

Amateur Radio

SERVING AMATEUR RADIO SINCE 1945
APRIL 1994

CQ

1945 *Our 50th Year* 1994

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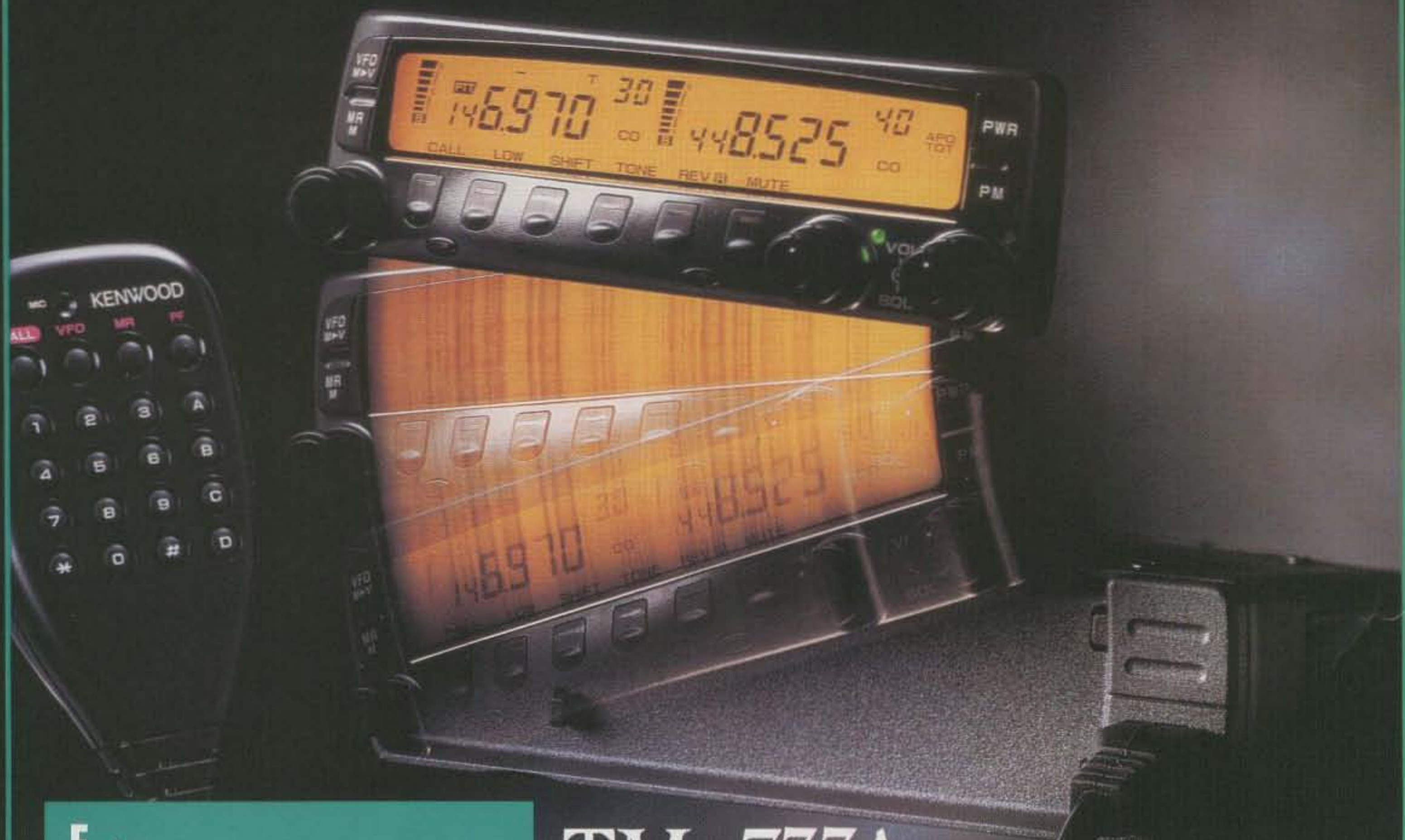
On the cover: Dale Hoppe, K6UA, Fallbrook, CA

THE RADIO AMATEUR'S JOURNAL



74820 08241

Kenwood's TM-733A - Faster and Faster!



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

TM-733A
FM DUAL BANDER

1200
9600
public compatible

Theft Deterrent
Faceplate

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.

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

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

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745
KENWOOD ELECTRONICS CANADA INC.
6070 Kestrel Road, Mississauga, Ontario L5T 1S8

KENWOOD

Kenwood's TS-50S: Awesome HF Versatility



TS-50S HF TRANSCEIVER

For the Amateur Radio enthusiast, going "beyond bounds" is what it's all about. That's why Kenwood created the TS-50S, the world's smallest and smartest HF transceiver. The choice is yours: you can mount it in a vehicle, take it on a DX-pedition, or even install it permanently as a base station transceiver. Yet despite its size, the TS-50S provides a maximum output of 100W and the sort of sophisticated features normally found only inside a shack. Take for example the 100 memory channels for independent storage of transmit/receive parameters, the microprocessor-controlled DDS with innovative "fuzzy" control, and Kenwood's own AIP for superior dynamic range. There's also a powerful menu system, IF shift and CW reverse mode for interference reduction, TF-SET, and a noise blanker--plus everything you need for split-frequency operations. So, if you want HF operation beyond bounds, check out the TS-50S at your favorite authorized Kenwood Amateur Radio Dealer today!

Features

- 500kHz-30MHz general coverage receiver
- DDS (Direct Digital Synthesizer) with fuzzy logic control
- Large LCD panel with digital bar meter
- Auto-mode capability
- Menu system
- AIP (Advanced Intercept Point)
- Switchable AGC Circuit (SLOW/FAST)
- All-mode squelch
- CW reverse mode
- Full break-in and semi break-in
- 20dB attenuator
- Multi-function microphone supplied
- RF output power control (100W, 50W, 10W)
- Optional 500Hz CW filter (YK-107C)
- Optional external antenna tuner(AT-50)
- Optional computer interface (IF-10D)

Kenwood's TM-251A/451A/551A Shift into Overdrive!



TM-251A/451A/551A FM MOBILE TRANSCEIVERS

9600
bps
packet
communications

When the going gets rough, Kenwood's mobile FM transceivers show their stuff. For a winning combination of performance and operating ease, nothing beats the TM-251A (144MHz), TM-451A (440MHz), and TM-551A (1200MHz). Despite being single-banders, they have a dual-band receive capability, allowing full-duplex cross-band communications using split-memory channels (TM-251A ↔ TM-451A). Each transceiver is equipped with 41 memory channels (expandable to 200 with the ME-1 option), a digital recording system for messages (max. 16 secs), a dual-menu system, and a 6-pin mini DIN connector for 1200/9600bps packet communications. Built-in DTSS allows 3-digit DTMF selective calling access, and the page function alerts you to incoming calls. There's also a large multi-function LCD with 3 different display modes, as well as a multi-function microphone with 4 programmable keys and 16 DTMF keys. So if you want pole position, choose Kenwood.



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

Features

- Max. 50W output (TM-251A), 35W (TM-451A), 10W (TM-551A)
- 41 memory channels (up to 200 with ME-1 option)
- Dual-menu system ■ DTSS with page ■ S-meter squelch
- Built-in digital recording system
- 6-pin mini DIN connector (1200/9600bps packet)
- Multi-function microphone with DTMF (supplied)
- Fuzzy logic control for tuning
- Selectable frequency step (5, 10, 12.5, 15, 20 or 25kHz)
- Channel number display ■ Auto-lock tuning (TM-551A)
- Band scan, program scan, memory scan, call scan
- Time Operated and Carrier Operated scan stop modes
- Cross-band repeater functions
TM-251A — TX: 144MHz band, RX: 440MHz band
TM-451A — TX: 440MHz band, RX: 144MHz band
- Auto repeater offset (TM-251A)
- 10 DTMF memory (15 digits)
- Built-in CTCSS encoder and optional TSU-8 decoder
- 5-step dimmer control
- 3-position RF output power control (TM-251A: 50W, 10W, 5W; TM-451A: 35W, 10W, 5W)
- Auto power-off (OFF, 60, 120, 180 min.) ■ Time-out timer (OFF, 3, 5, 10, 20, 30 min.) ■ Wireless clone function

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P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745
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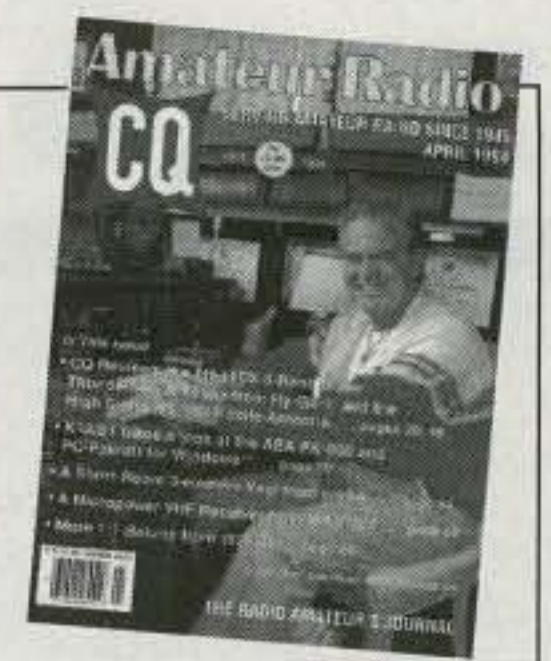
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The Radio Amateur's Journal



ON THE COVER: Here's Dale Hoppe, **K6UA**, at his Fallbrook, CA QTH. Dale has dabbled in a contest or two over the years, and has even come out in the winner's box from time to time. (Photo by Larry Mulvehill, **WB2ZPI**)

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It's time! It's time to dig back in your dresser to find that old sock in which you have been squirreling away a few bucks at a time. Air out those dollars, along with those rolls of change you've kept in the basement. "Why?" you may ask. If you have to ask, you obviously haven't looked at the calendar. It's that time of year again whereby a peculiar and singular synapse in most amateurs' brains triggers the response to head towards Dayton, Ohio. Most of us don't make it, but the lucky ones who do have stories to tell for years and years to come.

Amateur radio is a wonderful hobby, and Dayton is a wonderful experience. Both have a tertiary connection to real life behind family and earning a living. However, to paraphrase the Declaration of Independence, they both offer the self-evident truth that we have the unalienable right to partake of amateur radio and Dayton in the Pursuit of Happiness. The important part, though, is that it's not a guarantee that we'll find it—only that we have the right to chase after it. We all know a few amateurs who'd rather find misery than happiness. Maybe that's their definition of happiness.

As for me, I already have my shopping list in order, and I for one intend to have a good time. I intend to see a lot of folks whom I don't normally get a chance to see, check out stuff I've only seen pictures of, and rummage through a flea-market that has for the past 30-plus years yielded the most spectacular treasures calling to me to take them home. Is there a down side to any hamfest? Sure. But if a few weeks later you ask me what it was, I'd be hard pressed to tell you. Generally, I try to remember what I went there for. First and foremost, it's to display CQ and our amateur radio products. Second, it's a chance for people to see us and let us know what they think about what we're doing. Third, it's the opportunity for us as amateurs to enjoy what the rest of you go there for—the exhibits, the seminars, and of course the fleamarket. In spite of some of the people who manage some of the shows, just about every hamfest, regardless of size, satisfies the above criteria.

So why is Dayton so special? Why do the Dayton regulars smile when they try to answer that question? What does it have that other hamfests don't have to make it so memorable? It has a lot to do with magnitude. When you're used to going to a hamfest that can fit in one large room (no matter how large) in a civic center or other building, that becomes your frame of reference. Dayton creates a sense of reverence and awe at the physical size and the realization of how much time it's going to take to see it all. It's learning to check the "map" in the hamfest pro-

gram to find out where you are and where you want to go. It's the dawning of the idea that there are far more activities and things to see and do than can comfortably be covered in three days. It's a quantum leap in the order of magnitude.

At first there is the euphoric feeling of what is about to be experienced, followed by slight anxiety when you realize you are not going to be able to do it all. Notice that I haven't mentioned any specific activity or exhibit area, or even the flea-market. It's that generalized sensation everyone gets regardless of one's specific interest or calling within amateur radio. In German, the word would be *zeitgeist*, or the overall spirit of this particular time and place. It's all here, and it's all happening now.

If you're looking for something less metaphysical and more specific, I don't think that it really has anything to do with the city of Dayton, or any of the efforts put forth by the various groups of club members managing the hamfest all these years. I don't know why it continues to grow each year in spite of the inconveniences of lousy food, inadequate parking, lack of local restaurants, jammed hotels booked and paid for a year in advance, isolated location, and whatever else you might want to complain about. Maybe—just maybe—amateurs don't go specifically to enjoy the amenities of the Dayton environs, but rather find something bigger and better than anything else they enjoy. Something else tells me that most amateurs who attend have no intention of working on their tan or hanging out at the pool sipping piña coladas.

Most hamfests share many of the same attributes as Dayton and are only limited or restricted by their size. We go to them hoping to see, to meet, to buy, to brag, to learn, and to have a good time with amateur radio. We all want to bring some treasure home, if only a memory. Most of us will try to wedge about 39 pounds of freshly garnered (must have) literature into our already over-stuffed suitcases for the trip home. The more serious among us will tempt the fates and try to get the most bizarre items on board as carry-on luggage, protesting that it's not dangerous and hardly weighs anything at all. In fact, if you drive to Dayton (or any other hamfest), you get to bring home bigger and better goodies for yourself and anything else your friends can stuff into your car.

That's what Dayton or any other hamfest is about. It's about allowing yourself to have a good time, enjoying the company of friends both old and new, and checking out all the electronic marvels that you simply need and must have. It doesn't do much to solve world problems, change politics, or end disease, poverty,

and hunger. Then again, however, neither does stamp collecting.

Writer's Cramp

I finally received enough cards to confirm 500 counties and arduously began filling out two copies of our USA-CA Record Book. My old red book was ripped, tattered, and held together with cellophane tape and staples. I eventually managed to transcribe the stuff from the red book, add some recent arrivals, and come up with two clean copies. I certainly have developed a new respect for all of you who did it before me. It's no mean task. I worked on it off and on for several weeks and finally sent off my book the end of February. It's now in the hands of Norm Van Raay, WA3RTY, our USA-CA Custodian, for his scrutiny. By the way, Norm asked me to remind those of you who are involved with award programs to send him copies of your rules and certificates for publication in his monthly column. My next challenge is to do the sort and paperwork for the IOTA Awards. I'll probably wait until summer for that. Chasing paper does become habit forming.

If you would like to work towards any of CQ's awards, send us an SASE (52¢ postage) and we'll send you a package of rules and applications for our various operating achievement awards. There's something there to interest everyone.

You Should Have, Could Have

Of course you worked 3YØPI. It seemed as if most of the world had a shot. The point to brag about these days is on how many bands and how many modes. The pile-ups weren't too bad and the operators handled themselves very professionally. At one point I heard the number of contacts made as 61,000, but I'm not sure as of this writing what the official total is. John Dorr, K1AR, tried to regale me with how many bands and modes he had worked them on (after a week or two of telling me that "I've got that" from a previous operation and how he didn't need them). I tend to disbelieve the multi-mode contacts on 1296, but if he wants me to believe it, I will. The information published in the bulletins was quite correct for a change, and they were right where they said they would be. The only question was one of picking the right time. Congratulations to the team for a fantastic effort to make all of us happy. In spite of adverse solar activity and storms, they went all out and succeeded in making a lot of us happy, including me. We've been promised the story, and we will get it to you as soon as possible.

73, Alan, K2EEK



Award Tracking is Elementary

Remove the mystery from QSO logging with AEA Log Windows™. This fully integrated, easy-to-use Windows program combines the functions of logging, rig control, and DX Cluster monitoring with award tracking and reporting.

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Connect with us

ANNOUNCEMENTS

*The following Special Events are scheduled for April:

N2DMZ, from commemoration of birth of founder of Arbor Day, J. Sterling Morton; Jefferson County ARC; 1400-2400Z April 22-23; in lower 25 Mhz of General 80, 40, 20, 15 meter CW and phone subbands, plus 14.060+/- for CW QRP. For QSL send SASE and QSL to John Wagner, N2DMZ, 20 Robert St., Adams, NY 13605.

WA3BAT, from 96th anniversary of Admiral Dewey's triumph over Spanish fleet at Battle of Manila Bay; Olympia ARC; 1300Z April 30 to 2000Z May 1; SSB/Phone 3.898, 7.268, 14.268, 21.368, 28.368, 145.270, packet. For certificate send QSL and 9 x 12 SASE to Olympia ARC, P.O. Box 928, Philadelphia, PA 19105.

KK4VN, from commemoration of ending of US Civil War, Appomattox Courthouse National Historic Park, Appomattox, Virginia; Southside ARA; 1400Z April 9 to 1400Z April 10; CW and SSB in Novice and General 40 and 20 meters. For QSL send SASE to KK4VN, Route 3, Box 221, Cumberland, VA 23040-9229.

AA4RI, from 100th anniversary of wireless and 120th anniversary of Marconi's birth, Sparks, Georgia (Cooks County); Middle Georgia Pro Ams; 2100Z April 22 to 1800Z April 24; CW, SSB, RTTY, lower 25 kHz of General bands (no 160 or WARC); For certificate send 9 x 12 SASE with QSL to Curtis Carter, 114 Belmont Drive, Warner Robins, GA 31088. (For DX stations not desiring a certificate, QSLs will go out via the bureau.)

WA4TGF, from 30th anniversary of Chesapeake Bridge Tunnel, Virginia Beach, Virginia; Virginia Beach ARC; 1400Z April 16 to 2000Z April 17; CW 10 kHz up from bottom of Novice subband; Phone 3.880, 7.280, 14.280, 21.280, 28.363, 146.550. For certificate send QSL and SASE to VRARC, P.O. Box 62003, Virginia Beach, VA 23462.

W4UCJ, from 73rd Annual Rose Festival, Thom-

asville, Georgia; Thomasville ARC; 1700-2300Z April 22, 1100-2000Z April 23; Novice 10 meter phone subband and lower portion of General 80, 40, 20, 15 meter phone and CW subbands. For certificate send 9 x 12 SASE to TARC/Rose Festival Station, P.O. Box 251, Thomasville, GA 31799.

W5OK, from 70th anniversary of Tulsa, Oklahoma ARC; 1800Z April 2 to 1800Z April 3; Phone lower 50 kHz of General 15, 20, 40, 80 meter subbands and Novice 10 meter subband, plus 2 meters; CW lower 25 kHz of General 20, 40, 80 meter subbands and Novice 15 meter subband. For certificate send QSL and 9 x 12 SASE to Tulsa ARC, P.O. Box 4283, Tulsa, OK 74159.

N5QWF, from Bay City, Texas Centennial; Matagorda County ARC; 0000-2400Z April 22-24; all bands and all modes. For QSL send SASE to N5QWF, 4404 Doris St., Bay City, TX 77414.

WB6DWY, from Valley of the Moon Hamfest, Sonoma, California; Valley of the Moon ARC; 1700-2400Z April 30; General phone portions of 10, 20, 40 meters. For certificate send SASE and QSL to VOMARC, 358 Patten St., Sonoma, CA 95476.

KC7MF, from commemoration of closing of all Titan 2 Missile sites in US, Green Valley, Arizona; 1600-2300Z April 9-10; Phone 3.860 (AM or SB), 7.230, 14.250, 21.330, 28.450 MHz; local repeater 145.290 MHz 9-600. For certificate send QSL and 8 x 12 SASE to GVARC, 601 N. La Canada, Green Valley, AZ 85614.

K17KU, from roll-out ceremonies for the Boeing 777 airplane, Everett, Washington; Boeing Employees AR Operators North Society; 1500Z April 9 to 0100Z April 10; lower portion General 40, 20, 15 meter subbands, Novice 10 meter subband and VHF 146.920 P1 123. For QSL send QSL with contact number to John Stilson, K17KU, 2505 South Wells Way, Camano Island, WA 98292.

W8BI/8, from Dayton HamVention fleamarket,

Dayton, Ohio; 1200-2200Z April 29, 1000-2100Z April 30, 1000-1600Z May 1; General and Novice phone and CW portions as band conditions dictate. For QSL send QSL and business-size SASE to W8BI/8, P.O. Box 44, Dayton, OH 45401. (Those who upgrade at a HamVention test session are especially invited to stop by and use their new privileges.)

KA9NLX, from 24th anniversary of Earth Day, Chicago, Illinois metropolitan area; US Environmental Protection Agency Region 5 ARC; 1200-1900L mainly weekends throughout April; lower portion General CW and phone subbands, CW in Novice portion 40/15 meters. QSL to John Paskevicz, KA9NLX, 1423 N. Ridge Ave., Arlington Heights, IL 60004.

WØBU, KØRW, WRØU, WKØI, WBØB, from 100th anniversary of Snake Alley, crookedest street in the world, Burlington, Iowa; students from James Madison Middle School; 1400-2400Z April 20-24; Phone 7.238, 14.263, 21.325, 28.303 MHz; CW 7.110, 10.108, 21.108 MHz, all +/-5 kHz. For certificate send 9 x 12 SASE to WØBU, P.O. Box 185, West Burlington, IA 52655-0185.

WØSHQ, from dedication of Church of Latter Day Saints temple in Independence, Missouri; Association of Saints Church Radio Amateurs; 1500Z April 10 to 0300Z April 11 and 1800-2200Z April 11-16; on 14.285 and Novice 10 meter subband. For QSL send SASE and QSL to WØSHQ, P.O. Box 73, Independence, MO 64051-0073.

*The following hamfests are slated for April:

Apr. 2, **Southeast Connecticut Radio Amateur Mobile Society Ham Radio Auction**, Senior Citizens Center, Waterford Municipal Complex (Rt. 85, south of Exit 77 of I-395), Connecticut. Contact KA1BB at 203-739-8016. (Wheelchair accessible.)

Apr. 2, **Chesapeake Amateur Radio Service Springfest 94**, Virginia Beach Pavilion, Virginia.

(Continued on page 145)

“The best of the best for high-quality listening to news, music and entertainment from afar. Superb for reception of faint, tough signals.”

Editor's Choice
Passport to World Band Radio
Tabletop Receivers for 1992

“Overall, the Drake R8 is simply the best radio we have ever tested for quality listening to programs... There's nothing else quite like it.”

Lawrence Magne
Monitoring Times

“The R8 is like a breath of fresh air, with its ground-up engineering and up-to-date digital control from the front panel... a quality HF receiver of American manufacture that should successfully compete on the world market.”

Bill Clarke
73 Amateur Radio Today



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The world is an ever-changing place, but there is one thing you can rely on to remain the same...the Drake reputation for American-crafted, quality communications products and unsurpassed customer service. Now, the Drake R8 Worldband Communications Receiver has been heralded by the experts as “the best of the best,” delivering “unparalleled all-around listening performance” that is “right up there with the best for DXing.”

So if you want to keep up with a changing world, and you're not listening to a Drake R8, we'd like to suggest you make a change. Call 1-800-937-2530 today for more information about the R8, to find the dealer nearest you, or to order an R8 direct from the factory with a free 15-day trial period. If you're not impressed by Drake's quality, performance and ease of operation, all in a receiver costing less than \$1,000.00, return the R8 Receiver within 15 days, and we'll refund your money in full, less our original shipping charge.

The world is a big place. If you want to hear it all, listen to a Drake R8. If you're missing it, what in the world are you listening to?



R.L. Drake Company
P.O. Box 3006
Miamisburg, OH 45343
U.S.A.

DRAKE
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Key Bored?

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A4S

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

A3S

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

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

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

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

Heavy duty, high power trap coils.



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

ADD-ON KITS

Model	A743	A744	A103
Frequency, MHz	7 or 10	7 or 10	10

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The IC-Δ100H Takes The Magic Beyond 3 Wishes!

Exclusive Triple Band Capability

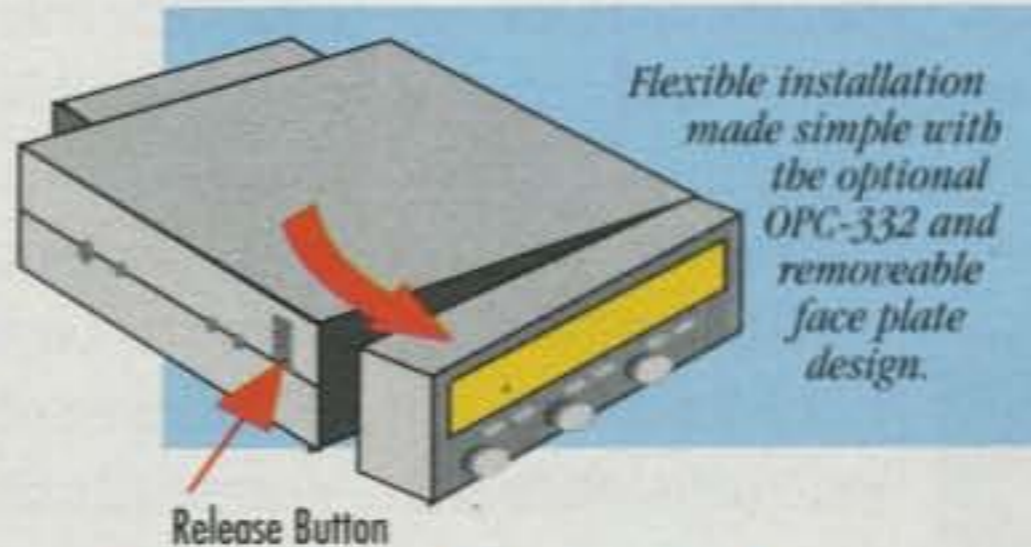
- ▲ Three independent band units for 2 M, 440 MHz and 1.2 GHz operation (simultaneous receive).
- ▲ Three independent displays can freely select the desired band unit.
- ▲ Each display indicates S/R/F, volume and squelch levels.
- ▲ Each display is controlled by a separate volume and tuning knob.
- ▲ Select from 3 external speaker jacks.

8 POSSIBLE COMBINATIONS!		
#1	#2	#3
2M	440 MHz	1.2 GHz
2M	440 MHz	440 MHz
2M	2M	1.2 GHz
2M	2M	440 MHz
440 MHz	440 MHz	1.2 GHz
440 MHz	440 MHz	440 MHz
440 MHz	2M	1.2 GHz
440 MHz	2M	440 MHz

More than a tri-band radio, the IC-Δ100H gives you true freedom of choice!

- ▲ No removal or installation of additional band units required.
- ▲ Each operating band has a separate antenna connector to enable duplex/triplexer use without any mismatching antenna loss (not one common antenna for multi-signal, one band operation like you see in competitive models).

- ▲ Cross band double duplex (transmit on one band while receiving on two others) and full crossband duplex (transmit on one band and receive on another) is possible. The one-touch PTT enables telephone-like conversations without having to continually press PTT.



Flexible installation made simple with the optional OPC-332 and removeable face plate design.

Remote Installation Options

- ▲ **One Body** – install as a complete unit.
- ▲ **Separate** – detach the front panel and mount each separately (see illustration).
- ▲ **Remote** – Mount the main body in the trunk (OPC-333 and OPC-335 req.).

Incredible Performance

- ▲ AFC-RIT, AFC-VXO, manual RIT and manual VXO modes to compensate for "off frequency" of the Tx station (1.2 GHz).
- ▲ High Sensitivity – less than .16μV.
- ▲ Double-conversion superhetrodyne receiver system.
- ▲ More than 2.4 W audio output power.

Memory Bank System

- ▲ 642 memory channels organized in two separate banks* (very convenient for two ham families).

MEMORY BANK SYSTEM							
Options	Bank/User #1			Bank/User #2			TOTAL
Bank	#1	#2	#3	#1	#2	#3	
Normal*	100	100	100	100	100	100	600
Scan Edge	6	6	6	6	6	6	36
Call	1	1	1	1	1	1	6
Total IC-Δ100H Memory Channels:							642

The memory bank system can even be customized for "bis" and "bers" operation!

- ▲ Priority Watch – Scans one (or more) memory channels per band while operating on a VFO frequency.
- ▲ Transfer call or memory channel contents to VFO. Particularly useful when searching for signals around a memory channel frequency and for recalling the offset frequency, tone frequency, etc.
- ▲ 14 DTMF autodial memories for autopatching, accessing repeaters and controlling other equipment, etc.

* Stores operating frequency, duplex direction, offset frequency, subaudible tone frequency, encode on/off, tone squelch on/off and skip information.

Microphone Remote Controls

- ▲ A multi-function keyboard with complete control over the IC-Δ100H.

- ▲ The beep tones for each band are different and distinguishable so you can keep your eyes on the road.

- ▲ Over 22 functions are at

your fingertips with the IC-Δ100's unique microphone keyboard (see chart above)!

You Can Control All Of These Functions From The Microphone Keyboard!

<input checked="" type="checkbox"/> Power On/Off	<input checked="" type="checkbox"/> Code Squelch
<input checked="" type="checkbox"/> Select Main Band	<input checked="" type="checkbox"/> Tone, Tone Squelch
<input checked="" type="checkbox"/> Change Operating Band	<input checked="" type="checkbox"/> Pocket Beep On/Off
<input checked="" type="checkbox"/> Volume Adjust	<input checked="" type="checkbox"/> AFC On/Off
<input checked="" type="checkbox"/> Squelch Adjust	<input checked="" type="checkbox"/> Attenuator On/Off
<input checked="" type="checkbox"/> Mode Select	<input checked="" type="checkbox"/> Set Mode
<input checked="" type="checkbox"/> Duplex Select	<input checked="" type="checkbox"/> DTMF Auto or Manual
<input checked="" type="checkbox"/> Frequency Select	<input checked="" type="checkbox"/> Operating Freq. Annce. (with opt. UT-66 synth.)
<input checked="" type="checkbox"/> Memory Channel Select	<input checked="" type="checkbox"/> Write VFO Contents to Memory or Call Channel
<input checked="" type="checkbox"/> Mute Bands	<input checked="" type="checkbox"/> Lock All Mic Keys or Keyboard Only
<input checked="" type="checkbox"/> Scan or Priority Watch	
<input checked="" type="checkbox"/> Pager On/Off	

Other Great Features

- External remote control via another transceiver (UT-55 required)
- Tri, dual or mono band operation
- Sub band access/mute/busy beep functions
- Optional pocket beep and tone squelch
- Opt. pager/code squelch
- Tone encoder built in
- Multiple scans

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IC-Δ100H Triple Band Mobile Transceiver (shown with the optional OPC-332)



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Books and Videos



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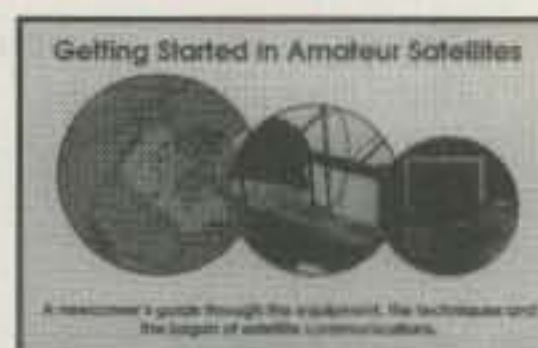


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This book is written by CQ columnist and Amateur Radio Packet authority Buck Rogers, K4ABT. An all new introduction and guide to packet operation, it is the perfect single source, whether you're an advanced user or just starting out. Learn about packet radio without all the technical jargon. Also included are detailed hookups for dozens of radio/packet controller/computer combinations, making this book the definitive resource for the active packet user.



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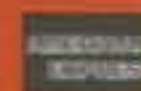
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Standard features of the new **KAM Plus** include

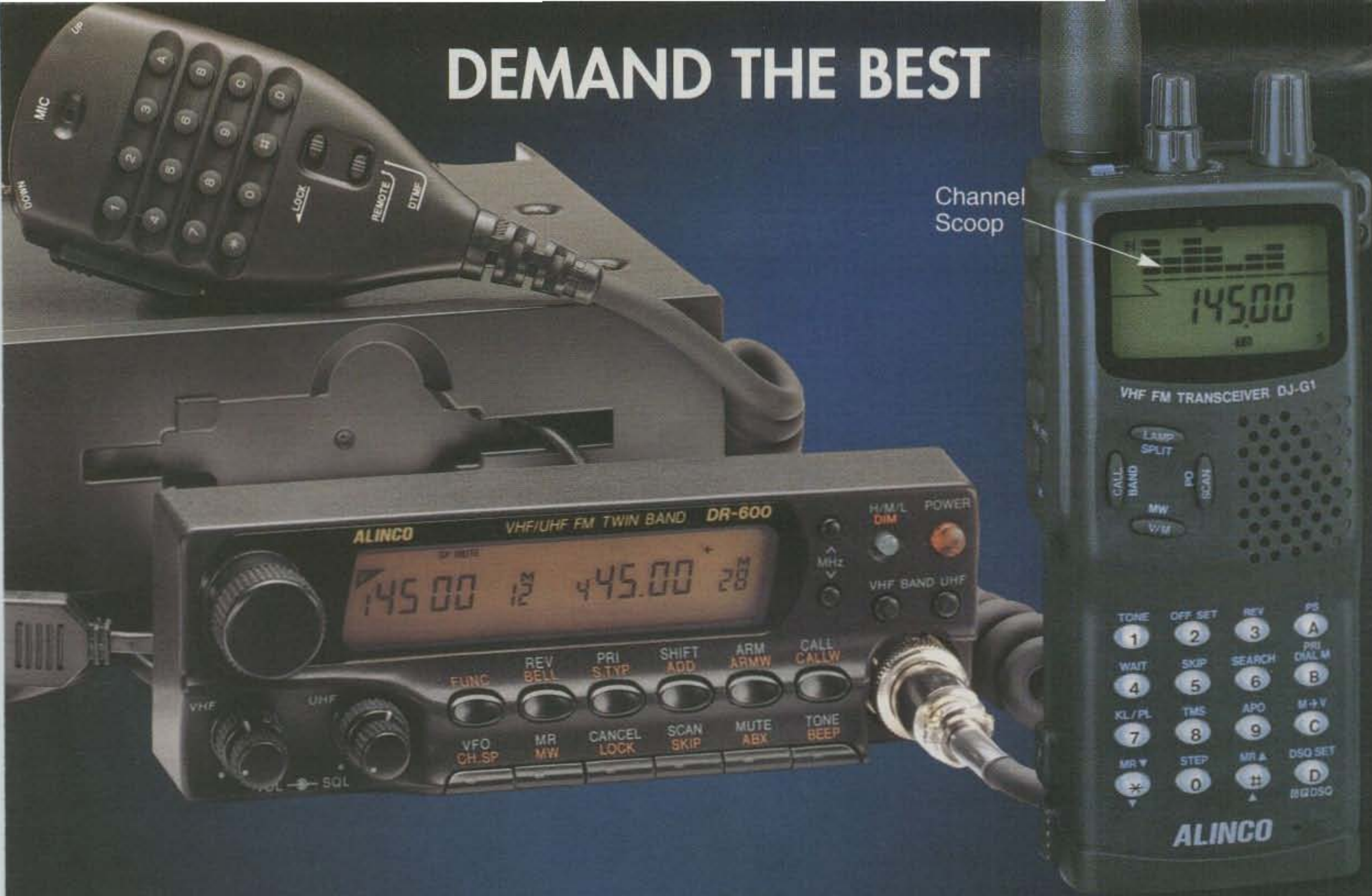
- PACTOR
- 128K bytes of RAM, expandable to 512K
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We have great news for existing **KAM users** too. Kantronics has developed a plug-in board that adds full **KAM Plus** functionality to your KAM. The KAM add-on board converts an existing KAM to one with Pactor, clock, 128K bytes of RAM (max), lithium battery, and the same firmware additions listed above.

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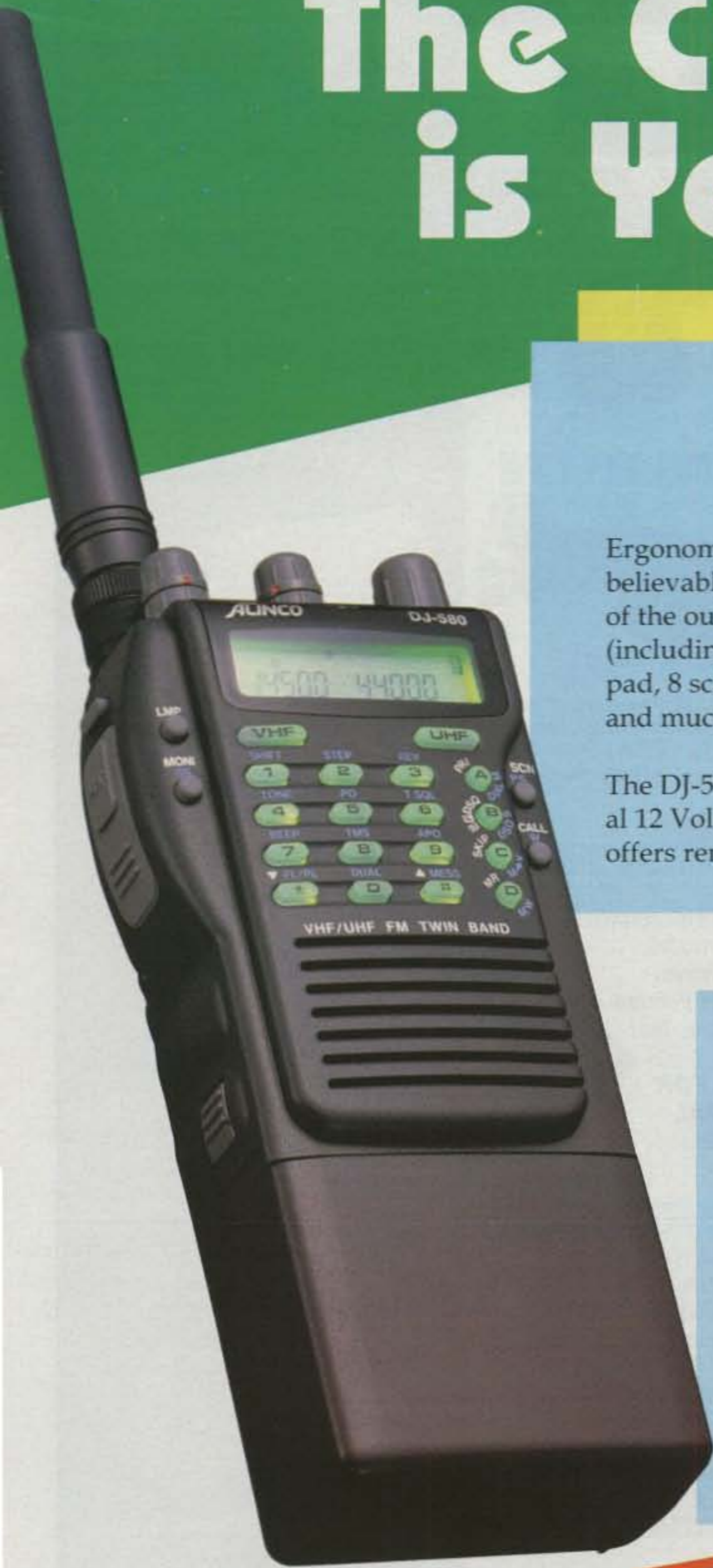
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DJ-580T

Loaded Package

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2M/440



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Ionospheric Propagation Possible On Mars

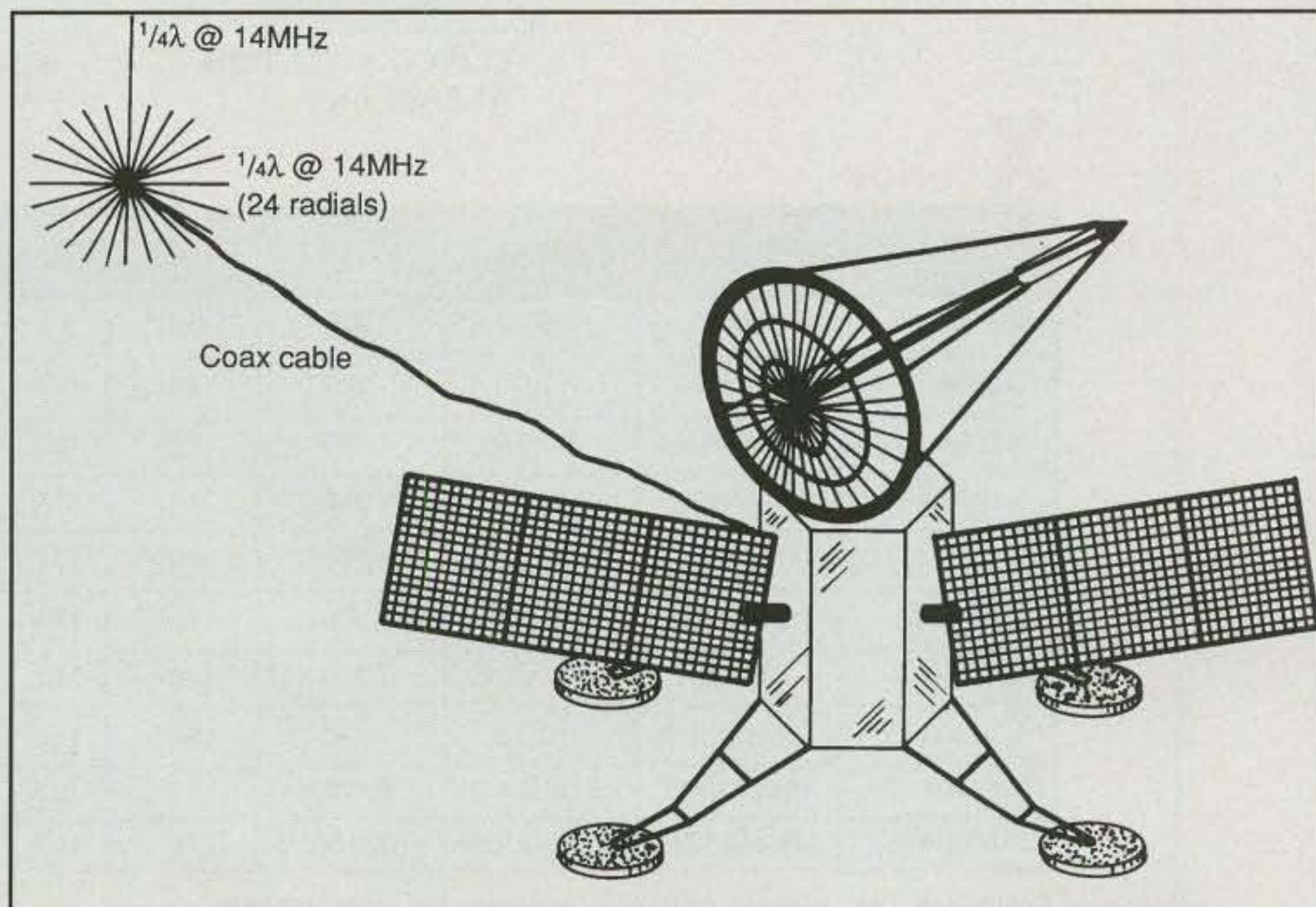
BY PROFESSOR EMIL HEISSELUFT*
LAUTON INSTITUTE
GROSSMAUL-AN DER DONAU, AUSTRIA

I haven't heard from Professor Heisseluft since late in 1984, when he forwarded his manuscript for "Amateur Radio's New Frontier: The Bands Below 30 kHz." Imagine my surprise, then, when the good professor's manuscript for this exciting article appeared on my desk! Not only does the professor discuss the exciting possibility of HF propagation on Mars, but he also reveals a hush-hush public relations project jointly sponsored by the United Nations and the World Meteorological Organization that could result in amateur radio communications on the Red Planet by the year 2000. —K2EEK

Talk of a mission to Mars has for years occupied layman and scientist alike. Today the planet is a primary target of numerous planetary exploration programs. One proposal now being considered in the United States, for example, is a mission called the Mars Environmental Survey (MESUR). This project calls for establishing 16 unmanned scientific stations on the planet's surface which will be used to collect meteorological and other data (see references 1 and 2). A similar concept set forth by the European Space Agency is embodied in a mission called MARSNET, and it would employ three surface stations for the same purpose. Both MESUR and MARSNET are scheduled for implementation by the year 2000.

With the discovery some years ago of an ionosphere on Mars similar to the ionosphere on Earth, both the United Nations (UN) and the World Meteorological Organization (WMO), in cooperation with NASA and the European Space Agency, are now developing a plan to facilitate HF communications on Mars by Earth-bound amateurs. The plan, which is now very hush-hush, will work as follows.

**Professor Heisseluft currently is at "Leslie's House," Colombo, Sri Lanka, working with Arthur C. Clarke on their new book, 2050. The professor may conveniently be reached by directing your correspondence c/o CQ.*



Artist's conception of the United Nations' MESUR Station at Olympus Mons. The 14 MHz, 1/4-wavelength vertical antenna is hydraulically erected, while the 24 radials are explosively ejected from tubes at the base. This HF antenna system is designed to be 90% efficient, with a take-off angle of 10° relative to the horizontal.

First, both the UN and the WMO will issue a limited number of amateur radio licenses to Earth-bound amateurs. The assignments will be done by lottery, and winners will be assigned either a 4U4AAA-4U4ZZZ callsign (UN affiliated) or a C74AA-C74ZZZ callsign (WMO affiliated). An amateur may hold only one call. These calls will be stored digitally in the memories of two MESUR stations which will be equipped with low-power HF transmitters. At random times over the Martian solar day (which interestingly is only 40 minutes longer than a solar day on Earth), callsigns will be selected from the memories of both stations, and an attempt will be made to communicate using packet techniques. If the exchange is successful, a Worked All Mars certificate will be issued to the two amateurs whose callsigns were used. All of the organizations involved would probably agree that this is nothing more than a public relations

ploy. However, the goodwill and publicity that will be generated cannot help but draw the public's attention to, and support for, all space programs.

Let's look in more detail at the various aspects of this exciting project.

Ionospheric Propagation On Mars

As early as the 1970s, a number of researchers (see refs. 3 and 4) reported peak Martian daytime electron densities of $1 \times 10^5 \text{ cm}^{-3}$ at a height of 130-140 km. It should be noted that the data used were acquired just before, or during, a minimum in the sunspot cycle. Additional studies in the late 1980s (refs. 5 and 6) supported the existence of a Martian ionosphere. Importantly, the peak electron densities and altitudes noted above compare favorably with those of the

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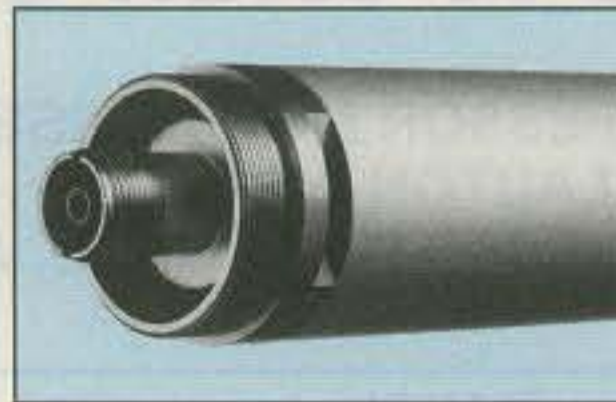
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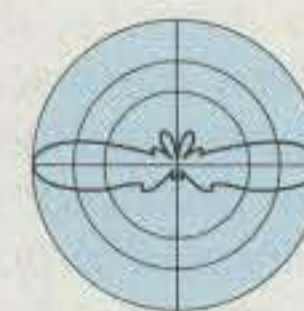
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X-200A	144/440	6.0/8.0	200	UHF	8.3	112
X-300A	144/440	6.5/9.0	200	UHF	10.2	112
X-510NA	144/440	8.3/11.7	200	N	17.2	90
X-510MA	144/440	8.3/11.7	200	UHF	17.0	90
X-500HNA	144/440	8.3/11.7	200	N	17.8	90+
X-700HA	144/440	9.3/13.0	200	UHF	24.0	90
X-2200A	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



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445MHz

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430=430 - 440MHz. 440=440 - 450MHz. 1240=1240 - 1300MHz.
* X510NJ :144 - 147 / 430 - 440MHz

X510

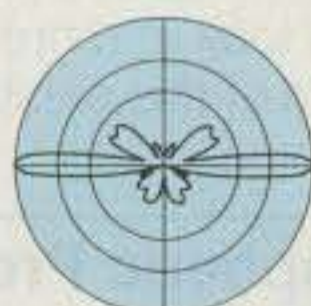
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F-22A	144	6.7	200	UHF	10.5	112
F-23A	144	7.8	200	UHF	15.0	90
F-142A	222	5.5	200	UHF	6.0	110
F-718A*	440	11.5	250	N	15.0	110
F-1230A	1240	13.5	100	N	10.5	90
U-200A	440/1240	8.3/11.7	100	N	5.9	135
U-300A	440/1240	8.6/13.2	100	N	8.3	110
U-5000A	144/440/1240	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

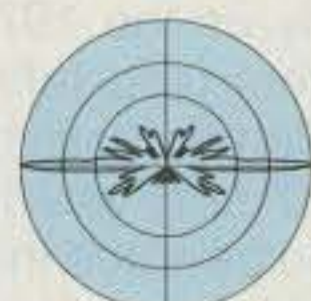
*F-718A:440 - 450MHz, F-718J:430 - 440MHz, F-718L:420 - 430MHz



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Earth's E-layer during periods of low solar activity (peak electron densities of 2×10^5 cm⁻³ at heights of 120–140 km), and so, we would, to a first approximation, expect Martian HF propagation to closely resemble that observed using our planet's E-layer. Specifically, the ionosphere of Mars ionosphere should support one-hop propagation to distances of 2000 km. Looked at another way, given that Mars has a radius roughly equal to half that of the Earth (3393 km vs. 6380 km), a one-hop, 2000 km path on Mars is, relatively speaking, equivalent to a one-hop, 4000 km F2-layer ionospheric path on Earth!

Finally, because Mars does not have a strong magnetic field, ionospheric storms on this planet will be considerably milder than on Earth. Aurora, too, will not present a problem. And best of all, on Mars interference from other amateurs will be non-existent.

The Mars Environmental Survey (MESUR)

As presently envisioned by its creators, MESUR will be comprised of 16 stations and several micro-rovers, all of which will be distributed over the Martian surface (see ref. 2). The network formed by these stations may employ relay satellites to transmit the data collected back to Earth from specific sites within the network, though direct transmission to Earth from each site is also a possibility. The 16 sites proposed for MESUR are shown in fig. 1 (from ref. 2).

The two sites proposed for the amateur communications "contest" are Olympus Mons (Site 4) and Gusev Crater (Site 12). The distance between them is 3625 km; as such, a two-hop ionospheric path will

No.	Site	Latitude	Longitude
1	Valles Marineris	-6.0	58.0
2	Valles Marineris	-5.0	54.0
3	Chryse Plan. VL-1	23.0	48.0
4	Olympus Mons	13.0	130.0
5	Valles Marineris	-2.0	54.0
6	Hadriaca Patera	-32.0	268.0
7	NW Hellas	-40.0	310.0
8	Argyre Planitia	-37.0	44.0
9	South Pole	-86.0	315.0
10	Sirenum Terra	-45.0	185.0
11	Northern Plains	60.0	50
12	Gusev Crater	-15.0	185.0
13	Syrtis Major	5.0	295.0
14	North Arabia	38.0	309.0
15	North Pole	82.0	55.0
16	Chasma Borealis	-66.0	66.0

Table 1—MESUR sites proposed by McNamee (see ref. 2).

be required for the two stations to communicate. The frequency of operation will be around 14 MHz. To achieve the low take-off angle required for effective communications, a one-half wavelength, base-loaded vertical antenna with 24 quarter-wavelength radials will be erected at each site. Transmitter output power will be 5 watts, though lesser power levels are under consideration to minimize battery drain and recharge time.

Amateur Proxy Licenses

Needless to say, it is expected that amateurs worldwide will want to participate in this "contest." Accordingly, both the UN and the WMO are now making plans to begin issuing licenses by lottery in 1997. Though the details are still sketchy, usually reliable sources in Washington, DC have told me that amateurs will be able

to apply for licenses to both organizations beginning April 1st of that year. Forms will be made available through all national radio clubs or directly by mail, and the only requirement for a Mars license is that the applicant have a valid license that permits operation in the HF bands (a copy of the license must accompany each application). The "window" during which applications may be submitted will run from April 1st through July 1st of 1997. Applications can be made both to the United Nations and to the World Meteorological Organization.

Once applications have been received and validated, each will be assigned a number. The lottery to select the winning licensees will then be held on April 1, 1998. Winners in the United Nations' lottery will be assigned one of 17,576 three-letter-suffix callsigns from the block 4U4AAA–4U4ZZZ. Similarly, winners in the World Meteorological Organization's lottery will be assigned one of 17,576 possible calls from the block C74AAA–C74ZZZ. Those amateurs who are lucky enough to have their numbers drawn in both lotteries will be assigned *either* a UN or a WMO callsign. Multi-color, commemorative licenses suitable for framing will be issued and mailed to each winner.

The Contest On Mars

Upon completion of the drawing, the callsigns will be stored in memory devices that will be embedded in the MESUR control systems for the two transmitter sites. Then, upon landing and deployment of the equipment and antennas at each site, operations will commence. On a time-available basis throughout the Martian day, a callsign will be selected at random from the memory of the UN station (Olympus Mons), and a packet containing the callsign and the time of day will be sent up to three times to the WMO station (Gusev Crater). Once the transmission is re-



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ceived without error, the WMO station will transmit a packet containing a randomly selected WMO callsign and the time of day up to three times. If the transmissions are received without error by both stations, a "contact" will have occurred. This information will be relayed back to Earth as part of the MESUR network's data stream to NASA ground control, and the two amateurs holding the callsigns exchanged will each be mailed a beautiful Worked All Mars certificate.

Summary

The United Nations and World Meteorological Organization are now working with NASA and the European Space Agency to equip two sites on Mars with equipment suitable for HF communications. The two sites should be occupied by the year 2000, about three years into the next sunspot cycle. Using embedded callsigns assigned to licensees on Earth that will be selected at random, up to three attempts will be made to complete a packetized exchange. If successful, the Earth-bound amateurs to whom these callsigns have been assigned will receive a Worked All Mars certificate, attesting to the achievement.

Watch the pages of January 1997 *CQ* for a copy of the license application form and instructions on how to apply for your Martian HF license!

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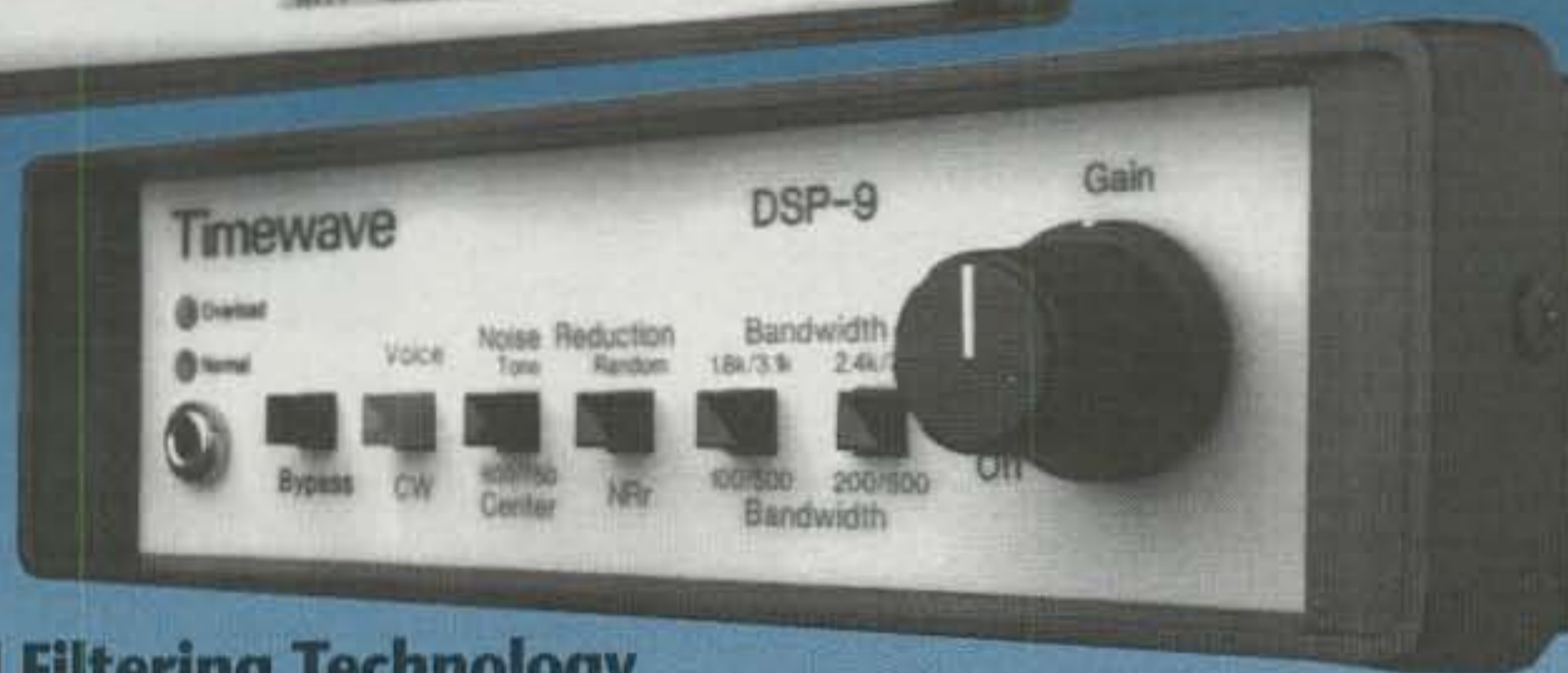
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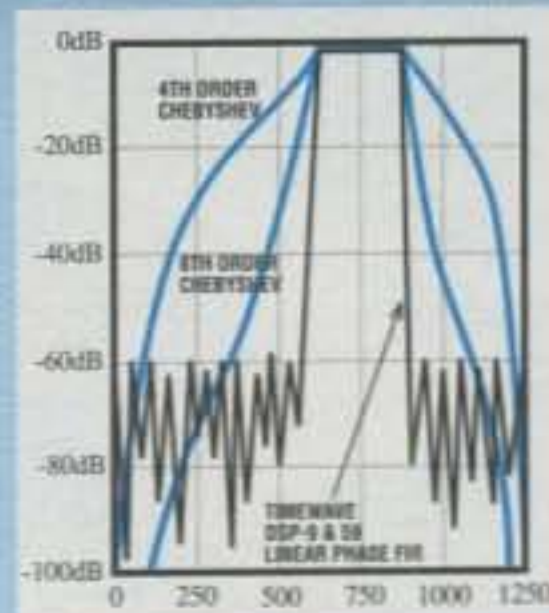
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CQ REVIEWS:

The Telex/Hy-Gain TH11DX 5-Band Super Thunderbird Antenna

BY LEW McCOY*, W1ICP

We have had the good fortune to test the new Hy-Gain TH11-DX, 5-Band superbeam for several months now, and it is time to do the review on it.

This new product from Telex/Hy-Gain is a very fine beam in that it covers 20, 17, 15, 12, and 10 meters. The antenna consists of 11 elements configured in a broadband, log-periodic dipole driven array for all bands with monoband reflectors for 17 and 20 meters and trapped directors for 10, 15, 17, and 20 meters. The beam also features the new Hy-Gain BN-4000 high-power balun. The beam is rated at a conservative 2000 watts continuous duty or 4000 watts PEP.

Electrically, the 2 to 1 SWR bandwidths cover each of the five bands except 10 meters, where the 2 to 1 bandwidth is 800 kHz. On front to back Hy-Gain rates the beam at 27 dB on 20, 22 dB on 17, 25 dB on 15, 15 dB on 12, and 19 dB 10 meters. Our on-the-air tests more than confirmed these figures, depending on the incoming signal angles.

To their credit, Hy-Gain provides what I consider extremely honest gain figures. With the advent of Yagi computer design information, the claimed gain figures would be considered very accurate. On 20 meters gain is 8.6 dBi (gain over isotropic) or 6.4 dBd (gain over standard dipole). I also might add that I have visited Hy-Gain in Lincoln, Nebraska on a couple of occasions, and they have an extremely well-equipped antenna measuring range.

Getting back to our specs, on 17 meters gain is 8.4 dBi (6.2 dBd), on 15 meters it is 8.1 dBi (6.0 dBd), on 12 meters it is 7.5 dBi (5.4 dBd), and on 10 meters it is 9.2 dBi (7.0 dBd). I might add, since erecting and testing the antenna over 130 countries have been worked on 10 meters alone.

Anyone studying the beam would have questions as to how the gain figures came about, because this is definitely a "different" type of beam. As I stated, the feed system is via six of the elements built into



Lots of aluminum, tubing, and parts. In fact, there are three shipping boxes that hold the parts.

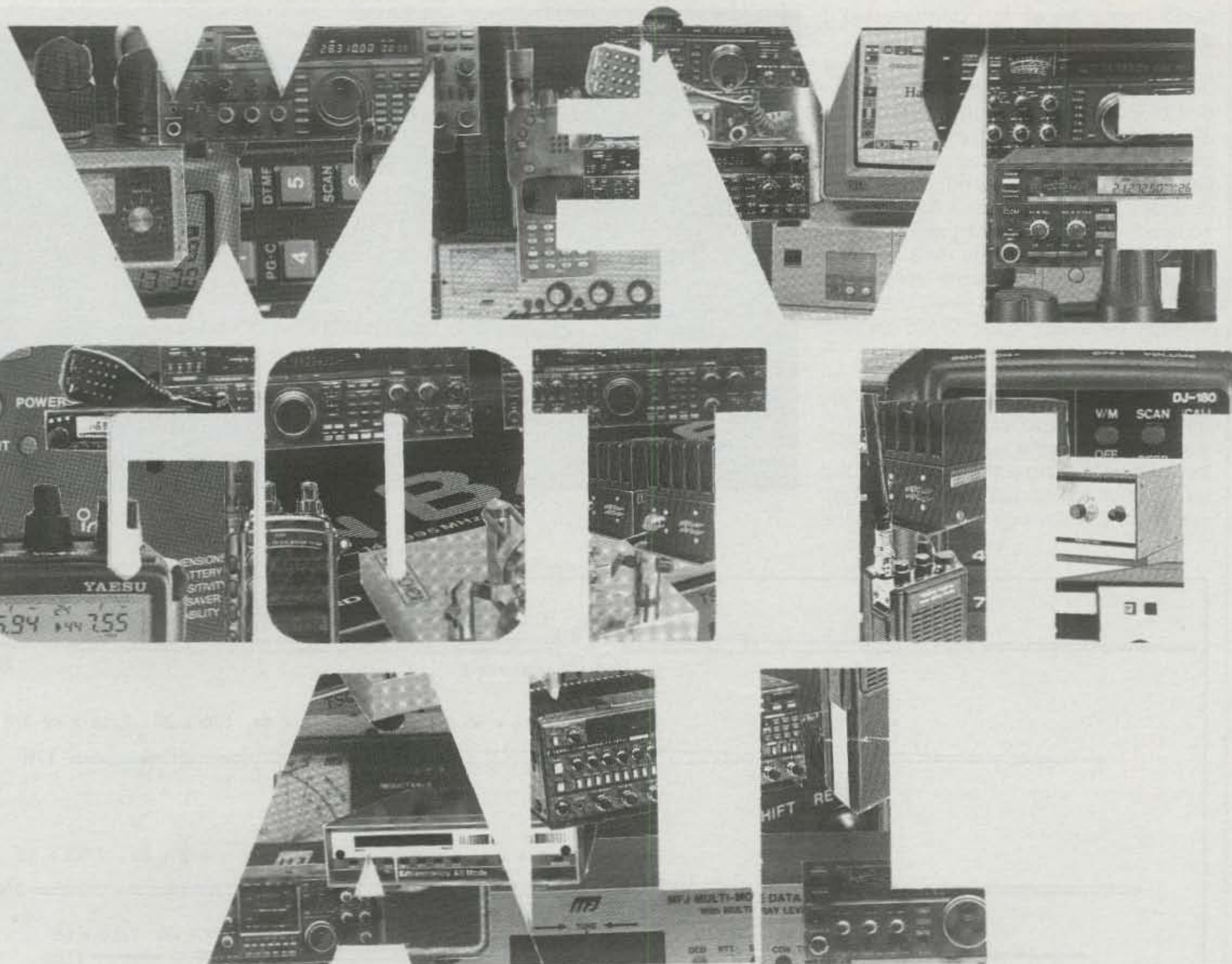
a "log cell." The beam actually has the 11 elements; the back two are reflectors—one for 20 meters and another for 17 meters. Then come the six elements (all driven) of the log periodic, followed by

three trapped directors. The gain on the bands is derived from the combination of the log-periodic system plus the directors. This is an unusual (and one of a kind) type of multi-bander to achieve excellent



This is the tubing that will become the elements, etc. Needless to say, the parts list should be checked carefully to make sure everything is there and identified. Incidentally, the Hy-Gain manual is excellent and detailed enough for everyone.

*Technical Editor, CQ, 1500 W. Idaho St., Silver City, NM 88061



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performance on all five bands—and it does it.

Mechanically the beam ratings are a boom length of 24 feet, with a boom diameter of 2 inches. The longest element is 37 feet, and the beam turning radius is 22 feet. The beam accepts a mast of 2 inch O.D. to 2.5 inch O.D. The net weight is 88 pounds. The wind surface area is 12.5 square feet, and maximum wind loading at 99 mph is 490 pounds. This antenna does require a "respectable" rotator. All the hardware is stainless steel. The boom support hardware uses 0.125 aircraft cable.

The TH11DX can be adjusted upon installation for three different settings. The "Phone" setting optimizes both the VSWR and patterns for the U.S. phone section for each band (and is the recommended Hy-Gain setting for full band coverage). The DX or CW settings optimize both the



A table layout of the many clamps, nuts, bolts, and so on.

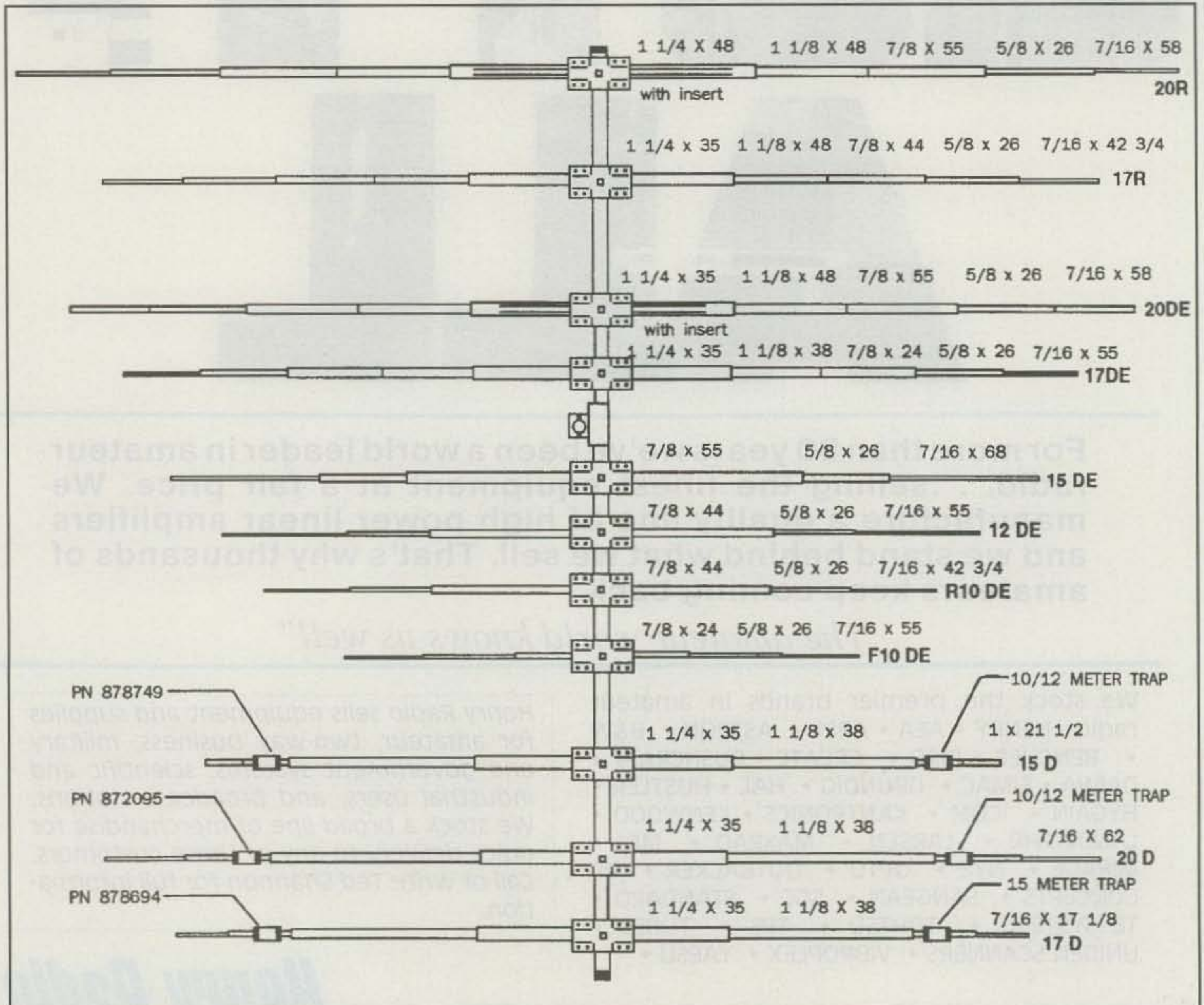


Fig. 1—Overall configuration and element description for the TH11DX antenna.



It gets a little tough when you have to work in a small yard. Woody, K2UU, is an antenna expert, though.

VSWR and patterns for the low end of each band (best for overseas use). Also unusual is a MARS setting, providing broader VSWR bandwidths for the 20 and 15 meter bands without affecting other bands. There is a complete element-length chart provided for each of these settings.

The beam is provided with the BN-4000 balun mentioned earlier. This is a current-type balun to provide a balanced feed from the 50 ohm coaxial line. The balun uses 77 ferrite beads on a length of RG-303 Teflon cable. There is a 200 degree

centigrade rating on both the beads and cable, which provides a rated continuous duty cycle of 2000 watts. Frequency range on the balun is 1 to 54 MHz.

I mentioned that the feed is a "log periodic type" in that individual driven elements are used for each band, but all feed through a log-periodic type phasing system. This arrangement goes a long way in ensuring good patterns plus excellent matching. The matching lines are of the "beta" matching type.

As can be seen from the photos, plenty of hardware goes into an antenna of



The antenna goes up in two sections. Shown here is the rear half, which contains the reflectors and part of the log-periodic setup.

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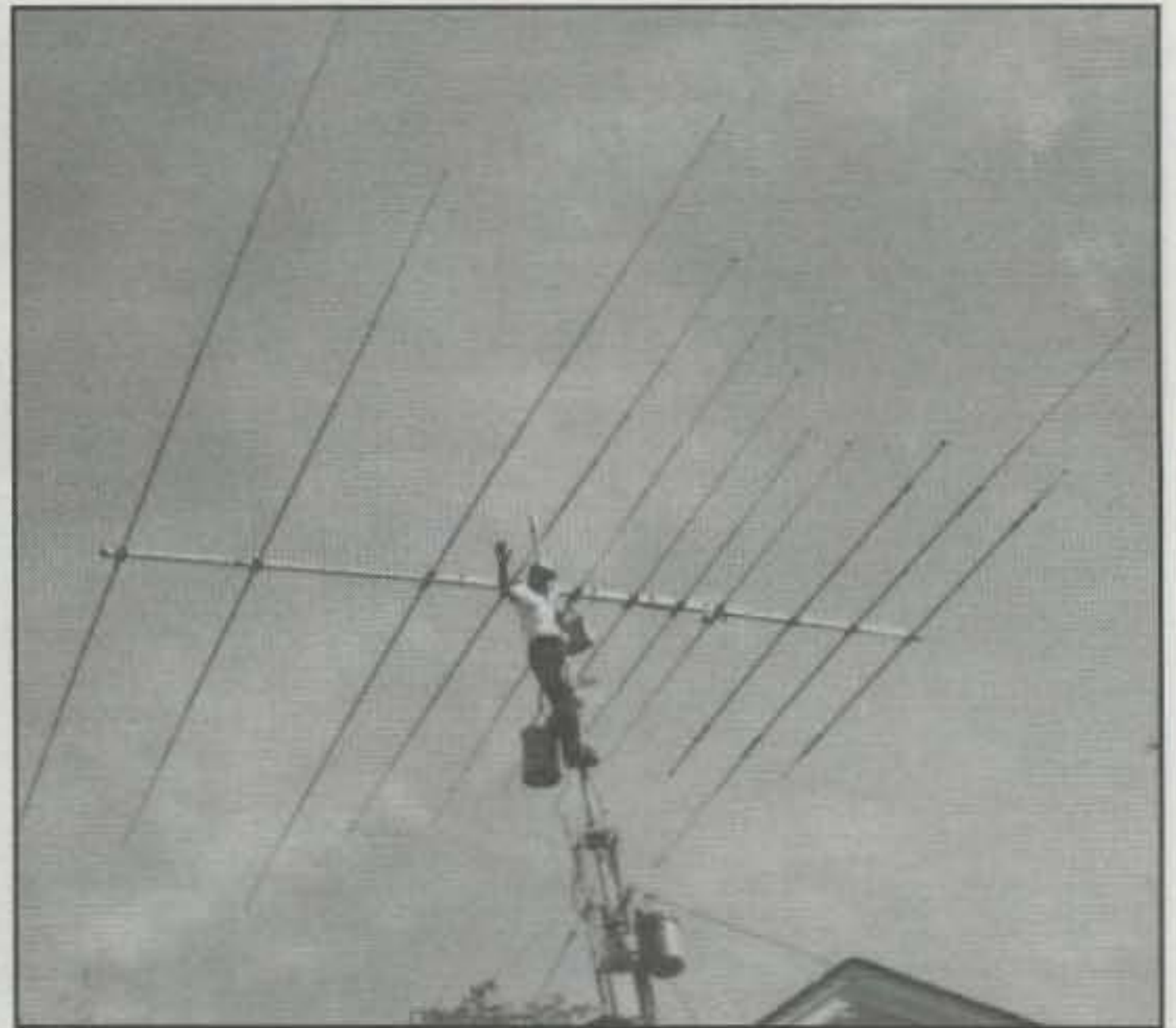
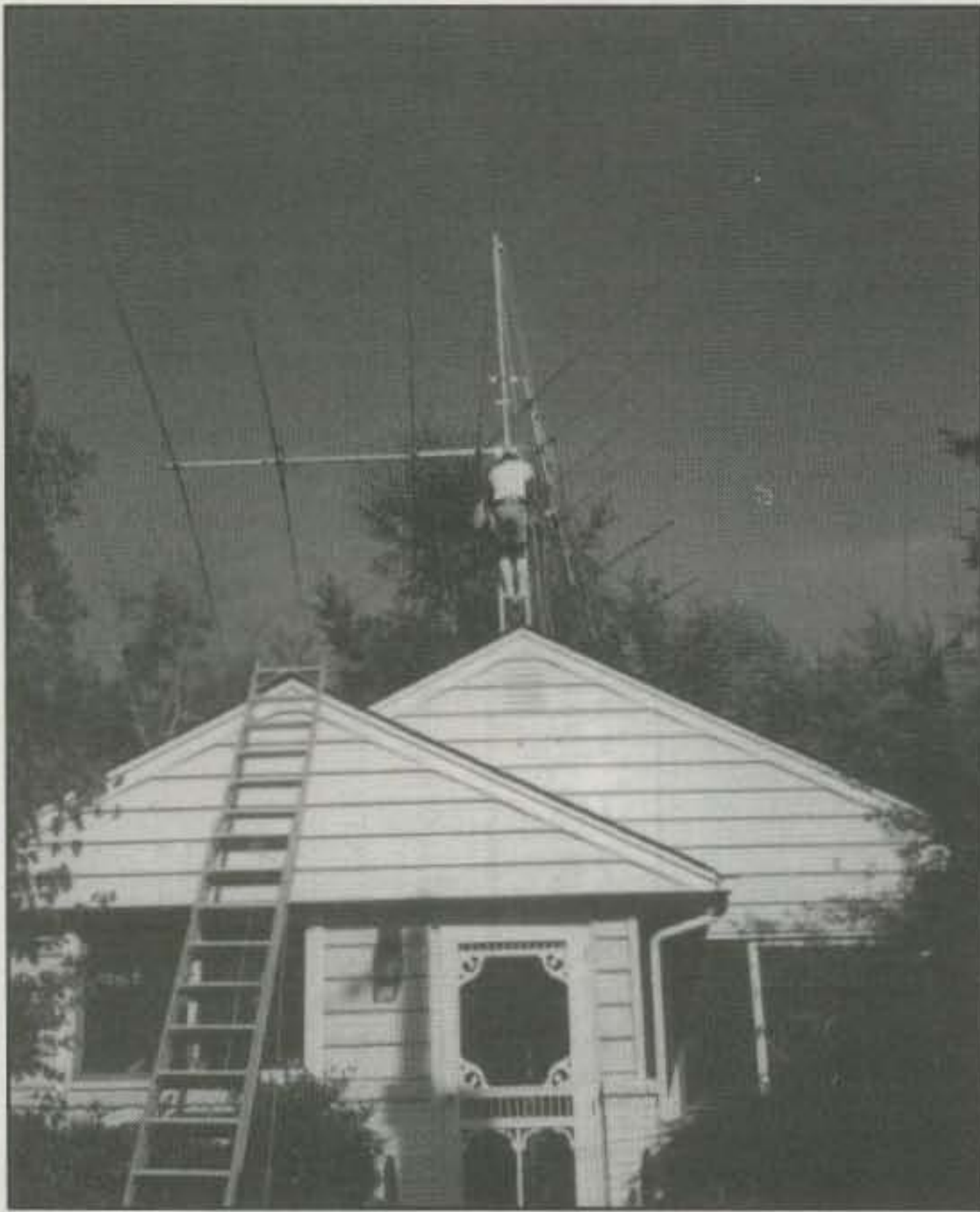
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CIRCLE 117 ON READER SERVICE CARD

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▲ Anyone for contesting? The beam is complete and ready to go to work.

Here the rear section is in place. Note the boom-to-mast truss. ◀ The front section is being raised to be put in place.

this magnitude. All the hardware is of stainless steel and the finest quality. Hy-Gain has a well-established reputation for making good antennas, and this one is no exception.

We constructed the antenna on the ground, and while the instructions are

well detailed, an antenna of this magnitude is no "instant" project. The manual speaks in terms of two days of construction time, and that is what it took—plus a little extra. Care was taken to ensure that all hardware is properly tightened and checked.

How good is the antenna? We would have to use the word "outstanding." All checks showed the beam performing as well or much better than the manufacturer's specs. It isn't really difficult to tell whether an antenna is a very good or bad performer when one has had countless previous antennas to test, and this is a good one by our standards.

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When putting up a new antenna, it is also a good idea to think about replacing the coax. During the installation process for the TH11DX we had the chance to use some of Nema Electronics' Hamcable. Nema manufactures their own coax and rotor cable in their UL-approved mill. Hamcable is a general name for a series of composite cables featuring various combinations of coax and rotor cable. The coax and rotor cables are then covered in a weather-resistant overall jacket, which means only one cable to run back to the shack. We used the HC150 combination, which is RG213 and an eight-conductor rotor cable made up of two #18's and six #22's. It was extremely easy to use and made a very neat installation. The combination cable sells for \$.67 per foot. Check out their ads in *CQ*. ■

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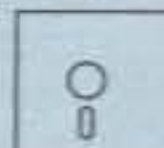
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While not strictly a compendium on baluns, W2FMI does review the amateur literature, both fact and fanciful, on the subject. He also presents the results of his experiments plus workable designs that we can build.

More On The 1:1 Balun

BY JERRY SEVICK*, W2FMI

My most recent CQ article entitled "More On The 4:1 Balun"¹ presented some new 4:1 designs as well as an evaluation of the designs which have appeared in our amateur radio literature over the years. If you read the article, you saw that I was very critical of the information made available to amateurs. In fact, it was shown that a very poor design was converted into a "peerless" design by making three simple changes. The number of bifilar turns was changed from 10 to 14, the cross-sectional area of the toroid was doubled by stacking two together, and the wires were covered with Teflon tubing, resulting in the optimum characteristic impedance of the coiled transmission line. These changes made very significant improvements in both the low- and high-frequency responses of the 4:1 balun.

This article can be said to be a complement to the 4:1 balun article. In this case it treats the much more popular 1:1 balun. It begins with my view on when to use a balun. Even though much of what has been written here is taken from my Summer 1992 article in *Communications Quarterly*,² it is presented again here, since some of you don't subscribe to that journal. As before, highlights are also given on what has been available in the professional and amateur radio literature on the understanding and design of the 1:1 balun.

This information is then followed by some of my latest designs. Of special interest might be the one I call the "economy" model. Economy, in this case, refers to economy in labor. I hope some of these baluns are constructed and compared with the "expensive" (in labor) models also described in this article.

The article finally closes with a short summary of the significant points brought forth in this essay. As will be seen (again), the information available to radio amateurs has been sorely lacking over the past 25 years (at least)!

When To Use A Balun

Baluns have taken on a more significant role in the past few decades with the advent of solid-state transceivers and Class B linear amplifiers, which have unbalanced outputs—that is, the voltage on the center conductor of their output chassis connectors varies (plus and minus) with respect to ground. In many cases coaxial cables are used as the transmission lines from these unbalanced outputs

to antennas such as dipoles, inverted Vees, and Yagi beams which favor a balanced feed. In essence, they prefer a source of power the terminals of which are balanced (voltages being equal and opposite) with respect to actual ground or to the virtual ground which bisects the center of the antenna. The question frequently asked is whether a 1:1 balun is really needed.

To illustrate the problem involved and to give a basis for my suggestions, I refer you to fig. 1. Here we have, at the feed point of the dipole, two equal and opposite transmission-line currents which have two components each— I_1 and I_2 . Also shown is the spacing (s) between the center conductor and the outside braid. Theoretically, a balanced antenna with a balanced feed would have a ground (zero potential) plane bisecting this spacing. However, since a coax-feed is unbalanced and the outer braid is also connected to ground at some point, an imbalance exists at the feed point, giving rise to two antenna modes. One is with I_1 giving a dipole mode, and the other is with I_2 giving an inverted-L mode.

If the spacing (s) is increased, the imbalance at the feed point becomes greater, giving rise to more current on the outer braid and a larger unbalance of currents on the antenna's arms. Several steps can be taken to eliminate or minimize the undesirable inverted-L mode (eliminate or minimize I_2). The obvious one is to use a well-designed balun, which not only provides a balanced feed, but also minimizes (by its choking reactance) I_2 if the coaxial cable does not lie in the ground plane which bisects the center of the dipole. The other step is to ground the coaxial cable at a quarter-wave (or odd-multiple thereof) from the feed point. This discourages the inverted-L mode, since it wants to see a high impedance at these lengths instead of the low impedance of a ground connection.

