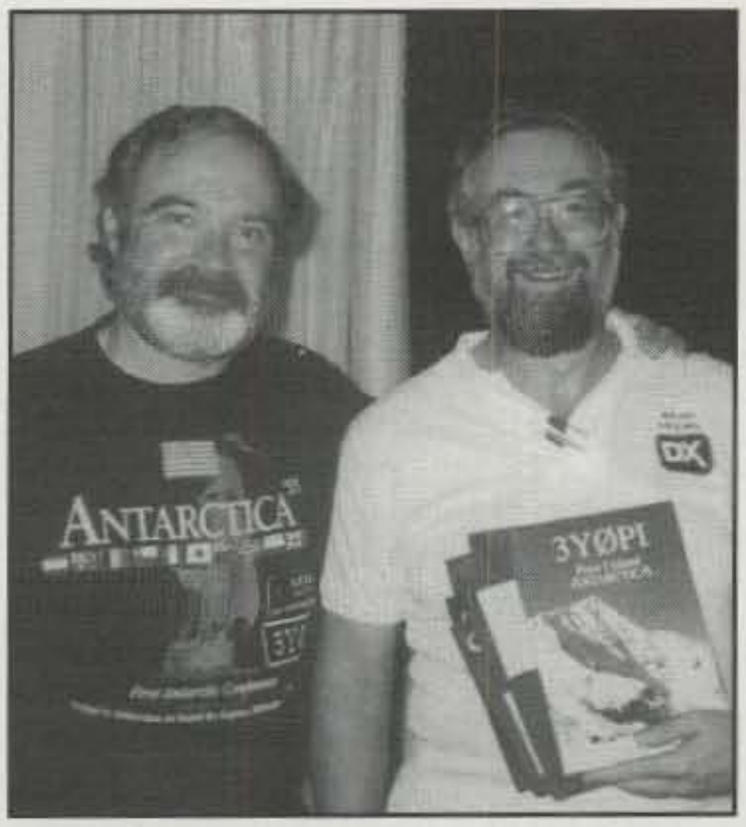
All Band WAZ SSB

4170 ..... K9APW
4171 ..... KE2SU
4172 ..... OE3WAC
4173 ..... W7DOZ
4174 ..... HBØHTE
4175 ..... EA3ESZ
4176 ..... EA5GRN
4177 ..... EA5OB
4178 ..... VE2AJT
4179 ..... HB9JAP
4180 ..... KY5I
4181 ..... W6WRA
4182 ..... HK6IMU

CW/Phone

7455 ..... JA9NPS (CW)
7456 ..... WN9P
7457 ..... K9APW
7458 ..... KE2SU
7459 ..... JE1YEM (CW)
7460 ..... W5ES
7461 ..... VE4AOZ
7462 ..... JA2FMW
7463 ..... I2EOW (CW)
7464 ..... WØIXQ (CW)
7465 ..... AB4VO

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.



Here 3YØPI DXpeditioner Luis, XE1L, greets your DX editor at the California Suite at the Dayton Hamvention. VP2ML holds KK6EK's excellent book about the DXpedition.

matters are the responsibility of the State (i.e., the French Republic): external relations; control of immigration and foreigners; post and telecommunications; money, treasury, credit, and exchange; financial relationships with foreigners and external commerce (except for quantity of imports); defense; importation, sale, and exportation of military material, arms, and munitions; civil rights; the organization of the legislature; general principles of the rights of work; justice; public functions of the state; and other functions. "The State [France] exercises these rights of *sovereignty*." The LOI does delegate to French Polynesia quantitative restrictions to imports and authority to grant landing rights.

Returning to the wording of Point 1(d), we find that French Polynesia has limited control of customs and landing rights, but not over regulation of foreign trade and commerce, nor immigration. It doesn't even have its own flag!

This is obviously not a clear-cut case. French Polynesia meets a few (a very few) of the requirements of Point 1. Most people would consider French Polynesia to be exactly what the reference books call it: an overseas territory of France, with no significant degree of sovereignty. However, there are some precedents in favor of separate DXCC country status for the two island groups.

One obvious precedent is Eritrea. That country was added back to the DXCC countries list with a reinstatement fully two years *before* it was a sovereign nation. In 1991 Eritrea was not recognized as independent by any other country, including the parent country of Ethiopia; it was not a member of any specialized agencies of the UN, nor did it use ITU-assigned prefixes. It did not have any diplomatic rela-

tions nor did it have any embassies. It didn't even have its own currency. Despite these drawbacks, the Awards Committee felt there was "sufficient degree of sovereignty for DXCC purposes." The case of French Polynesia is not much more farfetched. ARRL Awards Committee chairman Chuck Hutchinson, K8CH, said at the time that DXers shouldn't give much weight to the decision to go with the 1991 date, saying that it did not fundamentally change the definition of sovereignty in the DXCC rules. Perhaps Nao, as a fellow Headquarters staffer, was privy to some of the Awards Committee arguments in favor of the 1991 date, and will use some unique approaches in the expected petition for Australes and Marquesas.

Kan and Nao cite other cases of DXCC countries that were neither truly independent nor fully sovereign on the effective dates of their addition to the DXCC countries list as Point 1 countries. For example, Fiji 3D2 and Western Kiribati T30 are considered DXCC countries all the way back to the start of post-WWII DXCC (November 15, 1945). However, Fiji did not become independent until 1970, and Kiribati not until 1979. Aruba P4 was added to the DXCC countries list with an effective date of 1986, despite the fact that it will not become truly independent until 1996.

None of these so-called precedents carry much weight in the current situation. Both Fiji and Western Kiribati, as British dependencies prior to independence, were DXCC countries based on their physical separation from England.

In the case of Aruba, the argument for "independent government" was based on that island's "status aparte." This is a transitional period of ten years during which the parent Netherlands would handle defense and other external matters, while Aruba would be responsible for internal matters. In contrast to the case of French Polynesia, however, Aruba had its own flags, complete control of customs and passports, as well as public recognition as a country on a well-defined ten-year path to full independence. There is no such clear direction toward independence in French Polynesia.

The French Republic consists of metropolitan France (in Europe), four overseas departments, two territorial collectivities, and four overseas territories. Departments are similar to US states, and citizens of these (French Guiana, Guadeloupe, Martinique, and Reunion) vote in French national elections just as citizens of Hawaii and Alaska vote in ours. The two territorial collectivities, St. Pierre and Miquelon, and Mayotte have a relationship midway between that of a department and a territory. The overseas territories (French Polynesia, New Caledonia, French Southern and Antarctic lands, and Wallis and Futuna) have varying degrees of local autonomy, but remain under the administration of commissioners appointed by the central government of France.

Some members of the local French Polynesia Assembly have been elected on a pro-independence platform, but there have been no changes in the relationship between France and French Polynesia since the LOI of September 1984.

(DX nit-pickers will ask about the other French islands. Clipperton is *not* considered part of French Polynesia. The other French islands—such as Tromelin, Glorioso, etc.—are not considered to be part of the French Republic, but are merely island possessions.)

So where does all this leave us? French Polynesia exhibits an extremely low "degree of sovereignty," based on the characteristics of DXCC Country Criterion Point 1. Further, the DXAC has already considered adding Australes and Mar-

5 Band WAZ

As of April 30, 1994, 385 stations have attained the 200 Zone level.

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

UA9FAR

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
K6YRA, 199 (34)
AA4KT, 199 (26)
K7UR, 199 (34)
NAØY, 199 (26)
VE7DX, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
W9WAQ, 199 (26)
K6EID, 199 (34)
W1JR, 199 (23)
VE7AHA, 199 (34)
W1FZ, 199 (26)
IK2GNW, 199 (1)
W9CH, 199 (26)
ACØM, 199 (34)
G3MXJ, 199 (12)
IK8BQE, 199 (31)
JA2IVK, 199 (34,40m)
W6TC, 199 (34)
KA5W, 199 (26)
K1ST, 199 (26)
YZ1MB, 199 (23, 40m)
4X6DK, 199 (4)
I1POR, 199 (1)
SM6AHS, 198 (12, 31)
ABØP, 198 (23, 34)
UA3AGW, 198 (1, 12)
KL7Y, 198 (34, 36)
VO1FB, 198 (19, 27)
EA5BCK, 198 (27, 39)
KZ4V, 198 (22, 26)
K4PI, 198 (23, 26)
G3KDB, 198 (1, 12)
EA2KL, 198 (22, 26)
DK2GZ, 198 (1, 24)
W4YV, 198 (18,18 on 40)

The following have qualified for the basic 5 Band WAZ Award:

UA4PO, 166 Zones
AA4UF, 150 Zones
JA2TK, 188 Zones

Endorsements:

UA9FAR, 200 Zones
I1POR, 199 Zones
W4YV, 198 Zones
I2EOW, 195 Zones
K6FG, 177 Zones

895 Stations have attained the 150 Zone level as of April 30, 1994.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

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

4631 F9RM	3133 I2PJA	2800 YU7SF	2332 K9QFR	2016 N6JM	1832 W9IL	1505 LU8DY	1224 K9BQL	947 VE6BMX
4578 9A2AA	3125 W1BWS	2761 YU7BCD	2328 K2POF	1993 W8UMR	1824 G4OBK	1487 DK7NP	1214 HP2CWB	920 AA7TF
4247 K2VV	3070 N4MM	2727 HAØDU	2324 HAØIT	1961 S51NU	1814 NV9S	1480 OE6CLD	1210 WA3HUP	890 VE3OMM
3584 EA2IA	2973 ZP5JCY	2711 I1POR	2303 I2EOW	1960 WB4RUA	1784 W3KH	1452 IØACF	1194 JN3SAC	841 WU1F
3553 IT9TQH	2972 KØBLT	2656 SM7TV	2253 K8LJG	1955 9A1BHI	1772 IK2ILH	1365 I2EAY	1189 I1-50156	762 JR3TOE
3471 K6JG	2929 W9DWQ	2626 K9BG	2221 S53EO	1954 W6OUL	1730 S58MU	1289 KØIFL	1174 WØIJE	738 JA4DUD
3322 VE3XN	2922 WA8YTM	2589 N2AC	2219 K5UR	1951 K2OLG	1714 K5DB	1287 KSØZ	1125 WØULU	671 WB9IHH
3234 N4NO	2898 KA5W	2559 IT9QDS	2195 WB2YQH	1931 WE2L	1681 VE9RJ	1271 KC6X	1119 NH6T	640 KD6CJ
3229 N6JV	2826 I1EEW	2428 HAØHW	2139 KL7AF	1924 VE3MS	1605 CT1YH	1263 W9IAL	1094 AB5C	
3228 W2FXA	2841 PAØSNG	2416 K9AGB	2118 3A2LF	1920 KS4S	1577 PY2DBU	1252 WØIZV	1074 WK3Z	
3210 K6XP	2840 IN3ANE	2407 4N7ZZ	2118 W4UW	1869 KBØG	1567 WB3DNA	1252 K9XR	1072 EA3CWK	
3206 N9AF	2814 9A2NA	2402 SM6DHU	2041 DK5AD	1854 WB2ABD	1560 CT1QF	1248 NE6I	1020 IT9JPK	
3140 SM3EVR	2803 N4UU	2381 I2MQP	2029 HA5NK	1833 SM6CST	1520 HA9PP	1228 ND3A	1010 CT1EEB	

