ICD 08241

Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945

MARCH 1994

1945 Our 50th Year 1994

In This Issue

- CQ WW WPX SSB Contest Results . . . page 15
- FCC Proposes "Vanity" Call Signs . . . page 136
- A 20-meter Yagi With an "Amazing" Pattern . . . page 32
- A DXpedition to Christmas Island, VK9X . . . page 36

On the cover: Charles O'Neal III, WA1EKV, Bolton, MA

U.S. $2.95 CANADA $3.95

0

DIO AMATEUR'S JOURNAL

KENWOOD

...pacesetter in Amateur Radio

To get the most out of handheld communications, choose Kenwood's TH-78A (144MHz/440MHz) which offers all the latest features. Or the TH-28A (144MHz) and TH-48A (440MHz) single-band transceivers, which are equally impressive. All three represent a winning combination of top-flight technology and ergonomic design.

- **Alphanumeric memory**
  Alphanumeric data (max. 6 characters) can be entered directly into memory.
- **Alphanumeric message paging**
  In addition to standard DTSS and paging functions, alphanumeric messages can be stored in memory for immediate transmission.
- **Dual-frequency receive**
  In addition to full-duplex cross-band operation, the TH-78A is equipped to receive two frequencies simultaneously, even on the same band. There's also independent double-band scan and ABC (automatic band change). The TH-28A and TH-48A feature dual-band receive capability, enabling semi-duplex cross-band operations (TH-28↔TH-48A).
- **Frequency coverage**
  TH-28A: 118-173.995 MHz, sub RX: 438-449.995 MHz; TH-48A: 438-449.995 MHz, sub RX: 136-173.995 MHz; TH-78A: 118-173.995, 438-449.995 MHz. Transmit on Amateur bands only. (MARS/CAP modifiable, permits required).
- **2.5W power with supplied battery pack**
  5W with 12 VDC power source (PB-14, PB-17, or external DC).
- **Non-volatile memory**
  The TH-78A has 50 memory channels (expandable to 250 with the ME-1 option), while the TH-28A and TH-48A have 40 channels (expandable to 240 with the ME-1 option).

TH-78A/28A/48A

FM Handheld Transceivers

Handful of Performance

Dynamic performance plus handheld convenience—from Kenwood

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

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

93-ARD-0596

Majestic

New horizons in HF communications —from Kenwood

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

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

93ARD-0622

KENWOOD

...pacesetter in Amateur Radio

Kenwood's TS-450S is a triumph in transceiver technology. Covering all nine HF amateur bands—in SSB, CW, AM, FM and FSK modes—with powerful 100W output (40W for AM), it's ready to take the lead in all HF communications. Advanced features—with the option of adding a digital signal processor—give you the edge in performance. Yet the compact, lightweight construction makes it a winner for DX-peditions.

- **AIP system**
  Kenwood's exclusive AIP (Advanced Intercept Point) circuit raises the receiver's intermodulation dynamic range to 108dB, while lowering the noise floor level.
- **Superior interference reduction controls**
  IF shift, AF notch, dual noise blankers, CW reverse mode, and pitch control. IF filter settings can be stored in memory.
- **Ultra-fine tuning (SSB, CW and FSK modes)**
  By engaging the FINE key, the operator can tune precisely in 1Hz steps, thanks to the Direct Digital Synthesizer (DDS).
- **Automatic antenna tuner (built-in or option)**
  The internal antenna tuner can automatically establish the optimum match between 20 and 150 ohms in the 80 to 10 meter band. The optional AT-300 automatic external tuner covers 160-10m, and can also be used to tune single-wire antennas.
- **Optional digital signal processor**
  The DSP-100 provides signal modulation of unerring precision. In SSB operation, unwanted sidebands can be effectively suppressed, while in CW mode the rise and decay times of CW waveforms can be tailored for optimum clarity.

The TS-450S can be computer-controlled with the optional IF-232C and HamWindows software. See your Authorized Dealer for more details.

TS-450S

HF Transceiver

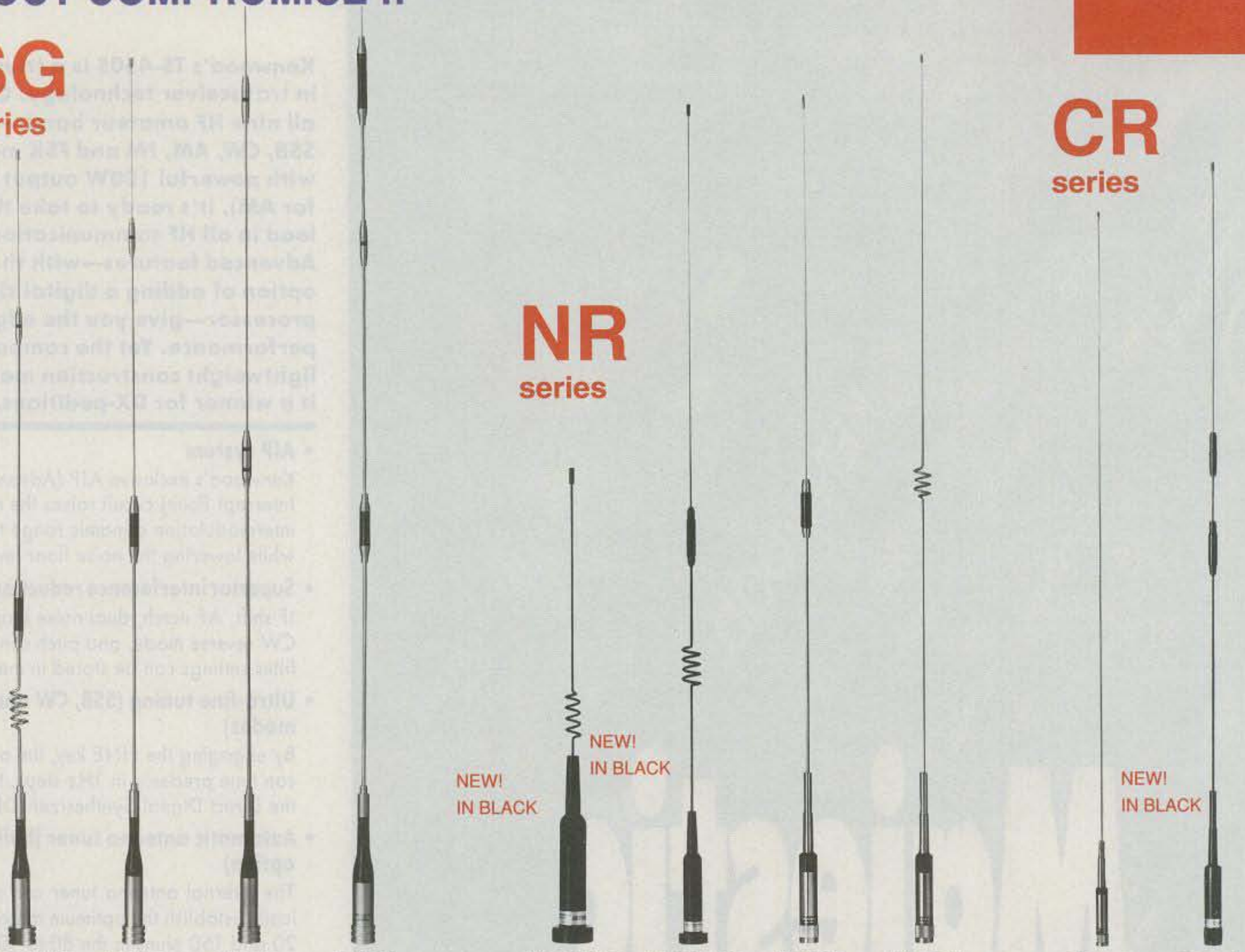
DIAMOND'S STATE OF THE ART VHF / UHF MOBILE ANTENNAS–MAXIMUM PERFORMANCE WITHOUT COMPROMISE !!

DIAMOND ANTENNA

SG series

NR series

CR series



SG7200NMO SG7500 SG2000 SG7900 NR72BNMO NR73BNMO NR770R NR770H CR214S CR320A

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

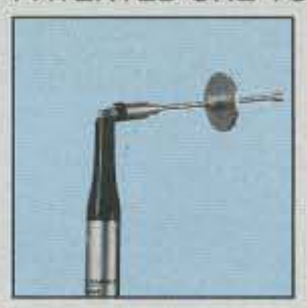
MODEL	BAND	GAIN(dBd)	POWER (w)	MOUNT	HT (IN)	ELEMENT PHASING
SG-7900	2m/70cm	5.0/7.6	150	UHF	62.2	7/8 λ ,3-5/8 λ
SG-2000	2m	5.2	150	UHF	62.6	7/8 λ
NR-140A	1-1/4m	3.8	100	UHF	36.2	5/8 λ
NR-124	23cm	8.4	100	N	25	4-5/8 λ
CR-214S	2m/1-1/4m	2.15/3.4	120	UHF	37	1/2 λ ,5/8 λ
CR-224A	2m/1-1/4m	5.0/6.0	150	UHF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

SPECIAL FEATURES

- Factory pre-tuned /no adjustment
- Highest Performance antennas
- SG&NR series do not need grounding
- NMO and UHF (PO) base styles
- New black color models available
- Fold-over feature on most models

FOLD-OVER

PATENTED ONE-TOUCH FOLD-OVER FEATURE



RF PARTS
SAN MARCOS,CALIF.
(619) 744-0900

MASTHEAD

EDITORIAL STAFF
Alan M. Dorhoffer, K2EEK, Editor
Gail M. Schieber, Managing Editor
Lew McCoy, W1ICP, Technical Representative

CONTRIBUTING STAFF
Doug DeMaw, W1FB, Doug's Desk
John Dorr, K1AR, Contest Calendar
Chod Harris, VP2ML, DX
Dave Ingram, K4TWJ, Special Interests
George Jacobs, W3ASK, Propagation
Joe Lynch, N6CL, VHF
Frederick O. Maia, W5YI, FCC Correspondent
Irwin Math, WA2NDM, Math's Notes
Bill Orr, W6SAI, Radio Fundamentals
Buck Rogers, K4ABT, Packet Radio Editor
Karl T. Thurber, Jr., W8FX, Antennas & Software
Norm Van Raay, WA3RTY, Awards & USA-CA
Bill Welsh, W6DDB, Novice

AWARD MANAGEMENT
Jim Dionne, K1MEM, WAZ Award
Norman Koch, K6ZDL, WPX Award
Norm Van Raay, WA3RTY, USA-CA Award
Billy Williams, N4UF, CQ DX Award

CONTEST MANAGEMENT
Steve Bolia, N8BJQ, WPX Contest Director
Larry Brockman, N6AR, WW DX Contest Director
Robert Cox, K3EST, WW DX Contest Director
John Dorr, K1AR, WW DX Trophies & Certificates
Roy Gould, KT1N, RTTY Contest Director
David L. Thompson, K4JRB, 160M Contest Director

BUSINESS STAFF
Richard A. Ross, K2MGA, Publisher
Dorothy Kehrwieder, General Manager
Arnie Sposato, N2IQO, Advertising Manager
Tracy A. Parbst, Sales Assistant
Frank V. Fuzia, Controller
John Dorr, K1AR, Director of Marketing

CIRCULATION STAFF
Catherine Ross, Circulation Director
Melissa Nitschke, Operations Manager
Edith Lennon, Circulation Manager
Carol Licata, Data Processing
Denise Pyne, Customer Service

PRODUCTION STAFF
Elizabeth Ryan, Art Director
Barbara Terzo, Assistant Art Director
Susan Reale, Artist
Edmond Pesonen, Electronic Composition Manager
Dorothy Kehrwieder, Production Manager
Tracy A. Parbst, Production
Pat Le Blanc, Phototypographer
Hal Keith, Illustrator
Larry Mulvehill, WB2ZPI, Staff Photographer
Joe Veras, N4QB, Special Projects Photographer

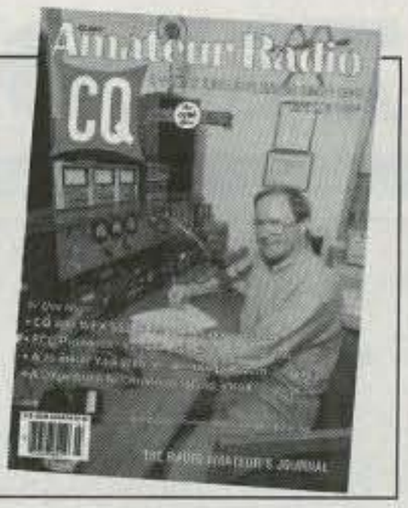
A publication of

CQ Communications, Inc,
76 North Broadway
Hicksville, NY 11801-2953 USA.

Offices: 76 North Broadway, Hicksville, NY 11801. Telephone: (516) 681-2922. FAX (516) 681-2926. CQ (ISSN 007-893X) is published monthly by CQ Communications Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices (all in U.S. dollars): Domestic—one year $24.50, two years $47.00, three years $69.00; Canada/Mexico—one year $27.00, two years $51.00, three years $75.00; Foreign—one year $29.00, two years $55.00, three years $81.00; Foreign Air Mail—one year $82.00, two years $161.00, three years $240.00.
U.S. Government Agencies: Subscriptions to CQ are available to agencies of the United States government, including military services, only on a cash with order basis. Requests for quotations, bids, contracts, etc. will be refused and will not be returned or processed.

CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address. Printed in the United States of America.
Postmaster: Please send change of address to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

The Radio Amateur's Journal



ON THE COVER: Whenever I see a station as neat and orderly as this one, I confess to thinking that it couldn't possibly be a REAL station. We all know that REAL stations need all that trash and clutter to perform! Charles O'Neal III, WA1EKV, Bolton, MA, proves that a very real, high performance station can look as good as it sounds. (Photo by Larry Mulvehill, WB2ZPI)

MARCH 1994 **VOL. 50, NO. 3**

FEATURES

RESULTS OF THE 1993 CQ WORLD-WIDE WPX SSB CONTEST
Steve Bolia, N8BJQ 15
TROPHY WINNERS AND DONORS 18
WORLD TOP SCORES 20
USA TOP SCORES 21
CONTINENTAL LEADERS 22

CQ REVIEWS: THE MFJ-249 HF/VHF SWR ANALYZER ..... Lew McCoy, W1ICP 30

A YAGI WITH AN AMAZING PATTERN AT 14.200 MHZ
Brian Beezley, K6STI 32

A HOLIDAY/DXPEDITION TO CHRISTMAS ISLAND, VK9X
Steve Ireland,VK6VZ 36

CQ REVIEWS: THE RF CONCEPTS VHF1-60 AND RFC-2/70H RF AMPLIFIERS ..... Joe Lynch, N6CL 48

CQ SHOWCASE: NEW AMATEUR PRODUCTS 52

PACKET USER'S NOTEBOOK: NETWORK OPERATING SYSTEM (NOS) AND MORE ..... Buck Rogers, K4ABT 54

MATH'S NOTES: A VISIBLE LASER DIODE DRIVING CIRCUIT
Irwin Math, WA2NDM 60

ANTENNAS & ACCESSORIES: SWING INTO SPRING '94
Karl T.Thurber, Jr., W8FX 64

CQ WORLD-WIDE WPX SSB CONTEST ALL-TIME RECORDS 76

VHF PLUS: WHAT IS A TYPICAL VHF+ STATION? ..... Joe Lynch, N6CL 80

THE THREE-ELEMENT YAGI ANTENNA ..... Bill Orr, W6SAI 90

DOUG'S DESK: SOME ANSWERS TO COMMON ANTENNA QUESTIONS
Doug DeMaw, W1FB 96

BILL'S BASICS: WORLDWIDE AMATEUR RADIO CALL SIGNS
Bill Welsh,W6DDB 100

WORLD OF IDEAS: HOMEBREW CLASSICS FROM THE FIFTIES, PART II
Dave Ingram, K4TWJ 106

WASHINGTON READOUT: FCC PROPOSES "VANITY" STATION CALL SIGNS ..... Frederick O. Maia, W5YI 136

DEPARTMENTS

AWARDS: STORY OF THE MONTH—DANNY ROZAS, KC5P
Norm Van Raay, WA3RTY 70
DX: LLOYD COLVIN, W6KG, SILENT KEY ..... Chod Harris, VP2ML 114
CONTEST CALENDAR: THE GRAY AREAS OF CONTEST RULES, CONTESTS FOR MARCH AND EARLY APRIL ..... John Dorr, K1AR 128
PROPAGATION: SHORT-SKIP CHARTS FOR MARCH AND APRIL
George Jacobs, W3ASK 134

ZERO BIAS 4
ANNOUNCEMENTS 6
OUR READERS SAY 144
HAM SHOP 146

ZERO BIAS

EDITORIAL

This winter those of us on the east coast had the wonderful opportunity to empirically check the ice-loading characteristics of our antenna systems. While some tree limbs and power lines crackled and broke under the weight of the ice build-up, I'm glad to say that my beam and wire antennas held up remarkably well. Between the wind and the ice, I expected something to give way and break, but everything, including the rotator, functioned smoothly. This theoretically may have been perfect weather to work on or to install a new antenna, but somehow I doubt it.

I've Got That—Maybe

By now you've either worked the 3YØ or you haven't. Good fortune has either smiled on you or given you a host of "coulda, woulda, shoulda" stories to tell at the next club meeting. I'm writing this about a week or so before they're due on, and so the best (or worst) is yet to come. I hope that by the time you read this we all can take pride in an operation that was well conducted, and most important, that our fellow amateurs conducted themselves properly. It would be nice perhaps for some of our big guns who continually brag "I've got that" to lighten the pile-ups a bit by standing by to let some of the less fortunate have a chance.

It's still amazing that so many people will get bouyed up and go to all sorts of extremes to work a new one or simply to prove that they can do it again. In these days of soaring data transfer rates and the new "in" term *information highway* we still get excited over the possibility of pushing some brute-force RF several thousand miles to an inhospitable spit of land (usually covered with guano) in order to get a signal report and a piece of cardboard. If you stop to think about it, it's also amazing that a group of people will gather and plan to go to such a forsaken spot, exposing themselves to all kinds of potentially threatening experiences, just to make the rest of us momentarily happy (or unhappy).

I don't think it's possible to define or explain why we do what we do and why it's so important to a lot of us. What we do transcends national boundaries, cultures, traditions, and languages. Somehow amateurs can make themselves understood to any other amateur on the face of the globe.

While some of us may have gross differences in ideology and politics, we do share a particular dream of what amateur radio should be like. We reinforce each other's belief in the merits and values of our mutual hobby, and most of us throughout the world are enjoying ourselves and having a good time.

Something else that transcends national boundaries, cultures, traditions, and languages is merely a universal part of human nature. Simply put, it's just that some of us feel more important, more entitled, more worthy, and far less encumbered by convention than others. While it would be nice to be able to modify some of this behavior, generally it is an exercise in futility. It's just about impossible in real life, so why should amateur radio be any different?

Recently someone I met asked me if I still enjoy the hobby. He wondered if, given the fact that I earn my living basically from amateur radio, I could still go home and take part in amateur activities. Well, after 40 years I still enjoy various aspects of amateur radio, and yes, I can go home and turn on the rig to read the mail.

It really doesn't matter what any of us do for a living, or whether we attend school or are retired. Each of us to a great degree looks to amateur radio as an entity separate from what goes on in real life. It's a way to relax (or should be), to talk to some old friends and perhaps meet new ones, and to some it's a series of new challenges. It can satisfy that urge to tinker in the shop, prove out an idea, and most certainly expand our personal universe. What's not to like? It's also a part of what I do outside of work and not my only pastime. In that respect, when I spend time at amateur radio, it's because I choose to, and I do get a sense of enjoyment and accomplishment from it.

44 Plus

Last month I wrote about waiting for 44 more QSL cards in order to complete the basic requirements for our USA-CA Award. Admittedly, it's only a total of 500 counties for the certificate and not the 3076 total representing all U.S. counties, but it was still exciting to go over the 500 mark. The next hurdle will be to actively go for the 1000 endorsement. Projecting out, I figure that I would have to make at least 10,000 contacts in order to receive the 3076 cards. One thing this experience has given me is a new respect for those who have persevered and confirmed them all. Another lesson I am learning is how to write or print small so I can properly fill out our *County Award Record Book*.

This month I hope to increase my total of prefixes by taking part in our CQ WPX SSB Contest (March 26–27). All sorts of interesting stuff shows up for this one, and it's always a lot of fun. Once again I heartily recommend contests and QSO parties as a terrific source of contacts for any achievement award on which you may be working at the moment or towards which you may be contemplating working.

If you are vehemently against contests, QSO parties, nets, and DXpeditions, however, there's even something for you—more stomach acid build-up as everyone else has a good time. I suggest you check the large table of activities for 1994 in our "Contest Calendar" column this month so you can prepare your spleen for venting. After all, if anger is the only thing you get out of amateur radio, then you need a source of frustration to promote it. Amateur radio is truly a wonderful hobby, as there is literally something for everyone.

As for me, I'll continue to fill out my *County Award Record Book*, and I think I'll devote some time to doing the paperwork for one of the IOTA awards. I have to admit that the only one who gets a bigger kick out of these certificates than me is the man who does the framing. He's looking forward to doing the USA-CA certificate, as it's much bigger than all the others out there. I wouldn't want to disappoint him.

It's That Time Again

By the end of this month we'll be at least three hamfests into the 1994 season and sufficiently tuned up physically for the BIG ONE next month. By the time Dayton rolls around we will have been to Miami, Orlando, and Charlotte.

I can think of several things I'm looking for that would be nice to have. No, I really don't *need* any of these things, but then again need never has anything to do with it. Hamfests are a wonderful augmentation to the amateur radio literature. Besides being able to read about products and see ads and perhaps check out your local distributor, hamfests provide access to manufacturers and distributors who display just about everything you could ever want or need. In one place and on one weekend you can get information and spec sheets plus the answers to just about any amateur radio question you can come up with. You can see and inspect the latest wares and spend time checking out the goodies at the flea-market.

Amateur radio really is not a passive hobby, but it can be as passive as you want to make it. There are plenty of exciting things to do out there if only you make the effort. Just getting out there to witness other people having a good time is infectious, and if you let yourself go, you might notice your face twitch a bit. Don't worry. It's just some infrequently used face muscles creating what generally is known as a smile. Trust me. You'll have a good time if you get out to a hamfest or two this year. Of course, once you're out of the house, the kid down the road will quickly realize that there is nothing wrong with the front end of his receiver and will finally start to work some DX, but then again, that's the price of having a good time.

73, Alan, K2EEK

Put yourself in the winner's circle

with the PK-232MBX multi-mode controller.

The PK-232MBX sets the pace for multi-mode controllers. While the competitors are racing to catch up, the PK-232MBX surges into the lead, winning more contests and providing the best value of any multi-mode controller on the market today.

Leave the competition in the dust—with the highest quality filters available (seventeen-pole effective filtering), the PK-232MBX pulls signals out of the noise better than any other controller.

Satisfy your drive for variety with PACTOR, Packet, AMTOR/SITOR, Morse, RTTY (Baudot/ASCII), WEFAX, NAVTEX, and TDM modes.

You won't spin your wheels trying to identify a signal. Our revolutionary SIAM™ technology automatically identifies the incoming signals, switches the PK-232MBX to the recognized mode, and starts displaying the data.

PACTOR, Packet and AMTOR mailboxes—with selective control of third party traffic—are standard to the PK-232MBX.

Our extensive Host Mode control gives you unmatched power and versatility from computer support programs for DOS, Windows™, Macintosh, and Commodore computers.

Our highly trained service crew keeps you on track with helpful advice and in-depth knowledge of amateur radio.

When you're ready for a multi-mode controller with a proven track record, the PK-232MBX is the choice of champions.

For more information on the PK-232MBX, call AEA's Literature Request Line at (800)432-8873 or contact your favorite ham radio equipment dealer.

Connect with us

ANNOUNCEMENTS

•**FAR Scholarships**—The Foundation For Amateur Radio, Inc., plans to administer 49 scholarships for the academic year 1994–1995 to assist licensed amateurs. Licensed radio amateurs may compete for these awards if they plan to pursue a full-time course of studies beyond high school and are enrolled in or have been accepted for enrollment at an accredited university, college, or technical school. The awards range from $500 to $2000 with preference given in some cases to residents of specified geographical areas or to the pursuit of certain study programs. For additional information send a letter or QSL card, postmarked prior to April 30, 1994, to FAR Scholarships, 6903 Rhode Island Avenue, College Park, MD 20740.

•**Hamming Bicycle Trip**—After a successful ham bicycle tour along the Pacific Crest Bicycle Trail last July, the organizer is again planning a week-long trip in July or August '94. It will begin at Crescent Lake, and will include Crater Lake, Ashland, and Siskiyou Pass, OR; and Horse Creek and Callahan, California, ending near Mt. Shasta. The tour will primarily camp and cook out. Experienced bicycle touring people who are hams are invited to join the free trip. For more information, write to Bil Paul, KD6JUI, P.O. Box 5183, San Jose, CA 95150.

•**Dayton '94 Hamvention Youth Forum**—Preparations are underway to interview speakers for the Dayton '94 Hamvention Youth Forum. Any youngster under the age of 18 who is a licensed ham radio operator may be considered. Applicants should be articulate and enthusiastic about their amateur radio activities. Each child will be allotted 10 minutes to address the audience. Interested children should send a brief outline of their radio activities to Carole Perry, P.O. Box 131646, Staten Island, NY 10314 (include a phone number).

•**The following Special Events are scheduled for March:**

2-land, from commemoration of the World War II operation of the Voice of America relay station WBØU, in the Bound Brook section of Piscataway, New Jersey; Piscataway ARC signing /VOA; 0000Z until 2400Z; March 20th; CW, all Novice bands; Phone, lower third of General 75–15 bands and the Novice 10 meter band. For certificate, send QSL and 9 × 12 SASE to station worked via *Callbook* address.

W4BKM, from the 12th Annual Macon Cherry Blossom Festival; Macon, Georgia; The Macon ARC; 1300Z–2200Z; March 26 and 27th; CW 7.135, 14.035, 21.135, and 28.135; Phone 7.235, 14.235, 21.335, and 28.335. For certificate send QSL and 9 × 12 SASE to Macon ARC, P.O. Box 4862, Macon, GA 31208.

4-land, from the 150th anniversary of Brevard County and the 3rd anniversary of the Mosquito Net; Titusville, Florida; The Titusville ARC; 1400–2300Z March 12; CW near the bottom of the Novice 10, 15, and 40 subbands; phone 28.333 (Mosquito Net freq.) and near the bottom of the General 15 and 40 subbands. For certificate send QSL and 9 × 12 SASE to TARC, P.O. Box 73, Titusville, FL 32781.

WA4TGF, from the 103rd anniversary of the Norwegian Lady, Virginia Beach, Virginia; The Virginia Beach ARC; from 1400Z March 26 to 2000Z March 27; CW 10 kHz up from the bottom of the Novice subband; Phone 3.880, 7.280, 14.280, 21.280, 28.360, and 146.550. For a certificate, send QSL and SASE to VBARC, P.O. Box 62003, Virginia Beach, VA 23462.

W5ORW, from the Texas Dogwood Trails Special Event Station; Palestine, Texas; Palestine/Anderson County ARC; 1900–2300Z; March 26; CW near the bottom portion of Novice 15 and 40 meter subbands; Phone near bottom of General 15 and 40 meter subbands. Guest operators welcome. For certificate and trails information, send QSL and business size SASE (2 stamps) to Jack Coleman, P.O. Box 737, Palestine, TX 75802.

6-land, from the Chinese Bokai (the God of Water) Festival in Marysville, California; Yuba Sutter ARC; 0000Z March 5th through 2400Z March 13th; 80 through 10 meter phone and CW bands. For a special QSL card, send a #10 SASE to YSARC, P.O. Box 1169, Yuba City, CA 95922 or participating station.

6-land, from The Los Angeles Marathon; Los Angeles, California; Kenwood Employees ARC, WD6DJY; 1500Z–2300Z; March 6; General 20, 17, 15 and 12 meter subbands; Novice 10 meter band and 146.55 MHz. For special QSL, send QSL and business size SASE to Kenwood Employees ARC, P.O. Box 22745, Long Beach, CA 90801-5745.

•**The following hamfests, etc., are slated for March:**

March 4–6, **TAPR Annual Meeting**, Best Western Inn at the Airport, Tucson, Arizona. The annual meeting formally begins Saturday with presentations and papers on several new hardware projects. For more information, or to pre-register, contact the TAPR office, 8987-309 E. Tanque Verde Rd. #337, Tucson, AZ 85749-9399; phone: 817-383-0000; FAX: 817-566-2544; or call Keith Justice, Program Chairman at 602-461-8687; Internet: kf7tp@kf7tp.stat.com.

March 5, **Shore Points ARC "Springfest '94,"** Holy Spirit High School, Route 9, Absecon, New Jersey. For more information contact SPARC, P.O. Box 142, Absecon, NJ 08201.

March 5, **Annual North Jersey Hamfest**, Denville, New Jersey. Talk-in on 146.985 and 223.86. Admission $5.00 at door. Contact Bernie, WB2YOK, P.O. Box 251, Flanders, NJ 07836 (201-584-4423). (Exams start 9 AM sharp—sign up by 9 AM).

March 5, **Hamfest and Fleamarket to Benefit D.A.R.E.**, Twin Mountain, NH Town Hall near inter-

(continued on p. 10)

Now You Can Operate Your Base Station From Just About Anywhere

Operate your base station from any touch tone telephone.

Operate your base station from any handheld or mobile radio.

No longer are you tied to your shack when you want the power of a base station. Now you can control your Icom, Kenwood, or Yaesu radio with a computer port using a telephone, handheld, or mobile radio. Operate SSB, FM, AM, and even CW from your car, your office, or on vacation—anywhere you go.

You can change bands, frequency, and mode with HamLink or RadioLink. Just in case you lose track of your frequency or mode, we've included a voice synthesizer to remind you. Optional plug-in cables make set-up a snap. Both units have outputs for controlling other accessories.

Don't take our word for it—try it yourself! Call our literature line at (800) 432-8873 for a brochure listing the phone number and commands for our demonstration unit. You can also call us direct at (206) 774-5554. See your favorite amateur radio equipment dealer for best pricing.

Connect with us

Duals At Dawn

Up To The Challenge

The challenge for Cushcraft engineers was to develop a line of 70cm/2m verticals with enough diversity in price and performance to suit any ham's needs. The task having been met, we now offer 3 models of dual band verticals: two aluminum and one fiberglass.

Choose Your Dual Band

If your space or budget is confined, then the AR-270 is the right choice. The "Dual Wonder" is less than 4 feet tall and mounts just about anywhere.

If, on the other hand, you're looking for top of the line performance, the ARX-270 is the way to go. It's a 16-1/2 foot, 3-piece fiberglass antenna that's factory tuned and assembled in minutes.

If the AR-270 isn't quite enough and the ARX-270 is more than what you had in mind, the all new AR-270B is the perfect middle ground. This antenna captures the best of both worlds with great performance in an 8 foot high package.

Cushcraft also offers the CS-270M dual band mobile antenna. This compact performer features the best components and the latest in 70cm/2m technology.

Whichever antenna is right for your situation, you can rest assured that performance and durability are built in. After all, it's a Cushcraft.

AVAILABLE THROUGH DEALERS WORLDWIDE

cushcraft
CORPORATION

P.O. Box 4680, 48 Perimeter Road, Manchester, NH 03108 U.S.A. • 603-627-7877 • FAX: 603-627-1764

FT-2200/7200
2-m/70-cm Mobiles

- **Frequency Coverage:**
  FT-2200
  RX: 110-180 MHz
  TX: 144-148 MHz
  FT-7200
  RX/TX: 430-450 MHz
- 50 Memory Channels
- Wide Receiver Coverage: 110-180 MHz
- AM "Aircraft" Receive: 110-139 MHz *
- Built-In DTMF Paging/Coded Squelch
- Power Output 50/25/5 Watts*
- CTCSS Encode Built-In
- 10 Memory DTMF Auto Dialer
- Selectable Channel Only Display
- Remote Operation w/ Optional MW-2
- Optional Digital Voice Storage System
- Backlit DTMF Mic
- **Accessories:**

FTS-27	CTCSS Decode Unit
DVS-3	Digital Voice System Unit
MW-2	Remote Control/ Wireless Mic
SP-7	External Speaker

*FT-2200 only.

"The FT-2200 answers my problem! It fits anywhere, and the 3 power levels are great!"

"Yaesu did it again!"

"I like the FT-2400H!"

"Rugged performance is my answer!"

For your sleek compact car, the sculptured FT-2200 looks terrific. With leading-edge features, performance and reliability too, it's the perfect answer to your 2-m needs.

At 5.5"W x 1.6"H x 6.5"D the FT-2200 installs nearly anywhere. And, it does "lead" with features like optional Remote Control Wireless Mic – first in the world for any 2-m mobile and AM Aircraft Receive – first in a Yaesu mobile. Performance? The FT-2200 has more than twice the memories of the competition! Reliability? Its bright, new LCD display and backlit DTMF Mic makes night mobiling safe. Features, performance, reliability – in a powerful little package. See your dealer for *this* answer to your 2-m needs.

The Yaesu FT-2400H set the standard by which all 2-m mobiles are judged. The first and only amateur radio to pass rugged MIL STD 810D tests for shock and vibration, its one-piece die-cast chassis with extra large heat sink gives years of trouble-free operation.

With 50 watts of TX power, large alpha-numeric display, auto display dimmer, exclusive backlit DTMF Mic and advanced track tuning front end for superior receiver performance, the popular FT-2400H is the choice of amateurs in the know.

Features, performance, reliability – ready to go anyplace. See your dealer for *this* answer to your 2-m needs.