Experiments with baluns were conducted on a 20 meter half-wave dipole at a height of 0.17 wavelength, which gave a resonant impedance of 50 ohms. VSWR curves were compared under various conditions. When the coaxial cable was in the ground plane of the antenna (that is, perpendicular to the axis of the antenna), the VSWR curves were identical with or without a well-designed balun no matter where the outer braid was grounded. Only when the coaxial cable was out of the ground plane was a significant difference noted. When the cable dropped down at a 45 degree angle

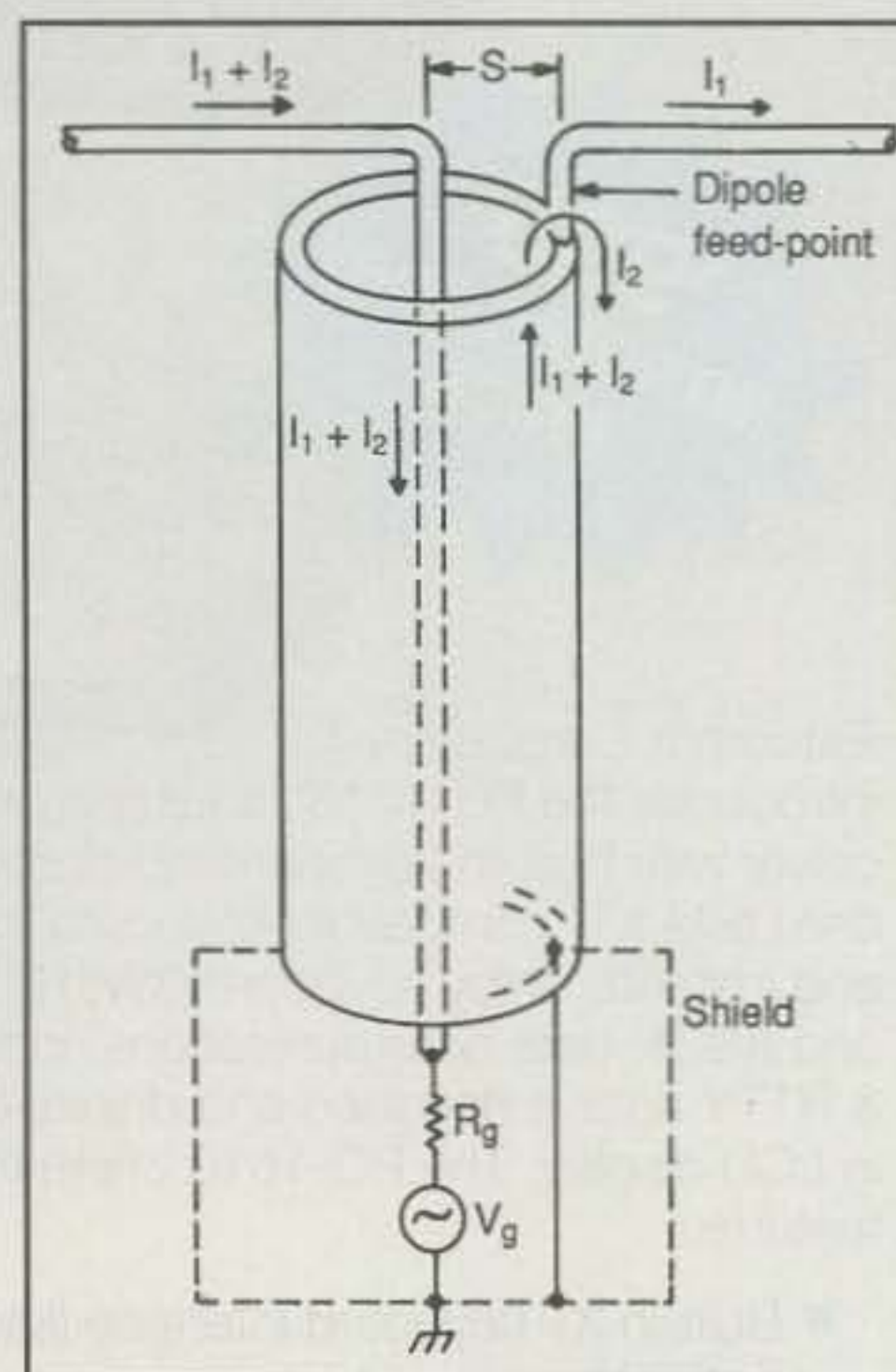


Fig. 1—Illustration of the various currents at the feed point of a dipole. I_1 is the dipole current and I_2 is the inverted-L (imbalance) current.

under the dipole, a large change in the VSWR took place. This meant the inverted-L mode was appreciable.

It should also be pointed out that the direction of I_2 , the imbalance current, can depend upon the side on which the coaxial cable is out of the ground plane of the dipole. For example, if it comes down under the right side in fig. 1 (that is, the angle between the horizontal arm and the coax is less than 90 degrees on the right side and more than 90 degrees on the left side), then the direction of I_2 can be reversed by the imbalance in the induced currents on the outside of the braid. By the same token, by having the coaxial cable come down on the other side, the value of I_2 is only increased in magnitude.

Feeding a Yagi beam without a well-designed 1:1 balun, however, is a different matter. Since most Yagi designs use shunt-feeding (usually by hair-pin matching networks) in order to raise the input impedance close to 50 ohms, the effective spacing (s) is greatly increased. Furthermore, the center of the driven element is actually grounded. Thus, connect-

*32 Granville Way, Basking Ridge, NJ 07920

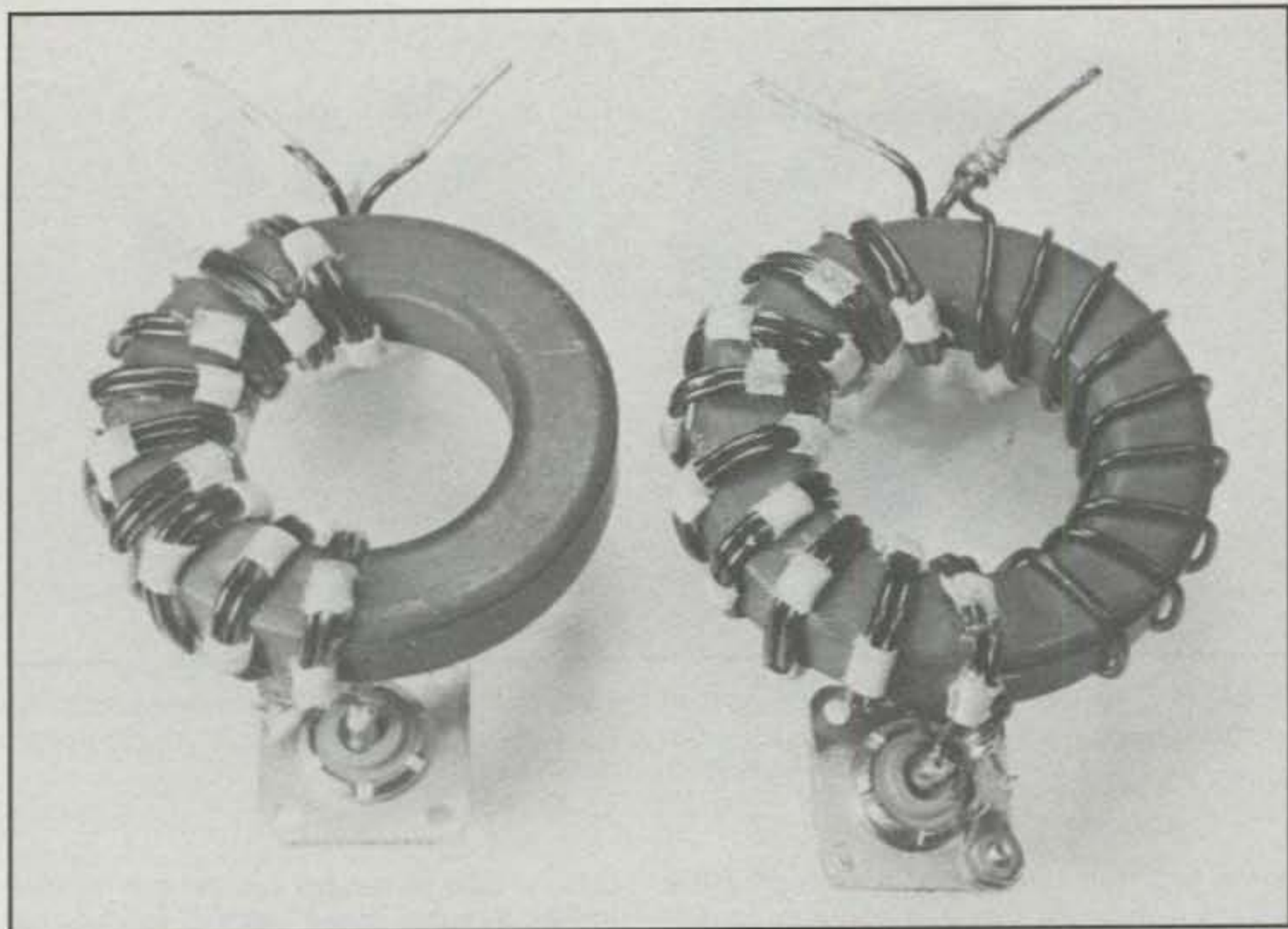


Photo A—The two basic forms of the 1:1 balun which first appeared in the professional literature. The two-conductor Guanella balun is on the left and the three-conductor Ruthroff balun is on the right.

ing the outer braid (which is grounded at some point) to one of the input terminals creates a large imbalance and hence a real need for a balun. An interesting solution, which would eliminate the matching network, is to use a step-down balun designed to match 50 ohm cable directly to the lower balanced-impedance of the driven element.³

In summary, if one concurs with the theoretical model of fig. 1, my experiments performed on 20 meters, and the reports from radio amateurs using dipoles and inverted Vees without baluns, then it appears that 1:1 baluns are really needed for (a) Yagi beam antennas where severe pattern distortion can take place without one and (b) dipoles and inverted Vees that have the coaxial cable feed lines out of the ground plane that bisects the antennas or that are unbalanced by their proximity to man-made or natural structures. In general, the need for a balun is not so critical with dipoles and inverted Vees (especially on 40, 80, and 160 meters) because the diameter of the coaxial cable connector at the feed point is much smaller than the wavelength.

If my model—which assumes that a part of the problem when feeding balanced antennas with coaxial cable is related to the size of the spacing (s), shown in fig. 1—is correct, then the possibility exists for using ununs for matching into balanced antennas with impedances other than 50 ohms and with small values of s . For example, half-wave dipoles at a height of about a half-wave, quads and center-fed $3/2$ -wave dipoles which all have impedances close to 100 ohms, could very well be matched to 50 ohm cable by a 2:1 unun.⁴ As was shown, they are considerably easier to construct than 2:1 baluns.⁵ Furthermore, Genaille⁶ has recently shown considerable success in using ununs in this kind of application.

In closing this section I would like to comment on an article published by Eggers, WA9NEW,⁷ concerning the use of a balun with

a half-wave dipole. While at North Carolina State University, he conducted an experimental investigation of pattern distortion without a balun at 1.6 GHz in an RF anechoic chamber (which simulates "free space"). Briefly, his results showed that with a balun (a bazooka type), the radiation pattern compared very favorably with the classic "figure-eight" pattern. Without the balun, the radiation pattern was severely distorted.

Even though the author expressed difficulty in obtaining accurate measurements at this very high frequency, I have a question regarding the validity of performing the experiment

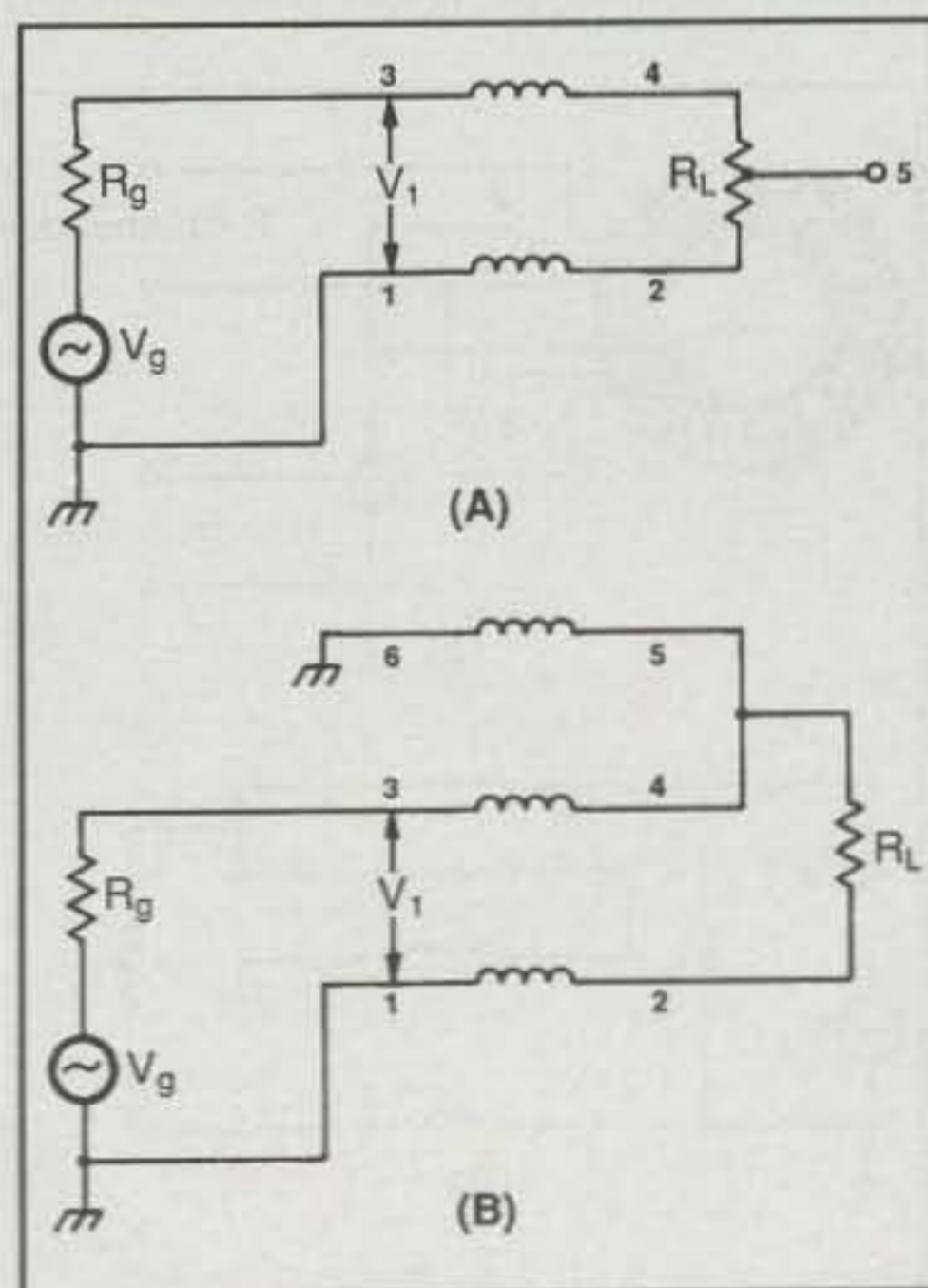


Fig. 2—Two versions of the 1:1 balun: (A) The Guanella balun and the basic building block; (B) The Ruthroff balun as originally drawn.

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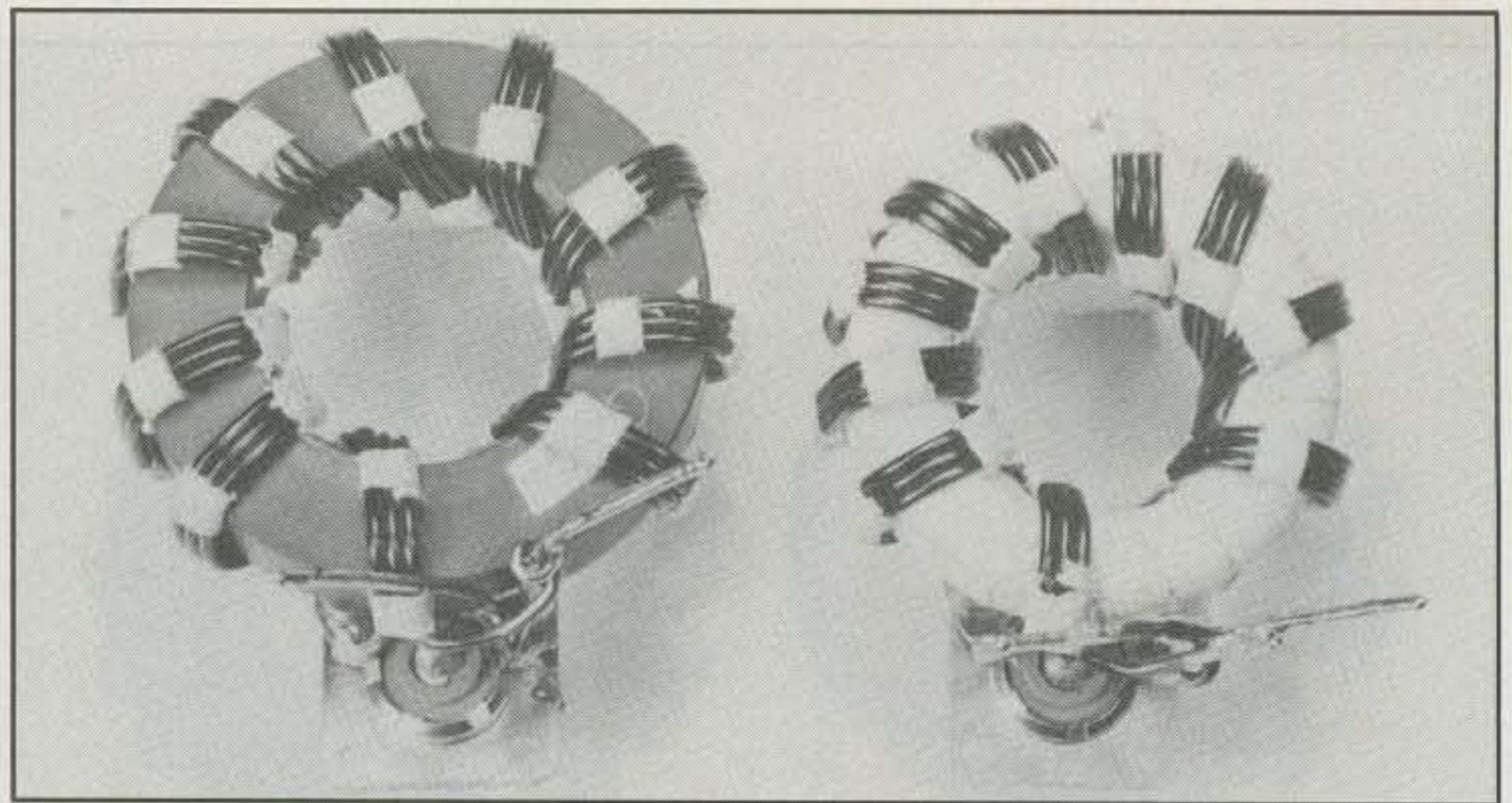


Photo B— Two versions of Turrin's design: on the left, the 1:1 balun that has appeared in the amateur radio literature; on the right, a 1:1 balun that has been readily available in kit form from Amidon Associates, Inc.

in the first place. From the photograph in the article it appears that conventional coaxial cable and connectors were used in the experiment. If we assume an effective diameter of 0.375 inches for these components, then scaling up to 3.5 MHz (457.14 fold) results in a coaxial cable with a diameter of 14.28 feet! I am quite sure that the large spacing (s) of 7.14 feet would bring about a noticeable imbalance, resulting in appreciable pattern distortion even at 3.5 MHz.

Highlights of Significant Articles on 1:1 Baluns

Although there have been many articles published in the professional and amateur literature, I have selected a few that I thought had the most impact on 1:1 baluns for amateur radio use. As you will see, even though I consider some of the amateur articles significant, their impact upon the use and understanding

of these devices has not always been positive. In fact, in some cases just the opposite has been true.

In The Professional Literature

As I noted in a recent CQ article,⁵ there are actually only two significant articles in the professional literature that provide the fundamental principles upon which the theory and design of this class of transformers are based. It can be said that succeeding investigators only really extended the works of the authors of these two articles.

The first presentation on broadband matching transformers using transmission lines was given by Guanella in 1944.⁸ He coiled transmission lines forming a choke such that only transmission-line currents were allowed to flow no matter where a ground was connected to the load. His single, coiled transmission line resulted in a 1:1 balun. It is shown on the left in fig. 2(A). Prior to this RF baluns were achieved by the use of quarter- and half-wave transmission lines, and as a result, had narrow bandwidths. Guanella then demonstrated broadband baluns with impedance transformations of 1:n² where n is the number of transmission lines he connected in a series-parallel arrangement.

Several important points should be made regarding Guanella's 1:1 balun shown in fig. 2(A). With sufficient choking reactance so that the output is isolated from the input and only transmission-line currents flow, by grounding terminal 5 (actually or virtually like the center of a dipole), terminal 4 becomes +V₁/2 and terminal 2 becomes -V₁/2, resulting in a balanced output. This type of balun has lately been called a "current" or "choke" balun. A significant feature of this model is that a potential gradient of -V₁/2 exists along the length of the transmission line. This gradient, which exists on both conductors, accounts for practically all of the loss in these transformers, since the loss-mechanism is voltage-dependent (a dielectric-type loss). All transmission-line transformers have some sort of voltage gradient along their transmission lines and are thus subject to the same type of losses. Furthermore, the theory and loss-mechanism are the same whether the transmission lines are

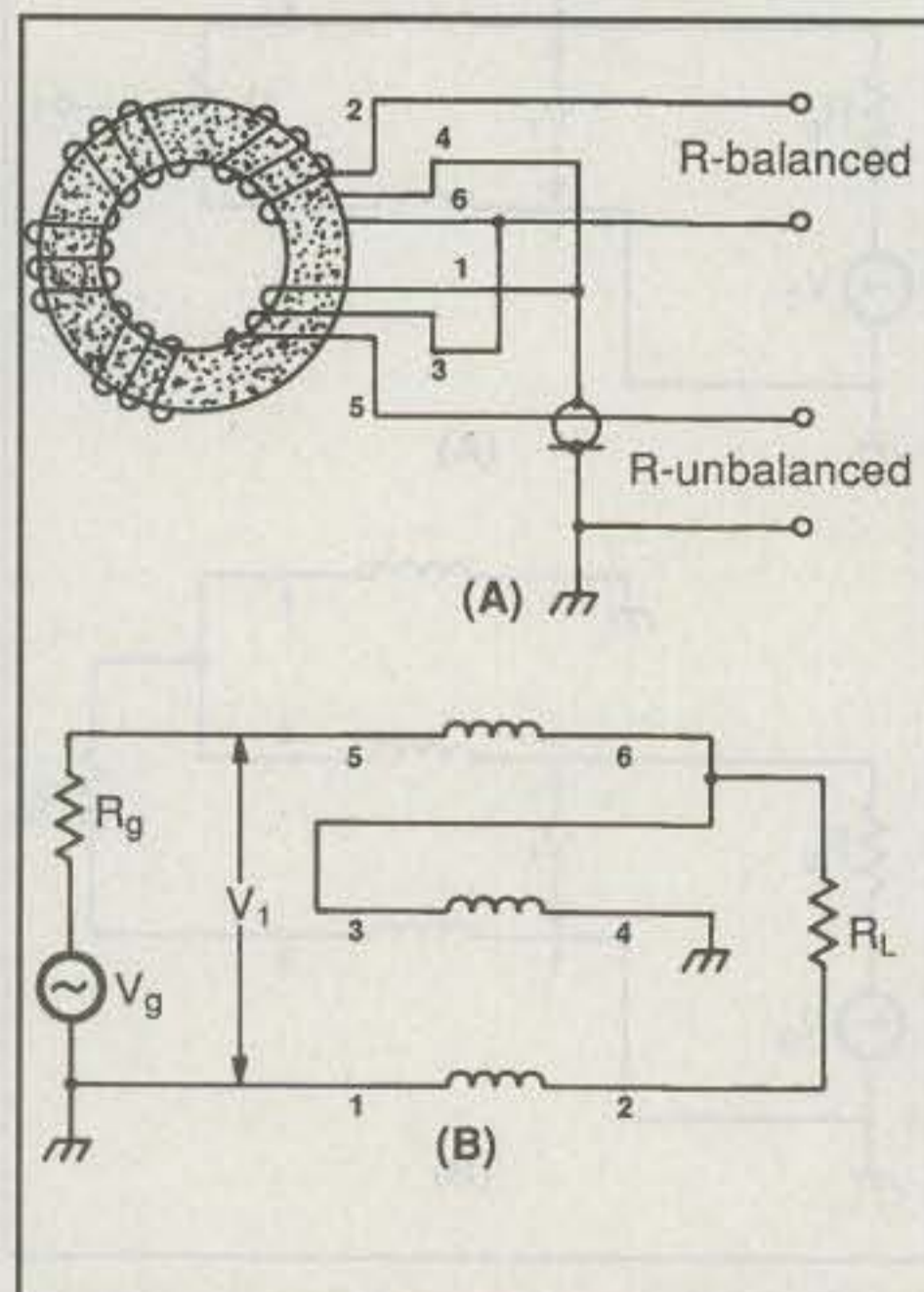


Fig. 3— (A) A pictorial of Turrin's 1:1 balun, and (B) a schematic of his balun.

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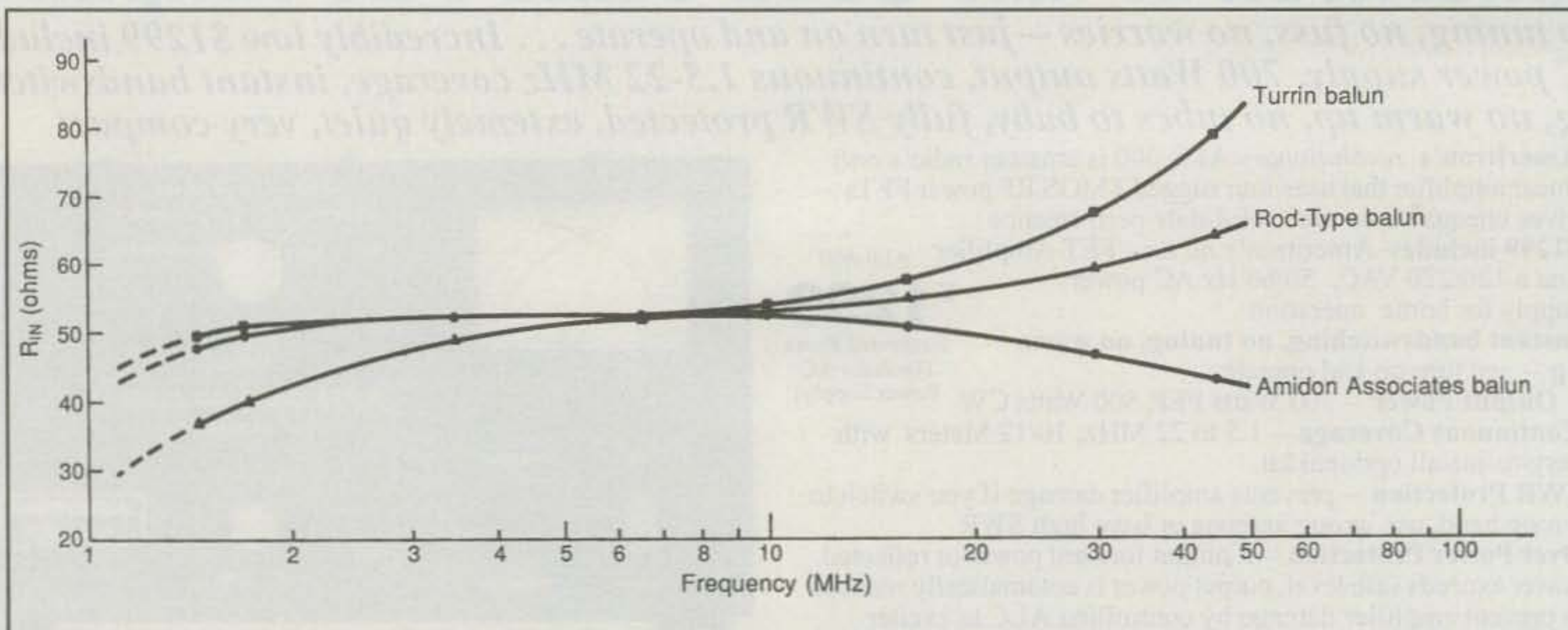


Fig. 4—The input impedance versus frequency, when terminated with 50 ohms, for the Turrin, rod-type, and Amidon 1:1 baluns.

coax or twin-lead or coiled around cores or threaded through ferrite beads. Additionally, it was shown³ that higher-impedance baluns or baluns subjected to higher VSWRs have more loss because the voltage gradients are also larger.

The second and other significant article on broadband transmission-line transformers was by Ruthroff in 1959.⁹ His 1:1 balun, which is shown originally drawn in fig. 2(B), used an extra winding to complete (as he said) the path for the magnetizing current. Even though his schematic drawing appeared to look like a trifilar winding, his pictorial in the article clearly showed that the third winding (5–6) was on a separate part of the toroid. With an equal number of turns, it forms a voltage divider with winding (3–4) placing terminal 4 at $+V_1/2$ and terminal 2 at $-V_1/2$. Ruthroff also presented in his classic paper his forms of the 4:1 balun (which are also different from Guanella's), a 4:1 unun, and various hybrids. Photo A shows the two basic forms of the 1:1 balun which first appeared in the professional literature. The two-conductor Guanella 1:1 balun is on the left and the three-conductor Ruthroff balun is on the right. As was mentioned before, the Guanella balun recently has been called a "current" or "choke" balun.

Before going on to the significant articles in the amateur radio literature, some mention should be made of the differences between the two basic forms shown in photo A. Guanella's 1:1 balun came to be known as the *basic building block* for this whole class of broadband transformers. This term was coined by Ruthroff as he showed its 1:1 balun capability when the load was grounded at its center (terminal 5) and as a phase-inverter when the load was grounded at the top (terminal 4). By connecting terminal 2 to terminal 3 and connecting the bottom of the load to ground, Ruthroff then demonstrated his very popular 4:1 unun. I called this type of arrangement the "boot-strap" connection. Furthermore, by grounding terminal 2, there is no potential drop along the transmission line and therefore no need for magnetic cores or beads. This arrangement, which turns out to

be an important function for extending the high-frequency performance of this class of transformers, I call the "phase-delay" connection.

Thus, with the flexibility shown by Guanella's basic building block, a 1:1 balun is now realized which not only presents a balanced power source to a balanced antenna system, but can also prevent an imbalance current (an inverted-L antenna current) by its choking reactance when the load is unbalanced or mismatched or when the feedline is not perpendicular to the axis of the antenna.

Interestingly enough, except at the very low end of the frequency response of the Ruthroff 1:1 balun where autotransformer action can take place, his balun takes on the characteristics of the Guanella balun. The reactance of the third winding becomes great enough to make it literally transparent. This is not the nature of the trifilar-wound (voltage) balun, which is sensitive to unbalanced and mismatched loads over its entire passband, since it is actually two tightly coupled transmission lines. This distinction was not recognized by most of those who published in the amateur radio literature.

In The Amateur Radio Literature

R. Turrin, W2IMU—1964. The first presentation in the amateur radio literature on 1:1

baluns using ferrite cores was by Turrin in 1964.¹⁰ Turrin, who was a colleague of Ruthroff at Bell Labs, took his small-signal design (which used No. 37 or 38 wire on toroids with ODs of 0.25 inch or less) and adapted it to high-power use. This was done by using thicker wire, larger cores, and (very important for high efficiency³) low-permeability ferrite. Ruthroff used lossy manganese-zinc ferrites with permeabilities of about 3000, since efficiency was not a major consideration.

Fig. 3 shows a pictorial and a schematic of Turrin's design. As you can see, the third wire (winding 3–4) is placed between the two current-carrying wires (windings 1–2 and 4–5). Photo B shows (on the left) his actual design using a ferrite core and a popular design (on the right) using a powdered-iron core that has been readily available in kit form. Both baluns use 10 trifilar turns of a single-coated wire such as Formex or Formvar on a toroid. Turrin's design uses a ferrite toroid with an OD of 2.4 inches and a permeability of 40. The kit balun uses a powder-iron toroid with a 2 inch OD and a permeability of only 10. Both baluns are specified to handle 1000 watts of power from 1.8 MHz to 30 MHz.

Fig. 4 shows the response curves for these two baluns when terminated with 50 ohm loads. Also shown is the response curve for a popular 1:1 rod-type balun which uses the

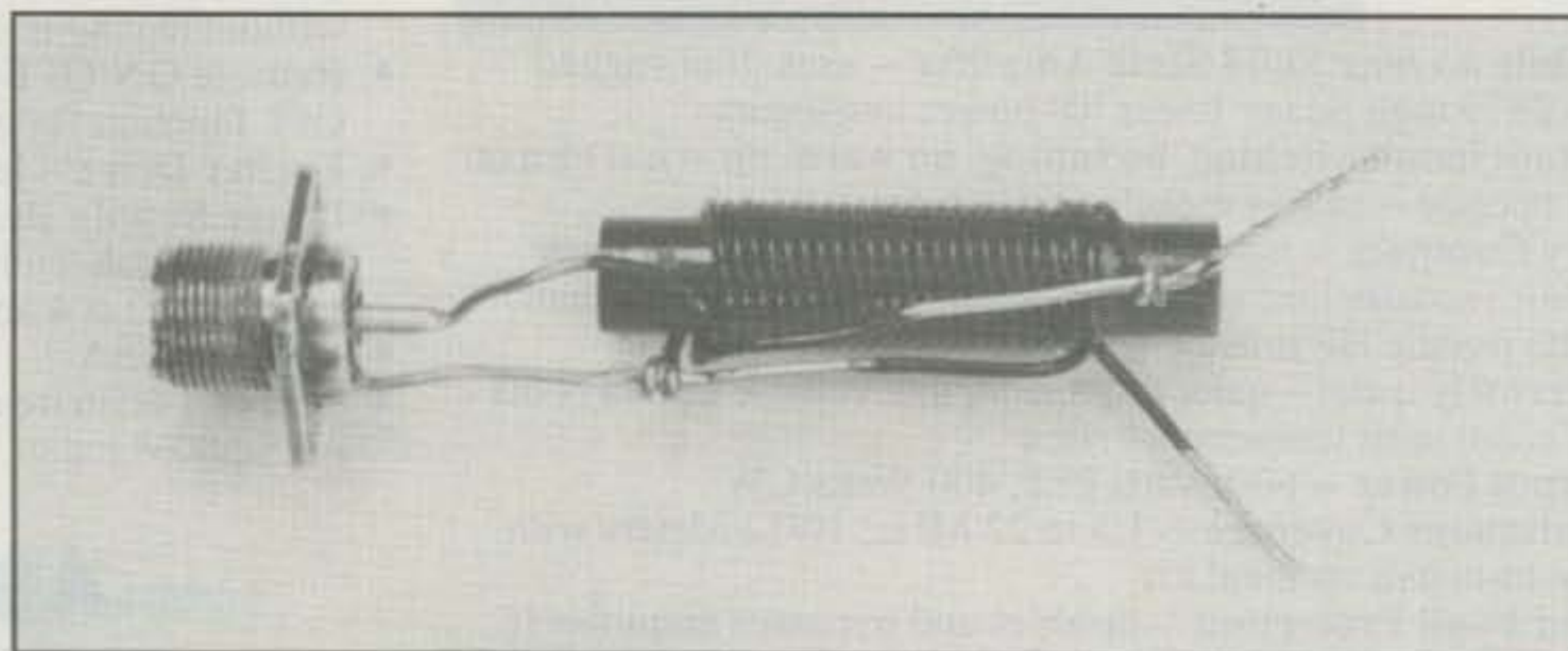


Photo C—A typical rod-type balun.

same "rod type" schematic and wire but on a ferrite rod. It has 8 trifilar turns tightly wound on a rod of 0.5 inch diameter, 2.5 inches long, and with a permeability of 125. The rod-type balun is shown in photo C.

Several important features should be brought out regarding the results shown in fig. 4. They are:

1. All baluns had insufficient choking reactance and hence poor low-frequency responses. The powdered-iron version was especially poor. They all showed a drop in the input impedance and an inductive component at 2 MHz. This meant flux in the cores and an undesirable condition especially for ferrite, which is a non-linear material. Ferrite cores could not only suffer damage, but they also could generate spurious frequencies under these conditions. In fact, the same condition could occur at 4 MHz with a VSWR of 2:1! Therefore, I don't recommend any of these baluns for use on 160 or 80 meters.

2. The major problem at the low-frequency end is the role of the third winding (3-4) in fig. 3(B). It has been claimed¹¹ that the third winding improves the low-frequency response (over the two-conductor Guanella 1:1 balun) because it enables autotransformer action at the low end. But recent measurements by the author on two-conductor Guanella baluns and three-conductor Ruthroff (or Turrin) baluns with loads grounded at their centers show insignificant differences. This type of load approximates the actual condition when feeding a balanced antenna system. The negative feature of the third winding (3-4) is that at the low-frequency end there can be insufficient reactance to prevent harmful flux in the core because of a direct shunting path to ground. With the two-conductor 1:1 balun the only flux-causing current is that of the imbalance current (the inverted-L mode), which is usually far smaller.

3. Another important feature of the curves shown in fig. 4 is the effect of the characteristic impedances of the coiled transmission lines. For example, a bifilar winding (wires tight together) on a toroid exhibits a characteristic impedance of about 45 ohms. When wound on a rod with no space between adjacent bifilar turns, the characteristic impedance drops to about 25 ohms. With the third winding (3-4) between the other two as shown in fig. 3(B), the characteristic impedance is raised to about 70 ohms in the toroidal case and to about 47 ohms in the rod case. If the toroidal baluns were terminated in 70 ohms and the rod balun terminated in 47 ohms, the high-frequency responses would be practically flat to at least 30 MHz. The difference in high-frequency response between the two toroidal baluns (with 50 ohm loads) is due to the differences in the lengths of their transmission lines. The transmission line on the powdered-iron core is appreciably less, since the OD as well as the cross-sectional area is smaller.

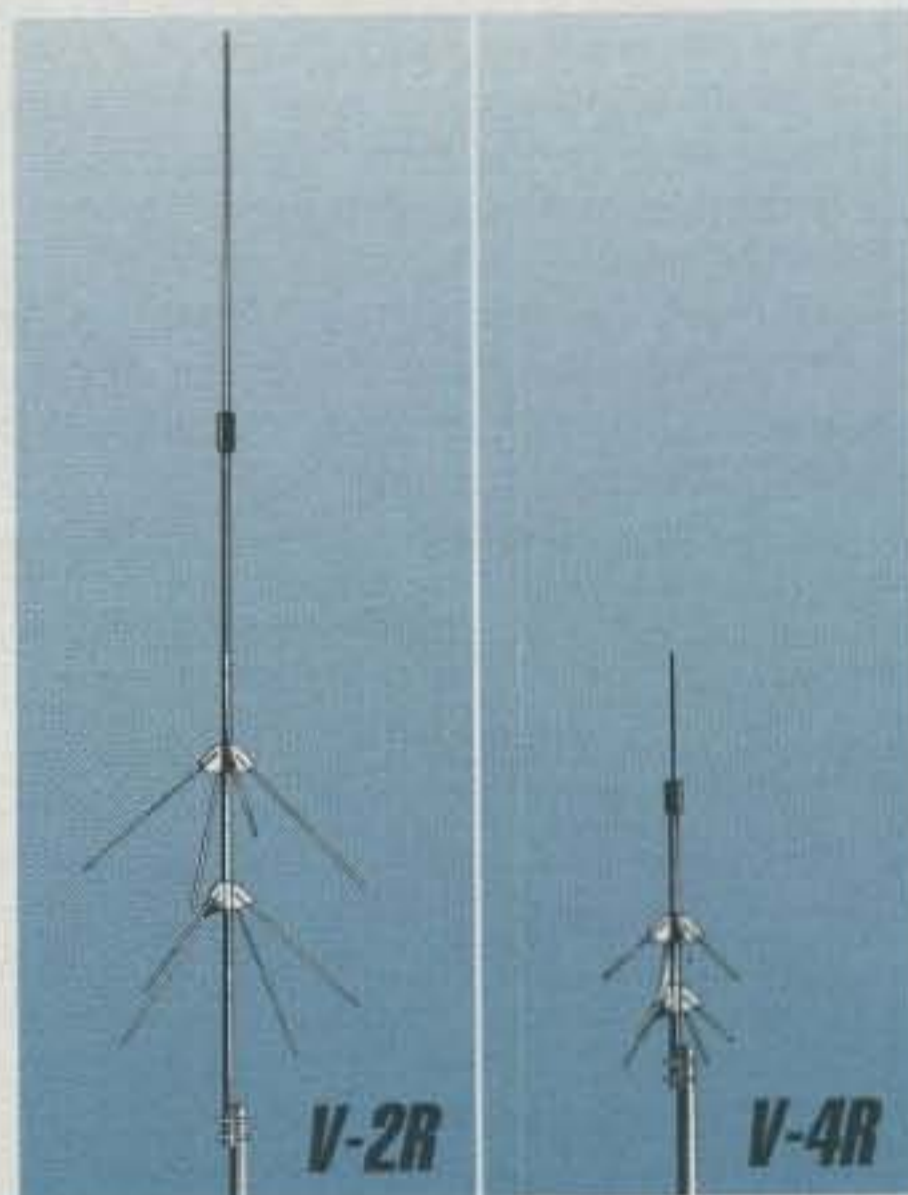
4. The trifilar-wound form of the 1:1 balun also has an additional undesirable property. Its high-frequency response is sensitive to unbalanced and mismatched loads. This is because the third wire now forms two transmission lines which are now tightly coupled. It is unlike the Ruthroff version shown on the right in photo A. In his second article Turrin pointed out this important distinction.¹¹

J. Reiser, W1JR—1978. The next signifi-

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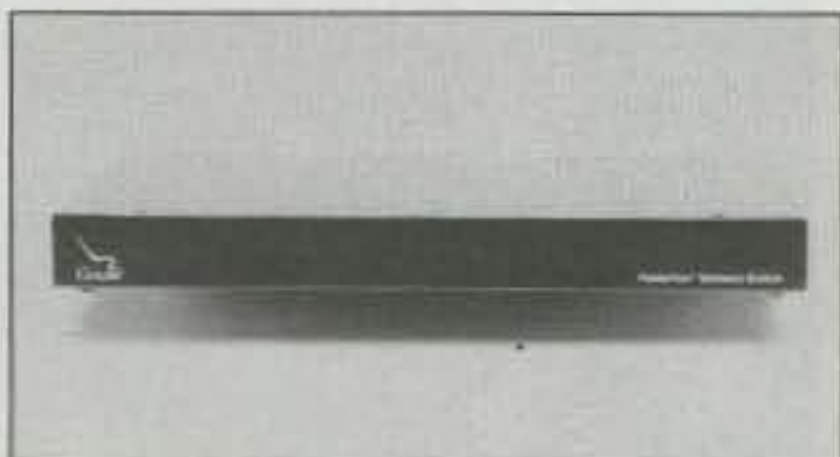
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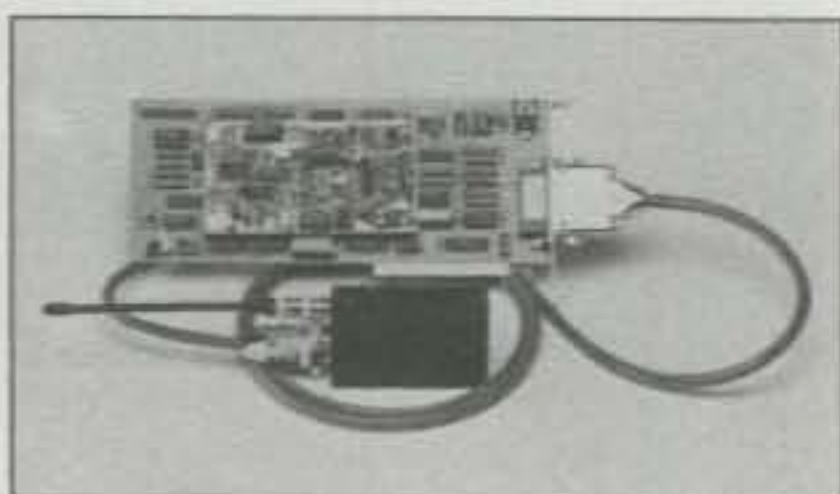
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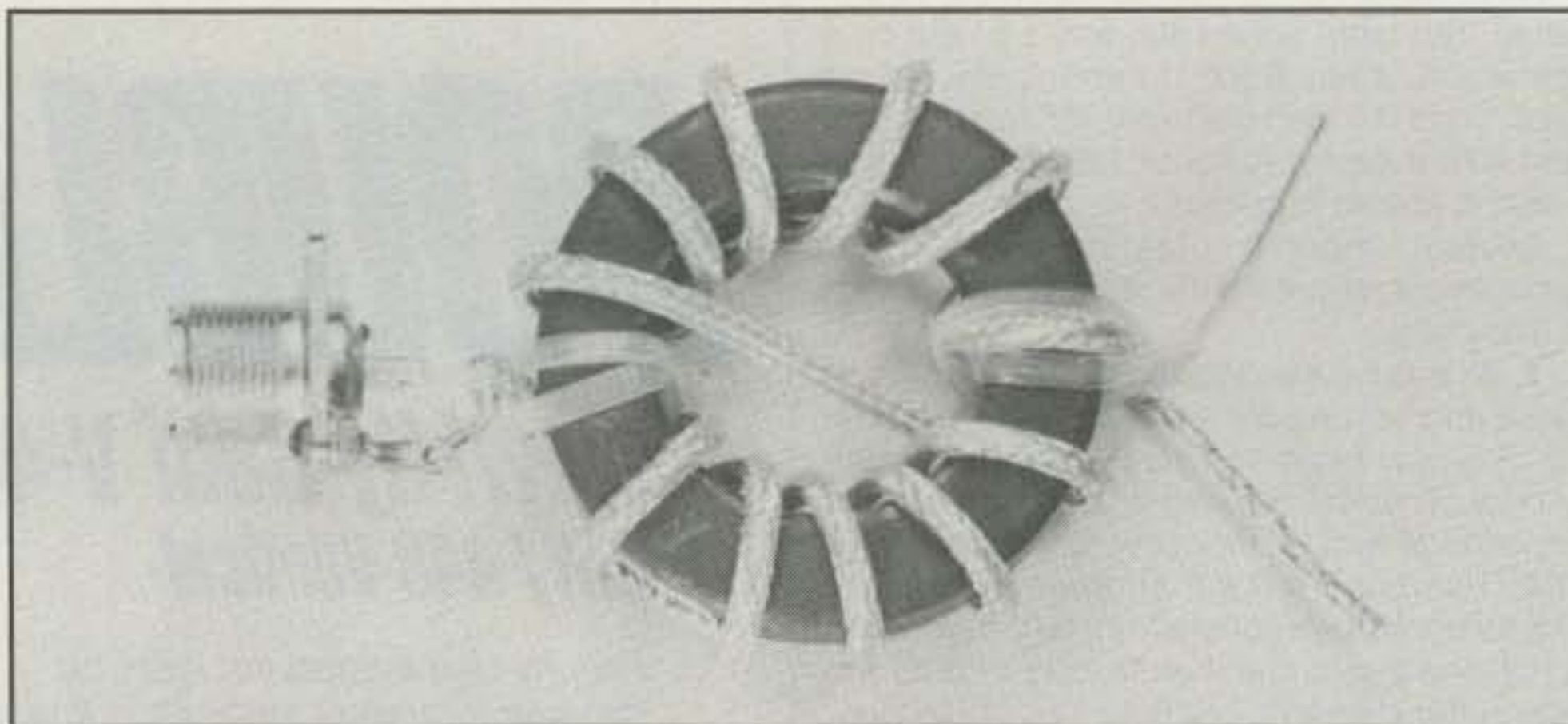


Photo D—A Reiser, W1JR, 1:1 balun.

cant article on 1:1 baluns was published by Reiser in 1978.¹² He proposed winding some of the smaller (but still high-powered) coaxial cables around a 2.4 inch OD ferrite toroid with a permeability of 125. The windings also included a cross-over which is shown in fig. 5 and photo D. In addition, he recommended various numbers of turns depending upon the low-frequency requirement. For example, 12 turns to cover 3.5 MHz, 10 turns for 7 MHz, 6 for 14 MHz, and 4 turns for 21 and 28 MHz. Since the characteristic impedance of the coaxial cable is the same as the coax feed line, the balun only introduces a foot or two of extra length to the feed line. This is true in the HF and VHF bands. The coaxial cables recommended in the article were RG-141/U, RG-142/U, and RG-303/U.

From the articles that followed in the amateur radio literature it became apparent that few recognized all of the important features of his balun, which were:

1. An efficient, low-loss ferrite was used.
2. The baluns had sufficient choking reactances for the various low-frequency requirements.
3. The characteristic impedance of the coiled transmission line was the same as that of the feed line, thus eliminating the extra transformer action of a length of transmission line with a different characteristic impedance.
4. The balun is a form of Guanella's two-conductor 1:1 balun which is not prone to core flux and hence saturation and the generation of spurious frequencies. It is also not susceptible to mismatched and unbalanced loads such as the Turrin and "voltage" baluns.

After constructing several of his baluns and comparing them with other Guanella designs, I found that the cross-over winding had virtually no effect up to 100 MHz (the limit of my equipment). My second comment is with regard to his VSWR comparison with a rod-type

balun when feeding a tri-band Yagi beam on 20 meters. His balun had a lower VSWR (practically 1:1) at the best match point. The rod-type balun had a best VSWR of about 1.3:1 but at a slightly higher frequency. He attributed the higher (and somewhat flatter) VSWR curve of the rod-type balun to its greater ohmic loss. Since the rod-type baluns I have investigated used the same low-loss ferrite that Reiser did, I suspect that the differences in the VSWR curves were mainly due to the mismatch loss introduced by the rod-type balun.

G. Badger, W6TC—1980. Badger published an in-depth, two-part series in 1980 on air-core baluns and ununs in *Ham Radio* magazine.^{13,14} I am sure it was instrumental in advancing the technology of this class of wide-band transformers. A recent article by Bill Orr, W6SAI, also shows that there are many other radio amateurs who see the advantages of air-core transformers.¹⁵

What are the claims for air-core baluns over their ferrite-core counterparts? The first and foremost claim is that they don't suffer the consequences of saturation, which leads to spurious frequencies, heating, and ultimate damage. Second, they are not subject to arcing from the windings to the core.

And what are the claims for the ferrite-core baluns over their air-core counterparts? Simply put, they have wider bandwidths and are more compact.

What especially came to my attention after reading Badger's two-part series was his experimental data on harmonic distortion due to saturation in a ferrite-core 1:1 balun. Although many have expressed concerns regarding saturation in ferrite-core baluns, Badger's data could very well be the only results available. He used the two-tone test method, which combined two RF sources of 2.001 and 2.003 MHz, amplified it to 2 KW PEP, and then fed it through a commercial 1:1 rod-type ferrite balun. The

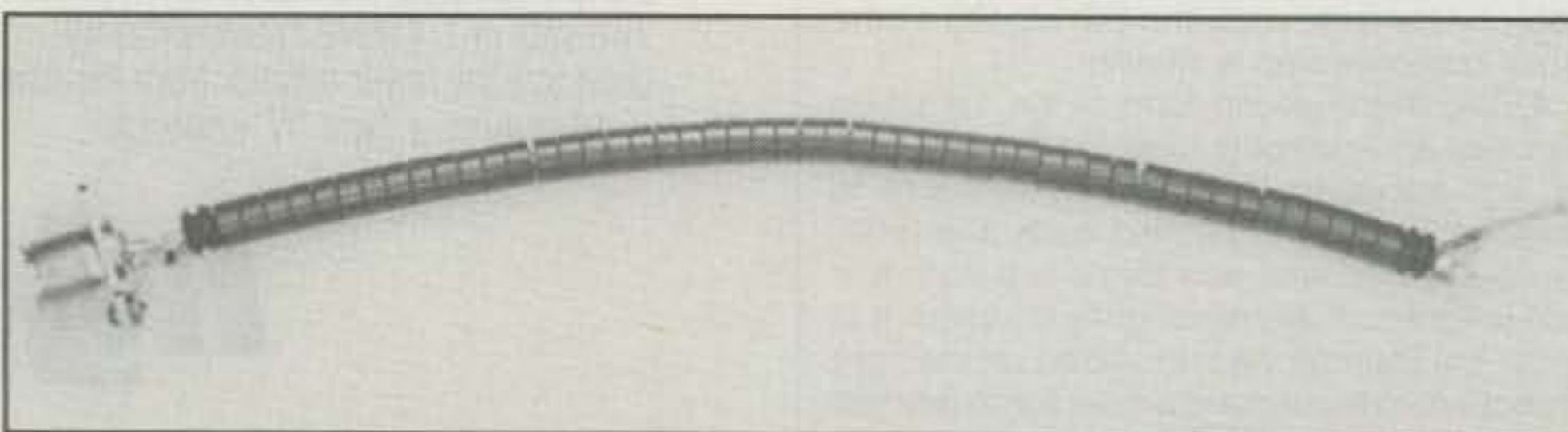


Photo E—The Maxwell, W2DU, "choke" 1:1 balun.

data showed considerable distortion in the 3rd order and the 9th order distortion products. In other words, appreciable non-linearity took place at this high-power level.

Several questions come to mind regarding these measurements. What was the low-frequency response of the commercial 1:1 rod-type balun he used? From my measurements on a rod-type balun (fig. 4), I found a drop in the input impedance and an inductive component at 2 MHz. This indicates flux in the core and a problem when using this balun at 2 MHz. Since many rod-type 1:1 baluns have been used over the years, it would have been instructive if he had also made these measurements at 4 and 7 MHz. They would have given the readers a safe lower-frequency limit for these baluns.

Also, why didn't Badger make similar measurements on Reiser's 1:1 balun, which he included in his articles? As noted earlier, I consider Reiser's 1:1 balun a very good design! I am sure that no distortion products would have been found at 2 MHz with it. The end result is that Badger chose a very poor ferrite-core design for making his comparisons. This helped contribute to an undeserved reputation for the ferrite-core balun.

Badger also suggested placing an insulated wire in parallel with the coax winding on Reiser's 1:1 balun. He called this a compensating winding, which provided a superior balanced output. The schematic is shown in fig. 6. Later experiments by the author and others have shown that a well-designed, two-conductor (Guanella) 1:1 balun has a completely satisfactory balanced output for antenna applications. Furthermore, it does not suffer from an unbalanced and/or mismatched load and core saturation. Incidentally, Badger's schematic of fig. 5 now adds up to four different versions of the 1:1 balun. They are the two-conductor version of Guanella's and the three, three-conductor versions of Ruthroff, Turrin, and (now) Badger.

Badger and Orr also mentioned the Collins balun in their articles. It is made up of a dummy length of coax which is wound as a continuation of the original coiled coax winding. Interestingly, it is connected as a Ruthroff 1:1 balun (fig. 2[B]), which also uses a third winding. Since there is appreciable coupling between the two coiled windings, the Collins balun should also be susceptible to mismatched and/or unbalanced loads. Badger claimed it was by far the best 1:1 balun he had ever used. Again, it would have been very informative if he had compared it with the Reiser balun (without the compensating third wire).

M. W. Maxwell, W2DU—1983. One of the more significant articles on 1:1 baluns was published by Maxwell in 1983.¹⁶ He introduced what he called the "choke" balun. It was formed by placing high-permeability ferrite beads over about one foot of small (but high-powered) coaxial cables similar to the ones used in the Reiser balun. Photo E shows the W2DU "choke" balun removed from its housing.

Maxwell compared his balun with (what he termed) a "transformer-type" balun by measuring the input impedances versus frequency when the outputs were terminated in 50 ohms. Since the "transformer-type" balun didn't yield a true 1:1 impedance transfer ratio, he claimed it was because of losses, leakage reactance, and less than optimum coupling. Since he gave no description of the "trans-

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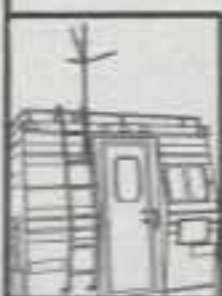


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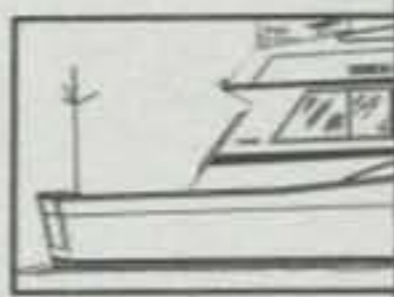


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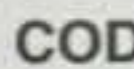
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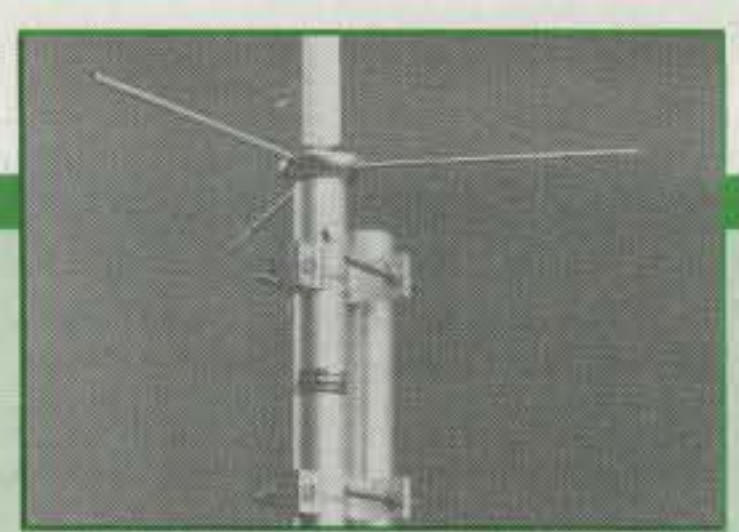
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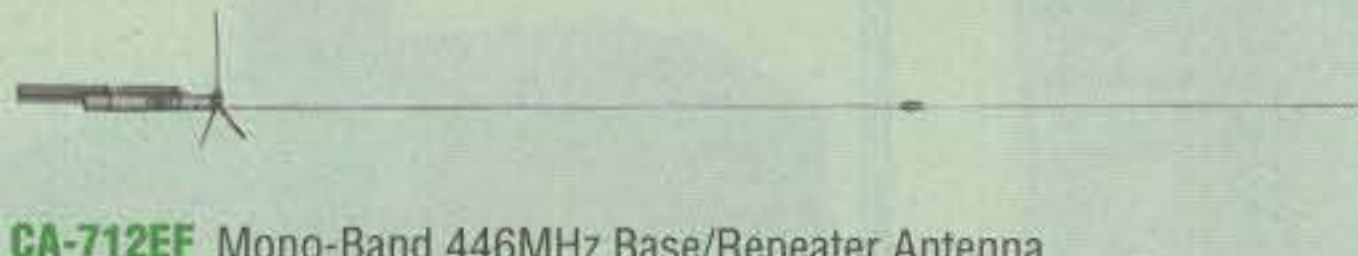
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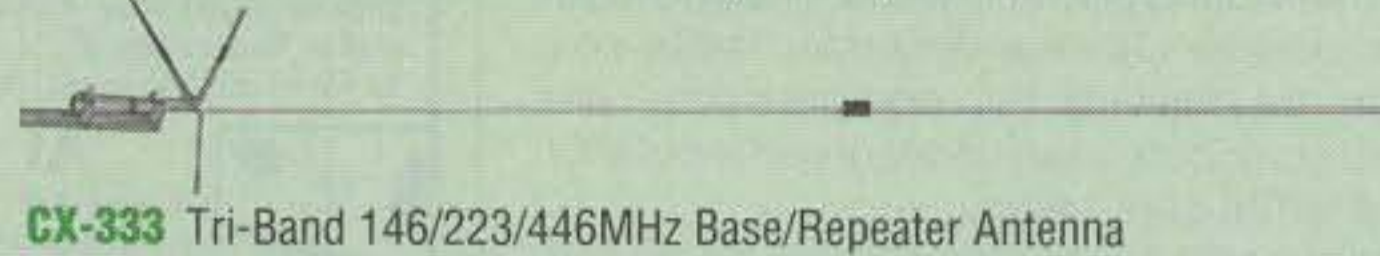
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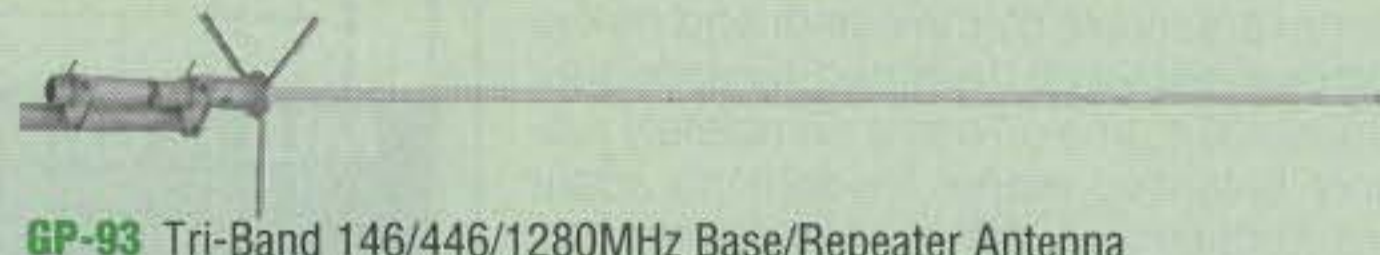


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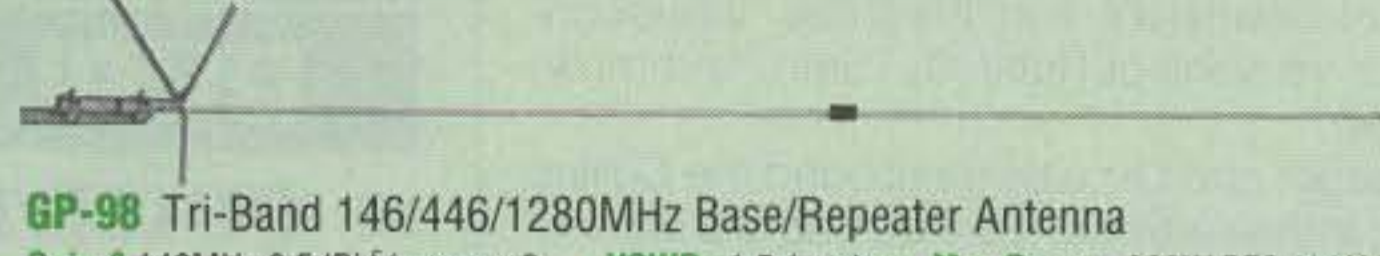


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 446MHz 9.0dBi $\frac{1}{2}$ wave x 5 **Mounts to Mast Size:** 1.25"-2.50"
Connector: Gold-Plated SO-239 **Construction:** Heavy duty fiberglass, 2 sections, 112MPH wind survival



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FL-67S Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 4.5dBi 1/2 wave, 446MHz 7.2dBi 1/2 wave x 3
VSWR: 1.5:1 or less
Max Power: 150 watts
Length: 4' 11"
Connector: Gold Plated PL-259

FL-62S Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 3.5dBi 1/2 wave, 446MHz 6.0dBi 1/2 wave x 2
VSWR: 1.5:1 or less
Max Power: 150 watts
Length: 3' 5"
Connector: Gold Plated PL-259

NEW! **SB-7/SB-7NMO** Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 4.5dBi 1/2 wave center-loaded, 446MHz 7.2dBi 1/2 wave x 3
VSWR: 1.5:1 or less
Max Power: 70W FM
Length: 4' 7"
Connector: PL-259 or NMO style

NEW! **SB-5/SB-5NMO** Dual-Band 146/446MHz w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 3.0dBi 1/2 wave, 446MHz 5.5dBi 1/2 wave x 2
VSWR: 1.5:1 or less
Max Power: 120W FM
Length: 38"
Connector: PL-259 or NMO style

NEW! **SB-2/SB-2NMO** Dual-Band 146/446MHz
Gain & Wave: 146MHz 2.15dBi 1/4 wave, 446MHz 3.8dBi 1/2 wave
VSWR: 1.5:1 or less
Max Power: 60W FM
Length: 18"
Connector: PL-259 or NMO style

NEW! **B-10/B-10NMO** Dual-Band 146/446MHz, Cellular Look-a-like
Gain & Wave: 146MHz 0dBi 1/4 wave, 446MHz 2.15dBi 1/2 wave
VSWR: 1.5:1 or less
Max Power: 50W FM
Length: 12"
Connector: PL-259 or NMO style

B-20/B-20NMO Dual-Band 146/446MHz, Cellular Appearance, No Ground Plane Required
Gain & Wave: 146MHz 2.15dBi 1/2 wave, 446MHz 5.0dBi 1/2 wave x 2
VSWR: 1.5:1 or less
Max Power: 50 watts
Length: 30"
Connector: PL-259 or NMO style

NEW! **SB-25/SB-25NMO** Mono-Band 146MHz w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 4.1dBi 1/2 wave center loaded
VSWR: 1.5:1 or less
Max Power: 100W FM
Length: 4' 9"
Connector: PL-259 or NMO style

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TRI-BAND MOBILE ANTENNAS

CX-224 Tri-Band 146/220/446MHz, w/Fold-Over, No Ground Plane Required
Gain & Wave: 146MHz 2.15dBi 1/2 wave, 220MHz 3.6dBi 1/2 wave, 446MHz 6.0dBi 1/2 wave x 2
VSWR: 1.5:1 or less
Max Power: 100 watts
Length: 3'
Connector: PL-259 or NMO style

FJ-15S Tri-Band 52/146/446MHz w/Fold-Over
Gain & Wave: 52MHz 2.15dBi 1/4 wave, 146MHz 4.5dBi 1/2 wave, 446MHz 7.2dBi 1/2 wave x 3
VSWR: 1.5:1 or less
Max Power: 120 W FM
Length: 4' 10"
Connector: PL-259

HF MOBILE AND HT ANTENNAS

HA-4S Quad-Band HF 40/* (20)/15/12/10 Meters w/Fold-Over
Wave: 1/4 wave
VSWR: 2:1 or less
Weight: 1 lb. 14 oz.
Length: 4' 4"
Max Power: 120W SSB (200W SSB 28MHz)
Connector: PL-259

SH-55 Super Flexible 146/446MHz HT Antenna
Gain & Wave: 146MHz 1.5dBi 1/4 wave, 446MHz 3.2dBi 1/2 wave x 2
Max Power: 10 watts
Length: 15.5"
Connector: BNC

NEW! **CH-722SA** High Gain HT Antenna
Gain & Wave: 146MHz 3.0dBi 1/2 wave, 446MHz 5.5dBi 1/2 wave x 2
Max Power: 50 watts
Length: 35", 2 sections, 18" each
Connector: BNC

CH-32 Miracle Baby 146/446MHz HT Antenna
Gain & Wave: 0dB 1/4 wave
Max Power: 10 watts
Length: 1.75"
Connector: BNC

DUPLEXERS AND MOBILE MOUNTS

CF-4106K, I, J 146/446MHz
Band Pass, Ins Loss, Max Pwr. 1.3-150MHz, 0.1dB, 800w PEP
 400-540MHz, 0.2dB, 500w PEP
Isolation: 60dB
CONNECTORS: 4160K 4160I 4160J
 Output: SO-239 SO-239 SO-239
 Low In: PL-259 PL-259 SO-239
 High In: PL-259 N-Male SO-239

RS-21 Trunk, hatchback, rear door (van, blazer, etc.) mount. Adjustable to virtually ANY angle. Rubber-coated base protects vehicle paint.

NEW! **RS-820** Heavy-Duty, Low Profile Trunk Lip or Hatch Back Mount. Rubber-coated base protects vehicle paint.

WS-1M Multi-Adjustable Window Clip Mount. 11.5 feet of high quality coax. Gold-plated UHF Conns. for Antennas up to 40" in height.

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HM-P2K/F Mini spkr/mic featuring full TX/RX quality! Light weight, extremely small. 1"x2" with collar pocket clip.
HM-P2K: Kenwood Version
HM-P2F: Icom/Yaesu Standard/Alinco/etc.

3D4M Standard Cable Assembly 13.5 feet of low loss coax. Gold plated UHF (PL-259/SO-239) connectors.
3D5M Standard Cable Assembly Same as 3D4M, but 17 feet of coax

CK-5M Deluxe Cable Assembly 13 feet double shielded very low loss coax + 12' RG-188 teflon coax. Gold plated UHF (PL-259/SO-239) connectors.
CK-5M5 Deluxe Cable Assembly Same as CK-5M, but 17 feet of coax

RF POWER AMPLIFIERS

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

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



MODEL 1410G
STANDARD



MODEL 1450G
HPA

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

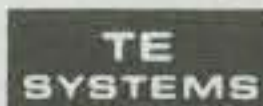
Amplifier capabilities: High-power, narrow or wideband; 100-200 MHz, 225-400 MHz, 1-2 GHz, Military (28V), Commercial, etc. - consult factory. A complete line of Rx preamps also available.

RX Preamplifiers

Band	Model	NF (dB)	Gain (dB)	Connector
50 MHz	0520B	.5	25	BNC
50 MHz	0520N	.5	25	N
144 MHz	1420B	.5	24	BNC
144 MHz	1420N	.5	24	N
220 MHz	2220B	.5	22	BNC
220 MHz	2220N	.5	22	N
440 MHz	4420B	.5	18	GNC
440 MHz	4420N	.5	18	N
1.2 GHz	1020B	.9	14	BNC
1.2 GHz	1020N	.9	14	N



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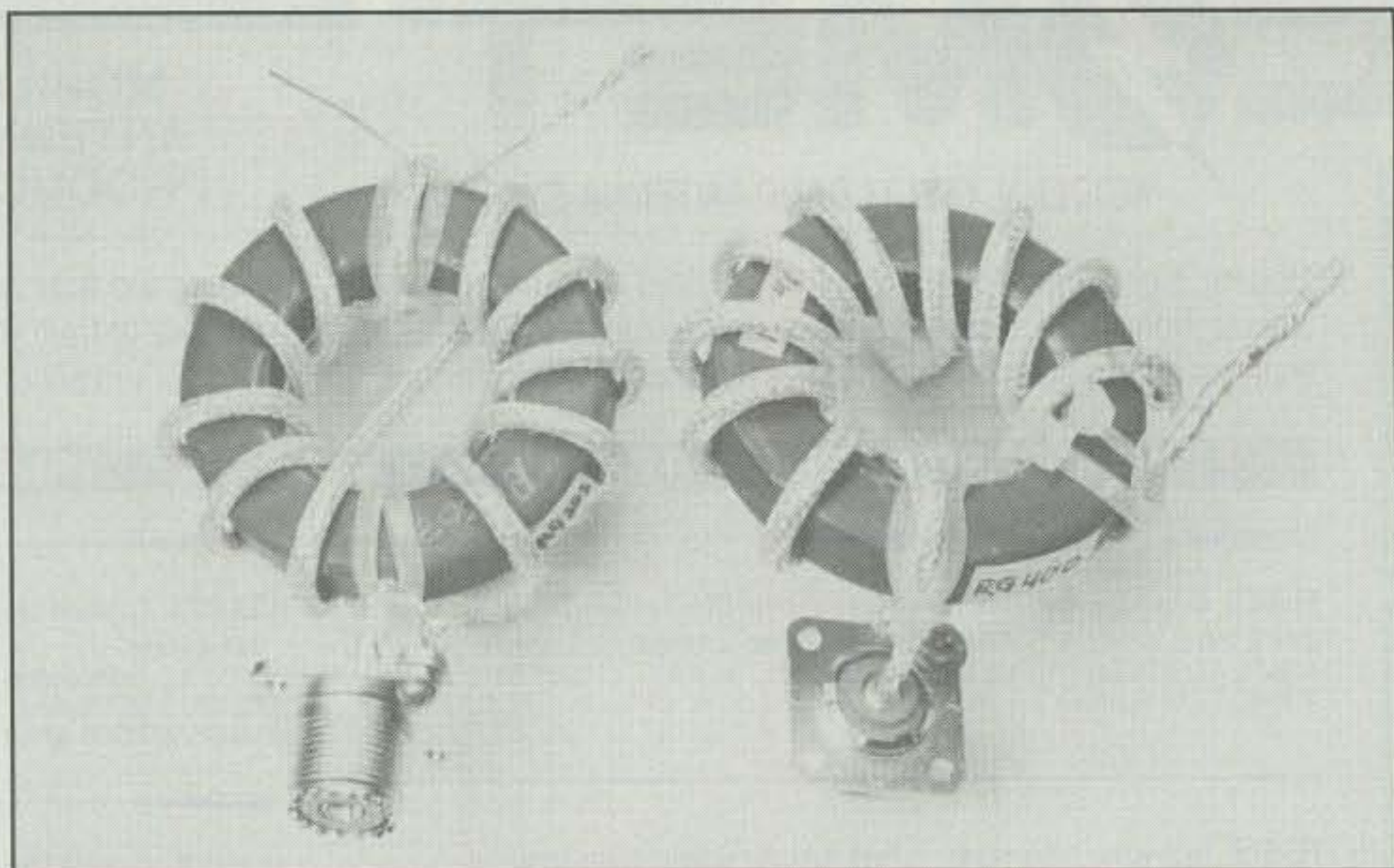


Photo F— Two versions of Reisert's 1:1 balun. The balun on the left uses the cross-over shown in fig. 5. The balun on the right is continuously wound. Both have the same electrical performance in the HF band.

former-type" balun, I assumed it was the popular rod-type balun shown in photo C. As you can see in fig. 4, this balun has a poor low-frequency response. Furthermore, it is really optimized for a load of 47 ohms and not 50 ohms.

But what Maxwell failed to realize was that his balun was a form of Guanella's two-conductor balun. That is, it is both a choke (a lumped element) and a transmission line (a distributed element). Additionally, Guanella's theory applies whether the transmission lines are coiled (about a core) or beaded or twin-

lead or coaxial cable. From Ruthroff's classic paper,⁹ which extended Guanella's work,⁸ we became aware of the voltage drops along the lengths of the transmission lines. And from very accurate insertion loss measurements,³ we learned that the losses were mainly in the magnetic medium and that they were related to the voltage levels and the permeabilities. Maxwell didn't take into account these latter findings. He used lossy high-permeability beads (2500) and assumed that the main loss was in the transmission line. He claimed that the CW pow-

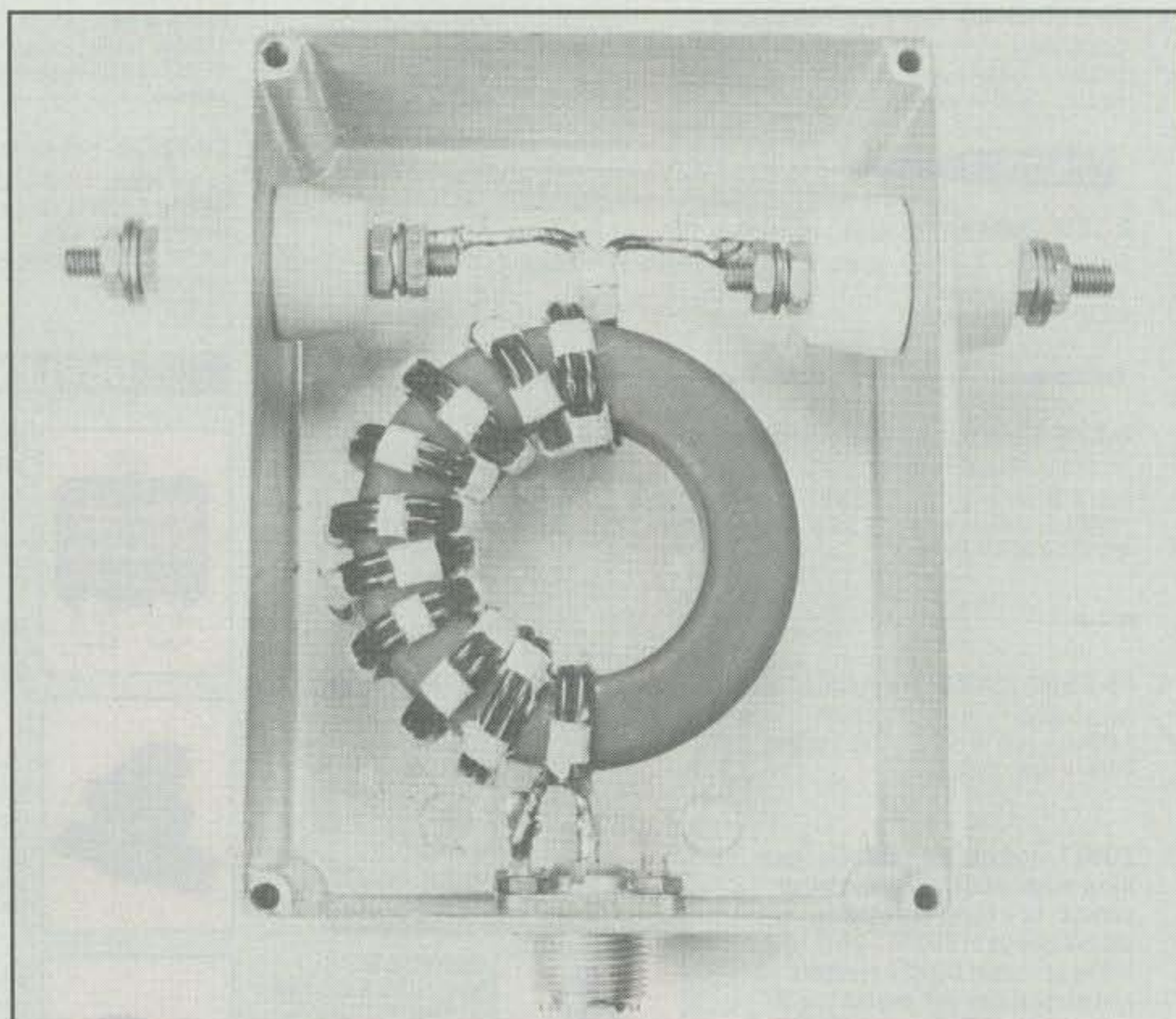


Photo G— My high-power design of a bifilar toroidal (Guanella/current) 1:1 balun mounted in a 4"L x 3"W x 2.25"H Bud aluminum box.

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.

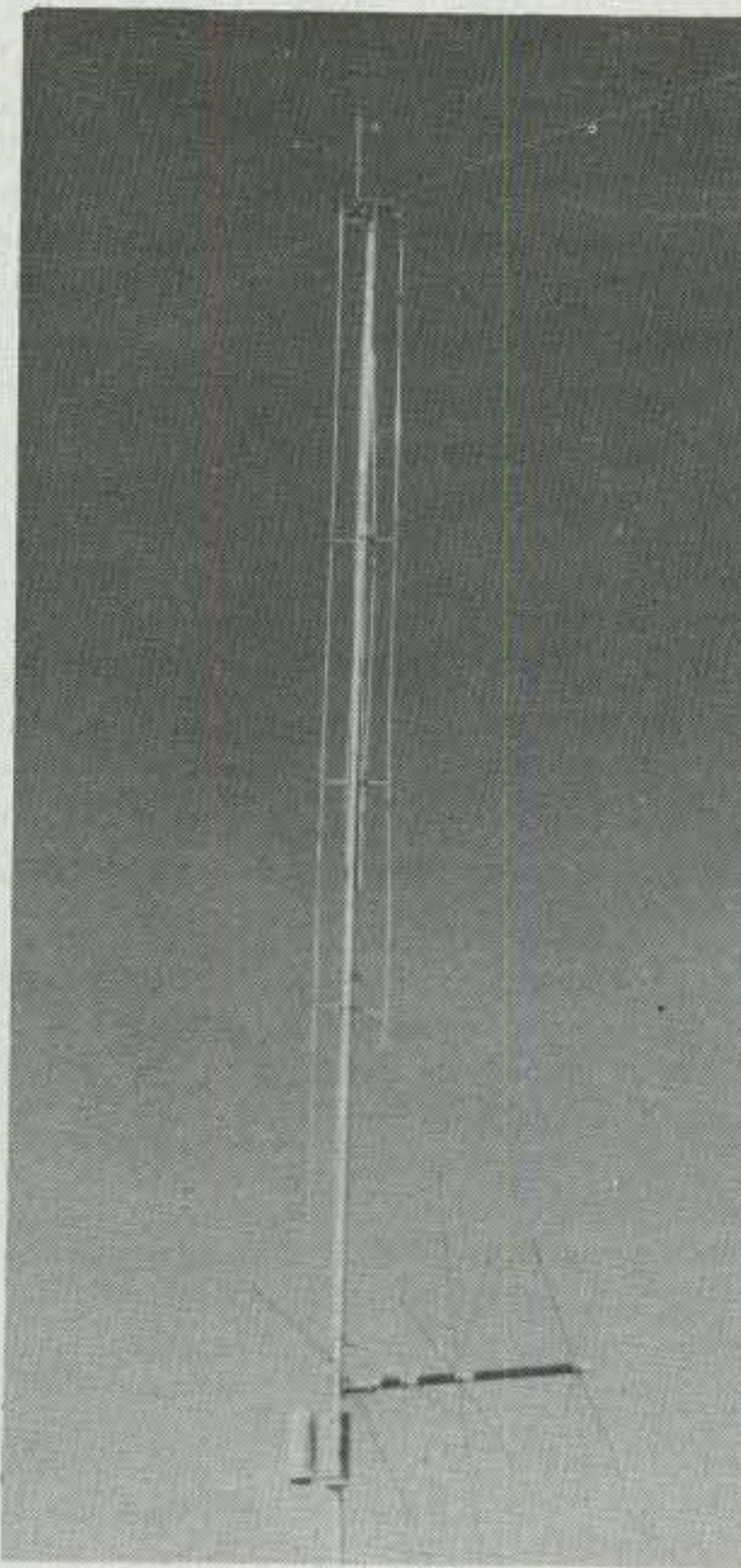
It's easy to tune because adjusting one band has minimum effect on the resonant frequency of other bands.

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



MFJ-1798

\$269⁹⁵

in all parallel radiators.

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'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.



MFJ-1786 \$299⁹⁵

Super 80/40M Vertical

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 4 1/2 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

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-1792 \$159⁹⁵



MFJ halfwave Vertical

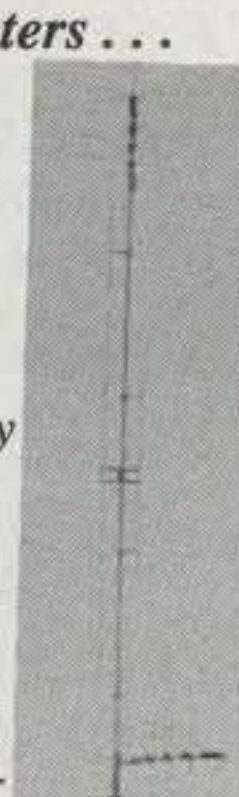
6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed!

Operate 6 bands -- MFJ-1796 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.



MFJ-1796 \$199⁹⁵

MFJ-1780 \$229⁹⁵



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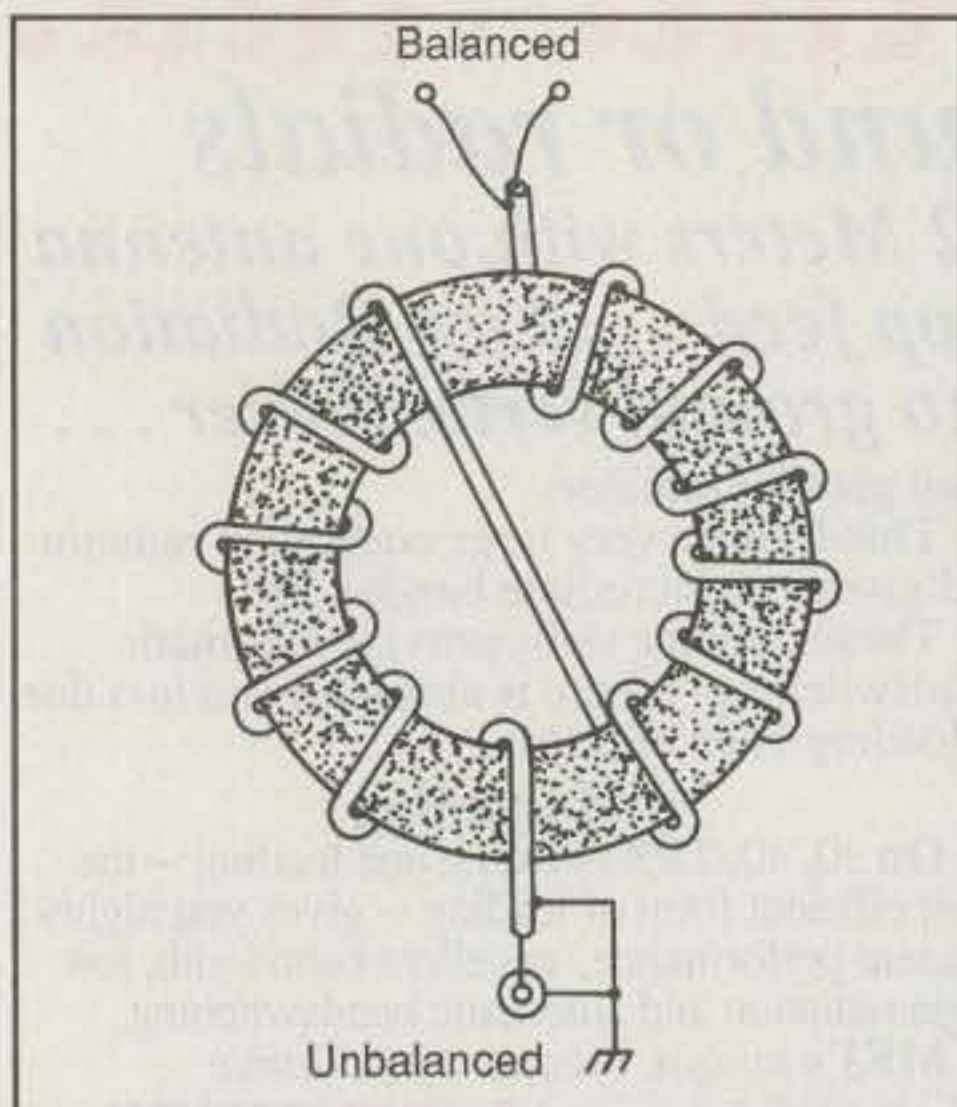


Fig. 5—A pictorial of the cross-over used in Reisert's 1:1 balun.

er-handling capability of his balun is 3.5 KW at 50 MHz and 9 KW at 10 MHz—the same as the coaxial cable itself. I seriously question these power ratings. Ironically, it is very likely that Maxwell's balun had *more* real loss than the so-called "transformer-type" balun!