SSB

4568 F9RM	2606 OZ5EV	2179 I1POR	1850 EA2AOM	1592 YU7SF	1308 KBØC	1148 F6FNA	910 NH6T	744 JR3TOE
3998 IØZV	2593 EA8AKN	2175 9A2NA	1849 IK8GCS	1589 KAØZFX	1298 W6OUL	1101 K9BQL	897 AA7TF	739 CT5FSB
3622 K2VV	2584 NJØC	2171 I8KCI	1811 CX6BZ	1565 LU8DY	1279 K3IXD	1100 HP2CWB	897 KAØIFL	710 JA4DUD
3434 IT9TQH	2583 F2VX	2156 EA3AQC	1806 CT1BY	1539 K8LJG	1278 HP6AYV	1089 WB6SRK	879 SV3AQR	701 SM6CST
3482 ZL3NS	2539 N4NO	2152 W9DWQ	1803 WE2L	1535 I6NOA	1273 W5ILR	1060 G4SDJ	871 EA1AX	674 KE4BM
3424 VE1YX	2517 PAØSNG	2149 YU7BCD	1796 N4UU	1470 OE6CLD	1264 I3ZSX	1046 KBØG	861 T3ØJH	672 IØUVP
3205 F6DZU	2499 I4CSP	2079 PY4OY	1787 SM6DHU	1457 K2EEK	1235 OE2EGL	1029 VE3MS	851 CT1YH	653 VE9RJ
3186 K6JG	2484 I1EEW	2049 I2EOW	1779 IN3QCI	1442 I8LEL	1228 I1-21171	1021 EA2IF	825 EA3EQT	652 S51NU
3130 I2PJA	2416 KA5W	2046 CT4UW	1770 IK5ACO	1439 KS4S	1226 G4OBK	1017 KC6X	818 EA8BWW	643 N3DRO
2893 ZP5JCY	2300 WA8YTM	1937 W4UW	1697 K2POF	1409 N2AC	1199 IK2AEQ	1015 CT1EEB	808 WU1F	620 UA1ZO
2859 CT4NH	2291 I2MQP	1933 KD9OT	1682 HAØIT	1389 WN5MBS	1185 HA5NK	977 K9XR	806 I6KYL	600 IK6JYY
2747 N4MM	2286 I5ZJK	1902 CT1AHD	1674 KL7AF	1347 IKØEIM	1176 K8MDU	933 ND3A	798 EA8BGY	
2647 EA2IA	2196 WA4QMQ	1886 4X6DK	1650 KF7RU	1345 CT1BWW	1161 NG9L	917 NE6I	775 EA1KN	
2644 I6ZJC	2186 LU8ESU	1880 K5UR	1616 N6FX	1331 DK5WQ		916 WT3W	762 EA5DCL	

CW

3618 K2VV	2513 YU7SF	1951 S51NR	1787 SM6DHU	1658 OK1CZ	1443 VR2UW	1287 EA6BD	973 EA2CIN	768 JA3ARM
3547 IT9TQH	2462 N4UU	1922 W8IQ	1769 K5UR	1650 KL7AF	1428 IK3GER	1280 ZP5JCY	945 W4UW	751 AA6WJ
3545 WA2HZR	2365 N2AC	1894 KA7T	1762 HAØIT	1602 VE9RJ	1410 I1EEW	1264 LU2YA	899 WØJIE	659 HB9CSM
3365 W8RSW	2348 W9DWQ	1890 EA7AZA	1743 K2POF	1598 W9PWM	1408 VE3MS	1225 I2EAY	860 NE6I	637 I2MQP
3211 N6JV	2284 JH3CXL	1861 9A2NA	1713 SM6CST	1559 I7PXV	1401 G4OBK	1207 IK2ECP	845 4X6DK	622 VE6BMX
3010 VE7CNE	2223 WA8YTM	1828 G3VQO	1709 N6FX	1555 W5AWT	1391 DJ1YH	1131 K9QFR	830 PY4WS	619 KØIFL
2787 N4NO	2207 YU7BCD	1814 JA9CWJ	1708 G4SSH	1547 KBØG	1345 G4MVA	1078 JN3SAC	821 KC6X	612 K2LUQ
2784 YU7LS	2132 KA5W	1808 TI4SU	1686 K8LJG	1534 ZS6EZ	1342 KS4S	1058 EA6AA	787 K9XR	
2639 K6JG	2079 N4MM	1801 S51NU	1660 HA5NK	1503 S58MU	1324 SM5DAC	1013 AC5K	787 VE3OMM	
2621 EA2IA	2060 G4UOL	1793 OZ5UR	1658 W1WAI	1454 W6OUL	1296 3A2LF	1009 W9IAL	775 ND3A	

quesas to the DXCC countries list in 1989. Paul Granger, F6EXV, submitted the petition, which included the LOI discussed above. *(The LOI is presented in French; Paul translated into English only those parts which helped his case for separate DXCC status. The above translations are my own.—ed.)* The DXAC voted against adding the island groups to the DXCC countries list at that time. The vote against separate country status was relatively close, indicating an internal split within the DXAC. With some new members, and others changing their minds after five years, perhaps the 1994 petitions for separate country status for Australes and Marquesas will meet with more success. However, the extremely limited official degree of sovereignty of French Polynesia, combined with the relatively recent rejection of separate DXCC status for the same locations, suggest that this petition will have an uphill battle. Further, if this petition is accepted, look for a flood of similar petitions, based on the dozens of overseas territories around the world.

Any DXer who wishes to share his or her opinion on separate country status for these two island groups should contact the DXAC via ARRL Headquarters.

Shown here is Bruce, WA1G, accepting the CQ DX Hall of Fame plaque for Charlie Mellon, W1FH, at the Dayton DX Banquet. Presenting is CQ's Editor, Alan, K2EEK.

Silent Keys

Two more members of CQ's DX Hall of Fame passed away in recent months. Geoff Watts, BRS3129, founded the "DX News Sheet" and edited it for 20 years. He also established the Islands On The Air awards program. He was the first shortwave listener to confirm all *CQ* Zones, and the first to confirm 300 DXCC countries. He eventually had every DXCC country confirmed as an SWL. He is the only non-amateur ever inducted into the DX Hall of Fame.

Stu Meyer, W2GHK, was inducted into the DX Hall of Fame as its seventh memberin 1970. He had been very active in recent years as the organizer of DXPOs in the Washington, DC area.

New Hall of Famer

In the good news category Charlie Mellon, W1FH, has been elected into the CQ DX Hall of Fame. Charlie earned DXCC certificates #1 for both Phone and Mixed. He remained at the top of the Honor Roll for the next 20 years, working every single DXCC country during that period. He finally "retired" from active DXCC participation because of the antics of a notorious DXpeditioner of the era. He was one of the original founders of the Southern New England DX Association. Welcome to the Hall of Fame, Charlie!

DXCC News

The DXCC desk made a little progress on the backlog in April, at least in terms of applications processed. They received 644 applications in April (down from 1127

QSL Information

3D2RW to ZL1AMO
4J3M to UD6DJ
4K8F to UA9AB
4K9W to DL6KVA
4N70DX to YU1DX
4U9ITU to I1YRL
4X46ID to 4X4HQ
5Z4JD to F6AJA
8Q7AA to JG2XYV
9G1RZ to K8JP
9H3AK to DL1SV
9H3FY to DL9PD
9K2ZZ to W8GIO
9L1NG to IØWDX
9MØA to JA9AG
9M2DM to JA7TQK
9M6LS to N5FTR
9Q5FHI to F6FHI
BO2AA/BV3 to BV3AA
BZ5HAN to BY5HZ
C53HG to W3HCW
CE1/GØSMC to G4SMC
CT3EU to G3PFS
DAØMID to DL5EBE
DLØKBM to DL5EBE
E28DX to JA1UT
ED7GXP to EA7GMC
EK6LF to N7RO
ER3ED to UO5OED
ER5AL to YO4BII
ET3JR to F5OYK
ET3VZ to OH3VZ
EU5R to EU1FC
EV2TK/200 to UC2LR
EV3TK/200 to UC2LR
EXØM to DF8WS
EX8W to DL8FCU
EY8FG to UJ8JA
EZ5AA to W5BWA
FG5FC to F6DZU
FOØRYD to N1MFW
FOØSST to AA6BB
FY5GJ to F2YT
HG1S to HA1KSA
HSØZAA to KM1R
HS1BV to W3HCW
HZ1TA to OE6EEG
IO7G to IK7NXU
IYØORP to IKØUSA
J37ZY to NS8G
JY8HL to WD4HDL
JY9ZK to KA5ZMK
KH2T to W3HNK
OK8BAF to DJ5CQ
OL5A to OK1FYA
OMØW to OM3CGN
OM7M to OM3LA
P29DX to N4EOF
PT1MD to PY1SL
PYØZFB to JH2MRA
RU6LC/Ø to UA6LU
RW3TT/Ø to DL8AAM
SØ1M to EA7EL
S21AM to N4VA
S21ZG to W4FRU
S52DD to WA4WTG
SNØPR to SP6FER
T28RW to ZL1AMO
T3ØRT to VK4CRR
T92A to S57MX
T94US to 9A2NR
T97T to SM5AQD
TG9GI to IØDX
TK/DL2NEF to DL8NBH
TL8MX to F5XX
TM3M to F6KLS
TM3UN to F5PGP
TM5FB to F5XL
TR8CA to F6CBC
TR8KW to G4JOA
TU4EI to W3HCW
UE9WAA to RW9WA
UE9WAB to RV9WB
UK8AA to G3SWH
UK8QU to K9FD
UN6P to RL8PY
V47RS to KO8O
V47WC to KB8WC
V47XS to N8LXS
V63SD to K7ZSD
V63YI to JA3IG
V73C to OKDXA
V73OZ to AD1S
VK3FBL/P to HB9AFI
VP2EJA to JA1VPO
VP2EOH to K8BL
VP2MCO to AA6MV
VP5P to WB3DNA
VP8GAV to GMØLVI
VQ9LV to KY3V
VQ9TV to N5FG
VS6GA to KG4ZQ
XT2TX to EA5TX
XU7VK to HAØTW
XX9AS to KU9C
XX9TZ to KU9C
YBØARN to KC9XN
YB3AQE to PAØGIN
YS1DRF to W2PD
YS1XS to WD4PDZ
YT7ØW to YU7AU
ZK1AT to WB6EQX
ZK1TB to W7TB
ZP5XTE to JA7ZF
ZS6MG to YU5FU
ZYØZFM to SM4NLL
ZZ5LL to PP5LL
FY5GF to P.O. Box 6005, Cayenne 97306, French Guiana
J55UAB to Mario, P.O. Box 5, 1415 Bissau, Guinea-Bissau
S92LB to Luis, P.O. Box 147, Sao Tome
VR6DB to Dave Brown, P.O. Box 13, Pitcairn Island, via New Zealand
ZB2JO to P.O. Box 516, Gibraltar

in March) and processed 723, leaving 541 unprocessed at the end of the month. In terms of QSL cards, they continued to fall behind. The 644 applications received in April included 53,843 cards. They processed 52,115, leaving a backlog of 63,665 unprocessed cards, up slightly from the 61,937 at the end of March. Turn-around time also slipped slightly, and at the end of April was about four weeks for those whose DXCC records are computerized. Some applications still await entry from paper records, and these take longer to process. DXCC applications are up 19% from last year, and the number of QSL cards in those applications is up 38%.