FT-2400/7400H
2-m/70-cm Mobiles

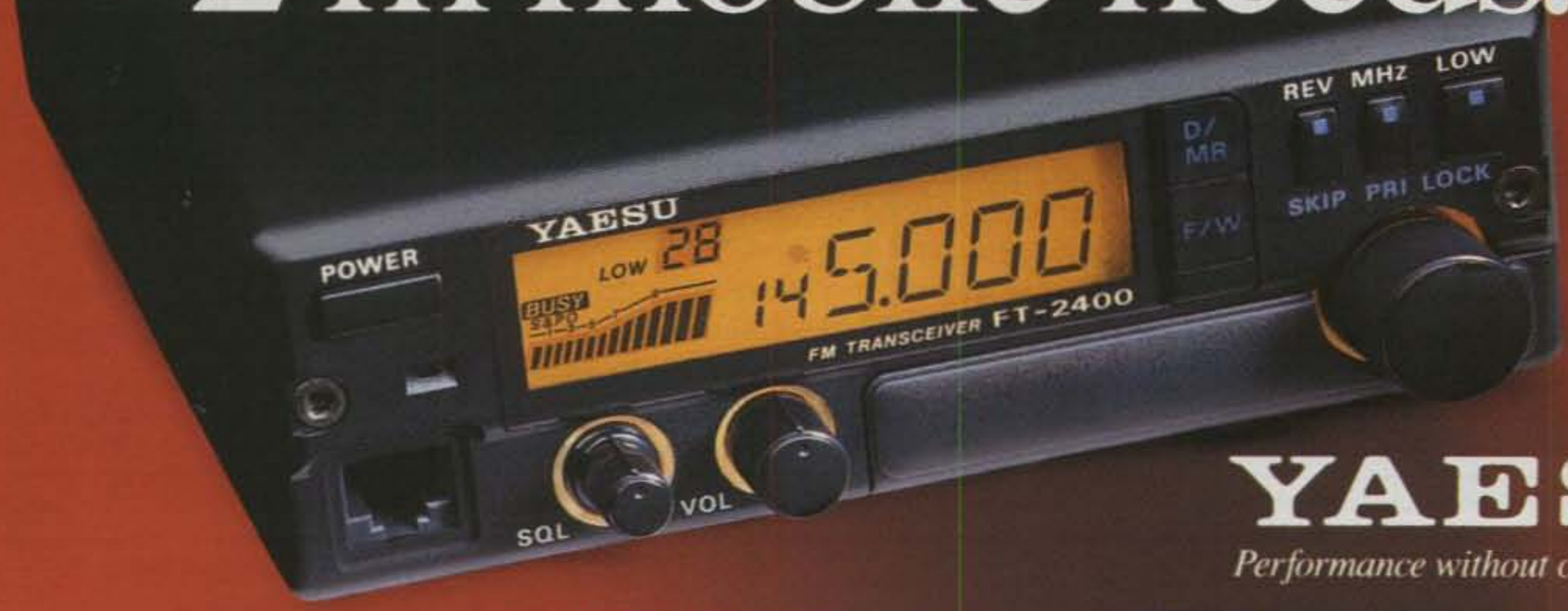
- **Frequency Coverage:**
  FT-2400H
  RX:140-174 MHz
  TX: 144-148 MHz
  FT-7400H
  RX/TX: 430-450 MHz
- Rugged Mil-Spec Design
- Advanced Track Tuning (ATT)
- 31 Memory Channels
- Wide Receiver Coverage: 140-174 MHz
- Selectable Alpha-Numeric Display
- Largest 2-Meter Display Available
- CTCSS Encode Built-In
- Power Output 50/25/5 Watts *
- Flip Up Front Control Panel Hides Seldom Used Buttons
- Backlit DTMF Mic
- **Accessories:**

FTS-17A	CTCSS Decode Unit
FRG-6	DTMF Paging Unit
SP-4	External Speaker
FP-700	Power Supply

*FT-2400 only.

FT-7200 IS NOW AVAILABLE!

Yaesu answers your 2-m mobile needs.



YAESU

Performance without compromise.℠

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

Announcements *(from p.6)*

sections of U.S. Routes 3 and 302, New Hampshire. 8 AM to 3 PM (EST). For more information contact Richard C. Force, WB1ASL, 12 Cottage Street, Lancaster, NH 03584 (603-788-2202).

March 5, **The Black Warrior Swapfest**, Northport Civic Center, Northport, Alabama. For more information, contact Kelly Bruce, WD4DAT at 205-339-7882 after 6 PM. (Exams start at 8:30 AM.)

March 6, **10th Annual MTARA Flea Market**, Smith Vocational School, Route 9, Northampton, Massachusetts. Site is handicapped accessible, no stairs. Contact Jim, K1MEA, at 413-527-3199 eves before 2200 EST. (Exams begin at 10 AM. Advanced registration is strongly recommended. Contact Jim, WA1ZUH, 413-245-3228, or @ MTMBBS via packet).

March 6, **Southshore ARC Flea Market**, DAV Chap #29 Hall, Liberty Street, Braintree, Massachusetts. Handicapped accessible. Contact Thaire, KA1MJR at 508-230-2248.

March 11, **Jefferson Barracks ARC 34th Annual Auction**, Concordia Turner's Hall, St. Louis, Missouri. Auction starts at 7:30. Contact Vivian, WDØEMS or Scotty, KAØFJA, 4121 Fabian Dr., St. Louis, MO 63215 (314-631-4068).

March 12, **Trojan ARC First Annual Swapfest**; Colby National Guard Armory, Colby, Kansas. VE test session March 11 6:30 PM at Sirloin Stockade. Write TARC, Box DX, Colby, KS 67701.

March 12, **The Mike & Key ARC Electronics Show and Fleamarket**; Western Washington Fairgrounds, Puyallup, Washington. Contact Michael Dinkelman, 637 2nd Ave. S., Kent, WA 98032 (206-854-4031 eves.).

March 13, **Indiana Hamfest & Computer Show**; Indiana State Fairground's Pavilion Building, Indianapolis, Indiana. For more information, send a SASE before Feb. 21, to Aileen Scales, KC9YA, 3142 Market Place, Bloomington, IN 47403; or call 812-339-4446.

March 13, **7th Annual York Springfest (Ham & Computer)**, York Fairgrounds, York, Pennsylvania. Advanced info and registration, call 717-843-7864 (leave message or FAX) or write: York Springfest, P.O. Box 526, Red Lion, PA 17356. (Exams.)

March 13, **Teays ARC Hamfest and Computer Show**; Pickaway County Fairgrounds; Circleville, OH. Contact Dan Grant, W8UCF, 22150 Smith-Hulse Rd., Circleville, OH 43113 (614-477-3026).

March 19, **IRS Hudson NH Flea Market**; Hudson Lions Club, Hudson, New Hampshire. 8 AM to 3 PM. For more information, contact John, KA1FYB, 1 Paget Drive, Hudson, NH 03051 (603-881-5796).

March 19,, **Irvington-Roseland ARC Hamfest**; West Orange High School, West Orange, New Jersey. For more information contact Howie Greenwald, W2VHI at 201-994-4057, or Jim Howe, N2TDI at 201-402-6066.

March 19–20, **North Florida Ham/Swapfest**; Fairgrounds, Ft. Walton Beach, Florida. Contact Bud, K8YNU at 904-243-5404 from 3–6 PM CDT, or Jerry, N4ZYB, 904-862-0419 from 6–9 PM CDT for tables. For RV space call Stan, WD4PEU, at 904-243-8801; or write PARC, P.O. Box 873, Ft. Walton Beach, FL 32549.

March 19–20, **Midland ARC St. Patrick's Day Swapfest**; Midland County Exhibit Building, Midland, Texas. For more information, contact AA5RS or N5TQU via MARC, P.O. Box 4401, Midland, TX 79704. (Exams Saturday 12 PM).

March 20, **Two Rivers ARC 22nd Annual Hamfest/Computer Fair**; Greater Pittsburgh Expomart; Monroeville, Pennsylvania. For more information contact Michael Kowalcheck, Jr., Hamfest Coordinator, Two Rivers Amateur Radio Club, Inc., P.O. Box 225, Greenock, PA 15047.

March 20, **The Sterling-Rock Falls ARS 34th Annual Hamfest;** Sterling High School Field House, Sterling, Illinois. Information, tables and tickets, contact Lloyd Sherman, KB9APW, P.O. Box 521, Sterling, IL 61081 (815-336-2434).

March 20, **Tri-County ARC Hamfest;** Jefferson County Fairgrounds, Jefferson, Wisconsin. Further information may be obtained by writing to W9MQB, 213 Frederick St., Ft. Atkinson, WI 53538 (414-563-6381 evenings). (Exams.)

March 20, **Electronic Flea Market; Knights of Columbus Hall**; Mattapoisett, Massachusetts. For more information call 508-993-3993.

March 20, **Walla Walla Valley ARC 48th Annual W7DP Swapfest**; Milton Freewater Community Center Building, Milton Freewater, Oregon. For more information contact David L. Pence, KB7WRT, 810 E. Sumach St., Walla Walla, WA 99362-1348 (509-525-2529).

March 20, **WECAFEST 1994**; Yonkers Raceway, Yonkers, New York. For more information contact Jeanne Raffaelli at 914-962-9666.

March 26, **Michigan City ARC Hamfest**; Rogers High School; Michigan City, Indiana. For more information contact Gene Ward, KD9VB, 312 Ash Parkway, Westville, IN 46391 (219-785-4295). (Exams.)

March 26, **Chestnut Ridge Radio Club Annual Flea Market**; Education Building, Saddle River Reformed Church, Upper Saddle River, New Jersey. For more information call Jack Meagher, W2EHD, at 201-768-8360.

March 26, **Lincoln Trail ARC Hamfest; Pritchard Community Center**, Elizabethtown, Kentucky. Contact Whitey Hensley, P.O. Box 342, Vine Grove, KY 40175 (502-877-2234).

March 27, **10th Annual Charleston Area Hamfest and Computer Show**, Charleston Civic Center, Charleston, West Virginia. For information write: Paul Ennis, KB8IWY, Hamfest, P.O. Box 916, St. Albans, WV 25177. (Exams.)

March 27, **16th Annual Lake County ARA Hamfest; Madison High School**, Madison, Ohio. Contact Roxanne, LCARA, 6899 Melridge, Concord, OH 44060 (216-352-6756 from 6 PM to 9 PM EDT weekdays or 10 AM to 4 PM weekends). (Exams.)

March 27, **4th Annual Down East Hamfest**, Kingston, North Carolina. For more information contact Robert McNeill, II, W4MBD or Jean H. DuPree, KB4OHX, Down East Hamfest Assoc., Inc., P.O. Box 1778, Kinston, NC 28503.

March 27, **LAMARSFEST '94; Lake County**, Illinois Fairgrounds, Grayslake, IL. For information write LAMARSFEST 94, 650 Green Bay Rd., Lake Bluff, IL 60044, or call Frank Avellone, W9GLO at 708-234-4124 (until 10 PM).

With ICOM's New IC-281H . . . It's Not Just 2 M Anymore!

(2 M mobile transceiver *with* 440 MHz receive!)

BONUS RECEIVE BAND!

New Exciting Features!

Bonus Receive Band – The 430 (440) MHz bonus band is available for receive. Enables full duplex, crossband operation between the 2 M and 70 cm bands. Crossband repeat from 440 MHz to 2 M.

Scratch Pad Memories – 10 scratch pad memories automatically store your 10 previously transmitted frequencies (5 simplex and 5 duplex) for instant recall.
No fumbling around trying to write down, or store into regular memories, frequencies which you want to use temporarily.

Memory Allocation Function – 60 regular memory channels can be divided between the main and bonus band. You can organize your memories for maximum efficiency and listening preference.

Automatic Memory Channel Advance – After a memory channel is programmed, the channel indicator automatically advances, speeding up the programming process.

Tone Scan* – Scans, detects *and sets* the subaudible tone. Permits access to a repeater when you don't know the tone frequency.

* Optional UT-85 required.

Voice Synthesizer* – The IC-281H announces the operating frequency, enabling quick confirmation without taking your eyes off the road. Very helpful for visually impaired operators, too.

* Optional UT-66 required.

Packet "Plug and Play" Operation

Data Jack – Connects a TNC directly to the modulation circuit for packet convenience.

9600 BPS Capability – No modifications necessary. Provides higher performance packet operations.

Modulation Circuit – Newly designed, prevents over modulation even during high data throughput.

Rugged, Durable Construction

Die Cast Aluminum Frame Construction – Meets the highest standards to provide reliability and long life. Will enhance your trade-in value years later.

Large Heat Sink – Dissipates the heat to maintain power output and stability characteristics.

Simple Operation

Remote Control Microphone – Puts the operation of several functions at your fingertips.

Auto Dialing Capability – Programs 14 telephone numbers for autodial via repeater autopatch.

"One Push" Action Switches – Eliminates the need for "two step" function switch operation. Simplifies mobile operations for convenience and safety.

Large Display – Easy to see and logically organized for easy interpretation.

Auto Power Off – Shuts the transceiver down (when programmed). Great for bedside use.

Compatible Accessories – For easy mounting and operation.

And More!

- Built-in Pager and Code Squelch
- Optional Tone Squelch and Pocket Beep
- Scanning

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.

IC-281H 144 MHz FM Transceiver

For more information call our brochure hotline: (206) 450-6088

Experience the Quality ©

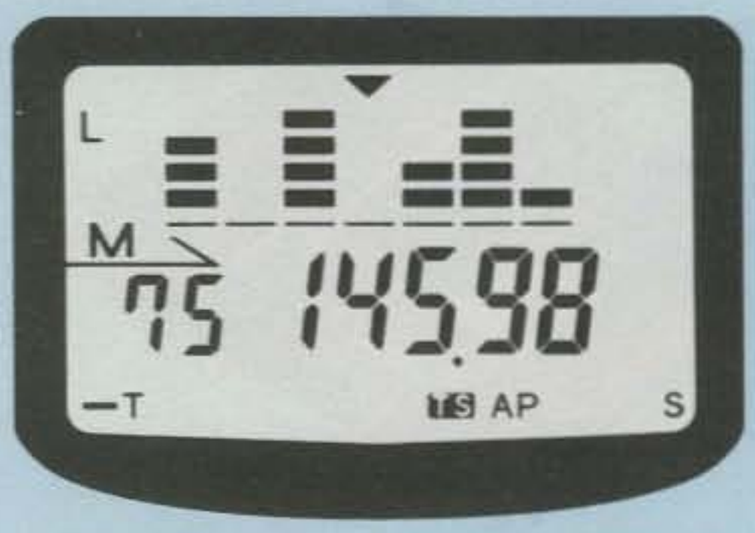
ICOM®

CIRCLE 162 ON READER SERVICE CARD

ALINCO Scores Another First
Built-In Spectrum Analyzer

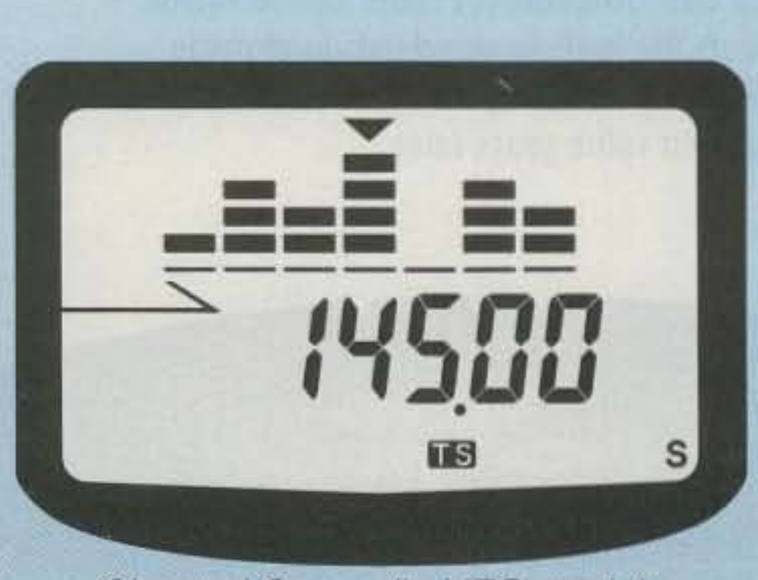
Finally. A New Feature That's Really Useful.

Alinco's newest 2-Meter HT, the DJ-G1T, offers the new "Channel Scope" built-in Spectrum Analyzer. This remarkable feature lets you visually monitor band activity, much like a commercial Digital Spectrum Analyzer.



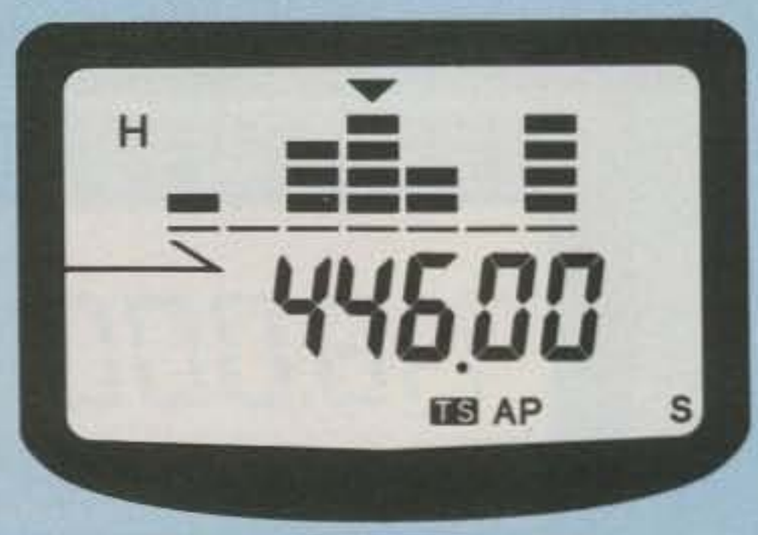
Channel Scope (in memory mode)

The over-sized display shows seven bar graphs, each of which can be assigned to an independent memory channel. This lets you monitor activity on seven different memory channels simultaneously, and instantly, with just a glance at the display. If one or more memory channels becomes active, the corresponding bar graph lets you know, and also gives you information on apparent signal strength.



Channel Scope (in VFO mode)

Alternately, the Display can be used to show band activity in the frequency domain, in either 5, 10, 12.5, 15, 20, 25, 30, or 50 KHz steps. **Hunting for band activity just got easier.**



2m/70cm Dual Band Receive

Some of the DJ-G1T's outstanding features include:

- 440 Receive (440 - 449.995 MHZ)
- 80 Memory Channels
- Channel Scope
- AM Aircraft receive
- 5 Autodialer Memories
- Programmable Delay for Autodialer
- DSQ for Private Paging
- Exceptional Audio quality (True FM)
- Cross-Band Semi Duplex
- CTCSS Encode built in
- 6 Scan Modes
- Odd-Splits on all Memory Channels

NOW AVAILABLE

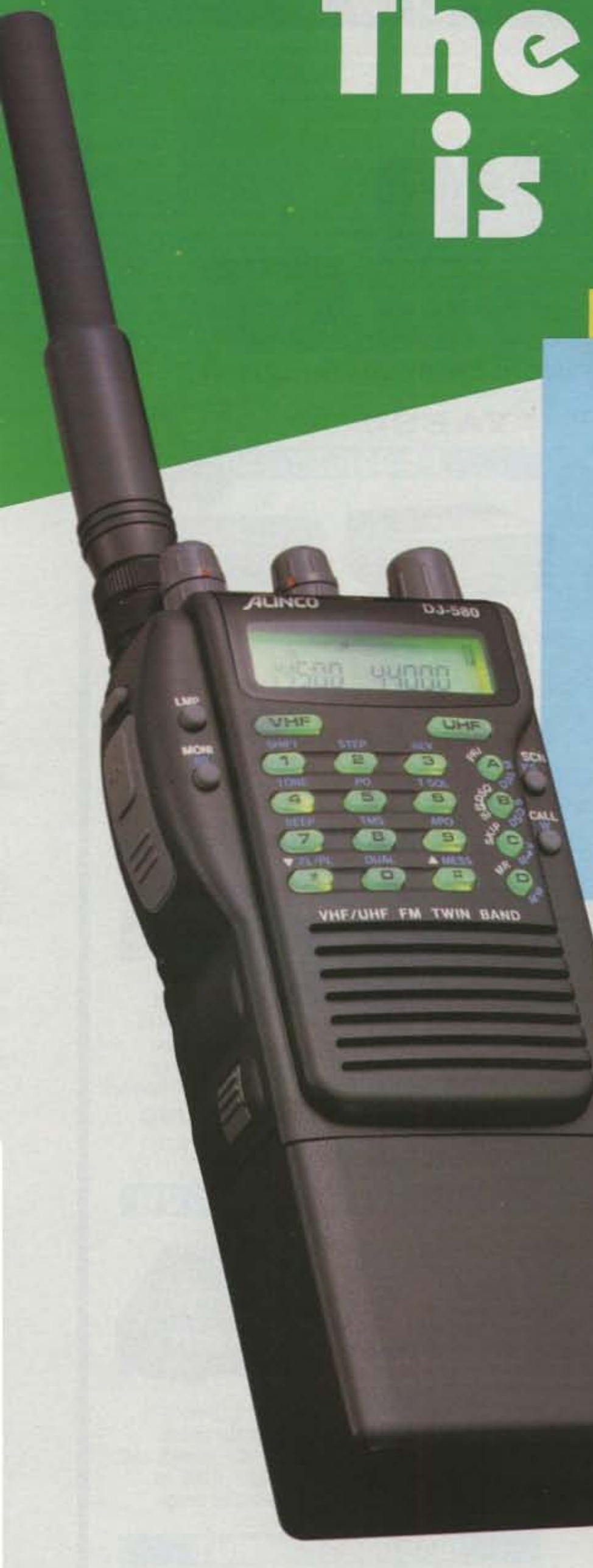
Better Products, Better Service
See for yourself why people are coming to Alinco

ALINCO ELECTRONICS INC.

438 Amapola Avenue, # 130
Torrance, CA 90501
Phone :(310) 618 - 8616
Fax :(310) 618 - 8758

CIRCLE 163 ON READER SERVICE CARD

The Choice is Yours



DJ-580T

Loaded Package

Ergonomic design, combined with excellent sensitivity and unbelievably great sound put the DJ-580T in a class by itself. Some of the outstanding features include extended receive range (including AM aircraft), Cross-Band Repeat function, backlit keypad, 8 scanning features, CTCSS encode/decode, DSQ Paging, and much more.

The DJ-580T will deliver a solid 5 Watts of power with the optional 12 Volt battery, and our EMS-8Z Remote Speaker Microphone offers remote control of Memory Channels and Scanning features.

DJ-F1T / DJ-F1TH

Sometimes Smaller is Better

Rugged construction and the most advanced technology make the DJ-F1T the best 2-Meter value available. The DJ-F1TH (High Power version) is the smallest 5-Watt rig you can buy.

Both of these models feature 40 memory channels, extended receive range (including AM aircraft), CTCSS encode, Superior audio quality, "battery save" function, and a backlit keypad.

All this is packed into a cast aluminum frame and tough poly-plastic case that has set a new industry standard for durability.

ALINCO IS
SHAKING UP PRICES AGAIN
WITH UNBELIEVABLE DISCOUNTS

$30 OFF	DJ-580T, DJ-G1T, DR-600T
$20 OFF	DJ-180T, DJ-F1T/TH, DR-130T
$10 OFF	DJ-180TH

Coupons are good until Mar. 31, '94. See your ALINCO dealer for details.

Better Products, Better Service.
See for yourself why people are coming to ALINCO.

ALINCO ELECTRONICS INC.
438 Amapola Ave., #130 Torrance, CA 90501
Phone:(310) 618-8616 / Fax:(310) 618-8758

CIRCLE 1 ON READER SERVICE CARD

— 11 STORE BUYING POWER —

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

Phone Hours:
9:30 AM to 5:30 PM

Store Walk-In Hours:
10:00 AM - 5:30 PM
Closed Sundays

NOW TOLL FREE IN CALIFORNIA!

CALL TOLL FREE:

West	1-800-854-6046
Mountain	1-800-444-9476
Southeast	1-800-444-7927
Mid-Atlantic	1-800-444-4799
New England	1-800-444-0047

Toll free, incl. Hawaii, Alaska, Canada; call routed to nearest store; ***all HRO 800-lines can assist you, if the first line you call is busy, you may call another.***

ANAHEIM, CA 92801
933 N. Euclid St.
(714) 533-7373
(800) 854-6046
Janet, WA7WMB, Mgr.
Near Disneyland

OAKLAND, CA 94606
2210 Livingston St.
(510) 534-5757
(800) 854-6046
Rich, WA9WYB, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa

SUNNYVALE, CA 94086
510 Lawrence Expwy. #102
(408) 736-9496
(800) 854-6046
Tom, KB6LUC, Mgr.
Lawrence Expwy So. from Hwy. 101

VAN NUYS, CA 91411
6265 Sepulveda Blvd.
(818) 988-2212
(800) 854-6046
Jon, KB6ZBI, Mgr.
San Diego Fwy. at Victory Blvd.

Bob Ferrero W6RJ
President/Owner

PORTLAND, OR 97223
11705 S.W. Pacific Hwy.
(503) 598-0555
(800) 854-6046
Earl, KE7OA, Mgr.
Tigard-99W exit from Hwy. 5 & 217

DENVER, CO 80231
8400 E. Iliff Ave., #9
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.

PHOENIX, AZ 85015
1702 W. Camelback Rd.
(602) 242-3515
(800) 444-9476
Gary, WB7SLY, Mgr.
East of Highway 17

ATLANTA, GA 30340
6071 Buford Highway
(404) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285

WOODBRIDGE, VA 22191
Washington D.C. area
14803 Build America Dr.
(703) 643-1063
(800) 444-4799
Curtis, WB4KZL, Mgr.
Exit 54, I-95; South to US 1

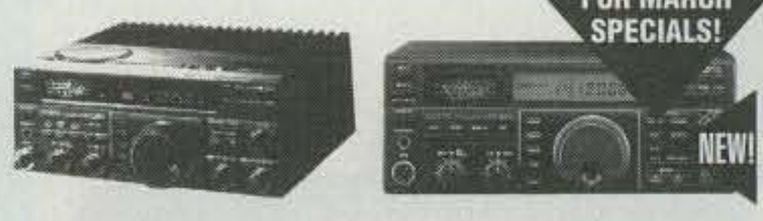
SALEM, NH 03079
Boston MA area
224 N. Broadway
(603) 898-3750
(800) 444-0047
Chuck, KM4NZ, Mgr.
Exit 1, I-93; 28 mi. No. of Boston

AZ, CA, CO, GA, VA residents add sales tax.
Prices, specifications, descriptions, subject to change without notice.

YAESU FT-990

100W HF Gen Cov Receiver
DDS, QSK • 500Hz CW Filter included
CALL FOR LOW PRICE

YAESU FT-890/FT-840



100w • Dual VFO's • QSK • DDS
IF notch filter, 12VDC
Optional built-in auto antenna tuner

100W • 12V DC • DDS
Gen. Cov. Rx, 100 mem.
Optional Ext. Auto Tuners Available

CALL FOR LOW PRICING!

YAESU FT-736R

The Ultimate Oscar Machine

VHF/UHF All Mode Transceiver
25W, Built-In Pwr Supply

YAESU FT-5100, FT-5200

2M/440 Mobile — 2M/440 Mobile

Ultra compact 50W/35W
94 Memories • Non-remotable
Dual in-band receive
Built-in DTMF paging/Coded Sql.
CTCSS Encode built-in
Backlit DTMF mic included

Ultra Compact
50w/35w 2m/440
32 memories
Built-in duplexer
Backlit DTMF MIC included

CALL FOR SPECIAL PRICING

YAESU FT-1000

200W, DUAL RX,
GEN COV RX, QSK, TCXO
CALL FOR LOW PRICE

YAESU FT-2200H, FT-2400H

2 Mtr. — 2 Mtr.

2M 50W Mobile + Aircraft RX
50 Mem. CTCSS Encode +
Paging Built-In. MW-2 Optional
Call For Special!

50W 31 memories
2 meter mobile
Large alpha- numeric LED
Backlit DTMF mi
Mil-spec design

YAESU HANDHELDS

FT-416/FT-816

2 Mtr 440 Mhz

2W 2M/2W 440
5W optional
Direct DC input
Built-in VOX, 41 Mem.
DTMF paging, CTCSS built-in
Call For Special Price On FT416 Gray

FT-11R/41R

2M 440mHz

150 Mem. Channels
1.5W standard, 5W option
Alpha-numeric display
Compact & back lit keypad

YAESU DUAL-BAND HANDHELD

FT-530

2M/440mHz

2W standard, 5W opt.
82 Mems, Dual in-band Rx
DTMF paging + coded Sql. std.
Built-in VOX & CTCSS
Auto tone search
Built-in clock • Backlit keyboard

SPECIAL PRICING!

Results of the 1993 CQ World-Wide WPX SSB Contest

BY STEVE BOLIA*, N8BJQ

Another CQ WPX SSB Contest is in the record books. While this won't be remembered as a record breaker, one world record, several continental records, and many fine scores were turned in from all parts of the world. No one area dominated the leader box. More stations took advantage of the low-power category, with over 50% of the nearly 1200 single operator logs received using 100 watts or less. The lack of "watts" reduced scores somewhat, but ZD88V and several others turned in excellent low-power scores.

Here are PYØFF, PU5OMS, PY5EG, PY5CC, N5FA, and PY5ZBU after their successful ZXØF effort.

DX

A familiar face returned to number one in 1993. In another close one, 1992 runner-up AI6V at P40V capitalized on his three-point location and fine station to edge out OH1RY at EA8AH and KW8N at KP2A. Bob's 6100 QSOs was tops, but he could not overcome the three-point advantage held by Carl and Pekka. Pekka had his station in good shape, but his spirits were dampened by news of the death of his father on Saturday. Both Pekka and Bob did establish new continental records.

Making another fine showing was XK3EJ, who moved up from number six in 1992. Yoshi, 5U7M, was less than 500K behind John.

WR6R/WH6 set a new Oceania record enroute to number six in the world. CE3FIP used his special 3G3R call to claim the seventh spot, followed by K5ZD at ZL3GQ. Had Randy known he was going to do so well, he would have rescheduled his return trip and stayed for the whole contest. 4X/S59PR (imagine saying that several thousand times) finished in the 9th spot, with CR9R rounding out the top 10.

ZPØY easily outdistanced all challengers to claim the top 10 meter spot. This may have been the swan song for 10 for the next several years. PY3OC took second, followed by C91J and V73CK.

KG6DX is the new 15 meter champion, followed by ZD8LII and KI6EZ/NH6. USA champ KA2AEV was fourth, with AL7CQ in fifth.

ED9LZ edged HK1HHX by less than 300K for 20 meter honors, with YW1A, 5Z4BH, and OH2BH (OH6EI) providing some stiff competition.

Claudio, IO4VEQ, just edged by Glenn, T32AF, for 40 meter honors, with YV5MRR and KH6XT not far behind.

XK7CC and S53EA were neck and neck for the top spot on 75 meters, with USA stations WE3C and KI6P (N6RO operating) turning in very respectable scores.

OM3CQD was number one on top band.

In the low-power category ZD88V was easily the class of the 100 watt club. Andy's 14.5M points more than doubled runner-up VP5G's fine score, and was the fourth best single op score overall. 3XØHLU was third, followed by LU2NI and VP2E/NR1R. There was some intense competition in the 10 meter category with seven stations scoring over a million points. ZY5C led the pack with 1.8M, followed by WP4WD, LU1VK, and 5H3MT. EA9UK had the big score on 15 meters with TGØAA (TG9AJR) and CX7BF providing the main competition. 7Q7XX captured the top spot on 20 followed by CT1BWW and CT3DZ. LZ1ZX edged out RB5QRW by 50K for 40 meter honors, with RB5DX taking the top spot on 80 meters and OZ3SK taking top-band honors.

KR2Q moved up from second place in 1992 to take the top spot in the QRP section. Following Doug were Randy, AA2U, and Pete, N1AFC. F1BEG and EA3FVX rounded out the top five. WB4KRH was tops on 10 meters, with JA2JSF edging out DU1CHD/6 for 15 meter honors. KS9U had an excellent 20 meter score. JR9GXQ/9 topped 40 meters, with 4M1G leading on 80 and UB5ZME top-band champion.

USA

KQ2M at KM1H retained his lock on the top spot in the USA. Soon Bob will have to put up a new wall just to hold all of his WPX plaques. WN4KKN/6 led the West Coast contingent with a solid second place. K3ZO was third, followed by K7RI and N7AVK. Five West Coast stations made the top 10. In the closest US race, NU4Y edged by NW6S with less than 10K for 10 meter honors. KA2AEV's world fourth high score led the 15 meter entries, with WF1L second and KQ4GC third. KF8TY borrowed WD8LLD's fine station to win the 20 meter title, with K6XT second. WB2ULI is the new 40 meter champ, followed by WAØETC. WE3C and KI6P both turned in excellent 80 meter scores from different sides of the US. AA4MM's 34K effort led the way on 160.

W9NQ and N1HOQ were one and two in the low-power category. KE3ZU finished third, followed by WA2EOV and WS1A. KJ6HO topped the 10 meter list, followed by K6SVL/4. N5NMX and N4MO were neck and neck on 15 meters. Twenty meters was hotly contested with the top four stations less than 16K apart. K9KU won, followed by WØMHK/1, WQ7R, and W5FO. WA6WPG worked enough JA's on 40 to capture the 40 meter title, with KE5FI doing likewise on 80. AA9AX made all of his 100 watts count in winning the 160 meter section.

In the QRP class the top three in the world were also the top three US finishers, followed by WB6JMS and N7RWH. WB4KRH led the

*4121 Gardenview, Beavercreek, OH 45431

KantronicsKPC3

LowPower **HighPerformance**

Designed for user friendly operation, but with an eye to the advanced packeteer too, the Kantronics Packet Communicator 3 delivers high TNC performance with low power in a compact package.

The **KPC**3 features an improved **Dual**Level™ command set. The NEWUSER level provides 23 commands most often used in basic packet while an expert level provides access to the **KPC**3's full 130 plus command set. The **KPC**3 also has Kantronics version 5.0 firmware. Add the **KPC**3 "Getting Started" and advanced reference manuals and you have a TNC that not only gets you up and running fast but a TNC sophisticated enough to keep you running with the state of the art.

The **KPC**3 provides status information at a glance via its six LEDs.The unit may be powered by an external supply or an internal 9-volt battery and features 32K of battery backed RAM expandable to 512K.

Additional features include Kantronics PBBS with reverse forwarding, message header editing, a mail waiting LED, remote sysop access and Kantronics KA-Node. Kiss mode and Kantronics Host mode are also provided for TCP/IP compatibility and advanced operation.

Options include Hostmaster Terminal Software for PC compatible, Macintosh and Commodore 64/128 computers, Weather Facsimile (WEFAX) reception, and real time clock.

The Kantronics **KPC**3: low power, high performance, and user friendly operation at a user friendly price.

Kantronics 1202 E. 23rd St., Lawrence, KS 66046 913.842.7745 TELCO BBS 913.842.4678 FAX 913.842.2021

— 11 STORE BUYING POWER —

HAM RADIO OUTLET

WORLDWIDE DISTRIBUTION

ALINCO DR-1200T

(Packet Only)

NEW DR-1200TH 9600 Baud Ready! Call For Price!

2M Packet Only
Transceiver, 25W
REG. $399.
SPECIAL $279.95
(DR-1200T)

ALINCO DR-570T / DR-592T

2M/440 | 2M/440

2M/440 TX
45W, 35W
Full Duplex Crossband
20 Mem. Channels
CTCSS Enc./Decode

2M/440 TX
45W, 35W
Detachable Front Panel
And Remote Control
User Friendly

Call For Special Low HRO Pricing!

ALINCO DJ-G1T

2M/HT

2M HT w/440 RX
Aircraft RX
80 Memories
Encode built in
Channel-scope built in

$30. Manufacturers Coupon Through 3-31-94

CALL FOR LOW INTRODUCTORY PRICE!

ALINCO DJ-F1T/DJ-F1T-HP

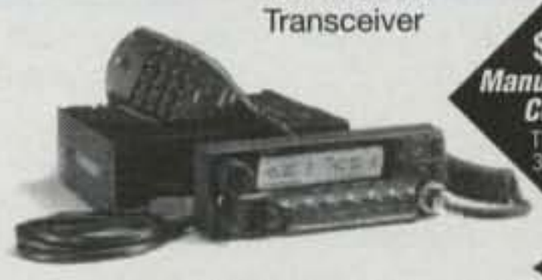
2w 2 meter compact HT
8 scan modes
40 memories
Now 5W Version Available, Too!