R. W. Lewallen, W7EL—1985. There is very little doubt that Lewallen's interesting article¹⁷ in 1985 contributed significantly to the better understanding and design of 1:1 and 4:1 baluns. In it he coined the (now very popular) terms "voltage" and "current" baluns. The "voltage" balun, which is a three-conductor balun, has output ports which have voltages that are balanced to ground. It is brought about (see fig. 5) by the voltage-divider action of windings (5–6) and (1–2). Since we have two tightly-coupled transmission lines in the pass-band with the same potential gradients, terminal 6 is at $+V_1/2$ and terminal 4 is at $-V_1/2$, where V_1 is the input voltage. The "current" balun, on the other hand, is a two-conductor balun which causes equal and opposite currents on the output ports for any form of load impedance.

Lewallen conducted a series of experiments on 10 meters to compare the performances of "voltage" and "current" baluns under balanced and unbalanced conditions. In the unbalanced (nonsymmetrical) condition the dipole was lengthened by five inches on one side and shortened by five inches on the other side. He then obtained a figure of merit for both baluns (as well as for the case without a balun) defined as the ratio of the average magnitude of the currents at the feed point over the magnitude of the imbalance (the inverted L) current. The magnitudes of the cur-

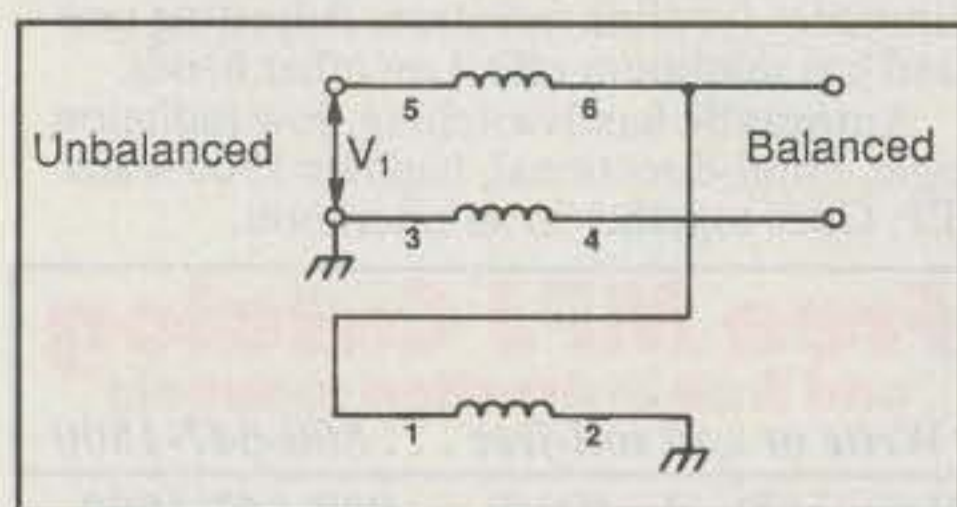


Fig. 6—Schematic of Badger's 1:1 balun with a compensating winding (1–2). Winding (3–4) is the outer-braid of the coax and winding (5–6) is the inner conductor.

rents were obtained by current-probe toroids. Measurements were made at the antenna feed point and at a half-wave (physically) from it.

The "current" balun consisted of 15 turns of very small RG-178U coax on a FT82-61 core (a ferrite toroid with an OD of 0.825 inches and a permeability of 125). The "voltage" balun had 10 turns of RG-178U coax with a No. 26 wire in parallel (closely coupled) on the same toroid. The schematic is shown in fig. 5.

Lewallen concluded (and I agree) that his experiments clearly showed that the "current" balun gave superior performance at every measured point in each experiment. However, the "voltage" balun still improved the balance over the no-balun case. He also concluded that other experiments should be performed in order to better compare the two forms of the balun. One is the difference when the feed line is placed nonsymmetrical with respect to the antenna (to induce an imbalance current into the feed line). Others include the optimum point in the feed line to place the balun and the various kinds of core and beaded baluns.

Although Lewallen's article pretty much speaks to Badger's proposal of adding a third wire to Reisert's balun for better balance (avoid it), there are some comments and questions I have regarding his experiments and findings. They are:

1. Why didn't he use Reisert's balun as the "current" balun and Badger's suggested third-wire design as the "voltage" balun? These would have been more realistic designs for comparisons. Instead, he used very small structures, which will find very little use, and as such have higher frequency capabilities. Also, since the "voltage" balun only had 10 turns (and hence a shorter transmission line and a poorer low-frequency response), it was favored in the comparisons on 10 meters. Had he used transmission lines of equal lengths, the differences between the two baluns would have been even more dramatic.

2. It would also have been very useful if Lewallen had made comparisons between a "current" balun that could handle the full legal limit of amateur radio power (again, like the Reisert balun) and "voltage" baluns such as the rod-type balun and the toroidal Turrin balun which have been readily available for nearly three decades.

3. Additionally, comparisons should not be limited to only 10 meters. Since "voltage" 1:1 baluns are configurations of coupled transmission lines with various characteristic impedances, their performances with mismatched and unbalanced loads are more sensitive to the higher frequencies than their "current" balun counterparts. Therefore, making similar measurements on 20 meters would also provide more useful information.

4. Even though Ruthroff's classic 1959 paper⁹ has been the industry standard over the years, his 1:1 balun design has been practically nonexistent in the amateur literature. Turrin mentioned its advantage over his first design in his second article.¹¹ However, Turrin's first design has prevailed in our amateur literature. Since Ruthroff's design has the third conductor on a separate part of the toroid, it has the balanced output mentioned by Badger¹³ but still retains the flexibility of the Guanella⁸ balun. In other words, as the frequency is increased, the choking action of the third wire makes it practically transparent. This enables it to handle any form of load imped-

ance. It would have been informative if Lewallen had pointed this out and also noted that Ruthroff's 1:1 balun, although looking like a "voltage" balun, is really a "current" balun.

5. Lewallen and the others who have published in the amateur radio literature failed to reference the first presentation on what is now known as "current" or "choke" baluns. It was by Guanella in 1944.⁸ Even though Guanella used coiled transmission lines without a magnetic core, his theory on how these devices work is still applicable today.

J. S. Belrose, VE2CV—1991. The last article on 1:1 baluns that I thought was worth mentioning was by Belrose in 1991.¹⁹ In it he described the W2DU balun by Maxwell and how his technique of threading coaxial cable through ferrite beads could easily be applied to 4:1 and 9:1 baluns.

What immediately caught my attention in this article were the editor's comments, which had *highly* complimentary remarks regarding the beaded-coax balun. In essence it said, "In this breakthrough article, W2DU's peerless 1:1 current-balun design serves as the basis for excellent ferrite-bead-choke current baluns capable of 4:1 and 9:1 impedance transformation."

If one reads the article carefully, however, it becomes apparent that Belrose did not say this. His words were, "The current balun of the type developed by Walt Maxwell, W2DU—a balun consisting of ferrite beads slipped over a length of coaxial cable—is the best so far devised." He did not say that W2DU's balun was "peerless." In fact, in the article he said just the opposite. He pointed out that the main disadvantage of the W2DU balun is that the beads are lossy at HF and that heating becomes a concern when the transmitting power exceeds 125 watts! For high power (1 KW CW) Belrose recommended Roehm's designs,²⁰ which use lower permeability (850) beads nearest the balun's balanced output (where most of the heating takes place).

I do, however, question two of the advantages he claims for the W2DU balun. They are:

1. Its excellent power-loss and impedance-versus-frequency characteristics are much superior to those of a bifilar current balun wound on a ferrite toroid.

2. It has excellent power-handling capability, and can function quite satisfactorily when working into highly reactive loads. This is so because the magnetic flux produced by currents flowing on this balun's wires cannot saturate its ferrite beads.

The first advantage listed above by Belrose was obtained by comparing the input impedance and power loss versus frequency of the W2DU balun with a commercial balun when they were terminated in 50 ohms. The commercial balun is a bifilar-wound toroidal type used in a differential-T tuner. What Belrose failed to realize was that the commercial balun had heavily insulated wires resulting in a characteristic impedance greater than 100 ohms. Thus, he was actually comparing a 50 ohm transmission line with a longer line that had a characteristic impedance in excess of 100 ohms! As expected, his input impedance versus frequency curve for the commercial balun was even more severe than that of the Turrin balun shown in fig. 4.

The second advantage listed above is based upon the premise that the magnetic flux produced by currents on the W2DU balun's

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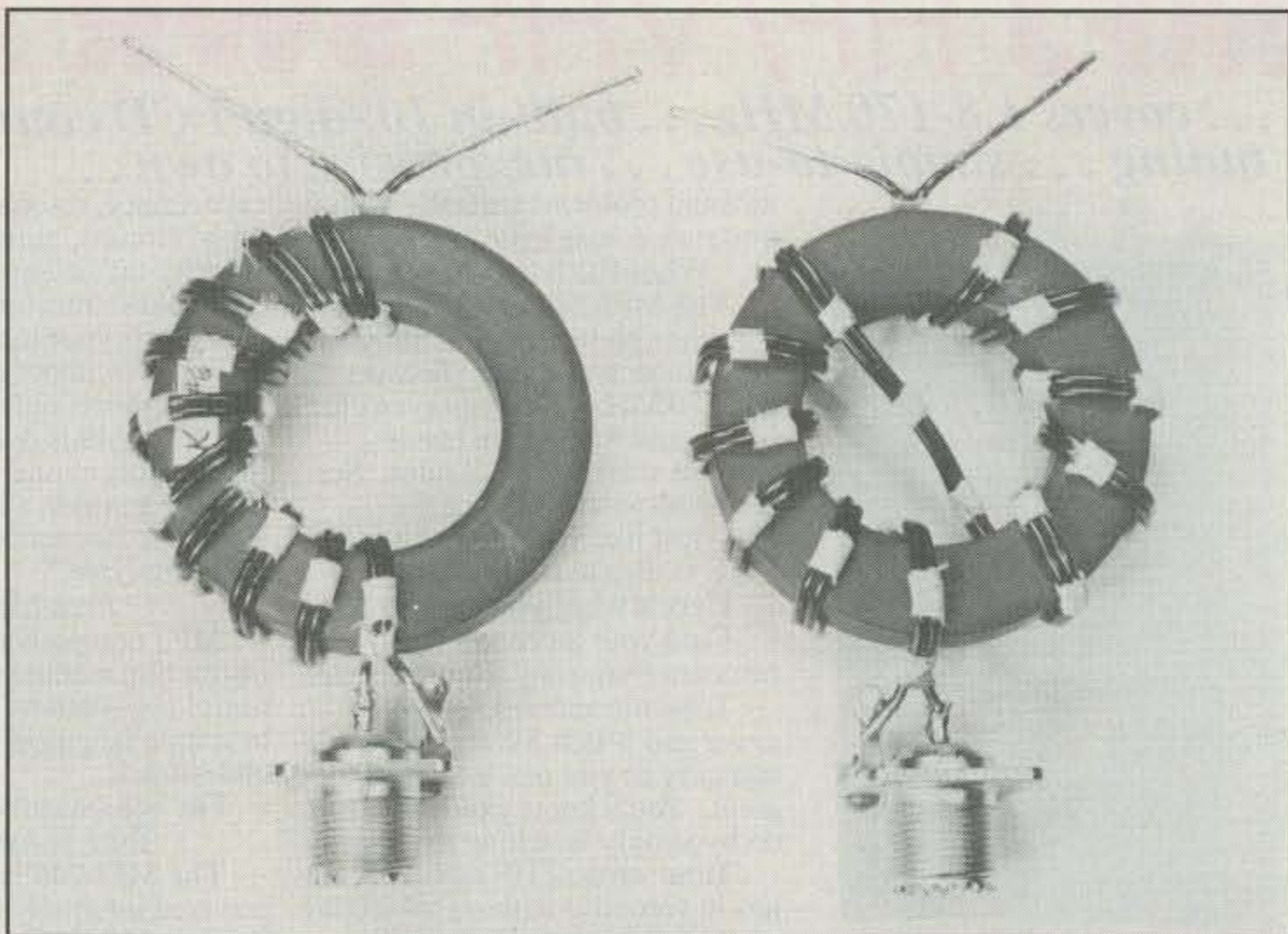


Photo H—Two “economy” versions of the high-power bifilar toroidal (Guanella/current) 1:1 balun. The one on the right uses Reisert’s cross-over technique.

wires cannot saturate the ferrite beads while the windings of a bifilar-wound toroidal current balun can saturate the core. This is wrong because the magnetic flux of a two-conductor type balun such as the beaded-coax or the bifilar-wound toroidal balun is generated by the imbalance (inverted L) current and hence is *much* less than the transmission-line currents. This is especially true with sufficient choking reactances. This impression could very well come from the perception that the toroidal-type balun still transmits the energy to the output circuit by flux linkages.

For high-power beaded-coax baluns, Belrose referred to the designs by Roehm,²⁰ who increased the power capability of this type of balun by using lower permeability beads near the balanced output. He also increased the length considerably. For operation from 80 meters to 10 meters, he used 28 inches of beaded coax. For 160 meters to 10 meters, he used 36 inches of beaded coax. With Belrose’s suggestion of connecting beaded coaxes in parallel on the low-impedance side and in series on the high-impedance side to obtain a broadband 4:1 transformation ratio, it would require transmission lines with characteristic impedances of 100 ohms. This means, for a high-power 4:1 balun using beaded transmission lines, about 56 inches of beaded line would be required for the 80 to 10 meter operation and 72 inches for the 160 to 10 meter coverage. For a 9:1 balun these lengths would even have to be increased by 50 percent!

The question that remains is what would Belrose have said or done if he had compared the W2DU balun of Maxwell’s with the W1JR balun of Reisert’s. He certainly couldn’t claim the advantages listed in his article for the W2DU balun. Would he still have said that the type of balun developed by Maxwell is the best so far devised? I doubt it.

J. Sevick, W2FMI—1994. In keeping with the preceding format, I thought it best to present my latest 1:1 balun designs at this point.

(Kits and finished units are available from Amidon Associates, Inc., 2216 East Gladwick Street, Dominguez Hills, CA 90220.) Except for one balun that appeared in the June 1993 issue of *CQ*, the others are presented here for the first time. Since I have favored Reisert’s design throughout this article, the first baluns described here are my versions of his technique of coiling small (but high power) coaxial cable around a low-permeability ferrite toroid. For my wire versions I could have used all sorts of adjectives to describe them, such as Guanella, two-conductor, choke, and current. But in the process of writing this section, I thought Belrose’s adjectives were the most direct. Using his words, I call my wire versions of the 1:1 balun simply *bifilar toroidal baluns*.

Photo F shows two versions of Reisert’s balun. The one on the left uses the cross-over shown in fig. 5. Since no difference in performance at HF was noticed without the cross-over, a continuous-wound one is also shown on the right. The main advantage in the HF band with the cross-over winding is purely mechanical. Having the input and output connections on opposite sides of the toroid is not only more convenient, but it also offers a much stronger method of mounting.

For operation from 1.8 MHz to 30 MHz, 10 turns of small coax such as RG-303/U, RG-142B/U, or RG-400/U are wound on a 2.4 inch OD ferrite toroid with a permeability of 250. If the use is limited from 3.5 MHz to 30 MHz, then a permeability of 125 is recommended, since it would yield a slightly higher efficiency at the high end. If one wants the highest possible efficiency and limits the operation from 14 MHz to 30 MHz, then a permeability of 40 is recommended. With loads grounded at their centers, these conditions were found to give ample margins (handle a VSWR of 3:1 without any appreciable flux) at their low-frequency ends.

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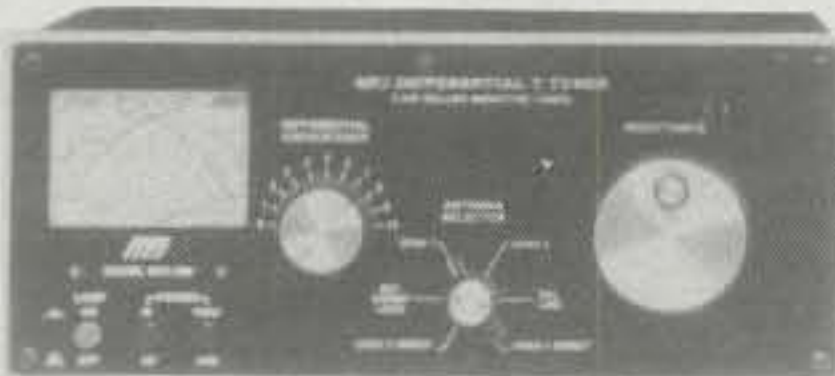
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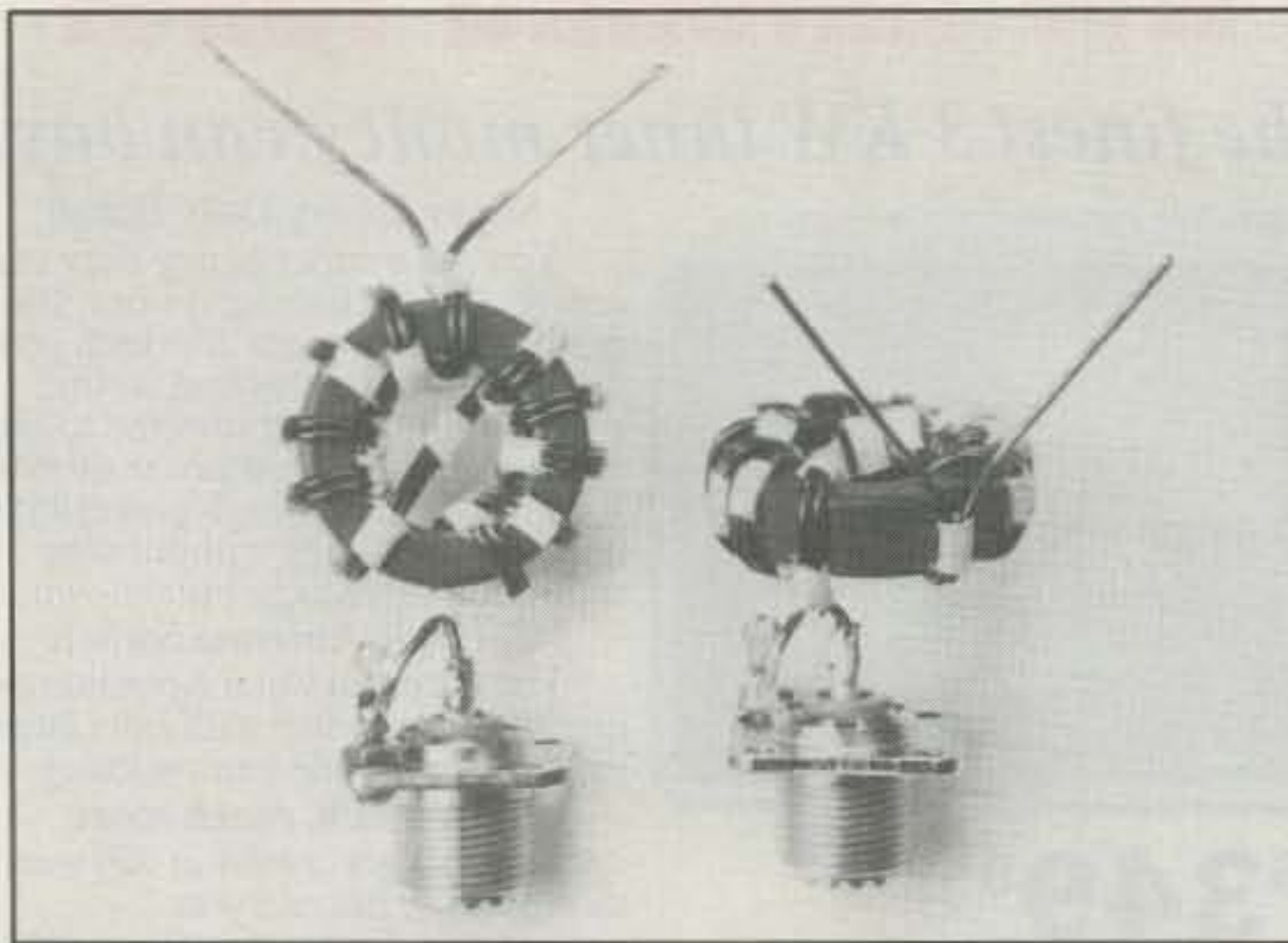


Photo I— Two low-power versions of the bifilar toroidal (Guanella/current) 1:1 balun capable of handling the output of practically any HF transceiver. The balun on the left has the cross-over.

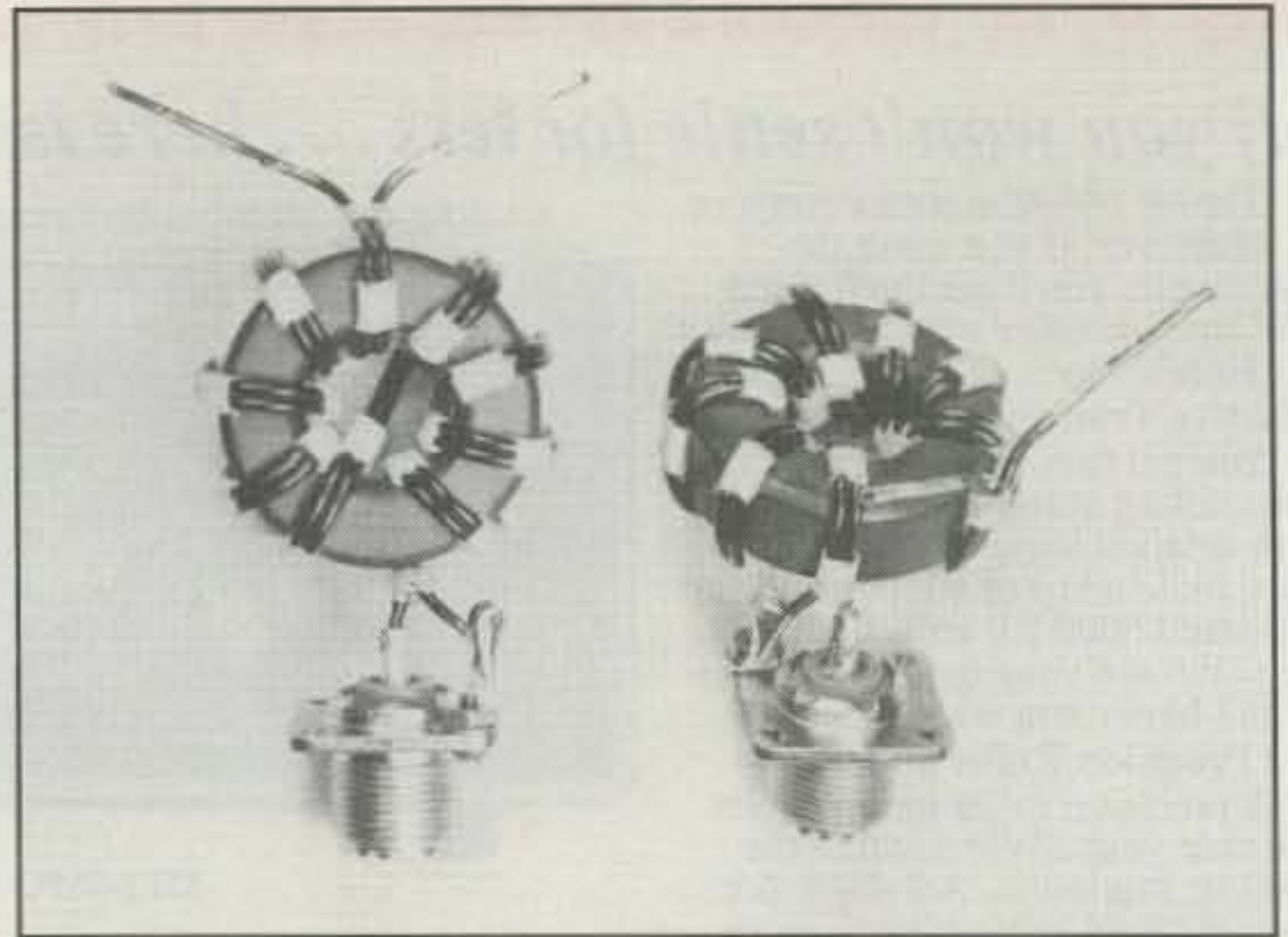


Photo J— Two medium-power versions of the bifilar toroidal (Guanella/current) 1:1 balun capable of handling the full legal limit of amateur radio power when the VSWR is less than 2:1. The balun on the left has the cross-over.

each end. Also removing the covering on the outer braid helps. Since about 24 inches of cable is wound on the toroid, starting with at least 32 inches is recommended. Of the three cables noted above, I found RG-303/U cable the easiest to wind and connect. Although it only has a single-thickness braid (the others have double-thickness braids), its power rating is still the same—9 KW at 10 MHz and 3.5 KW at 50 MHz.

The next high-power design is shown in photo G mounted in a 4"L x 3"W x 2.25"H Bud CU 234 aluminum box. It has 10 bifilar turns of No. 12 H Thermaleze wire on a 2.4 inch OD ferrite toroid. As with the Reisert versions before, a permeability of 250 is recommended for 1.8 to 30 MHz, 125 for 3.5 to 30 MHz, and 40 for 14 to 30 MHz. One wire is also covered with two layers of Scotch No. 92 polyimide tape in order to raise the characteristic impedance to 50 ohms. With this added insulation, the voltage breakdown of this twin-lead transmission line compares very favorably with RG-8/U cable (4000 volts). In order to preserve the spacing, the wires are also clamped together about every 1/2 inch with strips of Scotch No. 27 glass tape 3/16 inches wide and a little over 1 inch long.

Two "economy" versions of the high-power bifilar toroidal balun are shown in photo H. The one on the left shows the windings crowded on one-half of the toroid. The one on the right has the same positions of the input and output connections by using the cross-over. Their performances are identical. Both baluns have 10 bifilar turns of No. 14 H Thermaleze wire on a 2.4 inch OD ferrite toroid. The choices of permeability, which trade-off bandwidth for efficiency, are the same as those used in the two previous high-power designs. As was mentioned at the beginning, the word "economy" refers to economy in labor.

This balun, which also handles the full legal limit of amateur radio power, has a small trade-off in high-frequency response. Since no extra insulation is used, the characteristic impedance of two tightly-clamped No. 14 H Thermaleze wires is 45 ohms. With one layer of Scotch No. 92 tape it increases to 50 ohms. But for most of the HF band, the difference in perfor-

mance between baluns using transmission lines of 45 and 50 ohms should be negligible. Even without the extra insulation the voltage breakdown should compare very favorably with the smaller, high-power coaxes used in the Reisert versions (1900 volts).

Photo I shows two low-power versions of a bifilar toroidal balun capable of handling the output of practically any HF transceiver. One has a cross-over winding and the other a continuous winding. They both have 10 bifilar turns of No. 16 H Thermaleze wire on a 1.25 inch OD ferrite toroid with a permeability of 250. Since efficiency is not a major problem in low-power use, I found no reason to suggest the other two versions, which use lower permeabilities. It is interesting to note that two tightly clamped No. 16 H Thermaleze wires have a characteristic impedance close to 50 ohms. Therefore, this small balun (particularly with its short leads) has a very good high-frequency response.

Photo J shows two medium-power versions of a bifilar toroidal balun capable of handling the full legal limit of amateur radio power under controlled conditions—when the VSWR is less than 2:1. Being smaller than its larger (2.4 inch OD) counterpart, its heat-sinking capability, and hence power rating, is less. As before, one balun uses a cross-over while the other does not. Each has 8 bifilar turns of No. 14 H Thermaleze wire on a 1.5 inch OD ferrite toroid. The ferrite permeabilities and expected bandwidths are the same as with the other high-power baluns. Since the average magnetic path length in the core is about two-thirds that of the 2.4 inch core, only 8 bifilar turns are required in order to produce a similar low-frequency capability. Even though the characteristic impedances of their bifilar windings are 45 ohms, their responses on 10 meters should be somewhat better than the "economy" models, since the lengths of their transmission lines are shorter (18 compared to 24 inches).

And now a few words on what sort of efficiency one can expect in trading-off low-frequency response by using lower permeability ferrite cores. From earlier studies³ it was found that the efficiency (with sufficient choking so only transmission line currents flow) is related to the permeability, the voltage drop along the

length of the transmission line, and the frequency. The higher the permeability and/or voltage, the greater the loss. Additionally, the higher the permeability, the greater is the loss with frequency. It was also found that a permeability of less than 300 was necessary in order to obtain the very high efficiencies of which these devices are capable.

From the results of the studies, here are some efficiencies that might be expected from ferrites under matched conditions:

1. With 250 material, an efficiency near 99 percent at 1.8 MHz and 97 percent at 30 MHz.
2. With 125 material, an efficiency near 99 percent at 3.5 MHz and 98 percent at 30 MHz.
3. With 40 material, an efficiency of 99 percent at 14 MHz and at 30 MHz.

When a balun is exposed to a high impedance resulting in a VSWR of 2:1, the voltage, and hence loss, increases by about 40 percent. With a VSWR of 4:1 the loss doubles. With a VSWR of 10:1 the loss is more than threefold. Since limited data was obtained in this study,³ these increases in losses with increases in VSWR could very well be greater.

Summary

In preparing this article I was quite surprised to still see the ferrite- and powdered-iron-core 1:1 balun designs that have been available in the literature and elsewhere since 1964. They not only had poor low- and high-frequency responses, but they were also susceptible to flux in the cores at their low-frequency ends. Furthermore, since they only used single-coated wires, they were also prone to voltage breakdown. No doubt, these designs were responsible for the poor reputation that the balun has had for many years.

It wasn't until 1978, when Reisert published his article, that a balun became available with all of the attributes of a good design, namely:

- a) Is efficient because it uses a low-permeability core.
- b) Has sufficient choking reactance to meet its low-frequency requirement.
- c) Is not prone to flux in the core (and hence, saturation) since it has no third winding.

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MFJ Artificial RF Ground

MFJ-931
\$79⁹⁵

Creates artificial RF ground that eliminates or reduces RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding.

Greatly improves your signal if you're using a random wire or longwire antenna with an ineffective ground.

Electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire.

20 Meter CW Transceiver

MFJ-9020
\$179⁹⁵

Throw this tiny MFJ 20 Meter CW Transceiver in a corner of your briefcase and enjoy DXing and ragchewing wherever you go. You get high performance superhet receiver, crystal filter, RIT, AGC, vernier tuning, sidetone, speaker, up to 5 watts output, semi/full break-in, much more. Free manual. See free MFJ catalog for 40, 10, 17, 15 Meter versions, keyer, audio filter, power pack, tuner, antennas.

Super Active Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to-operate active antenna...quiet...excellent dynamic range...good gain...low noise...broad frequency coverage... excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz - 30 MHz.

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Switch two receivers and aux. or active antenna. 6x3x5 in. Remote has 54 inch whip, 50 ft. coax. 3x2x4 in. 12 VDC or 110 VAC with MFJ-1312, \$12.95.

Cross-Needle SWR Meter

MFJ-815B
\$69⁹⁵

Peak/average Cross-needle SWR/mattmeter. Shows SWR, forward/reflected power in 2000/500 & 200/50 watt ranges. 1.8-60 MHz. Mechanical zero. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, \$12.95.

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MFJ Coax Antenna Switches



\$34⁹⁵ MFJ-1701



\$21⁹⁵ MFJ-1702B



\$59⁹⁵ MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. One year unconditional guarantee.

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MFJ-1702B, \$21.95. 2 positions plus new Center Ground. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. MFJ-1702BN, \$31.95, N connectors, DC-1.1 GHz.

MFJ-1704, \$59.95. 4 position cavity switch with lightning/surge protection. Center ground. 2.5 KW PEP, 1 KW CW. 50 dB isolation at 500 MHz. 50 ohm. 6 1/4x4 1/4x1 1/4 in. MFJ-1704N, \$69.95, N connectors.

Dry Dummy Loads for HF/VHF/UHF

MFJ has a full line of dummy loads to suit your needs. Use for tuning to reduce needless (and illegal) QRM and save your finals.

MFJ-260B, \$29.95. VHF/HF. Air cooled, non-inductive 50 ohm resistor. SO-239 connector. 300 Watts for 30 seconds, derating curve. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 150 MHz. 2 1/2x2 1/2x7 in. MFJ-260BN, \$34.95, N connectors.

MFJ-264, \$59.95. Versatile UHF/VHF/HF 1.5 KW load. Low SWR to 650 MHz, usable to 750 MHz. 100 watts/10 minutes, 1500 watts/10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 in. MFJ-264N, \$69.95, N connector. MFJ-5803, \$4.95, 3 ft. coax/ PL-259.



\$29⁹⁵ MFJ-260B



\$59⁹⁵ MFJ-264

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\$39⁹⁵



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MFJ-422B
\$134⁹⁵



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\$19⁹⁵ MFJ-108B

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MFJ-112 shows hour/minute/second, day, month, date, year at any QTH on world map. 12 or 24 hour display. Daylight saving time feature.



\$24⁹⁵ MFJ-112

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Covers 2 Meters and 220 MHz. 30 and 300 Watt scales. Relative field strength 1-250 MHz, SWR above 14 MHz. 4 1/2x2 1/4x3 in.



Code Practice Oscillator

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MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable. 9-volt battery or 110 VAC with MFJ-1305, \$12.95.



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e) Has a good voltage breakdown capability (1900 volts).

f) Can handle a mismatched and/or unbalanced load.

Succeeding investigators, however, failed to see the advantages of his design and proposed their own. Surprisingly, they belonged to two distinct groups. One favored "air-core" baluns and the other "choke" (beaded-coax) baluns.

The main argument given by the "air-core" followers was that their balun would never experience the problems with saturation while the "ferrite-core" balun would. The Reisert balun, however, is a current/choke type balun which could only have flux in the core by the imbalance (inverted L) current, which is much smaller than the transmission-line currents. In fact, with any degree of choking reactance by the coiled transmission line, the imbalance current is essentially negligible. Therefore, saturation is not a concern with a balun such as Reisert's. But in all fairness, it should be pointed out that with the 4:1 current/choke and voltage baluns it is a different story. All three of these types of baluns have a "magnetizing inductance" in their low-frequency models and hence a possibility of saturation with a poor design.

The advocates of the "choke" 1:1 balun claim that their beaded-coax balun can't sat-

urate, while the bifilar (current) toroidal balun can. This is entirely wrong, since they are basically the same kind of structure—neither has a third conductor which could allow a flux-causing current at the very low-frequency end. But of all of the attributes listed above for the Reisert balun, the first one has the "choke" balun at a disadvantage in the HF band. Since its transmission line is not coiled about a toroid, it does not have the multiplication factor of N^2 (due to mutual coupling), where N is the number of turns, while the toroidal balun does. Therefore, higher-permeability beads are required in order to obtain sufficient choking reactance. This results in lower efficiency.

And finally, I am quite sure that some readers of this article will disagree with my views and/or think they have better designs than those of the Reisert baluns and the ones I presented here. If so, I encourage them to respond in print. In this way we will all benefit from the new information.

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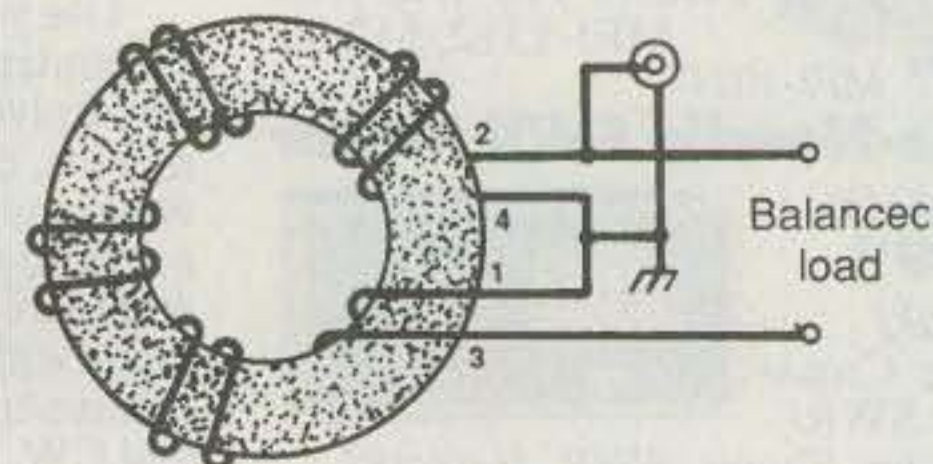
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Correction To February Article

In the February issue of *CQ* on page 28, "A Subsequent Look At 4:1 Baluns," also by W2FMI, fig. 2 was incorrect. The pictorial representation of the 4:1 Ruthroff (voltage) balun is as shown here.

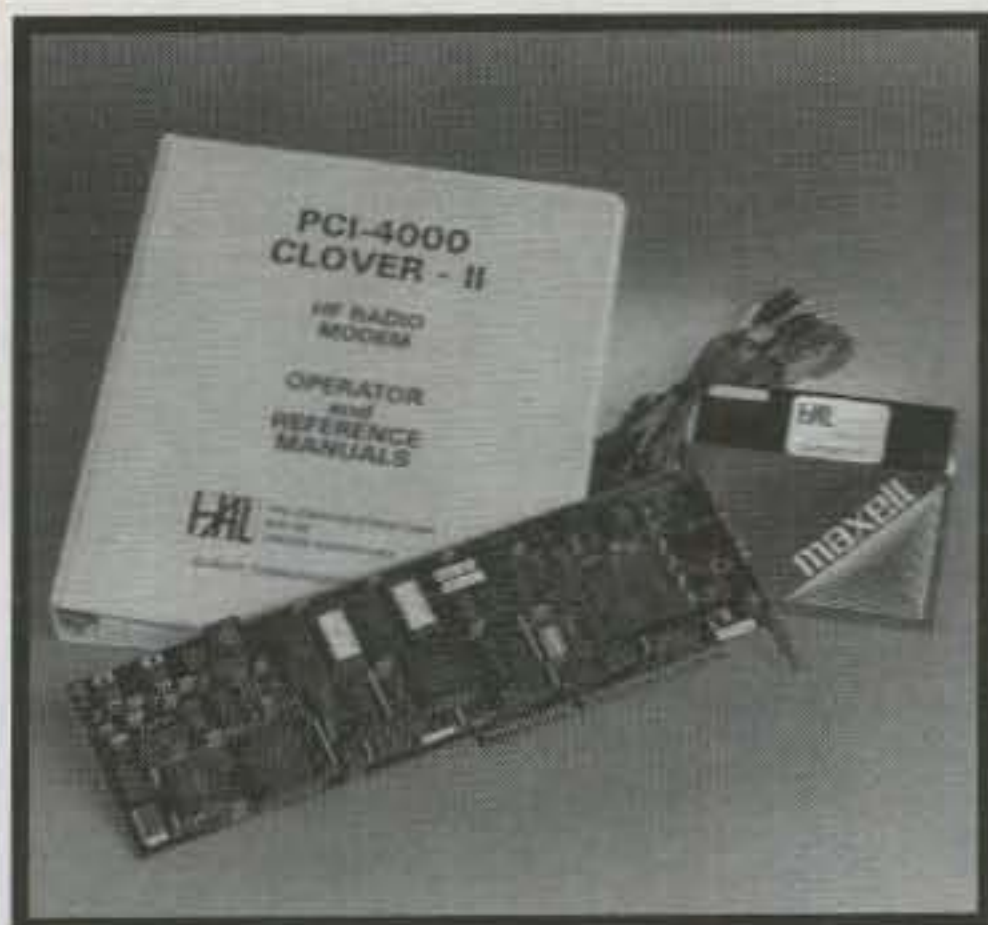




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Dawn of
A New Day



CQ REVIEWS:

The High Sierra Model HS-100 Antenna

BY LEW McCOY,* W1ICP

The name High Sierra is a relatively new one to amateur radio. However, their new antenna is probably one of the most tried and tested concepts around today. Briefly, the antenna is primarily designed for low-frequency, 80 through 10 meter mobile work, but there are many more uses for the antenna.

In my long career of working with antennas I have only seen a few that were completely tuned from the operating position.

* Technical Editor, CQ, 1500 West Idaho St., Silver City, NM 88061

By tuned, I mean an antenna that is tuned to resonance so that all reactance in the antenna feedpoint is cancelled out *at the antenna*. This is an extremely unusual procedure, to say the least. At this point I need to bring a little history into this product review.

Many years ago—over 40—an amateur name Don Johnson, W6AAQ, took a strong interest in mobile operation and constantly experimented with many designs, always looking for the ideal antenna. In fact, Don wrote a book entitled *40 + 5 Years of HF Mobiling* (published by

World Radio Books, P.O. Box 189490, Sacramento, CA 95818). This book covers his work, including a homebuilt model of the antenna described here. There are well over a thousand of Don's model DK-3 antennas in use, and this is not an exaggeration. The High Sierra HS-100 is an extremely well-made version of the DK-3. So what is the antenna?

The HS-100 is an antenna that is base mounted (see some of the photos). Just above the base is a hollow aluminum tube that encases a coil, the coil being 16 inches long overall. It consists of 160 turns



The High Sierra antenna mounted on my trailer. Note the convenience of the gate hinge for support. Of course, I do not use this when I'm moving, because the antenna is mounted high.



This is the antenna mounted for mobile operation.

YAESU



FT-1000D / FT-1000

A 200 watt HF XCVR with dual RX, automatic antenna tuner, built-in power supply, and more! The deluxe model also features a TCXO, 3 additional filters, and full dual RX (any two bands); the standard model has dual in-band RX. Both are excellent radios **Call**



FT-990 / FT-990DC

A 100 watt HF XCVR with automatic antenna tuner, digital peak filter, CW keyer, IF shift, notch filter, noise blanker, 90 memories, and more! The AC model also features a built-in power supply, DC input jack, and a 500Hz CW filter. Both are great performers ... **Call**



FT-890AT

A 100 watt HF XCVR with CW keyer, 32 memories, IF shift, notch filter, DC input, and one incredible automatic antenna tuner that will tune almost anything! The great tuner and compact size make this radio an excellent choice for mobile operation **Call**



FT-736R / FT-767GX

The FT-736R is an all mode 2m/70cm base rig. One open slot for 6m, 220 MHz, or 1.2GHz. The FT-767GX is an all mode HF rig with three open slots for 6m, 2m, or 70cm. Both radios are excellent, versatile performers **Call**



FT-5200 / FT-5100

Two 45 watt 2m/70cm FM mobile rigs. The FT-5200 has 28 memories, CTCSS encode, and an optional front panel separation kit. The FT-5100 has 94 memories and dual in-band RX. Both are great mobile radios **Call**

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A 150 watt HF XCVR with dual in-band receive, all mode digital signal processor, microprocessor controlled automatic antenna tuner with memories, built-in power supply, high stability crystal oscillator, CW keyer, 100 memories, and more! An excellent performer **Call**



TS-850SAT / TS-850S

A 100 watt HF XCVR with DC input, 100 memories, IF shift, pass band tuning, CW keyer, notch filter, and more. Optional all-mode digital signal processing unit. The AT model includes an automatic antenna tuner. Both radios are great performers **Call**



TS-450SAT / TS-450S

A 100 watt HF XCVR with DC input, 100 memories, IF shift, notch filter and more. Optional all-mode digital signal processor. Optional filters can be installed in two IFs. The AT model comes with an automatic antenna tuner. Both rigs are excellent mobile performers **Call**



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TM-742

A 45 watt 2m/70cm FM mobile radio with 100 memories per band, CTCSS encoder, and more. The radio has one open expansion slot for an optional 10m, 6m, 220MHz, or 1.2GHz band module, and an optional separation kit **Call**

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 TR-751 2m all-mode mobile **Call**
 TS-140 HF mobile XCVR **Call**
 TS-690 HF/6m mobile XCVR **Call**
 TS-790 2m/70cm base XCVR **Call**
 UT-50 6m unit- TM-742 **Call**
 UT-220 220MHz unit- TM-742 ... **Call**
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1.500"	.058"	1.384"	1.40/Ft.
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with a total inductance of approximately 120 uH. A 66 inch whip is mounted above the antenna, although the whip length is not critical. The overall length will depend on the flexible whip top length, but the antenna with a 66 inch whip is approximately 9 feet from top to base.

So far what I have described is somewhat like a conventional, center-loaded whip antenna. However, that far from tells the story of this remarkable system. Inside the coil—that's right, *inside* the coil—is a 12 volt DC motor. The motor is used to drive the coil assembly up or down, shorting out unused portions of the coil. In other words, the coil has turns shorted out to bring the overall antenna into complete resonance.

The coil assembly is driven up or down by the motor. Incidentally, the 12 volt DC motor is controlled via a double-pole, double-position, center-off switch (more on that in a moment).

So what is the result in simple, easy-to-understand English? We now have an antenna that can be remotely controlled, and can be brought into resonance on any frequency between 3500 kHz (the low end of 80) clear up to 29,700 kHz (the high end of 10). And to spell that out even further, it means that we have an antenna with a 1 to 1 SWR, or very close to 1 to 1, with a matched condition on any of these frequencies, which of course

includes MARS frequencies. You can quickly see why I say this is an unusual antenna.

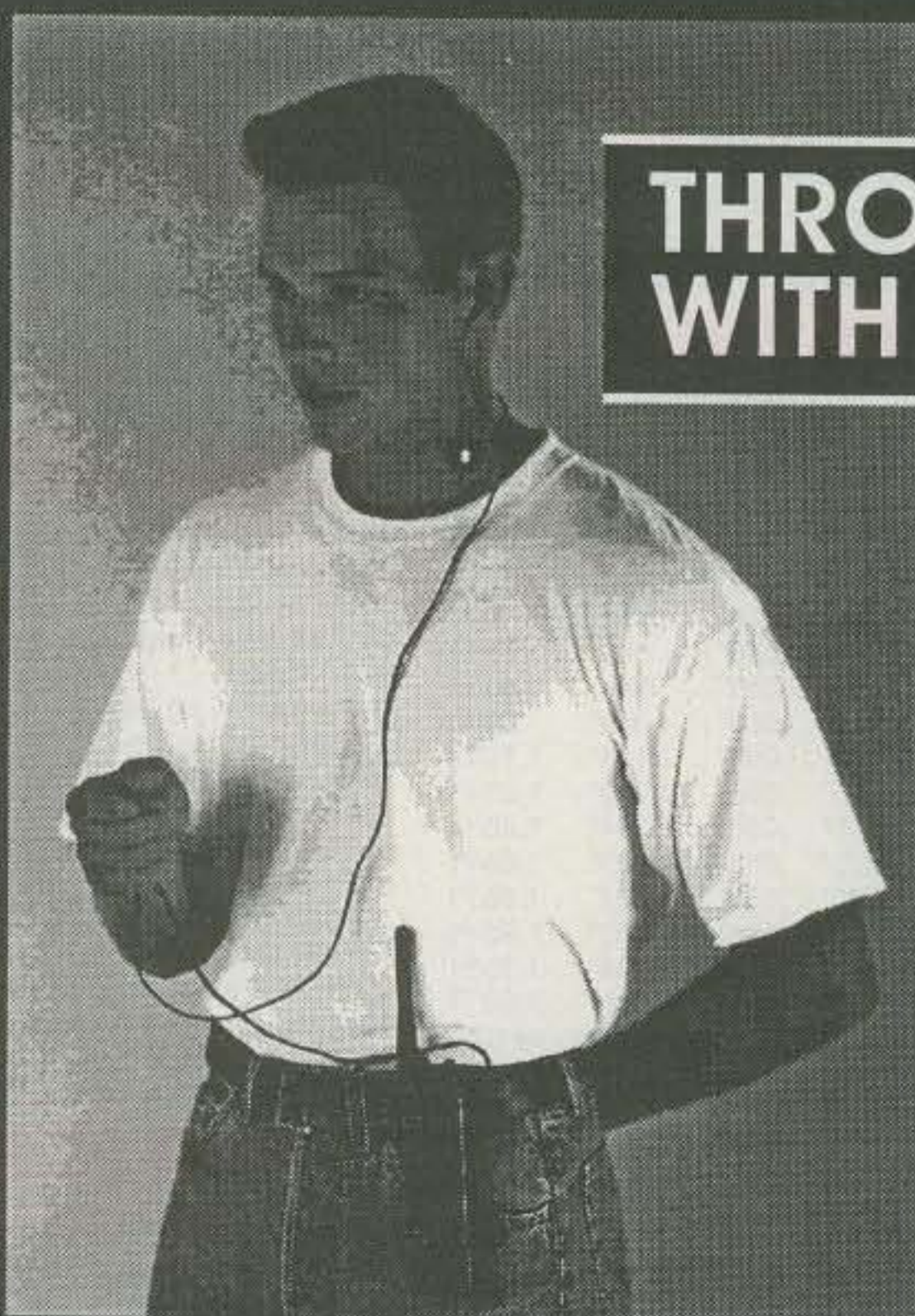
My review model of the High Sierra antenna was mounted on one end of my 28 foot travel trailer. I used it on 80 through 10 meters running 50 watts with a Ten-Tec Scout. I consistently got 5/9 reports or better on all the bands. My installation consisted of a novel mounting method as shown in the photos.

The antenna comes with a base tapered rod about 5 inches long which fits into a mating taper at the bottom of the antenna. The antenna coil is enclosed in an aluminum tube, and coming out of the bottom of the tube at the base are three leads—two for the motor control and a ground lead. The base unit mounted on the bumper shown in the photo is not what I used. I wanted to be able to install the antenna so that the base was near the roof of my trailer. However, I wanted easy access to mounting or demounting the antenna, which meant no ladders or climbing. I bought a gate hinge and mounted it on the wall of the trailer just a foot or so below roof level. The tapered base mount of the antenna was installed on the leaf of the hinge. I also made sure I had good electrical connections (ground) to the metal body of the trailer. I ran two leads for the 12 volts DC into the trailer along with the short RG-58 cable.

Next I connected the two 12 volt leads to a double-pole, double-throw switch, center off, and then the switch to the same 12 volt supply that runs the rig. The switch changes the polarity of the leads to the motor, making the coil raise or lower, shorting out turns as required. I had an SWR meter installed and started out on 20 meters. It was interesting to start the motor, hear the antenna coil move, and watch the SWR drop from infinity down to 1.2 to 1. There was a pile-up on an African station, but I thought, nothing ventured nothing gained. No, he didn't come back on the first call, but he did on the third. That gave me a lot of satisfaction, so I moved around the band, making several contacts.

I then switched to 40 meters, ran the coil in this case down to a 1 to 1 match and proceeded to work stations. I gradually worked through all the bands, and I must say, it was a real pleasure to use a resonant antenna at all times.

Getting back to the construction of the High Sierra HS-100, the coil is wound on an insulated form using 10 turns per inch at about 1.8 inch diameter. It is this coil form that travels up and down. At the top of the coil is a special "O" type ring that shorts out the unused turns (see photo). Also, the antenna is provided with a clear plastic cover that travels up and down with the coil. The cover serves to weath-



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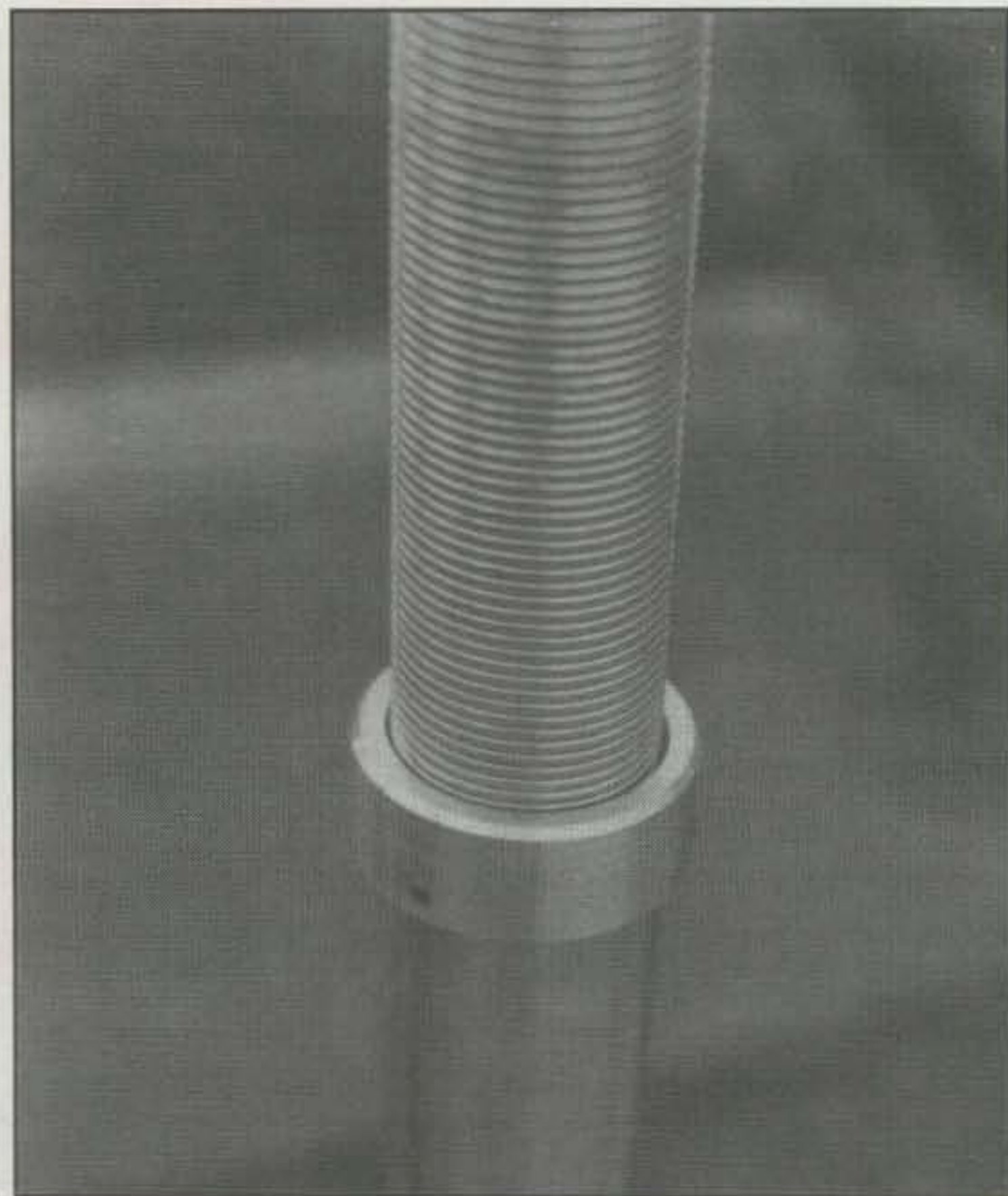
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Looking down at the "O"-ring decoupling collar. The coil moves up and down inside the aluminum tube.

A closeup of my hinge mounting method for my trailer. It is important to keep the ground lead and the coax ground lead close together. The two DC leads are merely dressed down and into the trailer (along with the coax feed).



erproof the innards of the antenna. At the base, inside the antenna, is a tapped matching toroid that provides the perfect—or almost perfect—match on all bands. I say almost perfect because at

one point I found that I had an SWR of 1.6 to 1 (big deal!).

Don, W6AAQ, mentioned earlier, had sent me many photos of unusual installations of this system, including many of a

strictly fixed system. I see this antenna not only as an RV or mobile antenna, but as a real working unit for condo dwellers, people who have antenna restrictions, etc. I received a phone call from an ama-

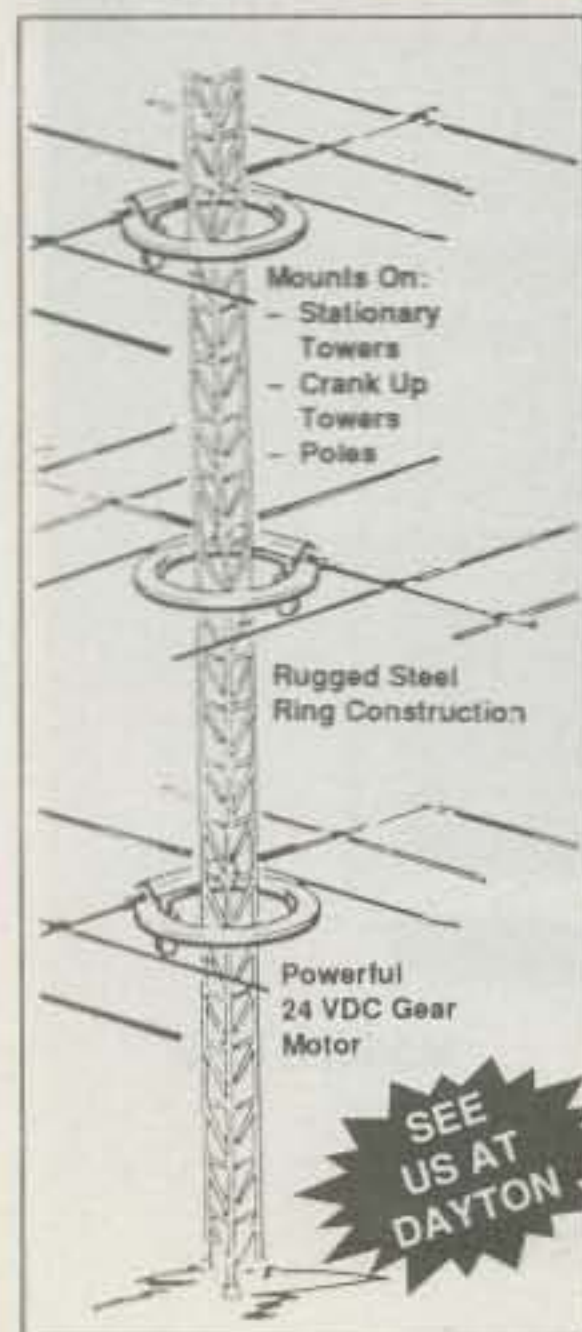
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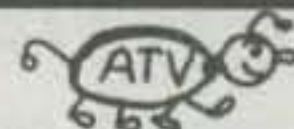
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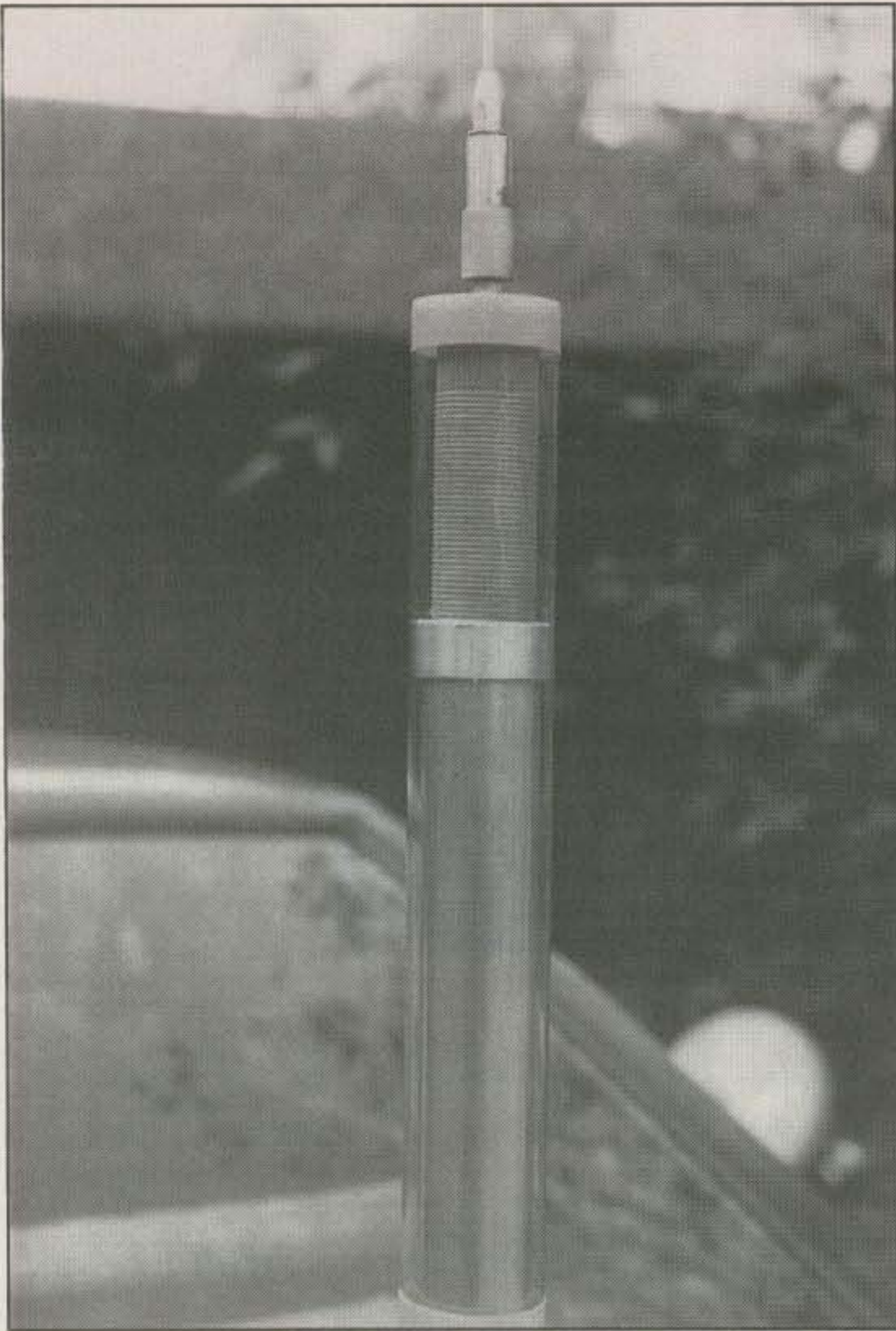
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teur asking about an antenna for an attic. I suggested buying a couple of rolls of heavy-duty aluminum foil, laying down a floor of this for a ground, and then mounting the High Sierra over the foil. You could use a bunch of random radials just as well—or almost as well. Keep in mind that the antenna could be mounted on a condo balcony, grounding to any metal. You could even mount the antenna horizontally, or at a 45 degree angle with a small American flag at the end of the whip! (Who said antenna restrictions?) What must be realized here is that this is a remotely-tuned-to-resonant antenna so all you need is that switch and an SWR meter at the operating position (and a very small 12 volt DC supply).

A couple of additional points are worth mentioning here. Running the coil up and down while listening on your receiver will quickly determine resonance. As you approach resonance, your receiver will come "alive" with signals, and the exact matching point will be very close. As stated, I used a 66 inch whip, and this was slightly long for 10 meters. There is, how-

ever, a "harmonic" resonant point for 10 just a little above the 75 meter point. I purchased a CB whip from Radio Shack and trimmed it to 66 inches.

The one point that is extremely important in low-band mobile work is to reduce ground losses. In RV work you usually have a large mass of metal such as aluminum roofs, etc., to help. In modern cars there is a lot of fiberglass and plastic and a sparsity of metal. Use plenty of bonding straps to bond motor, frame, etc., all together. In fact, while I have never tried it, it might not be a bad idea with modern automobiles to install a ground system. This would mean running some "radials" made from strapping copper braid around the bottom of the vehicle. The more you install the better.

A technical fact of life is that if you reduce the physical length of an antenna, you also reduce its impedance. To show you how important this is just look at the impedance of an 80 meter whip compared to an 80 meter dipole. The 80 meter dipole has an impedance on the order of 70 ohms. Of this impedance

something around 68 ohms is the useful impedance, or radiation resistance, R_r . Most of the power in the dipole goes into the 68 ohms to be radiated as useful power. But in an 80 meter whip that has been reduced in physical size to 8 to 10 feet, there is a serious power problem. The ohmic resistance (loss) is on the order of two to three ohms, while the R_r is only a small fraction of an ohm!

Let's be generous and say the radiation resistance is a quarter of an ohm (0.25 ohm) and that the ohmic loss is 2.5 ohms. Let's assume you are trying to put 100 watts into the antenna. You are working with a ratio of 2.5 to 0.25, or 10 to 1. The best you can do with the 100 watts is lose 90 watts as heat with only 10 watts radiated! (And, my example figures are generous!) The answer as I pointed out above is to try to reduce the ground losses in a car with metal bonding, etc. That reduces the loss ratio, putting more power into the antenna.

With the metal body of my trailer the ground losses are low, which provided an excellent signal from the High Sierra an-

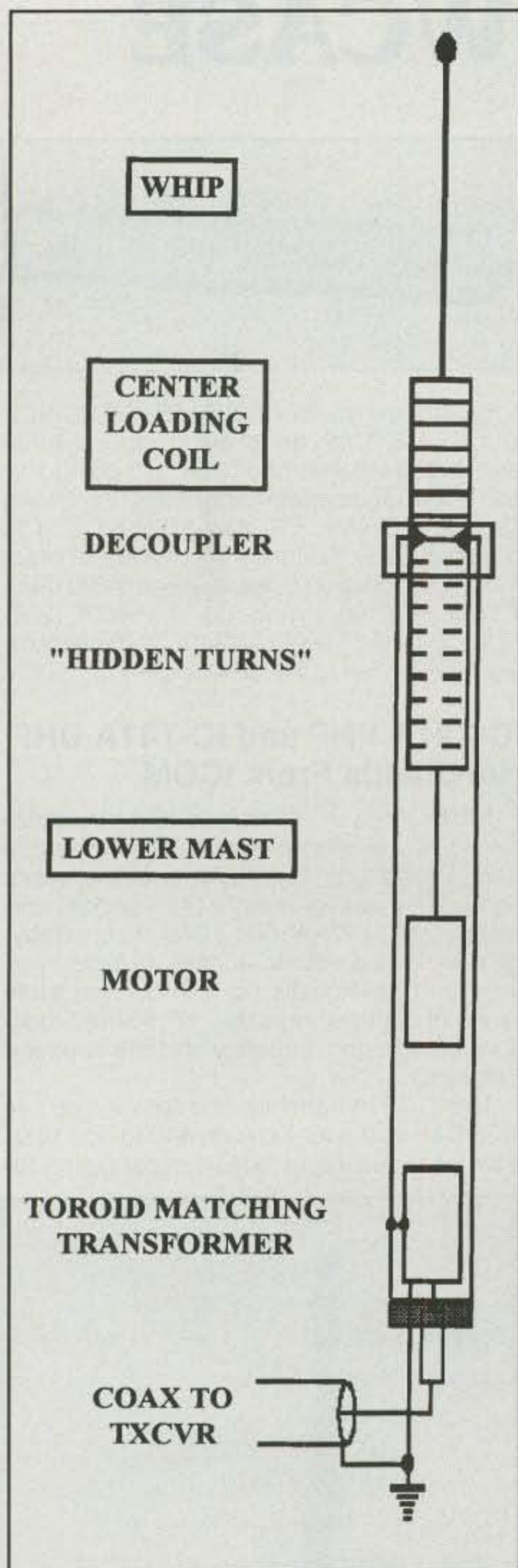


Fig. 1— The High Sierra HS-100 antenna's composite features.

tenna. Keep in mind that the HS-100 is not only a mobile antenna, but is also an excellent limited-space antenna for fixed-station work. Also, while I have no idea how many readers are simply shortwave listeners, the HS-100 would be a very good shortwave antenna, because it is continuously resonant from 3.5 through 30 MHz. The price class for the High Sierra HS-100 antenna is \$289 plus shipping and handling, and it comes with the base tapered rod. The antenna is available from High Sierra, P.O. Box 2389, Nevada City, CA 95959 (phone 916-273-3415; FAX 916-273-7561). ■

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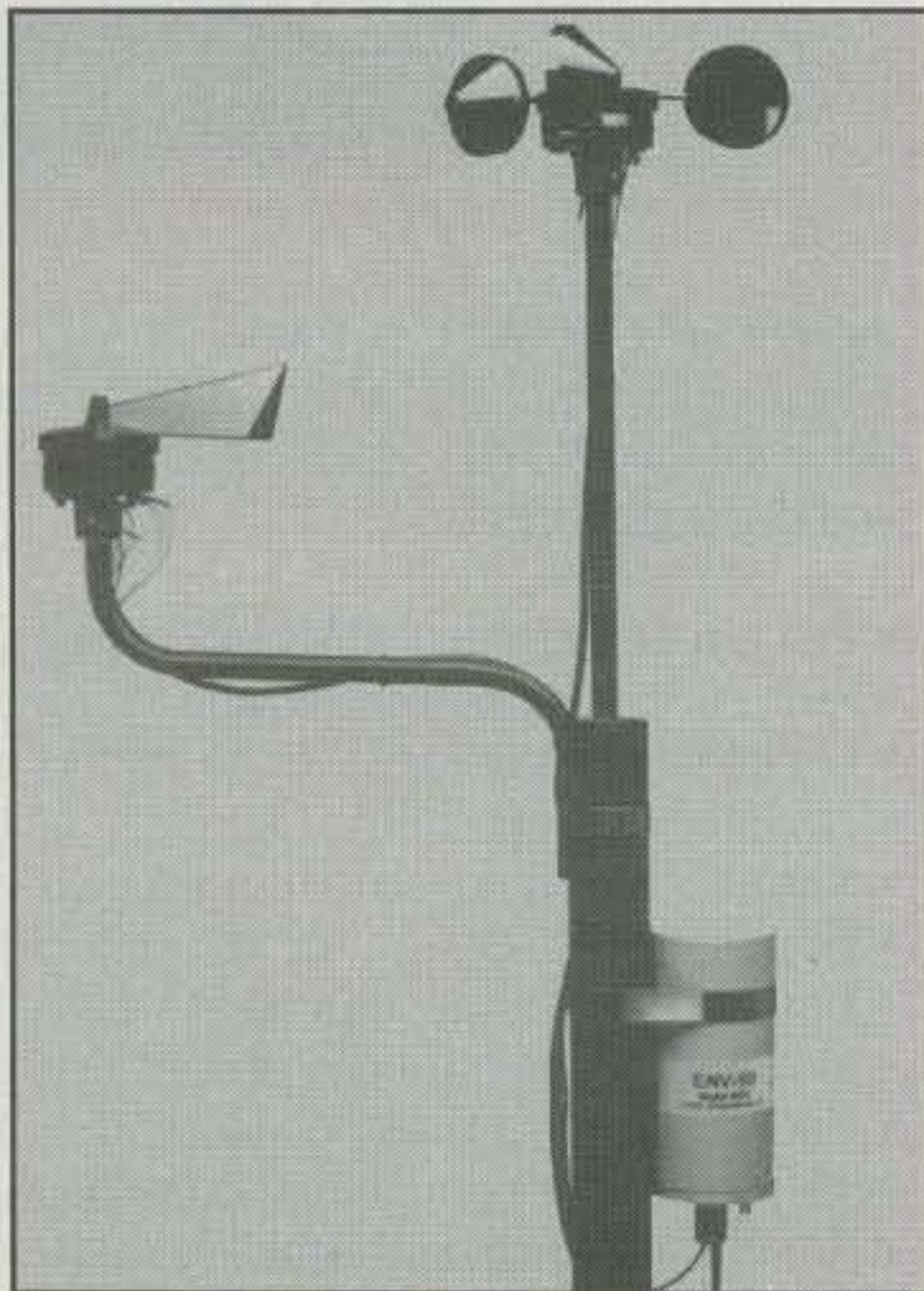
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CQ SHOWCASE



ENV-50 Systems Modules From SensorMetrics

SensorMetrics' ENV-50 systems are powerful, stand-alone modules suited for remote-site sensing and control applications. The family of modules can monitor and control various conditions. Conditions such as voltage (0-2.5, 0-5, 0-10 volts) and current (4-20 ma) can be monitored with the ENV-50-VOL. Humidity, barometric pressure, solar radiation, temperature, and rainfall can be monitored with the ENV-50-HUM. Wind speed/direction, temperature, and rainfall can be monitored with the ENV-50-WDT. These modules can operate independent from the PC to perform rugged remote sensing for extended periods. They are powered by a single 7-30 volt power supply. An optional interface kit is available which allows the modules to be connected serially; up to 30 modules can be linked to one serial port of any PC. Full RS-232/485, multi-drop capability is standard on all modules.

The ENV-50 systems sell for prices starting at \$379. For more information, contact SensorMetrics, Inc., P.O. Box 1049, Lakeville, MA 02347 (508-946-4904), or circle number 101 on the reader service card.

AEA ST-1 Satellite Tracker

AEA's ST-1 Satellite Tracker offers hands-off control of antennas and transceiver tuning for satellite operation. As the satellite appears near the horizon, the antennas are pointed in the proper direction and the rig is tuned to the right up-link and down-link frequencies. As the satellite moves into the field of view, the antennas track and the transceiver tuning is corrected for the Doppler shift throughout the pass.

Other features include completely resident program (TSR) so the user's computer is not tied up for tracking; automatic control of Yaesu 5400/5600 Azimuth-Elevation rotors; works with InstantTrack, QuickTrack, and RealTrack



software; tunes with FT-736, TS-790, IC-970, and IC-475/2785; hardware uses one serial port and parallel port from the host computer; and works together with other satellite software such as PG-AEA, PB, and PG. The ST-1 is priced at \$399. For more information, contact Advanced Electronic Applications (AEA), Inc., P.O. Box C2160, Lynnwood, WA 98036 (206-774-5554; FAX 206-775-2340), or circle number 102 on the reader service card.

IC-T21A VHF and IC-T41A UHF Handhelds From ICOM

ICOM's new IC-T21A and IC-T41A handhelds utilize elastomer construction on the side panels for a grip contoured to fit the user's hand. They are lightweight (11.1 ounce) and compact (2 1/16"W x 4 1/4"H x 1 1/4"D). A backlit keypad allows the user to access multiple functions, and the large display with four selectable levels of contrast indicates 17 different functions plus battery capacity and the subband frequency.

The IC-T21A transmits and receives on 144 to 148 MHz; the IC-T41A on 440 to 450 MHz. Both have dual-band receive capability for full



duplex crossband operation between the 2 meter and 70 cm bands. The units scan 33 channels per second/12.5 memory channels per second. Additional features include the ability to automatically dial five favorite telephone numbers, built-in pager, code squelch, pocket beep, and tone squelch. They come with a flexible antenna, belt clip, hand strap, rechargeable BP-151 nickel-cadmium battery pack, and BC-74A charger. For more information, contact ICOM America, Inc., 2380 116th Avenue NE, Bellevue, WA 98004 (206-454-8155), or circle number 103 on the reader service card.

PortaGrip From PanaVise

PortaGrip from PanaVise Products lets portable radio users secure their radios while driving. It holds radios from 1.6 to 2.6 inches wide with two independently adjustable jaws that have "sure-grip" non-marring pads. The body is made of black, high-impact plastic and mounts to any AMPS-compatible mount. The PortaGrip is packaged individually or boxed in combination with a mount for new installations.



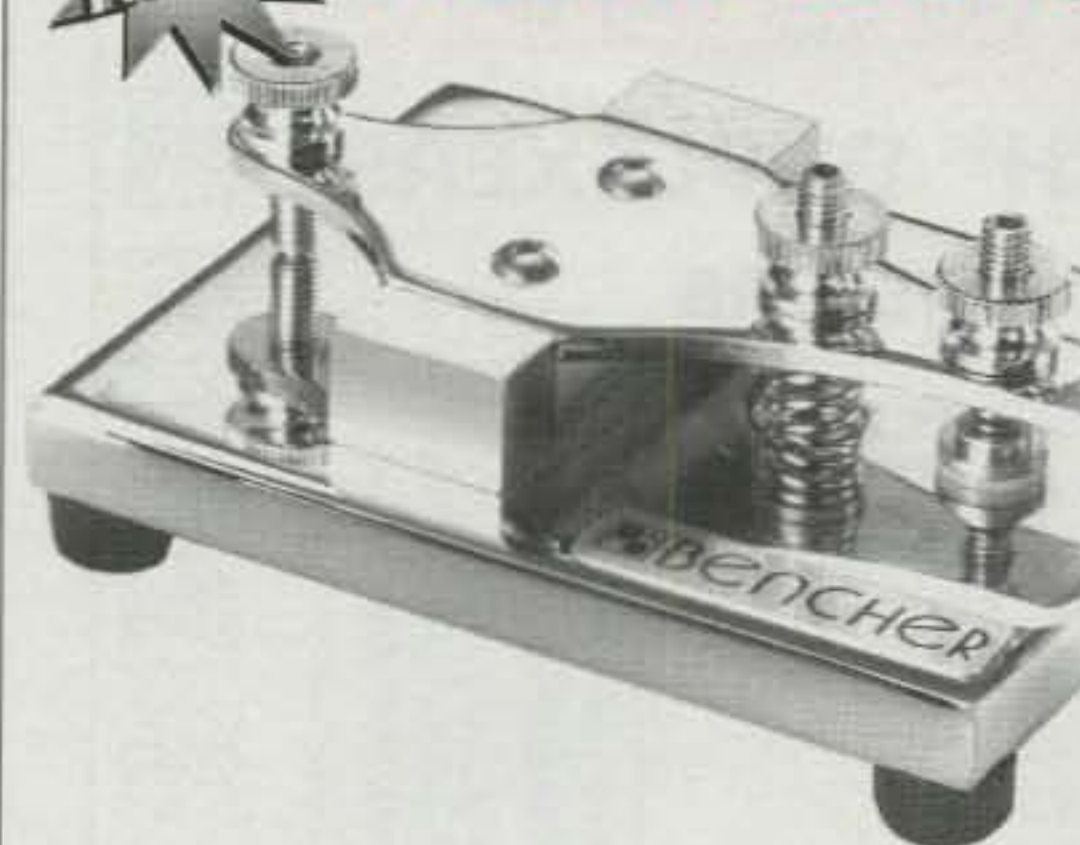
Porta-Grips are available through cellular phone dealers and installers. It is priced at \$24.95 for the PortaGrip only. Combination kits are slightly higher. For more information, contact PanaVise Products, Inc., 1485 Southern Way, Sparks, NV 89431 (702-353-2900), or circle number 104 on the reader service card.

Kenwood TS-60S 90 Watt, 6 Meter Rig

The new TS-60S transceiver from Kenwood features 90 watts on SSB, CW, FM modes, and 23 watts on AM; 100 memory channels; DDS (Direct Digital Synthesizer) with fuzzy logic control; large LCD panel with digital bar meter; auto-mode capability; menu system which selects custom operating features; AIP (Advanced Intercept Point) for increased receiver dynamic range; switchable AGC circuit (slow/fast); all-mode squelch; CTCSS (PL) encode built in; CW reverse mode; full and semi break-



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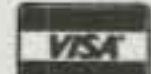
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in; 20 dB attenuator; and more.

The TS-60S is priced at \$1209.95. For more information, contact Kenwood Communications Corp., 2201 E. Dominguez Street, Long Beach, CA 90801-5745, or circle number 105 on the reader service card.

CAPMAN Skywave Analysis Package

CAPMAN is a menu/mouse-driven IONCAP propagation program package which delivers IONCAP input file construction and management, two integrated execute functions, the ability to view and manipulate huge output files, and display of multicolor output graphs. The package allows the user to customize it for his own amateur station. A full-featured location database, indexed on both country name and call prefix, provides access to over 490 prefixes. The predicted smoothed sunspot number may be configured and automatically set for the coming twelve months. Choices of output include MUF, FOT, S/N, Reliability, Service Probability, angles of take-off and arrival at receiver, field strength and modes of propagation, and more.

The IONCAP program is provided with the purchase of CAPMAN. The CAPMAN package is a 32-bit version and requires an IBM compatible 80386 or above. It is priced at \$89 shipped in the US postage paid (overseas plus \$3.50 s/h). For more information, contact LUCAS Radio/Kangaroo Tabor Software, 2900 Valmont Road, Suite H, Boulder, CO 80301 (303-494-4647; FAX 303-494-0937), or circle number 106 on the reader service card.

LMR™ Flexible Cables From Cable X-Perts

Two new 50 ohm low-loss cables have been added to Cable X-Perts line. The LMR™ Flexible Communications Cables use a specially designed solid-copper-clad aluminum center conductor and a foam dielectric that is moisture and crush resistant. The velocity of propagation is 89%. Shielding is a tinned copper braid over a 100% bonded aluminum foil. All cables come with weather-resistant polyethylene jacket.

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SM-1 speaker-mike is a beauty. It's only 1 1/2" wide by 2 1/2 inches high and has a handy clip on the back so you can easily clip it to your lapel or shirt. Its small internal speaker isn't going to break any eardrums but is very clear and has plenty of pop to be heard when worn. There's even a jack on the mike so when you plug it in, you still have the use of the speaker jack from your radio. Fits all Radio Shack, ICOM, Yaesu, Alinco and Ramsey rigs. SM-1 Mini-Speaker mike, Fully assembled.....

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CW-700WT Assembled CW-700and case	\$99.95		

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Cramped for space? Get longwire performance with this desktop antenna. Properly designed unit has dual HF and VHF circuitry and built-in whip antenna, as well as external jack. RF gain control and 9V operation makes unit ideal for SWLs, traveling hams or scanner buffs who need hotter reception. The matching case and knob set gives the unit a hundred dollar look!

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AR-1 kit	\$24.95
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Add some fun to your club events by having a transmitter hunt! Foxhunting is a craze sweeping the nation, but many clubs are missing out on the action because they lack the expertise or time to develop their own foxhunt transmitter. We set one of our most devious and sneaky engineers to the task of designing an easy to build and use, yet highly capable Foxhound transmitter. A snazzy microprocessor controller has both preset and programmable transmission characteristics allowing you to easily set the difficulty level from "beginner" to "know-it-all"! The SlyFox, FHT-1, is crystal controlled in the 2 meter band (crystal for 146.52 included) with a power output of 5 watts that is adjustable by the controller. The transmitter is programmed to ID in CW or add our voice option if you really want to aggravate the troops - "Ha ha, you can't find me!" Join the fun, get rid of those stuffy old meetings and picnics, have a foxhunt!

DF-1 Foxhound direction finder kit.....	\$59.95	CDF Matching case set for DF-1	\$12.95
FHT-1 SlyFox Foxhound transmitter kit	\$129.95	FHID-1 Voice ID option.....	\$29.95
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DN-1 Dr. Ni-Cad conditioner/fast charger kit	\$49.95
CDN Matching case set.....	\$12.95
DN-1WT Fully assembled Dr. Ni-Cad with case.....	\$89.95

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ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Soft Topics

This month we'll depart from our customary antennas-and-software mode and instead focus on cleaning out the software in-box. We'll catch up on some of the software developments found over the past few months, so let's get started.

Hamshack Software

ASAPS. Jacques d'Avignon, VE3VIA, is on first this month. He's the North American distributor of the highly regarded Australian ASAPS propagation forecasting software. ASAPS, which means Advanced Stand Alone Prediction System, is produced by IPS Radio and Space Services of the Australian Department of Administrative Services. Jacques sent me a demo of the program. It's quite impressive, indeed.

ASAPS (fig. 1) allows the sophisticated prediction of radio communications conditions in the HF spectrum, being based on an ionospheric model developed by IPS and others. The program is designed for use on the IBM PC and compatibles.

The prediction program compares favorably with the standard but much slower IONCAP. It allows you to enter a number of prediction input details for optimum accuracy of predictions. You can name communications circuits, make long- and short-path predictions, and use custom preset prediction frequency sets.

ASAPS also can produce a special output format, known as the GRAFEX format, which essentially consists of a table of symbols with dimensions of 24 hours by 40 frequencies. Each symbol represents the probability of successful communication at a particular hour and frequency.

In addition to the familiar MUF (Maximum Usable Frequency), the program also calculates OWF (Optimum Working Frequency), ALF (Absorption Limiting Frequency), UD (Upper Decile) frequency, and EMUF (E-Layer Maximum Usable Frequency). The result is a picture of the probability of successful HF communications for a circuit.

The price of ASAPS, \$275 (U.S.), may be high for casual users, but it includes a monthly bulletin to update the "T" index used by the software. For further details, contact Jacques d'Avignon, VE3VIA, 965 Lincoln Drive, Kingston, ON Canada K7M 4Z3 (613-634-1519).

SOLAR MAX. ASAPS, which we just described, is a real-world propagation prediction program. On the other hand, SOLAR MAX, by Bob Brown, NM7M, is a game, albeit one with a purpose: to raise the level of appreciation and understanding of HF propagation in DXing in general and in DX contesting in particular.