Bill Kennamer, K5FUV, of the DXCC desk reported that documentation has been received and approved for the following operations (beginning date): 3D2KR (25/2/94); 3D2LA (25/2/94); 3YØPI (29/1/94); 5R8KH (21/10/93); 9N1BD (25/8/93); 9U5DX (8/10/93); A25/WD8NMV (15/3/93); ET3RA (22/11/92); S21ZW (26/10/93); TU4EI (22/9/93); VP2EDK (23/9/93); XF4CI (15/12/94); XU9M (3/3/93); XU9R (3/3/93); ZF2CF (1/3/94); and ZF2QA (21/1/91).

Other DX News

On May 20 the Japanese Postal and Telecommunications services announced the release of an additional 75 meter band window for amateur use—3747–3754 kHz. Thus, Japanese amateurs may now use 3500–3575, 3747–3754, and 3791–3805 kHz. This is available for all HF license classes. The Japanese continue to push for additional operating frequencies on 80 and 160 meters.

Finally, "The Long Island DX Bulletin," previously published by Harvey McCoy, W2IYX, has been acquired by DX Publications and is now being edited by Chod Harris, VP2ML *(that name is somehow familiar . . .)* The bulletin will continue to be published biweekly, with a 100% increase in DX news content. Subscriptions are $25 in the US for 26 biweekly issues. Contact DX Publications at P.O. Box 50, Fulton, CA 95439 for samples or more information.

Up-Coming DX Events

The New Orleans International DX Convention will be held at the Royal Sonesta Hotel in the historic French Quarter of that city on Sept. 2–3. This is Labor Day weekend, and an excellent opportunity to view this fine location and enjoy a weekend full of DX activities. Among the presentations are Western Sahara SØ, Kawajelen, Eritrea E3, Mellish Reef VK9MM, and technical talks on amplifiers and coaxial cable. The banquet presentation is on the 3YØPI Peter I Island DXpedition. Other activities include DXCC and DXAC reports, DXCC card checking, and much more. Registration before August 15th is

CQ DX Awards Program

SSB

2086 ..... HL5BUV

CW

899 ..... N5HB

RTTY

20 ..... W4OHZ

SSB Endorsements

320 ..... W6BCQ/328
320 ..... W3GG/327
320 ..... YV5CWO/326
320 ..... KE5PO/325
320 ..... YV5IVB/325
320 ..... KD5ZM/322
310 ..... NI5D/316
300 ..... KD4YT/303
275 ..... 4X6DK/287
275 ..... KQ4GC/277
150 ..... HL5BUV/155

CW Endorsements

320 ..... N7RO/325
300 ..... N3DQN/307
300 ..... N5HB/305
300 ..... WB6OKK/304
300 ..... W6YQ/300
250 ..... KE5PO/272
1.8 MHz WB4DBB

RTTY Endorsements

200 ..... KE5PO/245

Total number of active countries is 329. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

$50, which includes the Saturday night banquet ($60 after August 15). Banquet only is $30. MasterCard/Visa or checks accepted. Send your registration to the NOIDXC, c/o Michael Mayer, W5PZA, 5836 Marcia Ave., New Orleans, LA 70124. I'll be there with my wife (she is *not* an XYL); will you?

The **St. Paul Island CY9** DXpedition described last month has been postponed until September in the hopes of improved propagation. NØTG/CY9, AA4VK/CY9, WA4DAN/CY9, and KW2P/CY9 will operate from St. Paul Sept. 19–25. QSL to NØTG. Yet another group plans to operate from this Canadian island. The West island Amateur Radio Club of Montreal will operate as **CY9CWI** Aug. 12–16. Planned frequencies are 3505-15, 7040–60, 10110, 14040, 18080, 21040, and 28120 kHz on CW, and 3780–3800, 7250, 14195, 18120, 21320, 24940, and 28495 kHz on SSB. RS-12 operation on 21220–29420 kHz. RTTY on 7090 and 14090 kHz. Two YLs, VE2YAK and VE2ZOO, will give YL DXers another country. QSL to WIARC Inc., P.O. Box 884, Pointe-Claire/Dorval, Quebec, Canada H9R 4Z6.

Other operations schduled for August include **JW4LN** from Svalbard by LA4LN, and **ZD8OK** from Ascension Island by Jon, GWØFJT.

In Islands On The Air DXpeditions look for N1JM/VE8 from Inuvik Region West (NA-192) Aug. 3–5, N1JM/AL7 from Gulf of Alaska center group Aug. 9–11, N6JM/NL7 from Cook Inlet (NA-158) Aug. 13–14, and N6JM/KL7 from Gulf of Alaska West group, a New One for IOTA, Aug. 20–22. John will try to operate as N6JM/VE7 from the Barren Islands, a New One for IOTA, Aug. 13–14. If he can't get permission to visit the restricted island, he'll be on from Cook Inlet. F5GVH will be on from Belle Ile (EU-048) Aug. 17–Sept. 4. F6AML will operate from several British islands this month.

In the special-event category, watch for **VI4WWA** all month (and to the end of October), celebrating the annual Whale Festival in Hervey Bay, Queensland, Australia. The Hervey Bay Amateur Radio Club will be on or around 3794, 7100, 14235, 21250, and 28495 kHz. They offer an award that consists of a large, glossy, color photograph of a hump-back whale for US$5. QSL, and apply for the award, at HBARC, P.O. Box 829, Hervey Bay 4655, Queensland, Australia.

Another special-event operation will be the annual airing of **K2BR** from the Miss America pageant in Atlantic City, New Jersey, Sept. 12–17. Try 25 kHz up from the General class band edges on SSB, and 65 kHz up on CW, as well as 28100-28500 kHz for Novices. QSL with SASE to SCARA, P.O. Box 121, Linwood, New Jersey 08221. Note that Atlantic City is on Absecon Island (NA-111).

QSL Notes

Wayne Mears, WB6EQX, reports that he is **not** the QSL manager for **KG4DX**, nor does he know who is.

By now **ZS6IR** should have been on the air from July 1–21. QSL via the bureau or direct to DL4JZ. (The ZS6IR *Callbook* address is wrong.)

QSL **VP2MAX** (ex-VP2MIX) via WØIJN as soon as possible; WØIJN wants to close out the logs.

QSL the 1982 Campbell Island operation of **ZL4OY/A** to Chris Hannagan, ZL4OY, 73 Strasbourge St., Martinborough 5954, New Zealand.

QSL **5R8DM** to Hitoshi Miura, 7K1EHK (ex-JE8XRF), 5-1-5-202, Akatsuka, Itabashi-Ku, Tokyo 175, Japan.

QSL **OD5/SP7LSE** direct to Zenon Brodziak's home address: ul: Konarskiego 1/20, 96-100 Skierniewice, Poland. (The old route of via SP7EJS is no good since January.)

QSL the WPX SSB operation of **PQØMM** via Sergio Lima de Almeida PP5JR, Rubens A. Ramos 1416/501, Florianopolis SC 88015-700, Brazil.

QSL **VP5/AB5MF** via S. Obara, AB5MF, 7205 Hart Lane #2010, Austin, TX 78731.

QSL **TY1DX** and **TY2FG** direct only to

Germano Gabucci, IK6FHG, Ville Federica, 61020 Trasanni, Italy, before the end of August. Cards will not be available after that date.

EO50JS commemorated the 50th anniversary of the liberation of the Crimea; QSL via Dainius Savicius, LY1DS, P.O. Box 1274, 232056 Vilnius, Lithuania, with return postage.

QSL **EO6J** and **EO50JA** via P.O. Box 10, Kerch 334500, Crimea, Ukraine, with 2 IRCs.

C91J (ex-C9RJJ), who has returned to the U.S. from Mozambique, has changed QSL managers; anyone still needing a card should QSL via Buzz, N5FTR. Buzz can also handle the cards for **A41KJ, KG4DD, P29BT, V31BR, V31ML, Z21BA, 9M6LS, 9M8FH, 9M8LL, 9M8YL**.

QSL **V63SD** to Bradley Wallingford, 11919 N. Jantzen, #385, Portland, OR 97217.

QSL **ZF2VZ/ZF8** and **FOØRYD** via Bob Ryder, N1MFW, P.O. Box 315, Chatham, MA 02633.

QSL **ZYØFZI, PS7ZIN, J79ROJ, 9M6RO, V31RO, J79OUT, JG1OUT/V2** via Isao Numaguchi, JH1ROJ, 4-9-31 Naka-Aoki, Kawaguchi, Saitama 332, Japan.

QSL **C6AHL** via Dick Wilder, K3DI, 913 Shore Acres Road, Arnold, MD 21012.

QSL the 1994 WPX contest call of **C4YY** via Jeff Hambleton, 5B4YY, Box 1222, Kato Paphos, Cyprus.

QSL **OY1CT** via the Faroes QSL bureau or direct to Carsten Thomsen, Box 25, FR-340 Kvivik, Faroe Islands, via Denmark, with one IRC or US$2.

QSL **OHØKDY** via Tomi Ylinen, OH2KDY, Kirkkokuja 12 C, 01230 Vantaa, Finland.

QSL **XE3ABG** via operator Benito, Avenida Universidad 4, Colonia Pemex 1, Ciudad del Carmen, Campeche 24100, Mexico.

QSL **PYØFM** via P.O. Box 007, Mathinhos PR 83260-000, Brasil.