$20. Manufacturers Coupon Through 3-31-94

CALL FOR SPECIAL PRICE

ALINCO DR-600T

2M/440 FM
Transceiver



$30. Manufacturers Coupon Through 3-31-94

45W/35W + Airband RX
Detachable/Remotable Head
Keyboard freq. entry from microphone!
CALL FOR SPECIAL PRICE

ALINCO DJ-180T/DJ-180T-HP

$20. DJ-180T
$10. DJ-180T-HP
Mfg. Coupon
Through 3-31-94

2M 2W HT
10 Mem. Standard
upgradable to 200 Mem.
PL Encode/Decode built in
DTMF Pad Included
no keyboard entry of frequency
Scanning
DJ-180T-HP 5W version
now available

CALL FOR SPECIAL PRICING

ALINCO DJ-580T

2M/440
Dual Band

$30. Manufacturers Coupon Through 3-31-94

40 Mem Channels
DSQ, Dual Display
CTCSS Enc/Dec Built-in
Cross Band Full Duplex

CALL FOR SPECIAL LOW PRICE

ALINCO DR-130T

2M Mobile

$20. Manufacturers Coupon Through 3-31-94

2M, 50W compact TCVR, Runs cool,
20 Memories, expandable to 100 Mems
with optional EJ-19U, CTCSS encode built in,
Tone SQL optional (EJ-20U)
Call For Special Low Price!

FREE SHIPMENT
UPS - Most items over $100

RAPID DELIVERIES FROM
THE STORE NEAREST TO YOU!

ANAHEIM, CA 92801
933 N. Euclid St.
(714) 533-7373
(800) 854-6046
Janet, WA7WMB
Near Disneyland

OAKLAND, CA 94606
2210 Livingston St.
(510) 534-5757
(800) 854-6046
Rich, WA9WYB, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 &
Claremont Mesa

SUNNYVALE, CA 94086
510 Lawrence Expwy. #102
(408) 736-9496
(800) 854-6046
Tom, KB6LUC, Mgr.
Lawrence Expwy.
So. from Hwy. 101

VAN NUYS, CA 91411
6265 Sepulveda Blvd.
(818) 988-2212
(800) 854-6046
Jon, KB6ZBI, Mgr.
San Diego Fwy.
at Victory Blvd.

Bob Ferrero W6RJ
President/Owner

PORTLAND, OR 97223
11705 S.W. Pacific Hwy.
(503) 598-0555
(800) 854-6046
Earl, KE7OA, Mgr.
Tigard-99W exit
from Hwy. 5 & 217

DENVER, CO 80231
8400 E. Iliff Ave., #9
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.

PHOENIX, AZ 85015
1702 W. Camelback Rd.
(602) 242-3515
(800) 444-9476
Gary, WB7SLY, Mgr.
East of Highway 17

ATLANTA, GA 30340
6071 Buford Highway
(404) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi.
no. of I-285

WOODBRIDGE, VA 22191
Washington D.C. area
14803 Build America Dr.
(703) 643-1063
(800) 444-4799
Curtis, WB4KZL, Mgr.
Exit 54, I-95, South to US 1

SALEM, NH 03079
Boston, MA area
224 N. Broadway
(603) 898-3750
(800) 444-0047
Chuck, KM4NZ, Mgr.
Exit 1, I-93,
28 mi. No. of Boston

AZ, CA, CO, GA, VA residents add sales tax.
Prices, specifications, descriptions, subject
to change without notice.

TROPHY WINNERS

SINGLE OPERATOR, ALL BAND

WORLD: Stanley Cohen, WD8QDQ Trophy. Won by: **Carl Cook, P40V**.
USA: Atilano de Oms, PY5EG Trophy. Won by: **Station KM1H operated by Bob Shohet, KQ2M**.
AFRICA: Peter Sprengel, PY5CC Trophy. Won by: **Station EA8AH operated by Pekka Kolehmainen, OH1RY**.
EUROPE: Jim Hoffman, N5FA Trophy. Won by: **Station LZ5W operated by Alexo Savkov, LZ3ZZ**.
SOUTH AMERICA: Ron Moorefield, W8ILC Trophy. Won by: **Station 3G3R operated by Jaime Poch Suarez, CE3FIP**.
OCEANIA: Philip Fraizer, K6ZM Memorial. Won by: **Al Crespo, WR6R/WH6**.
***JAPAN**: The DX Family Foundation Trophy. Won by: **Takeshi Kinsho, JH7PKU**.
WORLD QRP/p: Dayton Amateur Radio Association Trophy. Won by: **Doug Zwiebel, KR2Q**.
USA QRP/p: Doug Zwiebel, KR2Q Trophy. Won by: **Randy Rand, AA2U**.

SINGLE OPERATOR, SINGLE BAND

WORLD: John N. Reichert, N4RV Trophy. Won by: **Luis Kemper, ZP0Y**.
WORLD 7 MHz: William D. Johnson, KVØQ Trophy. Won by: **Claudio Veroli, IO4VEQ**.
EUROPE: Myron Crofoot, WB4VQO Trophy. Won by: **Station OH2BH operated by Tomi Ylinen, OH6EI**.
OCEANIA: D. Craig Boyer, AH9B Trophy. Won by: **Joel Chalmers, KG6DX**.
USA 3.7 MHz: Lance Johnson Engineering Trophy. Won by: **John Rodgers, WE3C**.
USA 7 MHz: Lewis Sayre, N7AVK Trophy. Won by: **Peter Sears, WB2ULI**.
USA 21 MHz: Bernie Welch, W8IMZ Memorial. Won by: **Mike Samanka, KA2AEV**.
USA 28 MHz Novice/Tech: Jon Engelhardt, KA0ZFX. Won by: **Greg Brewer, KB4TLH/T**.

MULTI-OPERATOR, SINGLE TRANSMITTER

USA: Oklahoma Comm Center Trophy. Won by: **Station NZ5I operated by GMØECO & W5ASP**.

MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Prince Georges Zulu Radio Club Trophy. Won by: **Station LU4FM operated by LU1FOW, LU2FFD, LU2FYA, LU4FGV, LU5FAQ, LU5FDQ, LU6FAZ, LU6FEC, LU7FN, LU7FW, LU8FFU, LU8FJY, LU9FDG, LU9FIO, LU1JRL**.
NORTH AMERICA: Burt Curwen, KL7IRT Memorial (James Dixon, NL7HI sponsor). Won by: **Station XK7SZ operated by: VE7SZ, VE7ON, VE7CV, VE7NTT, N7RO, W7EKM**.
USA: Glenn Tracey, KC3EK Trophy. Won by: **Station WZ1R operated by WZ1R, KY1H, NJ1F, KB1W, WM1K, NU1P, AA1AS, KD1GG, KA2CIW**.

CONTEST EXPEDITION

WORLD: Kansas City DX Club Trophy. Won by: **Station HC8A operated by N6KT & HC1OT**.

world on 10, and K3TW was the USA 15 meter champion. KS9U led all on 20, and W8QZA/6 finished as the USA 80 meter QRP champ.

Multis

The 1993 contest could be called the battle of the multis. Four multi-single stations made serious runs at the world record, with the top two breaking it. Finishing number one, by just a hair, was HC8A operated by N6KT and HC1OT. Taking second was the Araucaria DX Group entry from Fernando de Noronha, ZXØF, operated by PY5EG, N5FA, PY5CC, and PYØFF. Less than 100 QSOs and 20 multipliers separated the these two fine stations. Rich and Pedro won 10 meters and the low bands with the ZXØF group winning 15 and 20 meters. The 1800 point low-band margin for HC8A proved to be a big factor. Finishing a respectable third, and nearly breaking the old record, were OH6DO and OHØXX at PJ9X. VP2EC finished in the fourth spot. Gordon, Ray, and Jim couldn't work enough Europeans to make up for the location advantage of the top three. TO5M (in Martinique, not France) finished fifth, followed by C49C, EA4KR/EA8, P20X, TM7C, and CT5P. Both EA4KR/EA8 and P20X established new continental records.

LU4FM was the new multi-multi champion, with XK7SZ coming in second. Third went to 9A1A, followed by OT3A and HG73DX.

In the US the top multi-single station was NZ5I operated by GMØECO and W5ASP. AA8U was second, followed by W7ZR and KI1G and W6EEN. The gang at WZ1R was the multi-multi champs, with WK4Y and WX3N/Ø coming in second and third.

The Rest of The Story

Starting with the 1994 WPX SSB Contest, a Single Operator Assisted category has been added to remain consistent with the other major contests. I'm not sure how this will affect scores, but at least all those who previously used packet (myself included) and entered as a multi something will now be competing only with other single operators, not true multi stations. For those who chose to enter as single ops (and didn't get caught), you now have your own category.

A bunch of logs were entered in my database again. Logs from almost all of the top scorers and from all parts of the world were either typed in or a disk was submitted. All sorts of disk file formats were received, which makes it interesting to extract the required information for the database. If you only send a disk, with no paper log, make sure that your log is in ASCII and formatted so that all required log information is available. A separate file of calls would also be appreciated. It is quite an effort to extract calls from formatted logs. For those using the ever popular "CT," please send along your *.bin file. Please don't send Macintosh disks. Each year I get a couple, but have no way of converting them to PC format.

"Unique rates" remained about the same as in previous years, but it still amazes me how many stations don't check their computer logs for typos and busted calls. Those sorts of things really stand out in a fairly large data base and are the reason for many of the score reductions. Please check your work. Pretend you're balancing your checkbook.

Submitting your log on disk is highly encouraged. None of the committee really relishes typing 3000 contact logs into the database, especially when they have been scored by computer. Starting in 1994 a disk may be requested if you score your log with a computer and don't send along a disk.

As in previous years, many stations go to great lengths to use a new prefix for the WPX. Your efforts are appreciated by all. Some of the more unique calls worked this year include 3G3R, 4V2PK, XB2I, ZD88V, CU0WPX, TO5M, TO6A, ZX0F, C49C, P20X, PRØR, TM2V, T45DD, XJ2ZP, CR9R, TM93U, SN3A, US8I, RY7E, CH2WJ, RT1U, J42T, JU1T, and YW59M (an all-YL expedition). Also appreciated are the many DX stations such as 9V1YC, 4D9RG, V63OM, XU7VK, TA2DS, JT1BG, 5U7M, 9K2ZZ, A61AD, XT2BW, 3X0HLU, A92BE, and the KH2S/KP1 expedition. Thanks to everyone who helped to make the 1993 contest such a success.

A new committee member was added this year. Scott Jones, WR3G, has joined us and got his first taste of the glamorous life of a log checker. Thanks a bunch, Scott, and I hope you'll come back in 1994. Also thanks to the other Scott, N9AG, for his efforts again.

We are still searching for trophy donors, especially for the low-power and the new single operator assisted categories. The addition of trophies for the winners helps to spur interest and participation. If you, your club, or your company would like to sponsor a plaque for the CQ WPX Contest, please contact me. There is still time to sponsor one for the 1994 contest.

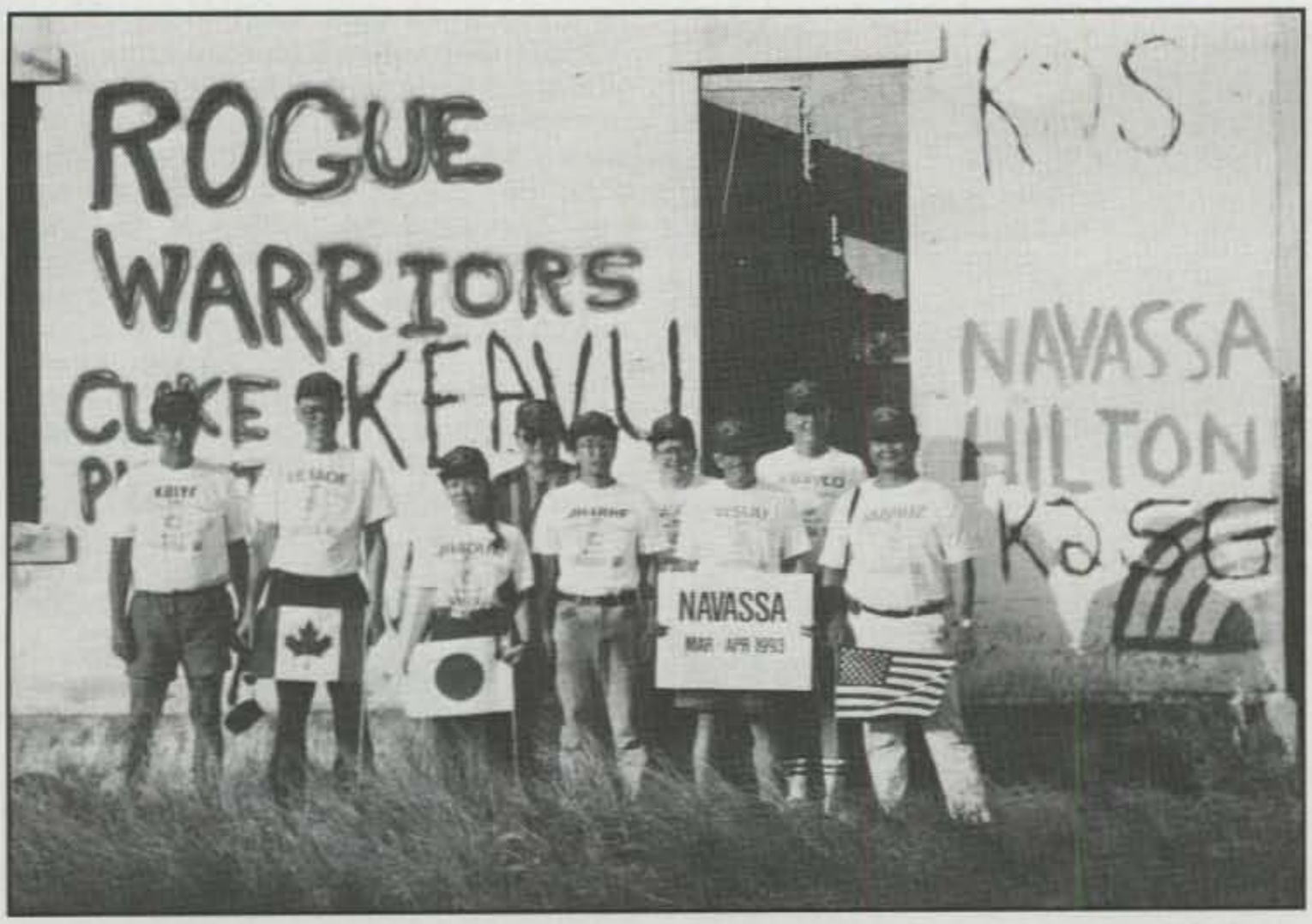
The 1994 WPX SSB Contest will be held March 26 and 27 (GMT). As always, logs and rules are available from *CQ* for an SASE. Please mark your envelope as such so that it does not get stuck in the boxes with the logs. I usually find several requests for log sheets mixed in with the logs. Copies of contest results can also be obtained from *CQ* in Hicksville.

Good luck in '94!

73, Steve, N8BJQ

Random Comments

"Have you ever been in a situation to contest while you are bombarded with shells and surrounded with explosions, while there is often no electricity and you are regularly asked in which country you live? . . . *4O4D*. Yasu, N3KOU (JG3OET) ,will be returning to JA this spring after graduating from MSU. We will miss



The "Rogue Warriors" of Navassa. From left to right the ops of KH2S/KP1 are KØIYF, VE1AOE, JR4DUW (the first YL to operate from Navassa), NF6S, JH4RHF, WJ2O, W5IJU, KB4VLO, and JA8RUZ.

him. His participation enabled us to achieve excellent results. . . . *AA8U.* Too bad the band 'police' QRMed us twice. Propagation on low bands was poor during the night. . . . *C49C.* We thought we were ready—equipment, antennas, callsign, etc. Missed our goal by a few kilo Q's and mults. Thanks to all organizers and participants. Great job. . . . *CK7K.* Conditions disappointing. . . . *G3OZF.* It is 10 years since the club entered this contest. We have not been so successful this time, but we have had a lot of fun. We will do better next year . . . *G6CW.* 28 MHz on Saturday was awful—lucky both 28 and 21 MHz picked up on Sunday with a nice pileup on 21 MHz from USA at 190 per hour! . . . *GX5QK.*

WPX—it's always a thrill. We will be back in next future with a special call. Tnx to everybody. . . . *IK2HDG.* JU1T is contest call for JT1KAA. . . . *JU1T.* This is my first WPX entry although I have given QSO's for many years. Packetcluster was useless for WPX and I won't make that mistake in CW portion. . . . *KC6X.* The boat delayed 1.5 days. Only 24 hours for the contest. . . . *KH2S/KP1.* First ever big effort from home. I guess I did okay. . . . *KY2T.* Most things were new. First use of LX4A, first time team worked together, new transceiver, and a whole bunch of new antennas. Team spirit was omni-present. . . . *LX4A.* Propagation was down from previous year. Without them W/VE runs one can't make a good score from Finland. JA's however weren't a disappointment. We'll be back again. . . . *OH5NQ.* Murphy gained power again. None of the Yagis were moving less than 10 hours before the contest started. We probably will have extra motivation next year as we are not pleased with this year's result. . . . *PA6WPX.*

Due to last year's neighborhood TVI problems, we moved on the south of the island and were portable on top of a hill. A real DXpedition. . . . *TO5M.* Congrats to HC8A. Being in a two-point area, we just couldn't run EU fast enough with 10 meters going down. . . . *VP2EC.* Two million down to the last year. . . . *XA5T.* Rotator jammed 2 hours into contest; tribander stuck at 90 degrees and 40 meter beam pointed at Antartica. So we had a barbecue and got a high hotdog and hamburger score. . . . *XL7U.* It's very hard work without a computer. . . . *YR6F.* The first YL DXpedition to Los Monjes Island. . . . *YW59M.* It took 8 hours to make six 8 km roundtrips with a skidoo and large sled to bring grub, computers, rigs, and gear to the club site. By the time we were set up, we were too tired to operate. . . . *CZ7Z.* Our operators drove a combined 38 hours to operate the WPX! The ever-decreasing activity from Asia, combined with poor condx left us midwesterners begging for stateside QSO's. We worked 447 US prefixes. . . . *WX3N/Ø.*

Nothing BLEW-UP this year! . . . *WZ1R.* Still get a thrill from cracking the pileups with 3 watts and thanks to the many US and DXpeditions who heard my tiny signal. They must have great equipment and super operators. . . . *G4MET.* Surprised how effective QRP can be! . . . *K3TW.* QRP means never having to say CQ! . . . *K9OSH.* Worked 113 DXCC countries with 5 watts. Also made 116 band changes; now that's moving! As always, a fun contest. . . . *KR2Q.* My first QRP effort—both frustating and fun. . . . *N8FEH.* Eighty meter QRP SSB is tough; I spent two full nights making 19 QSO's, but my QSO with JF1IST made it all worth while! . . . *W8QZA/6.* Didn't get much air time but had fun. . . . *WA7NWL.* I hate 40 meter phone in contests! Biggest thrill was working XT2BW on first call. . . . *WB6JMS.* Sorry, but we have AC power only this period. We have difficulties of any powers here—long and cruel blockade of Armenia. . . . *4J4JJ.* Try to spell my call about 10,000 times . . . *4X/S59PR.* Ah! Tired, could not reach 4000 QSO! . . . *5U7M.*

First contest entry from JA. Plan to enter many contests from here with greater effort as time allows. . . . *7J3ABV/7J1.* Amateurs! Let's

WORLD TOP SCORES

SINGLE OPERATOR ALL BAND

P4ØV	**19,406,800**
EA8AH	**17,387,133**
KP2A	16,694,570
XK3EJ	10,672,784
5U7M	10,149,202
WR6R/WH6	**9,803,972**
3G3R	**9,104,494**
ZL3GQ	8,459,200
4X/S59PR	8,263,122
CR9R	7,419,272
KM1H	**7,025,136**
HC7SK	6,873,680
4V2PK	6,622,284
LZ5W	**6,538,782**
WN4KKN/6	5,797,184
K3ZO	5,188,970
JH7PKU	5,122,156
K7RI	5,102,520
A61AD	4,989,600
N7AVK	4,785,942

28 MHz

ZPØY	**10,635,356**
PY3OC	5,363,820
C91J	3,629,840
V73CK	2,185,116
CT8T	941,147
UN8LA	890,666
NU4Y	626,560
NW6S	616,900
IO4ABF	545,877
CE3ZI	476,575

21 MHz

KG6DX	**6,597,812**
ZD8LII	5,456,589
KI6EZ/NH6	4,944,027
KA2AEV	**3,835,469**
AL7CQ	3,623,466
S56MM	3,311,963
OK1RI	3,028,065
LU1HOO	2,852,748
S57EK	2,835,924
9A1CCY	2,616,132

14 MHz

ED9LZ	6,121,569
HK1HHX	5,809,868
YW1A	5,194,194
5Z4BI	3,778,488
OH2BH	**3,735,324**
OH1EH/OHØ	3,526,587
7L1GVE	3,008,850
GW4BLE	2,992,041
9A7A	2,517,606
CT3BD	2,406,320

7 MHz

IO4VEQ	**4,184,292**
T32AF	3,995,928
YV5MRR	2,778,078
KH6XT	2,546,950
XB2I	1,801,500
F6EZV	1,671,320
4V2B	1,528,800
DJ7AA	1,522,560
OH5BM	1,002,300
F1NBX	872,490

3.7 MHz

XK7CC	1,320,926
S53EA	1,136,930
WE3C	**873,196**
KI6P	717,590
DL3LAB	635,600
IK3ORD	614,992
OM3TZW	544,578
LY1DS	512,528
LY3BS	458,496
4N1A	363,000

1.8 MHz

OM3CQD	105,878
4N4DD	88,086
F6AML	38,870
AA4MM	34,584
WF2W	18,560
RB5ELM	9,016
YV1DRK	8,736
WA6IET	1,232

LOW POWER ALL BAND

ZD88V	14,501,145
VP5G	6,634,896
3XØHLU	3,849,522
LU2NI	3,487,328
VP2E/NR1R	3,155,416
EA8BWW	2,875,575
NP2I	2,751,252
XJ4VV	2,723,680
XK7SV	2,618,356
CUØWPX	2,472,000
XT2BW	2,315,682
9V1YC	2,311,768
W9NQ	1,712,340
PW2N	1,668,472
VE3RM	1,610,282
TO6A	1,430,220
TM6GG	1,412,980
XK6CGY	1,323,705
N1HOQ	1,185,678
CJ6V	1,139,647

28 MHz

ZY5C	1,851,354
WP4WD	1,784,820
LU1VK	1,645,296
5H3MT	1,347,780
LU6EJP	1,231,367
4Z5AC	1,111,808
JM1TUY	1,027,699
LU8DY	438,681
XE1BEF	300,775
ON6TT	268,393

21 MHz

EA9UK	3,696,440
TGØAA	1,485,320
CX7BF	1,343,146
JR7OMD/2	1,302,623
JQ1NGT	1,197,380
XO1SF	1,158,476
JA7ZWD	943,920
N5NMX	760,529
N4MO	722,728
UB5QMA	642,025

14 MHz

7Q7XX	1,025,352
CT1BWW	638,675
CT3DZ	484,408
EA6WX	315,774
UA1TAN	268,576
XO2AC/XK1	263,676
HI8OMA	249,711
JE2UFF	201,788
K9KU	188,086
WØMHK/W1	174,896

7 MHz

LZ1ZX	539,110
RB5QRW	489,108
VF3SRE	284,616
LZ2ZY	96,768
SP9RVD	45,150

3.7 MHz

RB5DX	504,900
S59DRJ	340,000
YV4DSB	286,344
HA4XN	259,076
UA9DE	236,208
F6BVB	186,140
SO2FCJ	184,884
SP9CAY	180,400
DF3JO	179,196
OK2PJW	171,496

1.8 MHz

OZ3SK	104,876
UB5FAN	45,372
S53TK	26,264
RB5ILZ	25,208
AA9AX	5,656

QRP/p

KR2Q	**A**	**993,293**
AA2U	**A**	**738,843**
N1AFC	A	588,392
F1BEG	A	439,766
EA3FVS	A	306,333
WB4KRH	28	81,030
UWØST	28	57,081
WA6FGV	28	51,684
JA2JSF	21	105,814
DU1CHD/6	21	96,896
RW9QA	21	80,541
KS9U	14	326,988
RB5EG	14	191,646
JR9GXQ/9	7	1,200
4M1G	3.7	47,616
SP4GFG	3.7	19,980
UB5ZME	1.8	4,320

MULTI-OPERATOR SINGLE TRANSMITTER

HC8A	**32,502,677**
ZXØF	30,799,098
PJ9X	25,678,215
VP2EC	22,462,276
TO5M	17,310,349
C49C	16,387,756
EA4KR/EA8	14,108,475
P2ØX	13,440,570
TM7C	12,649,637
CT5P	12,479,320
TK6A	11,599,760
GB6BT	11,313,840
PRØR	11,036,112
EL2PP	10,578,167
CH2WJ	8,714,595
TM2V	8,484,040
CE6EW	8,332,632
JH5ZJS	8,085,615
PT7CB	7,962,741
WL7E	7,805,280

MULTI-OPERATOR MULTI-TRANSMITTER

LU4FM	**28,369,173**
XK7SZ	**22,633,136**
9A1A	18,456,290
OT3A	17,251,069
HG73DX	15,652,197
UX9C	15,078,492
PX4B	14,126,786
CZ7Z	13,234,540
US7I	12,307,950
WZ1R	**11,126,585**
WK4Y	8,854,545
7Z2AB	8,779,886
WX3N/Ø	8,771,860
JAØYAK	6,667,650
LY7A	5,861,464

get active on 10 meter band! I love '10'! . . . *7K2PBB*. Glad I went back for another trip to A6. Always fun to operate the WPX from there. I am still amazed how many said it was a new country for them after 45,000 QSO's logged since 1989. . . . *A61AD*. Got a lot of new countries. Tnx everybody! . . . *AA3CN*. Had a ball in this contest. Noise got real bad around 3 AM. . . . *AA4MM*. Condx worse, my score better, and fun just as good as 92. . . . *AA7FK*. Lots of big signals—more amps and beams out there. . . . *AI2C*. Cndx bad. No EU on 10 and very little on 15. Effects of current sunspot cycle really affected results. . . . *AI7B*. Still the greatest contest! I must say that on 20 I couldn't handle the pileups. . . . *CT1BWW*. Where was Europe?? Not on 10 meters! . . . *CT1ENQ*. I almost lost my fiancee during the contest (couldn't bear to hear another CQ call and split). . . . *CT1ERK*. QSL via AB4PW . . . *CT8T*.

It's hard work with a DL8 callsign. . . . *DL8PC*. This year finally the station was in good shape and I was in a good mood. But then Saturday night came a telephone call from home; my father had suddenly passed away. . . . *EA8AH*. Considering my limitations—I only can transmit between 3600 and 3700 kHz—I am very proud of this edition. . . . *EC3CIL*. This contest is wonderful, but I don't have very time. Thank you. . . . *EC7DYV*. Holiday in Ireland wouldn't be the same without WPX! . . . *EI/G3YOG*. See you from another country. Thanks to F2VX. . . . *FØ/EA3NY*. Sticking relay, awful conditions, and plain vanilla G4 prefix didn't help! So not a serious effort this year. . . . *G4PKP*. Sunday was bad news—high SWR on the beam and lousy propagation! . . . *GW4BLE*. First time ever operated a contest mobile. Great fun. . . . *GW4RTO/M*. Same frustrations prevail. The high elevation angles preclude many QSO's as just too weak. Hear a lot of East Coast N.A. and Europe right down at the noise level, but unable to raise most of them. . . . *HL9UH*.

This is my first contest on 80 meters and I enjoy for my score. Tnx for *CQ* magazine. . . . *IK3ORD*. The first very good propagation in the 20 meter band in the year 93. . . . *IN3KTT*. Rain and winds damage my main antenna system and I work the contest with emergency antenna with many TVI problem. Is funny in any case. . . . *IOØYQV*. Very poor propagation. . . . *IO4ABF*. Bad WX, bad propagation, but great fun! . . . *IT9NTT*. Ten meters was not very good, but enjoyed contesting as usual! . . . *JA8RWU*. Many thanks for the nice contest. I was contacted many stations in the world. . . . *JE2UFF*. I love this contest. Had a lot of fun. . . . *JF1SEK*. I could hear only big stations because of bad conditions and a small antenna. . . . *JR4GPA*. Eighty meter conditions allowed for good rag chewing with old friends. . . . *KØCS*. BC QRM on 7 MHz bad, but QRN from electric fences was horrendous. Have to fix fences. . . . *K6ZDL/5*. Fun to do a high power test for a change! . . . *K7RI*. Sure like the low power class, but it gets rough sometimes. . . . *K9BQL*.

Ten meters was dead! Fifteen meters was the place to be this year! Lots of fun. . . . *KAØCKN*. Saturday had great condx, Sunday brought varying condx and QRN from BIG thunder storm. Had a great time as usual, can't wait till next time. . . . *KA2AEV*. Learn more each time! . . . *KB8OAN*. Nice antenna weather, not too many Q's! . . . *KC1SS*. Worked a lot of African stations! . . . *KC4URW*. Ten meters was lousy, JA's and EUR were non-existent. . . . *KC7UP*. Found the humor of the sixes out west

to be welcome relief to the trench warfare amongst the kilowatts. . . . *KD4CDB/T*. What great openings! . . . *KF2MM*. About the best contest as always. Aloha and Mahalo to all. . . *KH6FKG*. Conditions were not good at all. Didn't hear any EU on 10 meters. Maybe next year I'll try all band. . . . *KJ6HO*. One can only be impressed by the Big Guns, Big Scores. Thanks CQ magazine for a fun time. . . . *KO4UE*. Fifteen meters allowed for plenty of sleep. I will be back. . . . *KQ4GC*. Biggest thrill was being called by 5X1A. . . . *KS2M*.

Lost voice Saturday afternoon. Had to quit. . . . *KY5N*. My 4-element Yagi went QRT few hours before the contest. So I had to work the contest with a ground plane and some simple dipoles. But even that was fun so weekend wasn't totally a disaster. . . . *LA9DFA*. Managed to work KP1 during the contest and S21ZG, Eric, answered my CQ Contest call on 10 meters. Lots of fun. . . . *LU2NI*. Thanks for a good weekend! . . . *LY1DS*. More QSO's, more mults, but ooooh so close on the score! Just couldn't get enough runs into EU for the points. . . . *N1HOQ*. My first CQ WPX contest! Liked it! . . . *N2ALE*. I fought the flu and the flu won. . . . *N4YKD*. Ten meters is gone but not forgotten, as is my score! . . . *N7AVK*. My first WPX contest—really enjoyed it despite constant QSK from the XYL and grandchildren who just had to see why papa was making so much noise in the shack. . . . *NH6XM/T*. All of the stateside multipliers make this contest a lot of fun for the low power operators. See you next year. . . . *NI9C*.

Strange conditions at end of contest. Actually had to turn beam to Australia to work the west coast of US! . . . *NL7VJ*. Static level very high Friday night. Had to QRT when the balloon supporting my 1/4-wave 160 vertical blew up. Had a spare balloon, but no more helium gas to inflate it. . . . *NOØY*. Tough conditions. Plus had a line noise of S-9 and higher from 300 kHz to 30 MHz for six hours on Saturday night and a couple of other times. Glad it's over but fun nonetheless. . . . *NP2I*. Band condx very poor from (no Europe on Saturday). Can only go up from here. 73's. . . . *NU4Y*. Tried 15 meters single band. Conditions were extremely poor, so I did not operate full time. But VR6BX was a goodie just before going QRT. . . . *OE3EMN*. Had to work this weekend and my second contest with computer logging. . . . *OHØNJ*. Intensive competition with OH1EH/OHØ. A good fight really makes the most out of contesting. But it also dries the juice out of the man. Boys, it was fun! . . . *OH2BH*. First contest in YK under the United Nations. QSL via OH3GZ 100% . . . . *OH3MIG/4U*.

Nice prefixes found but unfortunately 20 meters stayed closed to North America. . . . *OH3OJ*. I was missing my last year QTH (J68AX)! . . . *OH3VV*. Saturday propagation to USA was horrible, Sunday much better. Several 30 minute blackouts during both days. . . . *OK1RI*. A visit to my brother ON6NL brought us a good idea for a next CQ WPX! . . . *ON/PAØMPM*. Ten meters single band with this bad propagation. I must have been out of my mind. Worse than field day . . . *ON6TT*. Great to be contesting again. Was super impressed with low dupes. . . . *T32AF*. It is my first contest—WPX. . . . *T45DD*. I love low power. It's a challenge. . . . *TGØAA*. It is my first contest with my new callsign .. . . *UN7LZ*. Arcing power line insulator gave me trouble to Europe. . . . *VE7VX*. Great to be back seriously in WPX. I used to operate in the late seventies and early eighties as VK4VU but then other activities got in the way. Now with six acres we can start to play the low bands. . . . *VK5GN*. Murphy's law: Linear amplifier blew as I turned it on for the contest, no spare tubes! . . . *W1ENZ*.

My daddy told me: 'Son, when you get old an all nighter will do you in.' I didn't know (in my youthful ignorance) he was talking about ham radio contesting. . . . *W4TMN*. Henry 2K sure makes a difference; now I know how the 'Big Boys' feel even though I am not quite there yet. Sure lots of fun. . . . *W6TKF*. Sure enjoy WPX every year. This year European openings very short from my QTH. . . . *W7FP*. My first WPX but not the last! . . . *W7OM*. Tuff to get old. Can't get the log straight first time any more (hi). . . . *W7QN*. The main station radio broke and had to use the backup radio. Not being able to work split on 40 cost a lot of Q's. Oh well, had fun anyway. CQ always has the B-E-S-T contests. . . . *W7WHY*. I really enjoy the low power category. All contests should have one. The WPX contest should line up with the other major contests and create a single op assisted category. As usual, great contest! . . . *W9NQ*. My score would have been higher, but I had to take time off to buy a new car for my wife. . . . *WA6UFY*. Just got back on the air after 15 years. Can't wait for the CW section. This time as an 'accident.' Next time I plan on working the contest! . . . *WB2CKQ*.