SOLAR MAX is played in a contesting mode, being designed for knowledgeable and com-

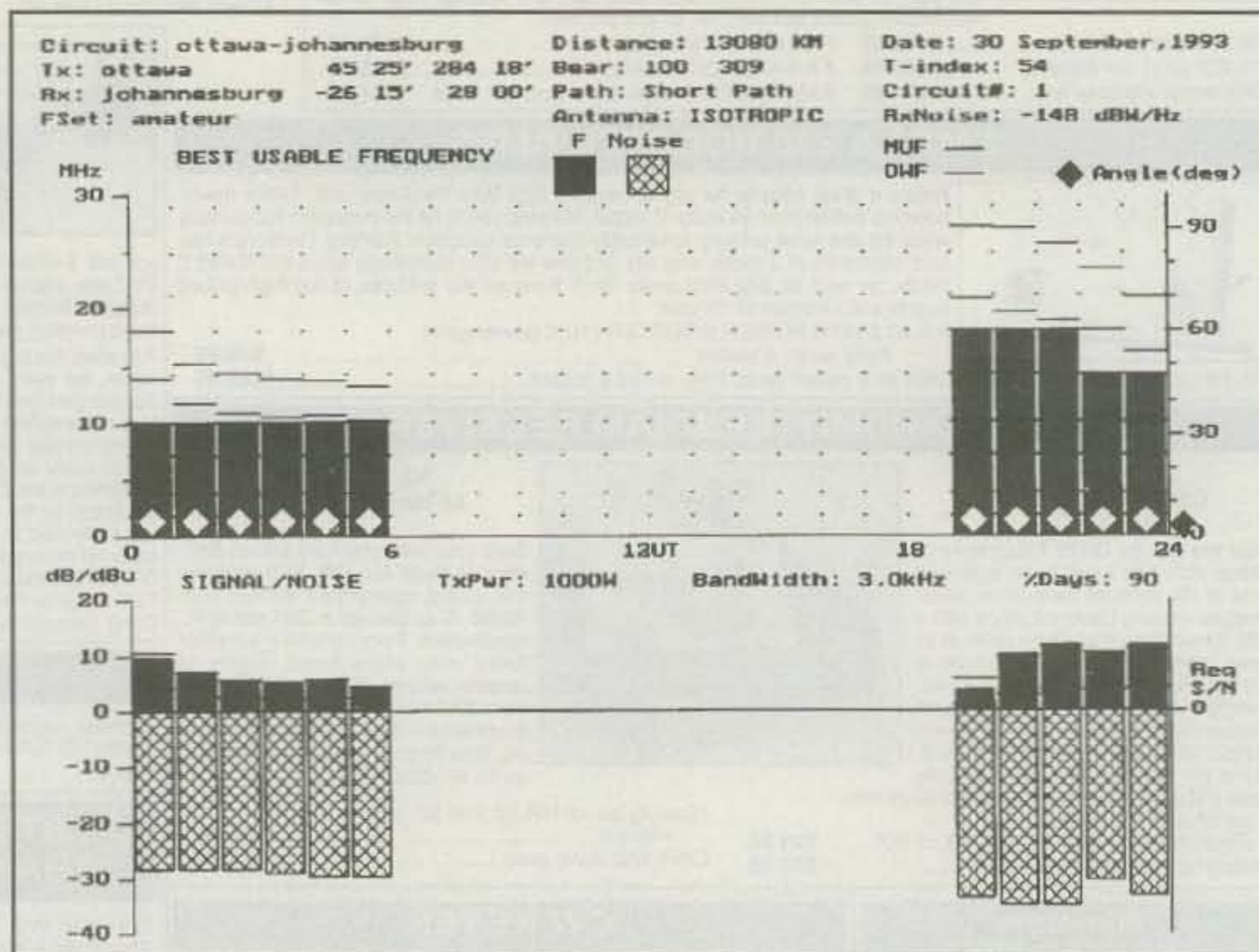


Fig. 1—ASAPS propagation prediction software. ASAPS allows you to make predictions of communications conditions in the HF spectrum. The sophisticated program compares favorably with the standard but much slower IONCAP, and it allows you to enter a variety of input factors for optimum accuracy of predictions. Various output formats are available to meet even demanding commercial prediction needs.

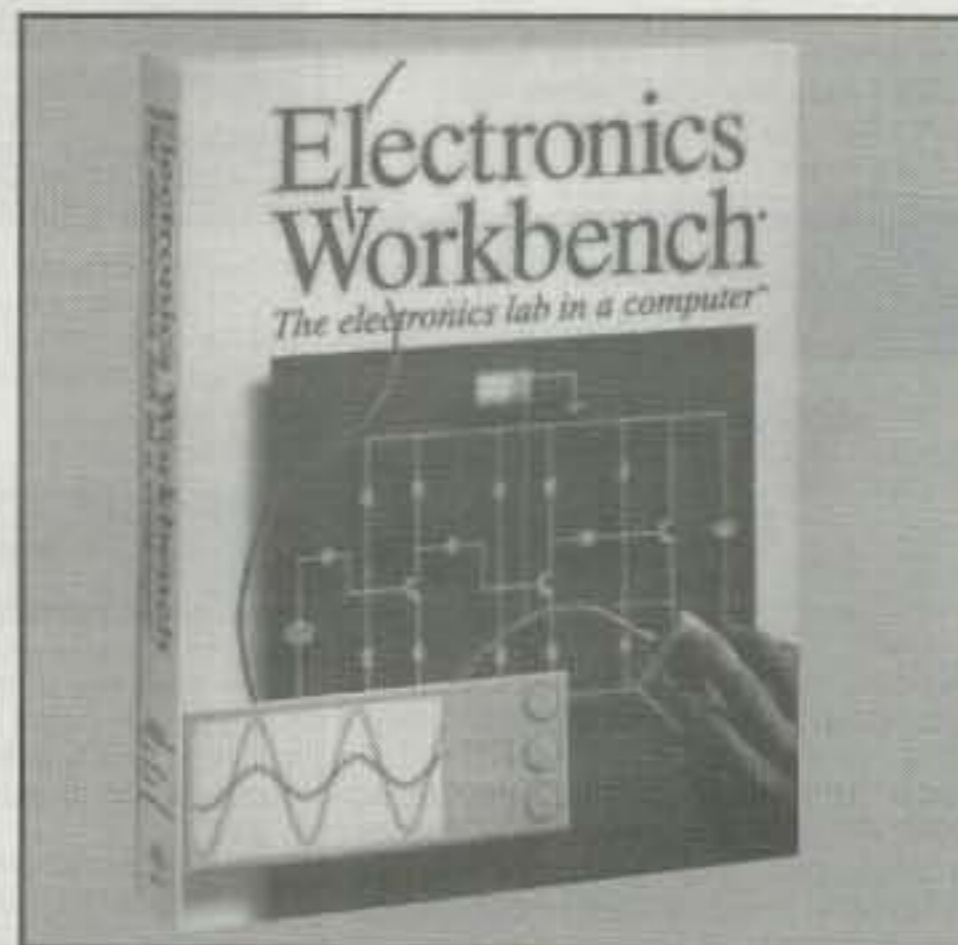
petitive DXers. It pits the DXer against a realistic model of the ionosphere that determines whether the band is open to the region. The game is played in half-hour intervals, one region and one band at a time.

The output screen shows the results obtained as well as signal strength at the far end of the path. The DXer is advised of the score achieved in each half-hour of operation (three points for each new multiplier), and he may see a band-by-band summary of results at any time. The program even includes a "hall of fame" ending in which earlier scores are listed and the player has the option of adding his or her score to the list.

Being laptop-portable, SOLAR MAX should keep you amused and interested no matter where you are or whatever the weather, solar or terrestrial. The price is \$10 postpaid in the U.S. and \$11 (U.S. funds) in Canada for the domestic model; it's \$13 for overseas airmail of the export model. Contact Bob Brown, NM7M, 504 Channel View Dr., Anacortes, WA 98221 for more info.

Electronics Workbench. One of the most impressive educational programs I have encountered is Electronics Workbench®, Version 3. The trademarked "electronics lab in a computer" offers digital and analog circuits and test instruments. It includes both a separate digital

module that simulates ideal logic circuits and an analog module that replicates either ideal or real-world components. In addition to the MS-DOS version I tried out, the program also is available for Windows and Macintosh platforms in nine other languages besides English.



Electronics Workbench is rightly billed as an "electronics lab in a computer." A highly innovative simulator, it meets the needs of hobbyists, educators, and professionals alike. (Photo courtesy Interactive Image Technologies, Ltd.)

289 Poplar Drive, Millbrook, AL 36054



Electronics Workbench is a realistic laboratory simulator that is used by hobbyists, educators, and professionals to test and verify circuit designs. It replicates digital and analog circuits and test instruments. (Photo courtesy Interactive Image Technologies, Ltd.)

Electronics Workbench simulates a real electronics lab, including parts and instrumentation, and lets you prototype, verify, and test circuits before breadboarding and actually constructing them. In a real sense the program can save time, as you can modify component values on-the-fly to see effects of changes immediately, and you can save money spent on parts that might be damaged or destroyed by faulty design. You can build and test circuits easily just by clicking and dragging a mouse.

Designed much like a "real" lab, the program has a simulated parts bin, a breadboard, and various shelf instruments that actually work. Instrument readings, circuit schematics, and parts lists can be printed out. The suggested retail price is \$299. An add-on component model library lets you simulate circuits more realistically; it's \$29.95. Also offered is a \$39.50 book/disk set, 150 Circuits, an add-on with 150 frequently-used circuits.

For more information, contact Interactive Image Technologies, Ltd., 908 Niagara Falls

Bld. #068, North Tonawanda, NY 14120-2060; or 700 King Street West, Suite 815, Toronto, ON, Canada, M5V 2Y6 (1-800-263-5552).

Pop-Up Morse. Pete Smith, N4ZR, is back in the ham software business with a new product, Pop-Up Morse. Pete is familiar to us as the proprietor of Winner's Edge Software, in which he developed the Contester software for the Commodore 64.

Pete left the Commodore software business about five years ago, with the decline of the C-64 and the rise of CT as a standard in contesting software. But we remember that he exited the business gracefully, tying up loose ends, and ensuring that users of his software weren't left in the lurch. Pete continued telephone support and a data recovery service for scrambled data disks even after closing up shop, and later placed the latest version of Contester and its documentation in the public domain.

Pete recently introduced Pop-Up Morse, full-featured CW keyboard software for simultaneous use with other programs. A small (8K)

1-9 speed ±/N Tone C/B Color P Pause L Loc. R Repeat U Your turn <ESC> Menu

14020.0 kHz 16 WPM Mon Jul 12 13:42:11 1993

SESSION 2

A: OH5F B: ABCDE USER: 4588

A: --> TU FER INFO = WX HERE SUNNY TEMP 16 C = OK MY QSL SURE ES PSE URS = NW Q

BU UY 73 = GB = ABCDE DE OH5F e KN

U: (Keyboard) --> qsl ok tu fer nice qso = very 73 = oh5f de abcde kn

Fig. 2- With QSO Simulator you can make contacts with about 200 simulated "computer hams" in 37 countries and automatically have their QTHs displayed on a map. You can run ordinary QSOs exchanging information such as QTH, RST, name, weather, equipment details, job, etc., or run contests with abbreviated signal exchanges. It's offered by Gote Lofstedt, a Swedish SWL.

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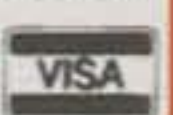
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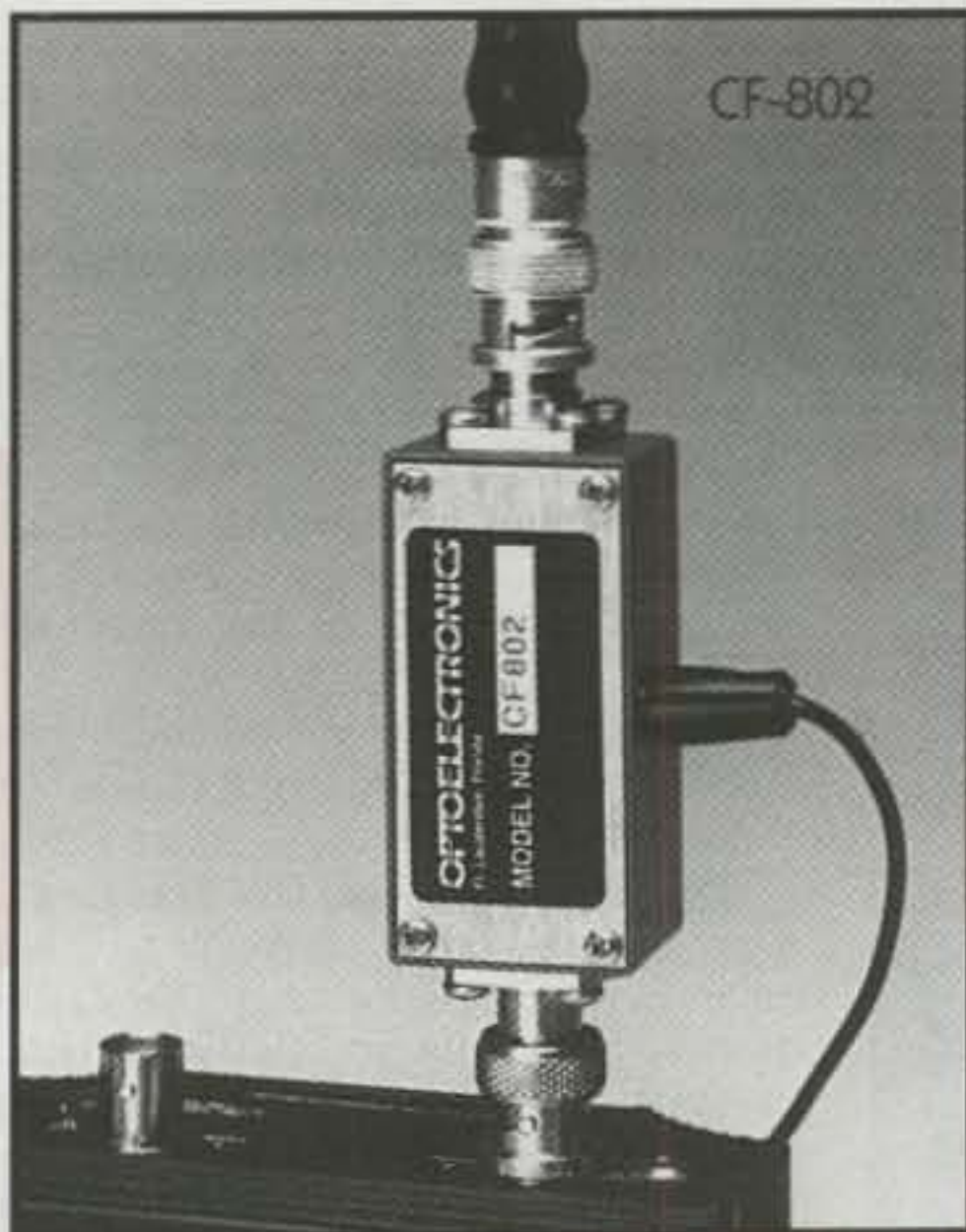
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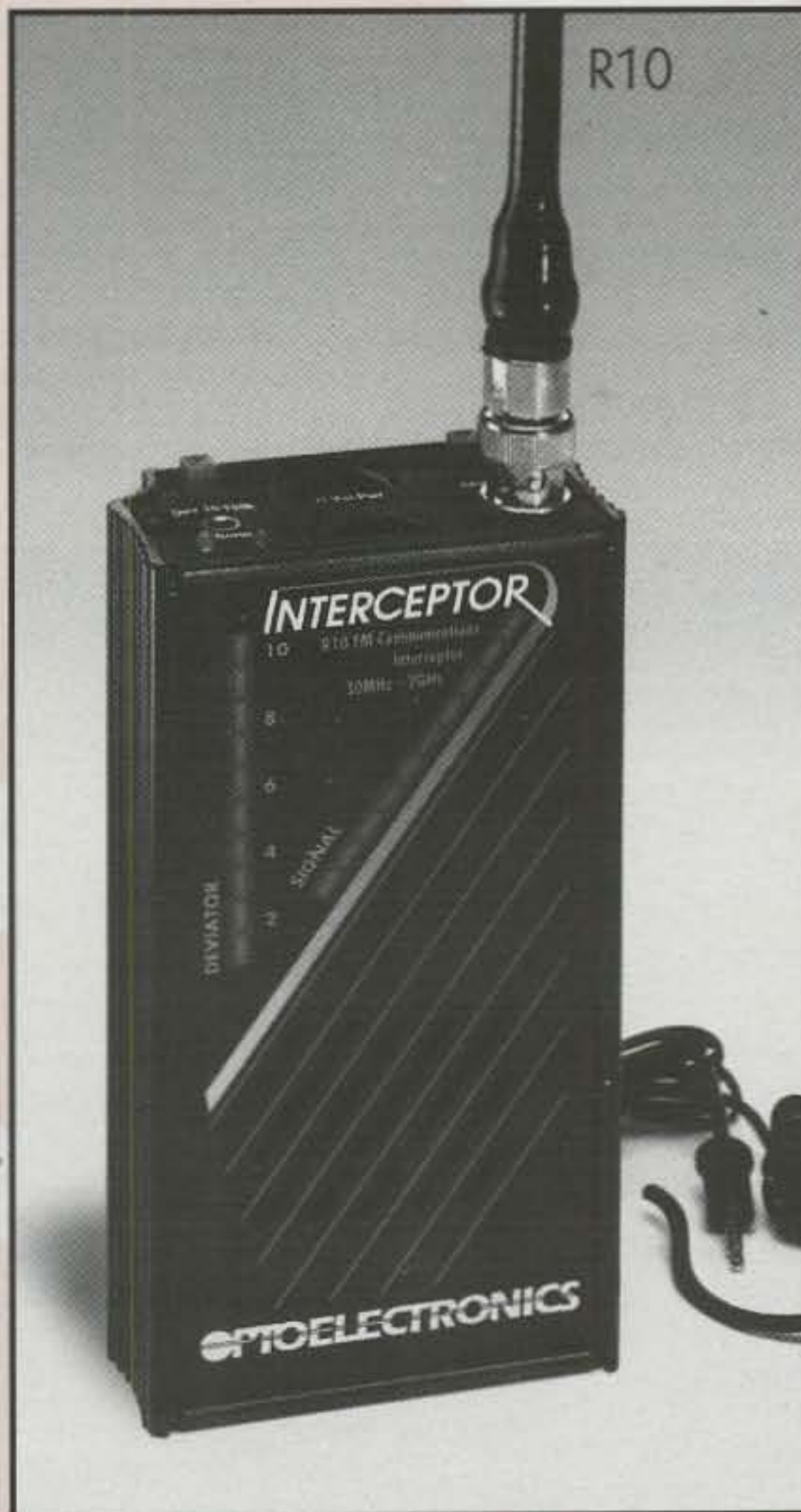
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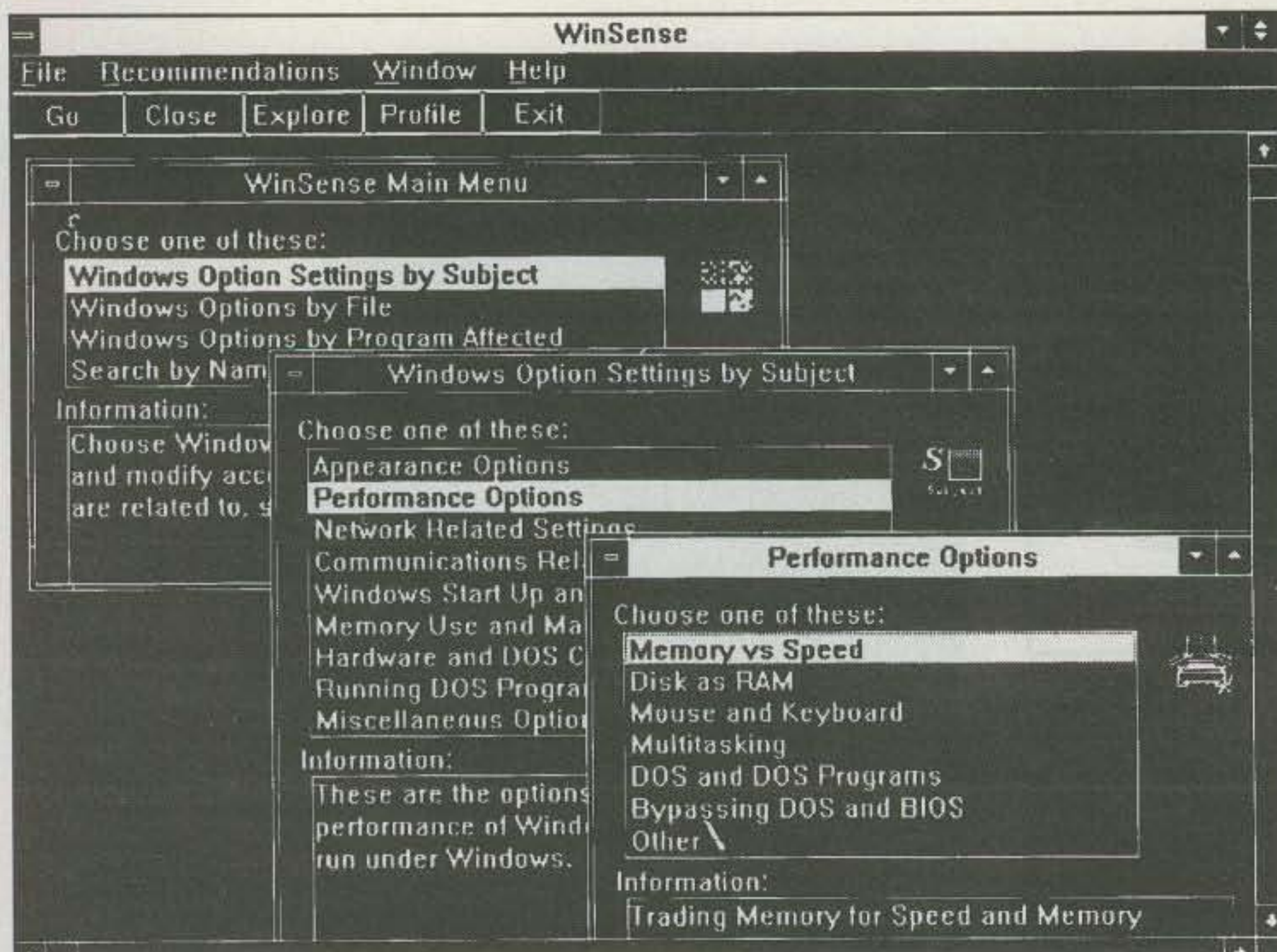


Fig. 3—WinSense optimizes Windows INI file settings based on recommendations it develops, or you can safely edit the various control files manually based on an included "knowledge base" of Windows information. The program includes a built-in INI file editor, a multi-level INI file backup system, and a unique file management and comparison feature that lets you identify and analyze differences or changes in INI files and backups.

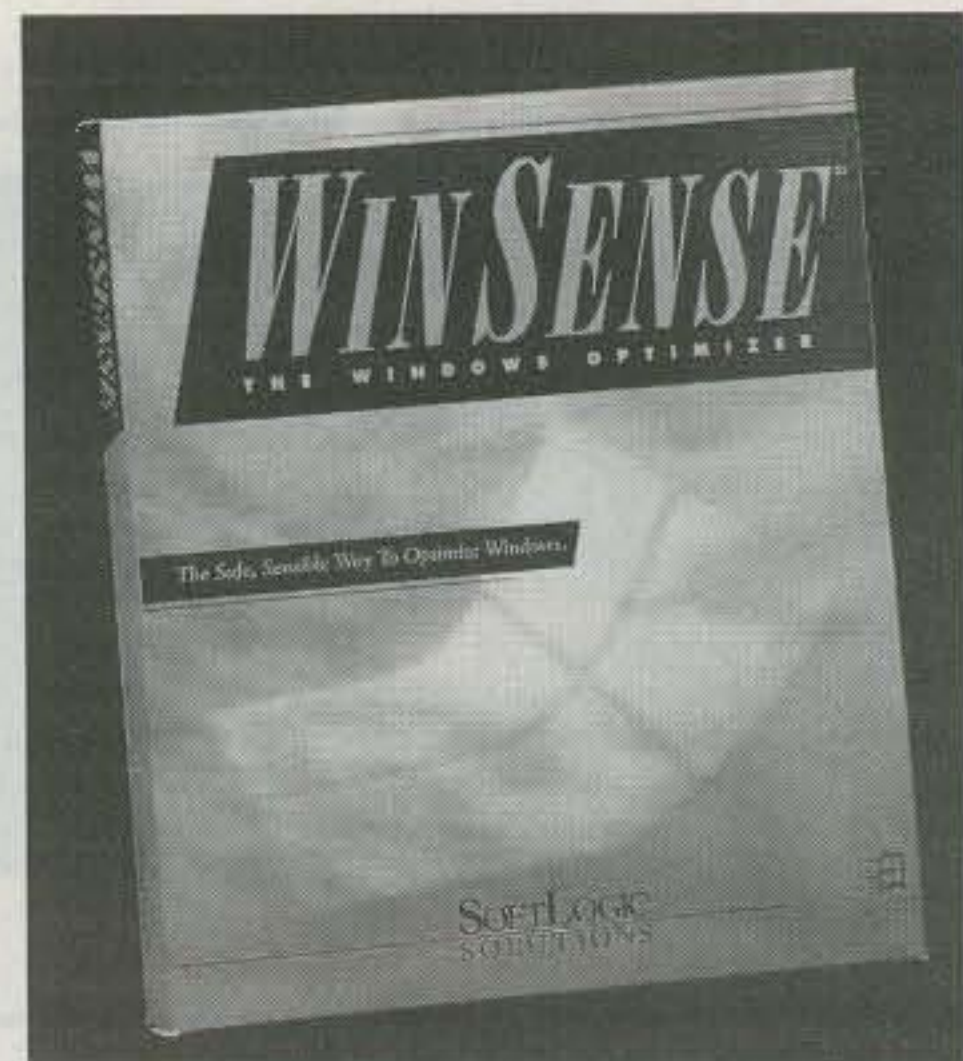
terminate-and-stay-resident (TSR) program, it allows you to log or receive packet spots and send perfect Morse at the same time on the same PC. The program uses a standard interface that's compatible with K1EA's CT contesting software, and it keys through any serial or parallel port.

Pop-Up Morse has eight 50-character memories, and it sends the full repertoire of prosigns

and English and foreign-language characters, including Russian. The \$29.95 program is Windows, DesqView, and OS/2 compatible.

For more information, contact N4ZR Software, 2003 Sarazen Place, Reston, VA 22091.

OH1AA Logging Software Update. In previous columns we discussed the Finnish logger that's increasingly being used by Scandinavian and other European DXers; at least



WinSense helps you optimize the performance and usefulness of the Windows operating environment. The program recommends and implements setting changes for the more than 350 Windows options. Various INI file management functions also are offered. (Photo courtesy SoftLogic Solutions, Inc.)

1000 users are claimed in Scandinavia alone. Offered by Veikko "Vic" Nieminen, OH1MIE, the program originally was designed for the Finnish radio amateur club station OH1AA, and it handled a maximum of 27,000 QSOs per log file (now up to 30,000 in version 6.15).

The package includes a variety of database utilities, including programs for QSL managers, QSL labeling, file manipulation, and format conversion. Documentation in English and several Scandinavian languages is included, though it's still minimal. The club requests a donation of \$10 for the program.

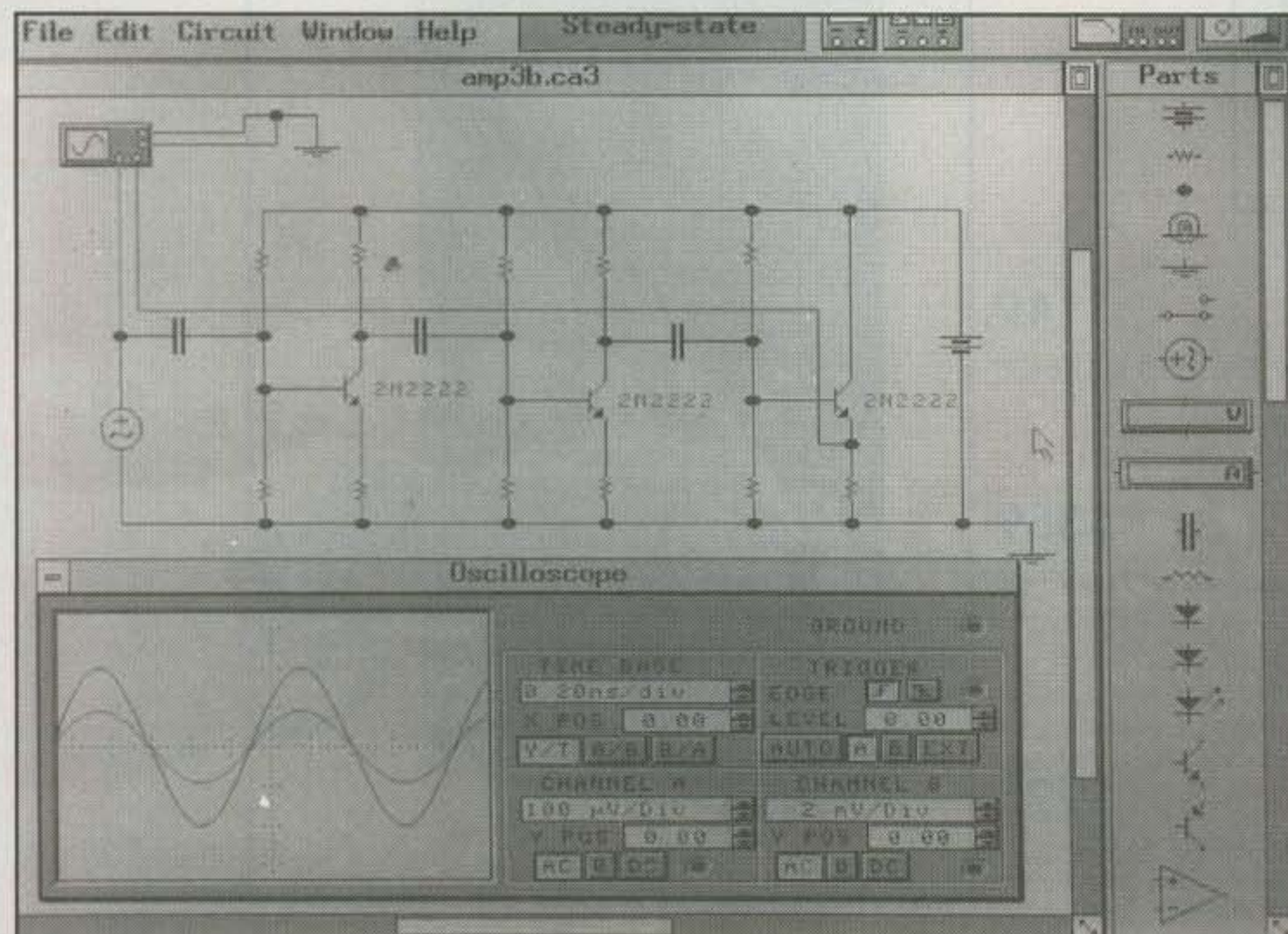
For more information, contact Radio Amateur Club OH1AA/Softline, P.O. Box 29, 20101 Turku, Finland.

QSO Simulator and CW Trainers Update.

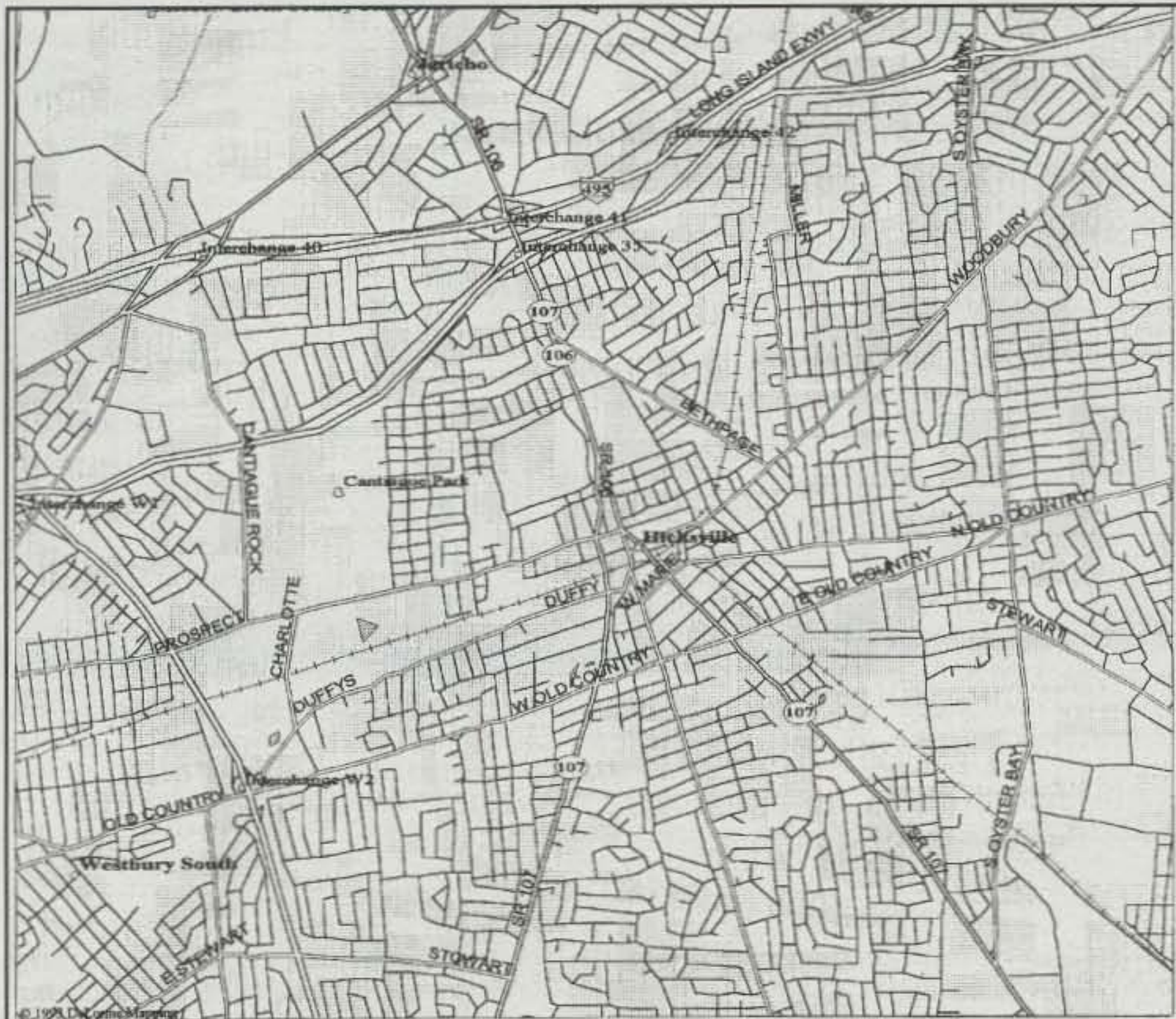
In previous columns we mentioned the innovative QSO Simulator and CW Trainer programs, both offered by Gote Lofstedt, a Swedish SWL (SM5-7609). New versions of both programs now are available.

With QSO Simulator (fig. 2), by plugging in your paddle or straight key to your PC's serial port (or using the keyboard) you can make contacts with about 200 simulated "computer hams" in 37 countries and automatically have their QTHs displayed on a world map or on a map of Europe. You can conduct ordinary QSOs, exchanging QTH, RST, name, weather, equipment details, job, etc., or you can run contests with abbreviated signal exchanges. You can use the simulator to get some operating practice before entering the amateur bands for the first time, or after a long off-the-air break. You also can use QSO Simulator as a game, since your score can be shown after each session.

Gote also offers CWR (for receiving) and CWS (for sending) in new versions. With these CW programs you can practice receiving and sending Morse code. The computer checks each character as you type it on the keyboard or send it with your straight key or paddle, errors being indicated visually and audibly. After each Morse session you're shown the results, as measured in several different ways. The CWS program even lets you send a



Shown is a sample three-stage amplifier circuit replicated by Electronics Workbench. Note the on-screen simulated oscilloscope. The on-screen instruments function much like their "real" workbench counterparts. (Photo courtesy Interactive Image Technologies, Inc.)



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Fig. 4- Street Atlas USA, CD-ROM based software for the IBM PC, offers a map database of the entire United States. With it you can zoom in on every city, town, and rural area in the country. Shown here is a view of the urban area around CQ's Hicksville, New York offices. With higher magnifications street names become visible.

sequence and have your "dits and dahs" analyzed graphically and numerically, followed by a playback of the Morse exactly as it was sent.

The three programs can be purchased separately. The QSO Simulator is priced at \$24 (U.S.); CWR and CWS are \$10 each. Shipping and handling is \$4 (\$2 in Europe). More details are available on request for an IRC. Contact Gote Lofstedt at Sim-Data Linko, Djurgardsgatan 71, 6tr, S-582 29 Linkoping, Sweden.

General Applications And Utilities

Two from SoftLogic Solutions. Do you know how to make changes to all-important Windows information files such as SYSTEM.INI and WIN.INI? For the most part, these files' contents and manipulation are mysteries to Windows users, despite their importance to proper operation of the Windows interface.

WinSense is a menu-driven software designed to help you maximize the performance and usefulness of the Windows operating envi-

ronment. It's a tool for fine-tuning, optimizing, and understanding each important aspect of Windows. The program recommends and implements setting changes for the more than 350 Windows options, to tune up the INI files that control Windows, based on user preferences and a custom system profile.

WinSense (fig. 3) automatically optimizes these settings based on recommendations it develops, or you can safely edit the various control files manually based on the included, well-indexed online "knowledge base" of Windows information. The program includes a built-in INI file editor, a multi-level INI file backup system, and a unique file management and comparison feature that lets you identify and analyze differences or changes in INI files and backups. This very useful program is \$49.95.

SoftLogic also offers Disk Optimizer™ for Windows. It safely defragments files continuously while you run under Windows to keep your disks running fast and smooth. Disk optimizers or defragmenters that run safely in Windows are few and far between. However, Disk Optimizer claims to be safe to use, even while other programs are running under Win-

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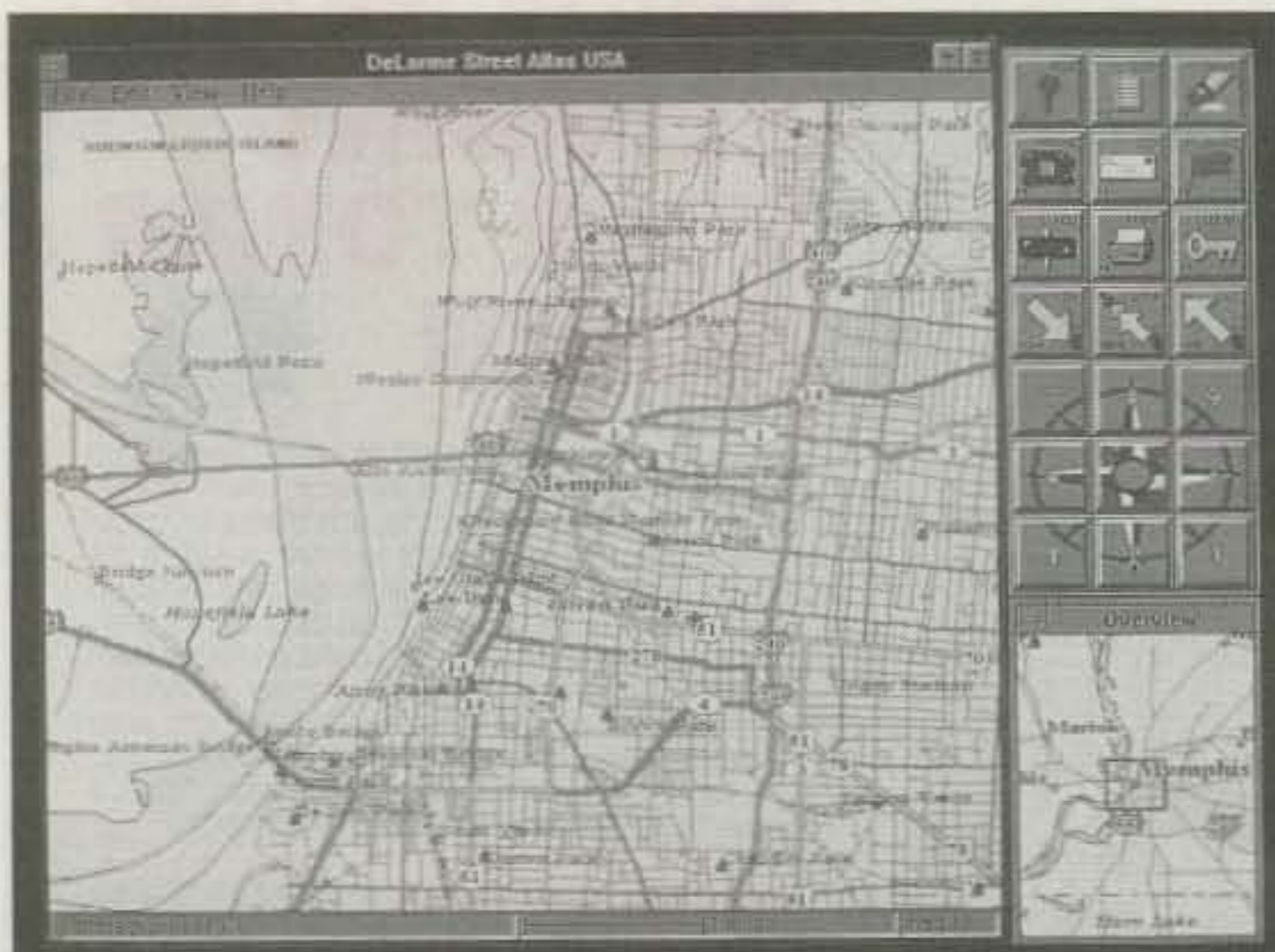
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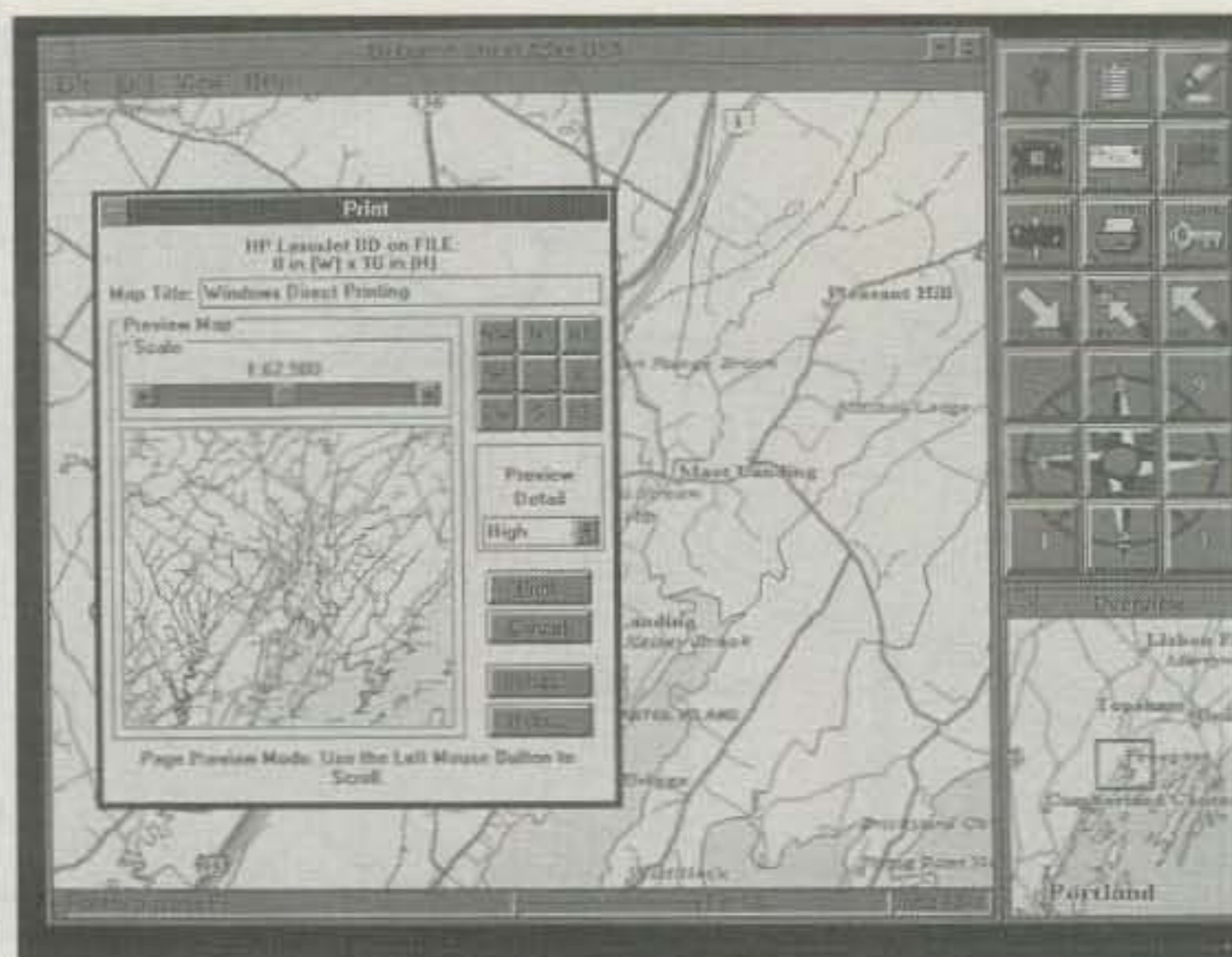
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With Street Atlas USA you may choose to use the standard user interface, which includes a main map screen, a small overview map, and a pushbutton control panel. Or you may select a standard Windows interface, with the function buttons displayed on a ribbon at the top of the screen, to increase the size of the main map display. The overview map and legend can be resized, moved, and turned on and off. (Photo courtesy DeLorme Mapping)



Street Atlas USA includes a direct-printing function which lets you print maps of any part of the country at a variety of scales from within the program. The maps can be printed on any color or black-and-white Windows-supported printer. (Photo via DeLorme Mapping)

dows in a multi-tasking environment, by skipping files that are in use by other programs.

Still, to be completely safe under certain conditions, such as when using the "full reorganization" mode, Disk Optimizer automatically but temporarily exits Windows to do the reorganization under DOS rather than Windows. It's \$49.95 also.

The two programs are available from Soft-Logic Solutions, Inc., One Perimeter Road, Manchester, NH 03103 (1-800-272-9900).

Street Atlas USA. The new Gateway 66 MHz 486 PC that I acquired several months ago has a built-in CD-ROM drive. The high-capacity drive, coupled with the multimedia and graphical characteristics of Microsoft Windows™, opens up some powerful new opportunities for productively using the PC.

One of these is the ability to use large databases and directories of information, as well as mapping and graphics-laden software—data that would otherwise fill up your hard drive in a flash. One such product that's both fun and highly useful is Street Atlas USA™, Version 2.0 (fig. 4). It's a computerized street map of the entire United States.

The CD-ROM based program provides a highly-detailed, virtually seamless map database of the whole country. With it you can zoom in on every city, town, and rural area. The internal database contains more than 12 million street segments and 1.1 million geographic and manmade features, including prominent mountains, rivers, streams, and lakes.

The maps include city and town names; highway, street, and road names; railroads; and countless major buildings and monuments. Elevation contours are displayed to give you the lay of the land. Amazingly, if you printed out all of the 646 MB database at the highest level of magnification, your map would cover more than 10 football fields!

Street Atlas USA is easy—even fascinating—to use. You simply type in the name of a city and state, telephone area code and exchange, or Zipcode to zero in on any area of the country. You can then search for any

street within the map you're viewing. In larger metropolitan areas block address ranges are displayed. The latest version has a direct-printing function that lets you print high-quality maps on any color or black-and-white Windows-supported printer.

I enjoy Street Atlas USA, and know that pre-planning with it—and having a vehicle equipped with a 2 meter FM rig—I'll probably never be lost again when visiting a distant and unfamiliar area. I do, however, question the currency and accuracy of some of the map data on which the program relies: my own residential area, for example, shows both unfamiliar and misspelled street names. Otherwise, the \$169 list-priced program is a very worthwhile investment.

For information on the program and the publisher's extensive mapping products (which include professional mapping and geographical software and a variety of printed U.S. and world atlases), contact DeLorme Mapping, P.O. Box 298, Lower Main Street, Freeport, ME 04032 (1-800-452-5931).

Info Select for Windows. A PIM, or "personal information manager," is a special database that allows you to enter, retrieve, analyze, and cross-reference data, both words and numbers. A PIM handles "random" bits of information you encounter every day, such as notes, names and addresses, parts lists, project plans, and magazine articles. This type of information often doesn't fit into well-defined formats as does data that you can place in a conventionally structured database, but a PIM can help you deal effectively with this hodgepodge of stuff.

Info Select is a very capable PIM, both in the DOS- and Windows-based versions. The program is easy to learn, since it uses a data structure analogous to the familiar "stacks of paper" in which we tend to accumulate information.

As we pointed out in reviews of the DOS-based version, the program effectively gives you the equivalent of a "photographic memory" by managing all the "random information" that covers a person's home, office, or ham-

shack desk. Features include phone dialing, wordprocessing, and database functions; a computational capability; overviews of your information; and more.

The Windows version is remarkably similar to the DOS version, but it now has a new interface that's very fast in a graphical environment, as well as being more informative, easier to operate, and more attractive and configurable than its DOS counterpart. The new interface takes advantage of some valuable Windows features including Windows-based fonts, cut-and-paste editing, toolbars, and context-sensitive, hypertext help. However, at present there are no Dynamic Data Exchange (DDE) and Object Linking and Embedding (OLE) capabilities, and no support for various word-processor formats.

The program is list priced at \$149.95, but previous Info Select users can upgrade at special prices. Contact Micro Logic Corp., P.O. Box 70, Hackensack, NJ 07602 (1-800-342-5930).

XTree Gold and XTree for Windows. One of the better "DOS shells" long has been XTree® Gold. XTree Gold 3.0 is the most recent version of the popular file management software first offered in 1985. The new DOS-based edition offers "power user" menuing, viewing, and file/archive/disk management features that have gone well beyond the features contained in V2.5, which we highlighted in September 1992.

New features of V3.0 include integrated PKZIP 2.0 archiving support for faster file compression and extraction, and new disk-spanning features allow easy compression of large ZIP files to multiple diskettes. A new text editor edits multiple files, while easily cutting and pasting text from one file to another. Another handy feature is "file compare," which lets you compare the text of two files, highlight the differences, and automatically launch the text editor to make changes. Suggested retail is \$149.

Rapidly winning favor with savvy Windows users is XTree® for Windows. The sophisticated file and disk management program, now in Version 1.5, lets you easily manage all disk volumes, directories, files, and ZIP archives;

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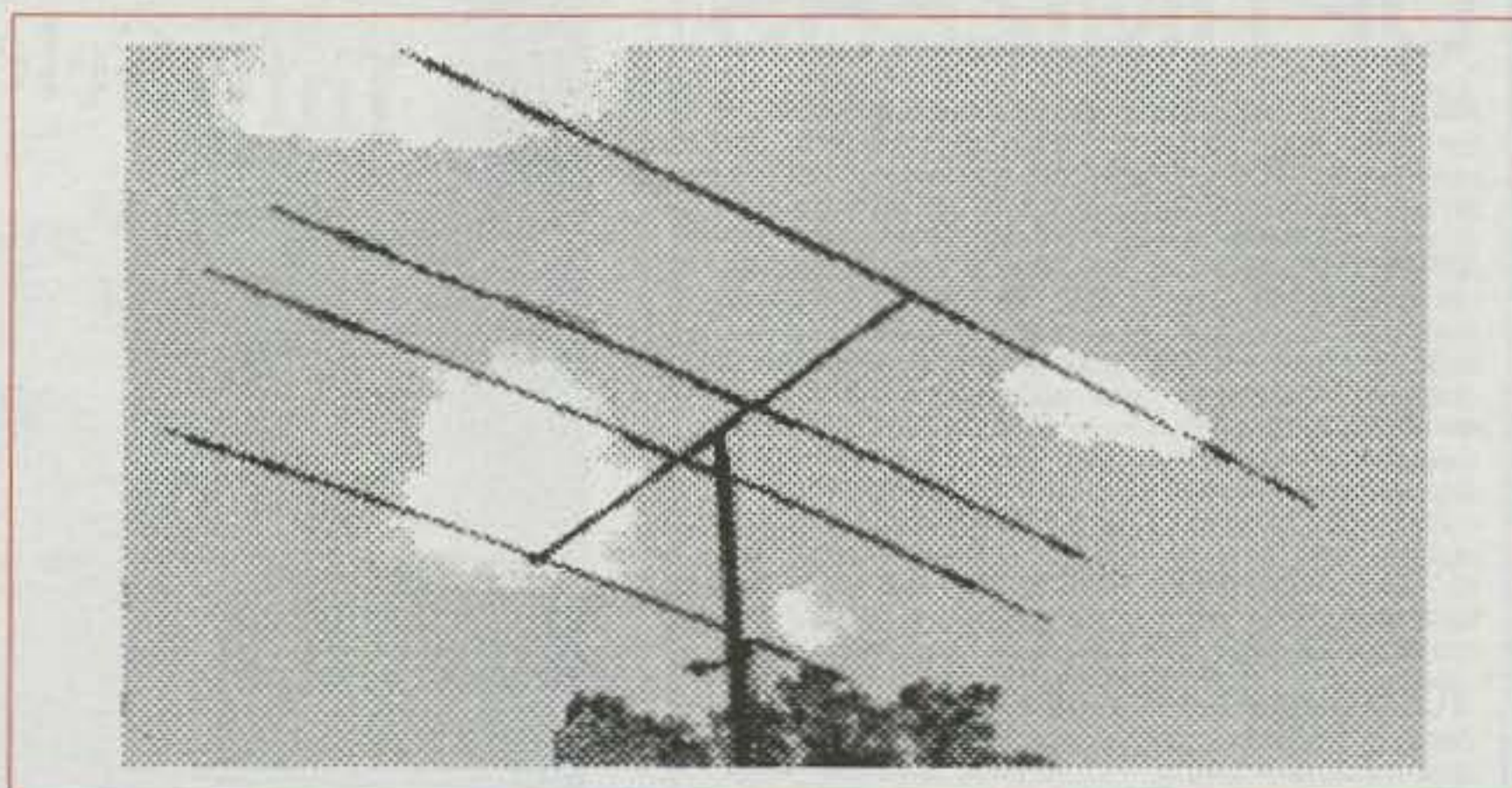
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The TA-53-M was designed to give the Ham who would like to have a 3 element beam on "5" bands, but keep the size of the antenna to a minimum.

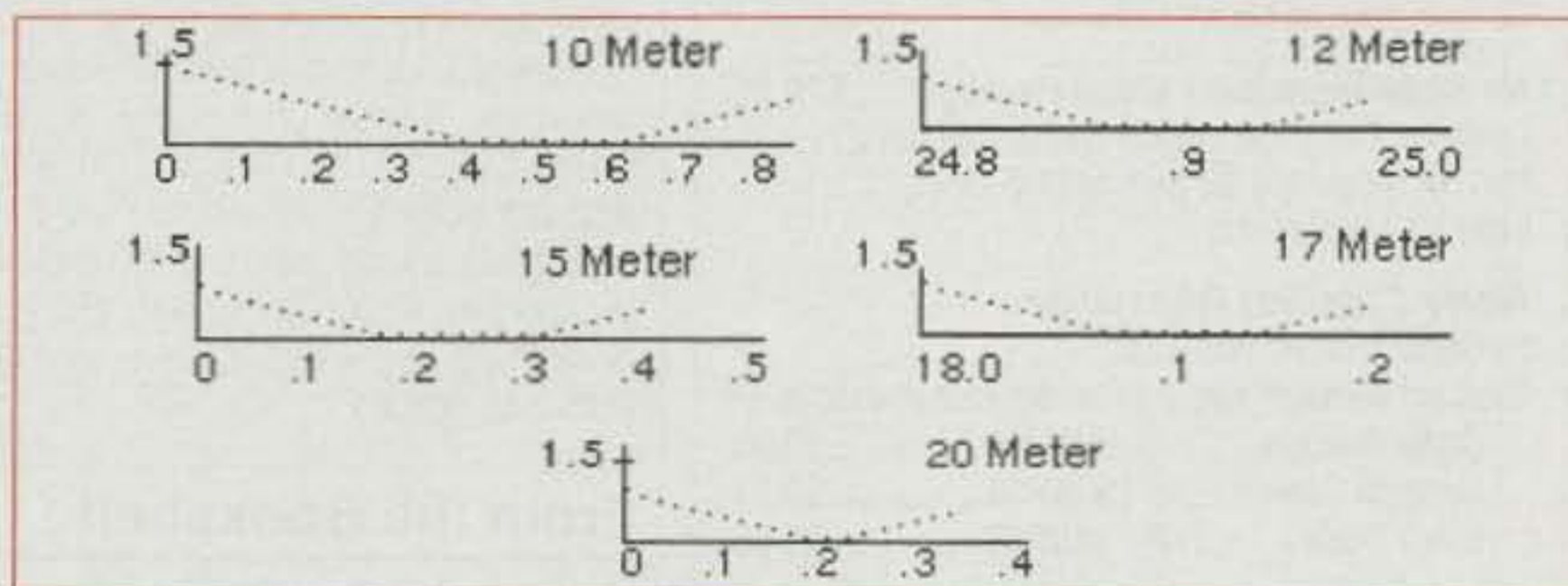
The design criteria was: 1. A single feed line. 2. A very broad band capability, which will work with the new solid state rigs. 3. An antenna that was as compact as possible to justify its use on five bands. 4. To tune it for optimum gain for a "5" band beam on a 14' boom. 5. To minimize the interaction of the close proximity of the various bands. 6. Build it to withstand any above average environments.

We feel this has been accomplished only at the expense of front to back. We considered this to be the least area of importance considering only one director and one reflector spaced over a 14' boom working on five bands.

For the ham that wants a heavy duty all around performer the TA-53-M is for you. It will equal or exceed anyone's 3 element beam on a 14 foot boom in the areas of gain, band width, and construction.

Even though the beam is on a 14' boom and we consider it a small, light weight antenna, it is heavier than our TA-33-M and 2 times heavier than some of our competitors products. This is due to its extra heavy duty construction. This antenna was originally designed to be used as a "light" weight Military and Commercial antenna; and in our Commercial department it is considered light weight.

We feel it gives a Ham the best of all worlds in a small package.



Element to Boom mounting uses our #48 Sand Casted Clamping Block, **not** a muffler clamp or some other galvanized bracket.

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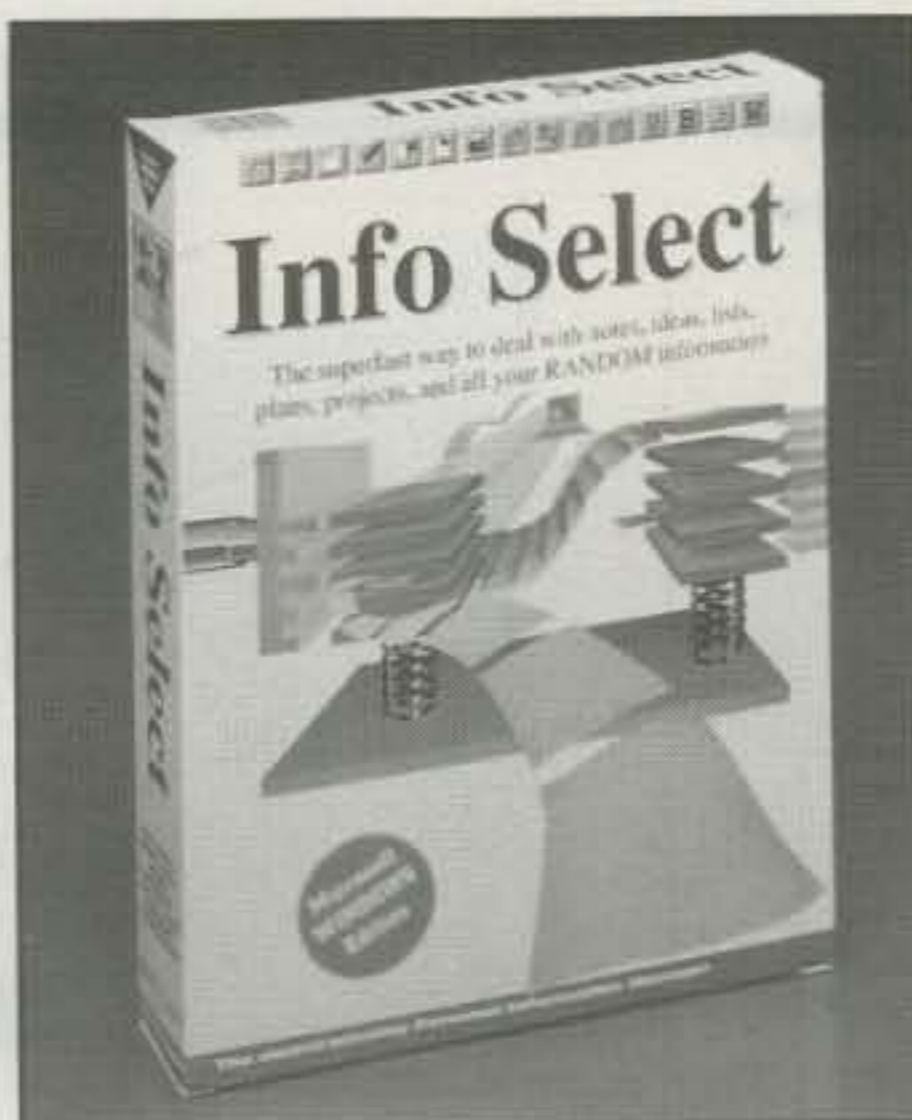
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Info Select for Windows™ handles the problem of addressing and managing "random information." The program affords text processing where windows of text are viewed, moved, and accessed by content simultaneously. It features "pile of paper" note-gathering procedures. (Photo courtesy Micro Logic Corp.)

share files between two computers; display directory and file information in highly flexible formats; and view datafiles in native formats from over 50 applications. Other new features include "Speed Search" in which you can quickly access a file or directory just by typing in the first few letters of the name; a menu to directly launch DOS 6 utilities; and support for 2.88 MB floppy disks.

Bundled with XTree for Windows is the XTree Command Center; it provides comprehensive and flexible "toolbar" capabilities. The toolbars you create enhance Windows by letting you launch applications and run macros when you need them, no matter what windows you have open on your desktop. The custom "CommandBars" you build can be set up to work within applications, to supplement or replace the existing toolbars in many applications. XTree for Windows is \$99. Special upgrade prices are available to XTree users on both the DOS and Windows versions.

Previously, the XTree product line was offered by XTree Company, 4115 Broad St., Bldg. 1, San Luis Obispo, CA 93401-7993 (1-800-333-6561). However, as the result of a merger late last year, the XTree line now is sold by Central Point Software, 15220 NW Greenbrier Parkway #150, Beaverton, OR 97006 (1-800-445-4208).

From the Bookshelf

Windows Shareware 500 Book/Disk Set. The shareware and freeware concepts of software distribution have done much to make available useful DOS programs at a fraction of the cost of their commercial counterparts. The last two years have seen the explosion of Windows-based shareware. But how to evaluate what's good, what's bad, and what's indifferent?

John Hedtke and a team of reviewers have examined thousands of programs, carefully selecting the most useful and reliable shareware, compiling it on three high-density diskettes, and including the disks in the 400+ page

book-disk combo, *Windows Shareware 500*. The book provides valuable information on IBM PC shareware, offers suggestions as to the best places to obtain shareware software, discusses checking software for viruses, and considers hardware and software compatibility. Also included in the book is a free introductory membership and disk for the popular online utility service, America Online.

Although I'm a fan of book/disk packages, they all suffer from program obsolescence due to long publication lead times; this book is no exception. However, to partially eliminate this problem, John hosts a Windows Shareware 500 section on America Online that includes updates of many of the programs included in the book. Also, by the time this appears, a new edition should be in the works. And yes, John is a ham: he's KD7WS.

Windows Shareware 500 is \$39.95 and is available in bookstores. Or contact Ventana Press, P.O. Box 2468, Chapel Hill, NC 27515 (919-942-0220).

Packet Power. Dave Wolf, WO5H, sent us copies of his new packet radio newsletter, "Packet Power." It's targeted specifically for the beginning packet buff and also for those who have been active on packet for some time but may have missed some of the important basics. Dave's interesting newsletter includes basic and advanced operating topics, packet tips, a system operator (SYSOP) forum, packet BBS suggestions, and considerably more.

A 1-year subscription is \$24 from "Packet Power," P.O. Box 189, Burleson, TX 76097-0189 (817-295-6222). Dave offers to send a free sample issue of his packet newsletter to CQ readers upon receipt of an SASE.

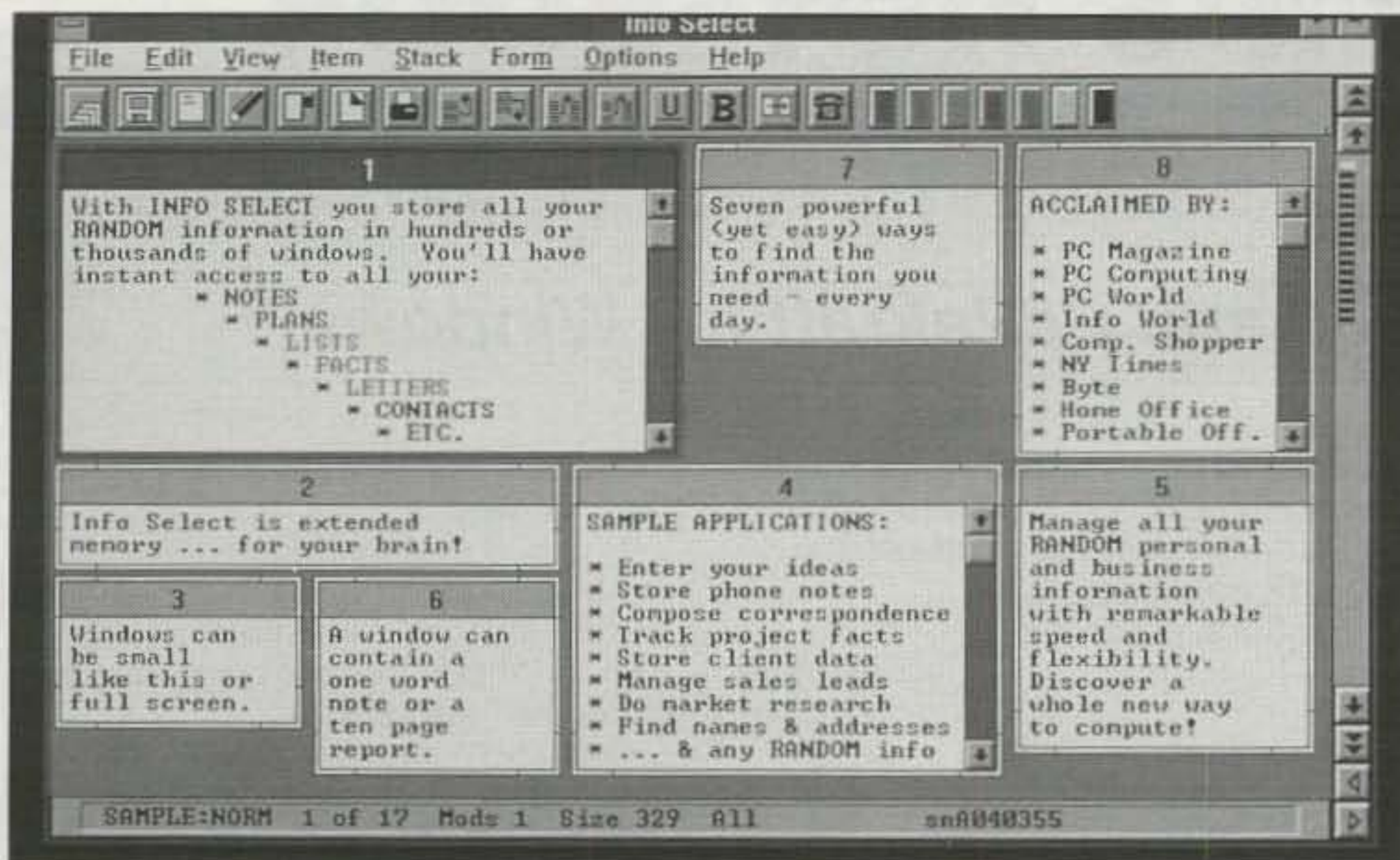
CRB Research Update. In the December issue of *Popular Electronics* we authored a feature article entitled "Super Resources for Hams and SWL's." In it we discussed several useful and educational radio catalogs as well as a number of popular radio resource books and equipment buyer's guides, mentioning some 27 sources in all.

One longtime resource, especially for SWLs and scanner users, that we overlooked was CRB Research. CRB is, in turn, a source for about half of the resources covered in the article. CRB has been publishing to and supplying the hobby communications market since 1967, offering a wide variety of hobby and professional books and other publications to SWLs, scanner owners, and amateurs. They publish a large, regularly updated catalog of "neat radio stuff" that's free for the asking. For a copy contact CRB Research Books, Inc., P.O. Box 56, Commack, NY 11725 (516-543-9169).

PHCP Forum Open on CompuServe. We have mentioned the consolidation of several technical book imprints under the Prentice Hall banner. These imprints include Que, Sams, New Riders, Alpha, Brady, and Hayden, all familiar industry names in their own right.

Through a new PHCP Forum on the CompuServe online service you can access technical support, disk updates, and additional information on books published under these PHCP imprints. You can download files, address questions to the publisher and book authors, and even present book proposals through the system.

You must, of course, be a CompuServe member to participate in the forum, which can be accessed in several ways, the simplest being to type the phrase "GO PHCP." PHCP



The Windows version of Info Select is similar to the DOS edition. But the earlier program has been rewritten using object-oriented programming. The new interface is lightning-fast in a graphical environment, and also is more informative, easier to operate, and more attractive and configurable than its DOS counterpart. (Photo courtesy Micro Logic Corp.)

offers a free CompuServe starter membership kit and \$15 usage credit via a coupon in the back of many of their books.

More from PHCP. Over the past several months we have been happy to receive for review several late 1993 PHCP titles, which we would like to share with you now.

Bearing the Brady imprint is *Great Stuff for Windows*, by Corey Sandler and Tom Badgett.

It's a 394-page book/disk combo that stresses making Windows more powerful while having fun doing it. Technical details are minimized, making the book useful even for the beginner. Two disks are included that contain a variety of shareware utilities and applications. The book is \$32.95.

Three titles from Que are worth noting. If you're heavily into the innards of DOS, a mas-

sive tome for you is Allen L. Wyatt's 1038-page *Killer DOS Utilities* (\$39.95). The book is the DOS counterpart to the equally massive *Killer Windows Utilities*, which we described recently. The DOS edition is a good reference that helps you get a handle on DOS, push your productivity, and automate DOS functions through macros and batch file programming. It includes more than 30 shareware utilities.

A second Que title is *Using PC Tools for Windows* by Caroline M. Halliday and four others. The 792-page, \$27.95 book is an authoritative reference companion for the excellent PC Tools for Windows software, profiled in a recent column. The book also provides sure-handed methods for efficient Windows management, data recovery, and hard-disk backup.

The third and last book this month is just for you if you're using any form of hard-disk compression, especially DoubleSpace or Stacker. It's *The Disk Compression Book* by Matthew Harris. The 338-page book tells you most everything you could possibly want to know about the two popular disk compression products. The \$19.95 book makes comparisons between the two formats, shows how to optimize and troubleshoot them, and describes the use of various utilities.

Wrap-Up

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

Overheard: If you don't understand a particular word you find in a technical article, don't fret. The article will likely make good sense without the unfamiliar word. 73, Karl, W8FX.

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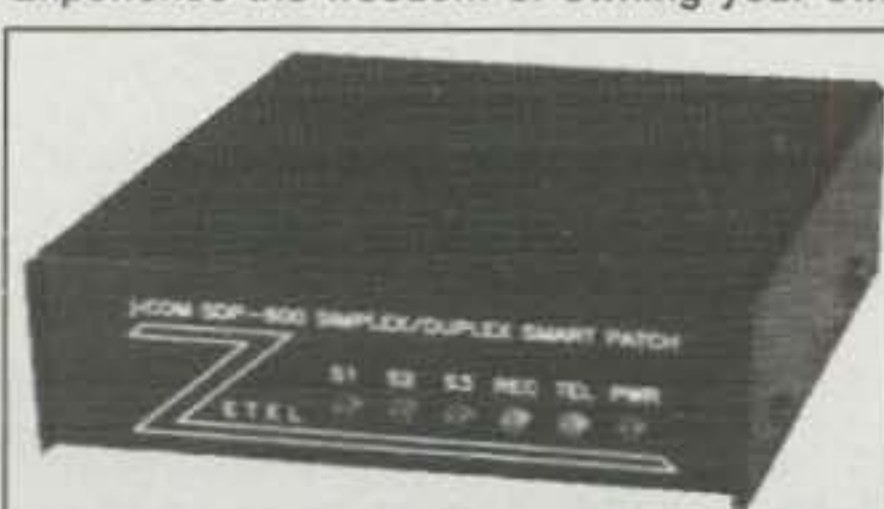
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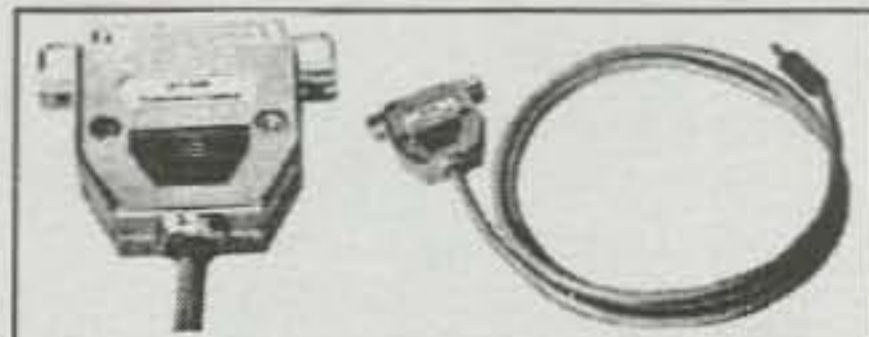
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PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

The AEA PK-900 and PcPakratt for Windows™

In this month's "Packet User's Notebook" we will describe the AEA PK-900 digital controller and the ultimate accessory for it—PcPakratt for Windows™. I've operated the best of them, and this is no exception. It is a combination of digital controller and terminal software that makes multimode digital communications easy and enjoyable.

First of all, the PK-900 controller is not just "another" multimode or all-mode controller. It is a totally different box of goodies, with everything the digital operator will use for a long time to come.

Here is a quick look at some of the digit

al modes and features found in the PK-900:

- AX.25 packet, both HF and VHF with full gateway capabilities between the HF and VHF ports.

- Baudot and ASCII RTTY.

- AMTOR/SITOR CCIR Rec 476 and 625.

- Morse code.

- HF weather FAX.

- PACTOR.

Included in the PK-900 are other receive capabilities which appeal to the digital amateur as well as many SWL enthusiasts.

- NAVTEX marine broadcasts.

- TDM (Time Division Multiplex) signals.

- Bit-inverted Baudot RTTY.

- SIAM for SWL.

Special features attached to packet, PACTOR, and AMTOR modes include:

- PacMail mail drop for automatic message handling.

- PACTOR maildrop operation.

- AMTOR maildrop operation.

- KISS for TCP/IP operation.

- HOST mode for host operations with appropriate software.

- Dual port gateway operations with port access mode as a SYSOP option. (Included in all PK-900s since November 15, 1993. If your PK-900 was purchased prior to November 15, 1993, contact AEA for retrofit and pricing information.)

Enhanced Gateway Operation

The last special feature listed above is not to be taken lightly, as it incorporates some distinguishing features not usually found in the gateway (gateway equals active

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*Windows is a trade name copyright by
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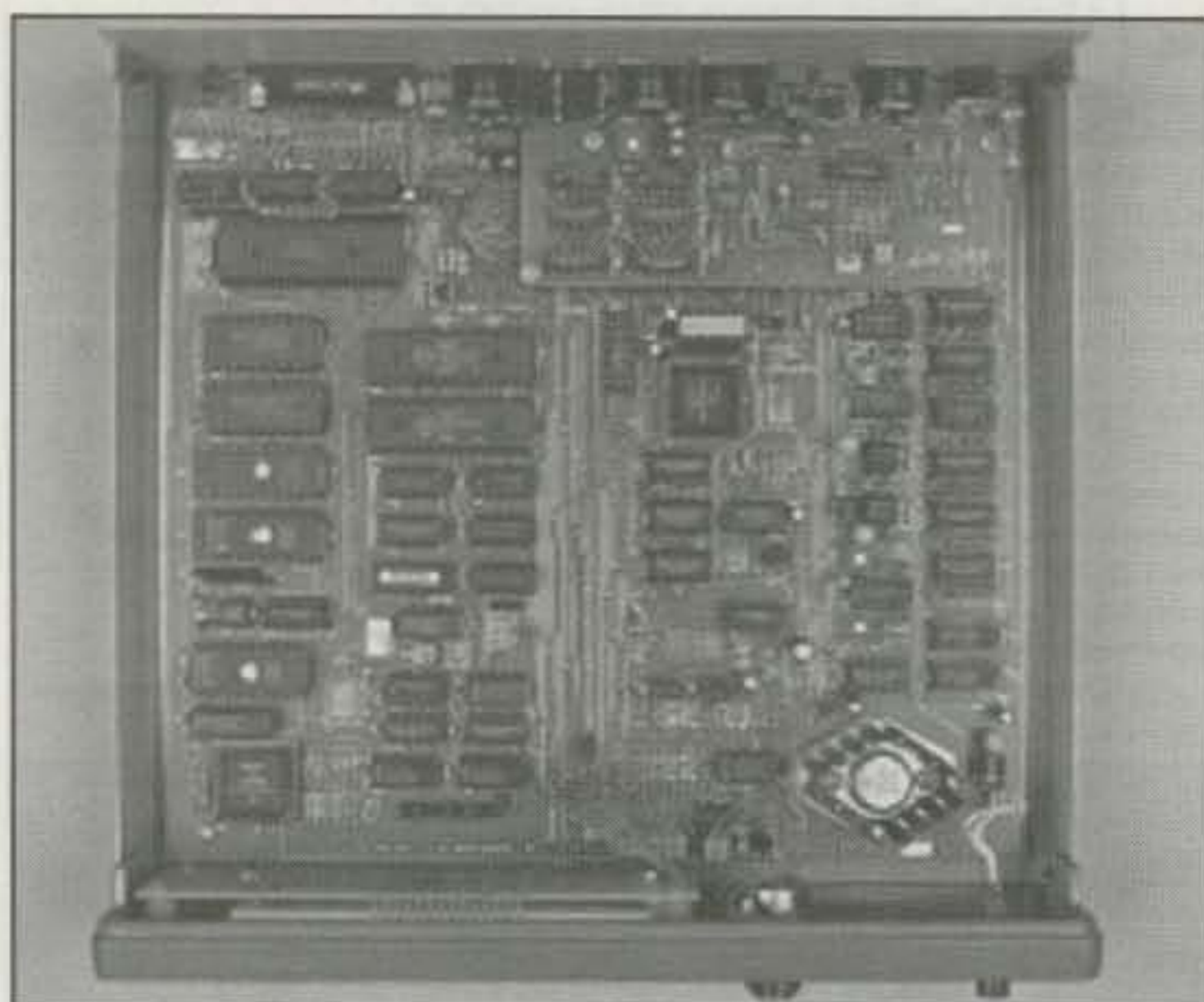


Fig. 1— (Above left) The opening screen of PcPakratt for Windows™ after setting program configuration for the AEA PK-900.

Photo A— (Above) The Windows™ display before PcPakratt is configured for a specific controller.

Photo B— (Left) A bird's-eye view of the arrangement of the circuitry of the AEA PK-900. All EPROMs and modem headers are in the clear and easily accessible.

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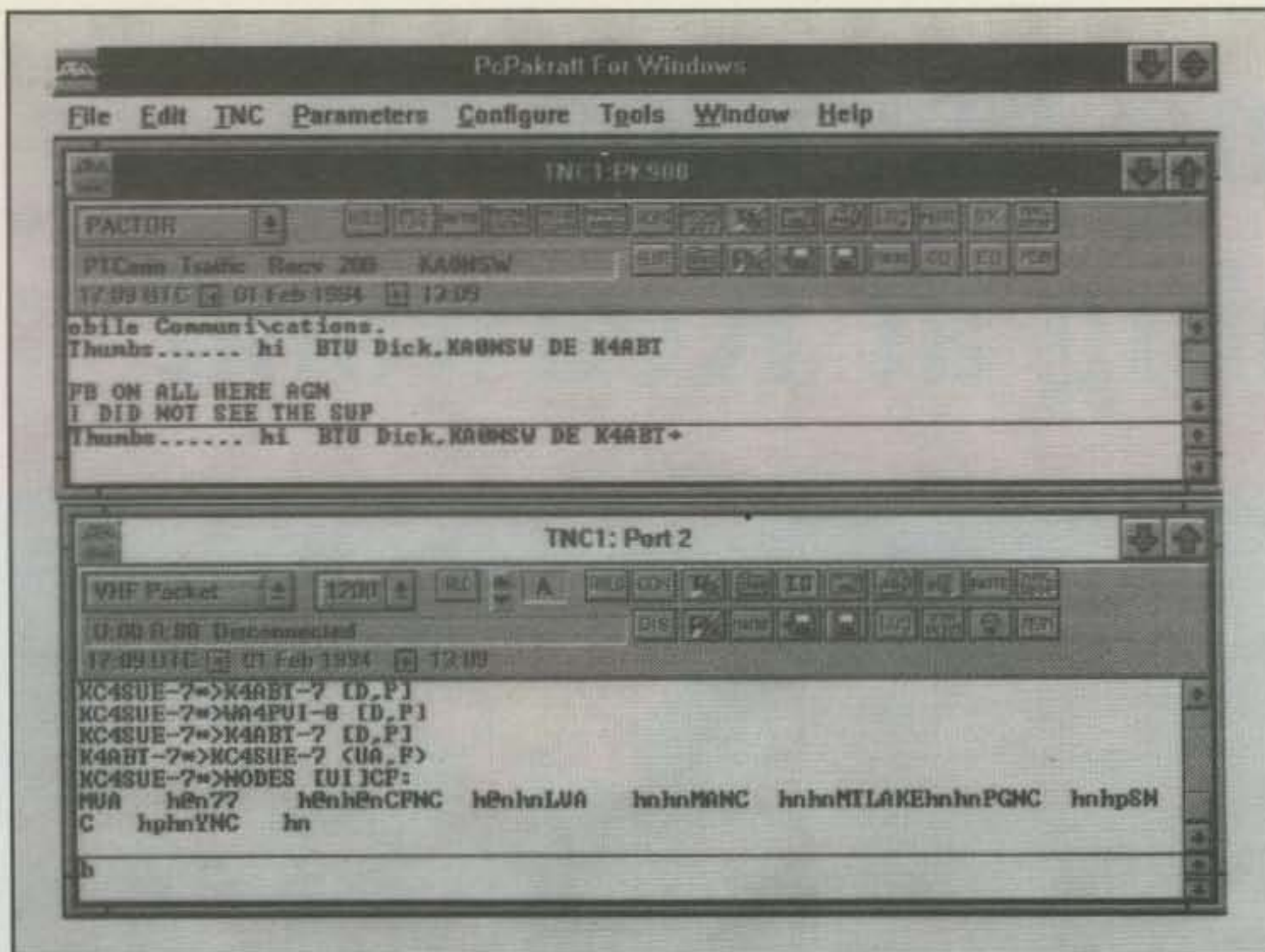


Fig. 2— In the illustration above I have both the HF port and VHF port active. Although both screens display transmit and receive text, the screen with the TNC1 PK-900 displayed is the window that is active. In this case, it is the top window. I'm in QSO with Dick, KA0NSW. Note the PACTOR turnover to KA0NSW de K4ABT, and the Ctrl Z. The turnover is completed using only the PgDn key.

communications between radio ports 1 and 2) application.

One example of such a feature is the addition of the ARXTOR command. ARXTOR enables the PK-900 to distinguish the difference between an incoming

AMTOR and PACTOR signal. The PK-900 will automatically select the correct mode and display received text or graphics.

Most controllers do have the usual MHeard feature, but in the PK-900 MHeard is an additional enhancement.