QSL the WPX SSB call of **Z30M** via the Nikola Tesla Radio Club Z37GBC, P.O. Box 71, 92000, Stip, Republic of Macedonia.

QSL **5U7Y** via Takayuki Yoshino, JG3UPM, 4-1-83 Uriwari-Higashi, Hirano-Ku, Osaka 547, Japan.

QSL Ralph Karhammar, **Z21HS,** via Box 4110, Harare, Zimbabwe, before the end of the year. As of January 1995 QSL Ralph at 6 Seven Oaks St., Taringa Q4068, Australia.

TI9JJP has a new QSL address: Office Box Acct 321 CR, 3900 NW 79th Ave., Suite 564, Miami, FL 33166.

QSL **VP2E/JA1CMD** via the JARL bureau to JA1CMD, or direct to Kazu Mayimore, c/o Furukawa, 200 Westpark Dr., Suite 190, Peachtree City, GA 30269.

73, Chod, VP2ML

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Storminess Continues

Although propagation textbooks say that geomagnetic, solar, or radio storminess generally subsides considerably during periods of low solar activity, storminess so far this year seems to be the exception to the rule.

The unusually long and often intense periods of geomagnetic and associated ionospheric radio storms which took place during February, March, and April of this year continued through May. On 14 days during May the worldwide planetary 24-hour geomagnetic Ap index exceeded the storm threshold figure of 25. On 7 days it exceeded the 34 index level, indicating severe storminess.

Such periods of storminess are not so unusual during years of very high sunspot count, but are supposed to be rare during the low sunspot period we are now in.

Solar Cycle Progress

Sunspot Cycle 22 continues to decline steadily towards its minimum, much as expected. The Royal Observatory of Belgium reports a mean sunspot number of 17 for April 1994. Daily values ranged from a low of 0 on April 3, 6, and 7 to a high of only 40 on April 24. The mean level observed in April results in a smoothed sunspot number of 45 centered on October 1993. This is a drop of four points from the previous month's level.

A smoothed sunspot number in the upper 20s in forecast for August 1994.

On June 2, as this column is being written, the sun has just completed a full week of being absolutely spotless!

The Dominion Radio Astrophysical Observatory of Canada reports a corresponding drop in 10.8 cm solar flux levels, with a mean value of 80 reported for April 1994. This results in a smoothed value of 100 centered on October 1993. A smoothed level in the upper 70s is forecast for August 1994.

Annual Ionospheric Salting

Over the past several years our "salting the ionosphere" expeditions have worked out very well for the annual CQ World-Wide DX Contests. During the first days of June, as this column is being written, I am finalizing plans for ten days in the high Rockies to conduct this year's "salting" experiences. This year we will have to use a lot more "salt" than during previous years because of considerably lower sunspot activity.

11307 Clara St., Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for August 1994

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 2, 10, 16, 29	**A**	**A**	**B**	**C**
High Normal: 1, 8-9, 11-12, 15, 28	**A**	**B**	**C**	**C-D**
Low Normal: 3-7, 13-14, 17, 21-23, 26-27, 30-31	**B**	**C**	**D**	**D-E**
Below Normal: 18, 20, 24-25	**C**	**C-D**	**D-E**	**E**
Disturbed: 19	**C-D**	**D**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on August 1, excellent (A) on the 2nd, fair (C) on the 3rd–7th, good (B) on the 8th and 9th, etc.

August Propagation

During August a few 10 and 12 meter DX openings should be possible to southern and tropical areas. Best bet is during the afternoon when conditions are expected to be High Normal or better. Frequent shortskip openings between distances of about 500 and 1400 miles can also be expected.

Look for no more than an occasional 15 meter DX opening towards Europe and the east before noon, but chances should be much better during the afternoon hours, particularly towards Africa, South America, the South Pacific, and Oceania. Expect frequent short-skip openings between distances of about 400 and 1400 miles.

The propagation pattern on 17 meters should be similar to 15 meters. With decreasing solar activity and summertime propagation conditions in the northern hemisphere, the somewhat lower frequency range of this band may well prove to be a propagation asset. On many days when conditions will not permit 15 meters to open, check this band for openings. When 15 meters does open, expect the same opening on 17 meters, but the band should remain active up to an hour after 15 meters closes.

During August 20 meters should continue to be the best band for DX propagation. Openings are forecast to most areas of the world between sunrise and midnight, when conditions are at least Low Normal. Peak conditions should occur, with strongest signals, during a two to three hour window just after local sunrise, and again during the late afternoon and evening. When conditions are High Normal or better, 20 meters may remain open through much of the period of darkness, particularly towards southern and tropical areas. Excellent short-skip openings are also expected to continue on 20 meters from shortly after sunrise to almost midnight. These should range from a few hundred miles out to the one-hop limit of about 2300 miles.

Thirty meters can be another propagation asset during the summer months. Peak openings are expected during the nighttime hours, much like 40 meters, but often with higher signal levels and somewhat lower noise levels.

Some fairly good 40 meter DX openings are forecast for the early evening hours towards the east and south. Conditions should improve towards the west and south after midnight, with the band remaining open for DX until sunrise. Look for excellent short-skip openings between about 250 and 750 miles during the daylight hours and between 750 and 2300 miles at night.

Despite seasonally high static levels, some fairly good DX openings should also be possible on 80 meters during the hours of darkness. Conditions should peak just as the sun begins to rise on the "light" side of the path. Try 80 meters for short-skip openings up to about 250 miles during the daylight hours and between 250 and 2300 miles at night.

It's still too early for 160 meter DX openings, but an occasional one may be possible during the hours of darkness and the sunrise period. Short-skip on 160 looks

August 15 – September 15, 1994
Time Zone: EDT (24 Hour Time)
EASTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	Nil	09-11 (1) 14-16 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	19-21 (1) 21-22 (2) 22-01 (3) 01-03 (2) 03-04 (1) 21-23 (1)* 23-01 (2)* 01-03 (1)*
Northern Europe & CIS (former European USSR	Nil	09-11 (1)	06-07 (1) 07-10 (2) 10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	20-22 (1) 22-00 (2) 00-03 (1) 22-02 (1)*
Eastern Mediter-ranean & Middle East	Nil	11-13 (1) 13-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	19-21 (1) 21-23 (2) 23-00 (1) 22-00 (1)*
West Africa	14-16 (1)	09-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-16 (2) 16-17 (3) 17-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	20-23 (1) 23-02 (2) 02-04 (1) 22-02 (1)*
Central & East Africa	Nil	11-14 (1) 14-16 (2) 16-17 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	21-01 (1)
South Africa	12-14 (1)	08-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-20 (1) 23-01 (1)	21-23 (1) 23-01 (2) 01-03 (1) 23-02 (1)*
Central & South Asia	Nil	17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 20-23 (1)	05-07 (1) 18-21 (1)
Southeast Asia	Nil	18-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-22 (1)	Nil
Far East	Nil	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1)
South Pacific & New Zealand	16-19 (1)	13-16 (1) 16-18 (2) 18-20 (1)	07-08 (1) 08-11 (2) 11-13 (1) 18-21 (1) 21-00 (2) 00-02 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 04-08 (1)*
Australasia	17-19 (1)	16-17 (1) 17-19 (2) 19-20 (1)	06-08 (1) 08-10 (2) 10-12 (1) 15-16 (1) 16-18 (2) 18-21 (1) 21-00 (2) 00-02 (1)	03-04 (1) 04-07 (2) 07-08 (1) 05-07 (1)*
Northern South America	13-15 (1) 15-17 (2) 17-18 (1)	08-12 (1) 12-14 (2) 14-16 (4) 16-17 (3) 17-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-02 (1)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-08 (1) 22-02 (1)* 02-04 (2)* 04-07 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-16 (1) 16-17 (2) 17-18 (1)	08-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-18 (4) 18-19 (2) 19-20 (1)	06-08 (1) 14-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-00 (2) 00-02 (1)	21-23 (1) 23-01 (2) 01-03 (1) 03-06 (2) 06-07 (1) 04-06 (1)*
McMurdo Sound, Antarctica	Nil	15-18 (1)	07-09 (1) 16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-01 (1)	01-06 (1)

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., etc. Appropriate *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

Time Zones: CDT & MDT
(24 Hour Time)
CENTRAL USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	Nil	09-11 (1) 13-15 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	20-22 (1) 22-01 (2) 01-04 (1) 22-02 (1)*
Northern Europe & CIS (former European USSR	Nil	10-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-14 (3) 14-16 (2) 16-17 (1) 21-23 (1)	20-02 (1) 22-01 (1)*
Eastern Mediter-ranean & Middle East	Nil	10-15 (1)	07-14 (1) 14-16 (2) 16-18 (1) 21-23 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
West Africa	12-14 (1)	09-11 (1) 11-14 (2) 14-16 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-22 (1)	20-22 (1) 22-01 (2) 01-02 (1) 23-01 (1)*
Central & East Africa	Nil	12-15 (1)	13-17 (1) 17-19 (2) 19-21 (1) 07-09 (1)	21-00 (1)
South Africa	11-14 (1)	08-10 (1) 10-14 (2) 14-15 (1)	07-09 (1) 12-15 (1) 15-18 (2) 18-20 (1) 22-01 (1)	20-21 (1) 21-23 (2) 23-01 (1) 22-00 (1)*
Central & South Asia	Nil	18-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-21 (1)	06-08 (1) 19-21 (1)
Southeast Asia	Nil	17-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 20-23 (1)	06-08 (1)

Far East	Nil	15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-13 (1) 17-19 (1) 19-22 (1) 22-01 (1)	03-06 (1) 06-07 (2) 07-08 (1) 06-07 (1)*
South Pacific & New Zealand	16-19 (1)	12-15 (1) 15-19 (2) 19-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-21 (2) 21-23 (3) 23-02 (2) 02-07 (1)	00-01 (1) 01-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	16-19 (1)	14-16 (1) 16-19 (2) 19-21 (1)	00-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-16 (1) 16-18 (2) 18-20 (1) 20-00 (2)	02-04 (1) 04-07 (2) 07-09 (1) 04-05 (1)* 05-07 (2)* 07-08 (1)*
Northern & Central South America	12-15 (1) 15-17 (2) 17-18 (1)	08-09 (1) 09-12 (2) 12-14 (3) 14-17 (4) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-16 (2) 16-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-02 (1)	19-21 (1) 21-23 (2) 23-03 (3) 03-06 (2) 06-07 (1) 21-00 (1)* 00-03 (2)* 03-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, Uruguay	13-14 (1) 14-16 (2) 16-17 (1)	08-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-18 (4) 18-19 (2) 19-20 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-17 (3) 17-20 (4) 20-22 (3) 22-01 (2) 01-03 (1)	21-23 (1) 23-01 (2) 01-03 (1) 03-05 (2) 05-07 (1) 02-06 (1)*
McMurdo Sound, Antarctica	Nil	15-18 (1)	15-17 (1) 17-19 (2) 19-21 (3) 21-23 (2) 23-00 (1) 08-10 (1)	01-06 (1)