To do a single band 40 meter SSB effort, one must ejoy pain. . . . *WB2ULI*. Eighty meter noise level was high, but lots of activity—fun contest! . . . *WE3C*. Being called by Good DX and not fighting through a pileup. . . . *WF1L*. My third contest from K3LYW. His station is a single op's delight. I hope to be back there for CQ WW complete with packet and interface to the computer for quick QSY. . . . *WI2T/3*. Oh what fun my first million score! . . . *WI6N*. It sure was hard to hold the mic, log, and keep the rig from sliding off the table while operating marine mobile on my way to Navassa. . . . *WJ2O/6Y5*. This is my second time entering, and it was just

USA TOP SCORES

SINGLE OPERATOR ALL BAND

KM1H	**7,025,136**
WN4KKN/6	5,797,184
K3ZO	5,188,970
K7RI	5,102,520
N7AVK	4,785,942
KF3P	4,740,040
KM5X	4,380,993
NI8L	3,758,843
NN7L	3,654,355
AI7B	3,646,008
W3BGN	3,046,428
WAØPUJ	2,422,362
WZ4F	2,414,820
KF2O	2,179,743
K3WW	2,016,300
AA2GQ	1,912,144
K2POF	1,911,100
K4VUD	1,864,356
KE9I	1,844,508
WØRRY	1,776,170

28 MHz

NU4Y	626,560
NW6S	616,900
WØACT	135,034
WA2SYN	122,791
KA8D	102,711

21 MHz

KA2AEV	**3,835,469**
WF1L	882,235
KQ4GC	746,304
NB7N	569,380
W7FP	509,913
WB2YQH	509,580
KD1GJ	494,265
WA4QMQ	358,834
N9LCR	201,779
N6MSQ	178,695

14 MHz

WD8LLD	1,046,960
K6XT	500,193
N6WR	232,560
W1LQQ	114,330
W4/HK3GZB	75,712

7 MHz

WB2ULI	**237,456**
WAØETC	146,556
KE4BM	113,094
NX7K	54,834
W4TMN	31,668

3.7 MHz

WE3C	**873,196**
KI6P	717,590
K2ONP	105,264
KE2JO/4	62,748
KØCS	32,240

1.8 MHz

AA4MM	34,584
WA6IET	1,232

LOW POWER ALL BAND

W9NQ	1,712,340
N1HOQ	1,185,678
KE2ZU	921,393
WA2EOV	875,472
WS1A	868,502
ACØW	863,154
NZ5O	732,875
NU7I	482,886
N6WLX	458,292
AA4EL	409,700

28 MHz

KJ6HO	182,406
K6SVL/4	157,731
KB4TLH/T	**116,633**
W6PYX	90,285
WB2BZR/3/T	64,944

21 MHz

N5NMX	760,529
N4MO	722,728
NY5B	440,428
WT5U	417,749
WZ8T	391,310

14 MHz

K9KU	188,086
WØMHK/W1	174,896
WQ7R	170,500
W5FO	162,400
W6OUL	54,776

7 MHz

WA6WPG	15,960
WM2V	3,540

3.7 MHz

KE5FI	35,868

1.8 MHz

AA9AX	5,656
NOØY	2,160

QRP/p

KR2Q	**A**	**993,293**
AA2U	**A**	**738,843**
N1AFC	A	588,392
WB6JMS	A	274,055
N7RWH	A	226,452
WB4KRH	28	81,030
WA6FGV	28	51,684
K3TW	21	59,748
W6CN	21	44,745
KS9U	14	326,988
W8QZA/6	3.7	540

MULTI-OPERATOR SINGLE TRANSMITTER

NZ5I	**6,423,699**
AA8U	5,617,863
W7ZR	5,391,684
KI1G	4,721,517
W6EEN	4,692,650
WU7Q	3,962,546
KE3Q	3,916,890
N7TT	3,337,236
NO9Z	3,251,409
NJ1V	2,329,094

MULTI-OPERATOR MULTI-TRANSMITTER

WZ1R	**11,126,585**
WK4Y	8,854,545
WX3N/Ø	8,771,860
N8BJQ	1,135,200
NK3U	1,017,344
NE1A	883,630
NY6Y	47,422

CONTINENTAL LEADERS

AFRICA

A	**EA8AH**	**17,387,133**
28	C91J	3,629,840
21	ZD8LII	5,456,589
14	ED9LZ	6,121,569
7	No Entrant	
3.7	CQ3B	193,280
1.8	No Entrant	

ASIA

A	4X/S59PR	8,263,122
28	*4Z5AC	1,111,808
21	4ZØT	2,376,048
14	7L1GVE	3,008,850
7	*RW9AB	416,744
3.7	*UA9DE	236,208
1.8	No Entrant	

EUROPE

A	**LZ5W**	**6,538,782**
28	CT8T	941,147
21	S56MM	3,311,963
14	**OH2BH**	**3,735,324**
7	**IO4VEQ**	**4,184,292**
3.7	S53EA	1,136,930
1.8	OM3CQD	105,878

NORTH AMERICA

A	KP2A	16,694,570
28	*WP4WD	1,784,820
21	**KA2AEV**	**3,835,469**
14	XJ2ZP	2,265,045
7	XB2I	1,801,500
3.7	XK7CC	1,320,926
1.8	AA4MM	34,584

*Denotes low power.

OCEANIA

A	**WR6R/WH6**	**9,803,972**
28	V73CK	2,185,116
21	**KG6DX**	**6,597,812**
14	KH6FKG	2,312,404
7	T32AF	3,995,928
3.7	No Entrant	
1.8	No Entrant	

SOUTH AMERICA

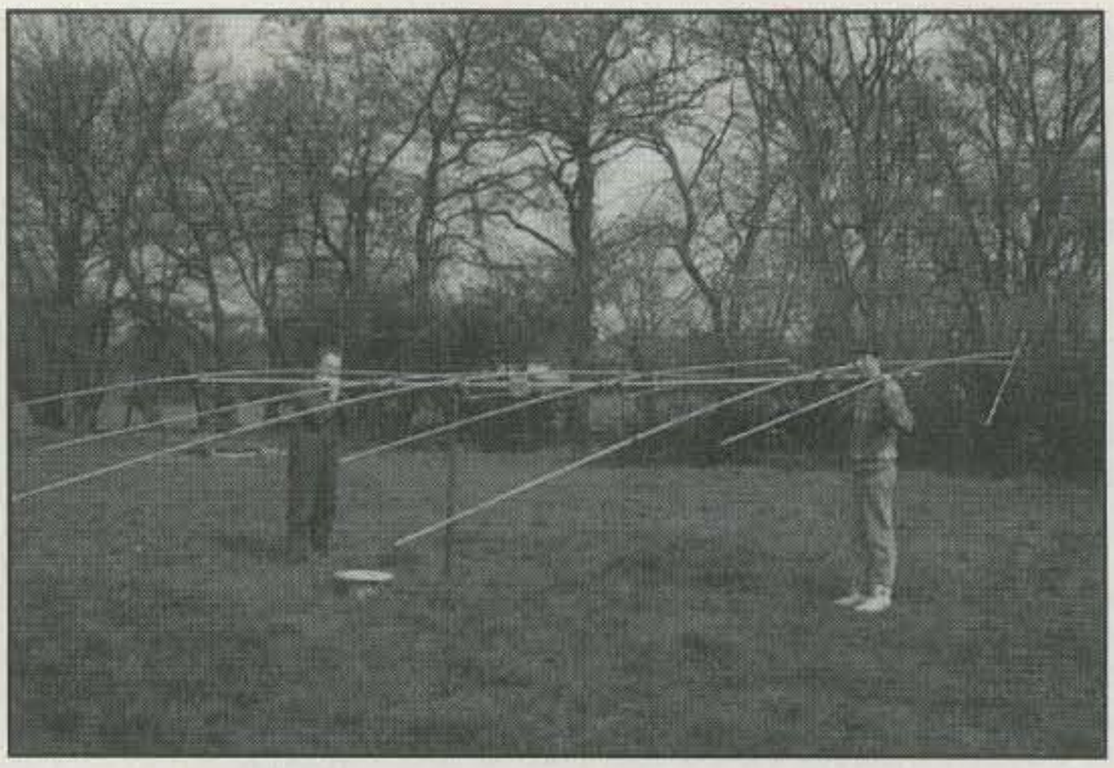
A	**P4ØV**	**19,406,800**
28	**ZPØY**	**10,635,356**
21	LU1HOO	2,852,748
14	HK1HHX	5,809,868
7	YV5MRR	2,778,078
3.7	*YV4DSB	286,344
1.8	YV1DRK	8,736

MULTI-SINGLE

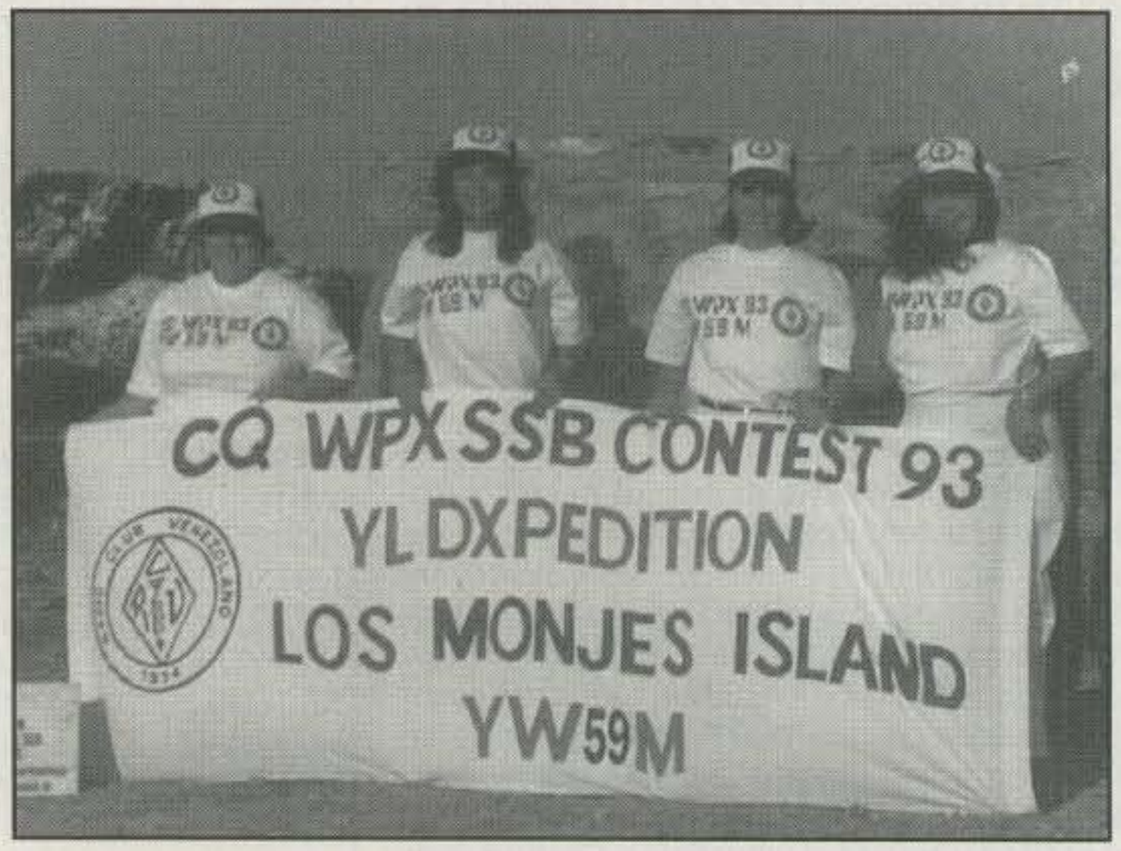
AF	EA4KR/EA8	14,108,475
AS	C49C	16,387,756
EU	TM7C	12,649,637
NA	VP2EC	22,462,276
OC	P2ØX	13,440,570
SA	**HC8A**	**32,502,677**

MULTI-MULTI

AF	No Entrant	
AS	UX9C	15,078,492
EU	9A1A	18,456,290
NA	**XK7SZ**	**22,633,136**
OC	No Entrant	
SA	**LU4FM**	**28,369,173**



Here are two unidentified operators of GX5QK trying to find the USA. I hope this was the low antenna.



Here are the ladies who put on YW59M, an all YL expedition to Los Monjes Island.

as much fun as the first time. . . . *WS1O*. Never heard Europe once. Ugh. . . . *WS7V*. Why is it that the stations saying 'What's your call?' never work you when you give it again? . . . *WV2B*. Didn't have time to work all the way but had a lot of fun. Next year I'll go for the record in the category. . . . *XE2VOP*. I lost my amplifier Saturday morning, but was able to borrow another within 8 hours. Thanks, VE3IQ. The VE record will have to wait till next year. The XJ prefix was to mark a curling tournament. . . . *XJ2ZP*.

Fifteen was fantastic! . . . *XK3EJ*. Ain't it strange. Murphy doesn't strike when condx are poor. . . . *XO1SF*. XO1 prefix commorating Postal Communications. . . . *XO1TX*. Like everyone else, wish I had more time and bigger antennas. . . . *XO2AC/XK1*. Saturday was the pits; when you can't get a string of JA's going from YB, you know propagation is mythical only. . . . *YB1ARW*. YB3ZBS is the scouting amateur radio club of East Java Provincial HQ in Surabaya. . . . *YB3ZBS*. Is my first CQ WPX Contest. I am 11 years old. . . . *YO8SMI*. This was my 18th CQ WW WPX SSB Contest and my 1614th contest log entry at all. . . . *YU7SF*. Heavy tropical QRN; CU next year. . . *YV1DRK*. It was like working QRP. Horrible conditions throughout the whole contest, but had a big deal of fun nevertheless. . . . *YV4DSB*. Super contest—great fun as always. Must get an amplifier for the next one. . . . *ZD88V*. Last year I was ZF2QP. Took Cayman exam to get ZF1 call, best part of the whole contest! Passed Friday 3 PM. . . . *ZF1CQ*. Only able to operate 27.5 hours before running to catch airplane home. Never expected to break record for Oceania or I would have arranged to stay for whole contest . . . *ZL3GQ*. QRN was fairly high at the beginning, increased steadily during the contest, and eventually forced me to close down; pity! . . . *ZS6HO*.

Station Operators Multi-Op Multi-Transmitter

7Z2AB: AP2ZA, K2XR, KBØEVM. **9A1A**: 9A2's AW, DQ, EU, HO, KL, LJ, MP, NJ, OH, RA, SD, YW; 9A3's CD, GW, UA, WK. CZ7Z: VE7's AV, BKO, CWG, DTE, DRS, GGG, EME, HRC, LJV, JMN, JWK, PHA, RBL, SK, SSS, TCP, WJA, XYL, VE6EZ. **DFØDC**: DL1XAQ, DJ2XS, DH3HAH, DL4HG, DL5XG, DL9HCL, DL9XAH, DL9XAT. **EG1RX**: EA1CB, EA1IF, EA1JP, EA1AAB, EA1BID, EA1EVY, EA1FDO, EA1FEQ, EA1DAX, EC1CTH, EC1CSF, Miguel. **HG73DX**: HA1's TJ, DAE, AH, TD, DAC, YA, VQ, YU, WD; HA6's ND, NF, OQ, ON, NY, NQ, WX; HA5's GF, IW, UA, CCC, FM, AWH, OM, ML, TI, HG5CCC, HA7VB. **JAØYAK**: JHØUSD, JRØDVM, JRØHYT, JG7JMO, JK2PVL, JFØTJU, Chiba, JFØFFR, Kozawa, JEØETP, Takamori. **JAØYDD**: Yasuo & Teruyoshi. **JA1YFG**: JJ3OLZ & JG3AXP. **LA1R**: LA4EU, LA3EDA, LA4EIA, LA4GIA.

LU4FM: LU1FOW, LU2FFD, LU2FYA, LU4FGV, LU5FAQ, LU5FDQ, LU6FAZ, LU6FEC, LU7FN, LU7FW, LU8FFU, LU8FJY, LU9FDG, LU9FIO, LU1JRL. **LU5MA**: LU1MHG & LU1MIK. **LY1GM**: LY2BUU, LY3BGT, LY3BFL, LY2OM, LY2TX. **LY7A**: LY3BBC, LYR346, LY1DI, LY2BQN, LY2BMX, LY3BN, LY1DF, LY2FN, LY2BKZ, LY2NK. **N8BJQ**: N8BJQ & packet. **NE1A**: NE1A, N1HRA, KA1PQB, KA1LK. **NK3U**: N3ADL, K3ANS, N3IYX, N3MKZ, NK3U. **NY6Y**: NY6Y & N6IC. **OT3A**: ON1's GL, AEI, ARZ, AWB, BCJ; ON2's AJC, ALD; ON4's BI, DB, FI, GG, HZ, OE, WW, ABW. **PX4B**: PY4AEJ, PY4BA, PY4BHB, PY4JDS, PY4OY, PY4VD, PY4VE, PU4WHO. **US7I**: RB4IZ, UB3IO, UB3IM, RB4II, RB5ID, RB1IA, UB5IKW. UX9C: UV9CP, RZ9CQ, UA9CBM, RV9CKV, UV9CCY, UV9CBQ. **WK4Y**: WK4Y, W4MYA, WA4DAI, W4DR, WA4PGM, KD4HEL, KD4JXY, KD4KYS, KD4KYQ, KC4AUF, WB4GVZ, KD4VOZ. **WX3N/Ø**: AAØCR, K4VX, K9ZO, NB9T, W9WI, WX3N, WX9E. **WZ1R**: WZ1R, KY1H, NJ1F, KB1W, WM1K, NU1P, AA1AS, KD1GG, KA2CIW. **XK7SZ**: VE7SZ, VE7ON, VE7CV, VE7NTT, N7RO, W7EKM.

Station Operators Multi-Op Single Transmitter

4N4ELD: AI, Nick, Amir, Zeljko. **4N7M**: YT7NW, YT7TY/x, YU7AL, Zoki & Dejan. **4O4D**: 4O4AR, 4O4NC, 4O4FA, Gojko. **5B4YY**: 5B4YY, 5B4YU, 5B4ABU, 5B4AAJ. **6Y5EW**: 6Y5EW & 6Y5CE. **AA3B**: AA3B & packet. **AA5NT**: AA5NT, WB2LMA, N4CD, N5UPH, AA5UO, KA6QFB. **AA8U**: AA8U, K8MJZ, KF8QE, KC8EK, N3KOU. **ABØS**: ABØS, WØCEM, KØWA, WAØSXR. **C49C**: 5B4LP, 5B4WN, 5B4ADA. **CE6EW**: CE6EW, CE6EZ, CE6PCM, CE6DFY, CE6COR. **CH2WJ**: VE2WJ, VE2AHC, VE2FOT, VE2BOG. **CK7K**: VE7ETY & VE7KD. **CQ1A**: CT1DYX, CT1EDY, CT1EEB, CT1YRV. **CT5P**: CT1AHU, CT1BOP, CT1DIZ. **D73A**: HL1's CG, EJ, IE, XP, EIZ, IHU, KFW, KII, KPS, LLF; HL2's IIJ, KAT, MDS. **DFØCG**: DJ5JQ, DL2ECU, DK3JE, DL3EBM. **DFØESA**: DK9FE, DL1ASA, DL1AWI, DL3APO, DL5AWI, DL5XU, DL7UCC, DL9AWI.

DKØBF: DJ4XA, DK7UY, DK9UV, DL1IAI, DL1UW, DL5IC,

DG1IAJ, DG2IAU, DG7SBX. **DKØBP**: DL4XS, DL1SDA, DL6CPG, DHØGRS, DJ2WX, DL3KDV, DD4EB, DG1KTH. **DLØDPM**: DL1RMT, DL1RNE, DL1RNH, DL2RMM, DL2RYL. **DLØDRL**: DL1DWB & DL4DRA. **DLØHGW**: DL9GWD, DL9GMN, DL9GRE. **DLØLX**: DJØMAT, DH5DAH, DL8DBZ. **DLØOHG**: DL5SDZ, DL3SBI, DL2SEA, DL8SDU, DH4SBO. **DLØSSB**: DJØMDW, DJ2JC, DK7FP, DL1EFO. **DLØUM**: Club Group. **DL1VJ**: DL1VJ, DL2BAY, DL5XX. **DL9JDT**: DL9JDT & DL1JPL. **DX3H**: 4F3AAL, 4F3BAA, DU3's CWM, CWP, FBB, FSK, MY, CWA; DY3's BRA, JMX, MAB, JEL, MAU, JCL, OSG, ZLL, FMC, MAC, LSC, JPJ, TRD, NET, KD4OAR/DU3, KD6KAS/DU3, KB9ILP/DU3. **EA2IA**: EA2CLU, EA2ADJ, EA2AOM, EA2ARD, EA2IA. **EA3KU**: EA3KU, EA3AIR, EA3DU, EA3LL, EA5WU. **EA4KR/EA8**: EA4KR & EA1AK.

ED3BT: EA3BT, EA3CB, EA3NB, EA3FGZ. **ED3CT**: EA3GHB, EA3GIZ, EA3GCJ, EA3GFT, EA3WZ, EA3BDW, EA3GEI, EA3GFK. **ED3RKG**: EA3BOW, EA3BOX, EA3DGQ, EA3EIO. **ED3TR**: EA3CLB, EA3GEJ, EA3DIW, EC3DFF, EC3DEG, EC3DFZ. **EI7M**: EI4HQ, EI7DNB, EI8GS. **EL2PP**: EL2PP & F6FYD. **FF6KAW**: CLUB GROUP. **FF6KIM**: FE1LEN & FD1RMY. **FO8AA**: FO5DB, FO5GW, FO5HL, FO5IW, FO5KZ, FO5LQ, FO5OC, FO4OF, FO4OK, FO4OR. **GØMIN**: GØPZA, GØURF, GØONA, GØLUH, GØOHW, G3GOX, G4ELF, G7MQX. **G3OZF**: G3OZF, G4DQW, G3XTT, G0HSD. **G6CW**: GØFOG, GØRVA, GØIXR, GØINA, G2SP, GØSLZ, GØMLM. **GB2MM**: G3VHB, G3LNS, G3NLY, G3KDB, G4CBQ. **GB6BT:** G4BAH, G4PIQ, G4VMM, G4BUO, G4FRE. **GIØKOW**: GIØKOW, GIØNWG, GIØSAP. **GU6YB/P**: G4OJH, G4UJS, G3TKF, GØJZA, G4NAQ.

GW6GW: GWØARK, GWØMAW, GWØOCJ, GWØLKJ, GWØLWJ, GWØJMJ, GWØRYT, GWØRQS. **GXØFDX**: GØIDE, GØGVA, G4ZYN, GØLRE, G1AHM, GØLBT, G7NER, G7NPG, GØFQN. **GXØOBS**: GØIZM, GØKYM, G4APA, G4JYE, G4WMH, G4XUM, G8CQH. **GX5QK**: G4DEZ, G4UOL, GØJYI, G7CWA, GØRSW, G1TYY, GØSCT, G1HQQ, GØFPV, GØEFI, G4WUE. **GX6OI**: G4XOM, G4IEB, G7BVV, G7JYZ, G7HEZ. **HA5KEH**: HA5EH, HG5AWP, HG5BGH, HA1ZU, HA4GDO, HG5BVD, Poroszlai. **HA8KCK**: HA8FW, HA8EK, HA8KH, HA8DZ, HA8DT, HA8FT. **HC8A**: N6KT & HC1OT. **HSØAC**: HS1CDX, HS1HSJ, HSØ/G3NOM, HSØ/G4UAV, HSØZAX (N4VA). **IG9/IT9SAZ**: IT9MUO, IT9JKY, IW9CDN, IW9BTW. **II5NA**: I5OYY, I5JHW, I5NSR, I5NXH, I5XFW, IK5JAN, IK5MES, IK5NAW, IK5PWC. **IK5RUN**: IK2HDG: IK2SGC, IK2SFZ, IK2GWH, IK2QCC, IK2QIN, IK2VCM.

IK3DVX: IK3DVX, IK3QAR, I3QKO, IW3FT. **IT9VDQ**: IT9VDQ & IW9BRJ. **IV3NTA**: IV3NTA & IV3JVJ. **IV3NVN**: IV3NVN & IV3GKA. **J42T**: SV2BFN, SV2BBJ, SV2BOH. **JA1YXP**: JF1QOW, JK1ATC, JP1AEQ, 7K1QOE, 7L1DGK, 7L1ETO, 7M1DVT, 7N1SYP, JS2XHN, JI6WOH. **JE6ZIH**: JR6GKT, JF6DEA, JG4KEZ, JI6BRB, Narumi, Ryoki, Maki. **JH5ZJS**: JA5BJC, JA5FDJ, JA5JCC, JH5FXP. **JJ3YBB**: JA3FHL, JA3LHL, JA3PJL, JA3FQF, JE3TXA, JG3CAY, JH3FBS, JI3ERV, JQ3QFA. **JU1T**: JT1BL & JT1BX. **K2PS**: K2PS & packet. **K3CP**: K3CP & packet. **K3JLK**: K3JLK & N3MPH. **KB2SE**: KB2SE & N2PNG. **KB3TS**: KB3TS & N3KEG. **KC1F**: KC1F & packet. **KC6X:** ops. **KD4SCE**: KD4SCE & KD4RHT. **KE3Q**: KE3Q, KJ4VG, KA4RRU. **KE5WH**: KE5WH & N5NDY. **KH2S/KP1**: JH4RHF, JR4DUW, JA8RUZ, NF6S. **KI1G**: KI1G, K1NG, WF1B. **KK4JF**: AC4OQ, AC4OS, K4NZL, KK4JF. **KY2T**: KY2T & packet.

LA1K: LA6PGA, LA4PHA, LA5IIA. **LU1FC**: LU5FCI, LU5FIC, LU1FZR, AZ8FAG, LU7FEF. **LU7FEU**: LU7FEU & LU1FNH. **LX4A**: LX1AT, LX1EA, LX1KC, LX1NO, LX1NW, LX1RQ, LX1SP, LX1UN, LX2KW, DA1DW, DF8WS, DL6RAI. **LY1BZB**: LY2BKF, LY1FR, LY1FF. **LZ1KBB**: LZ3FN & LZ4AX. **N4YET**: N4YET, WB4PJW, KB4DAI, N4ZKH. **N6IP**: N6IP & packet. **N7TT**: N7TT & Dolores. **NC1A**: NC1A & W1GD. **NJ1V**: NJ1V, AD1S, N5OHL. **NO9Z**: NO9Z, NM9H, N9HXG. **NU1H**: NU1H, KD1KZ, KD1LJ. **NWØF**: NWØF, NØBIW, NØTVI, WDØGQA. **NZ5I**: GMØECO & W5ASP. **OE1XTU**: Club Group. **OE2XEL**: OE2GEN, OE2LCM, OE2MRN, OE2SCM, OE2VEL. **OH5NQ**: OH5TS, OH5LF, OH1WZ. **OH7AAC**: OH7MCA, OH7MS, OH7MHL, OH7WV, OH4LTK, OH4MJ, OH6LNI. **OH8PF**: OH8PF & OH8MCT. **OK2KDS**: Club Group. **OK2KJU**: Club Group. **OK2KOD**: OK2BDI, OK2BGR, OK2BHM, OK2BNX, OK2PID.

OL3A: Club Group. **OM3KFF**: OM3TPG, OM3TRG, OM3TPW, OM3TLU. **ON6AH**: ON6AH, ON6QR, ON6MH, ON6VL, ON7PC, ON7ZV, ON9CMB. **OT3D**: ON4HF, ON4AYM, ON4AYP, ON4AYF, ON6KZ, ON6UO, ON7KS, ON7AQ, ON7FH, ON4APQ. **OZ9SIG**: OZ1ZSH & OZ3ABU. **P2ØX**: P29CW, P29DK, P29DS, P29DX, P29JA, P29KH, P29KS, P29NB. **PA6WPX**: PA3BBP, PA3BWD, PA3EWP, PA3GBQ, PA3DMH. **PI4TUE**: PA3GBU, PA3GBV, PA3EAH, PAØSHY, PE1NEX, PE1OBP, PE1NGP, PE1NVK, PE1MNL, PE1NEV, 4S6DU, Komen, Putter, Serree. **PJ9X**: OH6DO & OHØXX. **PRØR**: PP5JR & PP5WG. **PT7CB**: PT7CB, PT7BZ, PT7WB, PT7WZ, PT7CQ, PT7OO. **PXØZ**: PY1NEZ & PY1NEW. **R6L**: UA6LO, UA6LV, UA6LFQ, UV6LPL, UA6-150-1403. **R6Y**: RA6AX, UA6-101-2900, RA6YY, RW6YY, UA6YN. **RE6A**: UA6BGB, UV3DAZ, RV3DDZ, RV4HA, RA6HPV, UV6AFL, UZ1OWZ.

RT1U: UB5SDX, UT4UZ, UT5UGR, UT5UQM, UT5-186373. **RZ1AWO**: UA1AQF, UA1-169-2391, UA1-169-900. **SK5WB**: SM5INC, SM5NUZ, SM5PPS. **SK6AW**: SM6's CVE, DED, DGF, EHY, GBM, HCX, IQD, LFJ. **SK6NL**: SM6HRR & SM6BSM. **SK7BV:** SM7AIO & SM7SEA. **SK7CA**: SM7SHY, SM7SJR, SM7AIL, SM7SJV, SM7NZB. **SO3NL/1**: DL7UTA, DK2OC, DL7UTR, DL7UTM, DL7VTM. **SP3PLD**: SP3DUG, SP3HBF, SP3IBM, SP3SBB. **SP6YFU**: SP6NVK & SP6OPE. **SP9LJD**: SP9EWO & SP9LJD. **SP9PDF**: SP9FIH, SP9NRD, SP9TCE, SP9UOG, SP9WZF. **TK6A**: F6BBJ, F6HSV, TK5EP, TK5NN, ISØVSG packet cluster. **TM2V**: F6GLH & F6GYT. **TM7C**: FB1MUX, FD1NLY, F6CTT, F9IE. **TO5M**: FM5BH, FM5CD, FM5DN, FM5EB, FM5WD, FM5WW, FM4FZ, FM5GD, Joel, George, Thierry. **UB4PWC**: Club Group. **UI8B**: RI9AA, UI9ACQ, UI8AA.

UN8LW: Vladimir & Alex. **UT4JWI**: UT5-187-189, UT5-187-205, Denis. **UZØCWQ**: UAØCKN & UAØ-110-814. **UZ3AWR**: UA3-170-1169, UA3-170-126, UA3AEV, UA3ABJ. **UZ3GYM**: Club Group. **UZ4WWF**: UA4WI, UA4WII, UA4-095-759. **UZ9XWH**: UA9XLZ, UA9XFY, UA9XJV. **UZ9XWX**: Anatoly & Eugeny. **VE2UMS**: VE2FAB, VE2SDQ, VE2PEO, VE2GKL, VE2HTZ, VE2TUL, VE2HGG, VE2NCO, VE2BAP, VE2PPN, VE2MNT, F1MAA. **VE3HB**: Club Group. VE6AO: VE6's TAM, DIL, GQ, CCM, TFM, CIZ, KDS, BEN, GK, KC, FXR, SWR, NAO, MX, VTC, HMT, RCI. **VE6SV**: VE6SV, VE6WQ, VE6NAP. **VF3LRL**: VE3LRL, KA3SQL, VE3ITA, VE3DLE, VE3PMS, VE3MFB, VE3EDI. **VK4NEF**: VK4NEF & packet. **VP2EC**: K5RX, KC5EA, N5AU. **VP5L**: N4KE, WB4EYX, VP5P. **VS6CM**: VS6CM & VS6WV.

W6EEN: W6EEN, K6XC, KA6SAR. **W7ZR**: W7ZR & N7ZZ. **WF5E**: WF5E & packet. **WJ2W**: WJ2W & packet. **WL7E**: WL7E & KL7Y. **WS1L**: WS1L, KA1VVS, N1NDO, N1OEE, KD1BJ, N1LDC, N1MJS. **WU7Q**: N6TIB, WU7Q, W6REC. **WZ3T**: WZ3T, N3JLL, WC8R, AA3AO. **XA5T**: XE2KB, XE2DRM, XE2VY. **XK1JO**: VE1IW, VE1SLM, VE1ZJ, VE1GRP, VE1WOW, VE1RSA, VE1ERL. **XK3RRH**: VE3RRH & VE3FNY. **XK5SF**: VE5SF & VE5CPU. **XL7U**: VE7FVH, VE7TTQ, VE7EWU, VE7CNV, VE7JLB, VE7ACX. **YO2KBB**: YO2BYD & YO2LFP. **YR6F**: YO6DDF & YO6OBH. **YV5USB**: YV4FIH, YV5NEC, YV5NEH, YV5NQZ, YV5NSV. **YW59M**: YV5NCJ, YV5NPU, YV5NKV, YV4RH. **ZXØF**: PY5EG, PY5CC, N5FA, PYØFF.

Number groups after call letters denote following. Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the 1993 contest.)