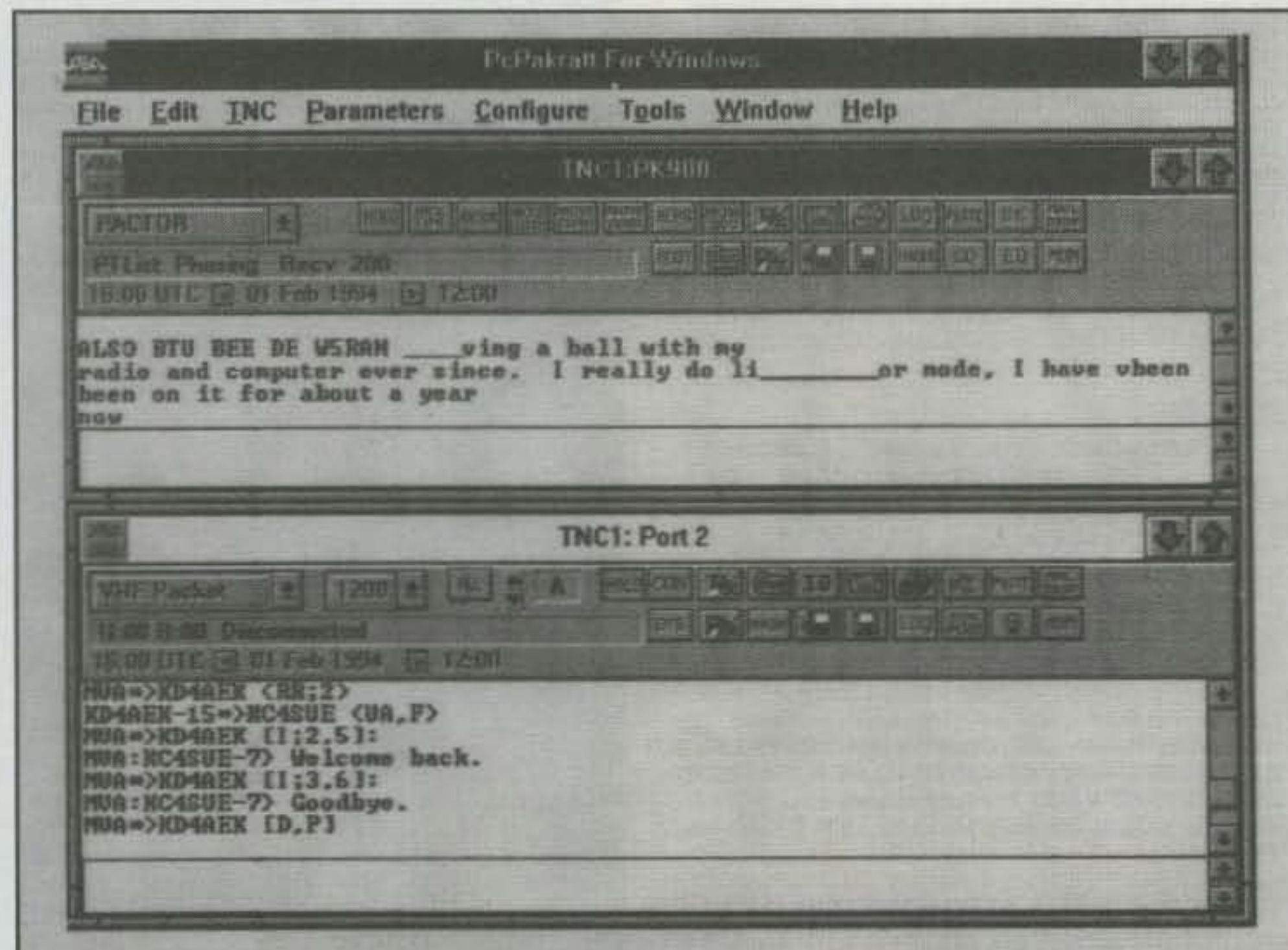


Fig. 3— Shown here is a PcPakratt for Windows™ screen capture that illustrates how the split screens are used to observe both ports of the PK-900. To access either port, use the mouse to move the cursor to the port screen heading and click on it. You are ready to use the active port for communications.

When the MHeard function is executed, not only do we display a list of the most recent "heard" stations, but we are now able to identify whether they are TCP/IP, NetRom, or TheNet stations.

Want to have some fun on HF, then get the gang together and have a roundtable discussion . . . on PACTOR?! With the PTRound command set to "ON" the controller returns to the PTListen mode after a PToSend transmission. Thus, we can have PToSend (FEC) roundtable contacts. This could also provide multiple input from several stations in an emergency net.

In addition to all of the above gateway enhancements, the gateway function is in itself what makes the feature so useful. The control operator can set either port of the PK-900 to handle one mode input/output and set the other port for a different digital mode input/output.

With this flexibility we are able to set up a 1200 baud packet port on VHF and a PACTOR port on HF. A VHF station can connect to the VHF port 2 and issue a connect request to a PACTOR station on the port 1 HF PACTOR frequency.

The gateway station operator is in control of access by other stations. In order for the gateway to be accessible by other stations on VHF or HF, the control operator must set three commands as follows:

- XGATEWAY ON
- GUSERS (to a number greater than zero—i.e., 2 or 4)
- UBIT 19 ON

The port user, whether on the VHF or HF port, can decide on which port to exit via his/her own port select command. Therefore, we can use the VHF port as a node. This is done by connecting to the VHF port on packet, looking at the JHeard list, and then issuing a connect to another station seen on the VHF ports "Heard" list.

If I connect to the VHF port of a station that has the gateway features activated, and I wish to use the HF port to connect to stations on HF packet, I use the following procedure.

Using my VHF packet station I connect to the "gateway" station's gateway call—K4ABT-3:

```
cmd:c k4abt-3
cmd:*** CONNECTED to K4ABT-3
+++ K4ABT AEA Cross-mode Gateway.
Other port (1) is 300 bps packet.
Type ? for help.
+++ You are on Port 2, 1200 bps packet.
Your ID is K4ABT-15.
de K4ABT-3 (B,C,D,J,L,N,P,S,?) >
```

The connect message tells me that I've connected to the cross-mode gateway. It also tells me I'm on port 2, and the HF port is port 1, set to 300 baud packet. To access the HF port I tell the gateway that

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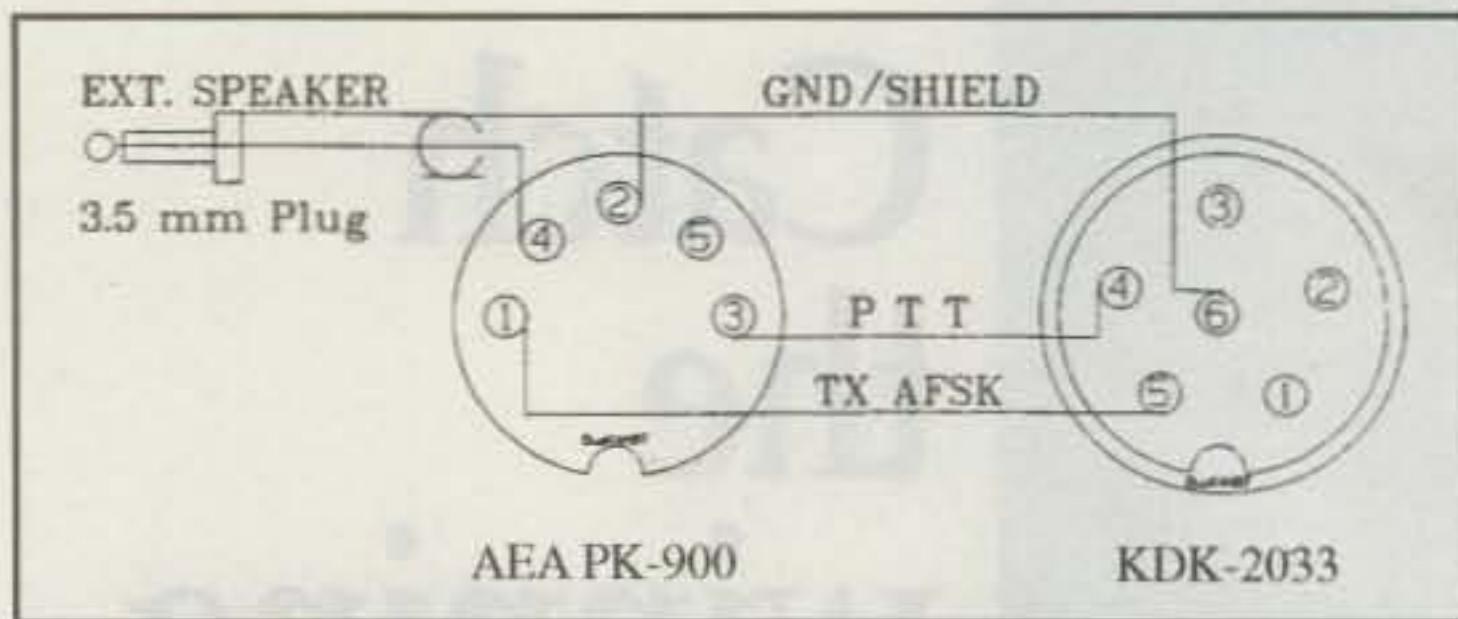


Fig. 4- (Left) AEA PK-900 to the KDK-2033. Either port of the PK-900 can be configured for any VHF mode or protocol; thus either port may be used to interface to VHF or UHF transceivers.

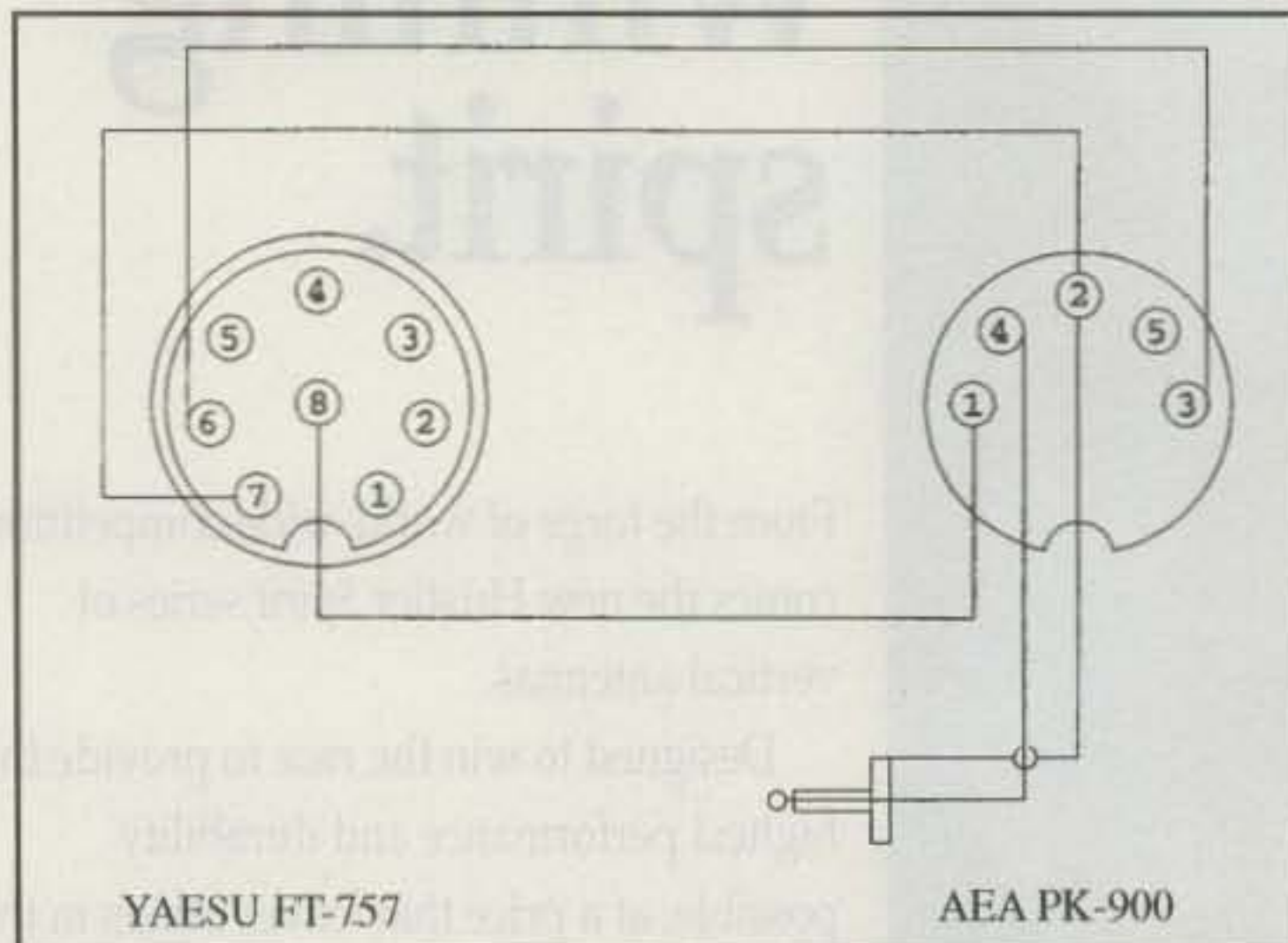
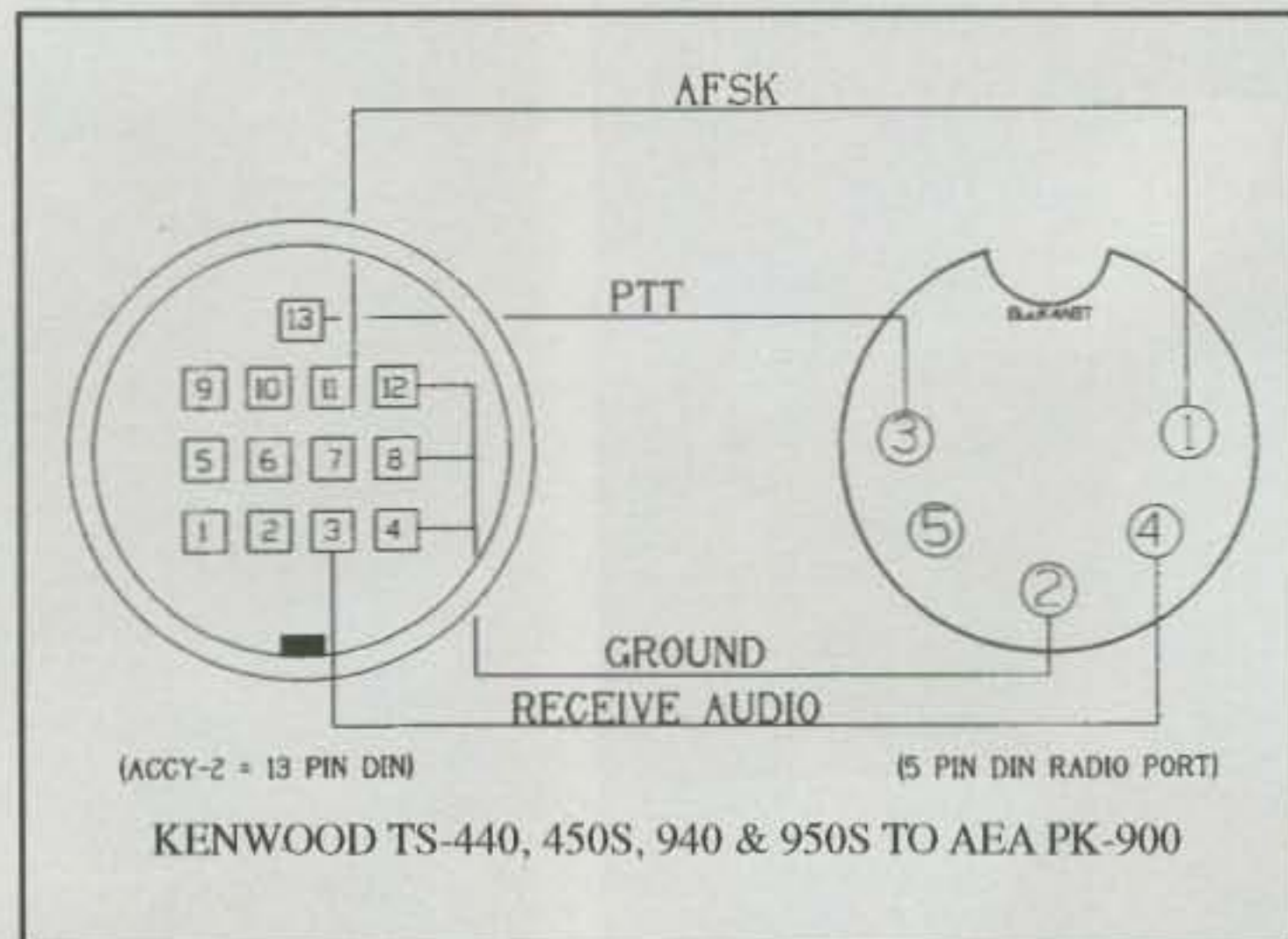


Fig. 5- (Below left) AEA PK-900 port 1 or 2 to the Yaesu FT-757. Either port of the PK-900 may be assigned to HF mode(s) and use.

Fig. 6- (Below right) AEA PK-900 to Kenwood transceivers. The PK-900 can be configured for HF operation and mode of choice.



I wish to exit/use the HF port 1. To do this I send it "P1."

P1

The gateway station responds with:

+++ Cross access to Port 1, 300 bps packet. Your ID is K4ABT-15.
de K4ABT-3 (B,C,D,J,L,N,P,S,?) >

Now that I'm on the HF port of the gateway station I can look at the JHeard list to see what stations are active on the gateway's HF frequency.

J

The gateway station responds with:

```
..... p2 K4ABT
..... p1 WA2PVV
..... p2 KD4HVZ-7 N/R
..... p1 WA2LKI
..... p2 KD4BNQ-7 N/R
de K4ABT-3 (B,C,D,J,L,N,P,S,?) >
```

The JHeard display allows me to see who is on the VHF (P2) port and a list of the calls that are active on the HF (P1) port. I can now issue a connect request to any of the stations that are displayed on the P1 port.

c wa2pvv

WA2PVV busy

+++ DISCONNECTED: WA2PVV at K4ABT-3
de K4ABT-3 (B,C,D,J,L,N,P,S,?) >
b
+++ DISCONNECTED

A similar scenario can be set in the gateway to allow cross-mode connections between VHF and HF modes using:

- Packet in > Packet out
- AMTOR in > Packet out
- PACTOR in > Packet out
- Packet in > PACTOR out
- Packet in > AMTOR out

That's Just For Openers

As if all the above features were not enough, there's more. The PK-900 has internal modem headers to allow the addition of 9600 baud modems (available now from AEA). Without giving it any thought, I went ahead and installed the 9600 baud modem into the internal modem header.

Table I lists the modems and the associated ports that are included in the AEA PK-900 as received. Any modem shown in the list may be initialized within the PK-900 simply by evoking the number of the mode, or modes, with the "MODE" command. For example, if I want to operate at 300 baud HF packet from RADIO port 1, and at 1200 baud VHF packet from RADIO port 2, simply type the following command in at the CMD: prompt:

MODE 10/4 <enter>

I will receive the following message from the PK-900:

MODem was x/x
MODem now 10/4

We begin to understand how the MODem command can control which mode is applied to which port. As another example we can select a different modem for port 1 without affecting port 2 by entering at the cmd: prompt:

MODem 11 <enter>

The PK-900 responds with:

MODem was 10/4
MODem now 11/4

Likewise, to change the mode of port 2 without changing the mode of port 1, we enter the following at the cmd: prompt:

MODem /3 <enter>

The PK-900 responds with:

MODem was 11/4
MODem now 11/3

A nice feature of the above becomes apparent when we have both ports active during contests. This allows us to view the local VHF DX spotting network on port 2 while actively contacting stations "spotted" on HF port 1.

The port identifiers allow us to view both

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- Pause and busy scan
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- Automatic power off
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Other HT's that share batteries and most accessories with the C158A: C228A (2m/220), C528A or C558A (2m/440), and C628A (440/1.2 GHz)

OPTIONAL ACCESSORIES:

CAW 150 mobile power cable, CBT151 battery case (6 pcs.), CHP111 headset with PTT, CHP150 VOX headset, CLC151 standard case, CLC152 large case, CMB111 mobile bracket, CMC150 mobile charger, CMP115 speaker mic., CMP111 large speaker mic., CNB152 12V 600MAH battery, CNB153 7.2V 1000MAH battery, CSA181A rapid charger.

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NILES, ILLINOIS 60714
TEL. (312) 763-0081 FAX (312) 763-3377

Port 1	
1:	FSK 45 bps 170: 2125/2295
2:	FSK 100 bps 170: 2125/2295
3:	FSK 45 bps 200: 2110/2310
4:	FSK 100 bps 200: 2110/2310
5:	FSK 100 bps 425: 2125/2550
6:	FSK 100 bps 850: 2125/2975
7:	FSK 100 bps 850: 1275/2125
8:	Analog 900/2500
9:	FAX 1300/2100
10:	FSK 300 bps 200: 2110/2310
11:	FSK 1200 bps 1000: 1200/2200
12:	Morse 750

Port 2	
1:	Internal 200: 1070/1270
2:	Internal 200: 2025/2225
3:	Internal 1000: 1200/2200
4:	Internal 1000: 1200/2200 eq.
5:	Internal 200: 1180/980
6:	Internal 200: 1850/1650
7:	Internal 800: 2100/1300
8:	Internal 800: 2100/1300 eq.
9:	Internal option
10:	Modem disconnect header

Table 1—The modems and associated ports that are included in the AEA PK-900 as received.

port packets on the same screen, at the same time, thereby enabling simultaneous port connects and communications.

Enter PcPakratt for Windows™

We now have the ultimate accessory for the PK-900—or for any AEA digital controller for that matter. It is called PcPakratt for Windows™. I've found this terminal program, which runs under the Windows environment, provides ease of operation and great enjoyment.

PcPakratt installs easily from the Windows Program Manager and is ready to

execute within minutes. The correct time zone and whether or not the user is in a "daylight savings" time zone must be included so that PcPakratt will display and log the correct time and date to the connects and contacts.

When we first execute PcPakratt it will display a screen that resembles the illustration at photo 1. The screen displays a stack of the AEA digital controllers. PcPakratt is presenting the user with a display of the controllers with which it works best. As soon as you "click" on the OK, you are presented with the first setup screen. (Although PcPakratt is mouse driven, it may also be operated using keyboard commands.)

Just A Glimpse

I'm not about to give a complete account of every feature found in PcPakratt for Windows because just when I think I've found or used them all, another one pops out. On-line "Help" windows are available on all functions within PcPakratt. In addition, a well-written and well-illustrated hard-copy manual is supplied with the PcPakratt software.

I'll make this brief, but I do want to give you some idea of how easy and accommodating PcPakratt is. The PACTOR operator will understand and relate to the following description immediately.

When operating PACTOR, we all know what happens when we stop sending a string of text and turn control over to the other station. We type in the callsign of the station to which we are connected, then "de K4ABT" (or your call) and press <enter>. Then we send a Control Z (Ctrl-Z) to give control to the other station. With PcPakratt this is not so!

All this is handled by pressing only one key. End your transmission as you usually do, but don't type in the connected stations call, don't type in "de your call," and don't look for and combo-press Ctrl Z.

Simply press the Page Down key (Pg Dn). The PgDn key does it all. It collects the callsign of the connected PACTOR station, and then adds "de your call" and

injects the Ctrl Z, all in one keystroke. Now this is keystroke multiplying at its best (see fig. 2).

I've given you this example of one of the many nice features found in PcPakratt so you can get some idea of how much thought was put into the writing of this terminal program for Windows. There's no question about it: PcPakratt is written by the digital operator for the digital operator.

PcPakratt transfers binary files and automatically captures incoming binary files. Everything is mouse or keyboard cursor driven. For the greatest ease of operation, it is best to use the mouse, so two comports are essential if you are using a serial mouse—one for the PK-900 and one for the mouse control. If you are using a buss mouse, address it accordingly.

River Crossing and "Stream Switching" Made Easy

Switching between ports and streams is just as easy as the other operations of the PK-900, especially while using PcPakratt. Simply click on the TNC icon and select the port to open and you are there. Changing streams is just as easy.

To operate with more than one stream or QSO going on at the same time used to mean a test of the operator's level of sanity. With the PK-900/PcPakratt combination the drudgery of stream switching is no longer a challenge.

As a matter of interest, port switching has attained new prominence in the PK-900 when used in conjunction with the PcPakratt for Windows software. To address the port to call, move the cursor to the TNC icon, click on it, and select the port to open.

If you wish to have both ports active, you may do this too. PcPakratt and the PK-900 allow the use of dual or split screens for this use. Even multiple screens are used when both ports are activated, and multiple streams are in use (fig. 3).

Summary

Photo B is a birds-eye view of how well the circuitry is arranged. All EPROMs and modem headers are in the clear and easily accessible.

I could continue relating the good points of the PK-900 and the PcPakratt for Windows, but it is most enjoyed when experienced first hand.

For more information about the AEA PK-900 and the PcPakratt for Windows, contact an AEA dealer, or call or write to Advanced Electronic Applications, Inc., P. O. Box C2160, 2006 196th St. SW, Lynnwood, WA 98036 (literature requests 800-432-8873, or direct 206-774-5554).

I hope to see you at the CQ booth at Dayton! Until then . . . Happy Packeting!
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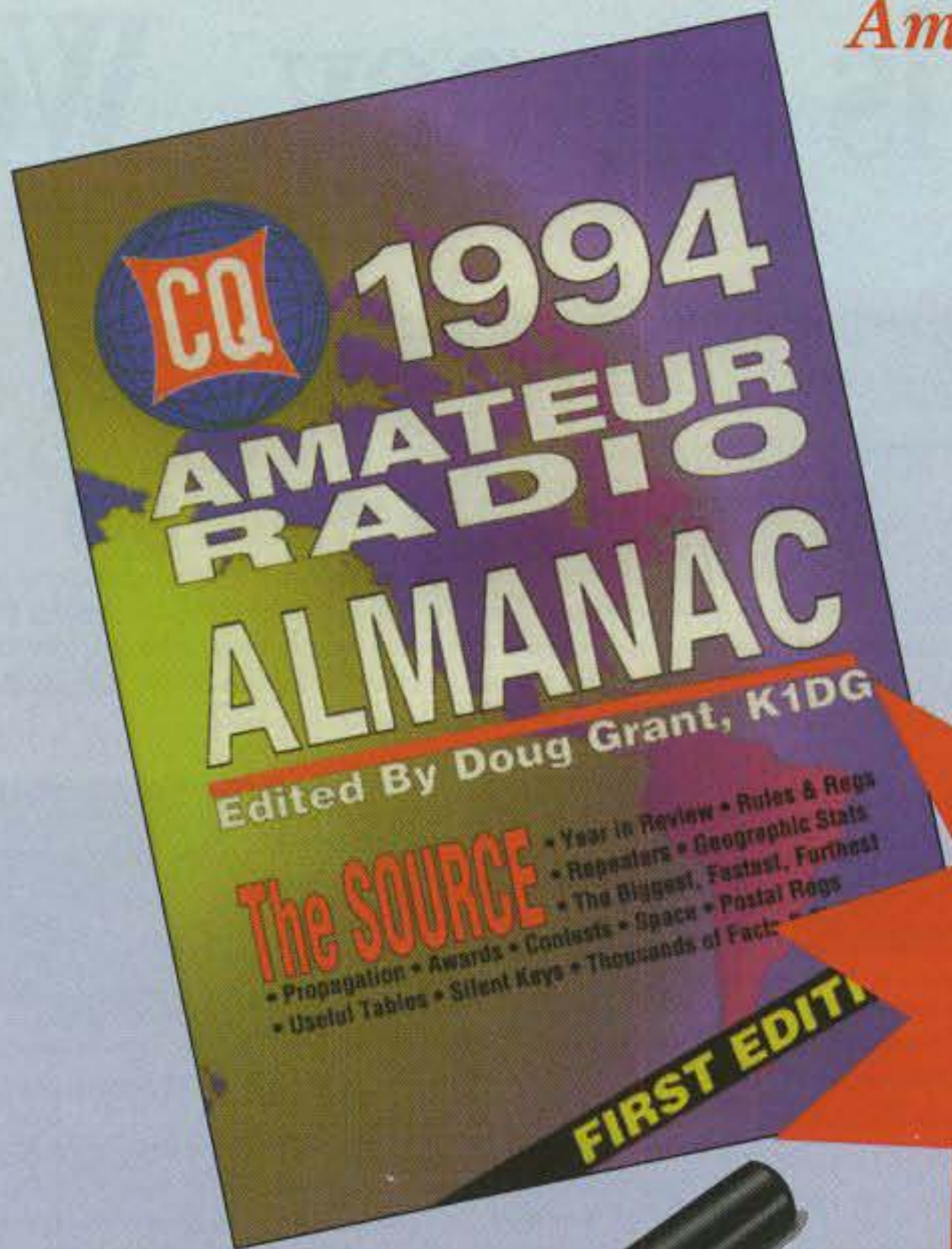
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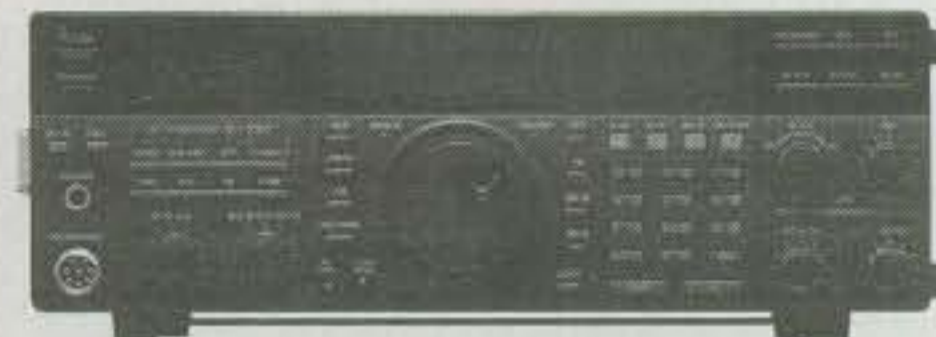
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Kantronics KPC-3 Packet TNC

\$117

The KPC-3 is a small-sized, low power, full featured packet TNC designed with the new user in mind while providing all the power required by experienced packet radio operators. The KPC-3 incorporates the Kantronics full-featured PBBS, including reverse forwarding to a BBS, mail waiting LED, and remote sysop access. It comes complete with version 5.0 firmware, DB-9 connector, 2.1mm power connector, and two manuals: one a quick-start manual, the other a complete reference manual. Measures 0.8" x 5.2" x 5.2" and requires 6-25 VDC at only 40 mA max.



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The IC-W21AT includes innovative features not found on any other handhelds. The V/V and U/U feature allows you to receive 2 signals simultaneously on the same band as well as normal cross-band repeat and duplex. In the innovative whisper-mode, the W21AT transmits constantly on one band while receiving constantly on the other. A microphone in the battery pack gives you true telephone-style full duplex for the first time in a handheld! Your most often used functions are automatically assigned to the Ai key in priority of use- another Icom exclusive! All of this plus "standard" dual-band features such as 70 memory channels, 4 DTMF memories, numerous scanning modes and much, much more combine to make this the ultimate choice in a dual band HT. Get yours today!



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Edco TX-146 2m Intermod Filter **\$59**

In today's radio jungle 2m radios are subjected to all kinds of interference: high-power pagers, other nearby VHF transmissions and even local FM broadcast stations can overload your sensitive HT or mobile and cause severe intermodulation distortion or "intermod". The new Edco TX-146 Intermod Filter solves this problem by simply adding back in what the new wideband HT's leave out-the high quality helical filter. The hi-tech 3-stage, full automatic filter will attenuate signals outside the 2m band by as much as 40 dB when switched on! Inside the compact, rugged filter housing is a special RF sensing circuit that automatically switches two RF rated relays to bypass the filter during transmit-up to 50 Watts of power. Installation is simple: simply connect the TX-146 in line with the radio's 2 meter antenna line and hook up the filter to +12 VDC and listen to clear 2m without the beeps and squawks of intermod!



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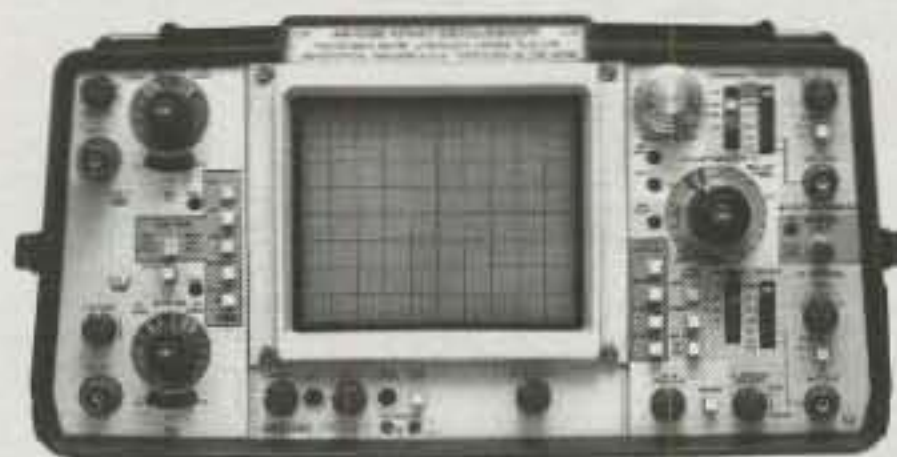
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CIRCLE 166 ON READER SERVICE CARD

WHAT'S NEW AND HOW TO USE IT

Another Micropower VHF Receiver

First I would like to thank all of you who have written regarding the SL6655 chip described in the December 1993 column. By this time everyone requesting the application note from me should have received one, and I am now out of stock. Any further discussions will have to be had with the manufacturer, GEC Plessey Semiconductor, who can be reached at 1500 Green Hills Road, Scotts Valley, CA 95066 (408-438-2900). There are also a number of GEC Plessey distributors who may be able to help; Pioneer (in several states) is one of the largest.

In the future, please do not forget the stamped, self-addressed envelope when requesting information. When you have to answer 50-plus letters, it really helps! I will answer 100% of the letters that include an SASE, but I may not answer the rest, so please understand! Thank you all also for your kind and encouraging words and good wishes.

Since there seems to be so much interest in this sort of device, I will try to cover others in the months to come. This month I thought I would briefly describe a cousin chip from GEC Plessey, the SL6659. This surface-mount device provides solid operation to 200 MHz, covering 2 meters in the process, but requires that you build a separate local oscillator. You may even be able to squeeze it to 220 MHz, since the mixer is rated to 300 MHz. Fig. 1 shows the block diagram of the chip, while fig. 2 shows the schematic of a 173 MHz VHF superhet using the chip.

Luckily, Plessey has provided a suggested circuit board artwork and component layout for a demonstration receiver, and these are figs. 3, 4, and 5 shown here. The overall dimensions for the artwork (for scaling purposes) are $2\frac{7}{16}'' \times 3\frac{7}{16}''$. The resulting circuit, shown in these figures, is a single conversion superhet with the following specifications (measured at 50 MHz):

Sensitivity—3 μ V at 12 dB SINAD.

Supply voltage—2.5–7.5 V @ 1.5 ma.

Recovered audio output—75–125 mv.

This may not be state-of-the-art, but look at the size and simplicity!

If you do build the circuit, alignment is achieved by loosely coupling a VHF frequency counter to pin 15 and adjusting C1 for "fine tuning" of the desired operating frequency. A low-frequency scope is then connected to pin 13 and an unmodulated carrier of -50 dB (at the oper-

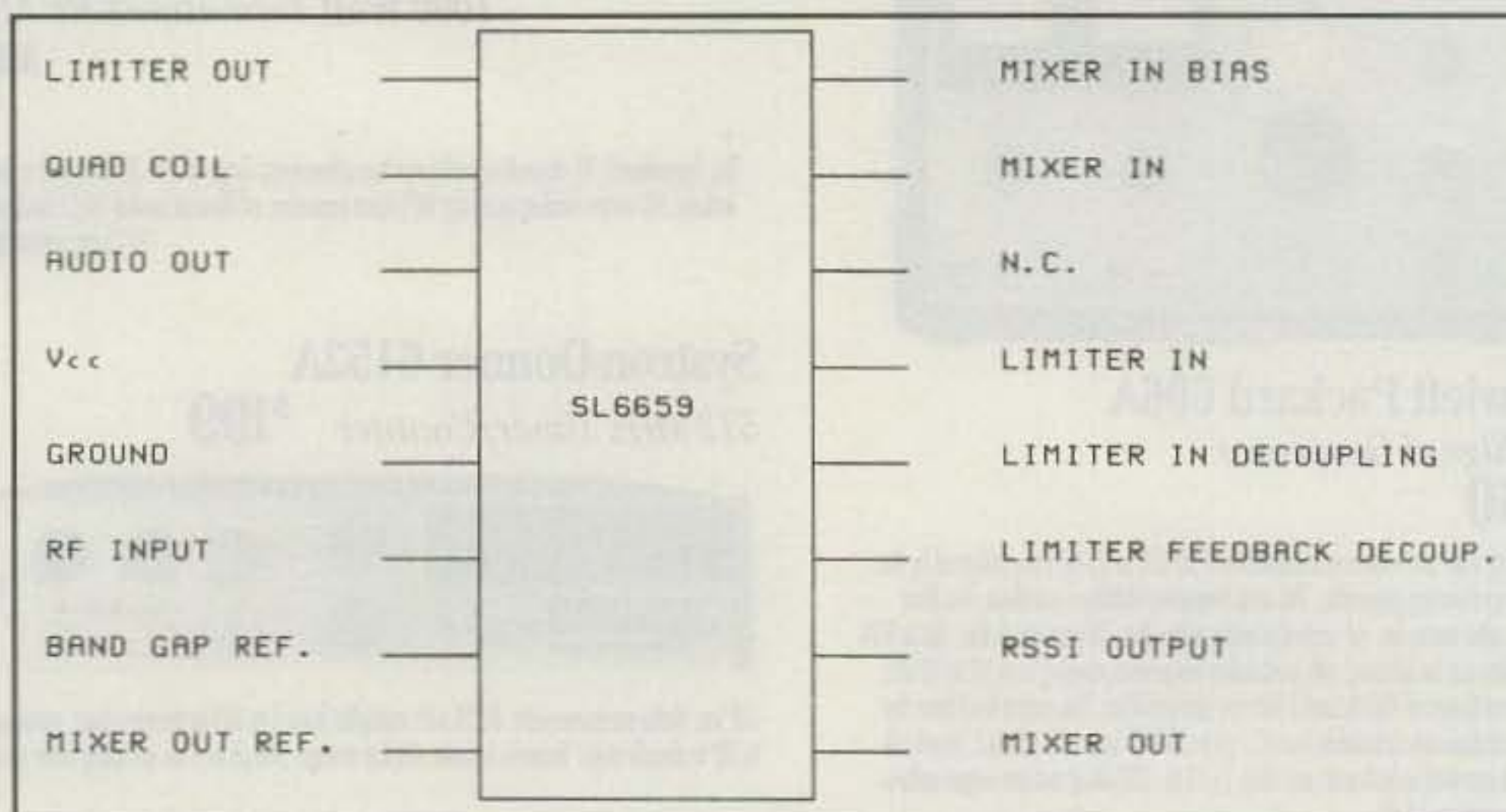


Fig. 1- Pin connections for the SL6659 (top view).

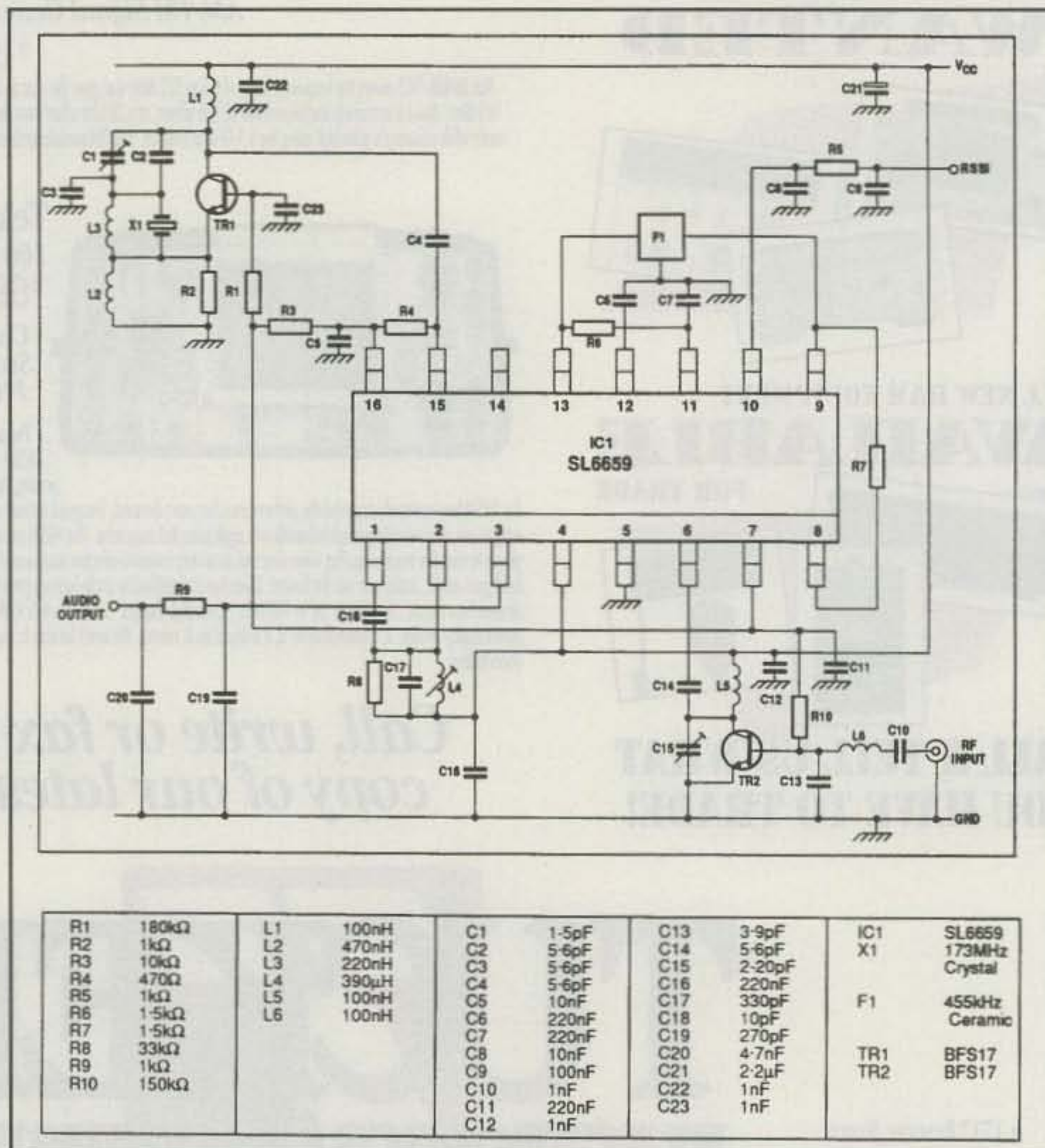


Fig. 2- Schematic and parts list for receiver. Note: All components are surface mount except for the crystal and ceramic filter.

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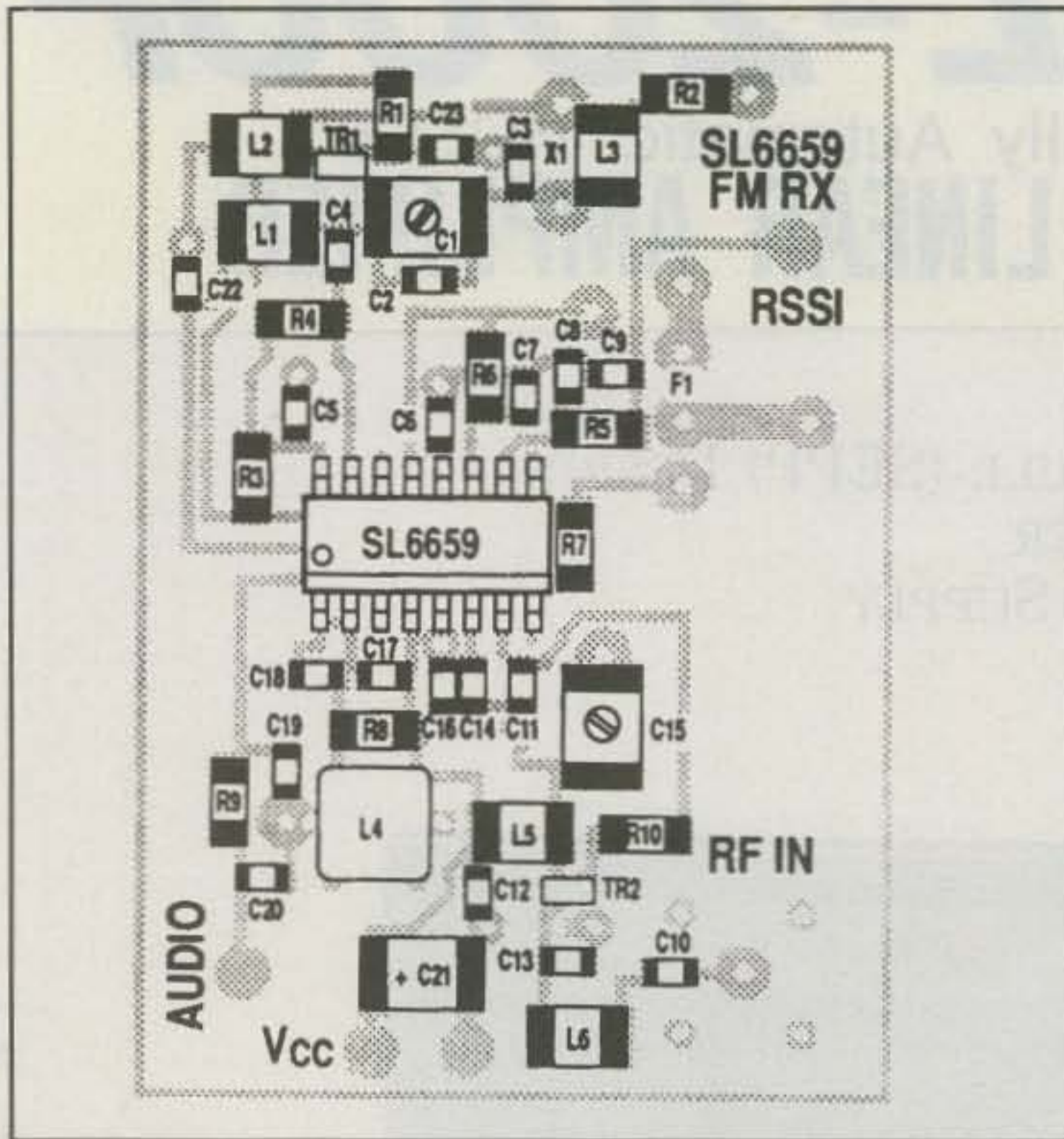


Fig. 3—PC board component layout diagram (shown actual size).

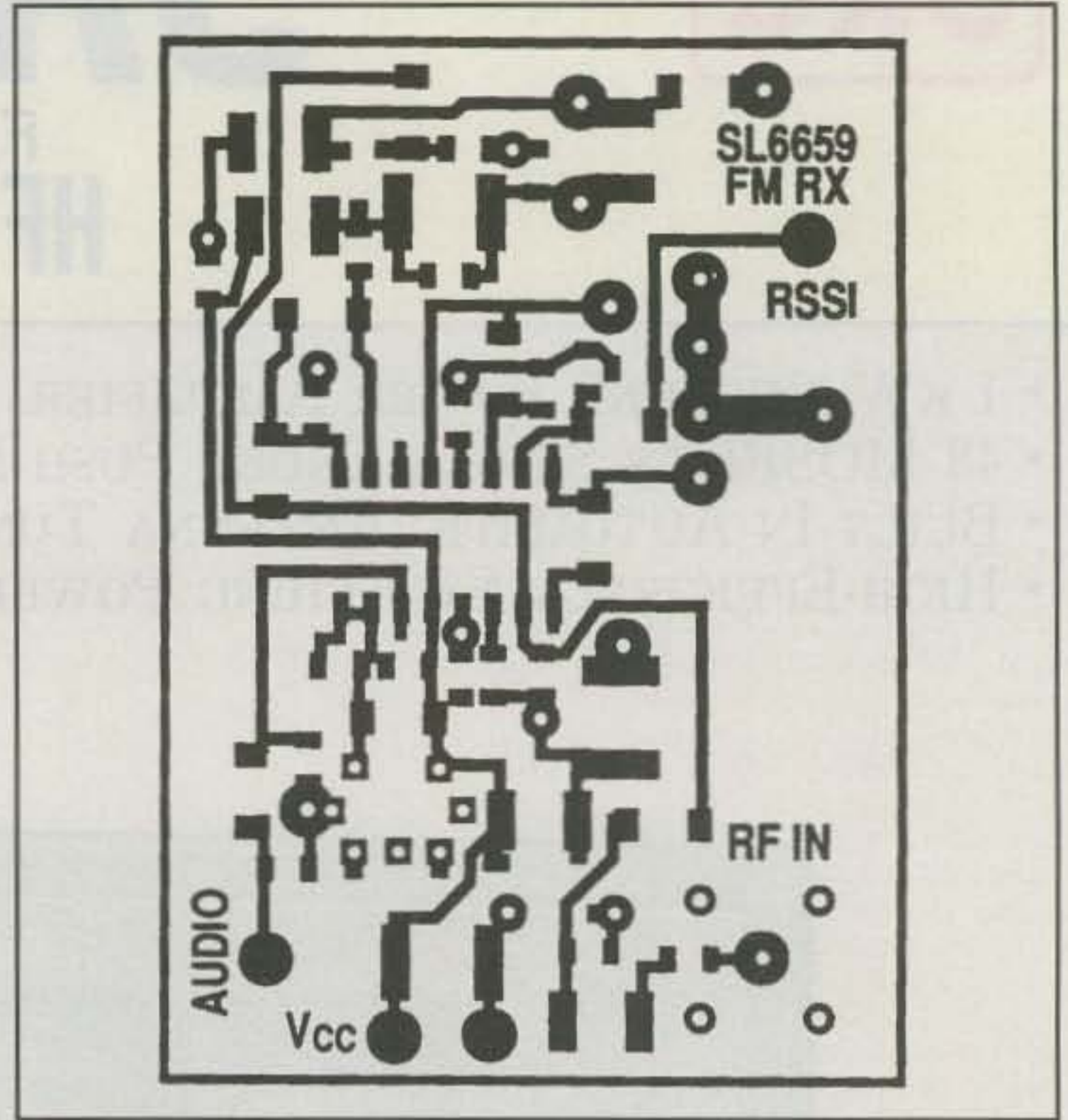


Fig. 4—PC component side layout artwork (shown actual size).

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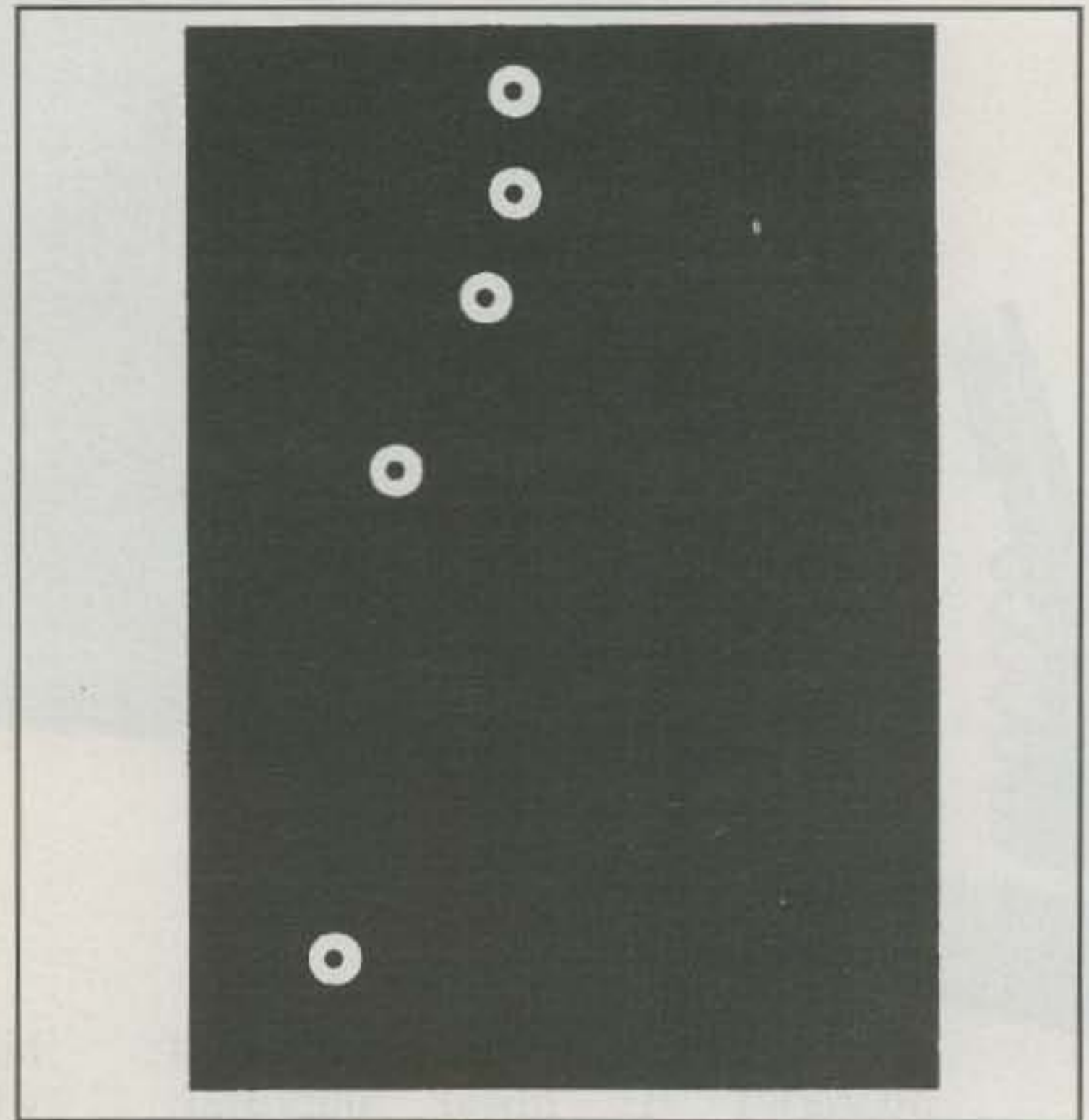


Fig. 5—PC board ground plane layout side (shown actual size).

ating frequency) fed to the RF input. C15 is then adjusted for maximum 455 kHz output on the scope, and you are ready to receive. L4 is then adjusted with an actual received FM signal for maximum recovered audio. For those interested, an RSSI, or received signal strength indicator output, is also provided and may be used by connecting a 100 uA full-scale meter between the RSSI output and ground.

Other crystals may be used with appropriate adjustments. I would be very interested in receivers built with either this chip or the SL6655, and look forward to the results of your efforts.

73, Irwin, WA2NDM

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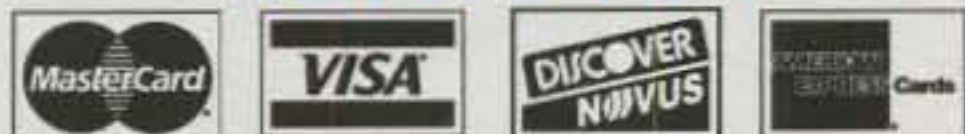
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A Short-Boom 3-Element Yagi

An interesting antenna design that can be investigated by the K6STI Yagi Optimizer is a short-boom Yagi. A 3-element, 20 meter Yagi on a 12 foot boom sounds very attractive. A single section of 2 or 3 inch diameter tubing can be used for the boom, eliminating the boom splicing usually required for a longer boom.

Accordingly, maximum element spacing (reflector to director) of 11 feet 8 inches was chosen, and element lengths and spacing were iterated by the Optimizer program. After 803 iterations, the program provided a design which exhibited a gain of 5.07 dBd at the design frequency of 14.15 MHz, a front-to-back ratio of 23 dB, a feedpoint impedance of about 15 ohms, and an SWR figure of better than 1.6-to-1 over a range of 300 kHz. The free-space polar plot of the short-boom array is shown in fig. 1. This is not too shabby.

Antenna operating parameters are shown in fig. 2. The upper-left plot shows power gain, which runs from 5 dBd at 14.0 MHz to 5.5 dBd at 14.3 MHz. The upper-right plot illustrates the very reasonable value of SWR across the design range. The lower-left plot shows that front-to-back ratio peaks at nearly 25 dB around 14.11 MHz. The lower-right plot shows that feedpoint impedance is about 15 ohms at the resonance frequency; this value can easily be matched by any of the popular systems. Antenna dimensions are given in fig. 3.

All in all this is a good, practical design. However, it must be pointed out that reflector to driven element spacing is tight, and movement and vibration of the elements may show up as slight variations of SWR when the antenna flexes in a heavy wind.

Compared to the wide-spaced 3-element 14 MHz array on a 24 foot boom discussed last month, this little antenna has about 1.04 dB less forward gain, and sacrifices about 5 dB in front-to-back ratio.

It is interesting to compare this antenna with the 2-element Yagi discussed in an earlier column. The big advantage of this little antenna over the 2-element job is not in gain, but vastly improved front-to-back ratio!

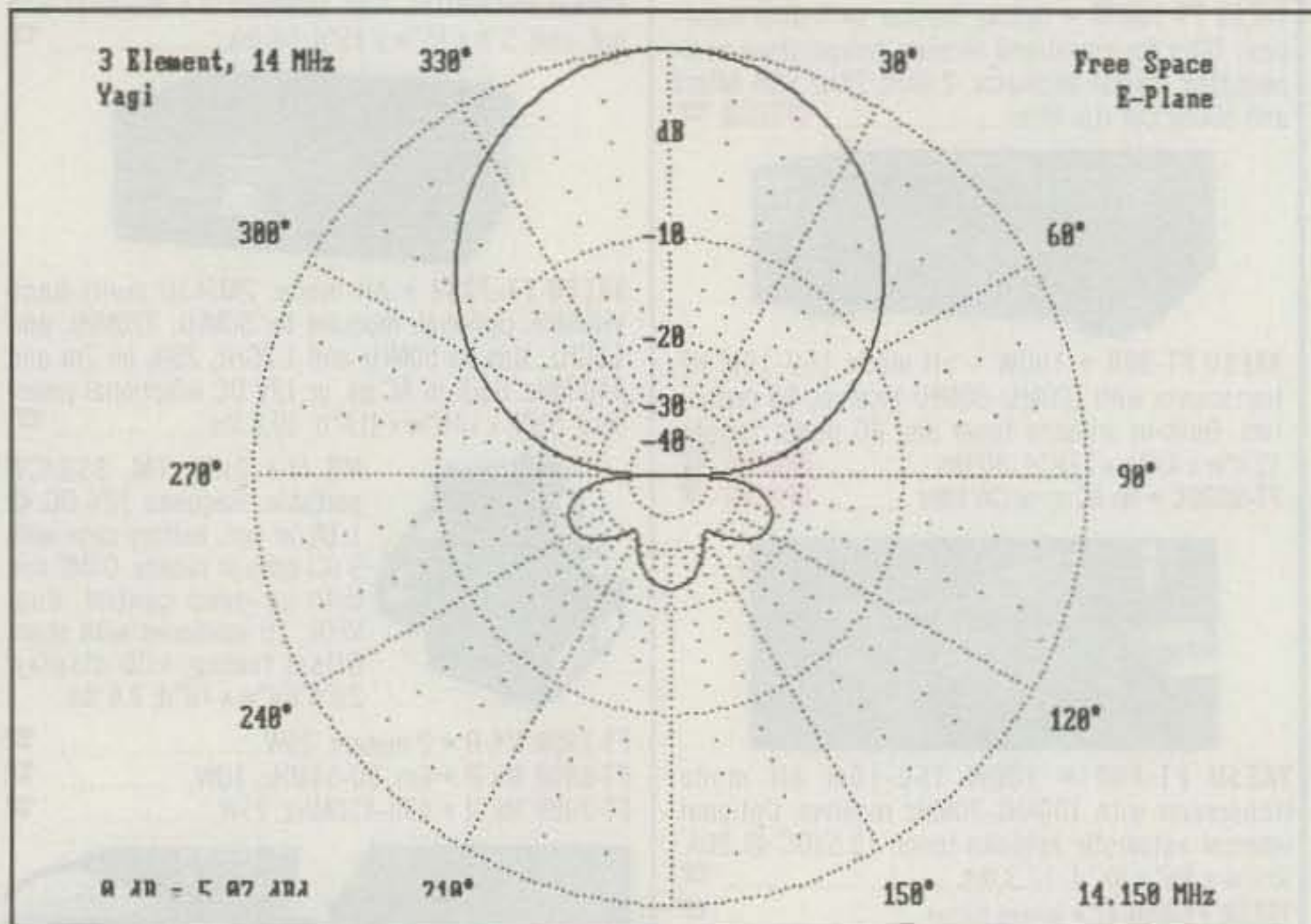


Fig. 1—Short-boom (12 foot) Yagi provides 5.07 dB gain and 23 dB front-to-back ratio.

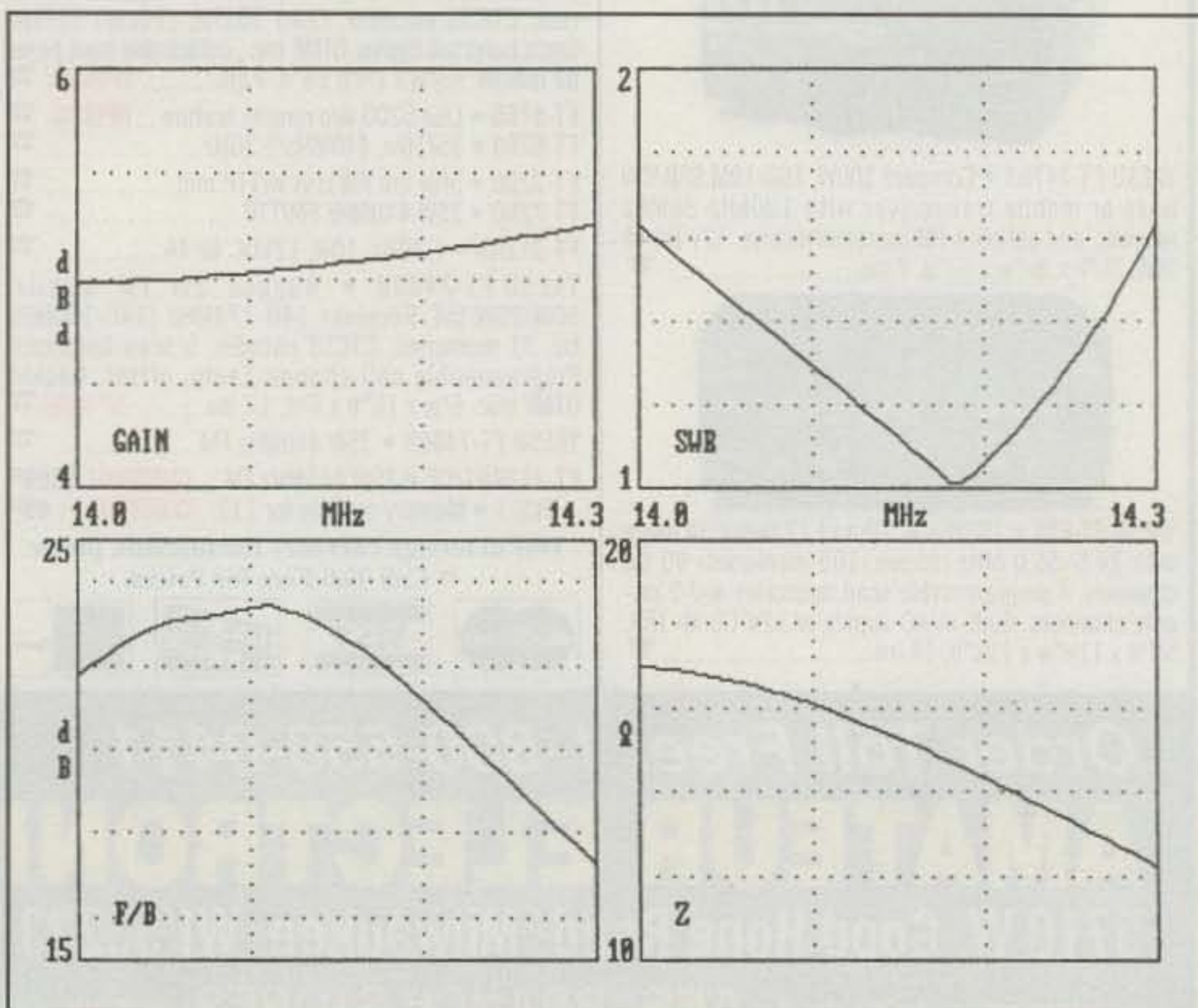


Fig. 2—Top left: gain vs frequency. Top right: SWR vs frequency. Bottom left: front-to-back vs frequency. Bottom right: feedpoint impedance vs frequency.

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An Interesting 3-Element Yagi Design

The Optimizer user can spend many a happy rainy day exploring antenna parameters, playing with gain vs front-to-back vs bandwidth vs boom length vs input impedance. There are an infinite number of configurations. An interesting one I ran across is shown in fig. 4. This is a 3-element design on a 20 foot boom. The beam provides 5.86 dBd gain and 26 dB front-to-back ratio near the design frequency of 14.2 MHz.

This is a well-behaved, wide-bandwidth design, having a feedpoint impedance of about 20 ohms at the design frequency. Various operating parameters are shown in fig. 5.

Note that the element spacing is not equal (fig. 6). The reflector-driven element spacing is much less than the driven element-director spacing. This uneven spacing has shown up so many times in modern Yagi designs that it seems to be an important factor in providing optimum performance.

Where did this particular design come from? It started with a design for a 3-element Yagi given in chapter 8, section 14, of *Yagi Antenna Design* (an ARRL publication), by the late James Lawson, W2PV. Gain, front-to-back, SWR response, and input impedance derived by the Optimizer are very close to those values given in the original W2PV design. But notice the difference in element spacings and length!

I started the program by inputting the W2PV data to the Optimizer program. As the program ran, I could see on the monitor the driven element moving steadily closer to the reflector and the element lengths changing. Very interesting. The end results were the same as derived by W2PV, but the Optimizer provided a different set of element dimensions and spacing.

Well, that's what makes the ball game interesting. The K6STI Optimizer is calibrated against NEC, the accurate antenna analysis program used by professionals. My opinion is that the results obtained from the Optimizer program are very close to real-life data obtained in the field on a well-calibrated antenna range. So there you are.

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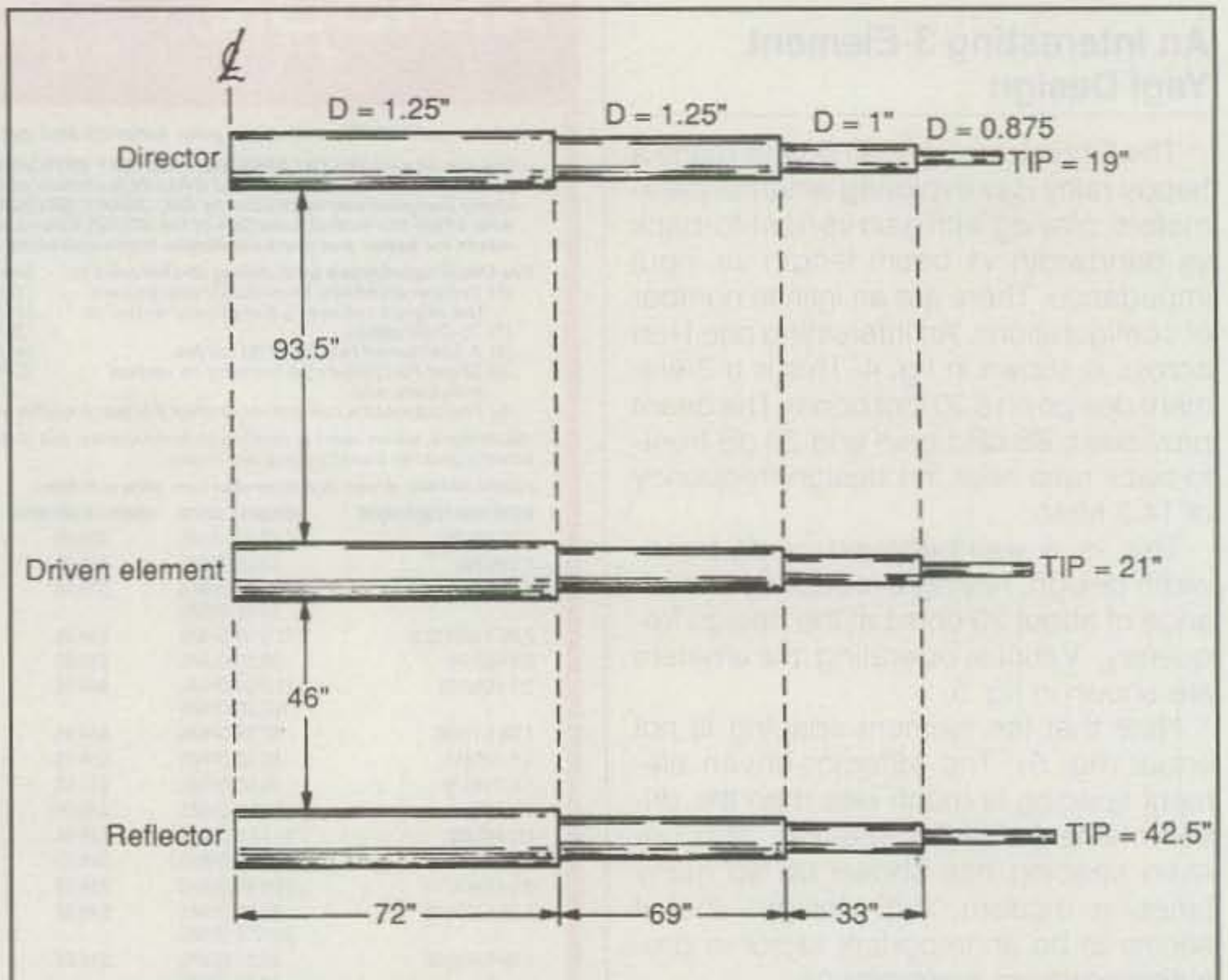
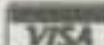


Fig. 3—Half-element lengths, spacing and diameters of short-boom Yagi.

book *Wireless Communication in the United States*, by Thorn Mayes, published by the New England Wireless and Steam Museum, 697 Tillinghast Road, East Greenwich, Rhode Island 02818.

In the letter Beverage tells that in 1920 he erected a wave antenna on Long Island. It was 9 miles long, running from Riverhead to East Moriches. He recounts that one day he connected headphones between the wire and ground and heard

a very high-pitch tone sending code. He listened carefully to the tone, which was a frequency of about 14,500 cycles (Hz). He identified it as the super-power station LY, the 1000 KW arc station near Lyons, France, transmitting on 14.5 kHz!

Trans-Atlantic reception without a receiver! I wonder if that astounding feat has been duplicated since then. With a very, very long, low wire antenna you might try to hear the VLF stations around

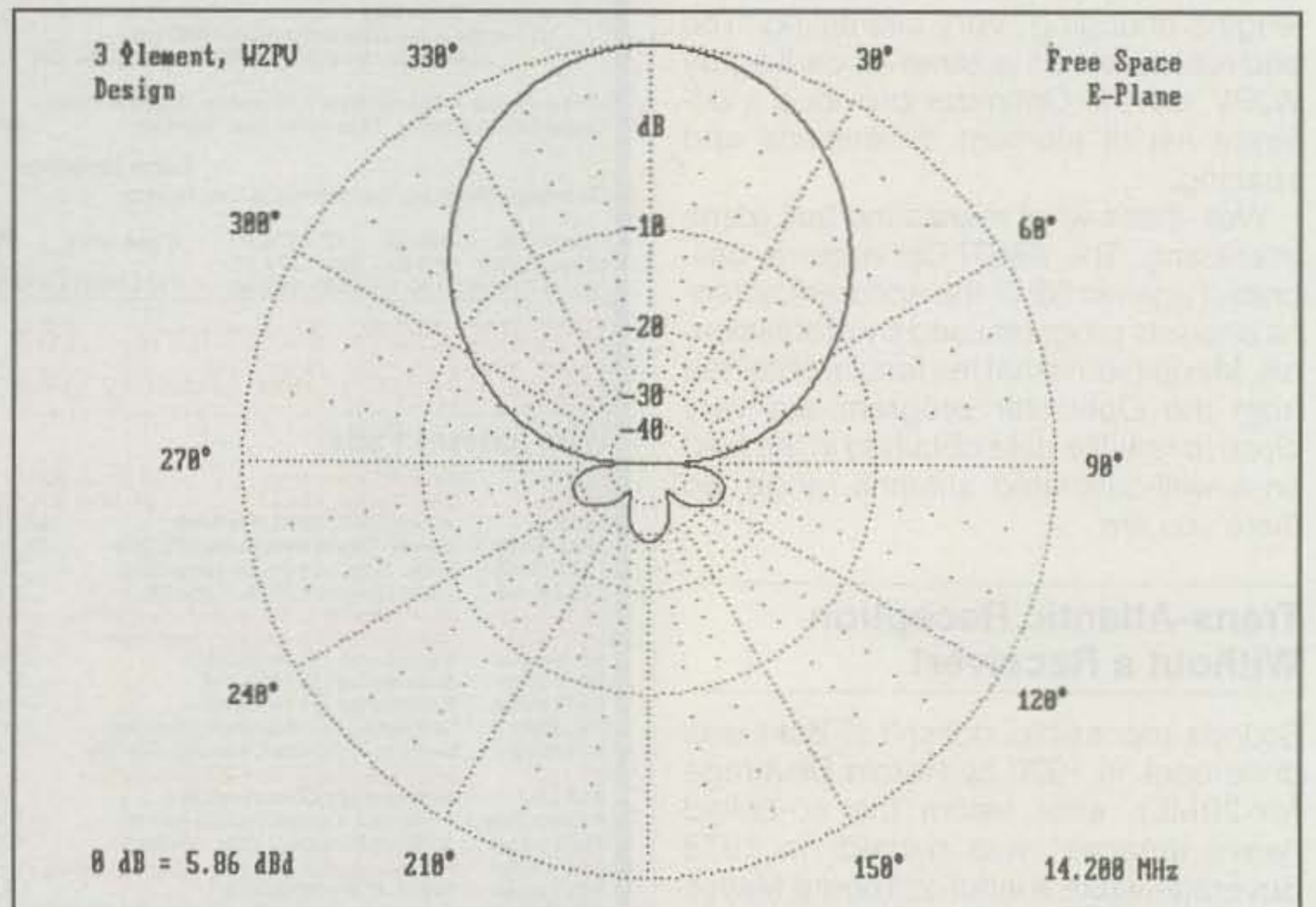


Fig. 4—Polar plot of modified W2PV-style 14 MHz Yagi on a 20 foot boom.

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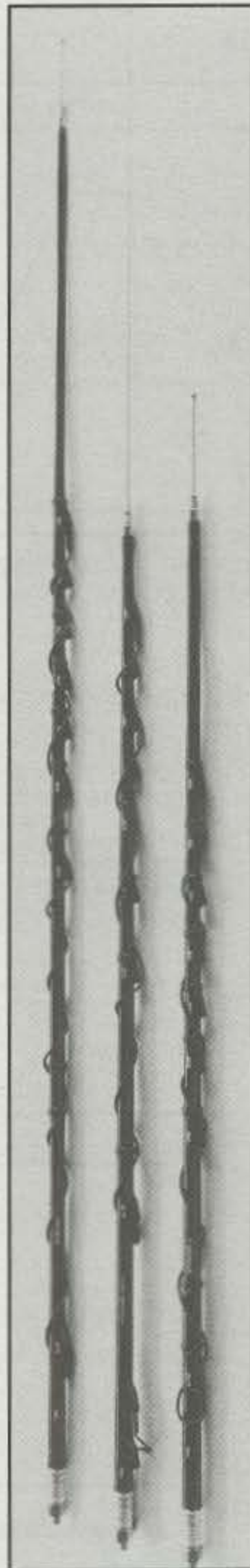
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1.000"	.058"	.884"	.202	.80
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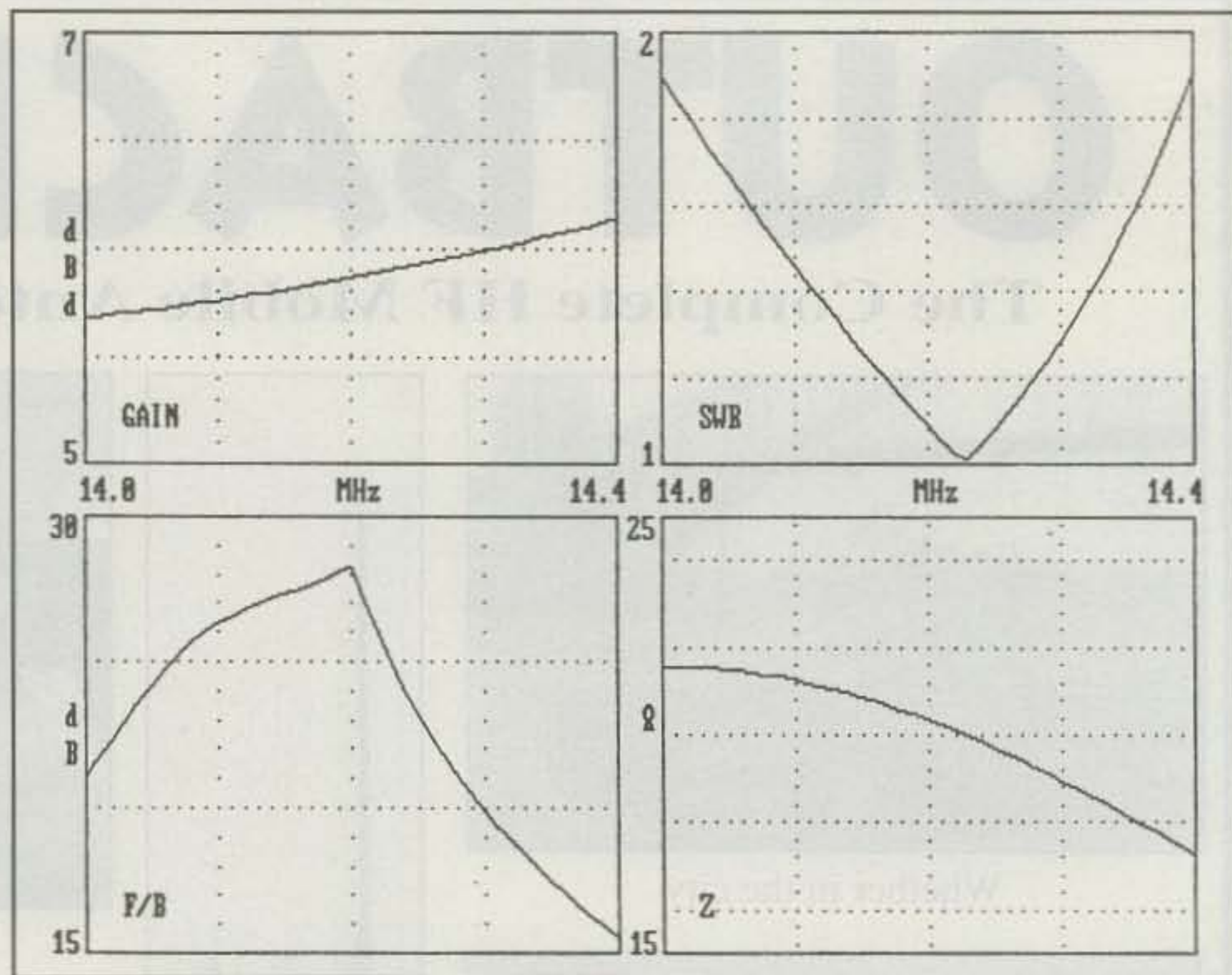


Fig. 5- Top left: gain vs frequency. Top right: SWR vs frequency. Bottom left: front-to-back vs frequency. Bottom right: feedpoint impedance vs frequency.

8 to 12 kHz. Headphones only, please. Keep me posted!

The Groundplane Loop Antenna

A low-profile, vertically polarized loop antenna was described by Hans Wuertz,

DL2FA, in the German publication *cq-DL*, issue 5/83. The article has been translated and appears in the August 1983 issue of *Radio Communication*, a publication of the RSGB.

The design comprises half of a full-wave loop antenna with the other half formed by the ground image (fig. 7). With

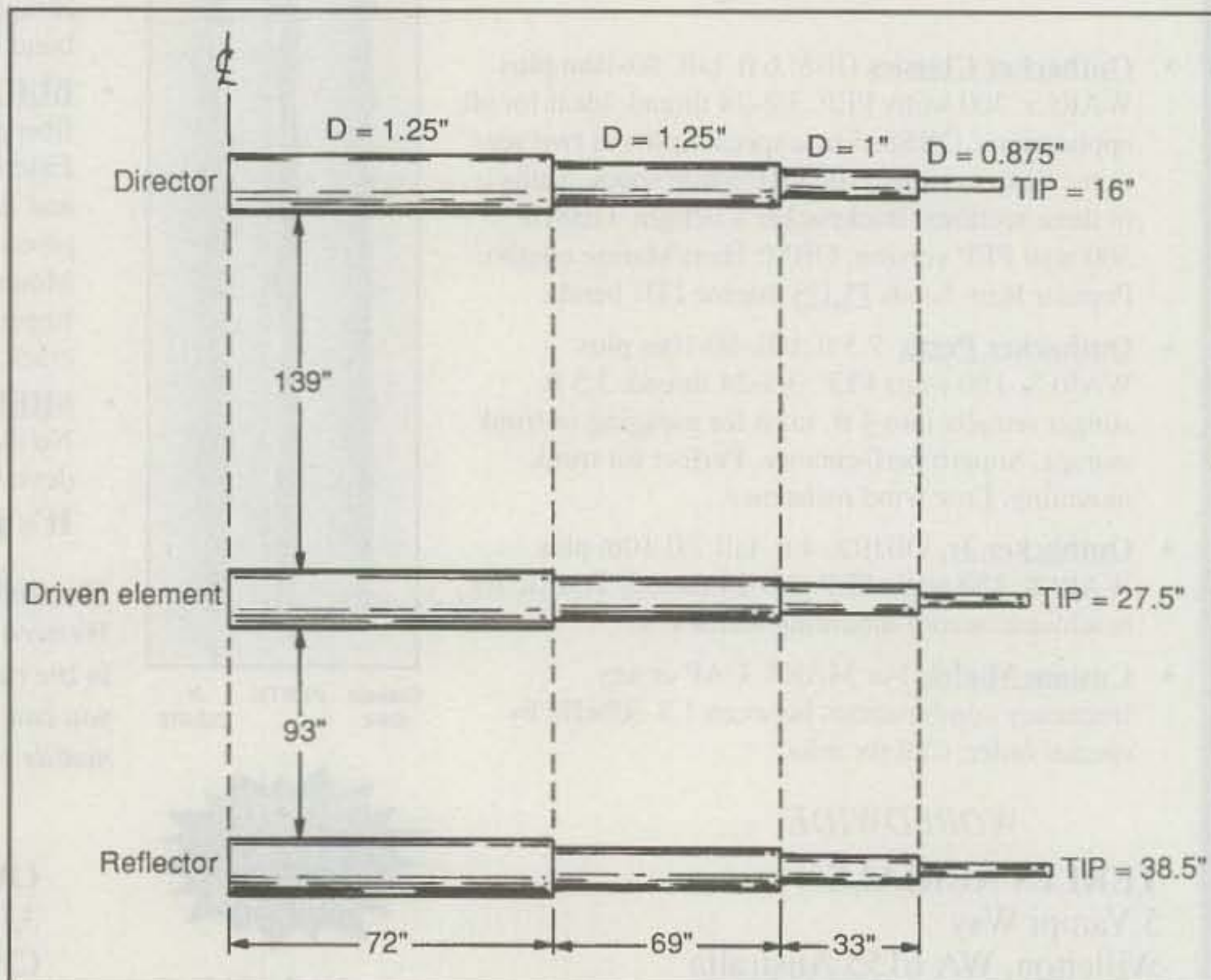


Fig. 6- Half-element lengths, spacing, and diameters of W2PV-type Yagi.

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a 0.2 wavelength semicircular half-loop for the lowest frequency, DL2FA claims the antenna can be tuned to cover a 2-to-1 frequency range, 3.5 to 7 MHz, for example. Bandwidth of the loop, without retuning, however, is quite narrow.

For low loss the antenna is made of 1/4 inch diameter copper tubing. The ground return is also made of copper tubing, soldered to a chicken-wire ground screen (dimensions not given). DL2FA predicts that loop efficiency is high, being only 2 dB down in field strength as compared to a full-size 1/4-wave vertical antenna, and only 0.5 dB down on the higher frequency band.

The antenna may be fed by a capacitive match, inductive coupling, or a form of Gamma Match, as shown in the illustration. Radiation efficiency and vertical radiation pattern will probably be affected by ground conductivity over the surrounding area.