Time Zone: PDT (24 Hour Time)
WESTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	Nil	11-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-17 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1) 22-23 (1)*
Central & Northern Europe & CIS (former European USSR	Nil	10-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (1) 21-23 (1)	19-00 (1)
Eastern Mediter-ranean & Middle East	Nil	09-12 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (1) 20-22 (1)	20-23 (1)
Western & Central Africa	Nil	12-15 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	21-01 (1)
East Africa	Nil	Nil	12-15 (1) 15-17 (2) 17-19 (1)	20-22 (1)
South Africa	Nil	10-12 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (1) 22-00 (1)	20-21 (1) 21-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	Nil	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-21 (1)	06-08 (1)
Southeast Asia	Nil	16-20 (1)	08-09 (1) 09-11 (2) 11-13 (1) 18-21 (1) 21-00 (2) 00-01 (1)	02-05 (1) 05-07 (2) 07-08 (1) 06-07 (1)*
Far East	Nil	15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-20 (2) 20-22 (3) 22-23 (3) 23-01 (1)	01-02 (1) 02-06 (2) 06-07 (3) 07-08 (1) 03-07 (1)*
South Pacific & New Zealand	16-18 (1)	12-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-21 (1)	01-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-14 (1) 14-18 (2) 18-20 (3) 20-22 (4) 22-23 (3) 23-01 (2)	22-23 (1) 23-00 (2) 00-06 (3) 06-07 (2) 07-08 (1) 23-02 (1)* 02-05 (2)* 05-07 (1)*
Australasia	15-18 (1)	13-16 (1) 16-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	12-19 (1) 19-20 (2) 20-01 (3) 01-04 (2) 04-07 (1) 07-08 (2) 08-10 (3) 10-12 (2)	00-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Northern & Central South America	12-14 (1) 14-17 (2) 17-18 (1)	08-09 (1) 09-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-22 (2) 22-02 (1)	18-21 (1) 21-22 (2) 22-01 (3) 01-03 (2) 03-07 (1) 20-22 (1)* 22-02 (2)* 02-05 (1)
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	13-14 (1) 14-16 (2) 16-17 (1)	08-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-17 (4) 17-19 (2) 19-20 (1)	04-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-22 (2) 22-00 (1)	20-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-06 (1) 01-05 (1)*
McMurdo Sound, Antarctica	Nil	13-16 (1) 16-18 (2) 18-20 (1)	08-10 (1) 16-19 (1) 19-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	01-06 (1)

*Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

For 12 meter openings interpolate between 10 and 15 meter openings.

For 17 meter openings interpolate between 15 and 20 meter openings.

For 30 meter openings interpolate between 40 and 20 meter openings.

good during the hours of darkness for distances up to at least 1300 miles.

Since the summer propagation season usually ends by mid-September, this month's DX Propagation Charts cover only a one month period rather than the usual two months. Short-Skip Charts for August appeared in last month's column.

VHF Ionospheric Openings

Although sporadic-*E* ionization is expected to decrease during August, some 6 meter short-skip openings still should be possible. These openings should normally extend between approximately 750 to 1300 miles, but during periods of widespread sporadic-*E* ionization, 6 meter "two-hop" openings may be possible up to as great as 2500 miles. During periods of intense sporadic-*E* ionization also check for possible short-skip openings on 2 meters over a range of about 1100 to 1300 miles.

What is likely to be the year's most prolonged and intensive meteor shower should take place between August 10 and 14. Called the *Perseids*, it's expected to peak on August 12th, with an average count of 50 meteors an hour. Ionization produced by these meteors as they enter the earth's atmosphere should make possible numerous meteor-scatter-type openings on the 6 and 2 meter bands. The range of such openings could be up to several hundred miles, and at times somewhat greater.

August is not usually a good month for auroral-type propagation on the VHF bands, but some could occur during times when the ionosphere is disturbed. Check the Last Minute Forecast appearing at the beginning of this column for those days that are expected to be Below Normal or Disturbed. These are the days when chances are best for auroral-type openings on the VHF bands.

Auroral-scatter openings can range from a few hundred up to about a thousand miles, and are usually characterized by very rapid flutter fading and Doppler shift on SSB signal.

73, George, W3ASK

Announcements

(from page 6)

KA9HDZ (618-488-7249). (Handicapped accessible; exams.)

Aug. 6, **Annual WA9SNT Hamfest**, ITT Technical Institute, Indianapolis, Indiana. Contact Dave Johnston, K9HDQ, 317-875-8640.

Aug. 6, **Elkhart County Hamfest**, 4-H Fairgrounds, Goshen, Indiana. Contact Jocelyne Slough, WZ9M, 20284 CR 36, Goshen, IN 46526 (219-533-7632). (Exams.)

Aug. 6, **4th Annual Columbus Hamfest**, Aladdin Shrine Temple, Columbus, Ohio. Contact Jimmy Caines, KB8KME, 1056 Erickson Ave., Columbus, OH 43227 (614-235-4506 eves/weekends). (Exams.)

Aug. 6, **Porter County Hamfest**, Porter County Expo Center, Indiana. Contact Rich, N9QLQ at 219-762-8701; or send SASE to PCARC HamFest, P.O. Box 1782, Valparaiso, IN 46384-1782. (Handicapped accessible; exams.)

Aug. 6–7, **Greater Jacksonville Amateur Radio & Computer Show**, Osborn Convention Center, Jacksonville, Florida. Contact Greater Jacksonville Hamfest Assn., P.O. Box 27033, Jacksonville, FL 32205 or call 904-350-9193. (Exams.)

Aug. 7, **Skyview Radio Society Swap-n-Shop/Hamfest**, club grounds, Turkey Ridge Road, Upper Burrell (New Kensington), Pennsylvania. Contact Michael Peltz, N3MRU, 11 Manorfield Drive, Delmont, PA 15626 (412-468-8699).

Aug. 7, **Hamfesters' 60th Annual Hamfest and Computer Festival**, Will County Fairgrounds, Peotone, Illinois. Contact David F. Brasel, NF9N, 708-448-0580. (Handicapped accessible.)

Aug. 7, **WECA Summerfest 1994**, Westchester County Center, Junction of Route 119 and Bronx River Parkway, New York. Contact Jeanne Raffaelli at 914-962-9666. (Exams.)

Aug. 7, **Wellesley ARS & Babson Wireless Club Flea Market**, Trim Hall College, Wellesley, Massachusetts. Contact Barbara Holdridge, N1ICQ, 107 Church Street, Westwood, MA 02090 (617-329-2628) for tables; contact Gerry Driscoll, NV1T, 107 Church Street, Westwood, MA 02090 (617-444-2686) for exam information. (Exams.)

Aug. 7, **The Mid-Atlantic ARC Hamfest**, Bucks County Drive-In, Warrington, Pennsylvania. Contact MARC, P.O. Box 352, Villanova, PA 19085, or call Bob Josuweit, WA3PZO, 215-624-4034.

Aug. 7, **Hamnic** (Marshfield ARS 3rd Annual Picnic), Wildwood Park, Marshfield, Wisconsin. Contact Guy A. Boucher, KB9GPJ, 107 West Third Street, Marshfield, WI 54449 (phone 715-384-4323; packet KB9GPJ @ W9IHW.WI.USA.NA).

Aug. 13, **Ham Radio and Computer Swapfest 1994**, Eagles Alps Lodge, Quincy, Illinois. Contact Rod Simon, N9MCX, c/o WIARC, P.O. Box 3132, Quincy, IL 62305-3132 (217-223-8739).

Aug. 13, **Tacoma Fleamarket**, Charles Wright Academy, Tacoma, Washington. Contact Alan Allen, N7EAY, P.O. Box 11188, Tacoma, WA 98411 (206-475-7413). (Exams.)

Aug. 13, **Reno Hamfest**, Stead facility, end of Mt. Anderson, 10 miles north of Reno, Nevada, on Hwy 395 North. Contact Bob Davis, KG7IY, 3775 Sleepy Hollow Dr., Reno, NV 89502 (home 702-856-2826; office 702-329-2833). (Exams, preregistration requested to KG7IY.)

Aug. 13–14, **BARC 42nd International Hamfest '94**, Old Lantern Campgrounds, Charlotte, Vermont. Contact Duane Waller, N1BBR, at 802-877-2819. (Exams.)

Aug. 13–14, **Shreveport ARA Hamfest**, Bossier City Civic Center, Bossier City, Louisiana. Contact Alice B. Prudhomme, KG5ZZ, Rt. 1, Box 410, Mansfield, LA 71052 (318-872-5988 after 6 PM). (Exams.)

Aug. 14, **Charlotte ARC Hamfest and Computer Fair**, Roll-A-Round Skate Center, Charlotte, North Carolina. Call 704-522-4971 ext. 3330 or send SASE to Charlotte ARC, P.O. Box 33582, Charlotte, NC 28233-3582.

Aug. 14, **Delaware-Lehigh ARC Annual Hamfest and Computers**, Career Institute of Technology, Easton, Pennsylvania. Contact Bill Goodman, K3ANS at 610-253-2745 (office), 610-258-5060 (home), or DLARC answering service at 610-820-9110. (Handicapped accessible; exams.)

Aug. 14, **Paulding County Amateur Radio Group 4th Annual Hamfest**, Paulding County Fairgrounds, Paulding, Ohio. For information, call or write PCARG Inc., KB8MAF, 14043 CR 111, Paulding, OH 45879 (1-419-399-3641). (Exams, call or send SASE to Bob High, 12838 Tomlimson Rd., Rockford, OH 45882; call 1-419-795-5763.)

Aug. 20, **The Duke City Hamfest**, New Mexico Army National Guard Armory, Albuquerque, New Mexico. SASE to P.O. Box 6552, Albuquerque, NM 87197-6552. (Exam info Bob Witter 505-292-3218.)

Aug. 19–21, **1994 ARRL National Digital Communications Conference**, Thunderbird Hotel and Conference Center, Bloomington, Minnesota. Contact Paul Ramey at the NDCC Info Line, 612-432-1149 (eves. or wkends) or Carl Estey via Internet e-mail at estey@skyler.mavd.honeywell.com.

Aug. 20, **LCARA 3rd Annual Ham Radio, Computer, & Electronic Swap Meet**, Cowlitz County Fairgrounds, Longview, Washington. Call 206-425-6076, 206-425-9184, or 206-425-1866.