SSB RESULTS
QRP/P SECTION

WORLDWIDE

KR2Q	**A**	**993,293**	**849**	**491**
AA2U	"	738,843	711	453
N1AFC	**A**	**588,392**	**627**	**392**
F1BEG	**A**	**439,766**	**579**	**346**
EA3FVS	**A**	**306,333**	**456**	**303**
WB6JMS	**A**	**274,055**	**464**	**295**
UWØSR	**A**	**263,889**	**423**	**269**
N7RWH	**A**	**226,452**	**315**	**226**
YU1KN	**A**	**219,081**	**385**	**309**
SM3DZH	**A**	**204,516**	**375**	**247**
N8FEH	**A**	**191,040**	**349**	**240**
KV8S	"	155,644	302	233
IK1GKE	**A**	**151,017**	**326**	**213**
IK7RWD	"	140,606	343	229
JR2BNF/1	**A**	**131,532**	**264**	**194**
YU1LM	"	123,114	331	213
KA1CZF	"	120,593	277	209
UA9SG	**A**	**107,415**	**246**	**165**
N8CQA	"	96,659	235	163
UB5VAP	**A**	**85,904**	**304**	**182**
SP7LZD	**A**	**85,888**	**233**	**176**
JH3AKD	"	75,123	231	153
NP2E	**A**	**71,121**	**204**	**157**
UO4OF	**A**	**61,050**	**181**	**150**
JE7DOT	"	58,236	159	138
OH5NHI	**A**	**54,219**	**196**	**159**
DL2RUG	**A**	**47,275**	**187**	**155**
N7JXS	"	29,007	126	99
LZ2MM	**A**	**27,768**	**112**	**104**
YO5BQ	**A**	**22,826**	**143**	**113**
KP4DDB	**A**	**15,150**	**79**	**75**
YO8SAC	**A**	**12,240**	**95**	**80**
SP4TBM	"	6,930	65	55
KGØBZ	**A**	**5,238**	**118**	**97**
YO8CMB	"	4,922	53	46
SP6DVP	"	1,056	17	16
WB4KRH	**28**	**81,030**	**307**	**185**
UWØST	**28**	**57,081**	**360**	**159**
WA6FGV	**28**	**51,684**	**425**	**177**
JF3EIU	**28**	**40,932**	**154**	**108**
WJ7R	**28**	**31,916**	**132**	**101**
EA3CKX	**28**	**19,987**	**95**	**79**
WA7NWL	**28**	**1,885**	**31**	**29**
KD4URA	"	1,105	24	17
WBØIWG	**28**	**946**	**22**	**22**
OH2MPO	**28**	**396**	**13**	**12**
SP4CQU	**28**	**216**	**9**	**9**
LU1FNH	**28**	**40**	**4**	**4**
JA2JSF	**21**	**105,814**	**221**	**191**
DU1CHD/6	**21**	**96,896**	**262**	**128**
RW9QA	**21**	**80,541**	**195**	**157**
EA1FCB	**21**	**62,957**	**184**	**157**
K3TW	**21**	**59,748**	**166**	**156**
G4MET	**21**	**49,609**	**160**	**133**
W6CN	**21**	**44,745**	**180**	**157**
VE6SH	**21**	**43,282**	**161**	**134**
JI3BFC	"	11,700	74	65
DU7AFT	"	4,255	41	37
KS9U	**14**	**326,988**	**433**	**372**
RB5EG	**14**	**191,646**	**451**	**273**
JH7VXB	**14**	**14,058**	**79**	**71**
K9OSH	"	9,045	72	67
SP9EH	**14**	**768**	**40**	**16**
JR9GXQ/9	**7**	**1,200**	**21**	**20**
JL6IPK	"	560	43	35
4M1G	**3.7**	**47,616**	**104**	**93**
SP4GFG	**3.7**	**19,980**	**116**	**90**
VE2IAN	**3.7**	**9,016**	**55**	**49**
W8QZA/6	**3.7**	**540**	**19**	**18**
UB5ZME	**1.8**	**4,320**	**49**	**45**

SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

KM1H	**A**	**7,025,136**	**3005**	**912**
			(Op. KQ2M)	
W1NG	**A**	**1,146,802**	**1070**	**586**
K1TO	**A**	**1,114,300**	**957**	**492**
WV1C	"	363,636	661	378
K1EFI	"	216,435	354	235
WS1H	"	204,171	385	269
W1KRS	"	104,716	188	188
N1DEA	"	60,858	167	147
KC1SS	"	48,672	175	144
AB1U	"	42,504	157	154
N1NQD	**28**	**8,418**	**68**	**61**
WF1L	**21**	**882,235**	**969**	**505**
KD1GJ	"	494,265	662	415
W1LQQ	**14**	**114,330**	**235**	**206**
***N1HOQ**	**A**	**1,185,678**	**1267**	**563**
***WS1A**	**A**	**868,502**	**778**	**454**
*ND1H	"	264,576	485	318
*KD1R	"	192,786	347	253
*KC1SQ	"	144,958	341	242
*N1KWJ	"	30,800	130	112
*WS1O	"	17,297	122	91
*K8JLF	"	15,660	98	90
*KA1EAP	"	7,215	70	65
***N1FUS**	**28**	**14,137**	**87**	**67**
***KA1SVV/T**	**28**	**10,880**	**71**	**64**
*N1NCJ/T	"	3,024	45	36
***WØMHK/W1**	**14**	**174,896**	**303**	**272**
KF2O	**A**	**2,179,743**	**1365**	**647**
AA2GQ	**A**	**1,917,065**	**1327**	**635**
K2POF	**A**	**1,911,100**	**1403**	**659**
KF2MM	"	1,289,250	1135	573
W2GD	"	522,029	570	383
W2IMO	"	281,880	419	270
KS2M	"	232,460	447	295
KB2DE	"	225,882	378	267
W2FR	"	210,930	290	237
NA2A	"	187,726	612	322
WF2Y	"	81,459	228	189
K2RXN	"	30,740	118	106
WF2W	"	18,560	217	116
WB2CKQ	"	1,537	30	29
WA2SYN	**28**	**122,791**	**372**	**233**
KA2AEV	**21**	**3,835,469**	**2092**	**809**
WB2YQH	"	509,580	552	380
KQ2O	"	152,514	360	229
K2MGA	**14**	**59,360**	**168**	**160**
K2ONP	**3.7**	**105,264**	**307**	**204**
***KE2ZU**	**A**	**921,393**	**818**	**451**
***WA2EOV**	**A**	**875,472**	**816**	**488**
*AA2EM	"	202,563	342	213
*W2KHQ	"	144,180	337	135
*WR2V	"	139,620	272	179
*W2FGY	"	100,014	248	158
*W2OMV	"	87,894	230	171
*N2INN	"	87,400	214	152
*K2TD	"	15,984	91	74
*W2AOY	"	14,980	81	70
***W2KZE**	**28**	**36,542**	**154**	**121**
***W2IQL**	**21**	**234,855**	**363**	**307**
*N2ALE	"	7,560	84	72
***W2EZ**	**14**	**1,917**	**27**	**27**
***WM2V**	**7**	**3,540**	**30**	**30**
K3ZO	**A**	**5,188,970**	**2619**	**841**
KF3P	**A**	**4,740,040**	**2449**	**815**
W3BGN	"	3,046,428	1693	693
K3WW	"	2,016,300	1367	611
WV2B	"	1,487,614	1166	562
WI2T/3	"	1,289,472	1103	552
KA3DSW	"	1,007,093	1117	521
NY3C	"	234,824	427	298
NE3F	"	159,236	350	242
W3KV	"	64,326	182	142
K3UA	"	31,770	111	90
W3FTG	"	20,210	106	86
WN3K	"	9,514	83	71
W3FQE	"	2,816	32	32
N3HBX	**21**	**1,165,320**	**1133**	**540**
WE3C	**3.7**	**873,196**	**863**	**419**
WR3E	"	10,440	99	87
***K3ND**	**A**	**151,463**	**265**	**191**
*AA3CN	"	52,632	250	204
*W3CPB	"	50,922	160	138
*NV3V	"	6,555	74	69
***WB2BZR/3/T**	**28**	**64,944**	**164**	**132**
*WB6VGI/3	"	31,080	151	120
WZ4F	**A**	**2,414,820**	**1683**	**668**
K4VUD	**A**	**1,864,356**	**1627**	**629**
AI2C	**A**	**1,689,072**	**1284**	**616**
KB4GID	"	1,319,074	1223	554
AB4RU	"	1,297,312	1291	568
K4LTA	"	975,520	917	536
KC4DWT	"	311,488	515	314
W4LMJ	"	167,741	306	217
W4OGG	"	157,339	348	247
N4MM	"	92,253	194	161
WY2V	"	84,251	202	173
W4VC	"	36,722	147	122
NU4Y	**28**	**626,560**	**1111**	**445**
KQ4GC	**21**	**746,304**	**905**	**507**
WA4QMQ	"	358,834	441	361
W4/HK3GZB	**14**	**75,712**	**266**	**208**
KE4BM	**7**	**113,094**	**230**	**183**
W4TMN	7	31,668	84	78
KE2JO/4	**3.7**	**62,748**	**281**	**189**
AA4MM	**1.8**	**34,584**	**214**	**132**
***AA4EL**	**A**	**409,700**	**510**	**340**
***W4FPF**	**A**	**287,826**	**440**	**294**
*AB4KL	A	197,568	415	294
*NK9C	"	173,128	357	268
*N4YKD	"	167,800	283	200
*KD4SOR	"	133,504	329	224
*K4BAI	"	78,192	195	144
*KN4MD	"	56,474	175	151
*KB4MIL	"	44,688	181	133
*WB4VIM	"	41,445	179	135
*AA4KD	"	31,828	145	109
*W1ENZ	"	30,276	140	116
*W4MZB/M	"	28,137	131	113
*KC4URW	"	21,510	108	90
*KO4UE	"	7,349	70	56
***K6SVL/4**	**28**	**157,731**	**414**	**259**
*WB4HFL	"	50,666	218	154
*KD4DUZ	"	49,104	695	248
*KD4CDB/T	"	43,225	163	133
*KD4MAB/T	"	2,139	33	31
*N1MNB/T	"	1,450	25	25
*W9CNF/M4	"	969	20	19
***N4MO**	**21**	**722,728**	**720**	**488**
*W4WJJ	"	37,851	131	111
KM5X	**A**	**4,380,993**	**2275**	**769**
WØRRY	**A**	**1,776,170**	**1747**	**670**
K5UA	"	451,616	538	352
WD5IQA	"	252,315	388	267
KV5F	"	116,064	281	208
KI3L/5	"	30,226	156	127
KJ5FF	"	9,085	86	79
K5HDU	"	6,450	54	50
KY5N	**28**	**97,010**	**369**	**218**
WB2ULI	**7**	**237,456**	**280**	**204**
KG5JH	**3.7**	**25,728**	**191**	**134**
***NZ5O**	**A**	**732,875**	**845**	**451**
***N5QDE**	**A**	**328,640**	**484**	**320**
*KA5W	"	289,044	463	333
*N5SMQ	"	15,136	99	86
*WBØNSA	"	7,680	74	64
*K6ZDL/5	"	5,612	49	46
*AA5HV	"	260	21	20
***N5NMX**	**21**	**760,529**	**1135**	**539**
*NY5B	"	440,428	819	412
*WT5U	"	417,749	757	443
*NW5H	"	220,039	461	313
***W5FO**	**14**	**162,400**	**337**	**280**
***KE5FI**	**3.7**	**35,868**	**185**	**147**
WN4KKN/6	**A**	**5,797,184**	**3022**	**758**
K6HNZ	**A**	**1,695,744**	**1330**	**576**
KI6CG	**A**	**1,471,860**	**1287**	**555**
KJ6DL	"	1,206,008	1513	543
W6TKF	"	1,151,874	1130	514
WI6N	"	1,019,142	942	466
KG6LF	"	621,888	1383	492
KA6ZYF	"	262,144	384	256
KD6QK	"	232,500	517	300
N6KI	"	218,496	295	192
WA6UFY	"	185,754	347	249
K6NY	"	175,168	336	238
N6SMW	"	157,206	298	197
AG6D	"	110,526	310	218
			(Op. N1EE)	
WA5VGI	"	94,400	263	200
KD6UO	"	41,610	134	95
K6SG	"	32,016	148	138
NW6S	**28**	**616,900**	**1166**	**398**
KA6ING/T	**28**	**32,368**	**134**	**119**
W6BIP	"	18,860	92	82
N6IFW	"	9,324	84	74
N6MSQ	**21**	**178,695**	**393**	**285**
KU6T	"	113,544	368	249
K6XT	**14**	**500,193**	**807**	**447**
			(Op. OH2PM)	
N6WR	"	232,560	423	342
WB6NFO	"	44,998	160	151
KI6P	**3.7**	**717,590**	**735**	**365**
			(Op. N6RO)	
WA6IET	**1.8**	**1,232**	**51**	**44**
***W9NQ**	**A**	**1,712,340**	**1501**	**630**
***N6WLX**	**A**	**458,292**	**575**	**362**
*W6HAL	"	155,463	403	231
*KM6YX	"	147,888	308	234
*N6JM	"	102,860	223	148
*N6TPT	"	90,818	250	182
*KN6DV	"	70,035	201	145
*WA6FIT	"	54,880	163	140
*KE6UP	"	53,535	180	129
*KI6PG	"	48,875	163	115
*AA6EE	"	30,195	117	99
*AA6DX	"	17,020	115	92
*KM6LH	"	10,900	103	100
***KJ6HO**	**28**	**182,406**	**414**	**258**
*W6PYX	"	90,285	292	195
*KD6KUI	"	61,050	355	185
*KA6EZP	"	5,040	47	42
*K6NA	"	60	5	5
*N6IUU	"	18	6	6
***W6OUL**	**14**	**54,776**	**186**	**167**
***WA6WPG**	**7**	**15,960**	**66**	**57**
K7RI	**A**	**5,102,520**	**2837**	**842**
N7AVK	**A**	**4,785,942**	**2257**	**714**
NN7L	**A**	**3,654,355**	**2138**	**739**
AI7B	"	3,646,008	2079	711
WA7FOE	"	1,298,444	1212	553
N7LOX	"	679,356	865	452
K6XO/7	"	613,588	658	422
W7OM	"	507,363	621	393
KC7UP	"	424,888	531	346
W7WHY	"	211,248	601	324
W7HS	"	169,274	320	226
KT7G	"	82,012	255	203
N7RVD	"	10,509	100	93
NB7N	**21**	**569,380**	**779**	**415**
W7FP	"	509,913	810	477
W7AYY	"	106,502	254	206
NX7K	**7**	**54,834**	**127**	**111**
***NU7I**	**A**	**482,886**	**589**	**386**
*W7TSQ	"	233,480	374	260
*W7QN	"	203,194	418	283
*AA7FK	"	177,674	375	259
*N7WWQ	"	41,700	165	139
***WS7V**	**28**	**17,535**	**138**	**105**
***WQ7R**	**14**	**170,500**	**419**	**310**
NI8L	**A**	**3,758,843**	**2142**	**803**
K8DD	**A**	**150,040**	**248**	**248**
K8CV	"	114,444	259	187
W8UPH	"	108,066	251	186
WB8BUQ	"	82,008	298	201
KF8YC	"	68,034	200	138
WB8BMV	"	50,125	150	125
W8IDM	"	47,580	165	130
NE8Z	"	19,024	105	82
KA8PTT	"	16,478	84	77
N8TEY	"	11,122	81	67
NA8W	"	10,726	63	62
KA8D	**28**	**102,711**	**450**	**219**
WD8LLD	**14**	**1,046,960**	**961**	**569**
			(Op. KF8TY)	
***N8FU**	**A**	**208,103**	**354**	**217**
***WB8ORV**	**A**	**82,160**	**195**	**158**
*KA8OUT	"	41,724	136	122
*KB8OAN	"	18,328	95	79
*AF8C	"	10,658	85	73
*N8PGI	"	494	52	26
***KB4TLH/T**	**28**	**116,633**	**558**	**253**
*KA8VPL	"	8,897	80	41
***WZ8T**	**21**	**391,310**	**509**	**359**
KE9I	**A**	**1,844,508**	**1486**	**652**
WN9P	**A**	**1,510,320**	**1408**	**651**
KBØC	"	433,188	499	324
K9UQN	"	211,958	354	262
W9BCV	"	0	132	0
K9HMB	**28**	**94,944**	**221**	**184**
KB9BGV/T	**28**	**61,992**	**211**	**164**
N9LCR	**21**	**201,779**	**439**	**283**
***NR9A**	**A**	**370,209**	**500**	**289**
***NI9C**	**A**	**321,112**	**530**	**328**
*NG9L	"	308,448	443	324
*KB9BIB	"	247,456	494	296
*AK9N	"	109,604	271	188
*WA9CCQ	"	58,080	175	132
***N9NUN/T**	**28**	**17,952**	**112**	**96**
***WA9BOW**	**21**	**186,660**	**329**	**255**
***K9KU**	**14**	**188,086**	**366**	**314**
*W9JOO	"	41,595	150	141
***AA9AX**	**1.8**	**5,656**	**147**	**101**
WAØPUJ	**A**	**2,422,362**	**1580**	**687**
KØIJL	**A**	**1,270,606**	**1079**	**551**
WJØI	**A**	**535,460**	**766**	**410**
KØGAS	"	353,884	783	374
NØKV	"	322,091	632	329
WBØYJT	"	257,770	409	298
NØAXL	"	188,513	400	221
NØKFE	"	122,622	278	191
NØZA	"	98,802	289	198
WØPPF	"	73,698	224	173
WØHW	"	57,204	160	126
K1ER	"	15,232	73	64
KØBJ	"	10,920	70	65
WØACT	**28**	**135,034**	**367**	**214**
WA2HFI/Ø	**21**	**52,288**	**168**	**152**
WAØETC	**7**	**146,556**	**256**	**207**
KØCS	**3.7**	**32,240**	**178**	**124**
***ACØW**	**A**	**863,154**	**841**	**474**
***K9BQL**	**A**	**199,936**	**354**	**256**
*KDØNB	"	156,488	323	248
*WAØDCB	"	58,216	200	152
*KAØCKN	"	50,676	158	123
*WWØQ	"	38,383	170	131
*KRØI	"	7,104	75	74
***WBØGFV**	**28**	**16,669**	**93**	**79**
***NOØY**	**1.8**	**2,160**	**86**	**72**

CUBA

T45DD	**A**	**1,043,432**	**1175**	**632**
			(Op. CO5DD)	

ALASKA

NL7DU	**A**	**762,311**	**720**	**407**
AL7CQ	**21**	**3,623,466**	**1955**	**713**
KL7RA	**7**	**609,672**	**501**	**228**
***NL7VJ**	**A**	**390,102**	**583**	**237**
***KL7FAP**	**21**	**103,968**	**248**	**171**

U.S. VIRGIN IS.

KP2A	**A**	**16,694,570**	**6136**	**1006**
			(Op. KW8N)	
***NP2I**	**A**	**2,751,252**	**2029**	**588**

CANADA

XK3EJ	**A**	**10,672,784**	**3552**	**956**
XK5MX	**A**	**3,268,956**	**2074**	**662**
XK3AT	"	2,003,268	1409	556
XK6UX	**A**	**1,497,825**	**1106**	**525**
VE7QO	**A**	**990,522**	**782**	**442**
VE5FX	"	721,344	769	416
XK1NH	**A**	**635,529**	**818**	**349**
XE1KK	"	420,912	538	296
VE7XO	"	365,205	452	291
VE5ZD	"	200,860	349	242
VE3CWE	"	158,976	275	207
VE1GFH	"	98,560	250	176
VE3PN	**28**	**237,838**	**503**	**218**
VO1LT	**21**	**69,483**	**197**	**159**
XJ2ZP	**14**	**2,265,045**	**1570**	**615**
VE6SF	**14**	**555,175**	**560**	**419**
VE3ZD	**14**	**261,346**	**348**	**298**
VE7VX	**14**	**80,190**	**206**	**165**
XK7CC	**3.7**	**1,320,926**	**876**	**353**
***XJ4VV**	**A**	**2,723,680**	**1905**	**587**
***XK7SV**	**A**	**2,618,356**	**1701**	**559**
			(Op. NL7GP)	
***VE3RM**	**A**	**1,610,282**	**1185**	**542**
***XK6CGY**	**A**	**1,323,705**	**1421**	**435**
*CJ6V	"	1,139,647	1289	421
*VE7ZAC	"	812,822	865	394
***XO2DQU**	**A**	**492,480**	**699**	**324**
*VE2BUW	"	312,930	415	285
*XE2WCD	"	295,836	545	267
***XO1TX**	**A**	**243,386**	**472**	**253**
*VE4WI	"	209,592	405	246
*VF3EZU	"	153,819	282	211
*VE7CFD	"	132,311	360	181
*VE3TPB	"	129,090	256	195
***VE2AEJ/3**	**28**	**43,316**	**156**	**119**
***XO1SF**	**21**	**1,158,476**	**1066**	**466**
***VE6BMX**	**21**	**499,624**	**733**	**346**
***XK7FJE**	**21**	**455,975**	**654**	**305**
***XK5GC**	**21**	**232,960**	**532**	**224**
***VE2EW**	**21**	**110,920**	**215**	**188**
*XK7DLM	"	76,208	210	176
***VE3WDJ**	**21**	**74,368**	**187**	**166**
***VE1BZA**	**21**	**43,703**	**137**	**137**
***XO2AC/XK1**	**14**	**263,676**	**384**	**292**
*VO1MPJ	"	66,332	161	161
***VF3SRE**	**7**	**284,616**	**397**	**201**
***VE5JAM**	**3.7**	**25,050**	**108**	**75**

EL SALVADOR

YS1X	**A**	**2,539,950**	**1696**	**574**

CAYMAN IS.

ZF1CQ	**A**	**1,216,332**	**1153**	**468**

HAITI

4V2PK	**A**	**6,622,284**	**3618**	**716**
			(Op. HH2PK)	
4V2B	**7**	**1,528,800**	**864**	**400**
			(Op. HH2B)	

MEXICO

XB2I	**7**	**1,801,500**	**991**	**375**
			(Op. XE2GV)	
***XE1RFM**	**A**	**1,111,466**	**1413**	**383**
***XE2VOP**	**A**	**1,007,860**	**1298**	**322**
***XE1BEF**	**28**	**300,775**	**641**	**227**

TURKS & CAICOS IS.

***VP5G**	**A**	**6,634,896**	**3648**	**752**
			(Op. WB6CJE)	

ANGUILLA

***VP2E/NR1R**	**A**	**3,155,416**	**3062**	**506**

MARTINIQUE

***TO6A**	**A**	**1,430,220**	**1255**	**484**
			(Op. FM/F6HMQ)	

PUERTO RICO

KP4CZ	**A**	**58,092**	**183**	**141**
***W8HNI/KP4**	**A**	**350,920**	**493**	**283**
***WP4WD**	**28**	**1,784,820**	**1868**	**453**

PANAMA

***HP2CWB**	**A**	**431,055**	**636**	**309**
*HP1BTV	"	11,484	106	87

GUATEMALA

***TGØAA**	**21**	**1,485,320**	**1287**	**523**
			(Op. TG9AJR)	

JAMAICA

***WJ2O/6Y5**	**21**	**105**	**7**	**7**

DOMINICAN REPUBLIC

***HI8OMA**	**14**	**249,711**	**531**	**231**

AFRICA

MADEIRA IS.

CR9R	**A**	**7,419,272**	**3150**	**722**
			(Op. CT3BX)	
CT3AP	A	3,069	34	33
CT3BD	**14**	**2,406,320**	**1440**	**560**
CQ3B	**3.7**	**193,280**	**204**	**160**
			(Op. CT3EE)	
***CT3DZ**	**14**	**484,408**	**550**	**302**

THE CHOICE IS SIMPLE

Pick a band. . .pick a power level. . .pick a price! Picking the right brand is simple

Henry Radio is the power amplifier specialist. Every one of our 14 models offer superb value, experienced engineering (30 years!) and top quality components.

Since we offer the broadest selection of power amplifiers of any manufacturer, we feel that you should find exactly what you need in the following list:

3K ULTRA console with remote desk top control panel. 1500 W PEP output, 1.8 to 30 MHz coverage.

2K CLASSIC X console. 2000 W PEP output, 80 to 15 meters, 1.8 to 30 MHz.

2KD classic desk top. 2000 W PEP, 80 to 15 meters, 3.5 to 30 MHz.

3K CLASSIC Mk II console. 2000 W PEP, 80 to 15 meters, 3.5 to 30 MHz.

3K PREMIER console. 2000 W PEP, 160 to 15 meters, 1.8 to 30 MHz.

3KD PREMIER desk top. 2000 W PEP, 160 to 15 meters, 1.8 to 30 MHz.

2002-A desk top. 1200 W SSB, 400 W continuous operation, 144 to 148 MHz. (100 to 300 MHz available on commercial models).

2002-A desk top. 1200 W SSB, 400W continuous operation, 220 to 225 MHz.

2006-A desk top. 1200 W SSB, 400 W continuous operation, 50 to 54 MHz. (30 to 100 MHz available on commercial models).

3002-A console. 2000 W SSB, 1000 W continuous operation, 144 to 148 MHz.

3004-A console. 2000 W SSB, 1000 W continuous operation, 430 to 450 MHz.

3006-A console. 2000 W SSB, 1000 W continuous operation, 50 to 54 MHz. (30 to 100 MHz available on commercial models).

3K Classic

We think this is the world's finest Amateur linear amplifier. It contains all of the famous Henry amplifier features plus the magnificent 8877 tube, heavy duty power supply components and advanced antenna switch relay for semi break-in on CW... the amplifier of every Amateur's dreams.

The 3K Classic/X with 10 meter capability is available for sale outside the USA where FCC type acceptance is not required.

2004-A desk top. 1200 W SSB, 600 continuous operation, 430 to 450 MHz.

Amplifiers for amateur radio is only part of the picture. We also design and manufacture amplifiers for commercial, MARS, military, short wave broadcast, VHF link, domestic, foreign. . . Henry amplifiers go everywhere for diverse services. HF point-to-point, SSB, AM, FM, RTTY, packet, meteor burst, digital, marine shore station. If you need a special purpose vacuum tube amplifier for a specific frequency from 2 MHz to 500 MHz at power levels up to 10,000 watts, we invite your inquiry.

But communications is only the beginning. Think about plasma generation, sputtering and etching, thin film deposition, laser excitation, nuclear magnetic resonance (NMR), photo-emissions and mass spectrometry, scientific research, industrial production. . .Henry equipment is used in all of these applications. We have always been customer driven and still are.

Commercial users, remember the superb new 8K ULTRA is now in full production and drawing unbridled praise from users.

Henry Radio

2050 S. BUNDY DR. • LOS ANGELES, CA 90025 • (310) 820-1234

Toll free order number: (800) 877-7979 FAX (310) 826-7790

CIRCLE 141 ON READER SERVICE CARD

MOZAMBIQUE

C91J	**28**	**3,629,840**	**2102**	**578**	

CANARY IS.

EA8AH	**A**	**17,387,133**	**5367**	**951**	
					(Op. OH1RY)
EA8AD	A	1,260,552	1008	424	
EA8LS	**21**	**392,560**	**474**	**280**	
***EA8BWW**	**A**	**2,875,575**	**1690**	**575**	
*EA8BGY	A	332,820	372	258	
*EA8BXQ	A	40,890	148	94	

CUETA

ED9LZ	**14**	**6,121,569**	**2972**	**691**
***EA9UK**	**21**	**3,696,440**	**2000**	**620**
*EC9LQ	21	12,449	74	59

BURKINA FASO

***XT2BW**	**A**	**2,315,682**	**1524**	**513**

SOUTH AFRICA

ZS6STU	**A**	**3,126,794**	**1690**	**622**
ZS6AXF	**A**	**3,016,804**	**1540**	**652**
ZS4WD	A	109,509	219	173
ZS6HO	A	55,341	147	129

ASCENSCION IS.

ZD8LII	**21**	**5,456,589**	**2568**	**713**
				(Op. GØLII)
***ZD8BV**	**A**	**14,501,145**	**5284**	**921**
				(Op. G4ZVJ)

ZIMBABWE

Z21HS	**A**	**161,955**	**296**	**183**

GUINEA

***3XØHLU**	**A**	**3,849,522**	**2091**	**618**

TANZANIA

***5H3MT**	**28**	**1,347,780**	**1109**	**420**

NIGER

5U7M	**A**	**10,149,202**	**3853**	**883**
				(Op. JH4NMT)

KENYA

5Z4BI	**14**	**3,778,488**	**1958**	**648**
***5Z4BJ**	**A**	**78,300**	**200**	**135**
				(Op. KJ4PN)

MALAWI

***7Q7XX**	**14**	**1,025,352**	**861**	**404**

ASIA

ISRAEL

4X/S59PR	**A**	**8,263,122**	**3773**	**714**
4ZØT	**21**	**2,376,048**	**1890**	**472**
				(Op. 4Z4UT)
***4Z5AC**	**28**	**1,111,808**	**1175**	**344**

ARMENIA

***4J4JJ**	**A**	**192**	**8**	**8**

SYRIA

***OH3MIG/4U**	**21**	**140,712**	**365**	**132**

KUWAIT

9K2ZZ	**A**	**4,301,246**	**2500**	**626**

UNITED ARAB EMIRATES

A61AD	**A**	**4,989,600**	**2704**	**616**
				(Op. WB2DND)

BAHRAIN

A92BE	**3.7**	**8,658**	**44**	**39**

CHINA

***BZ4DJW**	**21**	**260,010**	**611**	**243**

KOREA

***HL9UH**	**A**	**103,694**	**274**	**139**
***HL9AF**	**21**	**12,191**	**100**	**73**

JAPAN

JH7PKU	**A**	**5,122,156**	**2420**	**719**
JA8RWU	**A**	**3,490,368**	**1873**	**672**
JH1AEP	**A**	**3,430,224**	**1815**	**656**
JA5ONK	"	1,567,359	1110	499
JA9YAV	"	1,376,622	970	481
			(Op. Hajime)	
JA7BEW	"	981,130	844	410
JR4QZH	"	782,548	673	404
JA2ADH	"	299,040	400	267
JA6BIF	"	226,765	337	217
JN2AMD/2	"	184,440	353	232
JR1JCB	"	172,912	335	202
JN3SAC	"	131,788	263	188
JJ1NNJ	"	123,984	241	164
JA5IP	"	96,555	251	157
JG2GBZ	"	79,200	185	150
JH6FTJ	"	73,134	209	153
JA3UWB	"	64,771	165	133
JM1LAW	"	54,389	175	137
JA6OM	"	51,188	140	134
JG3KIV	"	42,051	143	107
JA4DHN	"	32,235	117	105
JA6QDU	"	16,576	87	74
JA2OJ	"	10,340	70	55
JK2HDC	"	5,200	45	40
JI7OED	"	4,025	40	35
JAØGZ	"	3,565	52	31
JF1YRK	"	774	20	18
			(Op. JA9VDA)	
JL2ICO	"	22,528	110	88
JH6WHN	**28**	**303,038**	**473**	**277**
JA2BNN	**21**	**1,102,066**	**927**	**446**
JA5APU	"	95,945	196	155
JE1LFX	"	12,716	70	68
JE3BMU	"	11,284	72	62
JA1STY	"	12	2	2
JL1DRX	"	0	212	0
7L1GVE	**14**	**3,008,850**	**1664**	**650**
JH7QXJ	"	861,105	742	417
JAØBQB	"	8,424	57	54
JQ1VNM	**7**	**35,600**	**98**	**89**
JH4UHW	**3.7**	**27,264**	**93**	**71**
***JF1SEK**	**A**	**757,340**	**724**	**380**
***JL1MWI**	**A**	**542,346**	**614**	**349**
***JH1UUT**	**A**	**352,782**	**447**	**282**
*JA1BUI	"	258,128	386	272
*7K2DOD	"	219,744	350	224
*JK1AJX/1	"	172,000	350	215
*7K2MPA	"	136,524	288	186
*7J3ABV/7J1	"	130,340	275	190
*JR9NVB	"	124,047	245	179
*JL2HUJ	"	110,584	252	184
*7K2MPE	"	105,461	236	163
*JH2WHS	"	97,686	238	162
*JR7LVK	"	88,935	203	165
*JK2VOC	"	85,901	231	163
*7J1AMM	"	75,999	212	147
			(Op. WA1FSV)	
*JA9GHC	"	65,550	167	138
*JH1TYU	"	61,750	173	125
*JN1FEA	"	36,668	145	103
*JA2GHP	"	35,496	146	102
*JI1MTF	"	35,190	147	102
*JA1AB	"	33,229	121	101
*JA3JOT	"	32,542	128	106
*JA1RKI	"	30,550	141	94
*7M2KXI	"	28,836	121	108
*7L2VOC	"	28,512	123	96
*7J1ABD	"	25,620	115	84
			(Op. WA6URY)	
*JA1ASO	"	25,017	103	93
*JF1SQC	"	22,113	97	81
*JA1PUK	"	21,754	84	73
*JH1JGZ	"	20,580	108	84
*JH1RMH	"	20,485	99	85
*JF5OVU	"	13,930	79	70
*JO1ATK	"	11,514	62	57
*JJ1LRD	"	10,788	76	58
*JA6CDC	"	10,496	64	64
*JA6BWH	"	9,168	65	48
*JR1MRG	"	6,624	56	46
*JI8LBW	"	6,517	51	49
*JA4AQR	"	5,848	52	43
*JG1GBL	"	3,589	41	37
*JN2WYE	"	2,996	46	28
*JK6LRI	"	2,145	38	33
*JI7WPV	"	1,113	24	21
***JM1TUY**	**28**	**1,027,699**	**979**	**439**
*JS6KWT	"	82,521	215	159
*JR4GPA	"	57,405	181	129
*JG1TVK	"	36,741	144	111
*JE2IFM/1	"	11,966	79	62
*JA4ETH	"	10,797	73	59
*JA5PEE	"	8,215	61	53
*JA7ARW	"	7,020	60	52
*JAØGCI	"	6,528	53	51
*JH1BUB	"	6,204	60	44
*JE2LPC	"	2,108	35	31
*JA9XAT	"	1,972	32	29
*JO1AHZ	"	1,932	31	28
*JO1TLP	"	1,540	24	22
*JA7AXP	"	1,452	26	22
*JR7CJO	"	432	14	12
*7N1HFK	"	420	16	14
*JEØVSW	"	408	12	12
*7K2PBB	"	377	14	13
*JF3WNO	"	119	7	7
*JE1HXZ	"	108	6	6
***JR7OMD/2**	**21**	**1,302,623**	**1001**	**491**
***JQ1NGT**	**21**	**1,197,380**	**1002**	**460**
***JA7ZWD**	**21**	**943,920**	**822**	**432**
*JE1VTZ	"	444,576	504	352
*JAØBMS/1	"	414,252	487	333
*JH9KVF	"	399,360	480	320
*JJ1KZZ	"	272,304	382	279
*JR8OGB/8	"	202,464	344	228
*JE2NWN	"	160,308	287	219
*JR2TRZ	"	143,880	266	218
*JQ1XDO	"	105,450	230	185
*JQ1UXN	"	102,676	227	193
*JG3UOB/1	"	102,480	226	183
*JR4CAU	"	56,290	202	130
*JP1LPH	"	37,278	132	114
*JR1LQK	"	33,136	123	109
*JK6ISK	"	29,760	192	155
*7K2FII	"	26,885	105	95
*JA9IKL	"	22,165	100	85
*JJ1NUI	"	17,556	95	77
*JH8AJB	"	15,466	88	74
*JF2PXB	"	15,450	97	75
*JA2IZA	"	12,489	73	69
*JA1NFD	"	11,718	68	63
*JA3FZI	"	10,620	69	60
*JA1XPU	"	8,909	71	59
*JI1RCB	"	3,700	42	37
*JA5ED	"	2,848	35	32
*JA3TBT	"	2,652	34	34
*7K2CWQ	"	2,052	28	27
*7L2QXT/1	"	1,425	25	25
*JR3KAH	"	1,219	27	23
*JR4ISK	"	540	16	15
*JG3EHD	"	476	14	14
*JM2BHI	"	384	14	12
*JA2PEI	"	304	16	16
*JM1NAD	"	8	2	2
***JE2UFF**	**14**	**201,788**	**320**	**244**
*JA9IVJ	"	41,040	135	120
*JF2XJE	"	8,965	64	55
*JG1RDV	"	7,854	56	51
*JE1GZB	"	5,504	46	43
***JM1NKT**	**7**	**22,776**	**80**	**73**
*JA7FFN	"	3,360	26	24
*JG7LBN	"	390	13	13

MONGOLIA

***JT1BG**	**A**	**51,272**	**150**	**136**

SAUDI ARABIA

HZ1AB	**14**	**24,119**	**101**	**89**
				(Op. AA6CQ)

TURKEY

***TA2DS**	**A**	**350,088**	**443**	**232**

ASIATIC RUSSIA

UA9XM	**A**	**178,563**	**307**	**231**
RA9XU	**14**	**240,456**	**368**	**233**
RW9AB	**7**	**416,744**	**350**	**226**
***UØC /UAØZBK**	**21**	**343,980**	**605**	**294**
***UA9CSX**	**21**	**311,538**	**470**	**274**
*UAØCKA	"	114,898	341	203
*RAØBR	"	77,154	239	154
***UA9DE**	**3.7**	**236,208**	**268**	**168**
***RAØFA**	**3.7**	**1,722**	**25**	**21**

UZBEKISTAN

UI9ACP	**A**	**1,062,180**	**942**	**420**

KAZAKHSTAN

RLØP	**A**	**460,495**	**804**	**223**
				(Op. UL8PC)
UN8LA	**28**	**890,666**	**1268**	**369**
				(Op. UL7LAO)
UL7JEG	**21**	**1,474,230**	**1382**	**471**
UL7BAY	"	370,500	492	285
UN7LZ	**14**	**1,530,570**	**1108**	**489**
UL7DA	**3.7**	**63,736**	**180**	**124**

KYRGYZSTAN

***UM8MFO**	**21**	**285,782**	**455**	**274**

HONG KONG

VS6WO	**A**	**3,743,238**	**2674**	**678**
				(Op. NA9D)
VS6BG	**21**	**228,060**	**510**	**252**

KAMPUCHEA

XU7VK	**21**	**798,792**	**1090**	**401**
				(Op. HA7VK)

EUROPE

CROATIA

9A3IJ	**A**	**1,318,384**	**1043**	**524**
9A1CCY	**21**	**2,616,132**	**1567**	**622**
				(Op. 9A3JZ)
9A2WV	"	546,040	623	374
9A7A	**14**	**2,517,606**	**1742**	**689**
				(Op. 9A3OS)
9A3QK	**3.7**	**193,848**	**318**	**197**
***9A1CLH**	**A**	**17,301**	**81**	**73**
***9A3SC**	**3.7**	**57,552**	**216**	**132**

PORTUGAL

CT1BWU	**A**	**40,866**	**177**	**139**
CR7EDX	"	28,956	120	114
			(Op. CT1EDX)	
CT8T	**28**	**941,147**	**926**	**401**
				(Op. CT1DVV)
CR6END	"	92,491	288	181
CT1UO	**21**	**22,368**	**100**	**96**
***CT1EDJ**	**A**	**112,752**	**272**	**216**
*CT1QF	"	67,320	199	165
*CT1EAT	"	34,553	123	109
***CT1ERK**	**28**	**87,740**	**215**	**164**
*CT1ENQ	"	36,951	130	109
***CT1BWW**	**14**	**638,675**	**790**	**433**

AZORES IS.