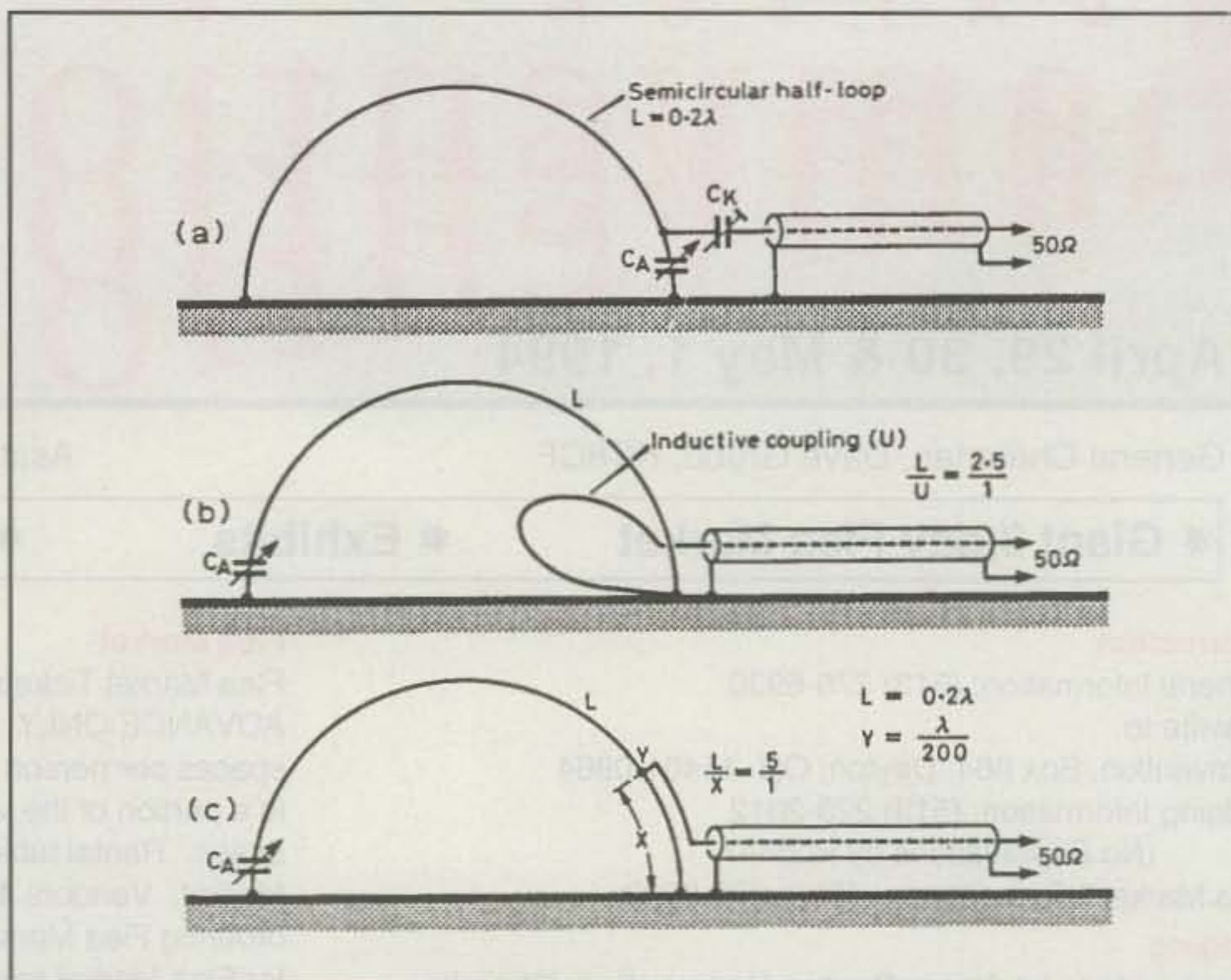


Fig. 7—DL2FA ground-plane loop antenna: (a) capacitive feed; (b) inductive feed; (c) gamma feed. (Drawing via RSGB)

Aluminum, Anyone?

Finding aluminum to build a Yagi can be a time-consuming and frustrating experience. Gone are the days when surplus-metal junk yards sold the stuff for pennies. Some home-improvement stores sell small lengths of tubing, but 12 foot telescoping lengths, necessary to build 20 meter beams, for example, seem to be hard to come by unless they are ordered from a large metal-supply store. Unfortunately, many of these big stores have a minimum quantity order, or refuse to deliver a small individual order of tubing.

Tubing is generally sold in 12 foot

lengths in standard diameters and various wall thicknesses. Any diameter tubing will telescope into the next larger size if the larger size has a .058 inch wall thickness. Thus, a 1 1/4 inch diameter length of tubing will telescope into a 1 3/8 inch diameter tube if the latter has a wall thickness of .058 inch.

Drawn aluminium tubing in various diameters and in 6 and 12 foot lengths can

be obtained from Texas Towers, 1108 Summit Ave., Suite 4, Plano, TX (214-422-7306). In addition, extruded tubing up to 3 inches in diameter and as long as 24 feet (suitable for booms or masts) is also available. Texas Towers will ship tubing via UPS truck or air freight collect.

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The W6SAI Mailbag

Many thanks to the following who have written to me with regard to this column. I appreciate hearing from you! W7JTR, AB6PY, KD4KOX, W7GW, K5IU, W6NSU, W1PN, K4WV, VK5BR, W0QLU, W8TFB, K2OR, W4LGK, WU2J, W1IAF, W5PSA, KW1L, I4AFQ, W6OAL, K6YO, DK5VP, and VE1KD.

73, Bill, W6SAI

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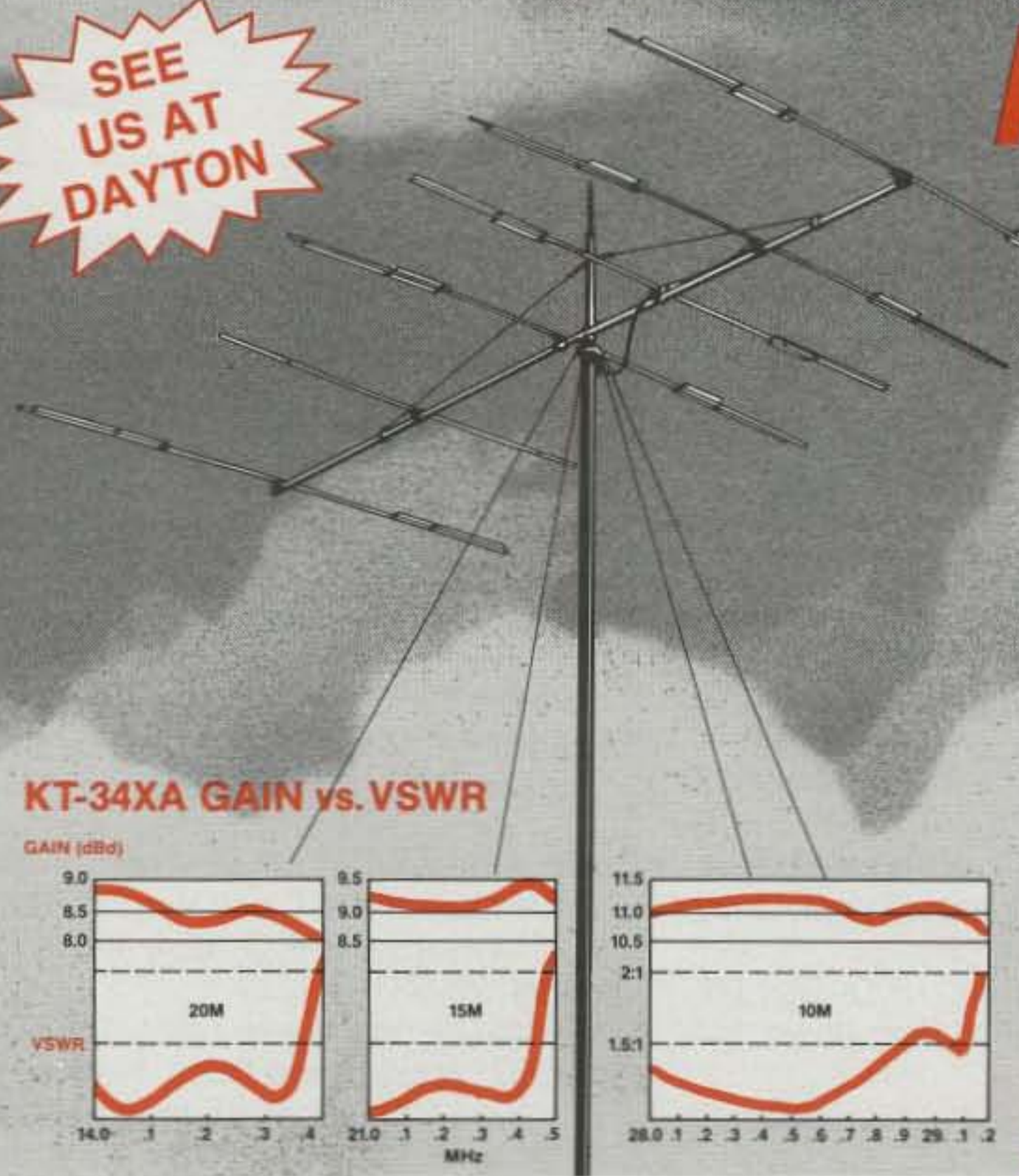
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Electronic Equipment Band (EEB), 323 Mill Street N.E., Vienna, VA 22180.

Fair Radio Sales Co. (Surplus), P.O. Box 1105, 1016 East Eureka Street, Lima, OH 45802.

Grove Enterprises, Inc., P.O. Box 98, 900 S. Highway 64 West, Brasstown, NC 28902-0098.

Ham Radio Outlet, 933 N. Euclid Street, Anaheim, CA 92801.

IIX Equipment, Ltd., P.O. Box 9, Oaklawn, IL 60454.

MFJ Enterprises, Inc., Box 494, Mississippi state, MS 39762.

Mouser Electronics, 2401 Highway 287 N., Mansfield, TX 78083.

Polyphaser Corp. (Grounds), P.O. Box 9000, 2225 Park Place, Minden, NJ 89423-9000.

Radio Shack, 500 One Tandy Center, Fort Worth, TX 76102.

The Radio Works, P.O. Box 6159, Portsmouth, VA 23703.

Tucker Electronics & Computers, P.O. Box 51419, 1801 Reserve Street, Garland, TX 75355-1419.

Universal Radio, 6830 Americana Parkway, Reynoldsburg, OH 43068.

Vibroplex Company, 98 Elm Street, Portland, ME 04101.

W.W. Sales (Antennas & Feedlines), 57 Echo Lake Drive, Fairview, NC 28730.

8 Radio Products, 6198 Marlo Drive, Painesville, OH 44077.

(Plus manufacturers' catalogs.)

Code

Code Operation, Robert Halprin, K1XA, Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147.

Dots & Dashes, Morse Telegraph Club, Inc., 1101 Maplewood Drive, Normal, IL.

Morsum Magnificat (bi-monthly), c/o G.C. Arnold Palmers, 9 Wetherby Close, Broadstone BH18 8JB, Dorset, England.

The Vail Correspondent (quarterly), Box 88, Maynard, MA 01754.

DX

Amateur Radio DX Blue Book, Jim Creevey, W4UYZ, J-C Enterprises, 4920 Mayflower Street, Cocoa, FL 32927.

Beam Headings, Alan Davis, KB7HM, 4204 Fox Point Drive, Las Vegas, NV 89108.



Larry Vogt, N4VA, is shown here demonstrating code operation to Scouts and Scouting officials at Taipei, Taiwan. He is the ITU Region III training director of the Foundation for Amateur International Radio Service (FAIRS). His goodwill tour also took him to Bangladesh, Jakarta, Kuala Lumpur, Malaysia, and Thailand.



The Dill's Landing Wireless Society is sponsored by Camillus Parks and Recreation. This photograph was taken at the New York State Fair. The adult on the left side is Tom Psyck, N2MKC, and the adult on the right is Dave Brooks, KA2VEE.

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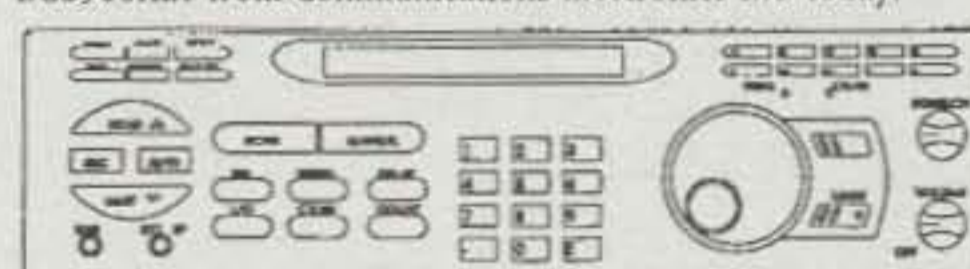
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76.000 - 107.995 MHz. (WFM), 108.000 - 136.995 MHz. (AM)
137.000 - 173.995 MHz. (NFM), 174.000 - 215.995 MHz. (WFM),
216.000 - 224.995 MHz. (NFM), 225.000 - 399.995 MHz. (AM)
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- Uniden WASHINGTON-H SSB CB Base \$189.95
- Uniden GRANTXL-H SSB CB Mobile \$149.95
- Uniden PC66XL-H CB Mobile \$78.95
- Uniden PC76XL-H CB Mobile \$99.95
- Uniden PC122XL-H SSB CB Mobile \$107.95
- Uniden PRO510XL-H CB Mobile \$36.95
- Uniden PRO520XL-H CB Mobile \$49.95
- Uniden PRO538W-H CB & Weather \$69.95

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- ICOM R1-H ultra compact handheld wideband receiver \$469.95
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- Grundig Satellit 700-H1 portable with 512 memory & AC adpt. \$389.95
- Grundig Satellit 500-H1 portable with 42 memory & AC adpt. \$329.95
- Grundig Yacht Boy 400-H compact portable shortwave \$199.95
- Grundig Cosmopolit-H with integrated mini-cassette recorder ... \$179.95
- Grundig Yacht Boy 230-H portable shortwave \$139.95
- Sangean ATS202-H ultra compact 20 memory shortwave \$79.95
- Sangean ATS606-H ultra compact 45 memory shortwave \$149.95
- Sangean ATS606P-H shortwave with antenna & AC adapter \$169.95
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- Sangean ATS803A-H portable with SSB reception & AC adapter \$159.95
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KH6BZF Reports (weekly), Lee Wical, 45-601 Luluki Road, CRT 44-25 Kaneohe, Oahu, HI 96744-1845.

K17NL DX Antenna Designs, Patrick Martini, Box 3350, West Sedona, AZ 86340.

Long Island DX Bulletin, P.O. Box 173, Huntington, NY 11748-0173.

QRZ DX (weekly), P.O. Box 832205, Richardson, TX 75083.

QSL Routes, Theuberger Verlag GmbH, P.O. Box 73, O-1020 Berlin, Germany.

Rose, P.O. Box 796, Mundelein, IL 60060-0796; *Speak to the World* (amateur radio language guide; 5 volumes, 25 languages).

The DX Magazine, The DX Bulletin, Box 50, Fulton, CA 95439.

The GO List, W6GO/K6HHD QSL Manager List, P.O. Box 700, Rio Linda, CA 95673.

History

Antique Radio Classified, Antique Radio Club, P.O. Box 802-C13, Carlisle, MA 01741.

Antique Radio Gazette, Antique Radio Club of America, c/o William Dawson, 300 Washington Trails, Washington, PA 15301.

Electric Radio, P.O. Box 57, Hesperus, CO 81326.

IEEE-PPL Department, IEEE Service Center, P.O. Box 1331, 445 Hoes Lane, Piscataway, NJ 08855-1331.

History of International Broadcasting, Marc Seifer, Box 32, Kingston, RI 02881. (*Tesla*.)

Old Timer's Bulletin, Antique Wireless Association, c/o Joyce Peckham, Box E, Breesport, NY 14816.

QCWA Journal, 159 E. 16th Avenue, Eugene, OR 97401-4017.

Radio Bygones (bi-monthly), Owl Worldwide Publications, 4314 West 238th Street, Torrance, CA 90505-4509.

Wallace & Wallace, 11823 E. Slauson Avenue, Suite 38, Santa Fe Springs, CA 90670. (*The History of Amateur Wireless*.)

Magazines*

CQ, 76 N. Broadway, Hicksville, NY 11801. (Also *Communications Quarterly*.)

QST, 225 Main Street, Newington, CT 06111.

The Amateur Radio Communicator, National Amateur Radio Association, P.O. Box 598, Redmond, WA 98073-0598.

The AMSAT Journal, 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910-4703.

Used Magazines, Bill Welsh, W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

Worldradio, P.O. Box 189490, 2120 28th Street, Sacramento, CA 95818.

73, 70 Route 202N, Peterborough, NH 03458.

Manuals

Ardco Electronics, P.O. Box 95, Berwyn, IL 60402. (Hallicrafters Service Manuals.)

HI-Manuals, Box R-802, Council Bluffs, IA 51502. (Amateur Equipment Manuals.)

National Radio Examiners, P.O. Box 565206, Dallas, TX 75356. (Commercial Radiotelephone Operator License.)

Newsletters

ARRL Newsletter, ARRL, 225 Main St., Newington, CT 06111.

Clandestine Confidential Newsletter, RR-4, Box 110, Lake Geneva, WI 53147.

HamAdventures, Rusprint, 26037 W. 220th Terrace, Spring Hill, KS 66083.

ICOM (bi-monthly), ICOM America, 2380 116th Avenue N.E., Bellevue, WA 98004.

Kenwood (bi-monthly), P.O. Box 22745, 2201 East Dominguez Street, Long Beach, CA 90801-5745.

National Contest Journal (bi-monthly), ARRL, 225 Main Street, Newington, CT 06111.

Packet Power Monthly Newsletter, Packet Power Publishing, P.O. Box 189, Burleson, TX 76097.

RTTY Journal, 1904 Carolton Lane, Fallbrook, CA 92028-4614.

Spec-Com Journal (bi-monthly), Membership Services, P.O. Box 1002, Dubuque, IA 52004-1002.

Westlake Report (weekly), Westlink International, 28221 Stanley Court, Canyon Country, CA 91351-3818.

W5YI Newsletter (bi-monthly), Box 10101, Dallas, TX 75207.

Other special interest groups which publish newsletters include local radio clubs, QRP (low power), OOTC (Old Old Timers Club), and various YL (female operator) groups.

Publishers/Distributors

Ameco Coporation, 224 East Second Street, Mineola, NY 11501.

American Radio Relay League, 225 Main Street, Newington, CT 06111.

Artsci, Inc., P.O. Box 1428, Burbank, CA 91507.

Buckmaster Publishing, Route 4, Box 1630, Mineral, VA 23117.

CQ Communications, 76 N. Broadway, Hicksville, NY 11801. (*Amateur Radio Almanac; Equipment Buyer's Guide; Ham Radio Horizons; Keys, Keys, Keys; The Packet Radio Operator's Manual; The Quad Antenna; The Shortwave Propagation Handbook; The Vertical Antenna Handbook; calendars*.)

CRB Research, P.O. Box 56, Com-mack, NY 11725.

Electronics Book Club, Blue Ridge Summit, PA 17294-0810.

FB Enterprises, 23801 N.W. First Avenue, Ridgefield, WA 98642-8830.

Gordon West Radio School, 2414 College Drive, Costa Mesa, CA 92026.

D. Heise, AA6EE, 16832 Whirlwind, Ramona, CA 92065.

Idiom Press, Box 583, Deerfield, IL 60015.

ALL ABOUT THE WORLD ABOVE HF

Your VHF+ Editor Visits Cuba

In the last few years the world has seen tremendous changes taking place in countries that previously were considered "behind the iron curtain." These changes, particularly the collapse of the Soviet Union, have profoundly but indirectly affected the Republic of Cuba. Without the support of the Soviet Union, the economy of Cuba has been thrown into a tail-spin.

Parallel to this development are the relaxations in religious freedoms in Cuba that followed the 1984 visit of Rev. Jesse Jackson to Havana during the time of his U.S. presidential campaign. Five years ago this month these relaxations took another turn for the better when leaders of the protestant community had a significant meeting with Castro. The result of the meeting was even more relaxation of religious freedom, so much so that the following year the Cuban Ecumenical Council of Churches submitted two proposals to the Fourth Congress of the Communist Party. Among the requests was the country no longer be considered athiestic, but secular instead. The Congress passed this resolution and one permitting Christians to be members of the Communist Party, thereby removing a pseudo form of discrimination through eliminating a barrier to entry to certain employment opportunities within the government.

Another turn of events opened even more doors to religious freedom. The legalization of the U.S. dollar permitted the inflow of funds for making badly needed repairs on church buildings that have been neglected for the past 35 years.

Typical of the denominations in Cuba are the Methodists. Following these relaxations an appeal went from the Methodist churches in Cuba for assistance from the Methodist churches in the U.S. Following an exploratory trip last October by a team which included a former Methodist missionary who was living in Havana at the time of the Revolution, the United Methodist Churches through their statewide conferences began setting up teams to go for week-long construction trips.

The Oklahoma Conference scheduled four trips over the course of the next two years. The first of these trips was in February. I have been on two previous trips to other countries, the first following Hurricane Hugo to Montserrat to repair a roof on a church, the second to Costa Rica following the earthquake to begin construction on homes in Matina.

Because of my friendship with Arnie Coro, CO2KK, I already had a desire to visit the country. Because of this and my previous experience, I was quick to volunteer to be on the first team.

On 3 February I left with other members of the team for Miami. We stayed overnight in Miami and flew on to Havana the next morning

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

VHF+ CALENDAR

April 3	Very poor EME conditions.
April 4	Last quarter moon.
April 9	Northwest VHF Conference, Tacoma, Washington. (See text for details.)
April 10	Very poor EME conditions.
April 11	New moon.
April 12	Perigee.
April 18	First quarter moon. 144 MHz Sprint, 1900-2300 local time (see text for details).
April 22	<i>Lyrids</i> meteor shower predicted peak.
April 24	Good EME conditions.
April 25	Perigee and full moon. 222 MHz Sprint, 1900-2300 local time. (See text for details.)
April 29-May 1	Dayton HamVention. QST and CQ VHF editors to host joint forum at VHF Sessions. (See text for details.)
April 29-May 1	West Coast VHF Conference, Cerritos, California. (See text for details.)
May 1	Very poor EME conditions.

on a charter service flight that makes regular trips in and out of Cuba.

After clearing customs, I was met by Arnie; his wife, Olguita; and his son Arnie, Jr., CM2KW at the airport. Arnie, Jr. drove us from the airport to the Methodist guest house/conference center. For a short while after we arrived we were able to catch up on each other's activities, since Arnie's visit to Oklahoma the previous August. Then after lunch with my team, I was off to Cifuentes, the site of the Methodist church that we were to help begin rebuilding.

Before leaving, however, Arnie and I made arrangements with my hosts for Arnie to pick me up the following Thursday night after my return to Havana for a special meeting of the Federacion Radioaficionados de Cuba (the FRC, the national amateur radio club of Cuba).

For the next several days I participated with our work team and several members of a local congregation in the preliminary rebuilding of a church that was in such disrepair that it had to be torn down. Our job was to clear the lot and set the forms, getting the site ready for the pouring of the concrete foundation for the walls of the new church/parsonage.

During our off times I was able to meet with the local people of the town of Cifuentes. As an amateur I am always on the lookout for fellow amateurs. I met three of the twenty in the town of a population of 5000. They are: Luis Hernandez, CM6LX; Pastor, Perez, CM6PD; and Humberto Diaz, CM6HH. Luis is a member of the congregation and worked with us on the church project. Pastor is the president of the local radio club and works for the local ministry of health. In that capacity he is in charge of mosquito infestation control. Humberto is employed elsewhere in the community.

On Thursday the team returned to Havana. That evening, in my capacity of an ARRL Official, I met with Ing. Pedro Rodriguez, CO2RP, the president of FRC, in order to present him with a certificate commemorating the FRC's participation in the past June VHF QSO Party through the DXpedition of COØFRC at Bello-monte. In addition, I participated in lively and

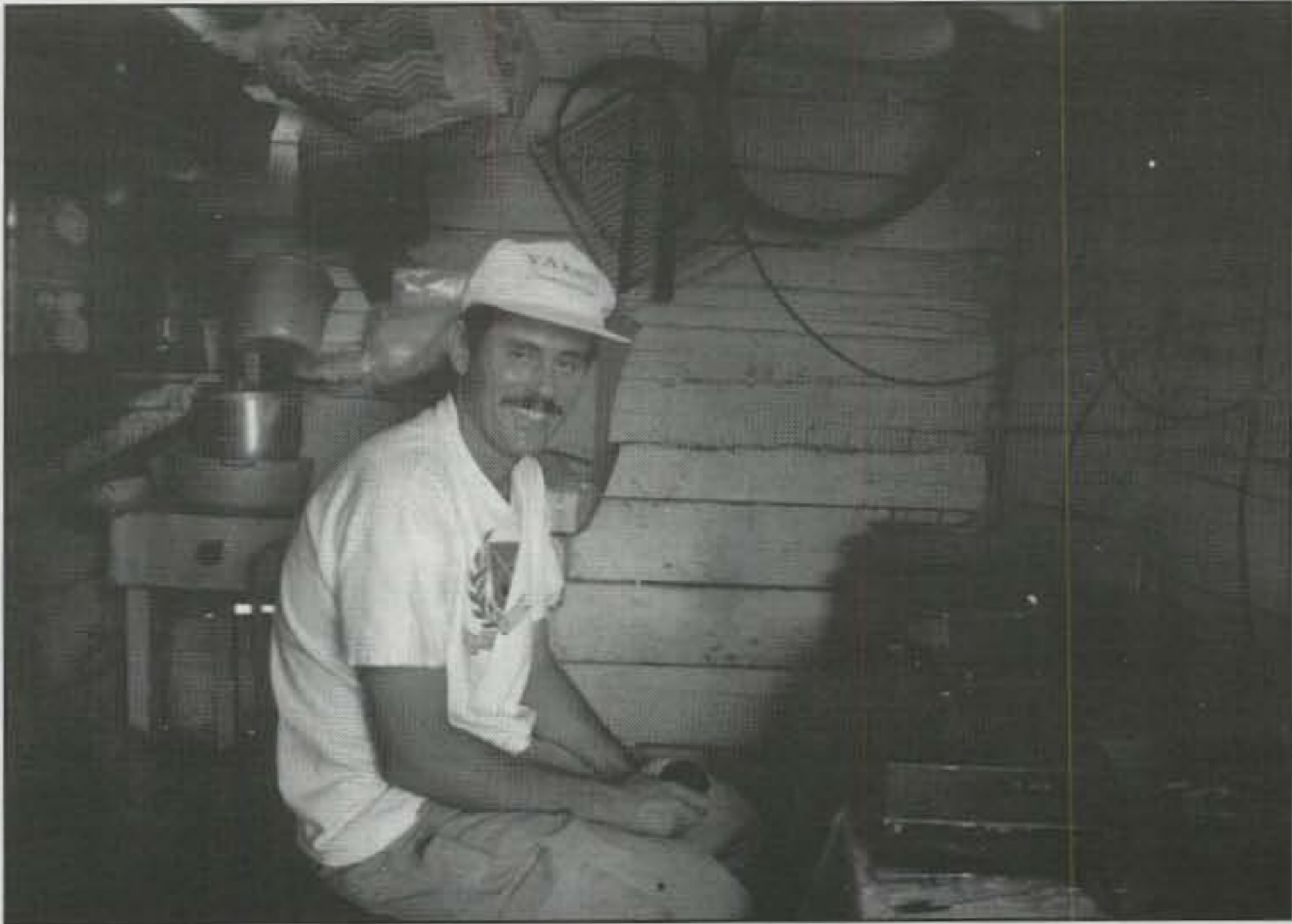
fruitful discussions with Pedro; Francisco Hernandez, CO2HA, FRC Vice President; Giraldo Uffo, CO2UF, FRC Secretary General; Oscar Morales, Jr., CO2OJ, FRC Chairman of the VHF/UHF/SHF Committee; and Eddy Frank, CO2EG, one of the members of the board of directors of the FRC concerning amateur radio in Cuba today.

I was accompanied by Lynn Mims, one of the Methodist ministers who agreed to do the photography work so that I could have pictures of the occasion.

At one point our discussion was interrupted by a Cuba Channel 2 news team who wanted to interview me for their evening news and get tape of my presenting the certificates I had for Pedro and Arnie. After the interview, the FRC leaders held a public reception honoring my presence at their headquarters. Following that reception, complete with homemade goodies, we resumed our discussions. Among the items



Pastor Perez, CM6PD, left, and Luis Hernandez, CM6LX, were two of the three amateurs whom I met in Cifuentes, Cuba during my stay.



Humberto Diaz, CM6HH, met me at the job site wearing his Yaesu hat. He walked me to his home and demonstrated his station, a humble Canadian-made 30 watt rig that operates on 75 and 40 meters. He also showed me his copy of a Yaesu catalog and pointed to the FT-1000 as his dream radio.

discussed were future Cuban proposed changes that would create a no-code type class of license authorizing these licensees very low power access to 160 meters, authorizing the present Novice type class licensee access to 10 meters (with 50 watts of power), and increased frequency authorizations on VHF and UHF bands. With regard to the last item, because their VHF/UHF frequency allocations are modeled after the IARU region 1 band plans, allocations of amateur radio frequencies are similarly modeled. For example,

they only have the bottom 2 MHz of the 2 meter amateur band (same as Europe). Their primary FM repeater pair is on 145.600, the same as the R0 channel in Europe. They pointed out to me that they have had access to the 2 meter amateur band only since 1987. It was interesting to note that, while not having access to the latest repeater directory or direct contact with south Florida repeater coordinators, they developed a defacto plan of cooperation with south Florida by monitoring the frequencies of frequently heard repeaters and avoiding them.



Arnie, Jr., CM2KW; Olguita; and Arnie Coro, CO2KK, met me at the airport and gave me a ride to the Methodist conference center/guest house. The family is pictured in front of the conference center/guest house.

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This is the QTH of Arnie Coro, CO2KK, a two-story duplex. Arnie and his wife, Olguita, live upstairs. Notice the 6 and 2 meter beams on the roof. (Photo courtesy CO2KK)

With regard to the 135 cm amateur band, over time they have gained piecemeal access to it. However, their frequency allocation presently starts at around 223 MHz! They assured me, however, that they are working to acquire a portion of the band that would be common to USA weak-signal operations. In that light, I provided them with the weak-signal calling frequency for that band, as well as all the VHF+ USA amateur bands.

Regarding the 70 cm amateur band, they have gained a window around 435 MHz for access to amateur satellite uplink and a window around 432.100 MHz for access to weak-signal operation, but only with antenna elevation in excess of 15 degrees. However, they have requested and have been assured that they will receive access to that window with no elevation restrictions in the near future.

They explained that the time required for the transition is necessary to accommodate other services moving off the requested amateur frequencies. This, they said, will take some time because some of the radios of the other services are crystal controlled and such crystals are not readily available.

They also told me of the plans to develop radio clubs and that would encourage the growth of the Novice class of license by authorizing the supervised use of these club stations by non-licensees who are apprenticing to become amateurs.

A major item discussed was the proposal of a joint Cuba-USA team to operate a contest station during the ARRL June VHF QSO Party from Bellomonte, possibly with a special rare prefix callsign. Suggestions were made that possible special permits would be issued for Cuban operation on various microwave bands not currently available to them. Two of the bands discussed in particular were 135 and 33 cm.

I was invited to head a team of U.S. ama-

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SL-11S	•	•	7	11	2 1/8 x 7 1/8 x 9 3/4	12
SL-11R-RA		•	7	11	4 1/4 x 7 x 9 3/4	13

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RS-5L	4	5	3 1/2 x 6 1/2 x 7 1/4	7

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RM-12A	9	12	5 1/4 x 19 x 8 1/4	16
RM-35A	25	35	5 1/4 x 19 x 12 1/2	38
RM-50A	37	50	5 1/4 x 19 x 12 1/2	50
RM-60A	50	55	7 x 19 x 12 1/2	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5 1/4 x 19 x 8 1/4	16
RM-35M	25	35	5 1/4 x 19 x 12 1/2	38
RM-50M	37	50	5 1/4 x 19 x 12 1/2	50
RM-60M	50	55	7 x 19 x 12 1/2	60

RS-A SERIES



MODEL RS-7A

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

RS-M SERIES



MODEL RS-35M

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

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VS-20M	16	9	4	20	5 x 9 x 10 1/2	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13 3/4 x 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5 1/4 x 19 x 12 1/2	38
VRM-50M	37	22	10	50	5 1/4 x 19 x 12 1/2	50

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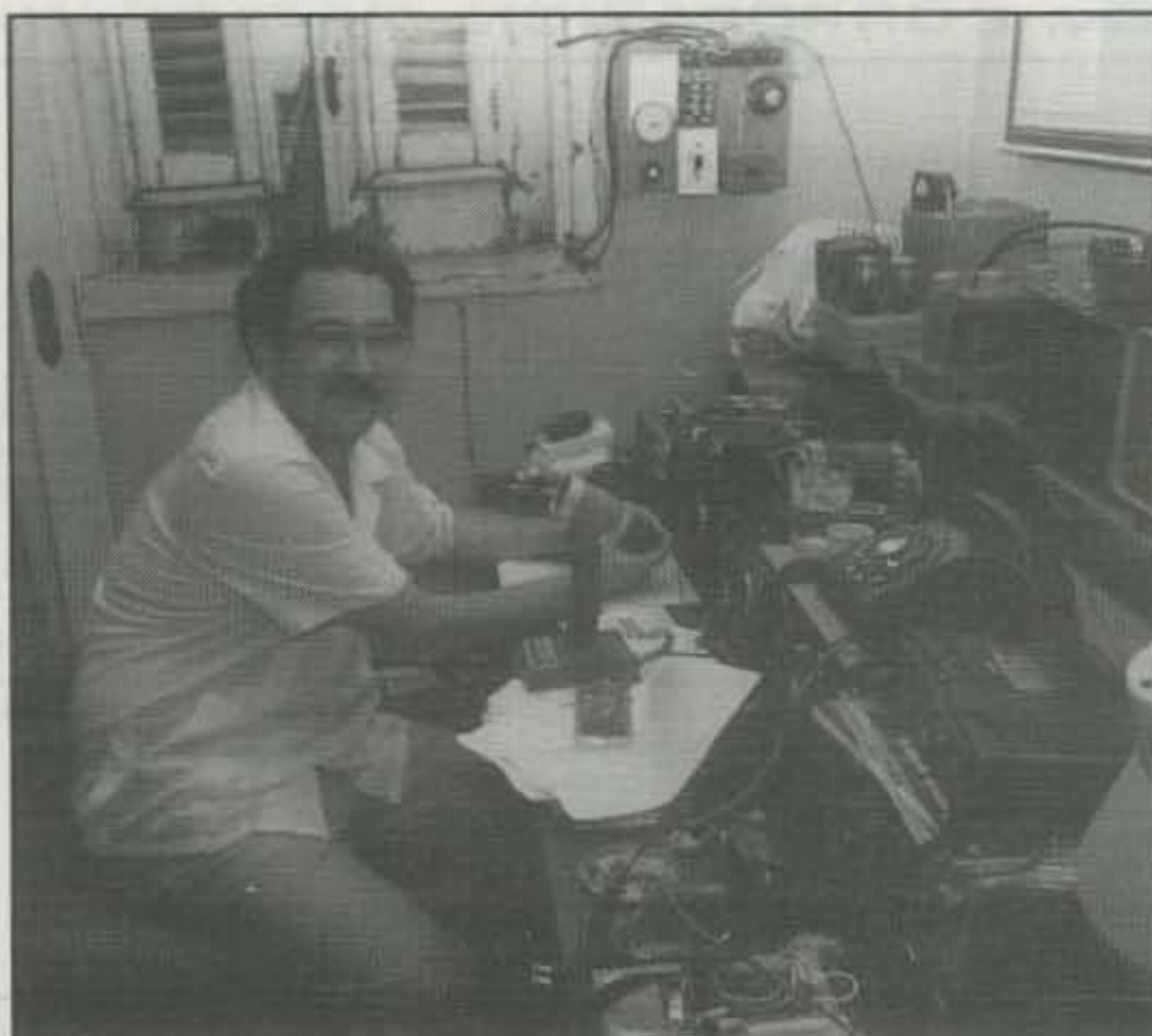
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MODEL	Colors		Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt. (lbs.)
	Gray	Black				
RS-7S	•	•	5	7	4 x 7 1/2 x 10 3/4	10
RS-10S	•	•	7.5	10	4 x 7 1/2 x 10 3/4	12
RS-12S	•	•	9	12	4 1/2 x 8 x 9	13
RS-20S	•	•	16	20	5 x 9 x 10 1/2	18
SL-11S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



As an official of the ARRL, I met with Ing. Pedro Rodriguez, CO2RP, the president of the Federation de Radioaficionados de Cuba. Arnie, pictured left, provided language interpretation for us. (Photo courtesy Lynn Mims)



Arnie Coro, CO2KK, at home in his shack. He is a bit pleased with himself for having keyed up a Florida repeater during a tropo event that was underway while I was visiting him.

teurs. I accepted conditionally upon clearance of all the government hurdles. (I have been through that route before!) Among possible team members is Emil Pocock, W3EP.

During our discussions, I hand-delivered a letter from Mike Manafo, K3UOC, suggesting an exchange of amateur radio operators similar to the US1A joint Soviet, USA exchange

and suggesting a joint USA-Cuba HF contest operation in Cuba during the 1995 CQ WPX Phone contest. They said that they would seriously consider such an operation.

We carried on the discussion of other items (including the touchy subject of deliberate interference to internal traffic nets from stations in south Florida) for a total of nearly two hours until

we just had to leave in order for the building to be secured. All of us concluded that we had covered a great deal of ground in furthering the hobby of amateur radio and the relationships between the amateurs of our two countries.

Following the meeting Lynn and I went to Arnie's home. We had a wonderful visit with Arnie and his family that lasted until after 2 AM!

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When we so exhausted that we could not go on any further, they called Lynn and me a cab and we reluctantly returned to the Methodist guest house to finish what was left of the night. Needless to say, I did not get much sleep for being so excited about the meetings.

The next day I headed back home, a bit sad to say goodbye to my new friends in Cuba, but also a bit tired and homesick. It was a bit odd for a few days readjusting to the many freedoms that we have in the good old USA. Nevertheless, I did so, but a bit more thankful for having them.

ARRL Petitions For Primary 902 MHz Allocations

In a petition filed with the FCC on 13 January, the ARRL has asked for primary allocations of subbands within the 902-928 MHz amateur band. In aiming its petition at accommodating the principal users and the principal sources of growth of usages of the band the League has requested that 902-904 MHz and 912-918 MHz be designated as primarily for Amateur Radio Service use, with secondary uses to be permitted on a cooperating basis with the ARS.

The League stated that since the band has been allocated to the amateurs in 1985, growth in usage has principally taken place among the weak-signal users in the lower subband requested and among the ATV users in the upper subband requested. The League points out that although cooperation in high population areas already exists between the amateurs and other users, it is still necessary to have the ARS be designated as the primary user in order

to reinforce such working arrangements.

The League further argued that the FCC considered the availability of the 902-928 MHz amateur band when it deleted the bottom 2 MHz of the 135 cm band from the ARS and that because of significant encroachments into the 33 cm amateur band by other services, these intrusions constitute a defacto breach of the FCC's previous assurances of continued availability of the band for amateur use.

As of the writing of this column no deadlines have been set for comments on the League's petition.

January VHF Sweepstakes Contest

Activity for the contest seemed to be up across the country. The only report of extended propagation came out of the midwest, particularly around Ohio and extending west to Kansas.

Your editor operated from the North Texas Microwave Society contest station located at the shack (in back of the garage) at **Greg McIntyre, AA5C's** QTH. Among the other operators present were AA5C, WB0CGH, WA5JAT, KC5CBJ, WA5VJB, and N5OSG. The club scored almost 128K, making contacts on all the bands up to 24 GHz and LASER. They made eleven contacts on LASER, four on 24 GHz, and eight on 10 GHz. Conditions were not great. However, thanks go to the Rover efforts of N5QGH/WB5LUA (who scored 96K/ 92K, respectively), who went to 7 grids, and the other two teams, KB5UBE/N5PGH and KB5YZQ/KB5BOU. The NTMS station saw a vast improvement over last year's 90K score. The

only significant propagation took place during a 45 minute 6 meter sporadic-E opening on Saturday night into Minnesota, South Dakota, Wisconsin, Michigan, and Indiana. One other contact of note was to DM71 on 2 meters FM!

Bald Knob DX Hogs At It Again: Rob Gerardi, N9LAG, and a group consisting of N9KJE, WA9KNP, and N9QKZ, operated from EM58 using the call N9KJE during the January contest. The following is a report from them.

"I thought I would let you know how well we did in the January contest, although we did not operate from Bald Knob Mountain, because of the weather conditions. This appears to have been a wise decision, because it received some 4 to 6 inches of snow the week preceding the contest, on top of about 1 to 1½ inches of ice, all of which remained on the ground until contest time. I am not complaining, as I believed we were more fortunate than some ops farther north and south of EM57 and EM58.

"This January we operated using N9KJE's callsign from EM58, in which half of our group lives, including N9KJE. The QTH is near Johnsonville, IL, just west of Jeffersonville (also known as Geoff), in Wayne county. We had the loan of a heated 2½ car garage converted into a workshop by WT9H (who did not choose to join our operation).

"Because of the weather and rotator problems we were not on the air until 2004 UTC on the 22nd. We got the 2 meter and 70 cm antennas and rigs up and running first. Our farthest west station was N0OFX in EM29 at 0418 UTC on the 23rd. Our farthest W5 was K5YY in EM34 at 1441 UTC on 23rd. WB5NPG was worked in EM44 at 2040 UTC. Our farthest east contact was WA8WZG in EN81 at 2013 on the 23rd. To



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the north, EN61 was worked starting with WA9KRT at 0633 UTC on the 23rd.

"Basically, band conditions were lousy, although on 2 meters we worked 74 stations in 31 grids, with about half being on CW. One thing we have learned from previous operations is that any limited multi-op or multi-op setup needs some good CW operators. We were glad we had one of the best, WA9KNP, as part of our group.

"Six meters is where we, and I am sure several others, experienced some great openings. We had a western opening occur at 0111 UTC on the 23rd when WA7KYM came booming in from DN71; this was followed at 0140 UTC by KD0DW in DN70 (KD0DJ was worked from here also at 0150 UTC), and was followed at 0146 UTC by DN78 K0RI and KF0WU. N0LL was worked at 0207 UTC from EM09, and we finished the opening by working KB0JB in DM79 at 0211 and W0RNI also in DM79 at 0234 UTC.

"On Sunday afternoon we experienced an even better opening on 6 meters to the northeast! W1AIM in FN34 was worked at 2217 UTC from FN34, followed by VE9AA from FN65 at 2224, N1JQZ in FN34 at 2226, along with several other FN34 stations. Then WZ1V, FN21, was logged at 2300 UTC (he had been heard earlier that morning at 1243 UTC with a strong signal for about 2 minutes, but no contact was made at that time). Then N1MUN gave us FN32 at 2306 UTC, followed by WA1YHO in FN42 at 2255 UTC and NY1E at 2317 UTC. Then N1KAT at 2314 UTC gave us FN44; WC1B at 2328 gave us FN41 and W3EP gave us FN31 at 2332 UTC, near the end of the opening to this area.

"During this opening we received some strong signals on 6 meter FM, AA1EU and several other amateurs in the Maine, New Hampshire, Vermont areas were heard, but we made no contact with them. So we quickly returned to SSB.

"All told, these openings helped us work 24 Grids and 42 stations on this band.

"On 432 MHz we were only running 25 watts into a 24-element beam. Again our farthest contact was with WA8WZG in EN81 at 2015 UTC; EN61 came in second with WA9KRT at 0633 UTC, both on the 23rd. However, because of severe icing conditions to the south of us, during the days prior to the contest we only made 13 contacts in 7 grids on this band.

"We hope to see everyone in the Spring Sprints as N9KJE from EM58. And in June we plan to return to Bald Knob Mountain as N9LAG in EM57."

Jon Jones, N0BY, reports that he operated QRP portable on 2 meters and 70 and 23 cm. He states that there was a good tropo opening all day Sunday to Iowa and Illinois. He goes on to report that running 10 watts on the above bands, he was able to work K0DAS in EN42 on 2 meters and 70 cm. In addition, he worked Roger Schneider, WB9OJR, in EN50 on all three bands. (Jon was so excited about the 23 cm QSO that he FAXed Roger's QSL card to me twice!) He further reports that the tropo extended into Indiana and Ohio. His best DX was WA8MZQ on 2 meters and 70 cm.

Jon observed that the tropo was workable from eastern Oklahoma, but that he did not hear Oklahoma City or Dallas stations participating in it. He expects his final score to be around 6700.

Carl Smith, AA4H, noted that there was an increase in activity on 222 MHz during the contest. He attributes it to the publicity given that

band in the announcement of the new subband which appeared in the February column. He says the timing of the reception of the magazine was just right to stimulate the activity. Well, I would love to take credit for such an accidental coincidence. However, I can't. Credit goes to the FCC and the USPS—the FCC for timing their announcement of the new allocation and the USPS for delivery of the magazine.

On The Air

The following is Hal Perry, KC4YO's summary of his EME operation in the fall EME contest.

"The EME weekends were pretty good to me. I had seven contacts on 144, including three new ones. The 144 contacts were made using two M² five-wavelength antennas at just over 100 feet fed with 7/8 inch Andrews hardline and 1 KW.

"The 1296 MHz operation is a story within itself. Because of the many trees in our yard, all the 1296 MHz equipment had to be loaded onto my F350 one ton truck, including the 10 foot satellite dish, for which I had to make up a special mount.

"The station was an FT-736R with homebrew preamp and water-cooled PA running 150 watts. The dish was fed by 14 feet of 7/8 inch Andrews hardline. On that band I made six contacts while the weather was windy and snowy with a temp of around 22 degrees!

"The stations worked on 23 cm were VE3ONT, OE5JFL, OE9XXI, WB0TEM, and WD5AGO. It was a real thrill to get to work as many stations as I did. I thought there was a good chance to work VE3ONT with all the receiver gain that they had, and I was surprised to work the others. Sure wanted to make a sweep of the VE3ONT operation, but was unable to work them on 432."

Among the other operators who worked New Zealand on 6 meters on 13 January was **Ed Johnson, WD5EWD**, who worked ZL2TPY at 0115 UTC.

Pat Rose, W5OZI, Jim, W5EU, and Tom, WD5K, are among the operators known to have worked **XF4CI** on 6 meters. Pat worked the operation on 29 December and the others on the following Sunday.

Ray King, WB8YFE, in EN71 in Indiana, sent in the following for December and January: On 4 December he worked W4RGB (EM75), and KB5RKO (EM30), N5CTE (EM12), W3XO (EL09), KB5OAI (EM22), W4SVI (EL95). On 11 December he had a sporadic-E opening that started in Maine, New Jersey, and New York. It then extended into Florida, North Carolina, and Georgia. On 16 December he had a short, weak opening into VE1 and VE9. On 25 December he had a 15 minute opening and worked W1BDC (FN43). On 27 December he worked CH1YX (VE1YX). On 15 January he worked W5FUA (EM10), N5ZLC (EM13), WA5JCI (EM21), K7IRK (EM21), N7JJS (Louisiana), KA5TJI (EL29), K5LLL (EL29), KC5FP (EL16), KB5IUA (EL29), WQ5Y (EM20), C6AGN (FL16), and XE1J (DK89). On 23 January he worked N0LRJ (DN80), KF0DA (DN70), WA7KYM (DN71), W0NRI (DM79), K0RI (DM78), NK5F (DM66), K5MAT (DM65), W5FF (DM64), VE1PZ (FN85), VE9AA (FN65), W1AIM (FN34), K1TOL (FN44), WA1YHO (FN42), N2OHV (FN33), WZ1V (FN31), N1JOH (FN32), N1JVE (FN41), and N2GHR (FN30).

Bill LeBaron, W0MTK, sent us this report

of his activity: On 4 December he worked W5EWB, N5XJG, W5OZI, KB5VTD, W5VAS, WB5GD, and WA5JCI. On 5 December he worked AJ6T, W6RXQ, and KB5RKO. On 14 December he worked N5XJG, W3XO, and KE5ZS. On 17 December he worked KG0HA, W9GWT, EL98, and 19 other contacts in Florida, Louisiana, Arkansas, Illinois, Oklahoma, and Texas. On 12 January he worked XE2LQB (DL98), KC5FP, and W5UWB. On 15 January he worked AA6DD, K6TPG, KD6JQN/M, KC6WLC, KC4YO, and KF4WE. On 22 January he worked N9MKC (EN71), W8ULC (EM79), and KE0BI (EN72).

Current Conferences

Northwest VHF Conference: This conference will be held on 9 April at the Tacoma Inn Best Western, 8726 South Hosmer, Tacoma, WA 98444, between the hours of 10 AM and 2 PM. For reservations call 800-528-1234. Their flat rate for one to four persons is \$56. There is a hospitality room to be opened Friday evening. For more information, contact Jim Christensen, K7ND, P.O. Box 147, Fox Island, WA 98333, or call 206-549-4062.

Dayton HamVention Program: The following is the planned program for the Dayton HamVention, which is scheduled to take place 29-30 April and 1 May. On Saturday at the VHF/UHF Forum in Room 5 the following seminars are scheduled between 0900 and 1330 local time: "Current Trends in VHF/UHF/Microwave," presented by Emil Pocock, W3EP, and Joe Lynch, N6CL; "VE3ONT EME Operation," presented by Peter Shilton, VE3VD, and Michael Owen, W9IP; "Backpacking a VHF QRP Portable Station," presented by Peter Puttman, KT2B; "Taking the Magic out of Microwave—Using No-Tune Transverters," presented by Kent Britain, WA5VJB; and "Spread Spectrum Communications," presented by Dave Wood, WB4KPD. The above programs will be moderated by Joe Burke, WA8OGS, and Merle Rummel, W9LCE.

West Coast VHF Conference Program: The West Coast VHF Conference is to be held 29-30 April and 1 May. The location is at the Sheraton Cerritos Hotel, Town Center, 12725 Center Court Drive, Cerritos, California. For the special reservation rate of \$59 per night double occupancy (\$69 triple and \$79 quad) call 310-809-1500, or FAX 310-403-2080.

Confirmed speakers include Joe Moell, K0OV; Tim Marek, NC7K; Wayne Overbeck, N6NB; and Roy Tucker, N6TK. The Saturday night banquet speaker will be Scott Bovitz, N6MI.

Registration for the conference (prior to 1 April for the pre-registration drawing) is \$15.00. The banquet price is \$25.00 and the Sunday morning breakfast is \$12.00. Both require advance purchases. Copies of the *Proceedings* are available for \$10.00 and can be purchased at the door.

Send your registration to Southern California Six Meter Club, P.O. Box 10441, Fullerton, CA 92635. For more information contact Gracie Hastings, KK6CG, at 714-990-9203, or FAX 714-990-1340.

Current Contests

This month begins the annual Spring Sprints. Except for the 6 meter Sprint, all contest times

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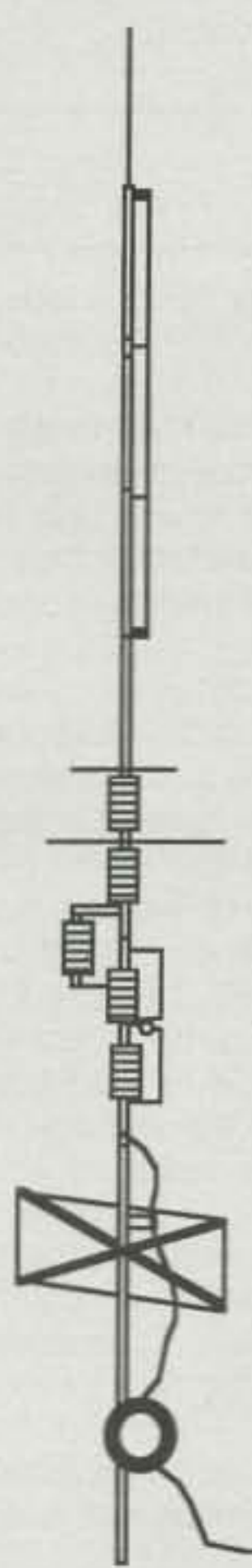


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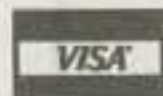
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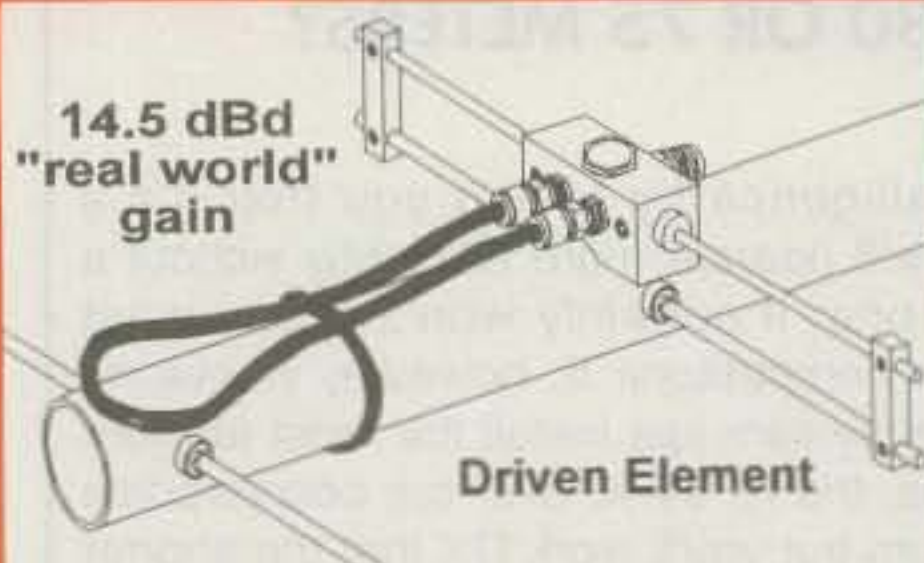


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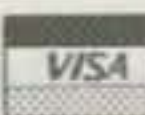
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106 • CQ • April 1994

are 7-11 PM local time. The 2 meter Sprint is 18 April. The 135 cm Sprint is 25 April. Exchange is your grid locator. Complete rules were in the "Contest Corral" column in March QST and results are normally found in the *National Contest Journal*, another League publication.

Results: 1993 SMIRK Contest

Pat Rose, W5OZI, supplied the following write-up of the 1993 SMIRK contest.

Based on log entries, an estimated 400 stations participated in the June 1993 SMIRK Contest. However, only a disappointing 13 entries were received. The overall winner was W5OZI, with 15,036 points. Second place was achieved by N5HHS with 11,780 points, and the third-place winner was W3XO/5 with 6912 points. Incidentally, all three winners were from south Texas.

First-place winners for their geographical areas are: K1DAT, MA; WB4WXE, NJ; KC4SUS, FL; W5OZI, TX; WB7OHF, AZ; N8AXA, OH; N0LL, KS; WD0BQM, NE; VE1SLM, NB; VE7XO, BC; and ZR1AEZ, RSA.

Current DXpeditions

Jan Mayen: Per, LA7DFA, is going back to Jan Mayen (JX7DFA) this month and plans activity on 2 and 6 meters. Per says that 2 meters EME will be his first priority. The grid locator is IQ50ov. Thanks go to Paul Kelley, N1BUG, for this report.

Current Meteor Showers

The *Lyrids* meteor shower is predicted to peak around 22 April at approximately 0918 UTC. This is a north-south shower, producing at its peak around 15 meteors per hour.

Monitoring Meteors And Propagation

The following was submitted by Todd Evans, KB6IGC, as another way of detecting meteor activity.

"Here is what I did to monitor the rise in activity during this year's *Perseids* meteor shower. The following is an example of how simple it can be to keep tabs on meteor and other propagation activity while away from the house and radio.

"The first thing I did was go out and buy an inexpensive voice-activated cassette recorder for the shack. The one I chose had quite a sensitive microphone to allow any activity in the shack to start the tape rolling.

"The second thing I did was convert an old VHF TV antenna into a four-element 162 MHz Yagi. After completion of the Yagi, I installed it vertically on a clothesline post outside, pointed it northeast, ran some spare CATV RG-6 line into my shack, and connected it to my police scanner. I programmed in all seven of the NOAA weather stations in the 162 MHz range. Where I live in the northern Mojave desert there are no weather transmitters that are received (except one that is 70 miles away and so weak that the side/back rejection of the beam easily nulled it out).

The reason I chose to use these frequencies is that there are weather transmitters all over

the US that run 24 hours per day. Another reason is that I was interested in 144 and 222 MHz meteor propagation this year, so I figured that the weather station frequencies would be a good candidate.

"If you are interested in 50 and 144 MHz propagation, then monitoring the 88-108 MHz FM spectrum would be a neat alternative. Just tune into an area in the FM band where there are no local stations in your area. Many of the newer higher priced scanners will accommodate the FM radio band and any old three- or four-element FM band Yagi should do the trick.

"Operation was the easy part. Before leaving the house for work in the morning I simply turned up the volume of the scanner to monitor the weather transmitters and turn on the Yaesu 736 and get it to scan 144.190, 144.195, 144.200, 144.205, 144.210, and 222.100 MHz. I then set the VOX tape recorder on and left. I also had a telephone answering machine that had a monitor function, so during my federally mandated 10 minute breaks at work, I dialed up my answering machine at the house and listened in on activity (over the phone) while at the desk at work.

At lunch time I went home and played the tape to get an idea of the activity for that morning. The same happened after work. This went on for two days before the predicted peak, and one day after the peak. Although the exact times and locations of ionization were not logged with this method, a good idea of activity was noted, and it sure beat being at work oblivious to the activity until I got home.

"I'm always looking for 222 MHz contacts, and of course will be receptive to any and all 50, 144, 222, and 432 MHz contacts via any mode of propagation except elevated EME. I still run no more than 200 watts on any band and no more than two antennas on any one band. So if you need or want to work grid square DM15 on these bands, feel free to give me a call anytime at 619-371-4864 after 5 PM weekdays or anytime on weekends. If I'm not home, leave a message and I will return your call as soon as I arrive home.—73 from the Mojave Desert, Todd Evans, KB6IGC."

Was and Almost Was On 2 Meters

On 1 January Ron Ogren, WA6PEV, started the year out right by completing an EME contact with Charlie, N8AKC, in Wisconsin for state number 50 on 2 meters. Ron states that this was the first EME-equipped station on from Wisconsin on the air in four years! Thanks go to Todd Evans, KB6IGC, for this report.

During a visit with Greg, WQBP, he advised me that he has completed working all 48 contiguous states terrestrially on 2 meters. He has recently moved from grid locator EM29 to EM19 (but not out of the 50 mile radius to maintain credit for his WAS contacts). At this rarer grid he expects to construct an EME array to make the two other contacts to finish his WAS for that band.

Hamfest Within A Hamfest

During last fall's Chattanooga hamfest a group of VHF+ operators gathered at Hal, KC4YO, and Matty, KM4XW, Perry's home. The following is her account:

Say You Saw It In CQ

"The weekend of October 23rd proved to be very exciting around the house for us. The troops from Ohio—Bryan, WA8MZQ; Craig, N8DJB; Tom, WA8WZG; Matt, KB8OIV (Tom's son); John, WZ8D; and Byron, WA8NJR, came down for the Chattanooga Hamfest. Also attending were Joel, WB5IGF (he and Hal held a forum on VHF); Bob, KA2DRH; and Fran, N2KMA (Bob's wife).

"After the hamfest we all gathered at Waycrazy's Barbeque place for some good eating and visiting. We had all of the above except John and Byron (they had to get back to Ohio) plus Ben, AC4HG; Dot, AC4HH; David, WB4JGG; Al, N4VC; Colin, AD4HJ; Erin, KB0IEW; Santa (Chris), N3IWJ; and Linda.

"We had a mini VHF dinner and the best time. After we ate we gathered back at our house and visited some more. It was really nice to meet some of the people we have talked to so often, and hope it will not be the last time to have them down to visit us."

On their return trip several of the VHF+ operators drove through rare grids and gave out contacts to the deserving.

Newsletter Note

"Anomalous Propagation" is the monthly newsletter of the Midwest VHF-UHF Society, Inc. It is co-edited by Gerd Schrick, WB8IFM, and Robert French, N8EHA. Society dues is \$6.00. Make out the check out to Gerd Schrick and mail it to 1729 East Central Avenue, Miamisburg, OH 45342.

CSVHF Society Call For Papers

The Central States VHF Society has issued a call for papers for presentation at their 1994 conference in Memphis, Tennessee 28-30 July. Accepted papers will also be published in the Conference *Proceedings*. Those interested should contact Joel Harrison, WB5IGF, 528 Miller Rd., Judsonia, AR 72081, or call 501-729-3301.

Notes on Beacons

New Brunswick Beacon, New Callsign: After we went to press for the January issue, the Canadian province of New Brunswick received allocation of the VE9 prefix. Very quickly after availability of the new prefix Mike Smith, VE1MQ, became VE9AA. In addition, Mike changed the callsign on the beacon on 50.073 MHz mentioned in the January column to VE9MS/B. It has essentially the same message, except for the new callsign. Reports of it have already been seen on northeast packet spots.

XE2UZL: This beacon, which uses the callsign of SK W6UZL, is located at San Quintin, Baja California, Mexico, which is in DM10. The beacon uses two stacked SLOOP antennas, with the top one 60 feet high. It runs 25 watts on 50.0277 MHz.

VHF+ Software

Astronomy Lab for Windows: This is a comprehensive program for predicting solar, lunar,

planetary, and meteor shower events for the next 5000 years! It and many other programs related to VHF can be downloaded from the VHF/UHF BBS, 704-284-4854.

VHF+ Nets—General Class Option?

Leon Crouch, W6SQN, who holds a General class license, has expressed a desire to see a VHF+ coordinating frequency on 75 meters that would be workable by General class ops. As crowded as the band is on any given evening, it may be very hard to establish such a frequency. What are your suggestions?

And Finally . . .

I didn't know exactly what to expect during my visit to Cuba. However, I came back from there with memories for a lifetime.

I met fellow amateurs of a country with which presently our government does not have diplomatic relations. And yet, these amateurs were amateurs just like any whom I have met in any other country, including my own. They are the same kind of experimenters who are trying to learn about the hobby and trying to do something good and positive with the hobby and most important, with their lives. They are just

like the best I have met on the VHF+ amateur bands in my country.

Surprisingly, I found no restriction of my freedom of expression. Because of this I told the amateurs, the church members, and citizens I met on the street that I felt their future was within their own country, that their ingenuity was what had kept them surviving so long under horribly adverse conditions. And when asked, I carefully explained my government's position on the embargo, and they respectfully listened.

In our dialogues they gave me constructive ideas that would help to improve relationships between the people of our two countries.

I came home from Cuba with new impressions of a country that has so much potential for its future. However, I also came back with a firm conviction of how very important it is to delicately and carefully handle the changes that will bring about the fruition of these potential transformations in its future.

I also came home with hope, not only hope for my friends in Cuba, but hope for all of us as human beings striving to make Earth a better QTH.

This is all I have space for this month. Again, I thank you for your contributions to this, your column. Please keep them coming to the address at the beginning of the column, via CompuServe (72124,2734), or via my phone numbers (voice 405-528-6625, FAX 405-528-0746). Until next month 73, Joe, N6CL

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NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we feature USA-CA #712, Charles W. Peale, W5MW, of Dallas, Texas. Let's hear from him in his own words.

"My first association with County Hunters was a contact with Mary, KC5UO, who with W5UJO was mobile in Colorado at the time. (Note that W5UJO, Joe Parsons, is now president of the Mobile Amateur Radio Awards Club.—ed.) When they returned to the Dallas area, Mary contacted me and explained how the County Hunters operate; gave me frequency, QSL, and awards information; and outlined the CQ USA-CA Awards plan. Mary also gave me my last contact for completing USA-CA, as she and Joe went to Arkansas and gave me Grant, AR.

"I have always been involved with radio and communications. I was first licensed as an amateur in 1933 under the Federal Radio Commission. At that time I received both station and operator licenses. I took my Advanced amateur exam a year later, as well as the exam for FCC First Class Telephone and FCC Second Class Radio Telegraph licenses. I received the number two licenses for Radio Telegraph issued by the FCC when it was established in 1934 (missed out on number one).

"Then I took a three-year cruise with the United States Coast Guard as a radio operator. I got my First Class Radiotelegraph ticket after a year's sea duty.

"I was manager of radio operations for two major aircraft companies during WW II. I also spent a few years as a Merchant Marine Radio Officer. I served as Field Engineer, working with the military and

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SM5BHW	930		
N5UR	931		
2000			
KG5UZ	1004		
AB4OQ	1005		
KA6SWI	1006		
WD3P	1007		
SM5BHW	1008		
N5UR	1009		
1500			
KG5UZ	1093		
AB4OQ	1094		
KA6SWI	1095		
SM5BHW	1096		
N5UR	1097		
1000			
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AB4OQ	1306		
KA6SWI	1307		
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N5UR	1309		
500			
KG5UZ	2738		
AB4OQ	2739		
CE7ZK	2740		
KA6SWI	2741		
N5UR	2742		

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.

systems communications. I finally retired from a major communications and electronics corporation.

"I attended Bible College for a couple of years while I was still working. I've done lay preaching in rural areas, prisons, homeless missions, and nursing homes. I taught Bible in an urban church.

"Most of my County Hunting time was

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Harry R. Sparks, AB4OQ
USA-CA All Counties #828
SSB/Mixed Band, 01-11-94

Clarence H. Story, KA6SWI
USA-CA All Counties #829
Mixed Band/Mode, 01-20-94

Hakan Ekdahl, SM5BHW
USA-CA All Counties #830
Mixed Band/Mode, 01-25-94

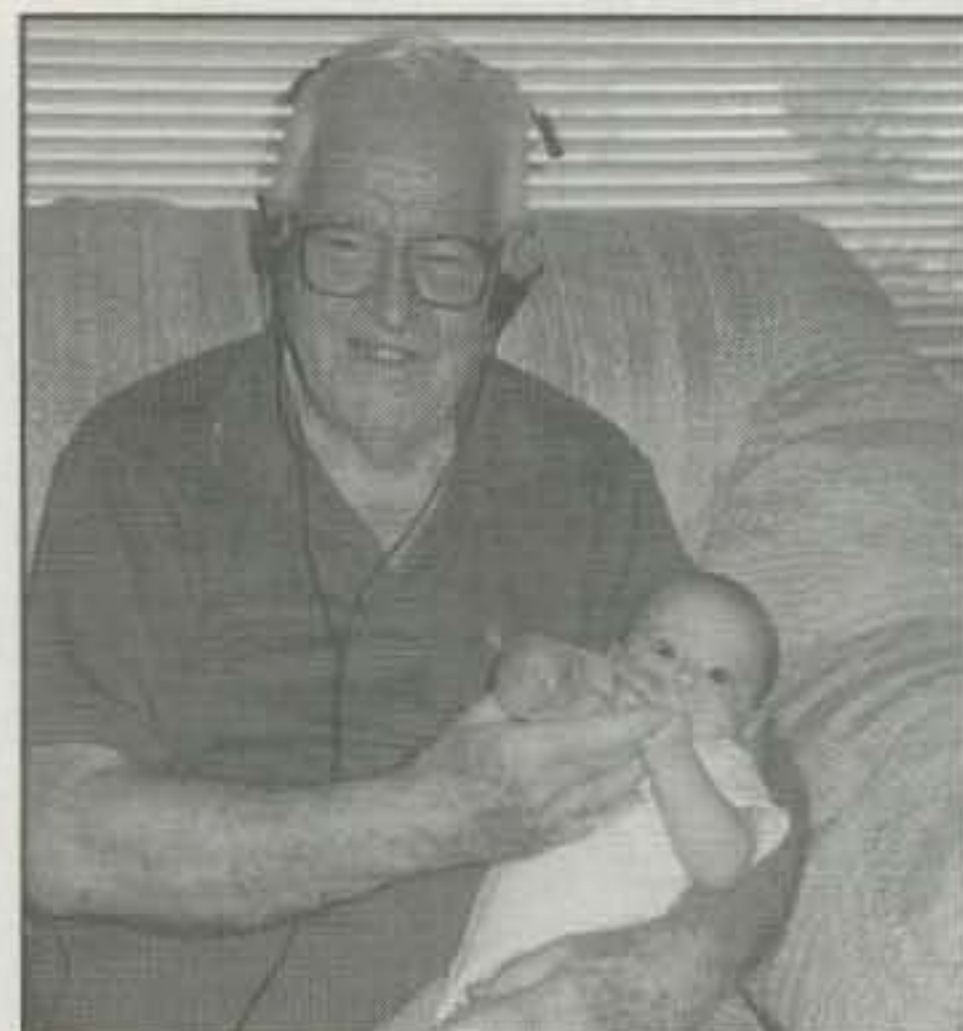
A.E. Buzz Jehle, N5UR
USA-CA All Counties #831
Mixed Band/Mode, 01-31-94

spent in the front room of our home with earphones on listening to 14.336 and other County Hunter frequencies. My wife and I babysit infants for working parents. My radio equipment is in another room, so I listen on the phone and then rush in to make an occasional 59, 55, or other contact report. I'm careful not to disturb the little cherubs. Heaven help me if I wake them up. (Hi!)

"I've been very impressed with County Hunting and the fine friendly folks involved. I see a valuable emergency asset, not only for mobiles, but also for the community. We have hundreds of well-equipped mobile stations, and many fine fixed stations constantly monitoring the net. When an emergency occurs, all attention is directed to taking care of the situation for as long as it takes to resolve it.



Charles W. Peale, W5MW, USA-CA #712, at home in his shack.



W5MW and his wife babysit infants, but he listens and makes an occasional contact report at the same time!

When the public electric power fails, hundreds of mobile stations are operating on their own power, and many fixed stations are equipped with emergency power sources as well. All of these amateurs together form a well-tested group of communicators responding to all kinds of emergencies.

"I am proud to be a small part of the County Hunting community. I appreciate everyone who helped me achieve this prestigious accomplishment.

"Drive safely and watch for the low branches. May the Lord richly bless and take care of each of you."—73, W5MW.

Congratulations to Charles W. Peale, W5MW, USA-CA All Counties #712 (30 May 1991). W5MW is 80 years young, and a credit to the amateur radio community.

Awards Issued

Mike Carver, KG5UZ, became the first USA-CA recipient for 1994 by submitting a completed Record Book and receiving USA-CA All Counties #827 (all 20 Meter Mobile) on 05 January 1994. He also received USA-CA 500 #2738, USA-CA 1000 #1305, USA-CA 1500 #1093, USA-CA 2000 #1004, USA-CA 2500 #927, and USA-CA 3000 #849.

Harry Sparks, AB4OQ, was next. He submitted a complete book and received USA-CA All Counties #828 (Mixed Band/Mode) on 11 January 1994, along with USA-CA 500 #2739, USA-CA 1000 #1306, USA-CA 1500 #1094, USA-CA 2000 #1005, USA-CA 2500 #928, and USA-CA 3000 #850.

Clarence H. Story, KA6SWI, sent in his book in the middle of January and received USA-CA All Counties #829 (SSB Mixed Band) on 20 January 1994. He also received USA-CA 500 #2741, USA-CA 1000 #1307, USA-CA 1500 #1095, USA-CA 2000 #1006, USA-CA 2500 #929, and USA-CA 3000 #851.

Sweden's USA-CA All Counties population increased when Hakan "Ken" Ekdahl, SM5BHW, received USA-CA All Counties #830 (Mixed Band/Mode) on 25 January 1994. Ken's first USA-CA Award was dated 16 September 1971—23 years ago. Special congratulations are due for his perseverance. He also received USA-CA 1000 #1308, USA-CA 1500 #1096, USA-CA 2000 #1008, USA-CA 2500 #930, and USA-CA 3000 #852.

A.E. Jehle, N5UR, rounded out this month's USA-CA All Counties laureates when he submitted his complete and correct documentation to receive USA-CA All Counties #831 (Mixed Band/Mode) 31 January 1994. He also received USA-CA 500 #2742, USA-CA 1000 #1309, USA-CA 1500 #1097, USA-CA 2000 #1009, USA-CA 2500 #931, and USA-CA 3000 #853.

Lawrence C. Cahoon, WD3P, received

USA-CA 2000 #1007 (CW/Mixed Bands) seal and ribbons 20 January 1994.

Finally, Percival Raurich U., CE7ZK, submitted his first documentation and received USA-CA 500 #2740 (All 20 Meter SSB) on 20 January 1994.

Awards Available

Award Lugo (Spain). The Award Lugo is given for contacts with the Group DX Lugo (Spain) after 01 December 1983 (repeater contacts excluded). The award is 44 x 32 cm, printed in color. It was de-

signed and made by the people of the famous ceramic art factory "Sagadelos." There is no charge for this award.

Number of contacts required: Spain 15, Europe 5, DX 3. The same station may be contacted on different bands, but only one contact within 24 hours with the same station.

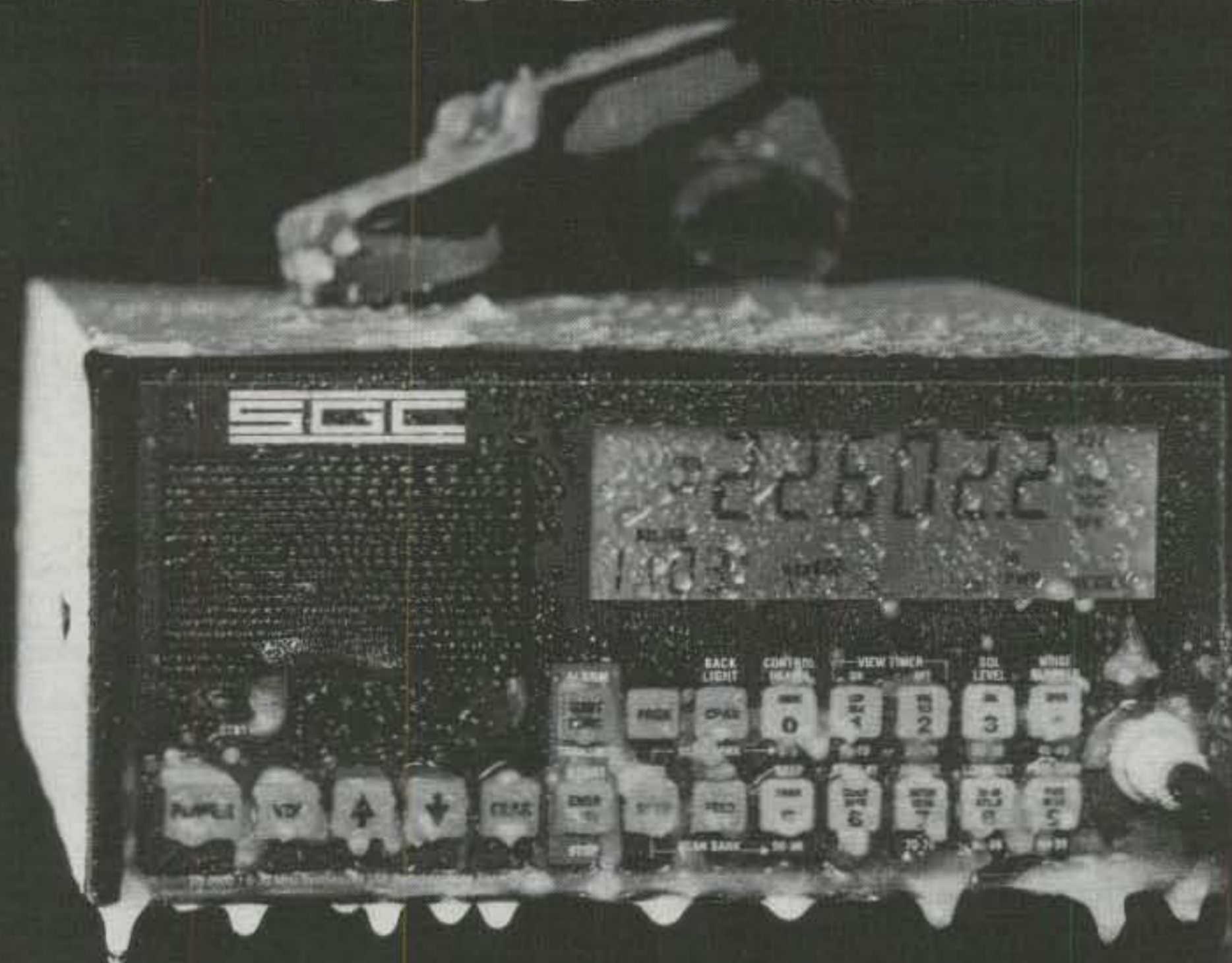
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The award certificate available from the Group DX Lugo, Spain.

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VM, VZ, WM, WN, ZA. EB1—ANV, ANW, AQI, ARI, AXO, BBU, BML, BMP, CEU, DHX, WL, YK. EC1DEQ, ED1FSF, ED1IDA, EF1FSF.

Applications should be sent to: Grupo DX Lugo, Manager "Diploma DX Lugo," P.O. Box 313, 27080 Lugo, Spain.

Georgia Special Event Station. The Middle Georgia ProAms are proud to announce that they will sponsor a Special Event station to commemorate the 100th anniversary of "wireless" and the 120th anniversary of Guglielmo Marconi's birth (25 April 1874). This event will take place on 22, 23, 24 April 94 at Sparks, Georgia. Operation under the callsign AA4RI will begin at 2100 UTC (approximately) and continue until 1800 UTC 24 April. The present intent is to operate two CW stations, one SSB station, and one RTTY station. Operation will be in the lower 25 kHz of the General portion of the bands. One-sixty meters and the WARC bands will not be used.

Since Sparks, Georgia is only 1 mile east of I-75, with easy on-off access, 146.52 will be monitored and traveling amateurs will be invited to visit and operate. The event site is in Cook County, a rare Georgia county for County Hunters.

For a certificate to confirm contact send a 9" x 12" SASE with QSL card to Curtis Carter, 114 Belmont Drive, Warner Robins, GA 31088. For DX stations not desir-

ing a certificate, QSL cards will go out via the Bureau.

New Award Manager For Haiti

The Radio Club of Haiti (Le Radio Club D'Haiti) has a new Award Manager, Bernard Russo, HH2B. Bernard is a very energetic and enterprising radio amateur. A ham since 1979, he has participated in numerous contests and even in a DXpedition. He has an active interest in diplomas, awards, and certificates. Current holder of DXCC from the ARRL, he will take care of the Haitian QSL bureau, Haitian awards, and verification of QSL cards for other hams working for awards.

HH2B's mailing address is Bernard Russo, HH2B, P.O. Box 38, Port-au-Prince-Haiti.

On A Personal Note

Plans for my trip to The Netherlands have been confirmed for 24 May through 08 June. I am willing to present the USA-CA Award (any category) during my stay. Write, phone, or contact me through CompuServe 76350,515. A big amateur radio thanks to The Netherlands QSL Bureau for their help in contacting my cousin. The visit is a life-long dream come true.

73, Norm, WA3RTY

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NEWS/VIEWS OF ON-THE-AIR COMPETITION

QSLs, QSLs, QSLs . . .

April's Contest Tip

Contest club newsletters are an excellent source for ideas and "what's happening" in contest circles. Consider subscribing to a couple—especially if you are geographically isolated from a club near your area—to get the latest information on RFI protection, computers in the shack, operating tips, etc.

While thousands of amateurs are running to their mailboxes every day to see if their latest DXCC QSL has arrived, hyper-active contesters like me are drowning in bureau cards. Now don't get me wrong. I actually like QSLing. However, after receiving more than 40 shoeboxes of cards over the past 20 years, it does make me begin to wonder if I've QSOed and received a card from every active amateur in the world!

Having so many QSLs in my personal collection affords me an excellent opportunity to perform some interesting log/QSL practice analysis. Here's just a sample of the things that could be analyzed:

- Overall QSL rates for many contests.
- Callsign error rates: overall and band-by-band, day 1 versus day 2.
- Best QSLers by DXCC country.

The list of analytical opportunities is endless. Computerization makes much of the data reported this month possible. Unlike many contesters, I answer my bureau QSLs as they arrive, and not in mass outbound mailings to everyone worked in the log, as many do. Although this greatly reduces the number of outgoing QSLs, it significantly adds to the data-entry effort required to answer those which arrive via the inbound path. Over the years my personal computerized database has grown to over 13,000 received QSLs. I use a simple program that Glen Whitehouse, K1GW, wrote many years ago and which has stood the test of time in the K1AR shack.

Naturally, with so much data it is possible to drown in the analysis. For this reason I settled on a specific contest to perform this month's research—the 1990 CQ World-Wide DX CW Contest. It seemed like a reasonable choice for a number of reasons. That particular contest found us in the Multi-Multi class with nearly 7000 QSOs. With a QSO sample that large, and over 3½ years to collect cards, the data should be fairly representative of other contests.

Here Are The Results

Let's begin by looking at the overall QSLing rate as shown in Table I. I found these numbers both surprising and predictable at the same time. For example, the overall QSLing rate seemed low to me. Perhaps the number

Calendar of Events

Mar.	19-20	Bermuda Amateur Radio Contest
Mar.	19-20	Alaska QSO Party
Mar.	19-21	BARTG RTTY Contest
Mar.	19-21	Virginia QSO Party
Mar.	26-27	CQ WW WPX SSB Contest
Apr.	1	Poisson d'Avril Contest
Apr.	2-3	Holyland DX Contest
Apr.	2-3	Italian YLRC XVII Int'l Contest
Apr.	9-10	Japan Int DX Contest (High Bands)
Apr.	9-10	MARAC County Hunters SSB
Apr.	13-15	DX-NA YLRL CW Contest
Apr.	23-24	Helvetia Contest (HB9)
Apr.	27-29	DX-NA YLRL SSB Contest
May	7-8	MARAC CW Contest
May	7-8	ARI International DX Contest
May	21	NorthWest QRP Club CW Sprint
May	21-22	Michigan QSO Party
May	21-22	MFJ 90's RC QRP Contest
May	28-29	CQ WW WPX CW Contest
June	11-12	ANARTS WW RTTY Contest
June	18-19	All Asian CW DX Contest
June	25-26	ARRL Field Day
July	1	RAC Canada Day Contest

is dampened by the fact that I have worked (and QSLed) so many stations in previous years. On the other hand, it came as no surprise to me that there was a much higher QSLing rate on 80 meters, for example, than on the higher bands.

If you're like me, you're a little embarrassed to find any callsign errors in your log, although mistakes are inevitable. Table II shows the data I uncovered for this one.

Perhaps more interesting than the actual error rates are the results displayed in the second part of Table II showing error rates as a function of operating day. You'll note the 21% increase in errors committed on the second day, which was a small confirmation of the old adage that says "Sleep and lower error rates DO mix!"

An interesting sidebar to this data was the surprising number of QSLs I received which turned out to be "not in the log" (14 in this sample). Also, I should point out that while searching for callsign errors I looked through the log

Band	QSLs Received	Bad Calls	Error Percentage
160	0	N/A	N/A
80	129	5	3.9%
40	219	6	2.7%
20	263	18	6.8%
15	209	7	3.3%
10	142	8	5.6%
Total	962	44	4.6%

Day 1	Day 2
Total Errors—28	Total Errors—16
Received QSLs—657	Received QSLs—305
Day 1 Error Rate—4.3%	Day 2 Error Rate—5.2% (21% increase)

Table II—Error analysis for 160–10 meter bands for 1990 CQ WW DX CW Contest.

Band	Total QSOs	QSLs Received	% of Total QSOs
160	91	0	0
80	712	129	18.1
40	1334	219	16.4
20	2109	263	12.5
15	1543	209	13.5
10	1173	142	12.1
Tot.	6962	962	13.8

Table I—QSLing rates for the 1990 CQ WW DX CW Contest.

± 15 minutes from the time on the QSL. Finally, out of the 44 identified errors, the vast majority of them (42) were callsigns that were mis-copied by only one letter or number (e.g., K1AP instead of K1AR).

Now let's take a look at the best QSLers of the world. Table III shows the QSL rates for the top 10 QSOed countries during the contest.

If you've worked any JAs over the past 10 years, I'm sure the Japanese section of your QSL collection is overflowing. Having said that, it should come as no surprise that our JA friends overwhelmingly led the "QSLing pack." Although I've always had an inkling about the Gs, I was very surprised about the very, very low rate of QSLing from England. Anyone have some ideas on this one?

QSLing is a part of amateur radio operating that can be both enjoyable and outright drudgery. I'm convinced that a proactive approach to QSLing not only contributes to your contest scores (many DX stations remember the "non-QSLers" in our ranks), but adds to the growth of contesting participation. Put another way, while an 80 meter QSL from a 5W German station may seem insignificant, it may mean the world to the DL7 who worked you!

Results of the 1993 Poisson d'Avril Contest

As usual, and in the spirit of the month of April, I am proud to present the results of the annual Poisson d'Avril Contest. This one is really picking up in popularity, although the dynasty

Country	Total QSOs	Rec'd QSLs	% Rec'd QSLs	QSO Ranking	QSL Rate Ranking
DL	820	114	13.9%	1	7
JA	634	164	25.9%	2	1
UA	544	112	20.6%	3	2
UB	464	85	18.3%	4	3
G	418	11	2.6%	5	10
OK	356	56	15.7%	6	5
YU	321	21	6.6%	7	9
OH	284	41	14.4%	8	6
F	223	23	10.3%	9	8
I	214	38	17.8%	10	4

Table III—QSL rates for the top 10 QSOed countries during the 1990 CQ WW DX CW Contest.

that K1DG has built may seem formidable to some participants. Here and in Table IV are this year's results as reported by the P d'A Contest Committee.

Soapbox Comments: "If you can't run with the big dogs, take the old lady to the movies and leave the contesting to us" . . . *WB4EVH*. "I worked every legitimate station in the Andamans" . . . *W1/G4CLF*. "Took OH2BH's advice from the ETO ad and ran two Alpha 87As in parallel—worked great!" . . . *N2MNN*. "You can RUM, but you can't hide" . . . *VE3RUM*. "Couldn't get on this year, so am submitting last year's WPX log" . . . *K1AR*. "Dear John (!) . . . the local newspaper reported 'Foss Tapped for PDA' in the April 12 edition" . . . *WA1WPR* (Thanks for the swell keychain, Rick—ed.). "I would appreciate some sympathy points for my broken arm" . . . *N3NEI*. "I just extended my subscription to 3 years. Will this help my score?" . . . *VE3CK* (No, but thanks for the smoked salmon; it was delicious!). "Can't believe I won again!" . . . *K1DG*.