Aug. 20–21, **The 1994 Huntsville Hamfest**, Von Braun Civic Center, Huntsville, Alabama. Contact Huntsville Hamfest, P.O. Box 12534, Huntsville, AL 35815 (205-534-7175).

Aug. 21, **Delmarva Hamfest**, Delaware Technical & Community College, Georgetown, Delaware. Contact Bill Hammond, N3IOD, 302-539-5780.

Aug. 21, **The Warren ARA 1994 Hamfest**, Trumbull Branch Campus of Kent State University, Warren, Ohio. Contact Al VanSlyke, N8IKX, Warren ARA Hamfest, P.O. Box 809, Warren, OH 44482 (216-889-3378). (Exams.)

Aug. 21, **Union County ARC 18th Annual Hamfest**, Union County Fairgrounds, near Columbus, Ohio. Contact Gene Moore, N8YRF, at 24461 Claibourne Road, Marysville, OH 43040 (513-246-5943).

Aug. 21, **MIT & Harvard Clubs Fleamarket**, Cambridge, Massachusetts. Call 617-253-3776.

Aug. 21, **6th Annual CIDX International Radio Festival**, Montreal, Canada. Contact Sheldon Harvey, 79 Kipps St., Greenfield Park, Quebec, Canada J4V 3B1 (514-462-1459).

Aug. 26–28, **The 1994 ARRL Southwestern Div. Convention**, Town and Country Convention Center, San Diego, California. Call 619-278-4284. (Exams.)

Aug. 27, **Chanute Area ARC Hamfest**, National Guard Armory, Chanute, Kansas. Contact Paul, NØNBD, and Sarah, NØTKO, Smith, Route 1, Box 208, Humboldt, KS 66748 (316-473-2873). (Exams.)

Aug. 27, **Lake of the Woods Repeater Assn., Inc. 8th Annual Hamfest**, Roseau High School Gym, Roseau, Minnesota. Contact Don Rose, NØKSS, LOWRA Chairman, Route 1, Box 110, Roseau, MN 56751 (218-463-1002); or David Landby, KBØHAP, Reservation Chairman, Route 3, Box 10, Warroad, MN 56763 (218-386-1092). (Exams.)

Aug. 27, **SCARS Hamfest**, Somerset County 4H Center, Bridgewater, New Jersey. Contact Donna/George at 908-369-4533; or write to SCARS, P.O. Box 742, Manville, NJ 08835.

Aug. 27, **Pioneer Radio Operators Society 3rd Annual Chaffee Hamfest and Computer Show**, Manion Park, Chaffee, New York. Contact Paul Sumski, KA2ZMC, P.O. Box 334, Arcade, NY 14009 (716-492-3198).

Aug. 27, **1994 Northwoods Swapfest**, Sugar Camp Town Hall, 13 miles north of Rhinelander, Wisconsin. Contact Mary Berger, NS9Q, 367 Lois Street, Rhinelander, WI 54501 (715-362-9296). (Exams.)

Aug. 28, **Tri-State ARC Hamfest**, Hunts Best Western Pavillion, Matamoras, Pennsylvania. Contact Paul, KD3L, 717-491-4808 after 1 PM, or Ray, WY2D, 914-856-1733 after 6 PM; or Bob, N3NPT, at 717-296-4551.

Aug. 28, **St. Charles ARC Hamfest '94**, Blanchette Park, St. Charles, Missouri. Contact Scott Schultz, NØUVM, 241 Burning Leaf Drive, St. Peters, MO 63376 (314-928-7267). (Handicapped accessible; exams.)

Aug. 28, **Tri-County Radio Group, Inc. Hamfest and Computer Show**, McHenry County Fairgrounds, Woodstock, Illinois. For information or reservations, write to TCRG, P.O. Box 3107, Skokie, IL 60076-6107, or call Robert, N9KXG, 708-658-1678.

Aug. 28, **Short Mountain Repeater Club Hamfest**, Cedars of Lebanon State Park, Tennessee. Contact Mary Alice Fanning, KA4GSB, 4936 Danby Drive, Nashville, TN 37211 (615-832-3215).

Aug. 28, **Yonkers ARC Hamfest/Computerfest**, Yonkers Municipal Parking Garage, Yonkers, New York. Contact YARC, P.O. Box 378, Centuck Sta., Yonkers, NY 10710-0378 (call Jim, 914-969-5182; or John, 914-963-1021).

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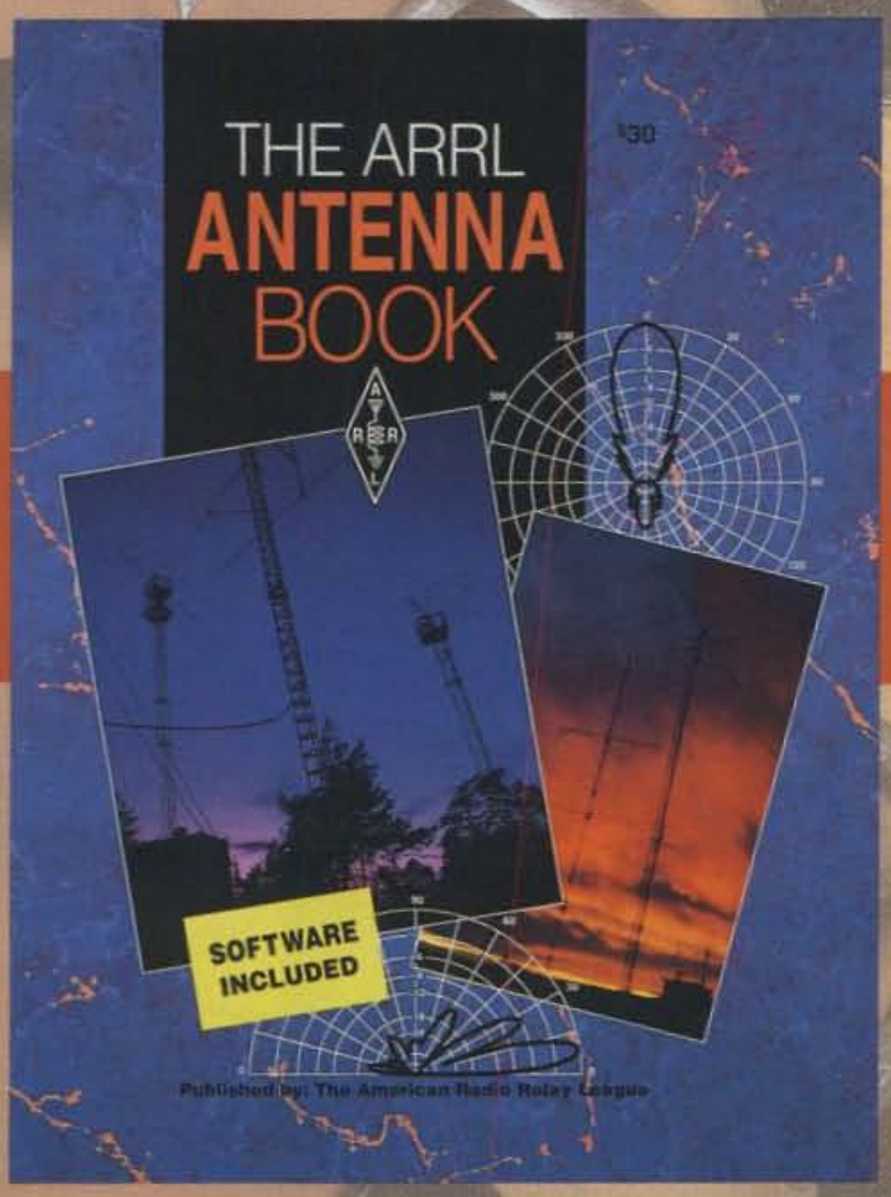

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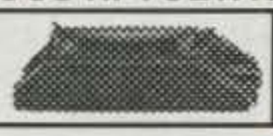

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ROSS'$$$$ NEW August (ONLY) SPECIALS: Save time and money. Have model number and manufacturer ready when you call or write. KENWOOD IF-10A $69.50, PB-12 $50.00, TH-41BT $220.00, TH-205AT $250.00. MFJ 1228 $44.90, 1229 $129.90, 840 $16.00, 815B $50.00. ALINCO CALL. YAESU CALL. ICOM AG-35 $130.00, 707 $800.00, AG-1 $80.00, BC-50 $35.00, 04AT $250.00, BP-70 $52.00. CALL- BOOK outdated $15.00, supplement $4.50. BENCHER CALL. BUTTERNUT CALL. CUSHCRAFT R-7 $342.50, CALL FOR MORE. TELEX HY-GAIN T2X $360.00, CD-45II $225.00. RFCONCEPTS CALL. MIRAGE CALL. LARSEN CALL. LIMITED TIME OFFERS. Looking for something not listed or hard to find? Call or write. Over 9000 ham-related items in stock for immediate shipment. Mention ad. Prices cash, F.O.B. Preston. Hours Tuesday–Friday 9:00 to 6:00, 9:00 to 2:00 P.M. Mondays. Closed Saturday & Sunday. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

QSL SALE! 100/$8, 300/$14, 500/$20, 1000/$28, 1500/$38, 2000/$48. Many designs! 1994 Callbooks $25.95, includes 100 free Eyeball QSO cards. Free shipping! Phone or write for free samples or ordering. Shell Printing, KD9KW, Box 50, Rockton, IL 61072. Call 815-629-2193, anytime.

KIT BUILDERS: NEW, SYNTHESIZED QRP Transmitter/Transceiver, the ARK4. Full Transceiver Kit w/case only $199.95. One board, no wiring, top-quality components & PCB. GUARANTEED TO WORK. For info send **SASE**. Call/write to order: S & S Engineering, 14102 Brown Road, Smithsburg, MD 21783 (301-416-0661).

UNUSED KENWOOD For Sale. TS940S, SP940, MC60A. Jason, W4DXE, 203-438-8134.

ASTROLOGER-HAM wants mail QSOs with like-minded amateurs. Zak, KI7XG, General Delivery, Wolf Creek, OR 97497.

KEYS, BUGS, SOUNDERS, Relays, Paper, Parts, Meters, Testers, Spark Coils, etc. 15 pages, refundable, $2.00 plus 2 stamps. Dr. Jacobs, 60 Seaview Terrace, Northport, NY 11768.

WANTED: KENWOOD TS130, TS430, TS440, TS930 with ant. tuner, or **DRAKE** TR7 ant. **CUSHCRAFT** TR5, TR7, **MOSLEY** TA33. Info to P.O. Box 421723, S.F., CA 94142.

WANTED: Clapp Eastham Morse key and any info on British Air Ministry Key Type B1 Ref. No. 10F/7839. Dave Johnson, NF5B, 15514 Ensenada Dr., Houston, TX 77083 (713-498-8945).