CUØWPX	**A**	**2,472,000**	**2129**	**600**
				(Op. KB3RG)

GERMANY

DL8PC	**A**	**2,457,520**	**1500**	**680**
DK2XX	**A**	**2,424,840**	**1524**	**668**
DJ8UV	"	914,850	907	450
DL1APW	"	684,855	783	405
DF1IAZ	"	577,187	735	377
DL6ET	"	529,056	607	396
DJ5AV	"	362,838	483	318
DL4YBP	"	361,971	505	333
DJ3HJ	"	204,269	330	247
DL1BFZ	"	149,079	314	217
DL3JXN	"	29,044	132	106
DL8UED	"	7,904	60	52
DL9FCY	**21**	**142,552**	**273**	**206**
DL8OBQ	**14**	**508,196**	**634**	**377**
DJ7AA	**7**	**1,522,560**	**1061**	**480**
DK4LI	"	253,820	431	245
DJ2YE	"	58,058	178	143
DJØBX	"	1,200	25	25
DL3LAB	**3.7**	**635,600**	**787**	**350**
DL4SUA	"	135,710	367	205
DL1ARD	"	15,200	105	80
***DL8SDC**	**A**	**214,316**	**389**	**262**
***DK6BT**	**A**	**204,732**	**378**	**242**
*DJØMW	"	181,944	354	252
*DK7ZH	"	157,648	350	236
*DL3DBY	"	102,648	268	188
*DL6DVU	"	94,822	267	182
*DL8UVG	"	89,640	260	166
*DK4IO	"	70,880	230	160
*DLØSFB	"	70,350	245	150
			(Op. DL6UJH)	
*DL7VBM	"	70,200	207	150
*DL2GBB	"	47,790	166	135
*DL1DWT	"	18,177	108	83
*DL3HWW	"	15,355	90	83
*DL4MGX	"	13,944	115	84
*DL5SVB	"	9,360	78	60
*DL2HTF	"	3,399	37	33
*DL1USA	"	3,078	46	38
*DJ6QO	"	275	11	11
***DL3BRA**	**21**	**58,653**	**180**	**133**
***DJ6TK**	**14**	**25,520**	**119**	**110**
***DF3JO**	**3.7**	**179,196**	**523**	**218**
*DK5VO	"	57,024	216	144

SPAIN

EA7DHP	**A**	**1,205,820**	**1092**	**462**
EA4BT	**A**	**521,289**	**596**	**387**
EA1JO	"	337,920	518	330
EA1BQR	"	218,535	409	255
EA5BY	"	134,280	219	180
EA2CKP	"	129,165	351	237
EA5JC	"	86,826	227	174
EA5AEN	"	82,641	197	169
EA3EKT	"	39,476	149	142
EA5GJM	"	24,514	134	103
EA2CR	"	16,968	103	84
EA5GRO	"	3,492	36	36
ED3PX	**14**	**629,280**	**940**	**437**
				(Op. EA3CWS)
EA5BXT	"	265,737	513	313
EA1FER	"	16,320	117	96
EA3ELM	**3.7**	**118,864**	**263**	**184**
***EA3BKI**	**A**	**1,135,330**	**1005**	**490**
***EA1EVW**	**A**	**784,665**	**761**	**477**
*EA3GJH	"	431,959	553	367
*EA3EJI	"	423,168	630	348
*EA5PX	"	318,111	566	321
*EA5EYJ	"	145,415	319	229
*EA1FAC	"	97,948	235	188
*EA3GHQ	"	86,304	230	174
*EA5GRP	"	80,337	238	183
*EA1EMZ	"	64,622	199	158
*EA3GHC	"	62,125	210	175
*EA2CNG	"	49,764	195	143
*EA3EAN	"	37,878	164	118
*EA1DVY	"	32,754	120	103
*EA7EBL	"	26,264	106	98
*EA3ELZ	"	25,568	113	94
*EA5ETP	"	22,770	118	115
*EA3PE	"	15,120	93	80
*EA7PN	"	4,440	43	40
*EC7DYV	"	1,269	28	27
*EA2OJ	"	306	12	9
***EA1BFZ**	**28**	**5,502**	**49**	**42**
*EA3TI	"	3,922	38	37
***EF5CXQ**	**21**	**518,040**	**843**	**360**
				(Op. EC5CXQ)
*EA7FTR	"	480,636	749	316
*EA7HF	"	407,286	581	363
*EA1EVQ	"	264,327	408	307
*EA7CD	"	143,038	344	238
*EA1CCU	"	81,803	208	179
*EA1FFC	"	28,994	120	109
*EC1DHR	"	2,145	46	39
*EC1DMQ	"	1,368	24	24
*EC1DMP	"	663	17	17
***EA1CS**	**14**	**71,621**	**217**	**187**
*EA4HR	"	437	19	19
***EA3CVO**	**7**	**14,868**	**102**	**59**
***EC3CIL**	**3.7**	**79,680**	**235**	**166**
*EA5YJ	"	18,870	100	85
*EC2AUD	"	7,936	69	62

BALEARIC IS.

***EA6HK**	**A**	**13,692**	**87**	**84**
***EA6WY**	**28**	**768**	**16**	**16**
***EA6WX**	**14**	**315,774**	**704**	**331**

IRELAND

EI/G3YOG	**14**	**218,025**	**492**	**285**

FRANCE

F6BEE	**A**	**3,371,184**	**1706**	**656**
TM93U	**A**	**2,484,665**	**1591**	**653**
				(Op. F6DZU)
FØ/EA3NY	**A**	**2,363,526**	**1574**	**621**
F8WE	"	310,170	585	294
FE1OGG	"	78,824	210	167
F1OBK	"	41,217	153	131
FD1TCN	"	23,896	111	103
F6EZV	**7**	**1,671,320**	**1125**	**470**
F1NBX	"	872,490	710	381
F6AML	**1.8**	**38,870**	**170**	**115**
***TM6GG**	**A**	**1,412,980**	**1063**	**530**
				(Op. F6FGZ)
***F2AR**	**A**	**200,685**	**371**	**255**
*F2RO	"	184,262	351	247
*FE6FNA	"	153,170	301	265
*FD1RAB	"	81,084	217	174
*FD1PYI	"	74,120	181	170
*FD1RDS	"	33,558	154	119
*F1NYK	"	25,990	140	115
*FD1PAY	"	6,848	72	64
***F6BVB**	**3.7**	**186,140**	**386**	**227**

ENGLAND

G3ICG	**A**	**42,284**	**155**	**124**
G4PKP	**28**	**42,875**	**145**	**125**
G4CNY	**21**	**103,934**	**238**	**157**
GØPMQ	**3.7**	**44,888**	**171**	**124**
***G4ENZ**	**A**	**868,500**	**792**	**450**
*GØKTN	"	156,860	300	220
*G4NXG/M	"	7,905	60	51
***GØNIF**	**14**	**1,120**	**21**	**20**

SCOTLAND

GM3BCL	**A**	**278,100**	**424**	**300**

WALES

GW4BLE	**14**	**2,992,041**	**1882**	**717**
***GW4RTO/M**	**A**	**78,568**	**242**	**184**
				(Op. G4RTO)

HUNGARY

HA5MY	**A**	**1,165,962**	**1148**	**497**
HA8AT	**14**	**57,792**	**231**	**172**
HA9BVK	**7**	**620,625**	**753**	**331**
				(Op. HA9CU)
***HA5NK**	**A**	**312,360**	**505**	**285**
*HA7UV	"	205,656	395	246
*HA5NG	"	137,292	312	204
*HA8CO	"	30,820	136	115
***HG8QB**	**28**	**22,742**	**110**	**83**
***HA5WG**	**21**	**186,676**	**310**	**236**
*HA6NW	"	62,780	179	146
*HA4YV	"	14,283	90	69
***HA4FB**	**14**	**158,670**	**389**	**246**
***HA4XN**	**3.7**	**259,076**	**528**	**239**

SWITZERLAND

HB9AAA	**A**	**414,596**	**464**	**364**

ITALY

IK1SLE	**A**	**2,034,182**	**1416**	**614**
I6NOA	**A**	**350,030**	**464**	**290**
IK6JNH	"	234,000	283	208
IK6QRH	"	190,893	303	197
IK1RQQ	"	92,771	214	203
IN3KTT	"	64,200	212	150
IK6RHT	"	44,880	105	88
I2CMA	"	17,082	89	73
IO4ABF	**28**	**545,877**	**624**	**393**
IG8R	"	317,709	515	287
				(Op. I8RIZ)
IQ2DZN	**21**	**1,361,507**	**1085**	**469**
IBØC	"	201,438	363	186
I8NHJ	**14**	**284,400**	**536**	**316**
IK6PMF	"	276,892	563	319
IK5ROS	"	74,636	258	188
IK2VJF	"	12,425	81	71

IO4VEQ	**7**	**4,184,292**	**1768**	**654**
IK3ORD	**3.7**	**614,992**	**645**	**323**
IK8NRL	*	77,872	251	157
***I2UIY**	**A**	**929,538**	**829**	**457**
***IK7NXU**	**A**	**326,186**	**491**	**322**
*IK3STG	*	323,352	524	324
*IØØYQV	*	260,040	301	220
*IK3TPP	*	204,572	356	257
*IK4QJH	*	200,207	350	259
*IK4DBT	*	156,607	322	253
*IN3XUG	*	121,604	256	202
*I1QBI	*	118,170	269	195
*IK2SOE	*	104,742	245	207
*IK8SMZ	*	86,078	212	193
*IK5RLR	*	79,716	239	182
*IK1PHC	*	51,408	149	112
*IK1TWC	*	47,816	179	139
*IK3OGL	*	46,248	190	123
*IK5TUZ	*	46,116	167	122
*IKØQSO	*	36,580	149	124
*I4CSP	*	31,320	126	108
*IK8IFW	*	15,423	111	97
*IK4CBM	*	11,020	45	58
*IK5TBK	*	4,656	49	48
*IK4RSK	*	2,847	41	39
*IK3SCB	*	2,688	31	28
*IKØQDB	*	1,204	28	28
*IK1GEN	*	1,080	30	27
***I2AT**	**28**	**27,360**	**113**	**96**
*IK2UCK	*	1,564	24	23
***IK5FTV**	**21**	**120,384**	**258**	**209**
*IØIKV	*	38,350	136	118
***I4PZP**	**14**	**117,746**	**302**	**226**
*IV3ZCS	*	90,900	230	202
*IK5RUR	*	16,366	103	98

SARDINIA

***ISØLLJ**	**A**	**80,983**	**215**	**161**

SICILY

IT9HBT	**A**	**1,665,252**	**1372**	**612**
IT9RYJ	**21**	**1,122,240**	**1129**	**501**
IT9NTT	*	762,555	886	435
IO9BLB	**7**	**751,184**	**836**	**353**

NORWAY

LA9DFA	**A**	**464,594**	**775**	**334**
LA6MP	*	55,695	194	141
LA7NIA	*	55,566	228	162
LA6LHA	*	40,296	96	92
LA2IR	**14**	**120,750**	**308**	**230**
***LA2GCA**	**A**	**164,500**	**360**	**235**
*LA2AD	*	56,722	245	158
*LA2EIA	*	41,184	178	144
*LA5RBA	*	30,208	149	118
*LA4KGA	*	14,062	102	79

LUXEMBOURG

LX2PA	**A**	**206,492**	**365**	**286**

LITHUANIA

LY2BNC	**A**	**440,856**	**667**	**314**
LY2BN	*	200,460	375	257
LY2BGB	*	188,405	351	245
LY3BH	*	163,236	317	183
LY2TZ	*	60,551	229	151
LY2OU	**28**	**68,444**	**192**	**142**
LY2WW	**21**	**635,700**	**775**	**326**
			(Op. LY3IJ)	
LY3BA	*	162,162	322	198
LY2BI	*	4,214	51	43
LY1DI	**14**	**344,571**	**648**	**331**
LY1DS	**3.7**	**512,528**	**750**	**311**
LY3BS	*	458,496	751	288
***LY2BQJ**	**A**	**467,400**	**732**	**328**
***LY2BKT**	**14**	**18,800**	**130**	**94**

BULGARIA

LZ5W	**A**	**6,538,782**	**3013**	**881**
			(Op. LZ3ZZ)	
LZ6L	**A**	**818,184**	**646**	**292**
			(Op. LZ2HT)	
LZ1KNP	*	192,448	441	248
			(Op. LZ1N-143)	
LZ1BJ	*	37,873	163	121
LZ6R	**21**	**2,201,628**	**1547**	**572**
			(Op. LZ2PP)	
LZ1RN	**3.7**	**178,920**	**373**	**210**
***LZ1DM**	**A**	**136,960**	**347**	**214**
***LZ2GS**	**28**	**45,600**	**146**	**114**
***LZ1ZX**	**7**	**539,110**	**640**	**319**
*LZ2ZY	*	96,768	250	168

AUSTRIA

OE1MBB	**A**	**320,250**	**472**	**305**
OE1WWL	*	24,534	113	94
OE1MCU	*	16,450	104	94
OE3DSA	**21**	**232,716**	**384**	**246**
OE3EMN	*	105,450	250	185
OE/EA3FQV	**3.7**	**18,530**	**109**	**85**
***OE1KYW**	**A**	**302,865**	**501**	**305**

FINLAND

OH6NIO	**A**	**2,554,919**	**1616**	**631**
OH8LQ	**A**	**1,966,923**	**1695**	**567**
OH3OJ	*	1,767,904	1547	547
OH3VV	*	1,120,077	1035	483
OH1NSJ	*	346,491	500	313
OH4ML	*	265,350	465	290
OH2HE	**21**	**2,578,752**	**1648**	**576**
			(Op. OH6CT)	
OH6RM	**21**	**2,155,885**	**1491**	**541**
OH6IU	*	149,592	299	184
OH4OO	*	90,160	231	161
OH2BH	**14**	**3,735,324**	**2223**	**774**
			(Op. OH6EI)	
OH5BM	**7**	**1,002,300**	**947**	**390**
OH1MLB	**3.7**	**307,536**	**555**	**258**
***OH6SU**	**A**	**164,808**	**288**	**252**
***OH7NW**	**A**	**111,302**	**304**	**202**
*OH6QP	*	57,915	198	143
*OH4LYX	*	36,584	159	136
*OH7MFO	*	16,235	100	85
***OH2BUU**	**21**	**25,152**	**120**	**96**

ALAND IS.

OHØNJ	**A**	**22,011**	**100**	**87**
OHØMAM	**21**	**2,378,080**	**1609**	**576**
OH1EH/OHØ	**14**	**3,526,587**	**2402**	**747**

CZECH REPUBLIC

OK1RI	**21**	**3,028,065**	**1738**	**655**
OK1ARI	*	157,050	309	225
OK2KMR	*	54,740	172	119
			(Op. OK2BQZ)	
***OK1JJB**	**A**	**371,841**	**506**	**317**
*OK2SWD	*	23,904	141	96
*OK1AXB	*	22,230	112	90
*OK1MP	*	18,720	101	72
*OK1DXW	*	18,245	108	89
*OK2VVN	*	12,284	102	83
***OK2TH**	**21**	**7,488**	**73**	**48**
***OK1BLC**	**14**	**94,061**	**274**	**187**
***OK2PJW**	**3.7**	**171,496**	**464**	**194**
*OK1AXV	*	48,514	190	127
*OK2PQY	*	45,056	201	128

SLOVAKIA

OM3QW	**21**	**33,936**	**136**	**112**
OM3TZW	**3.7**	**544,578**	**670**	**323**
OM3CQD	**1.8**	**105,878**	**316**	**167**
***OM3CRH**	**A**	**221,375**	**429**	**253**
*OM3PQ	*	250,404	432	271
*OM3CDZ	*	142,623	325	207
*OM3TLJ	*	59,740	213	145
*OM3CTA	*	45,486	165	133
*OM3CAJ	*	26,544	148	112
***OM3YK**	**14**	**90,624**	**268**	**192**
***OM3CAB**	**7**	**23,424**	**115**	**96**
***OM3YCL**	**3.7**	**163,020**	**377**	**209**

BELGIUM

***ON4SS**	**A**	**505,232**	**686**	**364**
*ON7YP	*	22,672	124	104
*ON5EU	*	8,646	74	66
*ON6NL	*	455	16	13
***ON6TT**	**28**	**268,393**	**509**	**311**
*ON6CQ	*	21,870	105	90
*ON/PAØMPM	*	216	10	9
***ON4ZD**	**21**	**117,806**	**245**	**197**
*ON4XG	*	56,430	160	135
*ON4BW	*	34,832	143	112
***ON9CJM**	**3.7**	**73,990**	**232**	**151**
			(Op. WQ2M)	

FAROE IS.

***OY9R**	**A**	**40,719**	**193**	**147**

DENMARK

OZ5EV	**A**	**477,932**	**522**	**404**
OZ1ZTW	*	109,494	307	198
OZ1DYI	*	29,036	155	119
OZ6PI	*	8,509	87	67
OZ1INN	**21**	**275,355**	**411**	**261**
OZ1HXQ	*	225,144	322	236
***OZ9AAR**	**A**	**505,714**	**750**	**362**
*OZ1LTB	*	229,501	400	257
*OZ1ACB	*	90,582	260	186
*OZ5ABD	*	81,351	170	131
***OZ1CCB**	**28**	**952**	**32**	**28**
***OZ5LH**	**21**	**65,520**	**157**	**140**
***OZ8AE**	**14**	**9,035**	**73**	**65**
***OZ8KU**	**7**	**6,710**	**61**	**55**
*OZ1FMO	*	4,888	50	47
***OZ3SK**	**1.8**	**104,876**	**316**	**167**

THE NETHERLANDS

PAØIJM	**A**	**1,213,470**	**1214**	**485**
PA3AAV	**A**	**154,780**	**277**	**218**
PAØKDM	*	21,556	145	68
PA3BUD	*	2,112	29	24
PA3DWD	**14**	**2,277,660**	**1506**	**660**
PA3FBN	*	1,302,992	1135	496
***PA2SWL**	**A**	**228,206**	**443**	**253**
*PAØSNG	*	177,120	349	240
*PAØDOM	*	22,878	106	93
*PA3GBA	*	14,630	102	77
*PA3EMN	*	13,800	80	69
***PAØMIR**	**28**	**24,900**	**107**	**100**
***PA3ELD**	**21**	**132,712**	**266**	**212**
*PAØQX	*	8,533	55	53
***PA3FNE**	**14**	**169,425**	**350**	**251**
*PA3GAB	*	16,400	115	100

SLOVENIA

S53AA	**A**	**278,184**	**451**	**268**
S57AL	**28**	**249,522**	**474**	**273**
S56MM	**21**	**3,311,963**	**1891**	**691**
			(Op. S52AA)	
S57EK	*	2,835,924	1676	636
S53BM	*	386,400	505	300
S54DL	**14**	**1,376,535**	**1201**	**563**
S53EA	**3.7**	**1,136,930**	**1105**	**410**
***S57BU**	**21**	**175,406**	**316**	**238**
***S59DRJ**	**3.7**	**340,000**	**580**	**272**
			(Op. S57MYC)	
*S58BKL	*	76,708	252	151
***S53TK**	**1.8**	**26,264**	**135**	**98**

SWEDEN

SM7DXQ	**A**	**147,840**	**292**	**224**
SM7ATL	**A**	**53,339**	**201**	**143**
SMØBDS	*	52,338	188	143
SM5OK	*	31,473	141	117
SM7HSP	*	30,666	155	114
SM5ALJ	*	21,115	130	103
SMØFM	*	20,493	123	99
SM5AAY	*	20,200	102	101
SMØHTO	**21**	**2,244,531**	**1120**	**831**
SKØUX	**14**	**1,141,482**	**1090**	**527**
			(Op. SMØTQX)	
SM7CRW	*	1,065,024	952	516
SM2BUW	*	25,058	141	134
SMØJHF	**3.7**	**72,216**	**228**	**153**
***SM7RPU**	**28**	**192**	**8**	**8**
***SM6AHU**	**14**	**32,860**	**165**	**124**
*SM7TV	*	17,952	136	96

POLAND

SP9HZF	**A**	**171,710**	**350**	**223**
SP6AZM	*	73,177	200	169
SP2JMR	*	62,016	245	114
SP4PBI	*	57,086	197	146
SP7HKK	*	28,458	103	102
SP3JVA	*	23,352	119	84
SP9RQH/P	*	17,017	79	77
SP3NUY	*	5,250	115	35
SP4AVG	*	2,964	42	39
SN3A	**28**	**205,632**	**411**	**272**
SP9DEM/A	*	444	13	12
SP6YAQ	**14**	**306,900**	**484**	**330**
SP5ZIM	*	152,810	393	185
			(Op. SP5GRU)	
***SP9AGS**	**A**	**134,670**	**355**	**201**
*SP6MLX	*	73,513	222	163
*SP5ULH	*	63,492	194	143
*SP1AEN	*	39,235	171	133
*SP7FQI	*	34,650	153	110
*SP8OON	*	34,216	203	91
*SP7LHX	*	25,538	117	113
*SP3KPN	*	22,736	116	98
*SP6VXR	*	19,695	113	101
*SP7YBD	*	16,560	97	80
*SP5BB	*	14,245	89	77
*SP9IKN	*	9,176	88	62
*SP3OCR	*	7,021	60	59
*SP6HBX	*	5,650	77	50
*SP3CQP	*	4,275	50	45
***SN6O**	**28**	**74,104**	**210**	**157**
			(Op. SP6SNT)	
*SP6SOX	*	1,449	25	23
*SP9HQC	*	744	24	12
***SP2UUU**	**21**	**43,964**	**161**	**116**
*SP5YQ	*	38,010	153	105
*SP6AGD	*	25,920	124	90
*SP8LZC	*	20,995	101	85
*SP8TDE	*	6,936	56	51
***SP1EOI**	**14**	**105,876**	**227**	**204**
*SP7SEW	*	91,020	286	205
*SP4SHD	*	49,494	245	113
*SP2AHD	*	27,140	124	115
*SP3NYG	*	5,220	50	45
*SP6DHH	*	4,092	53	44
***SP9RVD**	**7**	**45,150**	**156**	**129**
*SP1JXC	*	21,716	136	89
*SP9MDY	*	2,048	32	32
***SO2FCJ**	**3.7**	**184,884**	**431**	**213**
			(Op. OK1FCJ)	
*SP9CAY	*	180,400	390	220

GREECE

SV1IG	**A**	**247,104**	**304**	**208**
***SV3AQR**	**28**	**108,069**	**306**	**163**

RUSSIA

UA4LCQ	**21**	**1,725,837**	**1216**	**479**
RA3R	**21**	**1,289,327**	**1028**	**533**
RA3QR	*	1,292,280	1030	534
UV6LC	*	326,748	522	292
RW4WR	**14**	**1,608,559**	**1334**	**589**
UA1OZ	*	935,922	978	507
UV3ACQ	*	120,240	350	240
UV3DRH	*	30,740	140	116
UA6LAK	*	30,562	145	118
RZ6LJ	**7**	**414,612**	**533**	**297**
UA3QCR	**3.7**	**207,270**	**433**	**235**
***UA3AIM**	**A**	**22,134**	**125**	**93**
***UV3DRU**	**21**	**37,092**	**140**	**132**
*UA4AVN	*	33,264	214	144
***UA1TAN**	**14**	**268,576**	**495**	**308**
*4K4BAT	*	31,188	160	138

UKRAINE

UY7E	**A**	**1,800,934**	**1703**	**571**
			(Op. UB5ECE)	
UT4UX	**A**	**1,532,950**	**1207**	**575**
UY5TE	*	420,161	695	311
UB4YWW	*	61,138	211	154
DJ5BV/UB7Q	**21**	**1,482,451**	**1309**	**527**
UT5UBN	*	75,429	207	153
RY7E	**14**	**1,397,132**	**1571**	**562**
			(Op. UB5EDU)	
RB5QW	*	1,275,060	1377	538
UB5QIT	**7**	**77,976**	**175**	**171**
UB5UT	**3.7**	**318,230**	**577**	**263**
UB5QN	*	149,868	346	207
RB5ELM	**1.8**	**9,016**	**78**	**49**
***US8I**	**A**	**1,008,960**	**1241**	**480**
			(Op. RB1IZ)	
*RB1IV	*	275,335	534	265
*UB5IFX	*	209,531	429	259
*UB5ZMI	*	78,936	286	184
*RB1IF	*	11,520	79	72
***UB5WAN**	**28**	**51,348**	**152**	**132**
***UB5QMA**	**21**	**642,025**	**747**	**425**
***RB5QRW**	**7**	**489,108**	**626**	**308**
***RB5DX**	**3.7**	**504,900**	**634**	**275**
***UB5FAN**	**1.8**	**45,372**	**175**	**114**
*RB5ILZ	*	25,208	130	92

BYELORUSSIA

***UC2ABO**	**3.7**	**94,800**	**281**	**158**

MOLDAVIA

***UO5OED**	**A**	**517,998**	**716**	**377**
***UO5OIV**	**21**	**49,784**	**392**	**127**

ESTONIA

***YL2GN**	**A**	**661,122**	**910**	**378**
***YL2GVW**	**28**	**3,978**	**41**	**34**

ROMANIA

YO7LFV	**A**	**216,524**	**419**	**266**
YO7AEW	*	61,146	193	158
YO3JF	**7**	**233,682**	**372**	**237**
YO2LIM	**3.7**	**3,216**	**68**	**24**
***YO3RU**	**A**	**291,740**	**485**	**290**
*YO9AGI	*	74,800	219	170
*YO7ARY	*	60,312	226	168
*YO8ROO	*	5,439	71	49
*YO2CMI	*	3,296	34	32
***YO9CNU**	**28**	**6,210**	**52**	**45**
*YO3BWK	*	5,076	52	36
***YO5BWI**	**14**	**16,512**	**120**	**96**
*YO8CRU	*	5,841	59	59
***YO2ARV**	**3.7**	**73,200**	**238**	**150**
*YO8SMI	*	1,248	26	24

YUGOSLAVIA

YU7SF	**28**	**31,312**	**123**	**103**
YU1AGX	**21**	**109,431**	**256**	**189**
YU7KM	*	59,214	183	139
YT7A	**14**	**1,461,745**	**1327**	**593**
4N1A	**3.7**	**363,000**	**546**	**275**
4N7N	*	211,596	444	231
			(Op. Zvone)	
***YU1ADO**	**14**	**124,509**	**322**	**231**

BOSNIA

4N4DD	**1.8**	**88,086**	**254**	**159**

MACEDONIA

***4N5DR**	**21**	**14,062**	**92**	**79**

OCEANIA

SINGAPORE

***9V1YC**	**A**	**2,311,768**	**1961**	**536**

PHILIPPINES

4D9RG	**A**	**2,195,282**	**1475**	**461**
			(Op. DU9RG)	

GUAM

KG6DX	**21**	**6,597,812**	**3120**	**724**
***KN4DG/KH2**	**A**	**132,990**	**322**	**143**

HAWAII

WR6R/WH6	**A**	**9,803,972**	**3776**	**758**
KI6EZ/NH6	**21**	**4,944,027**	**2569**	**643**
KH6GMP	*	170,558	280	214
KH6FKG	**14**	**2,312,404**	**1435**	**556**
KH6XT	**7**	**2,546,950**	**1124**	**383**
***NH6XM/T**	**28**	**219,856**	**366**	**208**

CHRISTMAS IS.

T32AF	**7**	**3,995,928**	**1532**	**437**
			(Op. KH6UR)	

FED. REPUBLIC OF MICRONESIA

V63OM	**14**	**33,405**	**131**	**85**
***V63FA**	**28**	**14,190**	**86**	**55**
			(Op. V63OM)	

MARSHALL IS.

V73CK	**28**	**2,185,116**	**1799**	**422**

BRUNEI

***V85BJ**	**A**	**487,620**	**796**	**210**
V85CJ	*	92,678	210	149

AUSTRALIA

VK5GN	**A**	**4,130,580**	**2201**	**645**
VK3TZ	**A**	**2,251,392**	**1346**	**572**
VK2GAH	**A**	**1,350,123**	**1185**	**391**
VK8AV	**A**	**119,598**	**226**	**186**
VK3ALZ	**28**	**279,279**	**428**	**231**
VK4UA	**14**	**921,717**	**723**	**423**
***VK2ARJ**	**A**	**439,880**	**552**	**280**
***VK3SM**	**14**	**57,477**	**173**	**119**

HONG KONG

***VR2GO**	**21**	**102,816**	**224**	**153**

INDONESIA

***YB6INU**	**A**	**964,590**	**851**	**370**
*YB1ARW	*	371,884	524	239
***YB3ZBS**	**21**	**473,304**	**499**	**328**
			(Op. YD3SPS)	
*YC8PN	*	151,092	483	108
*YC3MIG	*	1,122	23	22

NEW ZEALAND

ZL3GQ	**A**	**8,459,200**	**3426**	**800**
			(Op. K5ZD)	
ZL2AMI	**A**	**2,236,086**	**1562**	**486**
ZL1AAS	**21**	**518,130**	**519**	**342**

SOUTH AMERICA

CHILE

3G3R	**A**	**9,104,494**	**3444**	**854**
			(Op. CE3FIP)	
CE3ZI	**28**	**476,575**	**712**	**275**
***CE2EZE**	**A**	**438,876**	**479**	**292**

BOLIVIA

CP1FF	**A**	**57,000**	**300**	**190**

URUGUAY

***CX6BZ**	**A**	**225,456**	**349**	**231**
***CX4SS**	**28**	**8,272**	**48**	**47**
***CX7BF**	**21**	**1,343,146**	**955**	**487**

ECUADOR

HC7SK	**A**	**6,873,680**	**3086**	**730**
			(Op. SM6DYK)	
HK3JJH	**A**	**3,872,046**	**2168**	**582**
HK1HHX	**14**	**5,809,868**	**2535**	**773**

ARGENTINA

LU5ER	**A**	**2,825,028**	**1666**	**582**
LU8FDZ	**A**	**1,583,475**	**1100**	**491**
LU2FDN	**28**	**411,125**	**505**	**275**
LU3HPT	*	255,460	379	241
LU1HOO	**21**	**2,852,748**	**1492**	**654**
***LU2NI**	**A**	**3,487,328**	**1787**	**664**
*LU2DZS	*	13,717	108	43
*LU5EVK	*	11,286	68	66
***LU1VK**	**28**	**1,645,296**	**1248**	**454**
***LU6EJP**	**28**	**1,231,367**	**976**	**431**
*LU8DY	*	438,681	560	267
*LU7DW	*	70,560	189	144
***HA5AND/LU**	**14**	**26,800**	**100**	**100**

PERU

4T4ANR	**A**	**3,777,757**	**2050**	**619**
			(Op. OA4ANR)	

ARUBA

P4ØV	**A**	**19,406,800**	**6049**	**1015**
			(Op. AI6V)	

BRAZIL

PW1Z	A	**2,821,280**	**1873**	**616**
			(Op. PP1CZ)	
PX2A	A	**1,643,376**	**1220**	**469**
PP5TC	"	8,160	60	51
PY3OC	28	**5,363,820**	**2584**	**693**
PY3BD	21	**424,875**	**530**	**275**
PY2APQ	14	**467,142**	**490**	**339**
PY1LI	"	140,352	262	192
PY4BK	7	**2,852**	**23**	**23**
PY2PD	3.7	**13,200**	**61**	**55**
***PW2N**	A	**1,668,472**	**1220**	**488**
*PY3HLM	"	58,797	180	141
*PY2EMT	"	38,160	119	106
***ZY5C**	28	**1,851,354**	**1295**	**489**
***PY2OZF**	21	**37,278**	**127**	**114**
***ZW7AB**	14	**1,248**	**24**	**24**
***PU2LSR**	7	**4,556**	**40**	**34**
***PU5WKS**	3.7	**36**	**12**	**9**

VENEZUELA

YV4YC	A	**696,780**	**506**	**316**
YV6BTF	"	103,494	176	141
YW1A	14	**5,194,194**	**2415**	**753**
			(Op. YV1AVO)	
YV5MRR	7	**2,778,078**	**969**	**491**
YV1DRK	1.8	**8,736**	**45**	**39**
***YV4VN**	A	**102,256**	**221**	**176**
***4M5KWS**	21	**317,025**	**477**	**225**
			(Op. YV5KWS)	
***4M4T**	14	**51,590**	**146**	**134**
			(Op. YV4EYA)	
***YV4DSB**	3.7	**286,344**	**261**	**194**
YV4AZF	"	102,555	147	129

PARAGUAY

ZPØY	**2810,635,356**	**4169**	**862**
		(Op. ZP5JCY)	

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

NZ5I	**6,423,699**	**3363**	**939**
AA8U	**5,617,863**	**2680**	**893**
W7ZR	**5,391,684**	**2644**	**774**
KI1G	**4,721,517**	**2465**	**837**
W6EEN	**4,692,650**	**2561**	**739**
WU7Q	3,962,546	2233	698
KE3Q	**3,916,890**	**2068**	**801**
N7TT	3,337,236	2041	714
NO9Z	**3,251,409**	**2015**	**749**
NJ1V	2,329,094	1945	706
KY2T	**2,221,638**	**1541**	**654**
WZ3T	2,192,877	1033	501
KK4JF	**2,101,551**	**1524**	**659**
ABØS	**1,651,660**	**1467**	**614**
NU1H	1,404,200	1210	595
K2PS	1,358,448	1095	546
KC1F	1,295,872	1054	512
NC1A	1,068,166	904	506
KB3TS	1,010,072	861	476
KB2SE	934,464	853	471
AA5NT	796,572	785	436
NWØF	741,888	1158	512
KC6X	711,450	908	465
AA3B	545,100	618	395
WJ2W	336,256	452	296
N8JQX	317,768	436	314
KE5WH	242,535	430	285
K3JLK	232,180	400	260
K3CP	224,112	391	276
WF5E	132,528	360	251
WS1L	106,212	285	212
N4YET	95,526	254	174
KD4SCE	38,223	231	137
AB6FO	19,296	218	144
N6IP	2,914	33	31

NORTH AMERICA

VP2EC	**22,462,276**	**6795**	**1132**
TO5M	**17,310,349**	**6189**	**1099**
CH2WJ	**8,714,595**	**3513**	**885**
WL7E	**7,805,280**	**3027**	**808**
VE6SV	**6,323,328**	**3284**	**792**
XA5T	**5,355,270**	**2600**	**758**
CK7K	**4,848,978**	**2866**	**694**
VP5L	**2,975,174**	**2155**	**617**
6Y5EW	**2,860,924**	**2461**	**514**
XK1JO	**2,295,100**	**1685**	**590**
XL7U	1,994,592	1774	474
KH2S/KP1	**1,874,457**	**2100**	**433**
VE6AO	1,349,685	1329	445
VF3LRL	**1,315,160**	**948**	**440**
XK5SF	**1,036,980**	**1164**	**420**
VE3HB	1,026,312	843	447
VE2UMS	**316,929**	**406**	**267**
XK3RRH	101,184	221	192

AFRICA

EA4KR/EA8	**14,108,475**	**4408**	**939**
EL2PP	**10,578,167**	**4022**	**881**
IG9/IT9SAZ	**1,817,916**	**1324**	**394**