Final Comments

It seems hard to believe, but we are rapidly approaching another Dayton HamVention. One of my favorite pastimes is chatting with old friends and making many new ones as well. Be sure to come by our CQ booth and say hello!

As always, please submit your Contest Calendar announcements no later than April 1st to ensure coverage in the June edition of the column. 73, John, K1AR

42nd Annual Poisson d'Avril Contest

0000–1954Z Friday, April 1

This is one of my personal favorites. It is sponsored by the Radio Club of Les Iles et Rochers de Pierre Avec Les Operateurs Odeurs de Amateurs. I never miss it, unless I have something to do that day.

Eligibility: All licensed amateurs and registered SWLs may enter.

Exchange: RS(T), operator's name, rank, serial number, QTH, date of birth, shoe size, and Visa Card number (and they don't accept American Express) and expiration date.

Scoring: Stations may be contacted or heard only once per contact. Duplicate contacts are not permitted unless approved in writing before the contest by at least two officers of a major radio club. Count one point for QSOs with stations in your own country; two points for stations outside your own country but in the same time zone; three points for stations outside your own country in a different time zone but on the same continent; four points for sta-

tions outside your country, time zone, continent, but in the same ITU region; five points for stations outside your own country and way far away. It's complicated, but someone will eventually write a computer program for this and you won't need to know it anyway.

Multippliers: Multipliers are DXCC countries, continents, states, provinces, prefixes, ARRL Sections, WAZ Zones, ITU Zones, grid squares, Oblasts, Laens, and species per band-mode-hour. Add one bonus multiplier for every time you worked 3YØPI before the guy across town.

Frequencies: All amateur bands and modes may be used. Please try to adhere to the suggested frequencies for contests and minimize interference to other operators, unless you have a bigger signal than they do. In that case, just let it rip. After all, this is a contest!

Entry Categories: Single op, Married Op, Formerly-married op, Single-op assisted, Single-op impaired, single-op intoxicated, single-op unappreciated; Multi-op single transmitter, multi-op single receiver, multi-op single computer, multi-op multi-everything. All scores will be normalized in accordance with handicaps for the number of antenna elements, antenna height, geographic locations, operator age, height, and whatever else you think keeps you from winning. Note that there is no QRP category this year, since "Life's too short for QRP."

Club Competition: Any club may submit an aggregate entry of all its members, provided that the members are all at least still alive and well and living within 12,000 kilometers of the club center at the time of the contest. You can even start a club just for this contest and submit a club entry. We won't know, and we won't tell anyone.

Awards: Really impressive scores will be listed in CQ or someplace else a year or so later, just when you thought it was safe to open aa amateur radio magazine again. If you really want a certificate, let's face it: you can buy some desktop publishing software and make your own. Nobody will know it's a fake except us, and we don't care.

Disqualifications: Any entrant whose submitted log smells fishy will be disqualified for life. Or anyone we don't like.

Log Deadline: April 15, as usual. Tax forms to the IRS, P d'A logs to us. Contest logs may be submitted on disk, in RAM, or via Internet (dash.dash@dot.dot), or by telepathy. If you insist on sending paper logs by mail, send them to P d'A Contest Committee, c/o K1DG, 144 Kendall Pond Road, Windham, NH 03087.

Polish "SP" DX Contest

1500Z Apr. 2 to 1500Z Apr. 3

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WB4EVH	Single-op QRO	387,338,000,000	1.000
N2MNN	Single-op Humorous	14,313,000	1.000
N4YKD	Multi-op Transit Authority	2,660,116	1.000
W1/G4CLF	Single-op Preposterous	300,000	1.000
N3NEI	Single-op Incapable	1,977	1.000
K1AR	Single-op Redundant	161	1.000
WA1WPR	Single-op QRP	64	1.000

Table IV—Results of the 1993 Poisson d'Avril Contest.

end of April and generates a good level of activity by the SPs.

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

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

Multiplier: Count the total number of Polish provinces worked (maximum of 49).

Scoring: Three points per QSO times the number of Polish provinces worked.

Bands: 160–10 meters (no WARC bands).

Awards: Certificates will be awarded to the high scores in each class per country.

Mailing deadline for logs is 30 days after the end of contest. Send your entries to: Polski Związek Krotkofalowcow, Contest Committee, P.O. Box 98, 59-220, Legnica 2, Poland.

1994 Holyland DX Contest

1800Z Sat. to 1800Z Sun., Apr. 2–3

This is a fairly new contest sponsored by the Israel Amateur Radio Club and is designed to promote contacts between stations around the world and Israeli amateurs all SSB and CW.

Classes: Single operator all band, multi-operator single transmitter, and SWL.

Exchange: Worldwide stations send RS(T) and serial number. Israel stations will send RS(T) and their geographic "area."

Frequencies: Use IARU Region I recommended frequencies (e.g., 14.00–14.06 MHz) on 160–10 meters (no WARC bands).

Scoring: Credit 2 points for each QSO on 160–40 meters and 1 point for all other QSOs. Stations may be worked once per mode and band. Multipliers are each distinct Israeli "area" per band worked. Final score is total QSO points times multiplier.

Awards: A trophy will be awarded to the overall winner in each category. In addition, plaques will be provided to each continental winner. Certificates will be sent to the top scorers in each country (minimum 50 QSO points).

Entries must be postmarked no later than May 31, 1994 and sent to: IARC Contest Manager, 4Z4UT, Box 3003, Beer-sheva, 84130, Israel.

Japan International DX Contest

2300Z Fri. to 2300Z Sun., Apr. 9–10

This is the high-band CW edition of the Japan International DX Contest sponsored by *Five Nine Magazine*. It is open to participants worldwide on 14, 21, and 28 MHz.

Classes: Single operator, all bands and single band, and Multi-Single. Only 30 hours may be used as a single operator entry. Off periods must be a minimum of 60 minutes. Multi-operator stations may operate the full 48 hour period.

Exchange: Signal report and serial number

for DX stations; JAs send their prefecture in place of the serial number (number 01 to 50).

Scoring: DX stations contact Japan only. QSOs on 10 meters count 2 points. All other QSOs are 1 point.

Multipliers: Japanese Prefectures and Ogasawara, Minami-Torishima, and Okino-Torishima Islands (JD1) worked per band. Final score is computed by multiplying total QSO points times your multiplier.

Awards: The top scorer in each category on each continent will receive a winner's plaque. Additional plaques may be awarded based on merit. In addition, certificates will be awarded to the top three entries (participation pending) in each country and USA call area. Send your entries to: *Five Nine Magazine*, Box 59, Kamata, Tokyo 144, Japan. Mailing deadline for entries is May 10, 1994.

MARAC County Hunters SSB Contest

0000Z Sat. Apr. 9 to 2400Z Sun. Apr. 10

The Mobile Amateur Radio Awards Club is sponsoring the 23rd running of this event. Mobile and fixed operation from every county in the United States is welcome. Mobiles and portables may be worked each time they change counties or bands.

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

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

Frequencies: 3880, 7240, 14270, 21340, 28340 kHz. Fixed stations should operate above the suggested frequencies to allow more freedom for mobiles to operate on clear frequencies.

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

Completed logs, summary sheets, and check sheets must be received by May 11, 1994 and go to: Bill Nash, WØOWY, 13212 N 37th Ave., Phoenix, AZ 85029. Enclose a #10 SASE and two units of postage with your entry for a copy of the final results.

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Classes: Single operator only. You are limited to 24 consecutive hours of operation during the contest.

Exchange: QSO number, RS(T), and ARRL section/country. Entries in log must also show time, band, date, and transmitter power.

Frequencies: CW—3540–3570, 7040–7070, 14040–14070, 21120–21150, 28180–28210 kHz. SSB—3940–3970, 7240–7290, 14250–14280, 21380–21410, 28280–28510 kHz.

Scoring: Phone and CW are entirely separate contests. DX YLs, including Alaska and Hawaii, may contact the North American Continent. A station may be counted as one point and worked once per band for credit. Multiply the number of QSOs by your total multiplier (sections/countries) for final score. You may apply a bonus multiplier of 1.5 if less than 150 watts is used at all times during the contest.

Awards: Various cups and plaques will be awarded to the category winners. In addition, certificates will be provided to all second- and third-place winners.

Logs are due 30 days after the conclusion of each contest. Mail your logs to: Carla Watson, WO6X, 473 Palo Verde Drive, Sunnyvale, CA 94086.

Swiss Helvetia Contest

1300Z Apr. 23 to 1300Z Apr. 24

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

Frequencies: Use 1.8–28 MHz (no WARC bands) on both phone and CW.

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

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

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

Final Score: Calculate your final score by multiplying your total QSO points by the sum of Cantons worked.

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

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

The mailing deadline for contest logs is June 1, 1994. Logs are to be sent to: Nick Zinsstag, HB9DDZ, Postfach 651, CH-4147, Aesch, Switzerland.

ARI International Contest

2000Z Sat., May 7 to 2000Z Sun., May 8

This is the annual operating event sponsored by the Association Radioamatori Italiani. The ARI DX Contest is managed by veteran contester I2UIY and should offer a significant amount of activity. Stations are allowed to work each other worldwide.

Classes: Single Operator SSB, CW, or RTTY, Single Operator Mixed, Multi-Single Mixed, and SWL Mixed.

Frequencies: 160 through 10 meters (no WARC bands) according to the IARU band

plans. All stations (including single operator) must adhere to the standard 10-minute rule.

Exchange: Italians send RS(T) and province; all others send RS(T) and serial number.

Points: QSOs within your own country count only for multiplier credit. Count 1 point for QSOs inside your own continent, 3 points for QSOs outside your continent, and 10 points for Italian QSOs. Stations can be worked once per band and mode (e.g., 15 CW, SSB, and RTTY).

Multiplier: Italian provinces (103) and DXCC countries (not I or ISØ). Credit multipliers once per band.

Scoring: Final score is sum of QSO points times the sum of multipliers.

Awards: A plaque will be offered to the high-

est scoring station in each class. In addition, a certificate will be awarded to the top two to five placing stations as well as the leading scorers in each DXCC country.

Special Award: A pocket calculator will be awarded to all stations that work at least 100 Italian stations (outside Europe) or 250 Italian QSOs (inside Europe). A separate list of Italian stations worked is required for this award.

Free logging software is available for the ARI Contest. You may obtain your copy directly from the contest manager (\$5 or 10 IRCs for expenses). Logs must be mailed 30 days from the end of the contest and addressed to: ARI Contest Manager, I2UIY, P.O. Box 14, 27043 Broni (PV) Italy.

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A LOOK AT THE WORLD AROUND US

Mobile News and Views—Part I

A hint of spring is in the air, vacation time is rapidly approaching, and HF mobiling is once again capturing the interest of radio amateurs everywhere. Some of us will be hitting the road with a new rig or vehicle, some will use their station on wheels mainly for instant-portable operations, and some will be going "low band mobile" for the first time. Regardless of the reason, we all enjoy seeing how others do it and always pick up a few tried and proven ideas applicable to our own setup in the process. Yes, and that is precisely the theme of this month's column.

The first part of this column features news and views from some clever, innovative mobileers, and the second part is a collection of antenna ideas and technical notes for improving or expanding any mobile setup. Full-blown rigs are now small enough to fit in the most compact car and antennas are available in dozens of styles, so come on in and enjoy your fair share of the fun!

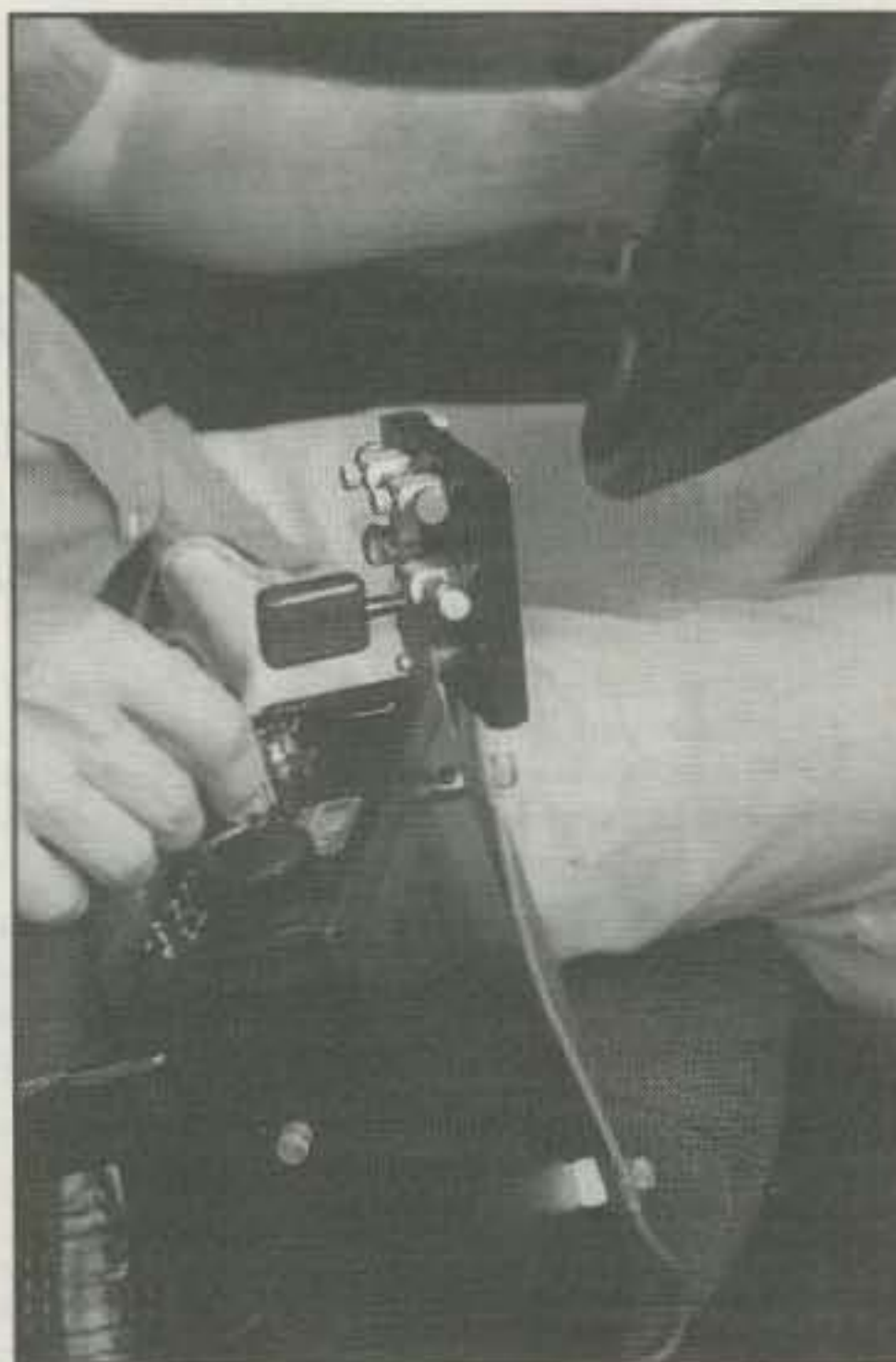
Some amateurs may assume the popularity of HF mobiling tends to decline right along with sunspot counts, but such is not the case. Indeed, the years of lower sunspot activity may actually prove to be ideal times for HF mobiling. Say what? When band conditions are great, most operators are hooked on working DX rather than chatting with mobileers. Additionally, your 100 watt signal and whip antenna are more prone to being overrun by DXers with high-power signals. After DX excitement quells, our interests turn more toward meaningful QSOs and renewed friendships with other stateside amateurs. Enjoy these "low years"; they ensure our numerous areas of pursuit stay balanced (and there are always surprise DXing times along the way!).

That's enough soapboxing for now, so let's check out some interesting 1994-style mobiles!

Get-Em-Up Scout

Both the Lone Ranger and his faithful Indian companion Tonto would be envious of the mobile setup of Stan Hail, W9WBL, shown in the accompanying photos. Stan latched onto one of Ten-Tec's new 555 Scout transceivers, combined it with

4941 Scenic View Drive, Birmingham, AL 35210



Neat "safe mobiling" CW setup of Stan Hail, W9WBL. The Ten-Tec Scout transceiver measures only 2.5"H x 7.5"W x 9.5"D and rides perfectly between car seats. Paddle is positioned at a perfect angle for no-fumble use. Homebrew-tuned CW speaker sits beside rig and makes copying in head easy.

some Hamstick antennas and his self-designed Vertical Single Lever paddle, and is having a ball. The 50 watt SSB/CW transceiver is positioned vertically between his car's seats with a bungee cord hooked on the tilt-up bail and a wood spacer between it and the armrest to hold everything securely. The rig and paddle are angled perfectly for quick-view operation, and they even swing up out of the way with the armrest when not in use.

Stan is a true CW aficionado, and his enthusiasm is vividly reflected in the fine points of his setup. First, the transceiver works full break-in and has a continuously adjustable bandwidth control plus a built-in keyer. Second, Stan seldom even carries a mic (the ideal way to avoid unauthorized rig use). Finally, Stan's new-style vertical paddle (which was also featured in our December "Christmas Gifts" column) is attached directly to the rig's cabinet by a brass mount custom formed to

the perfect operation position. Your imagination is probably transfixed on the paddle, so here is a review in a nutshell.

This single-lever delight pivots from the bottom, and its main arm stands vertically just like Martin's upright bug of eras past. The fingerpiece screws into one of two (height selection) holes above the arm's pivot point, and overall action is superb. The paddle is made with two side arms/supports which Stan removed to make a thin paddle for mobiling.

If you want more information on this unique paddle, write to Stan at 6345 Coffman Road, Indianapolis, Indiana 46268-2591, or you can order it by calling 1-800-726-8936. Stan's favorite frequency of operation (which is not visible in the photo) is 7.034 MHz. There is a good possibility Stan and I will be operating around that frequency this month.

N4KEL Returns

Our good friend Sy Moskowitz, N4KEL, favored us with a brief return visit a couple of months ago, and we naturally began discussing new mobile antenna ideas. As you may recall from previous columns, Sy is the multi-degreed and semi-retired electronic wizard who designed some of the higher tech items used by NASA, Motorola, etc. He also has a kilowatt mobile setup with phased antennas that radiate a band-blasting signal. This time Sy was using ferrite-fed coax for pumping RF energy into non-resonant antennas, and he quickly proved that the idea worked by running several DX QSOs on 40 meters using Hustler 20 meter resonators. Bear in mind the resonators were mounted on Hustler's stubby MO-4 masts, and each antenna was less than 4 feet tall. Interesting!

So what is ferrite-fed coax? Simply explained, two or three high mu ferrite cores $\frac{3}{8}$ inch inside diameter by 1 inch long are slipped onto the transceiver-to-antenna RG-58 feedline and positioned one-tenth wavelength apart for the lowest operating frequency. The cores minimize RF current flowing on the coax shield by making it a high impedance to reflected waves. Current (which in this case refers to reflected RF current) always takes the path of least opposition; thus it goes to the 50 ohm antenna(s) rather than the 1000 ohm (reverse-reactance) coax feedline. The



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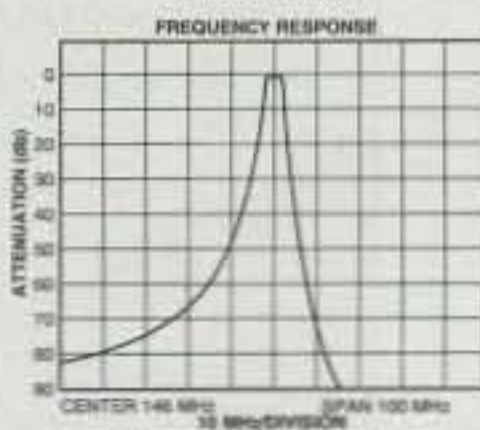
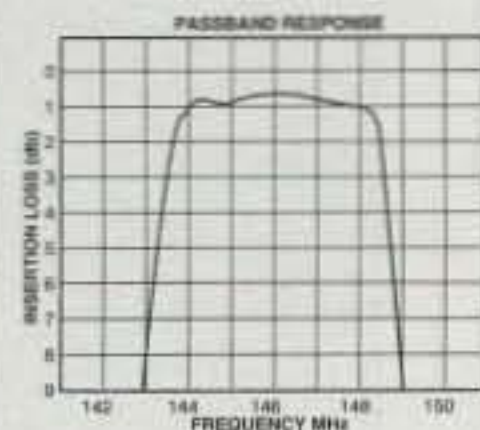
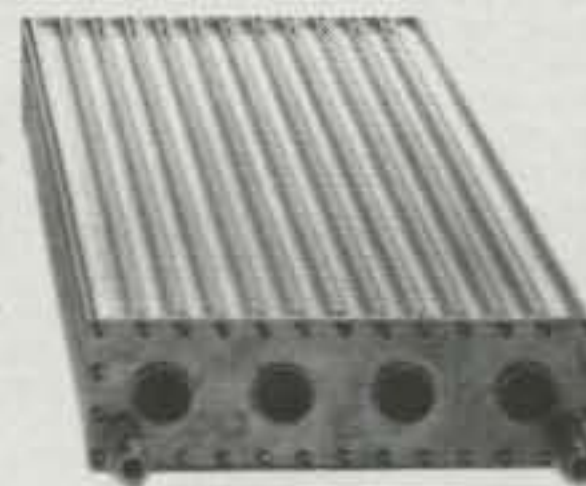
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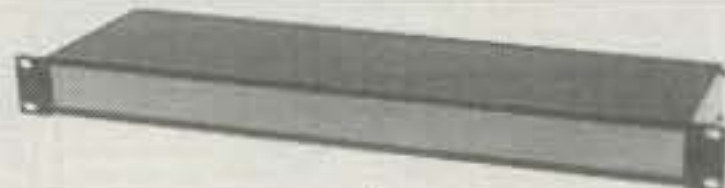


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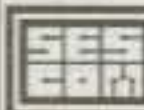
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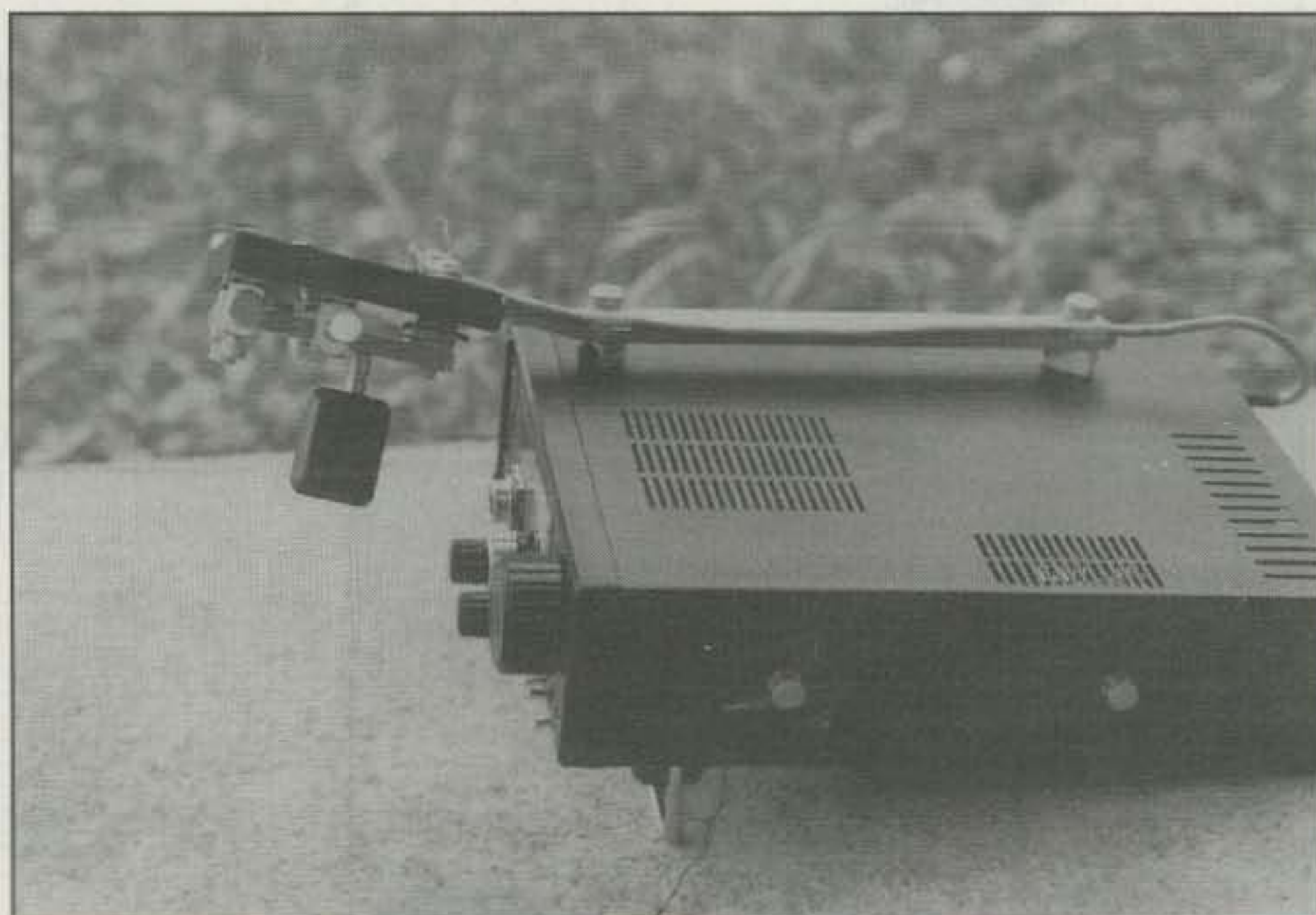
W9WBL's rig and paddle in "stowed" position, achieved simply by raising front armrest in car.

antennas are obviously as non-resonant (in the previously discussed 20/40 meter example) as a G5RV antenna is for home station use, so Sy uses a kilowatt tuner with the "force-fed multiband system."

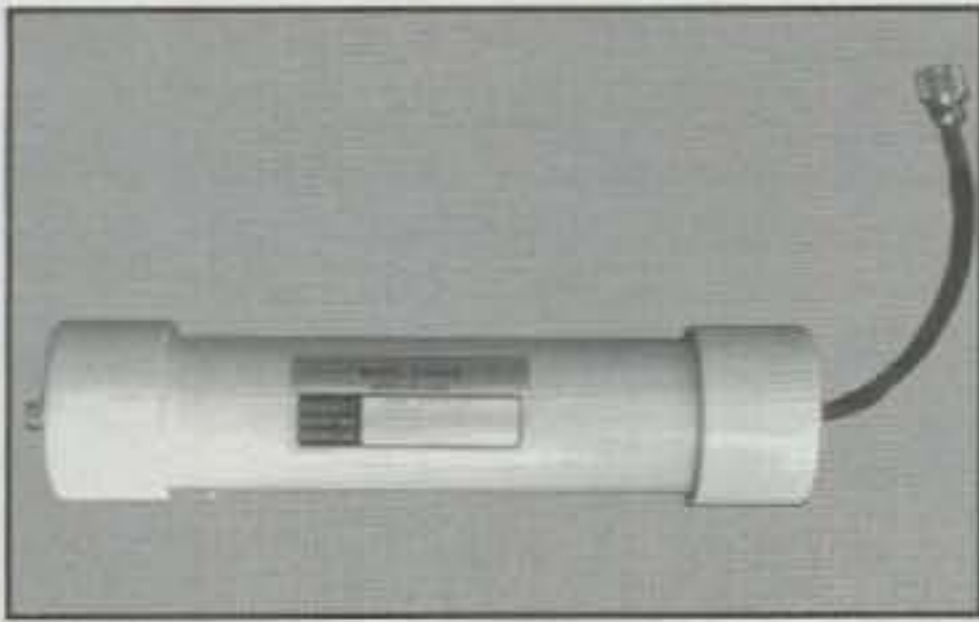
Are the short mobile antennas a significant handicap? Not really. As I have discussed in past columns, the main radiator section of a mobile antenna is the whip above its coil. The mast section below the coil serves mainly as a support to raise the coil above the vehicle's roof line. If I have a choice of a short mast and long top whip or a longer mast and shorter top whip (usual design), and assuming the coil can be raised above the roof line in

either case, I always choose the long top whip (additional details on that statement later in this column).

The more I studied Sy's ferrite-isolated coax, the more I realized it had an important second benefit: minimizing RF feedback and resultant vehicle computer interference caused by coax shield radiation. This quick-fix can be a blessing to amateurs plagued by bucking engines, erratic-reading gauges, automatically locking doors, and over-zealous fuel pumps whirring every time the rig is keyed. Say that "cure" caught your attention? Okay, the cores should be as high mu as you can find—800 mu if possible.



Detailed view of Stan's setup removed from car. Solid-brass mounting arm for keyer paddle has three custom-formed twists to produce ideal angle.



The Radio Works 4KV-L1 line isolator. Item is mainly used for reducing RF feedback and related TVI in home setups, but works fine reducing interference to computers in mobiles.

Amidon's 43-series or Indiana General's T1 or T3 core material series are good choices. Pick the small diameter cores that look like those on a computer monitor cable; they are long and fit snugly on the coax. If you space them one-tenth wavelength apart, one will end up close to the "antenna end" of the coax and the other will be near the "rig end" of the coax. When used with a regular mobile antenna (Outbacker, Valor, Hustler, etc.), they should prove quite helpful in minimizing "stray RF" problems.

A Mobile Balun? Yes Indeed!

A couple of weeks after N4KEL's visit I received a new catalog filled with baluns and line isolators available from The Radio Works (P.O. Box 6159, Portsmouth, VA 23703). Their model 4KV-L1 line isolator for verticals immediately caught my eye, as it seemed like the perfect plug-in "fix" for minimizing RF feedback and car computer interference as previously discussed. I quickly ordered one and tried it in my own mobile setup, and it really works! Without the 4KV-L1 in the coax feedline, the engine coughs and bucks like a bronco when I transmit using over 40 watts output. I then plug the coax feedline into the 4KV-L1, plug its output connector into my transceiver, and the engine runs smoothly at an even 100 watts output from the rig.

Radio Works' 4KV-L1 line isolator is shown in the accompanying photo. Its main function is to prevent RF current from flowing along the outer surface of the braided shield in a coax feedline. The line isolator thus reduces RF feedback and subsequent TVI in vertical antennas used with home setups. In many cases its isolation effects also break up (reduce) ground system noise relative to verticals. The 4KV-L1 is usually installed at the vertical's feedpoint (between the vertical and the coax). Obviously, the most effective place to mount/insert it in a mobile installation is in the trunk close to the whip. I cheated by installing it at the rig, but it still solved my problem. Difficult to fix cases

might require using two 4KV-L1 isolators—one added at the rig and one added at the antenna. They could easily prove a welcomed new lease on mobiling fun.

K4TWJ's New Mobile Antenna

My continuing search for a low-profile, high-performance mobile antenna for 20 and 30 meters finally met with success, and its design is too exciting to keep a secret. The antenna's upper whip is extra tall for big-signal results, the coil is above the car's roof line for maximum efficiency, wind resistance is almost zero, and no guying is needed. Performance is one to two S-units better than a standard Hustler. Furthermore, this antenna can be quickly assembled using readily available parts from several other antennas. Sound interesting? Read on!

A photo and a sketch (fig. 1) of my new "Sky Needle" are shown here, and a brief discussion follows. The base/mast section is made up of a 24 inch length of 1/4 inch diameter stainless-steel whip with regular 3/8-24 thread adapters on each end. The bottom part of a stout 108 inch CB whip can be cut (with a grinding wheel) and an extra adapter added to its "cut end," or you use a light-duty mini-mast from a Bugcatcher to make this mast. The length of 24 inches incidentally is not critical. Any length between 18 and 26 inches is fine because you will tune the finished antenna by adjusting the length of its top whip. As I have discussed in previous columns, the main purpose of this mast is supporting the coil above the car's roof line.

The loading coil used in this antenna is a regular Hustler resonator (ideal because it is readily available, lightweight, weatherproof, and screws onto the previously mentioned 3/8-24 adapter). A resonator for one band above the band you wish to operate is then selected (such as a 15 meter resonator for operation on 20 meters or a 20 meter resonator for working 30 meters). The resonator's short top stinger is then removed and replaced with a long, thin whip approximately 42 inches in length for 20 meters or 46 inches in length for 30 meters.

A replacement top whip for a Ten-Tec mobile antenna fits perfectly in a Hustler's resonator, is ultra-light, and gives good SSB coverage. A slightly longer stinger is required for 20 meter CW coverage (with 15 meter resonator) or 30 meter coverage (with 20 meter resonator), so I cut a few inches off the Hustler's discarded short stinger and butt it to the 42 inch Ten-Tec whip with a shaft coupler from a hobby shop. Just show the whip ends to a salesperson and ask for a coupler. Pick one that is lightweight.

The homebrewed antenna is then screwed into a trunk-lip mount and fine-



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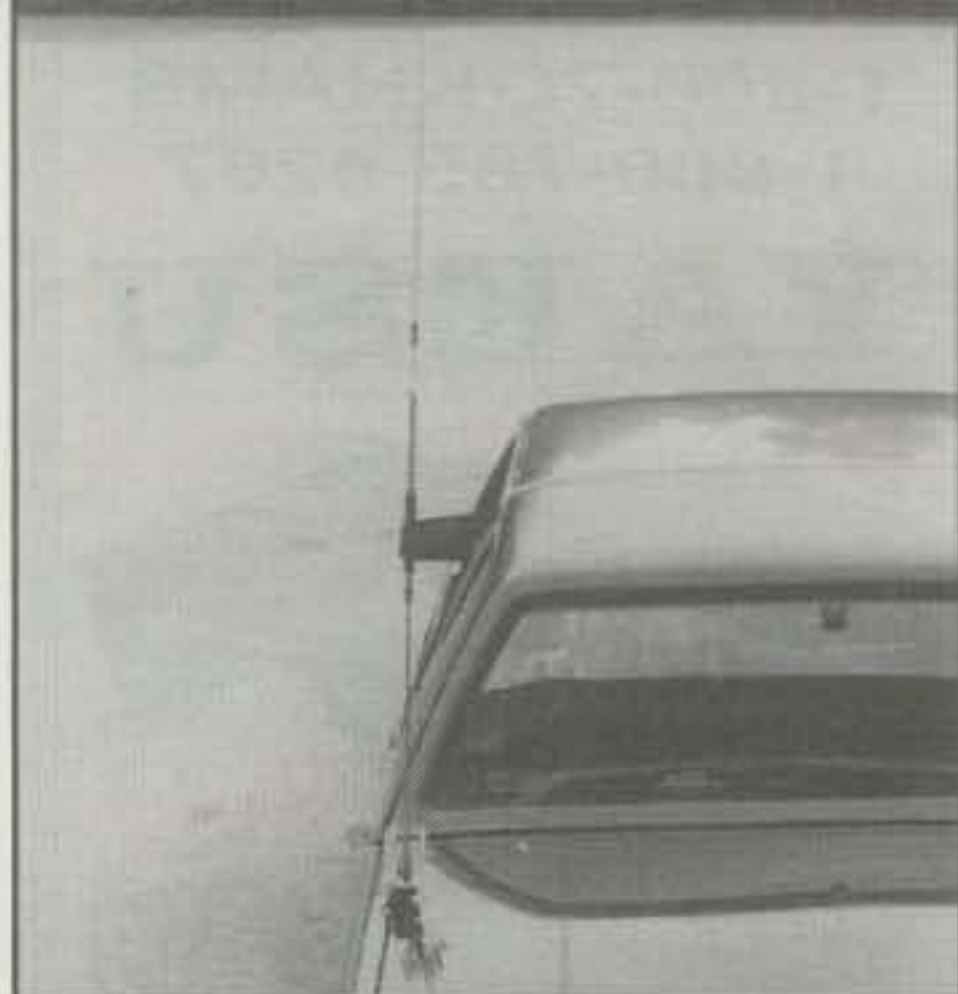
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TIP



The K4TWJ "Sky Needle" installed and ready for use. Ultra-thin top stinger is tall, yet difficult to see.

tuned to frequency by adjusting the amount of top stinger inserted in the resonator. Typically, stinger length will be 41 1/4 inches for 20 SSB, 42 1/2 inches for 20 CW, and 44 inches for 30 meters. Coverage of other bands is also possible by experimentally winding your own coils on blank forms (like rewinding a resonator) and/or adding small capacity hats (two 4 inch hats spaced 4 inches apart work like an 8 inch hat).

One additional tip: A 20 inch stinger in a 15 meter resonator makes a trim "garageable" 17 meter antenna that is only 53.5 inches tall, yet performs as if it is 7 feet tall (because it has extra whip length above its coil).

An MFJ 204B antenna bridge and a digital frequency counter make antenna tuning a 2 minute cinch. Just plug the antenna's cable into the bridge, tune for minimum meter reading, then read its center/resonant frequency on the counter. Extend or retract the stinger in 1/2 inch increments to lower or raise its frequency, respectively.

Finally, add a base matching coil between the mast's base and the trunk lip's mount and use the MFJ-204B to choose a tap point that will raise impedance from 14 to 50 ohms. I use an "Inducta-Match" from Lakeview Company/WD4BUM, and tap it at three turns from the bottom for base matching. An MFJ-247 SWR analyzer can also be used to tune this antenna. Just set the top stinger for lowest SWR, then add the base matching coil and vary its tap position around the "three turn point" until you acquire an even lower SWR reading. You will also notice the

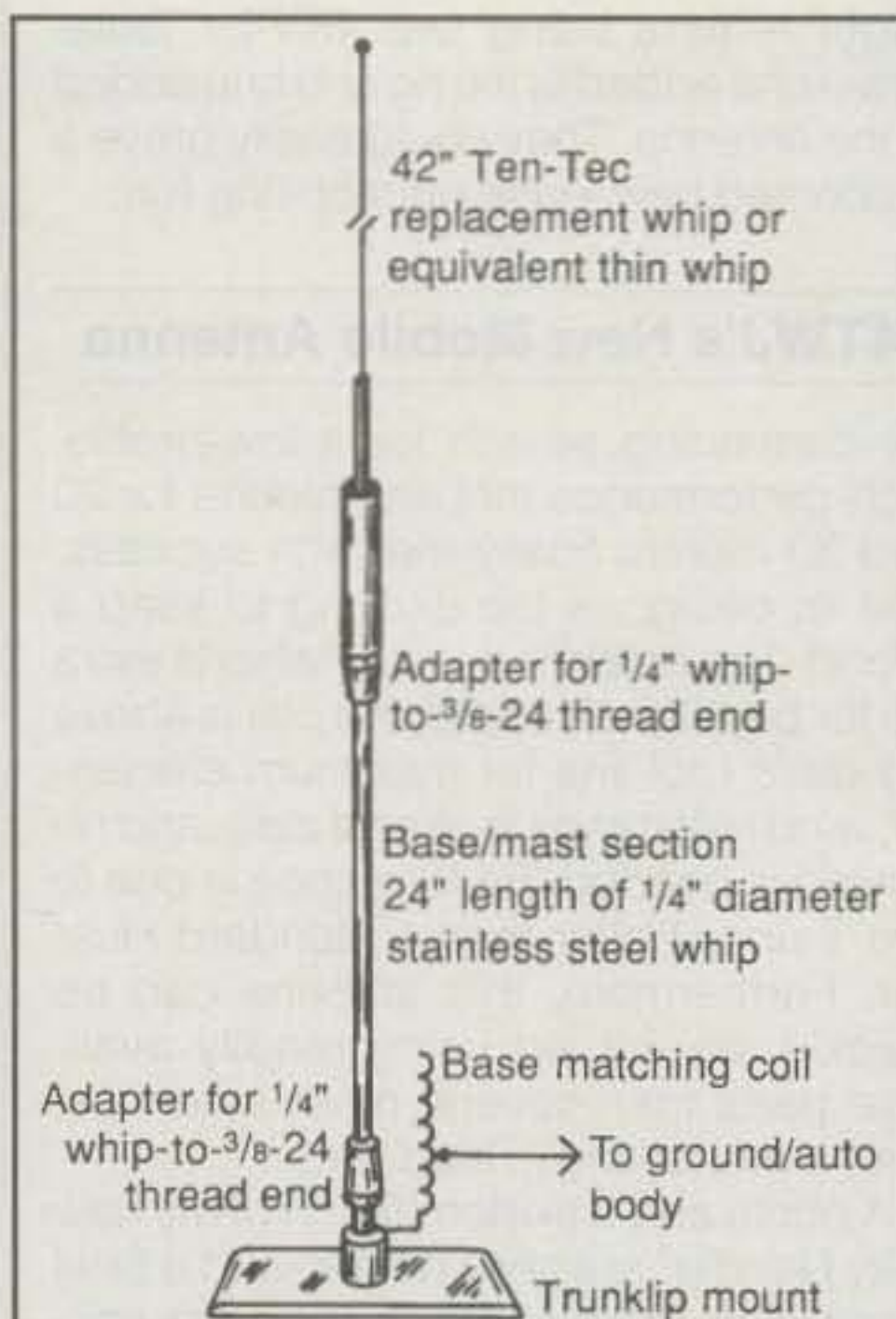


Fig. 1—Assembly outline of my new high-performance and low-wind-resistance mobile antenna for 30, 20, or 17 meters. (Details in text.)

antenna's 1.5:1 bandwidth triples at that time (a base matching coil really hops up a mobile antenna's performance).

As a final touch add a Radio Works model 4KV-L1 line isolator at the antenna's base (in the trunk) and another 4KV-L1 between the feedline/coax and your transceiver (under the front seat or behind the rig) to ensure the (outside) antenna rather than the (inside) feedline radiates your signal in high style.

After building numerous mobile antennas, I am convinced this new "Sky Needle" is the ideal blend of cosmetics and performance. It takes advantage of every "usual asset" (such as trunk mounting for extra height and a good span of metal below the antenna) and always pumps out a good signal. Build one and use it on your next outing or mini vacation. You'll love it!

Wrap Up

That winds down this month's column, gang, and we trust it has kindled or rekindled your interest in HF mobiling. Hamming on the open road is a real blast of fun, especially when you have a good setup. The key word is "setup," not simply "transceiver" and "antenna." That includes fine details such as a boom mic attached to a sun visor, PTT and tuning box attached to the gearshift, line isolator on the transmission line, and a separate ground strap from the transceiver's cabinet to the car's frame. These, plus more views and ideas on mobiling today, will be featured in Part II of this column next month. Stay tuned! 73, Dave, K4TWJ



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DX Gatherings

April marks the beginning of the DX gathering season. Two of the biggest DX events of the year are this month: the International DX Convention in Visalia, California, and the Dayton HamVention in Ohio.

Visalia

The International DX Convention is best known by its location. "See you in Visalia" is a common comment this time of year. The Visalia convention evolved out of a joint meeting of the Northern and Southern California DX Clubs, and has been a fixture on the DX circuit for more than 40 years. It is held in mid- to late-April, a week or two before the Dayton Hamvention. In 1994 the dates are April 15-17. In the past 20 years or so it has attracted prominent DXers from all over the world, who gather in this dusty Central Valley town to share DX stories, plan DXpeditions, and enjoy the company of more than 600 fellow DXers.

Visalia has grown to become the largest pure-DX convention in the world. Its list of speakers usually includes the most prominent DX figures worldwide, as well as the leaders of many of the major DXpeditions of the past year. For example, the survivors of the **3YPI** Peter I Island DXpedition will be among the guests at this year's convention, April 15-17.

Visalia begins informally on Thursday night, as many DXers who have a long way to travel to Visalia arrive a day early. The atrium of the Holiday Inn at the Visalia airport is the meeting ground for the early arrivals. The largely out-of-town DXers frequently head for the Vintage Press restaurant in downtown Visalia for dinner, probably the best place to eat in town.

More DXers arrive during the day Friday, and the parking lot gradually fills with call-letter license plates, as well as a scattering of DX-related tags. "DX IS" and "DOG XRAY" are a couple of the more obvious ones. (The DOG XRAY tag is mine.) The annual International DX Golf Tournament is Friday morning. With a few exceptions, the entrants in the tournament show that they spend far more time behind their microphone or key than they do practicing their golf swing, but the companionship makes up for the time wasted looking for errant golf balls.

P.O. Box 50, Fulton, CA 95439

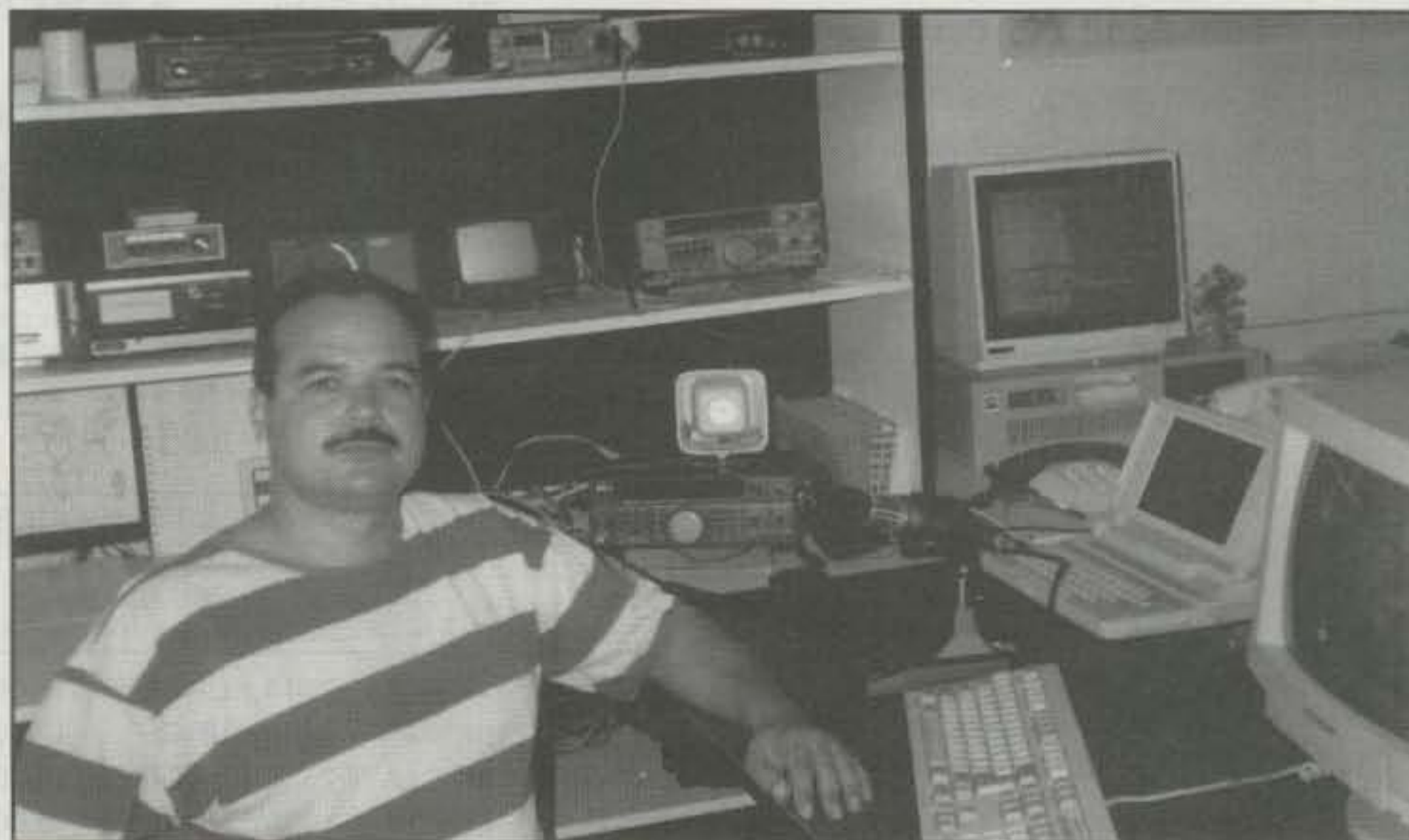


The Saturday Evening Hospitality Hour at the Visalia International DX Convention.

By mid-afternoon the hotel atrium is packed with DXers. The registration table is the initial focus of interest. The line to check into the hotel is another popular spot to sight the many world-class DXers who make Visalia a regular part of their yearly travels.

The convention officially gets under-

way late Friday afternoon. A few brief talks on DXpeditions or other DX-related activities are available for those DXers who have already renewed their acquaintances with fellow convention goers. At about 5:30 most of the DXers gravitate to the Hospitality Hour sponsored by *The DX Bulletin* and *The DX Magazine*, and this



Patrick Cardozo, HH2PK, finds the situation in Haiti difficult, but manages to stay active from this well-appointed station.

writer. (This is one of the ways I get to say thanks to the many hundreds of DXers around the world who make my job easier.—ed.) Following this attitude adjustment DXers scatter to restaurants in town or enjoy the DX barbecue at the Holiday Inn.

On Saturday morning the single-track program begins early with forums, presentations, and discussions on the wide range of subjects that comprise the world of DX. The DX forum is usually standing room only, as ARRL representatives, DX Advisory Committee members, and others discuss the current state of DX and the DX Century Club. The single-track program means that most DXers can attend all the major presentations without conflicts.

Late Saturday evening the DXers break to get into their good clothes, and then assemble around the hotel pool for another Hospitality Hour, this one sponsored by Bob Ferraro, W6RJ, and Ham Radio Outlet. The banquet which follows is the highlight of the convention, with major awards and a DXpedition report. Visalia comes to a close Sunday morning after a breakfast buffet and another DXpedition slide show.

The main focus of Visalia is the single-track program. However, there are a handful of exhibitors displaying their wares, usually including the Big Three Japanese radio manufacturers. The commercial exhibits are nothing like the mass displays at Dayton. Instead they are low-key, with knowledgeable staff members ready to discuss features of the latest state-of-the-art rigs. Other informal activities include late-night hospitality suites and intense discussions of possible future DXpeditions. Because Visalia attracts so many top DXers, it becomes the site of much DXpedition planning.

Another major attraction of the con-

The WPX Program

SSB

2429 VE3OMM 2432 JA3SSB
2430 IK2MMM 2433 WB4NFL
2431 JA8SU

CW

2805 JA8SU

MIXED

1641 VE6JAV 1643 HH2B
1642 IK7HWS

Mixed: 450 VE6JAV, HH2B. 500 HH2B. 550 9A2AJ. 600 9A2AJ. 650 9A2AJ. 700 9A2AJ. 750 9A2AJ. 800 9A2AJ, CT1EEB. 850 9A2AJ, CT1EEB. 900 9A2AJ, CT1EEB. 950 9A2AJ, CT1EEB. 1000 9A2AJ, CT1EEB, N7JB. 1050 9A2AJ. 1100 OZ1ACB, 9A2AJ. 1150 9Z1ACB, 9A2AJ. 1200 9A2AJ. 1450 WB4FOT. 1850 KB0G, WB4RUA. 1900 WB4RUA. 2150 KL7AF. 2200 KL7AF. 2350 WB2YQH. 2700 I8RFD. 3250 W2FXA.

SSB: 350 JA8SU. 400 JA8SU. 450 JA8SU. 500 JA8SU. 550 JA8SU. 600 JA8SU. 650 JA8SU. 800 CT1EEB. 850 CT1EEB. 900 CT1EEB. 950 CT1EEB. 1000 KB0G, CT1EEB. 1050 KB0G. 1250 W5ILR. 1300 W5ILR. 1400 H18LC. 1450 IK8BMW. 1500 IK8BMW. 1550 IK8BMW. 1600 I8RIZ, IK8BMW. 1650 KF9RU, I8RIZ, IK8BMW. 1700 IK5ACO, KL7AF, I8RIZ, IK8BMW. 1750 IK5ACO, I8RIZ, IK8BMW. 1800 IK5ACO, I8RIZ. 1850 I8RIZ. 1900 I8RIZ. 1950 I8RIZ. 20000 I8RIZ. 2050 I8RIZ. 2100 I8RIZ. 2150 I8RIZ. 2200 I8RIZ. 2250 I8TGF, I8RIZ. 2300 I8RFD, I8RIZ. 2350 I8RIZ. 2400 I8RIZ. 2450 I8RIZ. 2500 I8RIZ. 2550 I8RIZ. 2600 I8RIZ. 2650 I8RIZ. 2700 I8RIZ. 3150 F6DZU. 3200 F6DZU. 3250 F6DZU. 3300 F6DZU.

CW: 350 JA8SU. 400 IK5TSS, JA8SU. 450 IK5TSS, JA8SU. 500 K2LUQ, JA8SU. 550 JA8SU. 600 JA8SU, N7JB. 650 JA8SU. 700 JA8SU. 750 JA8SU. 800 JA8SU. 850 JA8SU. 900 JA8SU. 950 JA8SU. 1000 JA8SU. 1050 JG2LGM, JA8SU. 1100 JA8SU. 1150 WA2EYA. 1500 I8RFD. 1550 KB0G. 1650 KL7AF. 1900 G3VQO. 3350 N6JV.

10 Meters: I8YQV, WB4HGL, UA1ZO.
15 Meters: I8YQV, UA1ZO, CT1EEB.
20 Meters: I8YQV, UA1ZO, CT1EEB.
40 Meters: VE3OMM, UA1ZO
80 Meters: UA1ZO
160 Meters: I8RIZ, I2MQP

Asia: K9UQN, AA6WJ, JA3SSB, UA1ZO
Africa: UA1ZO
No. Amer.: AA6WJ, WB4HFL, UA1ZO, N5KUC
So. Amer.: SM5DAC, UA1ZO
Europe: IK5TSS, AA6WJ, UA1ZO
Oceania: AA6WJ, UA1ZO

Award of Excellence: I2MQP, I8RIZ.

Award of Excellence with 160 Meter Bar: I2MQP, I8RIZ.

Award of Excellence Plaque Holders: I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, I8JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, H18LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, WB1LC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YLW4, NN4Q, KA3A, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, I3PVD, KA5RNH, ZP5JCY, F1HWB, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DE0DAQ, LU1DOW, N11R, IK4GME, WX3N, KC7X, N6IBP, W5ODD, I8RIZ, I2MQP.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, H18LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, WB1LC, W1BWS, VE7WJ, K9QRF, NN4Q, W4UW, NX0I, G4BUE, LU3YLW4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, I3PVD, KA5RNH, ZP5JCY, I2MQP, I8RIZ, 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.

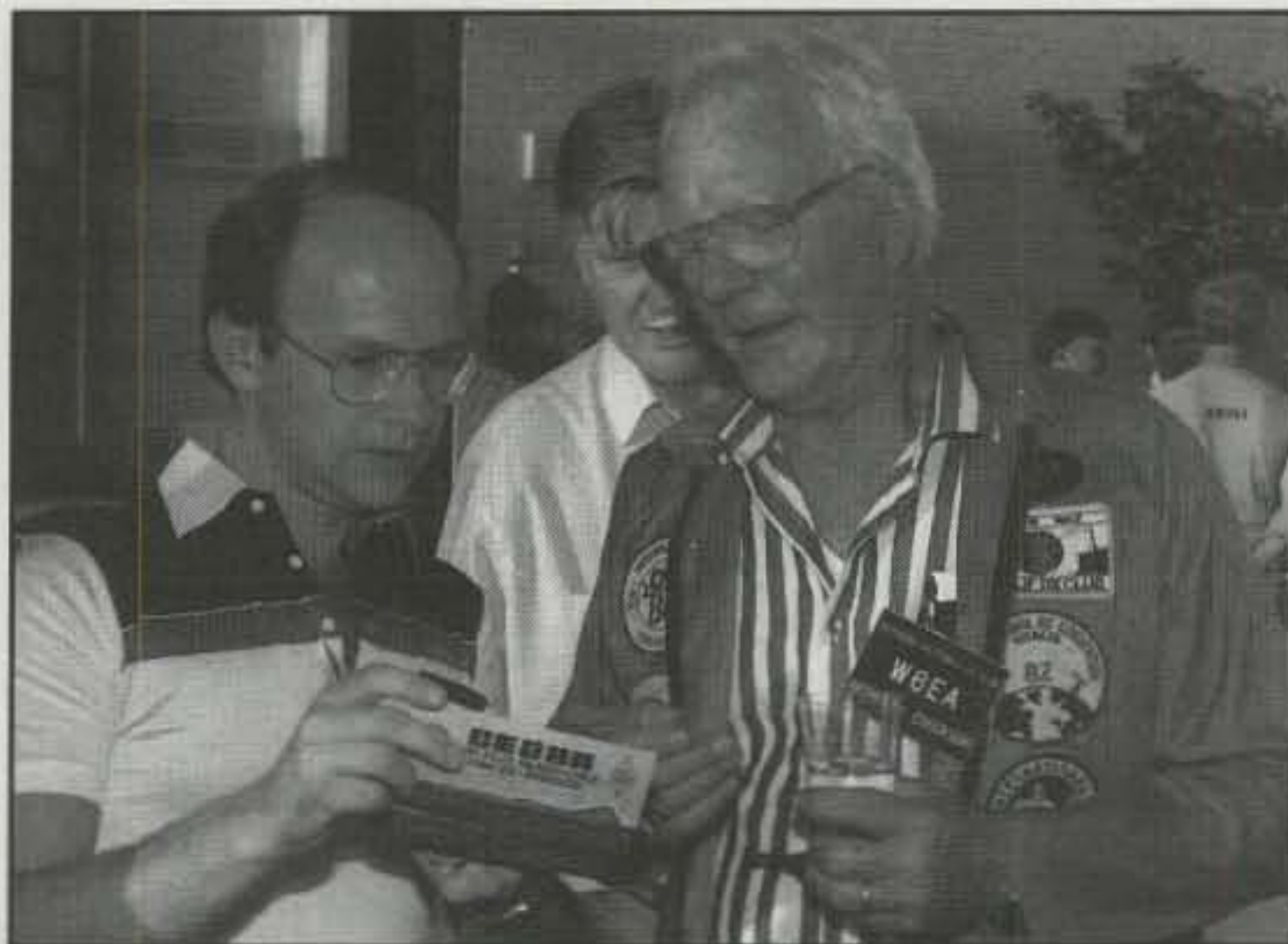
vention is QSL card checking by ARRL officials. DXers who are reluctant to send their valuable QSL cards through the mails can have them hand-checked and get their DXCC records updated.

Those planning to attend Visalia should make arrangements early. The Holiday

Inn sells out each year, and DXers must make reservations on a given day (usually in May) to ensure a room at the host hotel. (There are many other places to stay in Visalia, but none within walking distance.) The actual registration is very reasonably priced, considering it in-



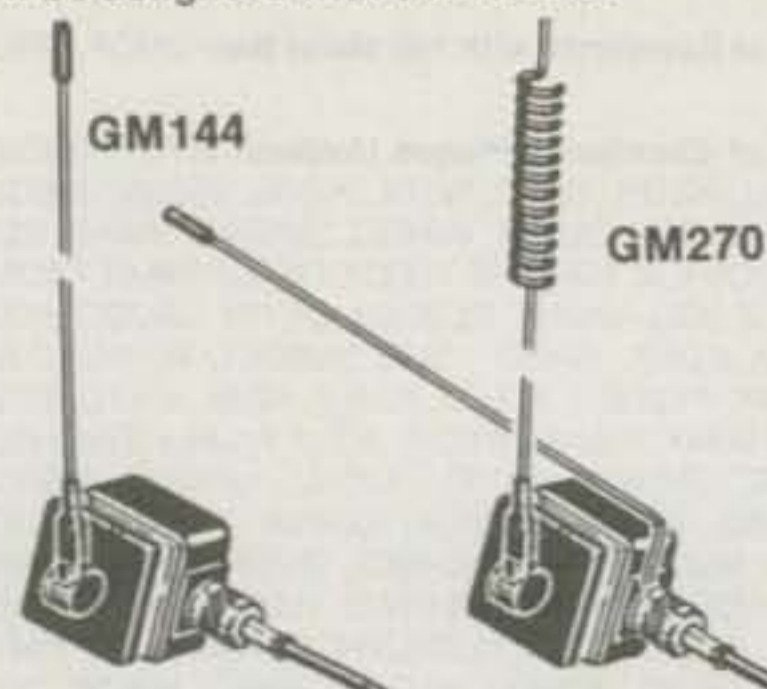
Vic, XE1VIC, will soon add the coveted 5-Band Worked All Zones plaque to his impressive array of awards.



Yet another reason to attend a DX convention: W6EA gets his CE0AA San Felix QSL hand-delivered by QSL manager CE3ESS at Visalia.

PRO•AM™'S NEW

PRO•AM's GM144 is 27.5 inches tall, handles up to 50 watts and covers 144-148 MHz with SWR below < 1.5:1 across entire band (tunable via interior coupling unit). Gain is 2.5 dB. Almost doubles your transmitted signal strength and extends receive range accordingly. You will be delighted with the results.



PRO•AM's GM270 is 26 inches tall, handles 50 watts, and covers 144-148 plus 440-450 MHz with SWR less than < 2:1 at band edges (tunable via interior coupling unit). Gain is 2.6 dB 2m and 6.3 dB 70cm. A real tiger!

"Stylish, trim, and petite" only begin to describe PRO•AM's exciting new 2 meter, 70 cm, and dualband mobile antennas. They feature a slender black chrome whip and small candy kiss-size base that looks terrific on any auto. Inside the little 1 1/4 inch diameter base is a newly-developed and ultra-strong titanium magnet that holds in place like a bulldog, even at high speeds. These new micro magnet antennas are supplied fully assembled and ready to use, with 9 feet of RG-174 mini coax and BNC connector.

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- Pretuned
- Low SWR
- Wide bandwidth
- 25 watt rating
- Weighs only 4 oz!
- New micro magnet look
- Super trim whip
- Micro-size base
- Titanium magnet
- Ready to use
- Made in U.S.A.
- Built to last
- Single & Dualband models

Technical Data

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



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CIRCLE 87 ON READER SERVICE CARD

The WAZ Program

Single Band WAZ

10 Meter SSB

471WB4YDM

15 Meter SSB

461KJ6HO 463KG6AR
462IK2MRZ

20 Meter SSB

942VE1OC 943KA1VHK

15 Meter CW

254I6DQE

20 Meter CW

441K0HQW 443KE5PO
442JA2EJI 444IK4MED

80 Meter CW

39W8SEY

17 Meter Mixed

23G4BWP

All CW

42WE1B

RTTY

88IK1HXN

WNZ

5510 Meter SSB—WB4YDM (27 Zones)

All Band WAZ SSB

4142ZS6JHS 4144K9VIQ
4143JH1ANZ 4145IK7FVF

CW/Phone

7424TA2SC 7428JA0GSB
7425FB1LND 7429DL2HRF (CW)
7426K0YR 7430W6/S52NC
7427VE6JAV

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4 1/4 x 9 1/2 to the WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Rd., Sudbury, MA 01776. Applicants forwarding QSL cards either direct to the WAZ manager or to a checkpoint should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

cludes the cost of both the Saturday evening banquet and the Sunday breakfast buffet. Early registrants are eligible for additional prizes in the highly anticipated drawings on Sunday. Unless you have your own airplane, you can't plan on flying into Visalia, as the limited commercial flights don't fly on weekends. You can fly into Fresno, which is about an hour away, or into San Francisco or Los An-

5 Band WAZ

As of December 31, 1993, 371 stations have attained the 200 Zone level.

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

JW7FD
W8SEY
JR1FYS

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)	W9CH, 199 (26)
K6YRA, 199 (34)	AC0M, 199 (34)
PY7ZZ, 199 (34)	G3MXJ, 199 (12)
K0CS, 199 (34, 40m)	IK8BQE, 199 (31)
AA4KT, 199 (26)	W6TC, 199 (34)
K7UR, 199 (34)	SM6AHS, 198 (12, 31)
NA0Y, 199 (26)	K1ST, 198 (19, 26)
VE7DX, 199 (34)	4X6DK, 198 (4, 6)
W0PGI, 199 (26)	AB0P, 198 (23, 34)
W2YY, 199 (26)	UA3AGW, 198 (1, 12)
W9WAQ, 199 (26)	KL7Y, 198 (34, 36)
K6EID, 199 (34)	VO1FB, 198 (19, 27)
W1JR, 199 (23)	EA5BCX, 198 (27, 39)
N7RT, 199 (34)	KZ4V, 198 (22, 26)
VE7AHA, 199 (34)	K4PI, 198 (23, 26)
W1FZ, 199 (26)	G3KDB, 198 (1, 12)
IK2GNW, 199 (1)	

The following have qualified for the basic 5 Band WAZ Award:

IV3GOW, 161 Zones	N14H, 180 Zones
JW7FD, 200 Zones	IK2FDM, 165 Zones
OH2DW, 185 Zones	JR1FYS, 200 Zones

Endorsements:

KJ6HO, 171 Zones W8SEY, 200 Zones

873 Stations have attained the 150 Zone level as of December 31, 1993.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and \$1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all CQ awards is \$4.00 for subscribers (please include your most recent CQ mailing label or a copy) and \$10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

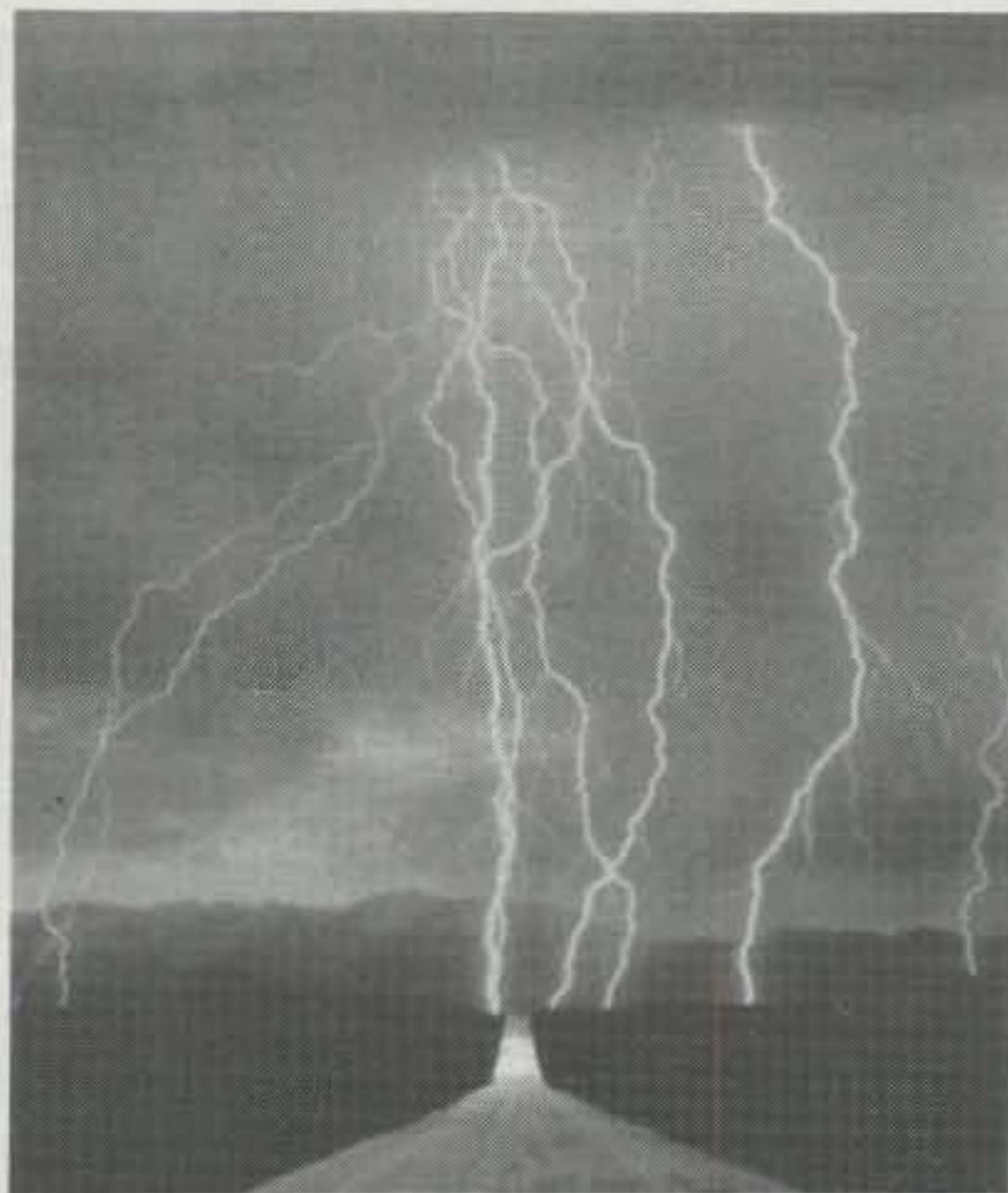
geles, and hitch a ride with some of the many hundreds of DXers driving to Visalia that weekend.

Visalia reflects its origins in its sponsorship, which alternates between the Northern and Southern California DX Clubs. It's the SCDXC's turn in 1994. Registration information is widely published, including in this column.

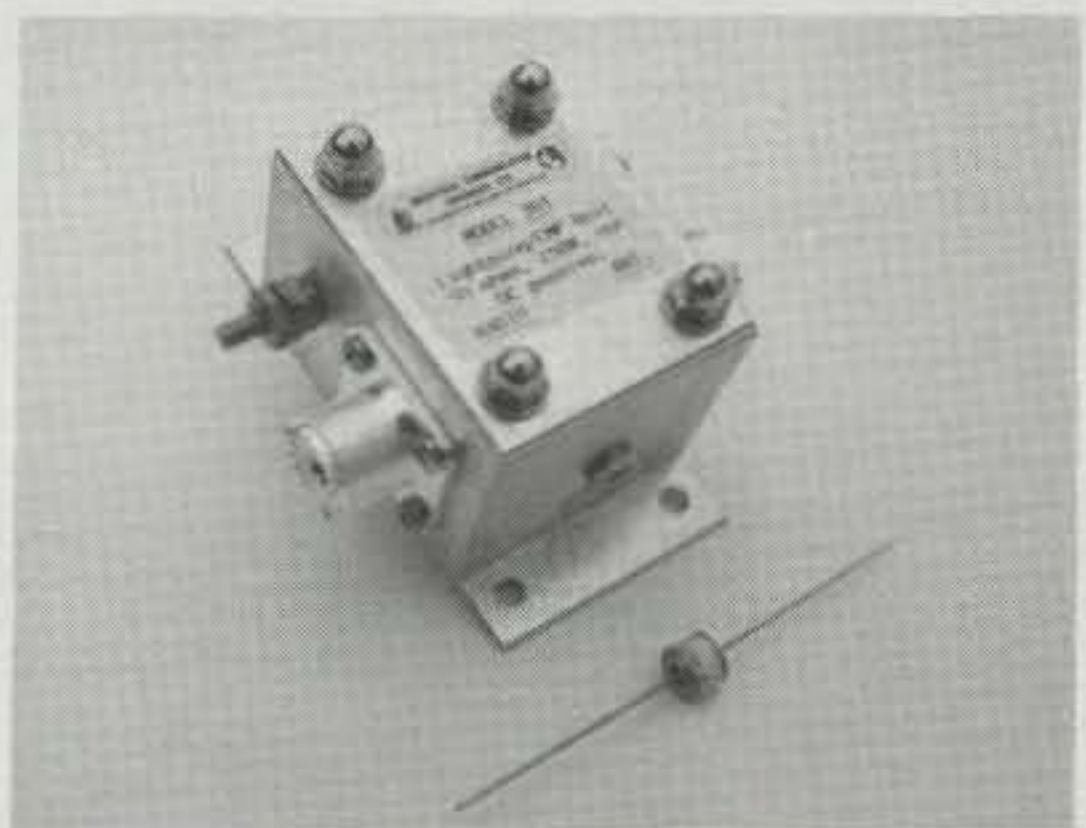
Dayton

While Visalia is the largest pure-DX convention in the world, the Dayton Ham-Vention actually attracts more DXers. For active amateurs going to Dayton is like the Muslims going to Mecca: it's a pilgrimage one must make at least once. For many active DXers the trip to Dayton at the end of April is an annual affair. (My travel agent calls me in the dead of winter when she spots a good fare to Dayton.) The 1994 Dayton Ham-Vention dates are April 29 through May 1.

The Dayton experience is far more than



THERE'S A BIG DIFFERENCE



Pictured above in front of an I.C.E. arrester is a ceramic-cased gas tube, a sealed device with a gaseous chamber designed to ignite conduction when a pre-determined voltage potential is reached. They were designed principally for telephone company use on tiny conductors and are rated to about 1 watt dissipation.

Can you imagine protecting a tower and radio facility with a 1-watt device? That's what other manufacturers call lightning protection - 1970s technology that's out of place when used with heavy coaxial conductors and guaranteed to fail.

Don't be misled by the spectacular claims used to describe this tiny part. Get the whole story - ask for our free publication set on lightning protection, including comparisons between the various designs available - how they're supposed to work - and why so frequently they don't.



You're dead. It's no joke. Lightning is unpredictably dangerous, and sooner or later you'll have to face up to both the certainty and ferocity of powerful electrical discharges. It doesn't take a direct "hit" to cause major or even catastrophic damage to modern transceivers and the accessories to which they are attached. We hear horror stories every day from new customers seeking to prevent a repeat of damage they have already suffered from overhead lightning during storms, rainshower static releases, and even dry winds.

We can protect you from all of them with simple do-it-yourself means and a small budget - less than an insurance policy and one heck of a lot more effective.

Find out about the only lightning arrestors in the world with all these features:

- Capacitive blocking - no DC continuity through the arrester.
- No singular reliance on a flimsy gas tube - secondary protective use only - and not a single failure in lightning applications - ever.
- Constant drain technology - constantly drains coax conductors to earth ground 24 hours per day, keeping lines "cold" and reducing receiver noise.
- U.S. Patent #5,122,921 in 1992 for advanced technology.
- More than 10,000 arrestors in service worldwide and not a single lightning-induced failure - ever.
- And a wide selection for LF, HF, VHF, UHF, coaxial, open wire, and even structural applications.



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CIRCLE 155 ON READER SERVICE CARD

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

4557	9A2AA	3003	W4BQY	2725	YU7SF	2328	K2POF	1993	W8UMR	1780	G4OBK	1484	K5IID	1224	K9BQL	956	JH11ED
4198	K2VV	2996	N4MM	2711	I1POR	2318	HA0HW	1955	9A1BHI	1772	IK2ILH	1480	OE6CLD	1213	W9IAL	945	W4USW
3553	IT9TQH	2973	ZP5JCY	2683	YU7BCD	2303	I2EOW	1954	W6OUL	1767	W9IL	1470	WB3DNA	1194	N6IBP	937	WB2PCF
3537	EA2IA	2972	K0FLT	2652	I6SF	2221	S53EO	1924	VE3MS	1730	S58MU	1452	I0AOF	1189	I1-50156	920	AA7TF
3400	K6JG	2964	W1BWS	2639	N4UU	2145	WB2YQH	1902	K2OLG	1714	K5DB	1430	LU8DY	1174	W0IJE	917	VE6BMX
3322	VE3XN	2905	WA8YTM	2626	K9BG	2142	I1WXY	1893	HA5NK	1688	WB2ABD	1365	I2EAY	1160	K0IFL	902	JH3SAC
3234	N4NO	2898	KA5W	2604	SM7TV	2141	K8LJG	1880	WE2L	1681	VE9RJ	1364	HA9PP	1125	W0ULU	851	VE7C8H
3229	N6JV	2855	PY4OD	2589	N2AC	2139	KL7AF	1869	KB0G	1674	S51NU	1318	NJ1T	1119	NH6T	840	VE3OMM
3210	K6XP	2852	W9DWQ	2556	HA8XX	2118	3A2LF	1860	WB4RUA	1577	PY2DBU	1287	KS0Z	1104	HP2CWB	788	WU1F
3206	N9AF	2841	PA0SNG	2407	4N7ZZ	2118	W4UW	1814	NV9S	1560	CT1QF	1271	KC6X	1074	WK3Z	762	JR3TOE
3117	W2FXA	2840	IN3ANE	2402	SM6DHU	2091	I2DMK	1802	KS4S	1546	EA1JO	1252	W8IZV	1072	EA3CWK	753	OZ-2044
3084	SM3EVR	2817	I1EEW	2381	I2MQP	2041	DK5AD	1784	W3KH	1531	KA5TQF	1248	NE6I	1020	IT9JPK	738	JA4DUD
3025	I2PJA	2814	9A2NA	2337	K9QFR	2016	N6JM	1782	SM6CST	1487	DK7NP	1228	ND3A	1010	CT1EEB	671	WB9IHH
																640	KD1CJ

SSB

3895	I0ZV	2593	E8BAKN	2175	9A2NA	1841	4X6DK	1535	I6NOA	1287	DK5WQ	1123	NG9L	933	ND3A	781	G0FWG
3572	K2VV	2539	N4NO	2171	I8KCI	1806	CT1BY	1534	YU7SF	1285	CT1BWW	1101	K9BQL	919	N4CSF	776	WU1F
3534	IT9TQH	2533	NJ0C	2129	PY4OD	1787	SM6DHU	1510	CT1UE	1279	K3IXD	1096	HA5NK	917	NE6I	775	EA1KN
3420	ZL3NS	2525	I2UIY	2110	LU8ESU	1779	IN3QCI	1490	LU8DY	1273	W5ILR	1073	WB6SRK	916	WT3W	762	EA5DCL
3361	VE1YX	2517	PA0SNG	2098	W9DWQ	1770	IK5ACO	1476	IK2DUU	1272	KB0C	1063	CT4RH	910	NH6T	744	JR3TOE
3205	F6DZU	2483	F2VX	2087	YU7BCD	1742	WE2L	1472	K8LJG	1254	KA5TQF	1046	KB0G	897	AA7TF	739	CE5FSB
3106	K6JG	2458	I1EEW	2049	I2EOW	1714	N4UU	1470	OE6CLD	1235	OE2EGL	1029	VE3MS	879	SV3AQR	710	JA4DUD
3018	WD8MGO	2439	I4CSP	2046	CT4UW	1711	KC8YM	1442	I8LEL	1228	I1-21171	1021	EA1IP	871	EA1AX	687	SM6CST
3015	I2PJA	2416	KA5W	1985	PY4OY	1708	CX6BZ	1402	K2EEK	1193	G4OBK	1017	KC6X	859	EA1JO	681	AA4UF
2893	ZP5JCY	2319	HA8XX	1937	W4UW	1697	K2POF	1389	WN5MBS	1180	EA9LZ	1015	CT1EEB	849	KF7IO	653	VE9RJ
2833	K6XP	2296	W4BQY	1933	KD9OT	1674	KL7AF	1363	KS4S	1176	K8MDU	1010	KB4HU	844	CP1FF	644	EA8BGY
2727	CT4NH	2291	WA8YTM	1930	EA3FHT	1659	I2TZK	1341	LU7HJM	1174	I3ZSX	998	HP2CWB	836	KA9MOM	611	EA8BWW
2690	N4MM	2291	I2MQP	1925	K5RPC	1650	KF7RU	1339	W5AWT	1156	KB2DE	991	YB3OSE	809	K0IFL	606	KE4BM
2616	EA2IA	2286	I5ZJK	1902	CT1AHJ	1589	KA0ZFX	1337	I2DMK	1153	K5IID	956	JH11ED	806	I6KYL	600	JA2OCU
2606	OZ5EV	2179	I1POR	1849	IK8GCS	1583	N6FX	1298	W6OUL	1148	IK2AEQ	944	EA3KB	797	EA3EQT	600	IK6JYY

CW

3568	K2VV	2460	YU7SF	2132	KA5W	1787	SM6DHU	1602	VE9RJ	1503	S58MU	1280	ZP5JCY	1002	EA6AAK	787	PY4WS
3547	IT9TQH	2401	I6SF	2060	G4UOL	1769	G3VQO	1598	W9PWM	1454	W6OUL	1277	EA1JO	952	W9IAL	775	ND3A
3486	WA2HZR	2400	K6XP	2029	N4MM	1743	K2POF	1596	HA8XX	1443	VR2UW	1244	NJ1T	945	W4UW	751	AA6WJ
3365	W8RSW	2354	W4BQY	1922	W8IQ	1737	I2DMK	1585	K8LJG	1408	VE3MS	1233	KS4S	944	FE1JUD	749	VE3OMM
3211	N6JV	2311	W9DWQ	1890	EA7AZA	1721	IT9VDO	1576	S51NU	1379	I1EEW	1229	LU2YA	907	K5IID	688	N5GFX
2910	VE7CNE	2302	N4UU	1861	9A2NA	1673	G4SSH	1562	OZ5UR	1364	IK3GER	1225	I2EAY	899	W0IJE	669	NH6T
2787	N4NO	2284	JH3CXL	1860	KA7T	1668	SM6CST	1559	I7PXV	1363	G4OBK	1131	K9QFR	860	NE6I	637	I2MQP
2605	YU7LS	2209	LZ1XL	1856	IK0ADY	1658	OK1CZ	1555	W5AWT	1354	DJ1YH	1110	KA1CLV	852	KA5TQF	611	KI4UZ
2588	EA2IA	2206	WA8YTM	1814	JA9CWW	1658	W1WAI	1547	KB0G	1324	SM5DAC	1102	IK2ECP	827	WB5MTV		
2577	PY4OD	2165	VE7DP	1808	TI4SU	1650	KL7AF	1539	HA5NK	1317	G4MVA	1013	AC5K	821	KC6X		
2570	K6JG	2146	YU7BCD	1801	N4YB	1646	N6FX	1534	ZS6EZ	1297	3A2LF	1004	AH6JF	789	KL7UR		

DX, of course, with the enormous flea-market, many hundreds of commercial displays, and wide-ranging talks on all aspects of amateur radio. For the DXer, going to Dayton means the Stouffers hotel in downtown Dayton. Experienced Dayton-bound DXers make their room reservations for the next year as they check out the previous year. Stouffers typically books up completely by January.

For the past ten years one of the highlights of the HamVention weekend for DXers has been the DX Dinner on Friday night at Stouffers. The SouthWest Ohio DX Association sponsors this dinner, which features talks and slide shows on major DXpeditions of the past year, as well as other topics. A DX countdown identifies those true-blue DXers who have worked more than 350 countries in their DX career. Tickets for the DX dinner are available only in advance; see the announcement in the News and Events area below.

After dinner the DXers head upstairs to one of the many hospitality suites hosted by major DX clubs. For example, the high-

spirited Kansas City DX Club suite includes a CW-copying competition and a variety of videotapes. Other hospitality suites advertise throughout the hotel, but the DXer needs merely to poke his head outside the elevator door to tell if there is an active suite on any given floor. (Hint: Experienced Dayton goers use the staircase, avoiding the elevator delays.) New this year at Stouffers is a low-key reception Friday and Saturday nights on the top floor of the hotel, hosted by *The DX Bulletin* and the *W6GO/K6HHD QSL Manager List*.

At the Hara Arena the DX activities center on Room 1, the site of the DX Forum. DXers can usually get their QSL cards checked by ARRL staffers just outside Room 1. In some years DXpeditioners will distribute cards from their operations in the same vicinity. Saturday night the action returns to Stouffers for another round of hospitality-suite hopping. Between the action at the hospitality suites and the all-day exhibits at the Arena, Dayton can be nearly a 'round-the-clock weekend for DXers. So catch up on your sleep, pack

a comfortable pair of shoes and lots of money, and head for amateur radio's Mecca at the end of April.

New Orleans

Non-amateurs frequently ask why radio conventions are in undesirable locations such as Dayton or Visalia. Why can't someone hold a convention in a nice place, where there is something for the non-hams to do? Some Louisiana DXers answered that question in 1992 by staging the first New Orleans International DX Convention at the Royal Sonesta Hotel in the historic French Quarter. Like Visalia, the New Orleans convention is a pure-DX activity without any commercial booths or displays. Instead it is a intense DX experience, with the added benefit of nearby Bourbon Street. In 1994 the New Orleans convention will be Labor Day weekend, September 2-4.

The convention begins Friday afternoon with a selection of DX-related programs at the Royal Sonesta. As with the other major conventions, an ARRL staffer

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bracelet for a YL ham from NJ, a few PL-259s, din plugs and other connectors for new rig owners, a cracked HT case, a pot metal toy gun for a budding cowpoke. One woman fixed a hole in her truck radiator so she could get home.

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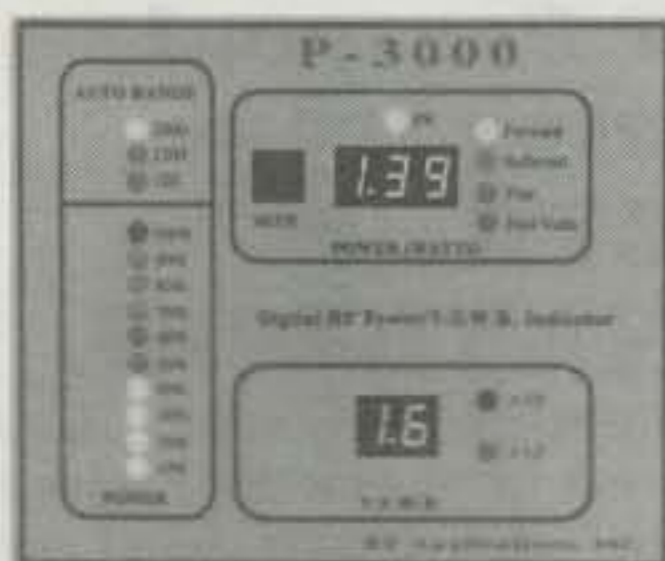
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is on hand to check QSL cards for DXCC. The program runs throughout Saturday with forums, technical talks, and DXpedition reports. The highlight of the convention is the banquet on Saturday night, with food a cut above the usual banquet fare. A report on a major DXpedition is the culmination of the evening.