WANTED: X-band radar/microwave equip. Complete/incomplete, civilian, military, parts test equip., TM's, etc. SHF, Box 10215, Pittsburgh, PA 15232-0215.

TRANSCEIVERS: Kenwood TS520S $375, TS530S $500, TS820S $475, TS830S $600. Yaesu FT101E $375. K1BW, 508-537-7195.

Advertiser's Index

(continued on page 147)

QSL SAMPLES: 50 cents. Samcards, 48 Monte Carlo Drive, Pittsburgh, PA 15239.

R-390A SALES – SERVICE – PARTS: Info SASE to Miltronix, P.O. Box 3541, Toledo, OH 43608.

TRADE: Broke and out of work. Trade Kantronics KPC-2 and KPC-4 for All-mode TNC. W7LHO, P.O. Box 1267, Bayfield, CO 81122.

1994 DX BLUE BOOK. Newest Prefix, Country, and 300 Pacific Islands listings. 10 fold-out Prefix Maps. 10-page easy-to-use Russian/English QSO dialogue. CQ/ITU zones, ITU times, DXCC status, QTH, QSL, third party & reciprocal operation info each Prefix. Much more! Large SASE info. $9.45 ppd. U.S. Optional 11" × 17" desk-top antenna headings. Amateur Radio DX Blue Book, 4920 Mayflower St., Cocoa, FL 32927 (407-632-6809).

PROGRAMMABLE COUNTER: Works with ANY VFO Rig! Get a digital display for your rig, 100 Hz resolution. You can read the tuned frequency directly, no need to calculate offsets. Counts to 40 MHz, up OR down. Counter Kit $69.95. Kit w/case $99.95. Assembled w/case $139.95. GUARANTEED TO WORK. For info send **SASE**. Call/write to order: S & S Engineering, 14102 Brown Road, Smithsburg, MD 21783 (301-416-0661).

FOR SALE: Yaesu G-800SDX rotator with 90 feet cable. Used only one month. Still under warranty, $300.00. Glenn Martin HB-18 hinged base plate for M-18 tower, $100.00. AP-18 Accessory Rotor Plate for M-18, $20.00. TB-25 ball thrust bearing, $35.00. H-6 Hazer unit for M-18 tower, $175.00. 5 foot aluminum mast 1.92 inch diameter, $20.00. Entire package, $550.00. Arnie Galina, P.O. Box 705, Randolph, MA 02368 (617-961-7767).

FOR SALE: FOREIGN Callbooks: URE (Spain) 1986; RSGB (England) 1989; CCCP (Russian) 1991. $12 each plus $3 shipping. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

TEXTBOOKS, RADIO, physics, ARRL, ham items, parts, test equip, art books. SASE lists. W4FXE (OK Callbook), 305-456-1349.

WANTED: ICOM 229A (not 229H). Leave message at 512-329-0639, or write N2UES, 5104 Cuesta Verde, Austin, TX 78746.

WANTED: Vibroplex Blue Racer or Lightning bug. Also would like booklet (or copy) for Instructograph. WEØQ, Paul Juen, POB 29, Vergas, MN 56587.

FOR SALE: Kenwood SM-220 Station Monitor with pan adapter, $220.00. Ask for Gary, N6BJF, 503-474-6466.

FOR SALE: AEA DSP-2232 with ver. 7.0 firmware, $600 OBO. Call 505-425-6066 from 1–5 PM MDT. NØAB, P.O. Box 710, Las Vegas, NM 87701.

WANTED: DX 300 or DX 600 Pride BY-Linear amplifiers in good condition, reasonably priced. Roy, 504-575-3100, after 6 PM.

GONSET COMM. II, textbooks, ham items, parts, test equip., art books, lists. SASE to Bill Tucker, W4FXE, (OK callbooks) 305-456-1349.

FOR SALE: Original Jack Benny Show program and matching script $100. Also want old microphones and parts, and old cat-whisker crystal set. Jim Lowe, W6JVK, 1521 Scenic Drive, Pasadena, CA 91103 (818-793-7374).

DJ-160 two-meter HT covers 130–174.995. Comes with one standard battery and two HD batteries and manual. Reason for selling: bought Alinco 580T. Price $150.00. Send for info to: P.O. Box 518, White House, FL 32220.

MERCHANT MARINERS WW II now have full Veteran's benefits. Details for a long SASE to: Merchant Mariners WW II, 14 Castle Drive, Chestnut Ridge, NY 10977.

WANTED: Collins Equipment. I am interested in buying the following Collins models: KWM-2A transceiver, 51S-1 receiver and 32S-3C receiver. If you have one and would like to sell it, please contact KD4AJ @ 1968 Huntington Hall Court, Atlanta, GA 30338. State price, condition, and available accessories. All inquiries will be answered.

ALUMINUM TOP-MOUNT THRUST BEARING PLATE for Universal or Heights towers, pre-drilled for SC-4 thrust bearing, $5.00. Walt Grosch, KZ9F, 1735 Stoneway Ct., Richfield, WI 53076 (414-628-1558).

BUY: Ham equipment good/bad/basket-case, send SASE. SELL: Ham, SWL, VHF, UHF equipment, manual copies & parts. New list $1 and SASE. Joe Bedlovies, P.O. Box 139, Stratford, CT 06497.

Advertiser's Index *(cont'd)*

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IC-736
New HF Plus 6 Meters, 100W Transceiver

YAESU

FT-2400H
Mil-Spcd 2 Meter Mobile. Up To 50 Watts

YAESU

FRG-100B
50kHz-30MHz Receiver With 50 Memories and New Broadcast Band Mode

YAESU

FT-1000D
Premium HF Transceiver In A Class By Itself

TM-733A
2 Meter/70cm Mobile 50W/35W output. Detachable Front Panel

NEW

IC-820H
2 Meter/440MHz All Mode Transceiver

FT-2200
2 Meter Mobile. Compact Size With 3 Power Levels

FT-416
2M/440MHz Handheld 41 Memories, CTCSS En/Decode Built-In. Multiple Power Levels

FT-990
100 Watt HF Transceiver With General Coverage Receiver

TM-241A
Easy To Use 2 Meter FM Mobile With Models For 440MHz and 1200MHz

NEW

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2 Meter Mobile

FT-5100
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FT-11R
2 Meter, FM Handheld. World's Smallest Size HT With Full Sized Keyboard

FT-890AT
100 Watt HF Transceiver With Dual VFO's

SALE

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Slim, Compact, Lightweight 2 Meter Handheld Plenty Of Power, Multiple Scan Functions

SALE

IC-2GXAT
2 Meter Handheld With Up To 7 Watts Output

FT-5200
Dual Band Mobile With Snap-Off Front Panel

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Medium, Medium Heavy, Heavy Duty And Azimuth-Elev.

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ARX2B	$ 49.95
AR270	$ 59.95
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ARX270	$184.95
A148-3	$ 34.95
A148-10	$ 57.95
A449-11	$ 59.95
A50-5	$124.95

MFJ

1270C	$110
1276	$139
1278B	$259
1704	$ 54
1786	$214
1796	$169
1798	$229
411	$ 66
284, 5, 6, 7	$ 22
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259	$189
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986	$239
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IC-820H FEATURES:

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- ☐ New Modulation Limiter Circuit
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- ☐ Noise Blanker
- ☐ RIT Function
- ☐ Memory Allocation Function
- ☐ Attenuator
- ☐ Programmed/Memory/Mode Select Scan
- ☐ CW Semi-Break In and Side Tone
- ☐ AF Speech Compressor (audio)
- ☐ Auto Repeater and One-Touch Functions
- ☐ Separate Main and CW Filters
- ☐ CW Narrow Filter (optional)
- ☐ Tone Scan (optional)
- ☐ 45 W (FM, CW), 35/6 W (SSB) VHF
- ☐ 40 W (FM, CW), 30/6 W (SSB) UHF

IC-820H 2 M/440 MHZ Dual Band All Mode Transceiver

The IC-820H isn't your typical base station transceiver. This all mode dual bander has compact and lightweight dimensions offering operating versatility other base stations just can't match. Mobile and field operations are ideal with this rig. But don't let its size fool you. This is a high performance transceiver with state-of-the-art construction, circuit design and cutting edge features.

ICOM's **Newly Designed I-loop DDS** (digital direct synthesizer) is employed in the PLL circuit of the IC-820H. Previous PLL circuits for 10 Hz resolution transceivers contained 2-loop circuits. The new I-loop has a single loop and **Generates a Signal with Superior 1 Hz Resolution**. ICOM's DDS PLL also contains a normal PLL as the main-loop and a DDS as the sub-loop.

Satellite operation with the IC-820H's **Built-In Satellite Functions** has never been this easy. These include **Normal and Reverse Tracking** for different modes of satellite communications; **Independent Uplink/Downlink Control** for Doppler shift compensation; **Separate Satellite VFO** and **10 Dedicated Satellite Memories** provide quick switching from normal to satellite operation as well as easy recall of satellite and downlink frequencies.

With **Independent Controls and Indications for Both Bands**, this dual bander is as easy to operate as most single band transceivers – and exchanging the main and sub bands is just a switch away. In addition, while simultaneously receiving signals on each band, **Separate S-Meters** indicate their respective signal strengths.

The **Sub Tuning Function** can be assigned to the **RIT** or **SHIFT** control and allows you to tune automatically at variable tuning speeds. This is especially useful when searching for signals over a wide frequency range – eliminating the need for excessive rotations of the main dial.

The IC-820H's **Compact Size** enables easy installation in a shack as well as a vehicle. Overall dimensions may be small, but important points such as LCD size and space between switches are more than adequate.

An important consideration in all mode transceivers is the interference reduction circuit. The IC-820H's **IF Shift Circuit** shifts the center frequency of the receiver passband electronically to evade interfering signals.

The IC-820H's **DATA Terminal** (in ACC socket) is connected to its modulator circuit directly. This **Data Jack supports Packet Operation** at up to **9600 bps** A newly designed **Modulation Limiter Circuit** is employed in the modulator circuit to prevent you from exceeding the maximum deviation – even with large amounts of data.

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4J1FS M-V Island
Northwest Russia, 1989
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Soviet-USA DX-pedition

ZA1A IARU Albania Project, 1991 Re-birth of amateur radio in The Most Wanted Country

World's First DX-

9MØS Spratly Island DX-pedition, 1993
DX excitement in the South China Sea

As dawn's faint pink tinge topped snowcapped K2, I pulled the collar of my parka snug around my neck against the chill of the makeshift room, adjusted my headphones, and took a sip from the steaming mug beside my key. Pausing for a moment, I considered the glowing FT-1000 in front of me. My stomach jumped in anticipation as I leaned forward and made my first call.