ASIA

C49C	**16,387,756**	**5640**	**847**
JH5ZJS	**8,085,615**	**3366**	**815**
JJ3YBB	**7,256,616**	**3111**	**822**
5B4YY	**6,054,672**	**3123**	**624**
UN8LW	**5,283,278**	**2509**	**638**
VS6CM	**5,190,354**	**3432**	**738**
JE6ZIH	4,809,760	2241	736
JA1YXP	4,369,488	1987	696
UZ9XWH	**4,067,810**	**1756**	**635**
D73A	**3,249,414**	**2232**	**629**
HSØAC	**2,645,055**	**2498**	**567**
JU1T	**1,225,156**	**1624**	**419**
UZ9XWX	549,186	577	314
UI8B	**219,240**	**360**	**203**
UZØCWQ	**4,840**	**47**	**44**

EUROPE

TM7C	**12,649,637**	**4428**	**1001**
CT5P	**12,479,320**	**4715**	**980**
TK6A	11,599,760	4350	976
GB6BT	**11,313,840**	**3991**	**1003**
TM2V	8,484,040	3500	904
EA3KU	**7,653,996**	**3196**	**882**
RT1U	**7,222,670**	**3928**	**910**
GB2MM	6,726,945	3130	831
GU6YB/P	**6,372,939**	**3219**	**831**
II5NA	**5,491,056**	**2623**	**823**
EI7M	**5,461,512**	**2880**	**798**
R6L	**5,438,352**	**3105**	**827**
LX4A	**4,929,512**	**2414**	**779**
CQ1A	4,777,425	2916	765
OH8PF	**4,700,160**	**2632**	**765**
G3OZF	4,634,132	2341	782
OH5NQ	4,225,958	2263	737
IK2HDG	4,071,596	1945	788
OM3KFF	**3,906,216**	**1959**	**717**
PA6WPX	**3,888,710**	**1977**	**761**
OL3A	**3,831,688**	**2151**	**742**
OE2XEL	**3,760,072**	**2053**	**712**
DL1VJ	**3,743,463**	**1986**	**687**
GXØOBS	3,661,767	2087	729
RE6A	3,535,200	2488	800
DFØESA	3,327,969	1882	723
EA2IA	3,323,970	1956	702
4N7M	**3,306,222**	**1956**	**747**
OH7AAC	3,169,067	2062	649
GIØKOW	**3,145,242**	**1992**	**678**
ON6AH	**3,028,712**	**1865**	**668**
ED3RKG	2,832,200	1987	700
UZ4WWF	2,625,335	1985	617
R6Y	2,607,044	2139	614
GW6GW	**2,298,046**	**1634**	**626**
DKØBF	2,154,159	1435	651
GX5QK	2,053,056	1577	592
FF6KAW	1,962,228	1369	606
HA8KCK	**1,772,050**	**1249**	**610**
DKØBP	1,726,340	1248	590
GXØFDX	1,610,573	1313	551
SP9PDF	**1,590,513**	**1288**	**579**
ED3CT	1,554,030	1442	557
PI4TUE	1,526,987	1202	539
ED3BT	1,504,368	1216	558
SP9LJD	1,430,805	1259	527
SO3NL/1	1,415,062	1340	491
DL9JDT	1,309,360	1156	520
DLØOHG	1,295,712	805	409
IT9VDQ	**1,289,195**	**1351**	**523**
DFØCG	1,139,850	1081	510
J42T	**1,112,004**	**1181**	**474**
UZ3AWR	1,103,850	1173	495
GØMIN	1,058,616	689	377
DLØSSB	1,032,226	972	481
LY1BZB	**981,180**	**1167**	**414**
G6CW	970,748	1091	482
SK6AW	**917,910**	**901**	**470**
SK7CA	823,424	861	448
SK7BV	772,686	587	349
LZ1KBB	**749,700**	**815**	**425**
SK5WB	701,376	864	0
SP3PLD	637,056	760	384
OT3D	632,835	903	369
DLØLX	596,820	518	343
UZ3GYM	547,600	800	370
OK2KOD	**531,753**	**655**	**361**
RZ1AWO	519,129	753	377
IV3NVN	510,784	616	368
IV3NTA	503,682	566	381
OK2KJU	487,200	648	348
DLØDPM	483,300	630	358
404D	**480,165**	**704**	**357**
DLØHGW	399,280	632	322
IK3DVX	363,658	500	349
YR6F	**363,080**	**502**	**313**
OK2KDS	342,000	494	300
HA5KEH	327,152	541	322
LA1K	**265,122**	**523**	**286**
SP6YFU	233,877	445	259
GX6OI	187,824	408	258
ED3TR	176,847	450	253
OE1XTU	155,520	367	216
DLØUM	145,255	317	209
DLØDRL	109,705	330	185
4N4ELD	63,945	183	147
OZ9SIG	**61,280**	**244**	**160**
YO2KBB	25,498	193	61
FF6KIM	10,290	73	70
SK6NL	6,800	70	68
UB4PWC	550	25	22

OCEANIA

P2ØX	**13,440,570**	**4855**	**858**
FO8AA	**6,625,300**	**3515**	**634**
DX3H	**3,655,344**	**2184**	**506**
VK4DMP	**485,674**	**567**	**307**
VK4NEF	343,728	480	252

SOUTH AMERICA

HC8A	**32,509,269**	**8703**	**1107**
ZXØF	**31,059,544**	**8629**	**1096**
PJ9X	**25,678,215**	**7678**	**1065**
PRØR	**11,036,112**	**4006**	**912**
CE6EW	**8,332,632**	**3548**	**792**
PT7CB	7,962,741	3216	801
YW59M	**7,683,840**	**3349**	**736**
LU1FC	**6,621,210**	**2702**	**822**
PXØZ	4,527,712	2347	656
LU7FEU	2,366,964	1139	666
YV5USB	1,753,619	1167	479

MULTI-OPERATOR MULTI-TRANSMITTER WORLD

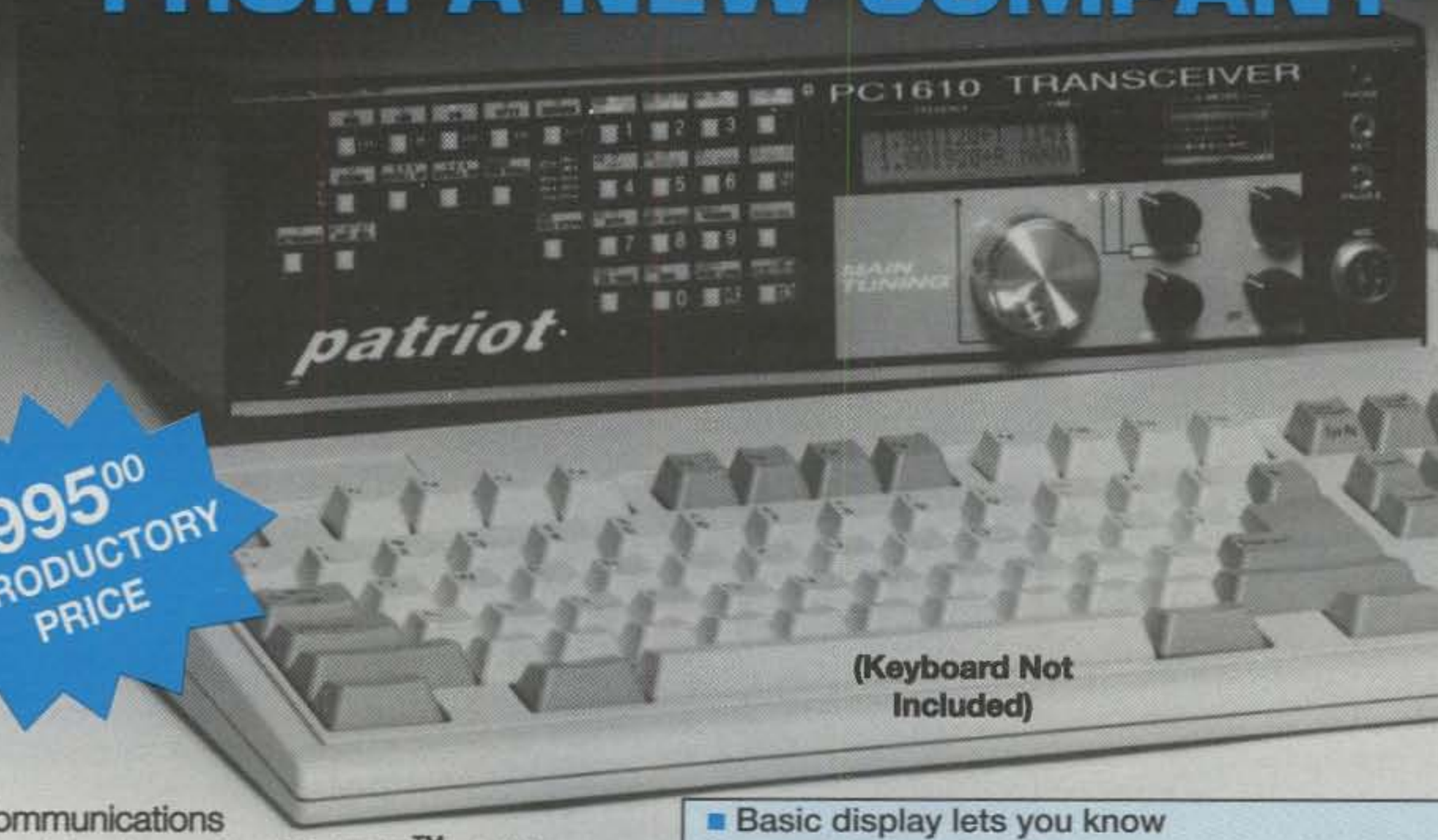
LU4FM	**28,369,173**	**7315**	**1253**
XK7SZ	**22,633,136**	**7719**	**1072**
9A1A	**18,456,290**	**6464**	**1130**
OT3A	**17,251,069**	**6294**	**1121**
HG73DX	**15,652,197**	**5778**	**1089**
UX9C	**15,078,492**	**3113**	**1508**
PX4B	**14,126,786**	**4705**	**1018**
CZ7Z	13,234,540	5296	946
US7I	**12,307,950**	**5712**	**1013**
WZ1R	**11,126,585**	**4840**	**1115**
WK4Y	**8,854,545**	**4387**	**1029**
7Z2AB	**8,779,886**	**3679**	**811**
WX3N/Ø	**8,771,860**	**4299**	**1070**
JAØYAK	**6,667,650**	**2763**	**825**
LY7A	**5,861,464**	**3399**	**799**
EG1RX	**2,966,350**	**1479**	**1025**
JA1YFG	2,086,276	1310	566
LY1GM	1,153,596	1076	502
N8BJQ	**1,135,200**	**1013**	**528**
NK3U	**1,017,344**	**1036**	**512**
NE1A	**883,630**	**1163**	**554**
DFØDC	**242,216**	**505**	**274**
LA1R	**180,858**	**369**	**258**
LU5MA	179,498	309	199
NY6Y	**47,422**	**160**	**131**
JAØYDD	192	9	8

CHECK LOGS

The following logs were used for cross-checking. Check logs and SWL logs are always appreciated. Thank you.

3G1I, 4M2NY, CE4ETZ, CS1JR, CS1L, CT3DC, DF5WN, DK5KJ, DL1ASZ, DL3DRN, DL3YDY, DL4VAD, DL5JRA, DL5YSM, DL6UEG, EA1CVZ, EA1DDU, EA1ETP, EA1EVR, EA2BP, EA2BXJ, EA3GBU, EA5FKS, EA5FNE, EA5FXG, EA5GCX, EA5GQK, EA5GRN, EA5RGM, EA6VQ, EA7BYM, EC3DFZ, EC6RN, EC7DMU, EH1DD, F6GQS, GMØNWY/M, HK3MAH, HP1ALX, IV3NHJ, IV3NZN, J8/K7SE, JA1IT, KA6OCO, KB1SF, LA2AIA, LA2IZ, LA2PGA, LA2XIA, LA4BN, LA4JHA, LA6VIA, LA8DY, LA9DAA, LA9LO, LA9RY, LU3OJZ, LY2BAG, LZ2LH, LZ3FN, OA4CTJ/LU, OH5KFJ, OH5TE, OH6MIL, OH7NRW, ON5FV, OZ1CID, OZ7QB, PAØUV, PBØALL, PU2VJJ, PU5AFS, PY2IAX, PY6WJ, PY7AHJ, RA4UDW, RA6HE, S57DX, SL5ZYB, SM2LWU, SM3MHD, SM4JUW, SM5CVC, SM6FPZ, SM6MVL, SM7AIL, SO9SBI, SP-Ø189-GD, SP1DMD, SP1GZT, SP1JXC, SP2DWA, SP2EIW, SP2ERZ, SP2SCX/OE, SP2WEP, SP3CNP, SP3JZI, SP4AS, SP4CHY, SP4CMW, SP4EEZ, SP4SKW/5, SP4ZJD, SP5NOG, SP5ZDD/5, SP6BEN, SP6CPF, SP6EFY, SP6FIB, SP6STB, SP6TGA, SP6URF, SP7GSM, SP7PGK, SP7VCA, SP8BJH, SP8EEX, SP8HXN, SP8MCP, SP8NAD, SP9AVZ, SP9BBH, SP9CLO, SP9CQ, SP9DEE, SP9EWM, SP9MAN, SP9ODY, SP9PRO, SP9XCN, UØC/UAØZBK, UA3-17Ø-919, UA3WCN, UA9QGB, UB4EYS, UB5XAN, UB5ZMI, UL7PIK, VE2BXA, VK5OE, W5BLR, W7LQU, WB4RUA, XK4SK, YL2KF, YO2DFA, YO5OBL, YO7LCX, YO8MI, YT2ZO, YV2FEQ, ZV2NP, ZW3A.

A NEW CONCEPT IN HF TRANSCEIVER DESIGN FROM A NEW COMPANY



Patent Pending

$995.00 INTRODUCTORY PRICE

(Keyboard Not Included)

Patriot Communications Technology introduces the PC-1610,™ a full featured HF transceiver with built-in keyboard interface. Plug a standard IBM XT* compatible keyboard into a PC-1610 and instantly enjoy keyboard CW, RTTY (BAUDOT and ASCII) data communications. Incoming morse & RTTY data is decoded and displayed on the built-in LCD display. The PC-1610 offers the following features:

- Built-in XT keyboard interface (keyboard optional)
- 160-10M ham band coverage
- USB/LSB/CW/FSK modes
- 75W output power
- Built in digital power/SWR meter
- DDS VFO with 1Hz step size
- Selectable variable speed/fixed 10Hz step VFO tuning
- Built-in 24hr clock
- 90 tunable memories
- 1 scratchpad memory
- 9 (256 character) keyboard data buffers
- Built-in 5-75 wpm IAMBIC keyer
- Built-in 2.4KHz, 1.8KHz, 500Hz, 200 Hz & RTTY filters
- Notch filter
- Select 1 of 3 antennas from front panel

Specifications are subject to change without notice.
* IBM XT is a registered trademark of the IBM Corporation.

- Basic display lets you know exactly where you are.

```
14.03510-T    0930
14.03510-R    M000
```

- Standard Display shows RX/TX VFO freq's, time and current memory

- Send & Receive in: CW / RTTY(BAUDOT) / ASCII

```
TNX FER QSO. 73
```

← Incoming data

← Outgoing data appears here

- Store up to nine 256 character messages.

```
14.03510-T    0930
3>CANNED      MSG
```

- Messages can be: edited, sent & appended to outgoing message

← Format & Edit stored MSG's here

PC-1610 = HF XCVR + PC + DATA CNTLR + 💾

- The PC-1610 Performs the functions of an HF Transceiver, Computer, Data Controller and Control Software all in one package.

The PC-1610 has too many features to adequately describe in one ad... call or write for a detailed brochure—Major Credit Cards Accepted.

patriot
PATRIOT COMMUNICATIONS TECHNOLOGY, INC.

Designed and manufactured in the U.S.A.
Phone: (516) 862-6512 ■ Fax: (516) 862-6529
7 Flowerfield M100, St. James NY 11780

CIRCLE 148 ON READER SERVICE CARD

CQ REVIEWS:

The MFJ-249 HF/VHF SWR Analyzer

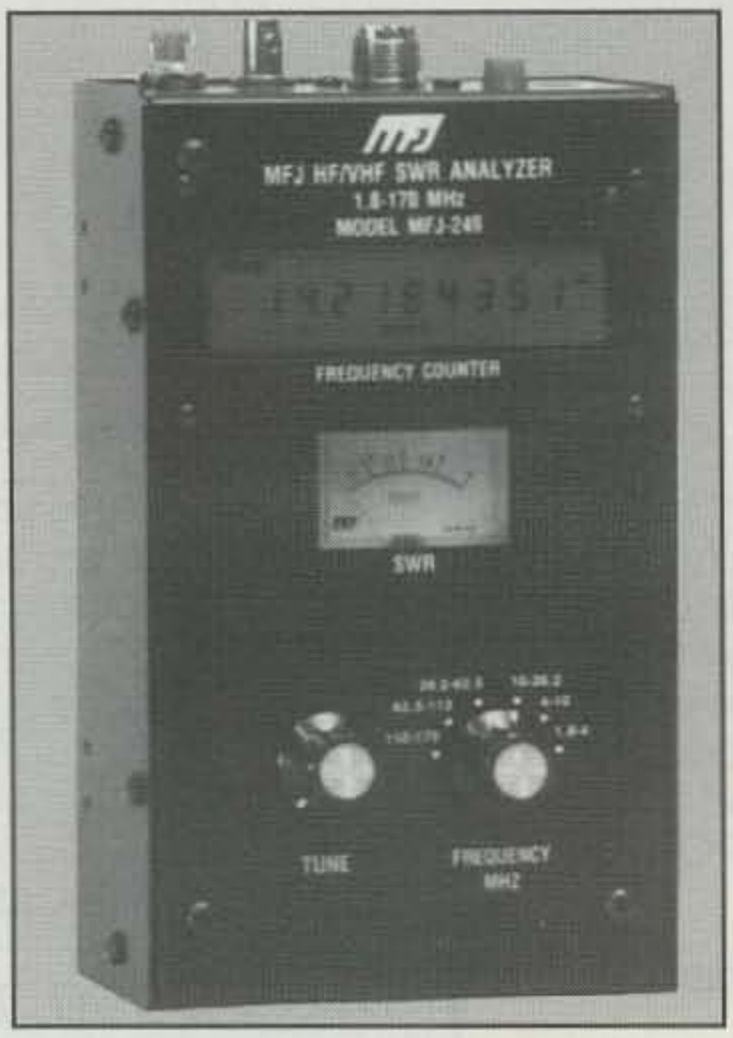
BY LEW McCOY*, W1ICP

Although MFJ Enterprises has made several antenna SWR measuring devices, their Model MFJ-249 is really a big leap forward in design.

Essentially, the MFJ-249 consists of a very accurate frequency counter that covers, in six band/steps, from 1.8 MHz through 170 MHz. This, in conjunction with a built-in SWR detector circuit, can be used to measure the SWR of an antenna system. For example, I have a multiband beam that works from 40 through 10 meters. I connected the MFJ-249 to the beam via the coax I normally use for transmitting. In other words, I disconnected the feed line from my rig and connected it to the '249. The meter on the '249 is calibrated in SWR, so by slowly turning the **Tune** knob to cover the various band/frequency ranges, you can see the SWR drop down as you go by resonance on each of the antenna's bands.

The meter is calibrated so that an SWR of 1 to 1 is at zero, graduated up to half scale, which is 2 to 1, and 3/4 scale, which is 3 to 1, with infinity as full scale. In these days of rigs that shut off when the SWR approaches 2 to 1, it is immediately apparent that considerable thought went into the design of the SWR readings. If your antenna feed system with coax is not below 2 to 1, you'd better fix the system.

I think what surprised me most with my multiband beam was that it had resonances (low SWR) in some very unexpected places. Even on 6 meters the beam showed an SWR of only 1.2 to 1! I am sure my antenna will load on 6, but it would take a rather exotic computer pattern to analyze the pattern! In this case, one becomes an old-fashioned amateur



This is the MFJ-249. The connections mentioned in the text are partially visible on top of the unit. Just above the meter is the LED frequency readout. At the lower right is the band switch, and on the left is the tuning control.

and empirically listens and observes how the antenna performs when it is not designed for, but is resonant on, a band. In any event, it is easy to go through the bands and plot the SWR and bandwidth of each band.

I tested the LED frequency counter readout and it is appears to be extremely accurate. It reads out to tenths of a kiloHertz—in other words, 14,222.5 kHz. It does this on all bands. I checked the counter against a known standard (WWV) on several bands, and the readouts checked to within the proverbial gnat's eyebrow.

The LED readout numbers are slightly more than 1/4 inch high, and the counter is very easy to read in bright sunlight, if for example you were working outside tuning up a beam or other antenna.

Additionally, the '249 serves as a frequency counter. To switch from the SWR bridge to frequency counter merely means turning the unit on via a button on the top, and then pushing another button (also on the top) which puts you in the counter mode. There is a jack mounted on the top to take a counter pickup antenna (I used a straightened-out paper clip!). MFJ recommends the use of a times one probe, as the sensitivity of the counter is on the order of 600 mv.

The six bands of coverage, in mega-Hertz, are first 1.8 to 4, 4 to 10, 10 to 26.2, 26.2 to 62.5, 62.5 to 113, and 133 to 170 MHz. It is really fascinating to connect this to a coax multiband fed antenna, go through the entire frequency range, and discover all the resonances. As I said, you are certain to be surprised.

Of course, the SWR analyzer can be used to adjust Transmatches. MFJ makes a switch, the MFJ-1702, which connects between your rig and tuner or the analyzer. Simply tune the analyzer to the desired frequency and then adjust the Transmatch so that you have a 1 to 1 SWR reading. MFJ, however, cautions the user not to turn on the rig while the analyzer is in the circuit.

The manual is well detailed and easy to read. Also, MFJ has an excellent 12-month guarantee policy. In addition, they have an "over the phone" help policy, and the guarantee is not voided for the owner who attempts to service his unit. The cost of the MFJ-249 is $199.95, and it is manufactured by MFJ Enterprises Inc., 921 Louisville Road, Starkville, Mississippi 39759. ■

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

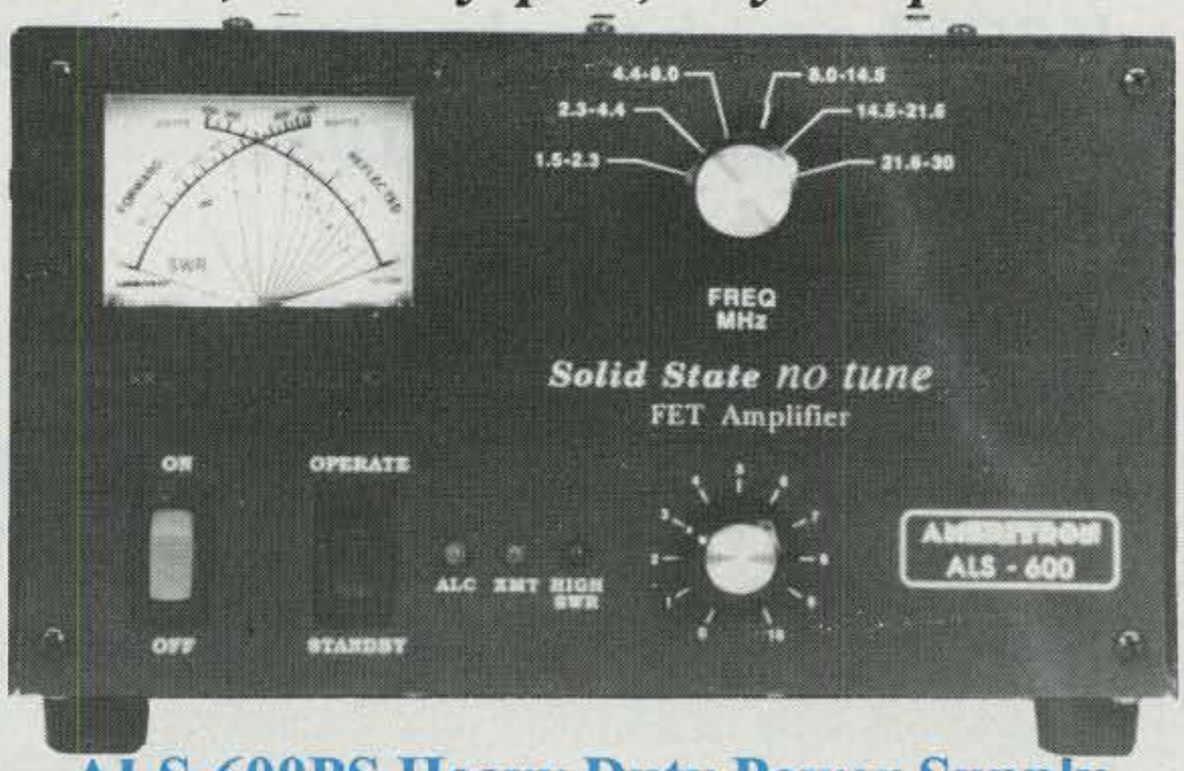
Ameritron *no tune* Solid State FET Amplifier

No tuning, no fuss, no worries -- just turn on and operate . . . Incredibly low $1299 includes AC power supply, 700 Watts output, continuous 1.5-22 MHz coverage, instant bandswitching, no warm up, no tubes to baby, fully SWR protected, extemely quiet, very compact

- **Ameritron's** *revolutionary* ALS-600 is amateur radio's *only* linear amplifier that uses four rugged TMOS RF power FETs -- gives unequaled *no tune* solid state performance
- **$1299 includes** Ameritron's *no tune* FET Amplifier *and* a 120/220 VAC, 50/60 Hz AC power supply for home operation

ALS-600
$1299
Suggested Retail
(*Includes* AC Power Supply)

- **Instant bandswitching, no tuning, no warm up** -- just turn on and operate
- **Output Power** -- 700 Watts PEP, 500 Watts CW
- **Continuous Coverage** -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit
- **SWR Protection** -- prevents amplifier damage if you switch to wrong band, use wrong antenna or have high SWR
- **Over Power Protection** -- if output forward power or reflected power exceeds safe level, output power is automatically reduced to prevent amplifier damage by controlling ALC to exciter
- **Extremely quiet** -- low speed, low volume fan is so quiet you' ll hardly know it' s there, unlike noisy blowers used in other amps
- **Very Compact** -- 6 x 9½x12 inch amplifier takes up less desktop space than your transceiver and weighs about the same -- only 12½ pounds
- **Illuminated Cross-Needle SWR/Wattmeter** -- lets you read SWR, forward and reflected *peak* power simultaneously
- **Operate/Standby Switch** -- lets you run "barefoot", but you can instantly switch to full power if you need it
- **Front Panel ALC Control** -- *exclusive* Ameritron feature -- convenient front panel control lets you adjust your output power
- **Transmit, ALC, SWR LED indicators** -- keeps you informed
- **12 VDC output jack** -- lets you power low current accessories
- **Separate** ALS-600PS power supply (included) can be placed conveniently out of the way and plugged into your nearest 120 VAC outlet -- no special wiring needed
- **Made in USA**
- **Enjoy** 700 Watts of *no tune* solid state power. Call your favorite dealer for your best price and order your ALS-600 with power supply today



ALS-600PS Heavy Duty Power Supply

ALS-600PS power supply included with ALS-600 amplifier

- **Massive choke input filter** greatly improves voltage regulation and reduces peak AC line current
- **Ameritron's** exclusive *Multi-Voltage Power Transformer* lets you compensate for stressful high line voltage and performance robbing low line voltage
- ***Step-Start Inrush Protection***™ stops damaging inrush currents and extends life of power supply components
- **Illuminated** Cross-Needle Meter monitors voltage and current of 50 VDC line
- **Extremely** quiet fan
- **Very compact** 6 x 9 ½x12 inches -- can be placed conveniently out-of-way
- **Wired for 120 VAC,** supplies 50 VDC at 25 amps to ALS-600 amplifier
- **Also** use on 100-130 VAC and 220-250 VAC, 50/60 Hz
- **Draws** less than 12 amps at 100 VAC and less than 6 amps at 230 VAC
- **Includes prewired cable** to plug into ALS-600 amplifier
- **Made in USA**

Ameritron Mobile *no tune* Solid State Amplifier

Ideal mobile amplifier -- ***uses 13.8 VDC mobile electrical system, very compact 3½x9x15 inches, extremely quiet, 600 Watts output, continuous 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm up, SWR protected***

ALS-500M
$799
Suggested Retail

- **Mobile *no tune* Solid State Amplifer** -- uses four rugged 2SC2879 high power linear RF power transistors
- **Instant bandswitching, no tuning, no warm up** -- just turn on and operate -- makes mobile QSOs safer
- **Very Compact** -- just 3½x9x15 inches -- fits in nearly any mobile installation; weighs only 7 pounds, that' s less than some mobile HF transceivers
- **Extremely quiet** --quiet low speed, low volume fan stays off and silent until temperature rises
- **Output Power** -- 600 Watts PEP, 400 Watts CW
- **Continuous Coverage** -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit
- **Load Fault Protection** -- disables and bypasses amplifier if antenna has excessively high reflected power or if bandswitch is set lower than exciter frequency -- virtually eliminates damage because of operating error; has Load Fault LED indicator
- **Thermal Overload Protection** -- disables and bypasses amplifier if temperature is excessively high; automatically resets when temperature drops to safe level; has Thermal Overload LED indicator

Exact power output of amplifiers may vary on each band.

- **Excellent harmonic suppression** -- multiple section output network and push-pull output circuit gives excellent harmonic suppression
- **DC current meter** lets you monitor collector current
- **ON/OFF Switch**-- bypasses amplifier for "barefoot" operation without having to disconnect high current power supply cables
- **Remote ON/OFF Control** -- lets you remotely control ON/OFF function for out-of-the-way mounting of amplifier
- **Exciter Drive** -- less than 100 watts input gives full output
- **Power Supply Requirements** -- requires 13.8 VDC at 80 amperes peak current for PA transistors and seperate line for 12-15 VDC at 4 amperes for control and bias circuits
- **Made in USA**
- **Call you favorite dealer** for your best price and order your ALS-500M today

AMERITRON
. . . the high power specialist
921 Louisville Rd. • Starkville, MS 39759
(601) 323-8211 **FAX:** (601) 323-6551
Free Catalog/Nearest Dealer: **800-647-1800**
8 a.m. - 4:30 p.m. CST, Monday-Friday

CIRCLE 22 ON READER SERVICE CARD

Some folks have a favorite band and some of us even think we own a particular piece of it. This theoretical design by K6STI can be adapted to whatever piece of the band you may want to stake out.

A Yagi With An Amazing Pattern At 14.200 MHz

BY BRIAN BEEZLEY*, K6STI

I'd like to show you an unusual antenna design. While very specialized, it's one of my favorites. This is a 4-element Yagi with a truly amazing radiation pattern at a single, spot frequency in the 20 meter band. Figs. 1 and 2 show free-space E- and H-plane patterns in polar coordinates, while figs. 3 and 4 present more detail using rectangular coordinates. Fig. 5 shows a close-up, three-dimensional view of the backlobe region.

This Yagi came about when one day I took a standard 4-element Yagi (probably the PV4 design of W2PV) and automatically optimized the E-plane pattern for minimum worst-case backlobes in the rear half-plane at 14.2 MHz.[1] I didn't try to optimize forward gain or input impedance (and I certainly didn't optimize conventional front-to-back ratio, a measure which takes the rear pattern into account at just a single point). In addition, I made no attempt to broadband the design. Fig. 6 shows the performance of the spot-frequency design over the entire 20 meter band.

While you might construct this design for use on a favorite frequency, its real purpose is to demonstrate just how good the pattern of a simple Yagi can be. While this kind of pattern cannot be maintained over a frequency band, it's useful to know the limiting case when making design trade-offs among forward gain, radiation pattern, and SWR bandwidth for more general antennas. A design like this also is useful for sensitivity studies. Because any pattern distortion is so plainly visible, it's easy to check proposed guy-wire systems or multiband stacking arrangements for minimum antenna interaction by modeling with the NEC- or MININEC-based programs.

By examining this design and others like it, I've concluded that pattern quality for practical, spot-frequency Yagi designs of four or more elements is limited only by modeling accuracy and construction tolerances, not by inherent limitations of the Yagi configuration. This is not true for 3-element Yagis, which bottom out with backlobes down about 28 dB, but for four or more elements the limit is below –40 dB. I don't trust the accuracy of anything but NEC for backlobes this small (and NEC requires high segmentation density). At these levels small, second-order modeling errors likely determine exact rear-lobe shape.[2]

Fortunately, the main effect of modeling errors normally is just a simple frequency shift (patterns occur slightly higher or lower in frequency than calculated). The effect of systematic construction errors (such as undercutting all elements by a fraction of an inch) is similar. It's easy to correct both modeling and systematic construction errors with minor adjustment of element lengths. Random construction errors and nearby conductors are likely to smear parasitic-element current amplitudes and phases and thus increase backlobes at all frequencies.

Table I gives dimensions for this design for untapered elements. Untapered dim-

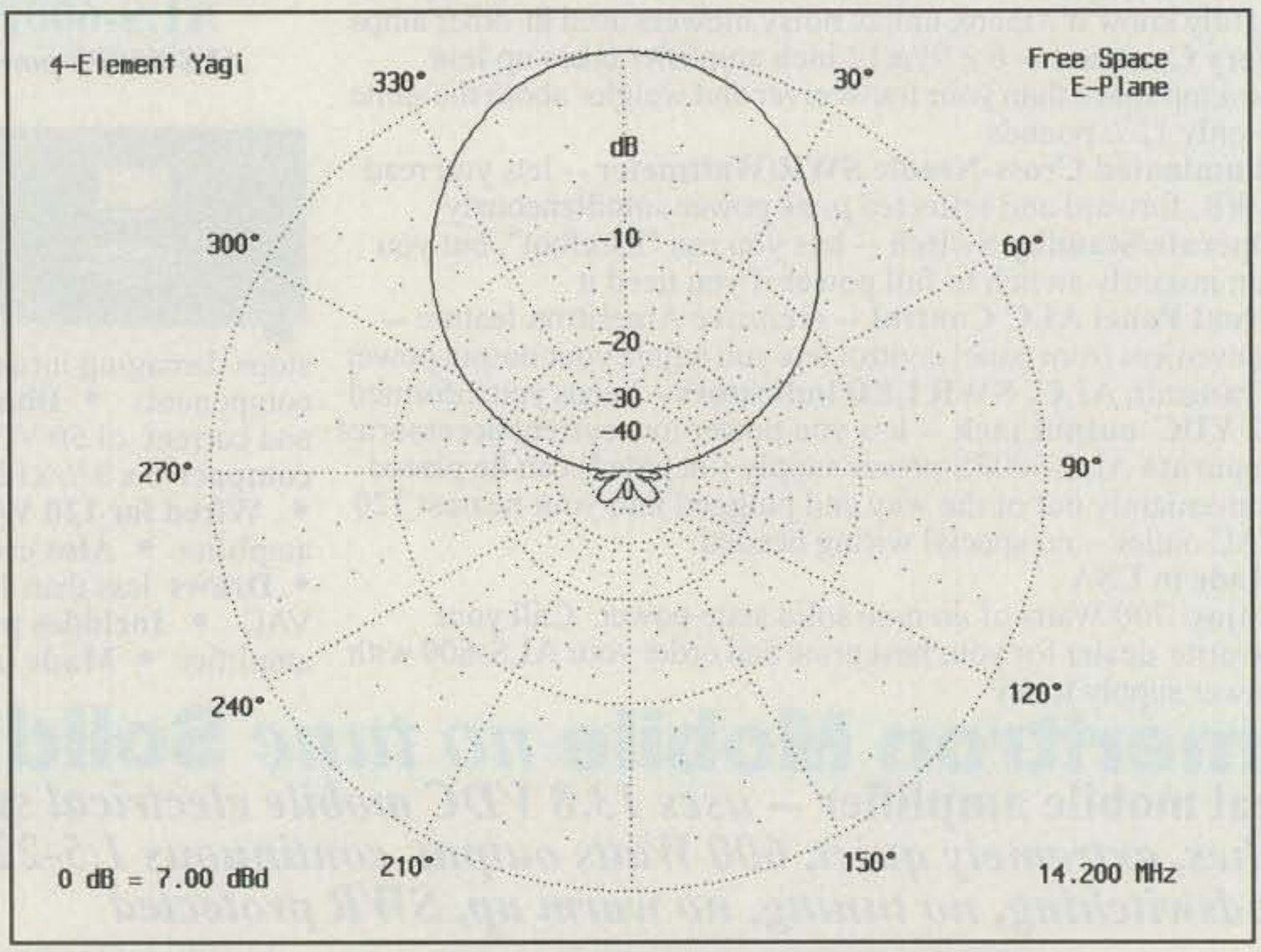


Fig. 1– The free-space E-plane pattern for the 4-element Yagi.