Unlike Visalia, the New Orleans convention has attractions outside the hotel. The street entertainers, night clubs, and other Bourbon Street activities draw convention goers out of the forums and into the French Quarter. Just the view from the hospitality suite, looking down at Bourbon Street Saturday night, makes the trip worthwhile.

The host group for the New Orleans convention has put together a fine package of DX and non-DX activities in an excellent location. Look for this convention to continue to grow and attract DXers from farther afield in coming years. For more information on the New Orleans International DX Convention, contact Weston Strauch, W5VBX, 2238 Lake Oaks Parkway, New Orleans, LA 70122.

Regional Conventions

In addition to the major DX conventions there are a handful of regional DX gatherings that provide an opportunity for DXers to swap DX tales and meet their fellow country chasers.

The Northwest DX Convention held in late July rotates among three host clubs. In 1994 the British Columbia DX Club will host the convention near Vancouver, BC. The weather is usually superb at this time of year in BC, and Vancouver is a delightful city for amateurs and non-amateurs, with plenty of activities and side trips available. The BC amateurs are among the most hospitable anywhere, and the US dollar goes a long way in Canada. Watch for the exact date and registration information later this year.

In 1995 the Western Washington DX Club will host the convention, near Seattle, another attractive city. In 1996 the convention slides down to the Portland, Oregon area, under the sponsorship of the Willamette Valley DX Club.

The Northwest DX Convention typically features informal activities on Friday evening, with a full program of DXpedition reports and technical talks on Saturday, along with QSL card checking and other services. A banquet on Saturday evening and a Sunday brunch both feature DXpedition reports by world-famous DXers. Some DXers plan their summer vacation around this convention, and DXers in the northwest make it an annual event.

The second weekend of September is the usual time for the W9DXCC convention at the Glen Ellyn Holiday Inn just west of Chicago. This is a one-day affair, be-

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 4K8F to UD6DFF
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 4L1AB to UF6AB
 4L8A to OZ1HPS
 4M1I to I2CBM
 4O7AV to YU7AV
 4S7DA to W3HNK
 4U1UN to W8CZN
 5N0BHF to OE6LAG
 5N0HBK to SM5LLD
 5N0MVE to ON7LX
 5R8DS to F6FNU
 5T5JC to F6FNU
 5X1JM to NK2T
 5Z4JD to F6AJA
 7Q7LA to G0IAS
 7X4AN to DJ2BW
 7Z2AB to K1SE
 9G1SD to N0NLP
 9G1WJ to KA1SE
 9H1EL to LA2TO
 9J2BO to W6ORD
 9L1CF to W5TXV
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 CQ8C to CT1EGW
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 CR1C to DJ0MW

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 CR6A to CT1AHU
 CR7EDX to CT1EDX
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 CS8B to WA1ECA
 CT7D to CT1DIZ
 CY0SAB to VE1CBK
 D2SA to F6FNU
 EK7DX to DL1VJ
 EL2FD to K4XG
 EL2PP to N2CYL
 ER1AM to SP9HWN
 ER1PE to I8YGZ
 EW/R3AW to GW3CDP
 EX0M to DF8WS
 EY8VV to UJ8JJK
 FG5FZ to F6FNU
 FK8GJ to F6CXJ
 FY5GJ to F2YT
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 UX0FF to DF8BK
 UX2FXX to UB4FXX
 UZ1OWZ to WA7OBH
 V21ZL to W2HWS
 V31ML to N5FTR
 V51/DL60BS to DL60BS
 V73C to AH9C
 VE3DX to VE3ICR
 VE9AA to VE1BTT
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 VK9XO to VK4CRR
 VP2EHF to KA3DBN
 VQ9HE to KC6OHE
 VQ9TV to W4TV
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 XT2BW to WB2YQH
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ginning early in the morning with DXpedition reports and technical talks, and concluding with a banquet. One of the highlights of this banquet is the awarding of DX Hog of the Year "honors" to an area DXer. Both the Northwest DX Convention and the W9DXCC convention have been held for more than 40 years.

New England DXers get together in October at the New England DX Convention in the Boston area. Like the W9DXCC convention, this is a one-day affair with either a dinner or luncheon. The program includes the usual DXpedition reports and technical talks, with DXCC and WAZ QSL card checking available.

Another regional DX event in October is the West Texas DX Association's DX Bash held at the ranch of Bryan Edwards, W5KFT, outside of Austin. In addition to the regular fare of DXpedition reports and technical talks, the DX Bash includes optional excursions to some of the many attractions in the area, such as the Longhorn Caverns and Buchanan Lake. Yasme DXpeditioner Danny Weil, ex-VP2VB, is a regular guest. The DX Bash is usually held in early October; check the

DX newsletters for the exact date in 1994.

In addition to the pure-DX conventions there are often DX tracks and special events at amateur radio get-togethers. The ARRL National Convention usually has a wide variety of DX-related activities, including a DX breakfast. The Ham-Com in Houston, Texas in June has a fine DX program thanks to the efforts of the Texas DX Society. The Southeastern DX Club sponsors a DXPO each year, sometimes in conjunction with an area hamfest.

Whichever DX convention you decide to attend, you can be guaranteed a strong dose of DX energy and warm hospitality. These DX get-togethers provide unique opportunities to put faces and personalities to the names and callsigns you work on the air and read about in DX publications. You can get your QSLs checked for various awards, share antenna ideas, and brag about how you bagged the Peter I Island DXpedition on the first call. If you haven't tried a DX convention yet, you're in for a real treat. If you have attended one, you know what I mean. See you in Visalia, at Stouffers in Dayton, and maybe at another DX gathering in 1994.

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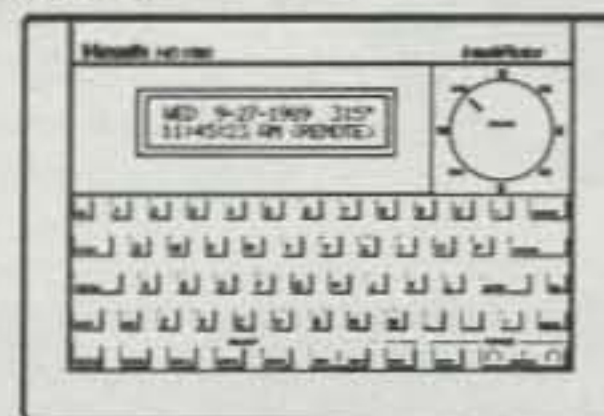
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CW

892.....9A2AA	894.....9A2AJ
893.....AI9W	

SSB Endorsements

320.....YV1AJ/329	320.....W7FP/325
320.....YV1KZ/329	320.....KS2I/323
320.....K9IW/329	320.....CE7ZK/321
320.....9A2AA/329	310.....KU9I/319
320.....WA4JTI/329	310.....IBIGS/318
320.....K6JG/329	310.....KB7VUJ/311
320.....WA6OET/329	300.....KA4RAW/309
320.....DL6KG/329	300.....W3YEY/304
320.....KD8V/329	275.....WN6J/281
320.....W4EEE/328	275.....KK4TR/279
320.....OZ3SK/328	275.....KC6AWX/277
320.....W0YDB/328	275.....VE2DRN/277
320.....K6LEB/327	150.....XE2JJP/179
320.....AA5NK/326	28 MHz.....K2YJL/M
320.....IK1GPG/326	28 MHz.....KC6AWX

CW Endorsements

320.....9A2AA/329	320.....KD8V/329
320.....K6LEB/329	320.....W0JLC/326
320.....K9JG/329	320.....AA5NK/320
320.....WA4JTI/325	320.....W1WAI/320

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.

News and Events

Dayton DX Dinner: The SouthWest Ohio DX Association is pleased to announce the Ninth Annual DX Dinner, which will be held on Friday, April 29, 1994 at the Stouffers Center Plaza Hotel in Dayton. There will be a cash bar at 6:30 PM with dinner at 7:15 PM. Tickets must be purchased in advance and are available from Scott Lehman, N9AG, P.O. Box 803, Greenville, OH 45331. Tickets are \$27. Please make your check payable to the SWODXA and include an SASE for ticket return. Seating is limited, so please order early. If you wish to sit as a group, it would be appreciated if you order as a group. All seats will be reserved. For further information, contact Scott Lehman, N9AG, at 513-548-6230 or Steve Bolia, N8BJQ, at 513-429-9954 (voice/FAX).

Unofficial Activities for HamVention 94: The North Coast Contesters and the Frankford Radio Club will be hosting the Contest Super Suite Thursday, Friday, and Saturday nights, April 28, 29, and 30. Located at the Stouffer Center Plaza Downtown Hotel Miami Room (2nd floor).

Large ballroom suite with cash bar. Room for 400 contesters and DXers.

The North Coast Contesters and the Frankford Radio Club and other contest clubs will host the 2nd Annual Contest Banquet on Saturday night, April 30. Seating is limited. For more information, send an SASE to North Coast Contesters, P.O. Box 59, New Bedford, PA 16140.

Also, *The DX Bulletin* will co-host a Hospitality Suite in the Judy Resnick Room on the top floor of Stouffers Friday and Saturday nights. More details nearer the Dayton HamVention.

Silent Key W6GC: Irv Emig, W6GC, passed away on December 21, 1993, at the age of 81. Irv was on the top of the Honor Roll, past president of the Southern California DX Club, and a fellow of the Radio Club of America. He was in charge of telecommunications for many manned and unmanned spaceflight missions to the moon, including Apollo missions 8 and 11. A Memorial Fund in his name has been established at the Don Wallace Museum, and contributions to that fund will be used for interior museum features, installations of exhibits, and related displays. Donations should be marked for the Irv Emig W6GC Memorial Fund, and sent to the Museum at 5746 Wildbrier Drive, Rancho Palos Verdes, CA 90274. The Museum is a 501 (c) (3) non-profit corporation, and contributions may be tax-deductible.

Peter I Island Fund-Raising

VP8SSI commemorative T-shirts are now available, with proceeds going to help fund the **Peter I Island** DXpedition. The 100% heavy cotton, US-made shirts are navy blue with a white VP8SSI logo, at a cost of \$15, including first-class postage. Sizes are adult S-XXL. Send orders to Tom Anderson, WW5L, 3505 Cliffwood Drive, Bedford, TX 76021-2043, or call 817-498-2820.

You can drink your coffee from the same mugs as the **3YPI** DXpeditioners! These black mugs feature a map of Antarctica, the 3YPI callsign, and "I Helped Make It Happen." The mugs are available for a donation of at least US\$20 from Robert Schmieder, KK6EK, 4295 Walnut Blvd., Walnut Creek, CA 94596. All donations over the cost of the mugs will be sent to AA6BB with a full accounting. Make checks payable to Robert Schmieder.

Upcoming DXpeditions

Holger Hannemann, DL7VTM, and other Germans will travel to Zambia 9J March 14 to April 6. Holger will use the call **9I2Z** and Lutz, DL7VLA, will operate as **9I2A**. Birgit (ex-Y58AO) will operate as **9I2M**. (These callsigns are an update from the

information published last month. The young German team will work 160-130 meters on CW, SSB, and the digital modes, plus the first satellite activity from Zambia. Their operation will be interrupted one week for a safari, but they plan an all-band effort in the CQ WPX SSB Contest March 26-27. QSL via DL7VRO.

Banaba Island T33: Mats Persson, SM7PKK, returns to Banaba Island (OC-018) accompanied by Philip Marsh, G4WFZ. They'll be there March 27 to April 5, including a late entry in the CQ WPX SSB test. Try the usual DX frequencies: 3505, 7005, and 25 kHz up on CW, and 3795, 14195, 21295, and 28495 kHz on SSB. On the new bands try the bottom of the subbands. The CW callsign is **T33KK** and the SSB call is **T33CS**. QSL **T33CS** to Philip at Orcheston Road 28, Bournemouth, BH8 8SR Dorset, Great Britain; and **T33KK** to Mats at Zenithgatan 24 #5, S-212 14 Malmö, Sweden.

QSL Notes

James, **9V1YC** (aka KB1CM), is having problems with mail directed to his Singapore post office box. Until these problems can be settled, QSL 9V1YC via Derek, AA5BT. AA5BT also handles cards for Trey, WN4KKN's contest activities, including KP2, ZP5, HC8N, HD9N, and V31RR.

QSL **ZF2VW & 6Y5/W7WY** via W7WY. QSL the October 12 and October 16-22 operations of special-event station **KP4/500** with control number given over the air and SASE, or SAE and US\$1 or one IRC, to Box 9369, Bayamon, PR 00960-8040.

QSL the ARRL 10 Meter Contest operation of **W3USS** (Capitol Hill Amateur Radio Society) via K8OQL, with SASE, please.

CR3W CQ WW CW contest contacts will be automatically confirmed via the DARC bureau. Do not send cards to the Portugal bureau.

Cards for **HS0AC** contacts after June 1, 1993 should go to Viroj Supapak, HS1HSJ, P.O. Box 7, Bangkok, 10220, Thailand. (KM1R was the former QSL manager.)

QSL **5K1R** contacts via Raul Gonzalez, HK1LDG, P.O. Box 6060, Barranquilla, Colombia.

QSL **ZP80A** via ZP5XHM, P.O. Box 512, Asuncion, Paraguay.

QSL **ZD8DEZ** via Dez Watson, G0DEZ, at 12 Chadwell Heights, Lichfield, Staffordshire, WS13 6BH, England, and *not* via the incorrect *Callbook* address.

QSL **4K1F** and **4K2BY** via Nikolai Komissarov, KF2KT, 714 4th Avenue, Brooklyn, NY 11232. (His *Callbook* address is incorrect.)

QSL **EZ5A, EZ5AA, EZ5DX, EZ5EZ, EZ5EA** via Tony Miller, W5BWA, 5812

Hiawatha Dr., Alexandria, LA 71301. These are the new callsigns of Victor, ex-UH8EA.

QSL the contest call **PV2A** direct to Ariosto R. de Souza, PT2BW, P.O. Box 03858, 70084-970 Brasilia DF, Brazil.

QSL **YJ8RN** contacts via Debbie Burton, N9DRU (not N9DRV as misprinted elsewhere), 1153 Union St., Marseilles, IL 61341-1710.

QSL the Croatian contest call **9A1A** via the Croatian Contest Club's new address: P.O. Box 108, 41001 Zagreb, Republic of Croatia. The following club members can also be QSLed via this address: 9A2s DQ, AW, MP, OG, KL, UA, RA, and club secretary 9A3RA.

QSL **T94KW** and **T96RNR** via Szabo Laszlo, HA0HW, P.O. Box 24, H-4151 Puspokladany, Hungary. Note that getting logs out of war-torn Bosnia-Herzegovina is very difficult, so expect some delays. He also handles the cards for **XU7UK**.

QSL **NH6MG/TG1** direct to David Stutz, Apdo #79, Huehuetenango, Guatemala, Central America, without any callsigns on the envelope. Dave says, "I will gladly return a card in exchange for a recent communications magazine which is donated to the local radio club." His *Callbook* address is no good.

QSL **1B/KU0J** via Igor Zdorov, 5980 Anna Ave., #308, Minneapolis, MN 55432. (His *Callbook* address is incorrect.)

The **VK9MM** cards are slowly coming out of Australia. A commemorative T-shirt is available from VK4CRR for US\$10, in large, extra large, or extra-extra large.

Gary, NM7G, reports that he has not received any logs from **Z21CA** for two years, and hence is unable to help with cards. He suggests trying directly to James Finch-Smiles, Private Bag T-5400, Bulawayo, Zimbabwe. No US\$1, but IRCs would be appropriate.

The QSL bureau of the **Moldavian** Amateur Radio League is managed by Valery Metaxa, ER1DA (ex-UO5ODA). Send cards to the bureau at P.O. Box 6637, Kishinev 277050, Republic of Moldova.

QSL **BZ4DHI, 3A/11YRL, 3A/11QOA,** and **3A/11ZB** via Luc Glarey, I1YRL, Via S. Martino 11, 10091 Alpignano, Italy.

QSL the Aland Island operations of **OH0LQK, OH0MEP, OH0MFP,** and **OH0MYD** via the OH3 bureau, or direct to P.O. Box 179, 33101 Tampere, Finland.

QSL the November 1993 operation of **S21ZX** via operator JA4ENL. He also has the logs for **V85NL, 9M8KT, HS5AID, V85SS,** and **VP8RX/RY.**

73, Chod, VP2ML

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Solar Cycle Progress

Sunspot cycle 22 continues its slow decline towards a minimum. The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a monthly mean sunspot level of 49 for December 1993. A daily high value of 82 was reported on December 25th, while the lowest number recorded was 8, which occurred on December 15th.

December's mean sunspot count results in a 12-month running smoothed sunspot number of 56 centered on June 1993. This is a drop of four numbers since the previous month's level.

According to daily observations made at Penticton, British Columbia by the Dominion Radio Astrophysical Observatory of Canada, the reported mean level of 10.7 cm solar flux for December 1993 was 105. This results in a smooth value of 111 centered on June 1993.

While solar flux levels and sunspot numbers are very closely interrelated, the solar flux measurement is less subjectively determined than is the sunspot count and more accurately represents levels of solar energy.

A smoothed sunspot number in the upper 30 range is forecast for April 1994. A corresponding 10.7 cm solar flux level of approximately 105 is expected for April 1994. The present sunspot cycle is expected to decline steadily until mid-1996 or early 1997, when it is expected to end with a minimum sunspot count of less than 10.

April DX Propagation

During April 20 meters should be the optimum band for DX propagation conditions during most of the daylight hours and into the evening hours as well. Considerably fewer openings are expected on 17 and 15 meters, but some fairly good DX should still be possible towards southern areas, especially during the late afternoon hours. Very few 10 and 12 meter DX openings are expected this month, but some should be possible from all USA time zones to South America and from the western states to the South Pacific. Be sure to check 10 and 12 meters when conditions are expected to be High or Above Normal.

After sunset optimum DX propagation conditions should be shared between 30

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LAST MINUTE FORECAST

Day-to-Day Conditions Expected for April 1994

Propagation Index.....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 12, 14, 23, 25	A	A	B	C
High Normal: 10, 13, 18, 20-21, 24, 26	A	B	C	C-D
Low Normal: 4-6, 9, 11, 16-17, 19, 22, 27-28	B	C	D	D-E
Below Normal: 1, 3, 8, 15, 30	C	C-D	D-E	E
Disturbed: 2, 7, 29	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 fair-to-poor (C-D) on April 1st, poor (D) on the 2nd, fair-to-poor again on the 3rd, fair (C) on the 4th through the 6th, etc.

and 40 meters. Good openings to many parts of the world are forecast for both bands between sunset and midnight, and on 40 meters from midnight to sunrise. Some fairly good 80 meter DX openings should also be possible during the hours of darkness and at sunrise, and there is a fairly good chance for an occasional DX opening on 160 meters during the same time period.

Seasonally favorable equinoctial propagation conditions over long paths between the northern and southern hemispheres—for example, to Australasia, South America, southern Africa, etc.—should continue during April on all HF bands.

Ionospheric absorption should continue to increase in the northern hemisphere during April as the sun rises higher in the northern sky. This should result in somewhat weaker DX signal levels during daytime openings, compared to the winter months. Static levels are also expected

to increase noticeably during April as thunderstorms become more numerous. This should result in higher noise levels, particularly on 40, 80, and 160 meters.

Short-Skip Propagation

For openings between 50 and 250 miles the best band should be 80 meters during the day and 160 meters at night. Between 250 and 750 miles, 40 meters should be best during the day, 80 meters for an hour or two after sunrise and again from sunset to midnight, and 160 meters from midnight to sunrise. For openings between 750 miles and the one-hop, short-skip limit of 2300 miles, use 20 meters during the day, 30 and 40 meters for an hour or so at sunrise and again from sunset to midnight, and 80 meters from midnight to sunrise. Look for 15 and 17 meter short-skip openings from about 10 AM to sundown, ranging between approximately 1300 and 2300 miles, although at times openings may be as short as 500 miles. There is also the possibility for some 10 and 12 meter short-skip openings during the daylight hours over similar distances.

The DX Propagation Charts in this month's column contain DX propagation predictions for each amateur band between 10 and 160 meters for the period April 15 through June 15, 1994. Beginning this month and continuing through the summer and fall, the times shown in the charts will be local daylight time (EDT, CDT, MDT, and PDT).

For more detailed predictions of short-skip openings between distances of 50 and 2300 miles, refer to the Short-Skip Charts, which appeared in last month's column.

A day-to-day forecast of general propagation conditions expected during April is given in the Last Minute Forecast, which appears at the beginning of this column.

VHF Ionospheric Openings

Chances for VHF ionospheric openings during April look pretty good. *Lyrids*, a major meteor shower, is due April 21-23. It should peak during the afternoon of April 22, when an average of 15 good-sized meteors are expected to enter the earth's atmosphere every hour. This should considerably increase the chances for VHF meteor-scatter-type openings.

Sporadic-E propagation normally be-



April, 1994

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Prof. Jerzy Ostermund-Tor in the facility bierstube of the Lauton Institute near Vienna, Austria. To his left is his protégé, Dr. Emil Heisseluft, and to his right is his granddaughter, Leni. (Photo by Bea)

gins to increase during April, and it should continue to do so through the spring and summer months. This should result in an increased number of short-skip openings on the 12, 10, and 6 meter bands. Most openings will fall between the 750 and 1300 mile range, but some may extend out to 2000 or more miles. During periods of intense sporadic-E ionization, openings on 2 meters may also be possible

over distances between about 1200 and 1400 miles. As its name infers, sporadic-E openings may occur at any time of the day or night, but there is a tendency for them to peak between 8 AM and noon and again between 5 and 9 PM local time.

Unusual ionospheric openings on the VHF bands can also occur during April from widespread auroral activity. The best times to check for such openings are dur-

ing periods of radio storminess on the HF bands. Check the Last Minute Forecast at the beginning of this column for those days during April that are expected to be Below Normal or Disturbed.

For the very patient, some trans-equatorial (TE) propagation maybe possible during April. This type of propagation tends to peak during the equinoctial seasons. Openings are most likely to occur between 8 and 11 PM local daylight time on long north-south paths which cross the geomagnetic equator at an approximate right angle. TE openings towards South America from the United States favor locations in the southern tier states and Caribbean area, but some openings may also be possible to more northerly locations. TE openings are more likely to occur on 10 and 6 meters. Openings can be expected to be very weak with considerable flutter fading.

Prof. Jerzy Ostermond-Tor Revisited

My recent visit with Prof. Jerzy Ostermond-Tor in Vienna has proven successful, and I am very glad to see that his protégé, Emil Heisseluft, has another thought-provoking article in this issue of CQ. Entitled "Ionospheric Propagation Possible on Mars," this exciting article bears the hallmark of the Lauton Institute,

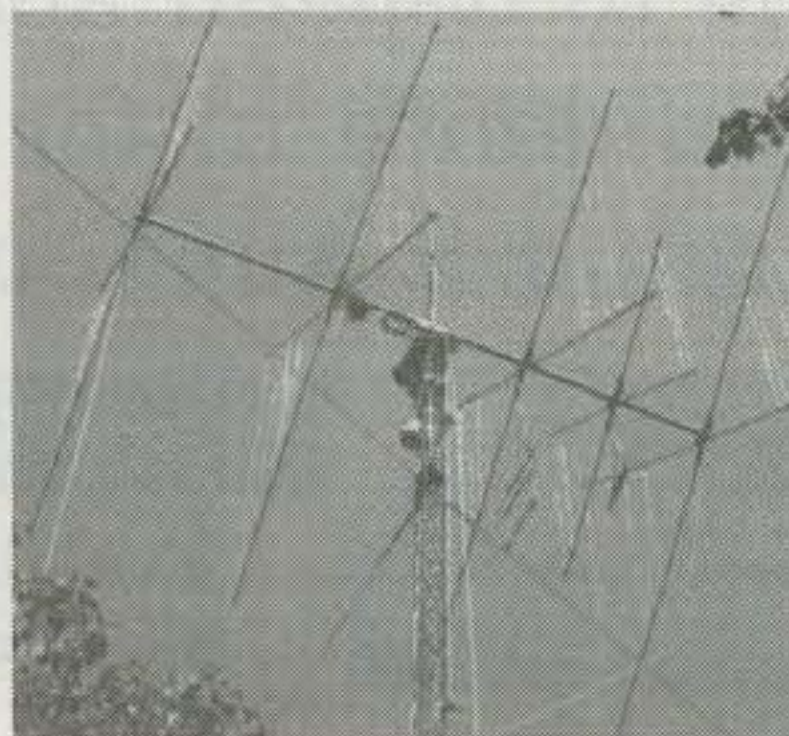
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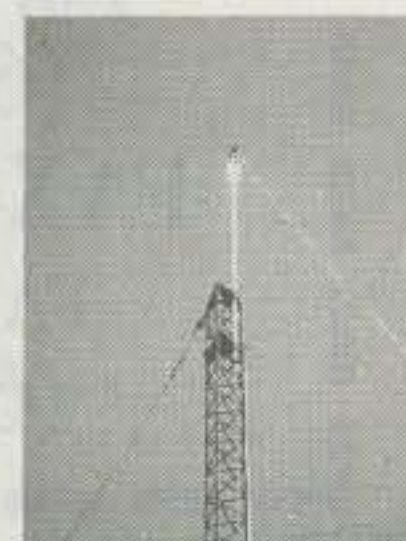
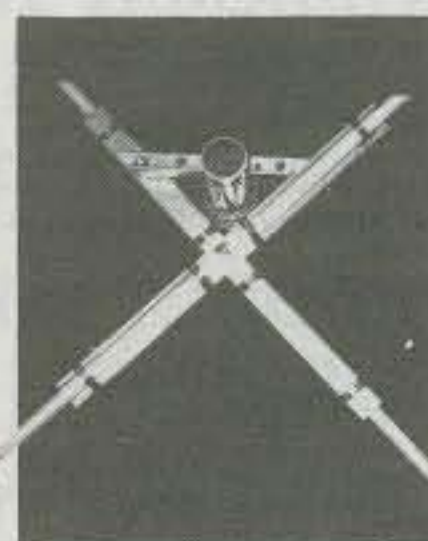
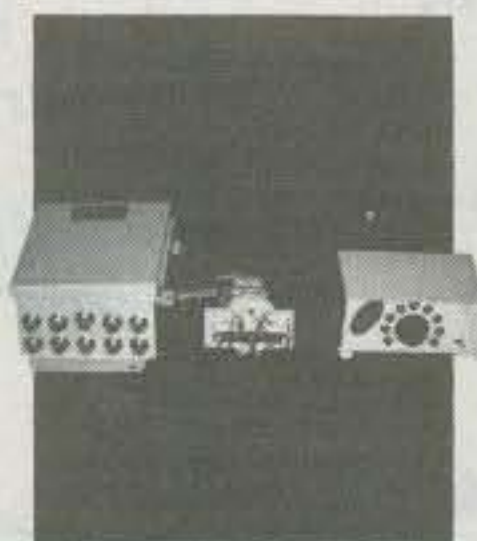


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HOW TO USE THE DX PROPAGATION CHARTS

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.

Far East	Nil	17-20 (1)	08-10 (1) 18-20 (1) 20-22 (2) 22-00 (1)	04-06 (1)
South Pacific & New Zealand	16-19 (1)	09-11 (1) 15-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-21 (1) 21-00 (2) 00-04 (1)	02-03 (1) 03-06 (2) 06-07 (1) 02-06 (1)*
Australasia	Nil	16-18 (1) 18-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 15-16 (1) 16-18 (2) 18-22 (1) 22-00 (2) 00-02 (1)	03-05 (1) 05-07 (2) 07-08 (1) 04-07 (1)*
Northern & Central South America	12-14 (1) 14-16 (2) 16-18 (1)	10-12 (1) 12-13 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	00-06 (1) 06-07 (2) 07-08 (3) 08-10 (4) 10-11 (3) 11-15 (2) 15-17 (3) 17-20 (4) 20-21 (3) 21-00 (2)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-07 (1) 21-02 (1)* 02-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	12-15 (1) 15-17 (2) 17-18 (1)	08-09 (1) 09-11 (2) 11-14 (1) 14-15 (2) 15-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-10 (1) 14-16 (1) 16-17 (2) 17-18 (3) 18-21 (4) 21-22 (3) 22-00 (2) 00-04 (1)	20-21 (1) 21-04 (2) 04-06 (1) 23-05 (1)*
McMurdo Sound, Antarctica	Nil	Nil	07-09 (1) 16-20 (1) 20-23 (2) 23-00 (1)	01-05 (1)

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	14-16 (1)	06-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-18 (2) 18-20 (1)	19-21 (1) 21-23 (2) 23-01 (1) 21-00 (1)*
Northern Europe & European USSR	Nil	Nil	06-07 (1) 07-09 (2) 09-14 (1) 14-17 (2) 17-23 (1)	20-00 (1)
Eastern Mediterranean & Middle East	Nil	Nil	07-09 (1) 13-15 (1) 15-18 (2) 18-19 (1) 22-00 (1)	20-00 (1)
West & Central Africa	Nil	12-14 (1) 14-16 (2) 16-17 (1)	07-09 (1) 12-15 (1) 15-17 (2) 17-20 (3) 20-21 (2) 21-23 (1)	20-01 (1)
East Africa	Nil	13-15 (1)	07-09 (1) 13-16 (1) 16-19 (2) 19-20 (1)	21-00 (1)
South Africa	Nil	09-11 (1) 11-14 (2) 14-15 (1)	14-16 (1) 16-19 (2) 19-22 (1)	20-22 (1) 22-00 (2) 00-01 (1)
Central & South Asia	Nil	17-20 (1)	07-10 (1) 17-19 (1) 19-21 (2) 21-22 (1)	05-07 (1) 19-21 (1)
Southeast Asia	Nil	Nil	07-10 (1) 19-22 (1)	05-07 (1)
Far East	Nil	18-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-20 (1) 20-22 (2) 22-00 (1)	03-07 (1)
South Pacific & New Zealand	15-17 (1)	11-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	16-19 (1) 19-22 (2) 22-00 (3) 00-04 (2) 04-07 (1) 07-09 (3) 09-10 (2) 10-12 (1)	00-02 (1) 02-06 (1) 06-07 (1) 02-06 (1)*

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April 15 - June 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	14-18 (1)	05-07 (1) 09-10 (2) 10-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	19-21 (1) 21-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Northern Europe & European USSR	Nil	14-17 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-16 (3) 16-18 (2) 18-22 (1)	19-20 (1) 20-23 (2) 23-01 (1) 20-00 (1)*
Eastern Mediterranean & Middle East	Nil	14-17 (1)	12-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
West & Central Africa	14-16 (1)	10-13 (1) 13-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	13-16 (1) 16-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-23 (1) 07-09 (1)	20-22 (1) 22-02 (2) 02-03 (1) 00-02 (1)*
East Africa	Nil	10-13 (1) 13-16 (2) 16-17 (1)	07-09 (1) 13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	21-01 (1)* 21-00 (1)*
South Africa	Nil	09-12 (1) 12-14 (2) 14-15 (1)	14-16 (1) 16-18 (2) 18-19 (3) 19-21 (1)	21-22 (1) 22-00 (2) 00-02 (1)
Central & South Asia	Nil	17-19 (1)	07-10 (1) 14-16 (1) 19-21 (1)	05-07 (1) 19-21 (1)
Southeast Asia	Nil	Nil	08-10 (1) 14-16 (1) 19-21 (1)	Nil

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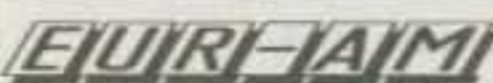
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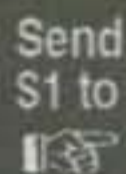
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Australia	Nil	16-18 (1) 18-21 (2) 21-22 (1)	07-08 (2) 08-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-21 (1) 21-22 (2) 22-00 (3) 00-02 (2) 02-07 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Northern & Central South America	11-13 (1) 13-16 (2) 16-18 (1)	09-11 (1) 11-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	00-06 (1) 06-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-20 (4) 20-22 (3) 22-00 (2)	19-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 21-23 (1)* 23-02 (2)* 02-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	12-15 (1) 15-17 (2) 17-18 (1)	08-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	07-09 (2) 09-10 (1) 14-16 (1) 16-18 (2) 18-19 (3) 19-21 (4) 21-23 (3) 23-01 (2) 01-07 (1)	21-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-05 (1) 00-04 (1)*
McMurdo Sound, Antarctica	Nil	15-18 (1)	07-09 (1) 16-18 (1) 18-21 (2) 21-23 (1)	00-06 (1)

Australasia	17-20 (1)	13-16 (1) 16-18 (2) 18-20 (3) 20-22 (2) 22-23 (1)	19-21 (1) 21-23 (2) 23-00 (3) 00-02 (4) 02-03 (3) 03-04 (2) 04-07 (1) 07-09 (2) 09-10 (1)	01-02 (1) 02-04 (2) 04-06 (3) 06-08 (1) 02-03 (1)* 03-05 (2)* 05-06 (1)*
Northern & Central South America	11-14 (1) 14-16 (2) 16-17 (1)	09-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-06 (2) 06-09 (3) 09-15 (2) 15-17 (3) 17-20 (4) 20-21 (3) 21-00 (2) 00-05 (1)	19-20 (1) 20-21 (2) 21-02 (3) 02-04 (2) 04-06 (1) 21-00 (1)* 00-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	13-17 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	05-06 (1) 06-08 (2) 08-09 (1) 13-15 (1) 15-17 (2) 17-18 (3) 18-21 (4) 21-22 (3) 22-00 (2) 00-02 (1)	20-22 (1) 22-01 (2) 01-03 (1) 21-01 (1)*
Antarctica	Nil	16-19 (1)	07-08 (1) 16-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-00 (1)	03-06 (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.

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	Nil	06-08 (1) 08-10 (2) 10-13 (1) 13-16 (2) 16-19 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Central & Northern Europe & European USSR	Nil	Nil	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 22-00 (1)	20-23 (1)
Eastern Mediterranean & Middle East	Nil	Nil	07-09 (1) 13-15 (1) 18-19 (1) 19-21 (2) 21-22 (1)	20-23 (1)
West & Central Africa	Nil	11-15 (1)	06-08 (1) 12-15 (1) 15-16 (2) 16-17 (3) 17-19 (2) 19-21 (1)	20-23 (1)
East Africa	Nil	12-14 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (1)	20-22 (1)
South Africa	Nil	10-13 (1)	06-08 (1) 13-14 (1) 14-16 (2) 16-17 (1) 22-00 (1)	19-22 (1) 20-22 (1)*
Central & South Asia	Nil	19-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	04-07 (1)
Southeast Asia	Nil	19-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 22-23 (1) 23-00 (2) 00-02 (1)	04-07 (1)
Far East	Nil	20-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 19-22 (1) 22-00 (2) 00-02 (1)	02-03 (1) 03-06 (2) 06-08 (1) 03-07 (1)*
South Pacific & New Zealand	14-16 (1) 16-19 (2) 19-20 (1)	11-13 (1) 13-16 (2) 16-21 (3) 21-22 (2) 22-23 (1)	04-08 (1) 08-11 (2) 11-17 (1) 17-20 (2) 20-21 (3) 21-00 (4) 00-01 (3) 01-04 (2)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 01-02 (1)* 02-05 (2)* 05-06 (1)*

world famous for its propagation research studies.

Old-time readers of CQ will certainly recognize the name of the famous Professor Jerzy Ostermond-Tor. Holder of the Distinguished Order of Scientific Effort (D.O.S.E.) and pre-war radio amateur YM4XR, he was a regular contributor to CQ between 1964 and 1970. I had the great pleasure of visiting briefly with the good professor at his home in Austria this past fall.

For those readers who do not remember Prof. Tor, or are too young to have read his articles, I would like to review them briefly. All of Dr. Ostermond-Tor's articles in CQ made scientific history! His initial article appearing in 1964 was entitled "Ionospheric Amplification." In it he explained a unique characteristic of the ionosphere, which he is credited with discovering, and which makes it possible to obtain greater amplification with very low power levels rather than with higher power. This initiated the trend back to the lower power levels so very much evident on the HF amateur bands. More radio amateurs are now making more contacts than ever before as a result of Dr. Tor's experiments with ionospheric amplification.

Who can ever forget his 1965 article entitled "Developing a DX Voice"? The amateur bands were filled with those practicing the voice exercises proposed by Dr. Tor for improving power and intelligibility, producing signal gains equivalent to approximately 10 dB, at no cost for any additional voice processing equipment.

His 1966 article entitled "MEMTAC—A New Method of Communications" was of particular interest. MEMTAC, which stands for "modulation of the earth's magnetic field to affect communications," resulted from Tor's experiments with the earth's magnetic field as a long-distance carrier of modulation. He successfully excited the field with a 50 watt magnetic modulator that he developed. Tor theorized that the magnetic lines would unlock stored energy in a chain reaction to propagate the modulation impressed by the amplifier over great distances.

In articles appearing in 1967 and 1968 Dr. Ostermond-Tor foresaw what is now computer E-Mail. In a two-part article entitled "Special Subscriber Service: The Telephone Company's Answer to Amateur Radio" he prophetically described a computerized system which would someday compete with amateur radio for communicating worldwide, but would not require any technical background, Morse code, or license.

A 1969 article was written by Dr. Ostermond-Tor's professional colleague and protégé Dr. Emil Heisseluft of Austria's Lauton Institute. The article was devoted to the Distinguished Order of Scientific Effort (D.O.S.E.) award bestowed upon Prof. Ostermond-Tor "for his outstanding contributions to the furtherance of the science of telecommunications." The D.O.S.E. award is one of the world's most prized scientific awards, and to this date Tor is the only radio amateur ever to receive it.

Dr. Tor's final article for CQ appeared in 1970. Entitled "SAPS . . . A Submerged Antenna Propagation System For Enhancing DX," Tor and a French associate described an underwater antenna-propagation system which enhances considerably the propagation of radio waves through water.

Austrian Reunion

This summary of the articles written for CQ by Prof. Ostermond-Tor is to introduce the younger readers to the invaluable contributions that Tor has made to the field of telecommunications and to amateur radio in particular. This should explain my excitement at being able to meet with Tor in the beautiful Austrian town of Grossmaul-an-der Donau, near Vienna, this past fall.

Tor retired in 1971 and returned to his native Austria as a part-time lecturer to graduate students at the Lauton Institute.

While Prof. Tor celebrated his 85th birthday this past summer, he is in good health and in good spirits. He holds several special seminars a year, where he still lectures on telecommunications. He asked me to personally extend his 73s to readers of CQ.

73, George, W3ASK

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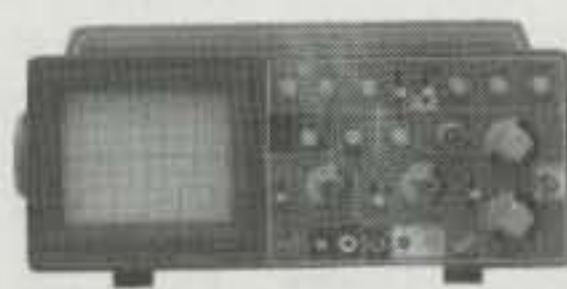
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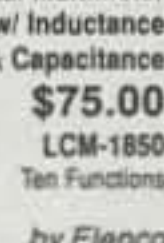
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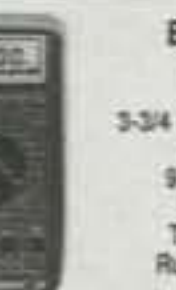
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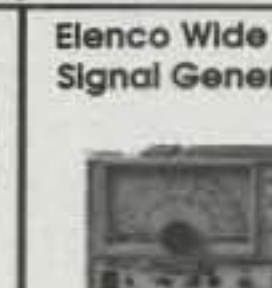
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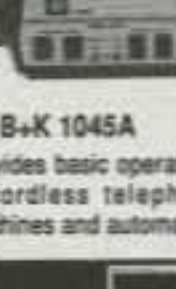
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REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

Letters From The Mailbag

We have been stacking up your letters for some time now. This month let's answer a few of them.

Q. When and how do I apply for an amateur radio callsign that I want? . . . C.E., Rochester, MN

A. We have gotten a ton of mail on this one! The last time we got anywhere near the volume of mail on a single subject was during the no-code license proposal of 1990.

The availability of special amateur radio station callsigns really came as a surprise to everyone—the FCC included. They had been saying for years that they simply could not afford the resources necessary to administer such a program. That was until Congress added a provision for "vanity" amateur radio callsigns at a cost of \$7.00 a year. The FCC does not actually get the funds. They will be allowed an unofficial budget credit equal to the amount of the income, however. The legislation was signed into law on August 10, 1993 as part of the Clinton administration's much publicized 1993 Budget Reconciliation Act.

The FCC released to the amateur community last December their proposal on how they envisioned the special callsign program would work. They asked for public comment. While the final decisions still has not been made, it appears that:

(a) New amateurs will first be issued a regular callsign from the sequential group callsign list for their license class. There is no charge for a "regular" callsign and no one will be compelled to order a special callsign.

(b) Amateurs (including trustees of club stations) who already have station callsigns will use new FCC Form 610-V (for "Vanity") to select up to ten callsigns in order of choice. The first available callsign will be assigned. The application form is not yet available, but should be shortly. (We will have them, and if you send us a large SASE we will forward one to you. See address below.) RACES and military recreation stations are not eligible for vanity callsigns.

(c) All expired amateur station callsigns may be reinstated during a two-year

grace period. Therefore, a lapsed call sign is not available to the vanity callsign system for two years following expiration of the license. Callsigns of deceased licensees are available for reassignment two years following death. "Vacated" callsigns—those voluntarily given up—are immediately available for reassignment.

(d) The cost of a special user-selected callsign will be \$70.00 for a ten-year term. The \$70.00 fee and 610-V application must be sent to a special address, not the FCC's Gettysburg, Pennsylvania licensing facility.

(e) Requests for license modification (upgrades to a higher class, and sequential callsign, name, or address changes) by amateurs holding vanity callsigns will carry the original expiration date. That is, the applicant will not be granted a new ten-year term as in the case of amateur's holding a regular sequentially issued callsign.

(f) The ham-selected vanity callsign will not be a secondary callsign. Once a special station callsign is issued, the amateur's previous callsign must be permanently relinquished.

(g) Station callsigns may only be chosen from callsign "groups" corresponding to the amateurs license class or a lower class. In other words, a Group "A" callsign (1-by-2, 2-by-1, and certain 2-by-2 formats) could only go to an amateur holding an Extra Class ticket.

(h) Amateurs holding a vanity callsign may apply for a no-charge "sequential" callsign simply by completing the regular FCC Form 610. Their previous vanity callsign is immediately available for reassignment.

Still to be resolved is exactly when the vanity callsign system will go into effect. Ralph Haller, Chief of the FCC's Private Radio Bureau, believes that it could happen within the next few months. At a speech given at Miami's Tropical Ham-boree in February, Haller said, "During mid to late summer, some of you will hopefully be able to order specific callsigns of choice." That is not very far away!

The FCC did not propose or request comments on a "phase in" program of vanity callsigns. The American Radio Relay League strongly believes, however, that there should be a series of four three-month windows before opening the system to all. The ARRL feels that previously

held callsigns—regardless of license class, format, or call district—should be available first. The second, third, and fourth windows would be by license class to Extra Class, then Advanced, and then General. At the end of one year any licensed amateur would be eligible for any call within his call area and license class blocks, or a lower class block. The ARRL feels that the fee should be a one-time occurrence, and should be refunded if none of the callsigns on the application are available. Calls should be held for two years after expiration or trade-in, and should not be transferable; the ARRL thinks these measures should help preclude "trafficking" in callsigns. It remains to be seen if the FCC goes along with these ideas. It shouldn't take long, and we understand that the vanity callsign matter is on the "fast track."

Q. I am confused by all the changes going on in the commercial radio operator program. . . G. L., Columbus, Ohio

A. Join the crowd! The FCC's commercial radio licensing program has been undergoing complete remodeling! Some of the changes are caused by the same legislation that made vanity amateur callsigns available. Effective April 1 there will be two charges for applicants being administered commercial radiotelephone and telegraph operator examinations; an Examination and a Regulatory Fee. Applicants renewing their commercial radio licenses will also be assessed two charges, although not the same two. They must pay a Regulatory and an Application Fee.

The first fee is an testing charge established by the COLEM, a Commercial Operator License Examination Manager. A COLEM is commercial radio's version of the amateur service's VEC (Volunteer Examiner Coordinator). There are nine COLEM organizations and their exam fees ranges vary from \$25.00 to \$120.00.

The Regulatory Fee is designed to assist the Commission in recovering the costs associated with government radio regulation and enforcement. Like vanity amateur station callsigns, this fee is also based on \$7.00 per year. A five-year term commercial license carries an additional \$35.00 charge. The General Radiotelephone Operator License (GROL) and Restricted Radiotelephone Operator Permit (RP) are lifetime licenses and their regu-

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Technician	Element 3(A)	June 30, 1997	295
General	Element 3(B)	June 30, 1994	285
Advanced	Element 4(A)	June 30, 1995	501
Extra Class	Element 4(B)	June 30, 1996	436

Table I—Written examination element expiration dates. All question pools are released into the public domain six months before they are used by volunteer examination teams. This is to allow time for license preparation publishers to get their study material on bookstore shelves.

latory fees were still unknown at press time.

The third fee, called an Application Fee, is only collected on renewal, duplicate, and replacement licenses. This charge reimburses the government for the costs involved in the administrative processing of radio licenses. Examination fees are paid to the COLEM; regulatory and administrative fees go to a special address in Pittsburgh, Pennsylvania.

Two new commercial radio operator licenses are just now coming on line. The GMDSS (Global Maritime Distress and Safety System) Operator's and Maintainer's License will eventually replace the commercial radiotelegraph licenses. The GMDSS is a new satellite-based marine emergency alerting system.

Q. Where do I get the new FCC Form 610, Application for Amateur Operator/Primary Station License? . . . R.S., Mt. Prospect, IL

A. The FCC Form 610 has been revised and is quite different from previous editions. The new version, dated November 1993, may be ordered from the FCC Forms Distribution Center at 202-632-3676, or just send an SASE to us and we will send you one. The new form reflects recent changes in the Amateur Rules.

As of March 1, 1994 only the November 1993 edition of the FCC Form 610 may be used to obtain a new, renewed, modified, or upgraded amateur license. Earlier editions of the form received after March 1, 1994 will delay issuance of the license, as the application will be returned by the FCC without action. The applicant will be required to refile on the current form. The FCC forwarded quantities of the new form to VE examination teams during February, so your local testing team should also have the new 610.

This marks the first time the FCC would not accept a previous Form 610 application form. The reason for this is the previous form is not compatible with the FCC's new computer processing system that is just now coming on line.

While we are on the subject of amateur operator/station applications, have you checked the expiration date on your amateur operator license? The FCC went to ten-year term tickets on January 1, 1984 and 1984 issued licenses must now be renewed!

Q. How do I know if I am studying the right questions for the amateur examinations? . . . T.G., Sandy City, UT

A. There are five different question sets—one each for the Novice, Technician, General, Advanced, and Amateur Extra Class. Most—but not all—study material will contain the question set expiration date on the cover. If it doesn't, don't buy it! Table I contains a list of the expiration dates on the current pools.

A new General Class question pool was released by the VEC's Question Pool Committee (QPC) on December 1, 1993. These questions will not be used in examinations, however, until after July 1, 1994. A copy of any question pool, complete with all multiple choices and correct answer identified, is available from The W5YI Group, P.O. Box 565101, Dallas, Texas 75356. Cost is \$3.00 each post-paid.

The QPC does not change or add any questions to any pool in between the regularly scheduled revision dates, which is every four years on a staggered schedule. They merely delete outdated questions that have been made inaccurate due to rule or technology changes. This ensures that the applicant will not be asked questions which are not part of study material already in the publishing marketplace.

Q. What is all this I hear about amateurs being impacted by new restrictive RF radiation rules? . . . W.B., Northampton, MA

A. The possible biological dangers caused by radio-frequency radiation is a very controversial and complex subject. High intensities of RF energy can be harmful, since they can heat biological tissue. This is the principle by which microwave ovens cook food. The extent of the heating depends upon several factors, including frequency, intensity of the radiation, and the duration of exposure. Although never proven, some scientists also believe that low levels of RF radiation—even fields created by electrical power lines and home appliances—use "non-thermal effects" such as immune system, behavioral, and neurological disorders, and even cancer.

As a general rule, however, environmental levels of RF radiation encountered by the public are far below the levels con-

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sidered to be dangerous. There are workplace situations, however, where RF safety standards are exceeded. Maximum absorption of RF energy by humans takes place when the frequency of the radiation is between 30 and 300 MHz. The amateur 6 and 2 meter bands fall in this range. There is disagreement over what levels of RF radiation are safe, particularly with regard to low levels of exposure.

While the FCC licenses radio stations that use RF radiation, it does not have primary responsibility in the area of adverse health or environmental consequences caused by RF exposure. That responsibility belongs to the U.S. Food and Drug Administration (FDA), the U.S. Environmental Protection Agency (EPA), and the Occupational Safety and Health Administration (OSHA), but primarily the EPA. So far these agencies have declined to develop national RF exposure guidelines.

The present *de facto* safety standard recognized by the federal government is based on a 1982 recommendation by the American National Standards Institute (ANSI), a non-government organization that develops standards. It was adopted as the FCC RF exposure safety standard in 1985 because it was considered to be widely accepted and technically supportable. These guidelines apply to non-occupational as well as occupational expo-

sures and exclude radiating devices with input powers of 7 watts or less that operate between 300 kHz and 1000 MHz.

A new 1992 joint ANSI/IEEE recommendation has now been proposed by the FCC as their standard for RF exposure. It is more restrictive and:

1. Specifies two sets of exposure recommendations, one for "controlled environments" (usually involving workers) and another for "uncontrolled environments" usually involving the general public. Amateur radio operators are involved in both controlled and uncontrolled environments since they "... are knowingly and willingly exposed" and their residential neighbors "... are inadvertently exposed" to nearby amateur transmitters.

2. Expands the covered frequencies from 3 kHz to 300 GHz (every amateur band!).

3. Does not exclude low-power (7 watts and under input power) hand-held devices operating between 300 kHz and 1 GHz. The 1992 guidelines would reduce this power exclusion significantly for devices that operate in uncontrolled environments and for devices that operate on frequencies above 450 MHz in controlled environments. There are further restrictions when the antenna is operated close to the body.

4. New restrictions are placed on cur-

rents induced in the human body by RF fields below 100 MHz.

5. The new proposed rules eliminate the categorical exemption for radio amateurs, which could result in amateurs having to prove that their transmissions do not expose anyone to RF radiation in excess of the 1992 ANSI guidelines.

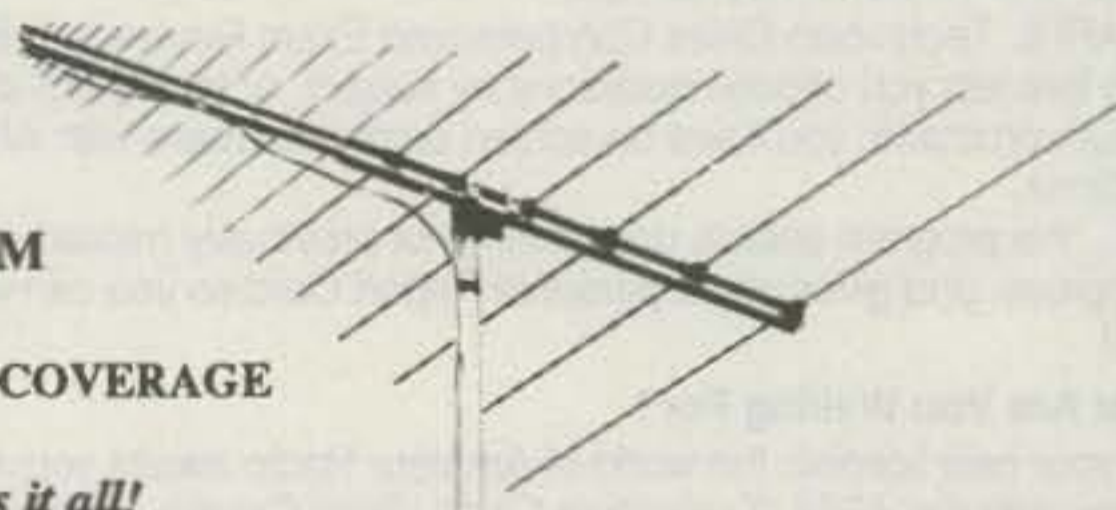
It remains to be seen just what the impact of the new RF safety standard will be on amateur radio operators who radiate energy in residential neighborhoods and operate VHF/UHF handheld transceivers with antennas close to the head. (We have even seen amateurs "wearing" their antennas on their heads, a dangerous practice!)

If adopted in its most stringent form, the new rules could result in enormous costs for amateurs. The FCC could even approve rules regulating the circumstances under which mobile, indoor, outdoor, attic-mounted or even handheld antennas could be used by amateurs.

The FCC feels compelled to adopt the new 1992 ANSI standard due to the growing amount of medical evidence (and media coverage) that indicates electromagnetic fields pose certain health hazards. It will be several months before the Commission makes a final decision in the matter.

73, Fred, W5YI

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CIRCLE 86 ON READER SERVICE CARD

Announcements

(from page 6)

Contact Preston P. Ipock, N4SHI, 1026 Calloway Avenue, Chesapeake, VA 23324 (804-543-4610). (Exams.)

Apr. 2, **LARCFEST**, Boulder County Fairgrounds, Longmont, Colorado. Contact Randy Stevens, N0NMD, 5280 Cypress Dr., Boulder, CO 80303 (303-499-1106). (Exams 1 PM.)

Apr. 2, **Columbus, Indiana ARC Hamfest**, Bartholomew County 4-H Fairgrounds, Columbus, Indiana. Contact Marion Winterberg, WD9HTN, 11941 W. Sawmill Rd., Columbus, IN 47201 (812-342-4670).

Apr. 9, **Rochester Area Hamfest, Computer & Electronic Show**, John Adams Junior High School, Rochester, Minnesota. Contact Rochester ARC, Colleen Vaneps, N0ZDY, 707 11-1/2 St. SW, Rochester, MN 55902 (507-280-9102).

Apr. 9, **Lawton Ft. Sill, Oklahoma ARC Hamfest**, Comanche County Fairgrounds, Lawton, Oklahoma. Contact Bob Morford, KA5YED, 1415 NW 33rd St., Lawton, OK 73505 (405-355-6120). (Exams, DXCC field checking.)

Apr. 9, **Lake Region ARC Hamfest**, Hockey Arena, Otter Tail County Fairgrounds, Fergus falls, Minnesota. Contact Keith McKay, N0FKF, Rt. 1 Box 46, Battle Lake, MN 56515 (218-826-6274). (Exams.)

Apr. 9, **1994 Ontario (Pickering) Durham Region Amateur Radio Hamfest**, Metro East Trade Centre, east of Toronto Hwy 401 and Brock Road, Canada. Contact South Pickering ARC, P.O. Box 53, Pickering, Ontario, L1W 1C2 Canada.

Apr. 10, **Penn-Del ARC Hamfest**, Nur Temple, New Castle, Delaware. Call 302-798-7270. (Exams with registration at 9 AM.)

Apr. 10, **Radio Central ARC Ham Radio & Electronics Auction**, Suffolk Community College, Selden, Long Island, New York. Contact John Mark, KB2QQ, 516-689-6343, or Emil Tillona, KD1F, 516-696-0610.

Apr. 10, **HAMCOMP 94 Fleamarket**, Trenton State College, Trenton, New Jersey. Contact HAMCOMP 94, P.O. Box 7024, West Trenton, NJ 08628, or call 609-882-2240. (Handicapped parking, wheelchair accessible.)

Apr. 10, **Madison, Wisconsin Swapfest**, Dane County Exposition Center Forum Building, Madison, Wisconsin. Contact Madison Area Repeater Assn., P.O. Box 8890, Madison, WI 53708-8890, or call Jim Waldorf, KB9AQQ, 608-249-7579.

Apr. 15-17, **1994 Visalia International DX Convention**, Holiday Inn-Plaza Park, Visalia, California. Contact Don Bostrom, N6IC, 4447 Atoll Ave., Sherman Oaks, CA 91423 (818-784-2590 evenings).

Apr. 16, **Joplin, Missouri ARC Hamfest 94**, John Q. Hammons Trade Center, Joplin, Missouri. Contact JARC, P.O. Box 2983, Joplin, MO 64803, or call 417-623-3610 (days), 417-782-5848 (evenings). (Exams.)

Apr. 16, **Old Natchez ARC Hamfest**, Natchez Convention Center, Natchez, Mississippi. Contact K5SVC, 601-442-0973, or N5YCY, P.O. Box 604, Natchez, MS 39121. (Exams.)

Apr. 16, **Oak Ridge Hamfest**, National Guard Armory, Clinton, Tennessee. Contact Gene Muncy, KB4UMM, Rt. 5 Pine Cir., Clinton, TN 37716 (615-435-1588). (Exams 10 AM. Must preregister before Apr. 15; send check for \$5.75 payable to WCARS/VEC, copy of license and 610 form to Ray Adams, N4BAQ, 4325 Felty Dr., Knoxville, TN 37918.)

Apr. 16, **Joplin, Missouri Hamfest**, John Q. Hammons Trade Center, Joplin, Missouri. Contact Andy Gabbert, KA0TUD, 417-673-8371.

Apr. 16, **S.M.A.R.T. Swapfest**, Goochland County Fairgrounds, Goochland, Virginia. Contact Buddy Travis, KA4NNN, Rt. 4 Box 36-B, Louisa, VA 23093 (703-894-0406).

Apr. 16-17, **Trenton Computer Festival**, Mercer County College, West Windsor, New Jersey. Contact Keith Sproul, WU2Z, 908-563-5389. (Exams both days.)

Apr. 17, **MIT Tailgate Electronics, Computer, Amateur Radio Fleamarket**, Albany and Main St., Cambridge, Massachusetts. Call 617-253-3776.

Apr. 17, **Sullivan, Illinois Hamfest**, 4-H Fairgrounds, 4 miles east of Sullivan, Illinois, on Cadwell

Rd. Contact Moultrie Amateur Radio Klub, P.O. Box 91, Lovington, IL 61937, or call 217-234-3283, Dave Duggins, KF9NB. (Exams on registration basis from 9 AM to 12 PM.)

Apr. 17, **Raleigh NC ARS Hamfest, NCS Convention & Computer Fair**, Jim Graham Bldg., NCS Fairgrounds, Raleigh, North Carolina. Contact Rollin Ransom, NF4P, 1421 Parks Village Rd., Zebulon, NC 27597 (919-269-4406). (Wheelchair accessible; exams preregistration AA4MY 919-847-8512.)

Apr. 23-24, **ARRL West Texas Section Convention & Hamfest**, Abilene Civic Center, Abilene, Texas. Contact Peg Richard, KA4UPA, 1442 Lakeside Drive, Abilene, TX 79602 (915-672-8889). (Wheelchair accessible; exams.)

Apr. 29, **SW Ohio Chapter QCWA Annual Banquet**, 7 PM, Alex's Continental Restaurant, Dayton, Ohio. For tickets (\$15 each, check payable

to Robert Dingle) send to Robert Dingle, KA4LAU, 1117 Big Hill Rd., Kettering, OH 45429-1201.

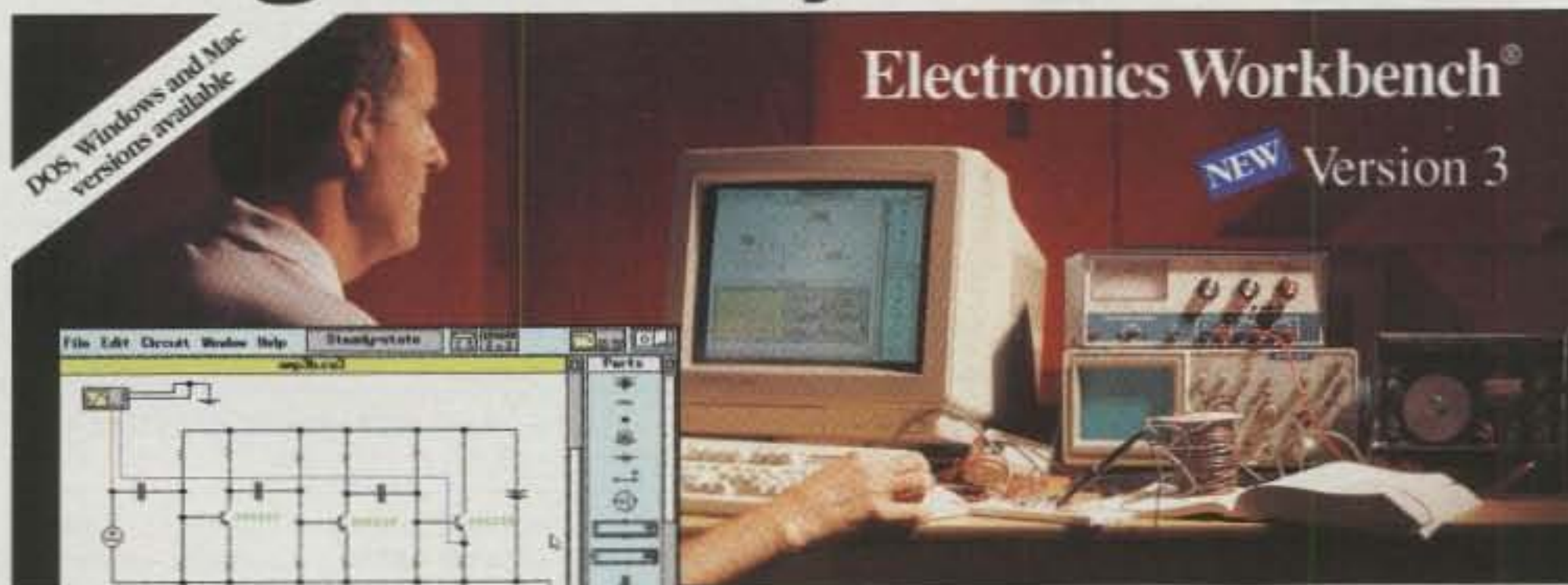
Apr. 29-30, May 1, **Dayton HamVention**, Hara Arena, Dayton, Ohio. Call 513-276-6930. (Exams Sat. & Sun. only; preregister: Exam Registration, 708 Mapleside Dr., Trotwood, OH 45426.

Apr. 30, **Talladega Radio Amateur Club Hamfest**, Craig Smith Community Center, Sylacauga, Alabama. Contact Jim, KD4BHH, 205-245-7825. (Exams 8 AM, walk-ins okay.)

Apr. 30, **Valley of the Moon ARC Hamfest**, Sonoma Veteran's Memorial Bldg., Sonoma, California. Contact Darrel, WD6BOR, 707-996-4494. (Exams, walk-ins okay, registration begins 10 AM, testing at 11 AM.)

May 1, **Bicycle Mobile Hams of America Forum**, Dayton HamVention, Hara Arena, Dayton, Ohio. Contact BMHA, Box 4009-T, Boulder, CO 80306.

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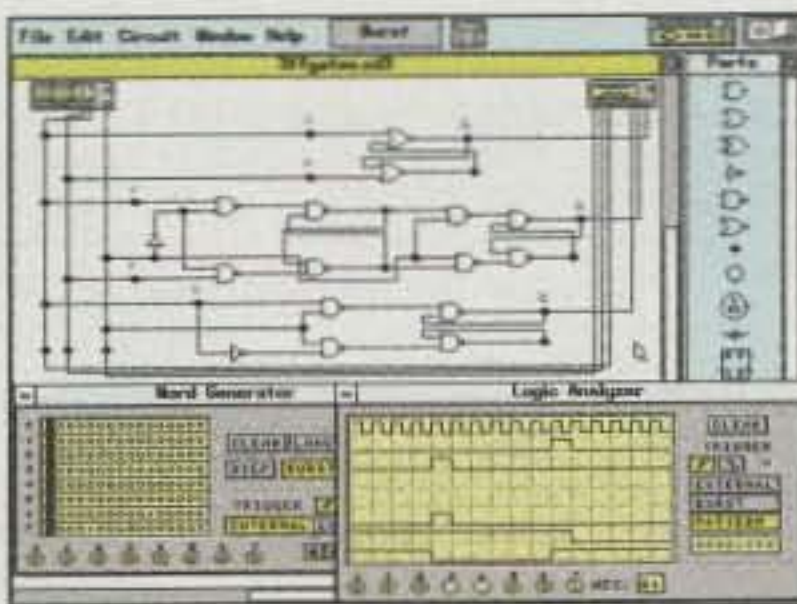


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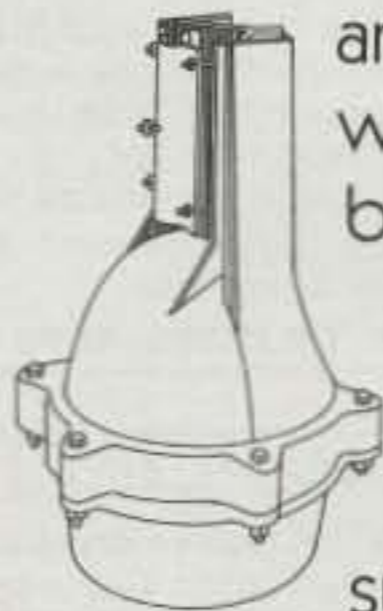
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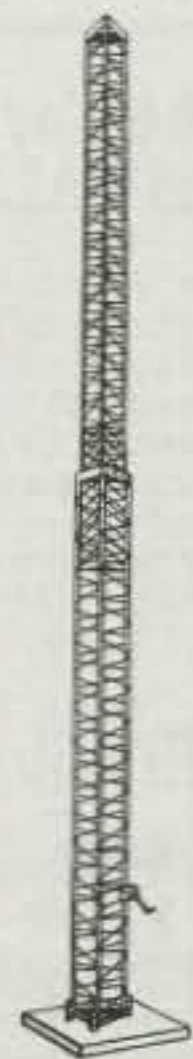
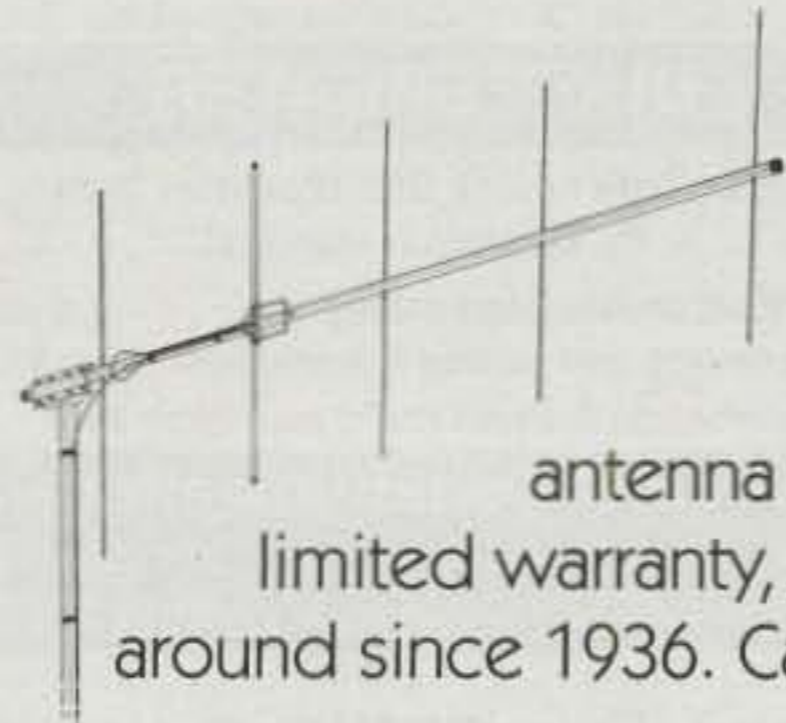


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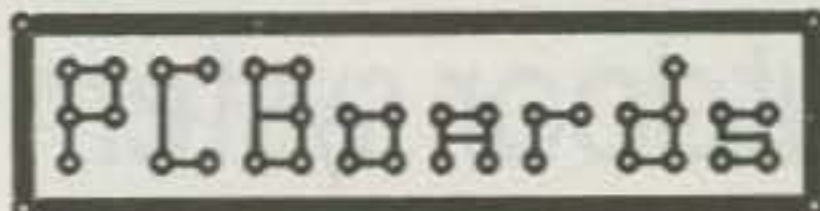
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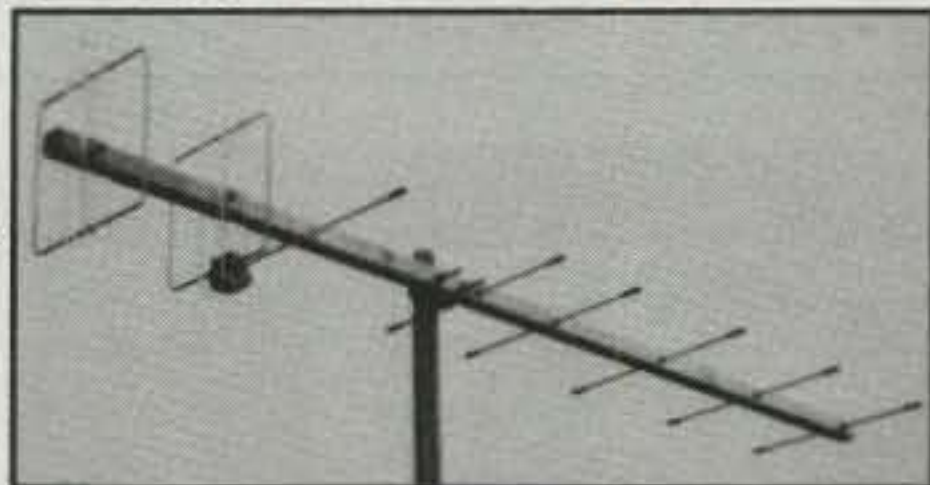
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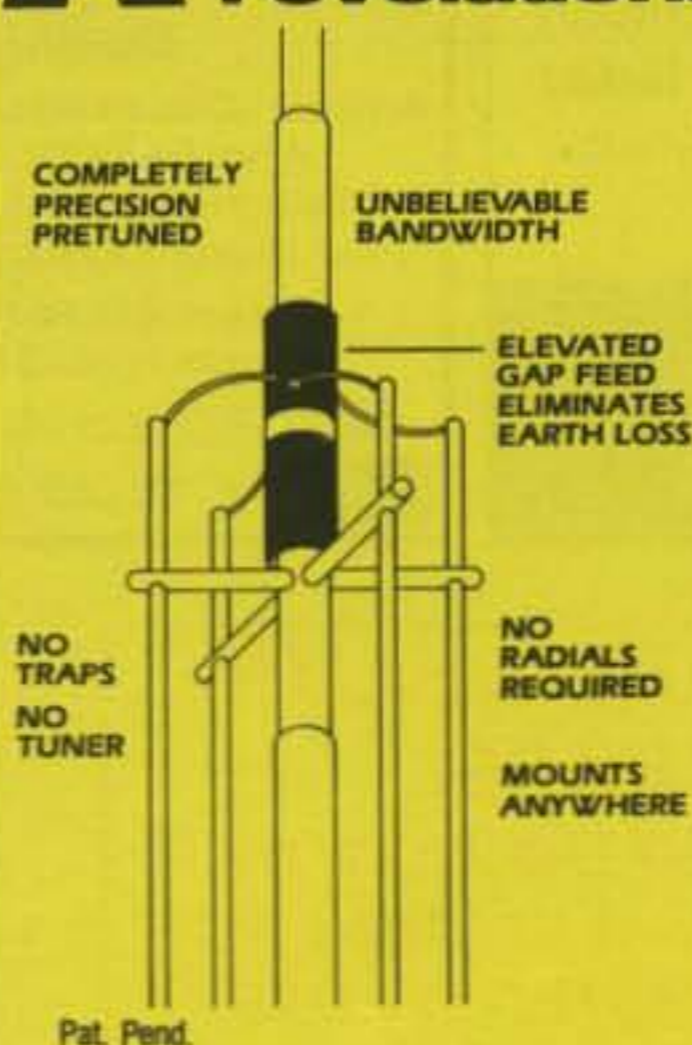
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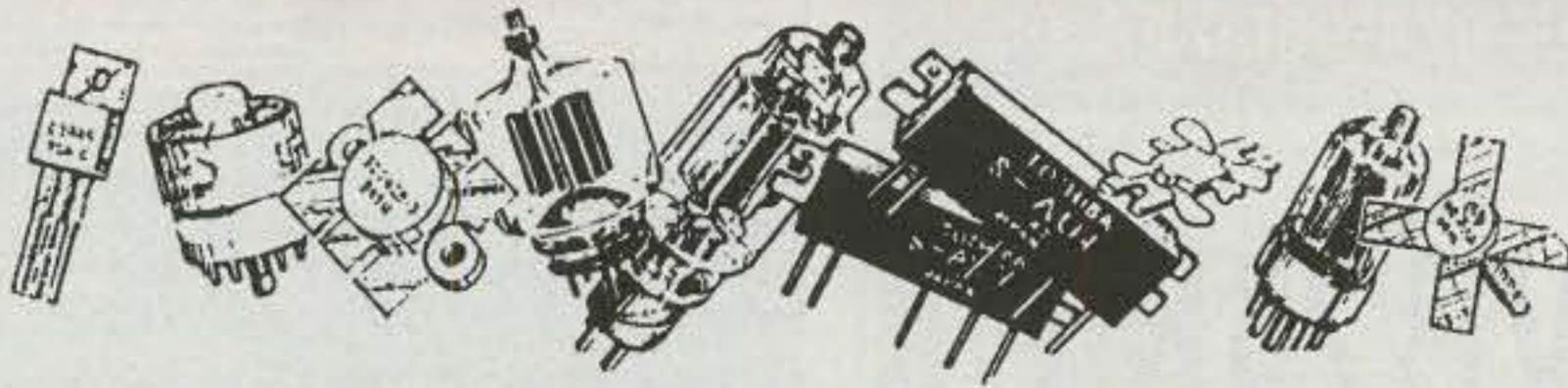
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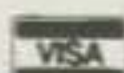
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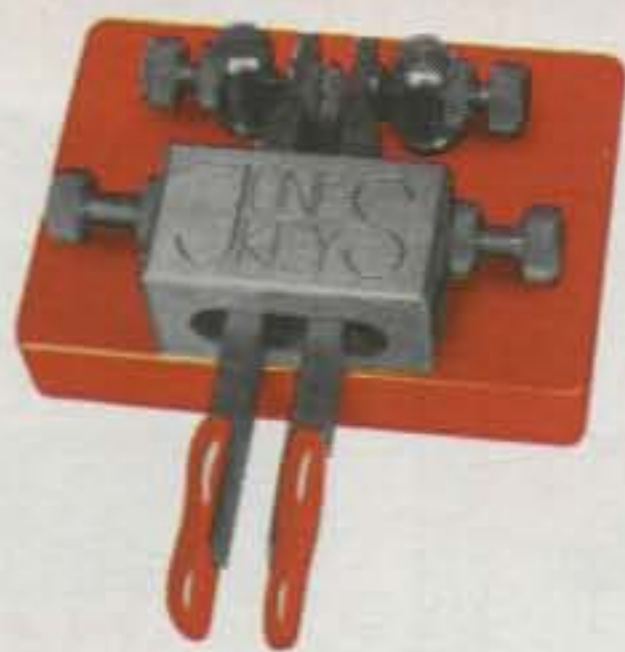


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"Yaesu did it again!"

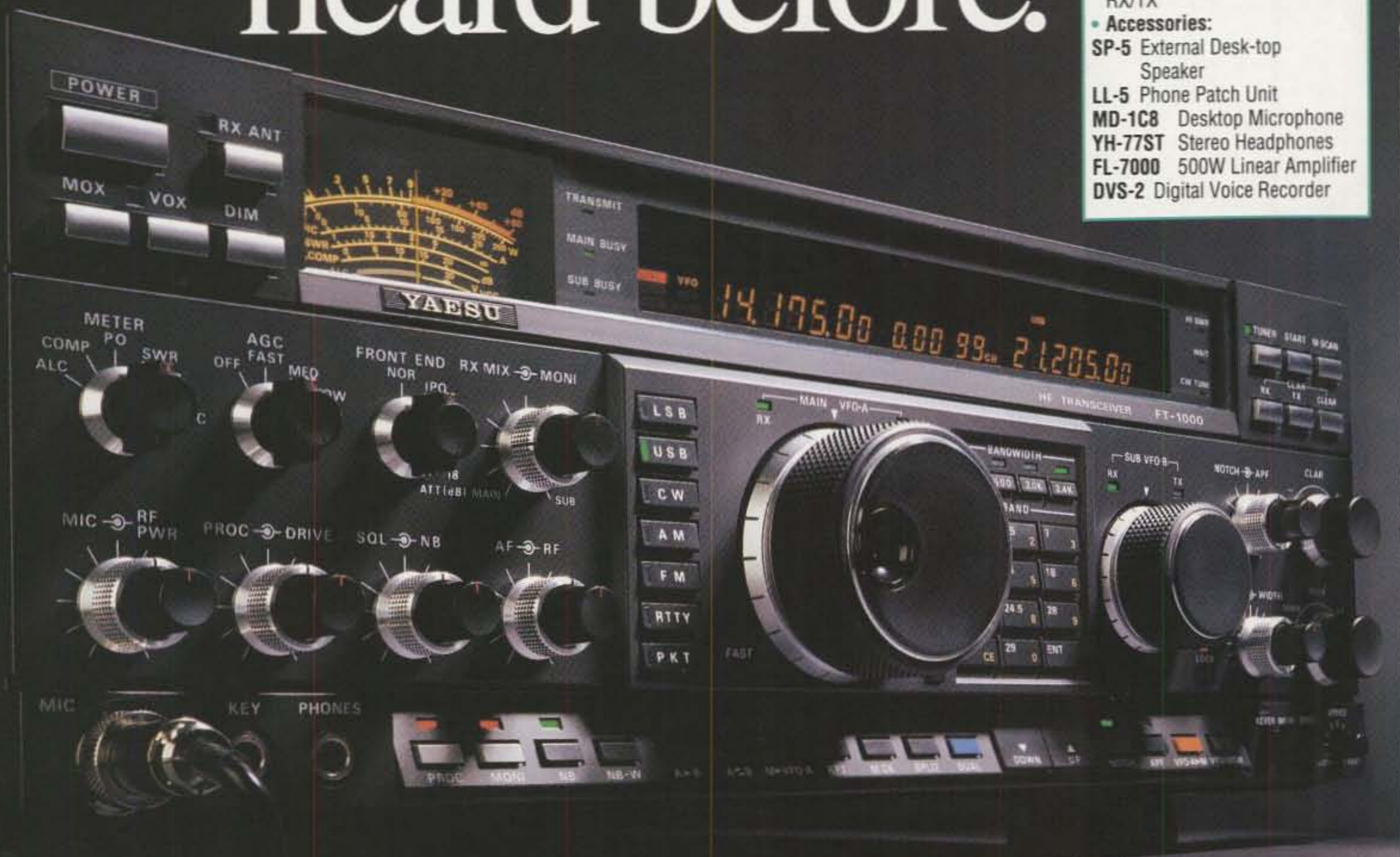


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FEATURES	Yaesu FT-530	Kenwood TH-78A	Alinco DJ-580	Icom IC-W-21AT
Memory Channels	82	50	40	70
Slide-out Lithium Battery	YES	NO	NO	NO
Dual CTCSS Decoder	YES	NO	NO	YES
Battery Voltage Readout	YES	NO	NO	NO
Automatic CTCSS Tone Search	YES	NO	NO	NO
Transmit Battery Saver (Repeater & Simplex Operation)	YES	NO	NO	NO
Built-In Vox	YES	NO	NO	NO
One Touch Reverse Button	YES	NO	NO	NO
Dual In-Band Receive (V+V, U+U)	YES	YES	NO	YES
Programmable External Speaker Audio	YES	NO	NO	YES
Optional Digital Display Mic with "S" Meter	YES	NO	NO	NO
AM Aircraft Receive	YES	YES	YES	YES

The Best vs. "the rest."

FT-530 Dual Band Handheld

- **Frequency Coverage:**
2-Meter 130-174 MHz RX
144-148 MHz TX
70 cm 430-450 MHz RX/TX
- 4 TX Power levels:
w/FNB-25: 2.0, 1.5, 1.0, 0.5W
w/FNB-27: 5.0, 3.0, 1.5, 0.5W
- DTMF Paging and Coded Squelch
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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!"

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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.

Get a grip on this!

World's smallest size HT with a full sized keypad
Measures only: 4"H x 2 1/4"W x 1"D

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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!

YAESU

Performance without compromise.SM

Attention :
DX Hunters,
Contestors, Multi-
Band Operators,
Rag Chewers and
Mobile Operators:

HIGH
PERFORMANCE

BEST FEATURES

IC-737A

A Winning Combination of Performance and Features Previously Offered Only on Rigs Costing Thousands More!

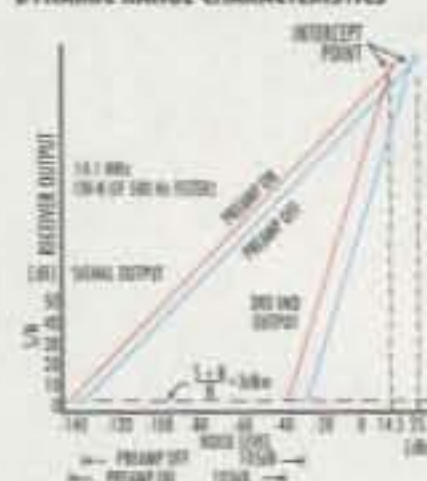
HIGH PERFORMANCE

New D.D.S. (Direct Digital Synthesizer) System – Miniaturized and improved technology provides phenomenal performance increases (higher PLL lockup speeds and improved C/N ratio, phase noise and blocking characteristics).

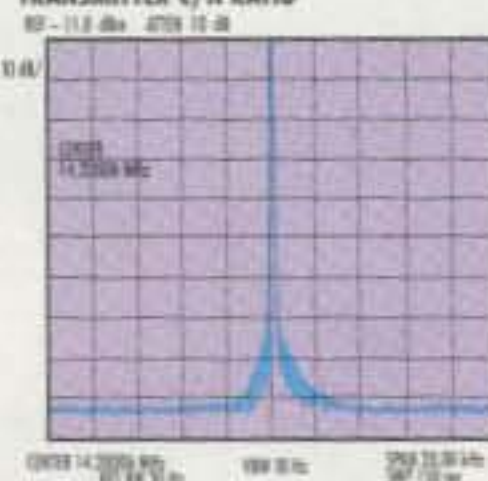


Pass Band Tuning – Electronically narrows the IF passband to eliminate interference signals (more effective than IF shift offered on competitive models).

DYNAMIC RANGE CHARACTERISTICS

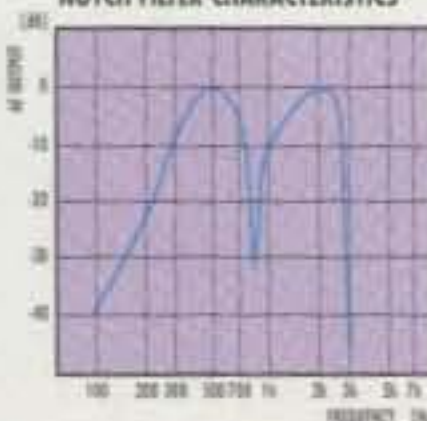


TRANSMITTER C/N RATIO

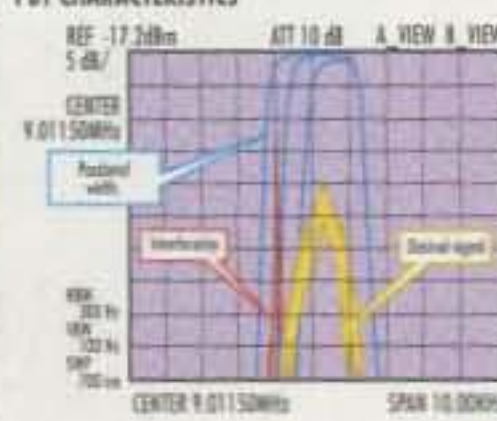


Notch Function – Tune out an interfering signal frequency to eliminate unwanted CW or AM carrier tones, while preserving the desired signal's audio response. The combination of PassBand Tuning and Notch Function is very effective on crowded bands.

NOTCH FILTER CHARACTERISTICS



PBT CHARACTERISTICS



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.

MORE GREAT FEATURES

- Voice Activated Transmit (VOX)
- 101 Memory Channels
- Multiple Scanning Modes
- General Coverage Receiver
- PC Compatible (w/optional CI-V)
- Many compatible options available
- Dial Lock
- All Mode Squelch
- Carry Strap
- Opt. Mounting Bracket

CIRCLE 165 ON READER SERVICE CARD

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 Technical Support: (206) 454-7619

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