"CQ, CQ, CQ,
this is AP2XX Portable on K2,
Himalaya DX-pedition listening
200 to 205, QRZ?"

FT-1000

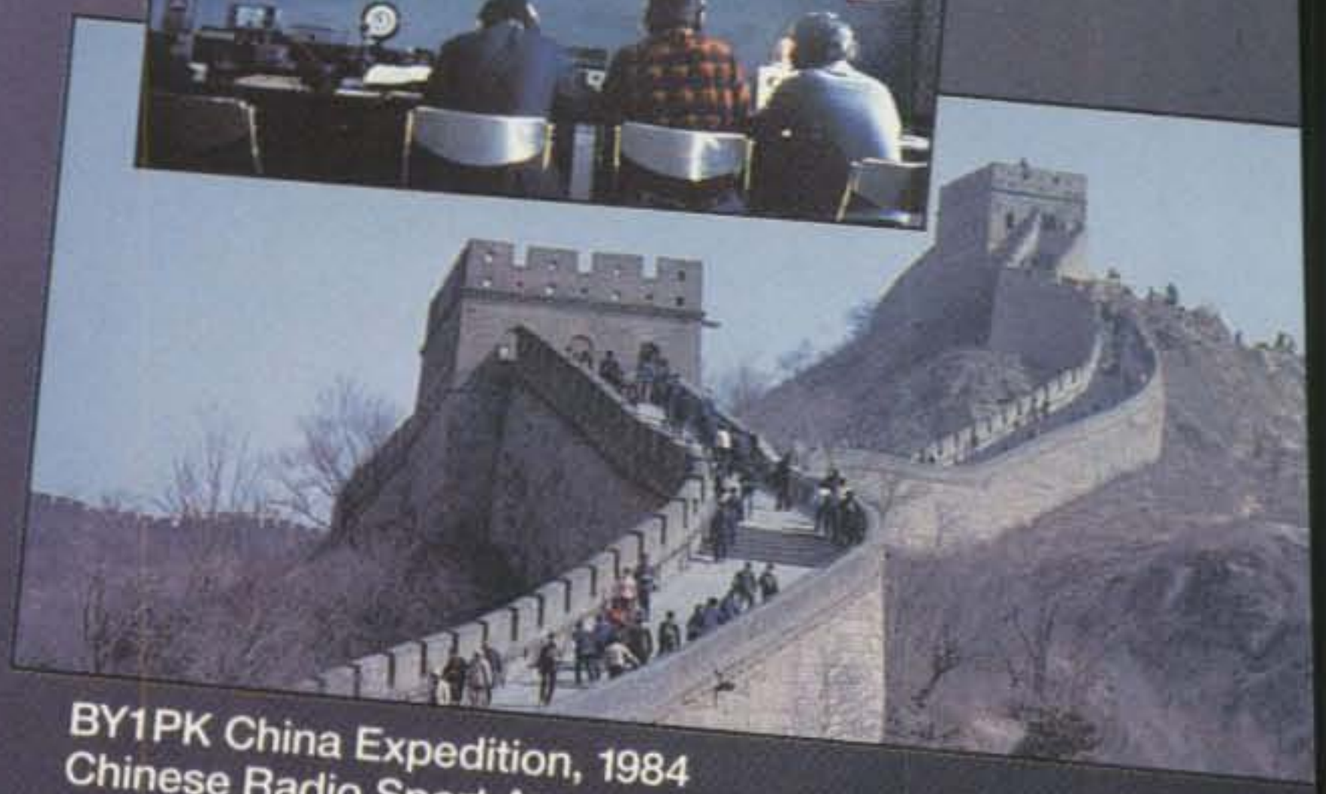
FT-990

FT-890

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

peditions demand Yaesu.

pedition Cruise, 1993 Yaesu DX-Caribe Cruise '93



BY1PK China Expedition, 1984
Chinese Radio Sport Assoc. Training Program

The band erupted before my eyes and ears. Fragments of calls. Jumbled voices. Numbers and letters from an unseen choir. Poised, I took a deep breath and jabbed PTT.

"Kilo Bravo 6 Yankee Zulu Delta, you're five-nine, QSL?"

Back came the crystal clear voice from on far.

"Roger, Roger, you're fifty-nine, thanks for the New One!'

I relaxed. The band was mine.

Nothing compares with that first moment – and nothing compares with Yaesu HF equipment for making each DX-pedition day the most memorable of your life. Demand Yaesu HF – the choice of the world's greatest DX-peditions. No matter which side of the pile-up you're on.

XYØRR Myanmar (Burma) DX-pedition, 1991
"CQ DX" from the "Golden Triangle"

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Performance without compromise.℠

FT-840

FT-736R

FT-11R/41R
2m/70cm Handhelds

- **Frequency Coverage:**
  Wide Receiver Coverage:
  FT-11: 110-180 MHz RX,
  144-148 MHz TX
  FT-41: 430-450 MHz RX/TX
- Selectable Alpha Numeric Display
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- Up/Down Volume/Squelch Controls
- Built-in DTMF Paging/Coded Squelch
- Automatic Power Off (APO)
- **Accessories:**
  FNB-31 4.8V, 600 mAh Battery
  FNB-33 4.8V, 1200 mAh Battery
  FNB-38 9.6V, 600 mAh Battery
  FBA-14 6 AA Size Battery Case
  FTS-26 CTCSS Decode Unit
  NC-50 Dual Slot 1-Hour Desk Charger
  CA-10 Charge Adapter (required w/ NC-50)

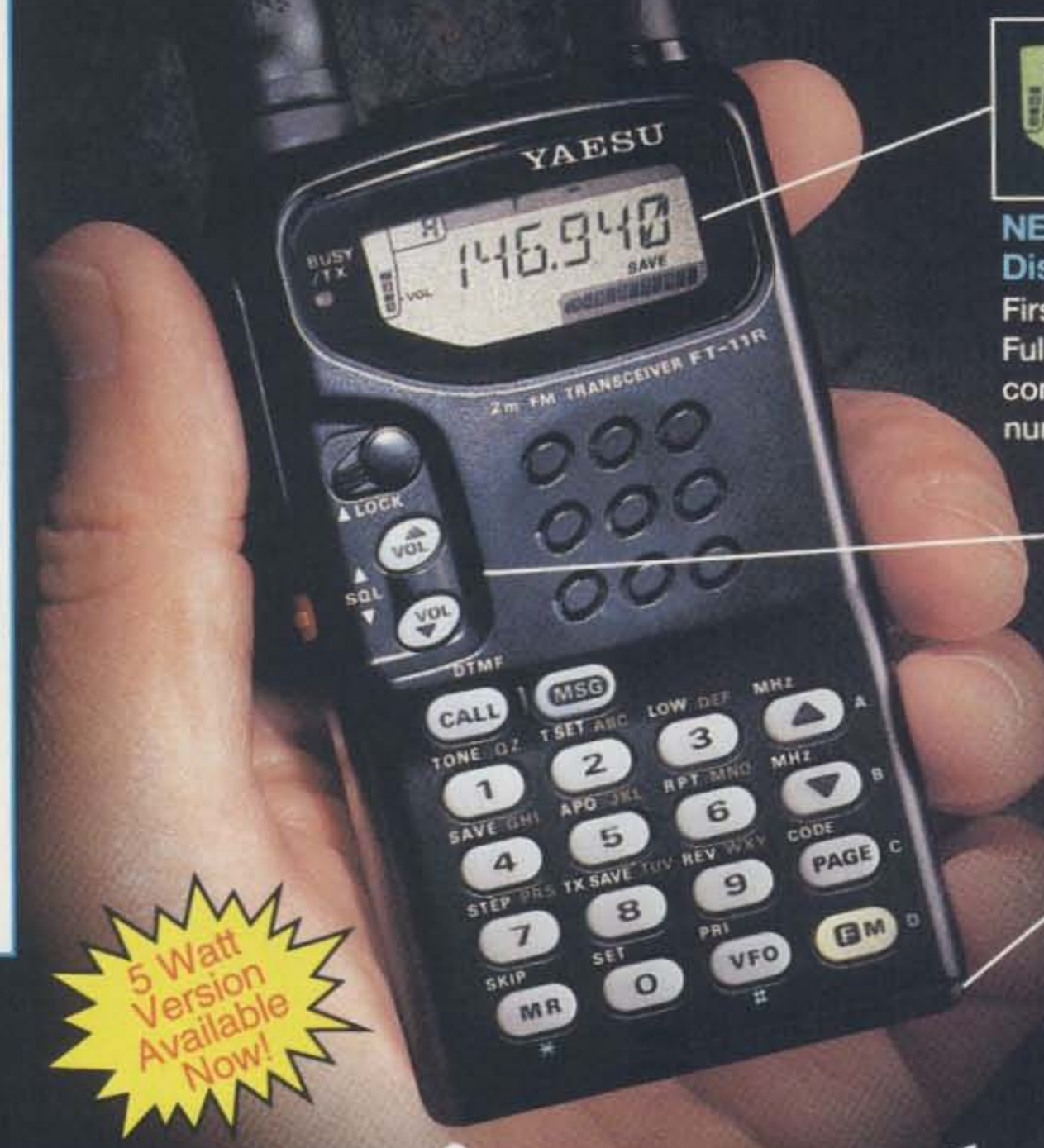
*FT-11 Only.
FT-41, 3.5 Watts

"Look, alphanumeric display and a 4.8V battery. Terrific!"

"Small and thin – with a full sized keypad! How'd they do that?"

"Yaesu did it again!"

NEW!



NEW Alphanumeric Display
First time for Yaesu HT Full function LCD combines letters and numbers.

NEW Up/Down Thumb Control
with Volume and Squelch Bar Graph. No other radio has this. Back lit, too!

NEW Compact Battery Design
4.8V gets you 1.5 Watts. A first for amateur radio.

5 Watt Version Available Now!

Get a grip on this!

World's smallest size HT with a full sized keypad
Measures only: 4"H x 2¼"W x 1"D

"Small" is relative, isn't it? It could mean size – which in this case it does. And, it could mean "reduced", which it doesn't! Nothing missing from the hot new FT-11R HT from Yaesu except bulk! You're going to wonder just how all the features of this full-function radio fit in. Until you remember Yaesu pioneered 2-way radio micro technology.

To see what this really means to you, check out all the new features. Like the alphanumeric display. This Yaesu HT first, lets you tag your favorite frequency by name, call sign or number. Or, the new "voltage stingy" battery. It's an industry first for amateur radio. Smaller and compact, the 4.8V battery gives you 1.5 watts on TX. And, if that's not enough, there's an optional drop in, dash mount battery charger.

You see it's not a small time performer. Just small sized. The FT-11R. Another small example of Yaesu superiority. See your dealer today!

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