Position (inches)	Half Length (inches)
0.0000	206.9633
83.1210	197.8870
209.6120	192.5607
460.5970	170.6652

Table I– Element positions and half-lengths for 1 inch diameter elements.

*507½ Taylor St., Vista, CA 92084

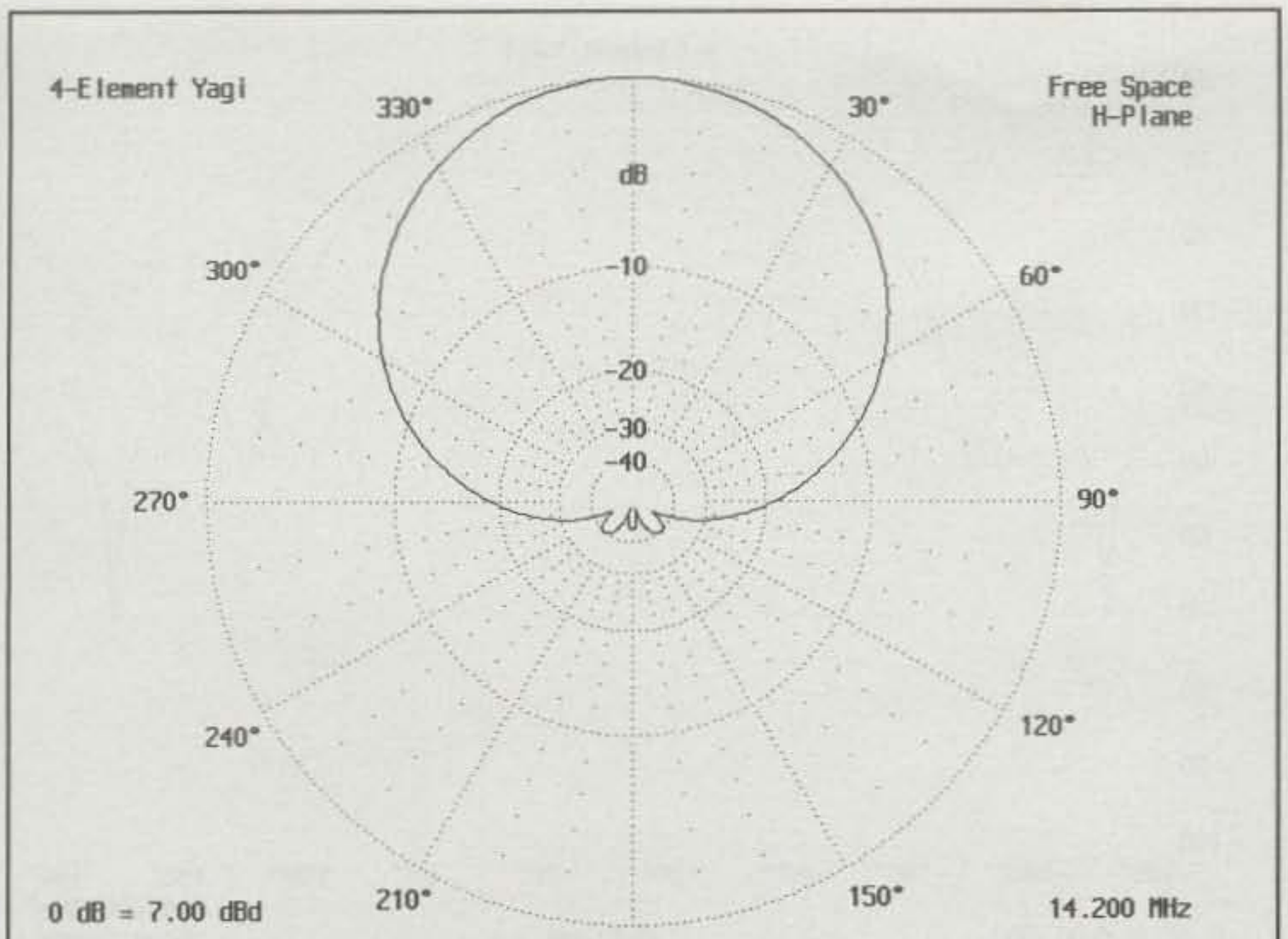


Fig. 2– This is the free-space H-plane pattern at 14.200 MHz.

ensions reduce the design to its purest form and simplify antenna modeling. I haven't included dimensions for tapered, telescoping tubing because a number of different taper schedules are in common use. (Overall lengths for Yagi elements depend critically on the exact way in which diameter varies along each element.) In addition, I really don't recommend this design for construction unless you lead a very sheltered life on 20 meters). Designs with higher gain, lower SWR, and excellent, if not spectacular, patterns across the entire band are possible on the same boom length.

If you do need dimensions for telescoping tubing, I recommend that you obtain them with the W6QHS tapering

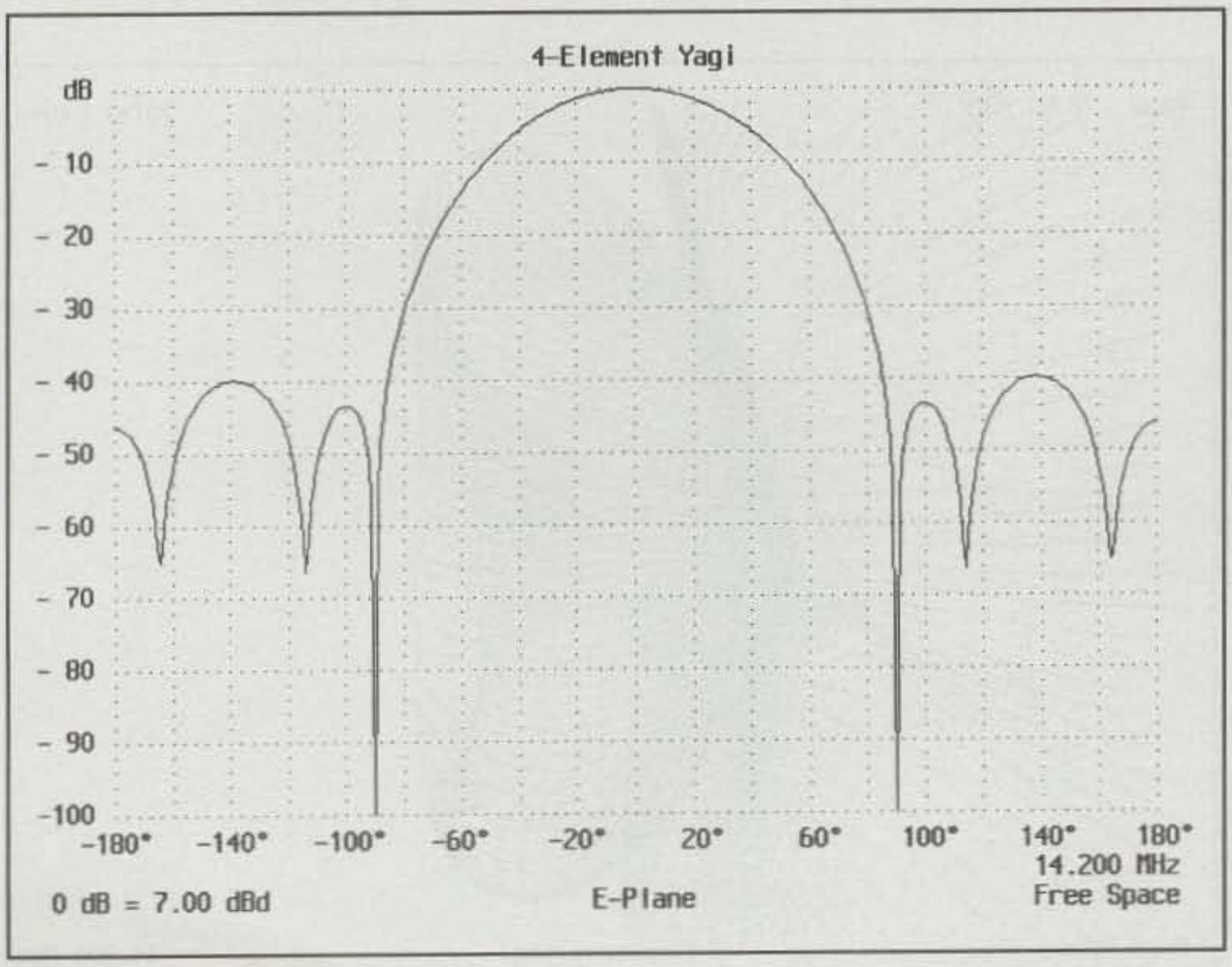


Fig. 3– By using rectangular coordinates, more detail can be seen in the E-plane pattern, as can be seen here.

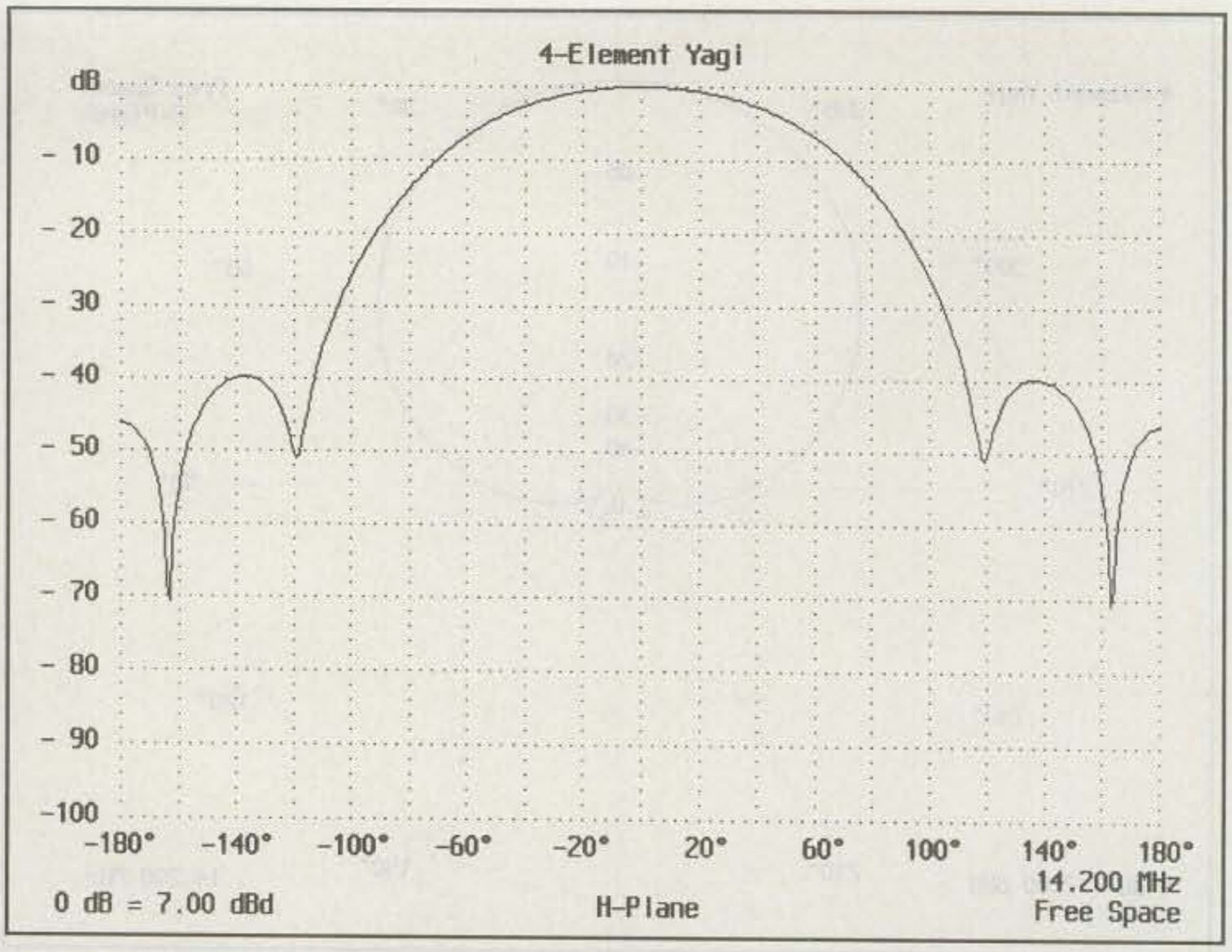


Fig. 4– The corresponding H-plane pattern depicted in rectangular coordinates.

algorithm (or with the modified-W2PV algorithm in YO). You can implement the W6QHS algorithm for a particular taper schedule using a hand calculator, a computer spreadsheet, or a BASIC computer program. For details of the method, see the ARRL book *Physical Design of Yagi Antennas* by Dave Leeson, W6QHS. The original W2PV tapering algorithm works fairly well for uncritical Yagis modeled with MININEC because systematic biases in the two algorithms tend to cancel. However, W2PV tapering does not yield very accurate results for critical designs when used with high-accuracy algorithms such as YO or NEC.

Footnotes

1. I used the UO 5.0 Yagi Optimizer program. YO uses a steepest-descent algorithm to automatically vary element

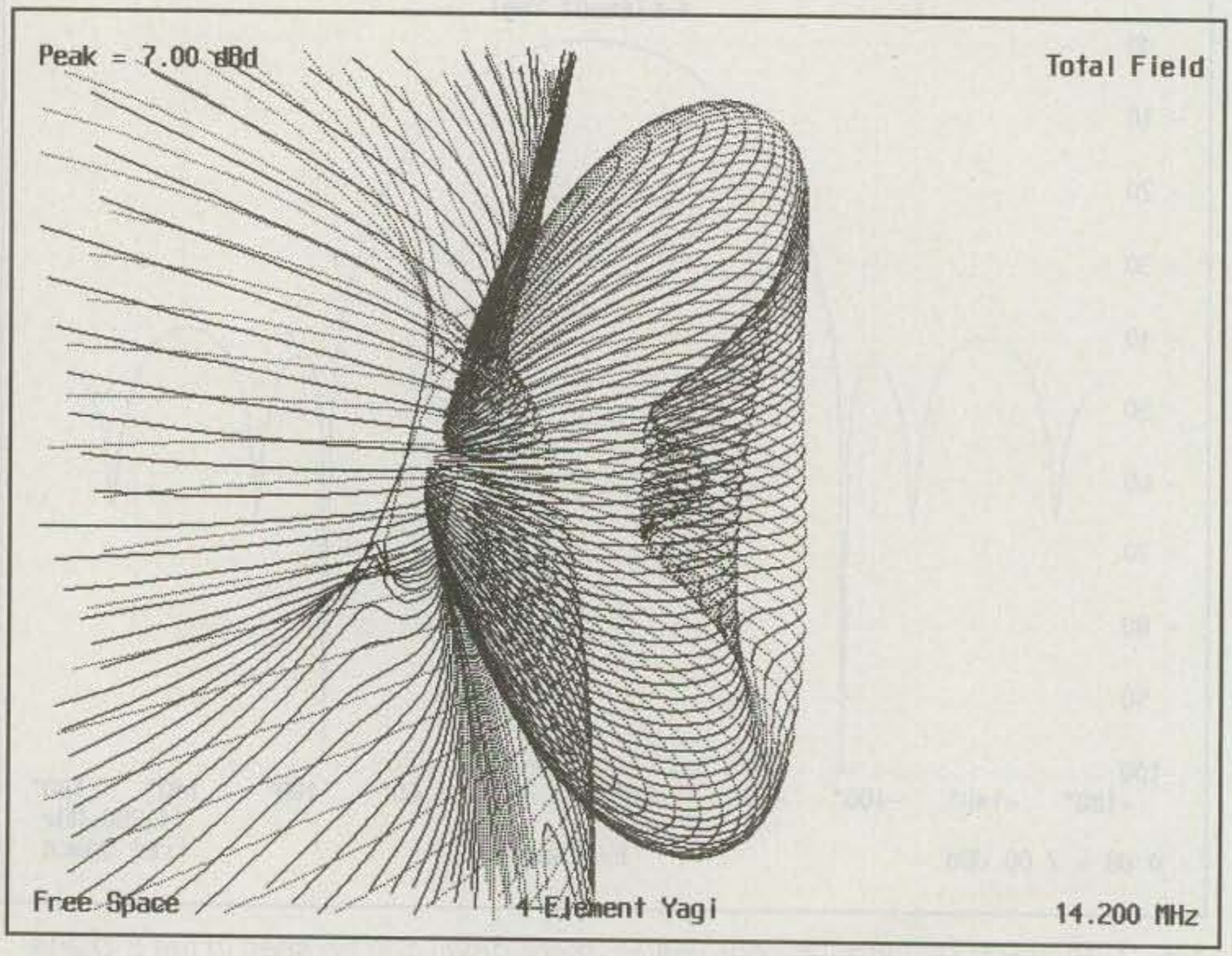


Fig. 5– Almost a work of art, this is a three-dimensional view of the backlobe region.

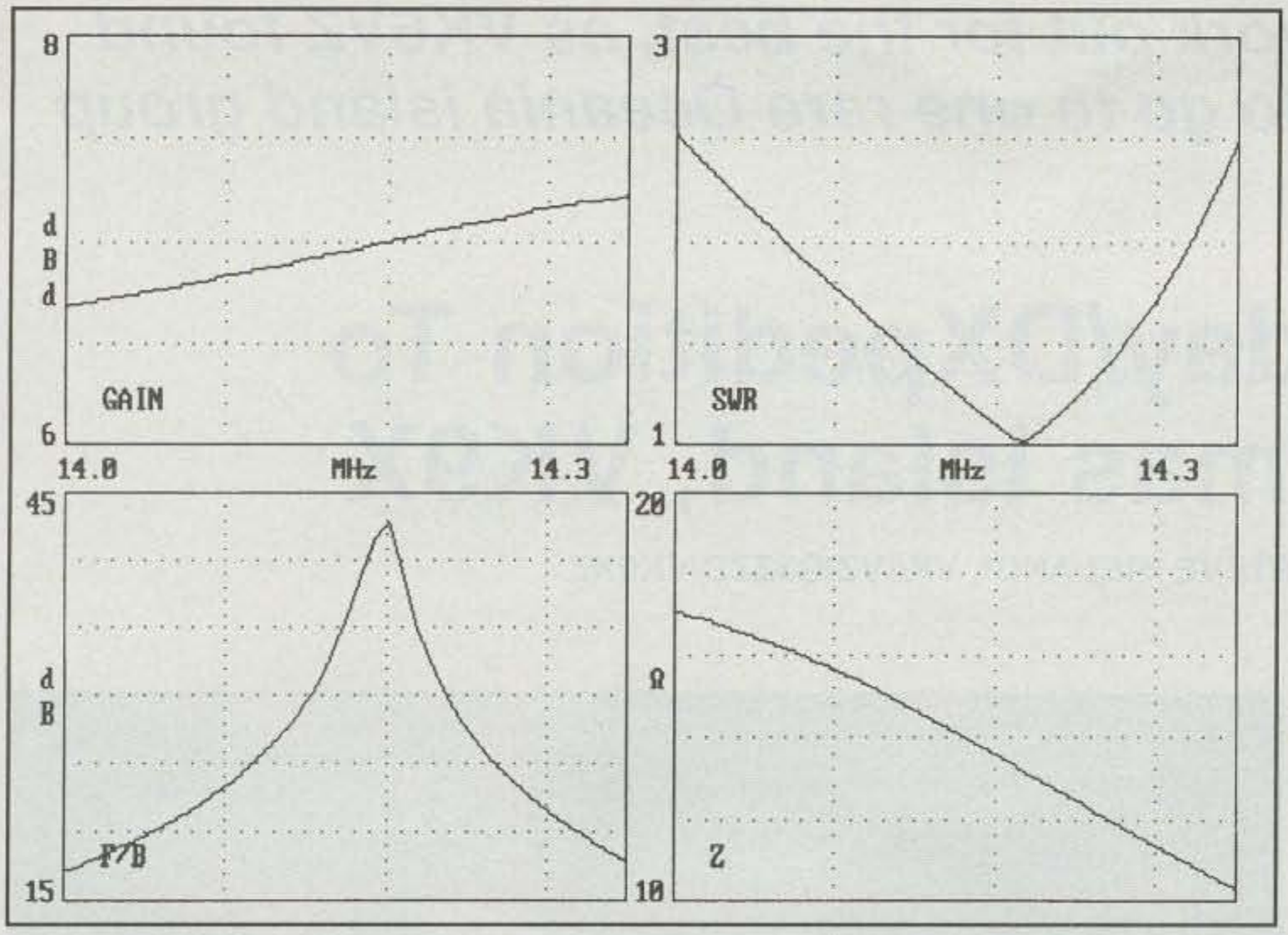


Fig. 6– These are the performance figures for the Yagi across the 20 meter band. The graph labeled F/B is actually the ratio of forward power to that of the worst-case backlobe in the rear half-plane.

lengths and positions to optimize the antenna characteristics you specify.

2. For example, fig. 5 was generated by the AO 6.0 Antenna optimizer program. Even though both AO and YO are calibrated to NEC, AO didn't exactly replicate the backlobe-dimple contour produced by YO in figs. 1 through 4. ■

Sometimes things work out for the best, as VK6VZ found out when his plans to go to one rare Oceania island group fell through.

A Holiday/DXpedition To Christmas Island, VK9X

BY STEVE IRELAND*, VK6VZ/G3ZZD/VK9XZ

It's funny how fate can take a hand in your life. My week of operating from an Indian Ocean island came about because I was attempting to go somewhere different altogether.

Myself and two other amateurs living in Perth, Western Australia were trying to get a special callsign to use from the rare Houtman Abrolhos Islands (IOTA Oceania 071), off the VK6 central coast. Fed up with the difficulties that we faced at every turn, I decided to take out a VK9 call and use it portable/6 (i.e., VK9XZ/6).

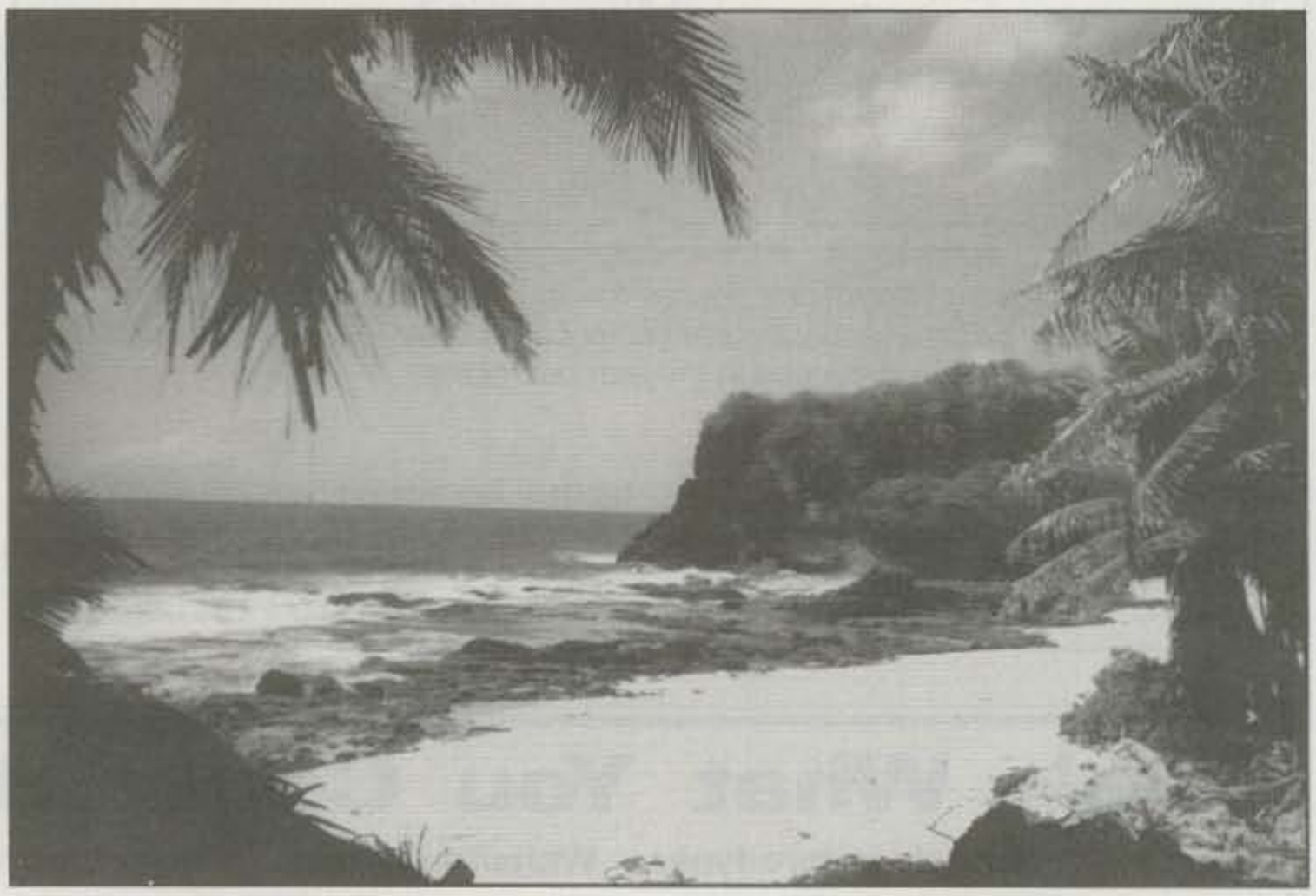
The idea was that this rare callsign would serve to attract other stations to us like bees to a honeypot, emphasizing the rareness of the Houtman Abrolhos, part of Western Australia but some 37 miles (60 km) off the Western Australia coast, highly inaccessible and only once before activated on the radio. I particularly fancied the idea of taking out a Christmas Island (VK9X) call.

I had just psyched myself up for a visit to the Australian Department of Transport and Communications (DOTC) in Perth to get the VK9X license and was explaining the situation to my wife, Debbie. Needless to say, I was a bit concerned about the ethics of using the callsign in this way.

Seeing my anxiety, and with a flash of genius, Debbie said, "Why don't we go to Christmas Island for a holiday?" I agreed in an instant. Perhaps I had really wanted to go to Christmas Island all the time.

Unfortunately, the Houtman Abrolhos trip never came to be, although we did eventually get a special callsign, but that is another story. After the last-minute aborting of this expedition a few weeks later, to the distress of myself and fellow conspirators VK6UE and VK6BFI, I was determined that the trip to Christmas Island was going to be a success.

One of the major problems we had struck in our Abrolhos attempt was that we tried to take too much equipment. We had arrived on the dockside with enough equipment, food, and clothing to keep an army of radio amateurs happy for months, and this had indirectly led to our downfall. Many of the DXpeditions I had read about over the years seemed to fall into the same trap.



Dolly Beach on Christmas Island. It is a two hour trek through the jungle to reach the beach from the nearest car parking spot, but it is worth every step!

This time I was going to travel light. Actually, I had to, because Debbie and I could only take 66 pounds (30 kg) of luggage each on the flight. Beams and linear amplifiers were out! Also, this was going to be a bushwalking holiday, with a bit of radio thrown in, and we needed to take suitable clothes and footwear.

Getting There

Having gotten that one straight in my mind, I thought I had better find out about where we were intending to go and how the trip could be accomplished. I immediately got onto 14 MHz SSB and tracked down my friend Steve, P29DX, alias G4JVG, whom I knew had been planning to go to Christmas Island himself some time ago.

Steve kindly sent me copies of all the documentation on Christmas Island he had collated, giving me much needed basic information about the place. Christmas Island, for the uninitiated, lies some 1600 miles (2600 km) northwest of Perth, Western Australia and 222 miles (360 km) south of Jakarta, Indonesia, and is 84 square miles (135 square km) in size.

The island is a steep-sided, jungle-covered coral atoll believed to have been formed around 60 million years ago around the cone of an undersea volcano. No humans seem to have lived on the island until 1888, when George Clunies-Ross, head of the entrepreneurial Clunies-Ross family, sent his brother Andrew from their home on Cocos Keeling Islands to establish a settlement on Christmas Island, following the visit of a small British group of scientists sent by Scottish busi-

**6 Lewes Road, Nollamara, West Australia 6061*

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.

You get very low radiation angle for exciting DX, fully automatic bandswitching, omni-directional coverage, low SWR and full 1500 watts PEP SSB power handling.

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 highest possible efficiency and exceptionally wide bandwidths.

MFJ's unique *Elevated Top Feed*™ 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.*

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 gain radiator.

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

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

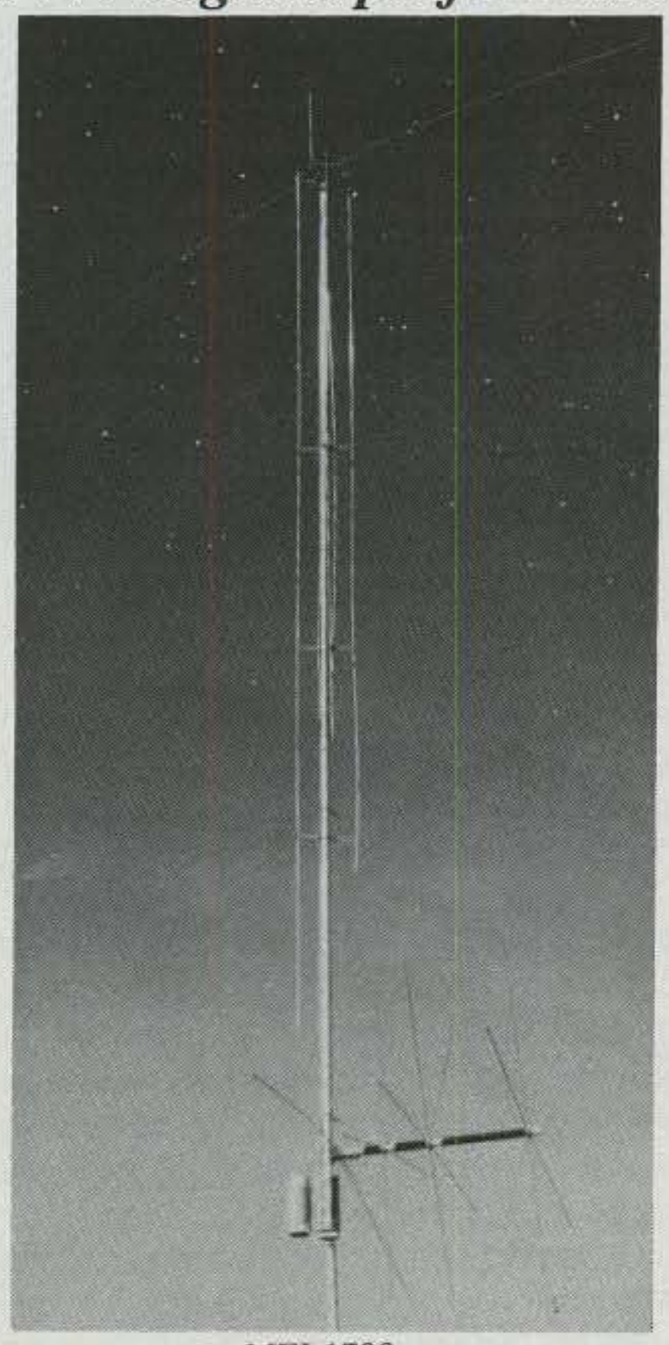
These radiator stubs provide automatic bandswitching -- there is absolutely *no loss* due to loading coils or traps.

End Loading

End loading -- the most efficient form of loading -- provides highly efficient performance on 30, 40, 75/80 Meters with excellent bandwidth, low angle radiation and automatic bandswitching.

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

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



MFJ-1798
$269.95

MFJ *Elevated Top Feed*™

The feedpoint is elevated *all the way to the top* of the antenna.

MFJ's *Elevated Top Feed*™ places the maximum current point high up in the clear where maximum radiation takes place -- a big plus, especially, if your antenna is mounted low to the ground.

Low Angle of Radiation

MFJ's *Elevated Top Feed*™ gives you a very low angle of radiation -- even if you ground mount it. Don't be surprised if you routinely work scarce DX.

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

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

This important decoupling attentuates RF on the outside of your coax and minimizes feedline radiation that wastes useful power and distorts your pattern.

Easy to Tune

Frequency adjustments are nearly independent and very simple -- adjusting one band has minimum effect on the resonant frequency of other bands.

Built to Last

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is used in the main structure. It's self-supporting -- no guy wires needed.

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

The MFJ-1798 is built to last. You'll enjoy many years of trouble free DXing and ragchewing with yours.

No Matter What™ Guarantee

You get MFJ's famous one year *No Matter What*™ unconditional guarantee. That means we will repair or replace (at our option) your MFJ-1798 antenna *no matter what* for a full year.

Continuing Service

MFJ Customer Service Techs will help you keep your MFJ-1798 performing flawlessly -- no matter how long you own it. Just call our toll-free help line 800-647-TECH (8324) -- *an MFJ exclusive.*

Made in USA

MFJ-1798 vertical antennas are made in the USA. Help our fellow Americans by keeping our money here -- buy Made in USA.

Call Your Dealer for Your *Best* Price

Enjoy operating on 10 bands with *full size performance.* Call your favorite dealer for your *best* price and order your MFJ-1798.

® Teflon is a registered trademark of Dupont.

MFJ Personal Morse Code Tutor™

MFJ-411
$79.95

Learn Morse code *anywhere* with this pocket size *MFJ Personal Morse Code Tutor*™!

When you have a spare moment, no matter where you are, you can enjoy a code practice session . . . at home, going to work, in a hotel, on vacation, on a plane, car, train or bus.

This *pocket size* tutor takes you from zero code speed with a *beginner's course* to Extra Class with customized practice. Select letters, numbers, punctuations and prosigns or any combination with normal or Farnsworth spacing.

A *Random QSO Mode*™ lets you practice copying plain English QSOs to get you ready for your FCC exam.

A *Word Recognization Mode*™ lets you practice copying *entire words* -- just like the pros on 40 Meters.

Easy-to-use menu selection. Use earphones or built-in speaker.

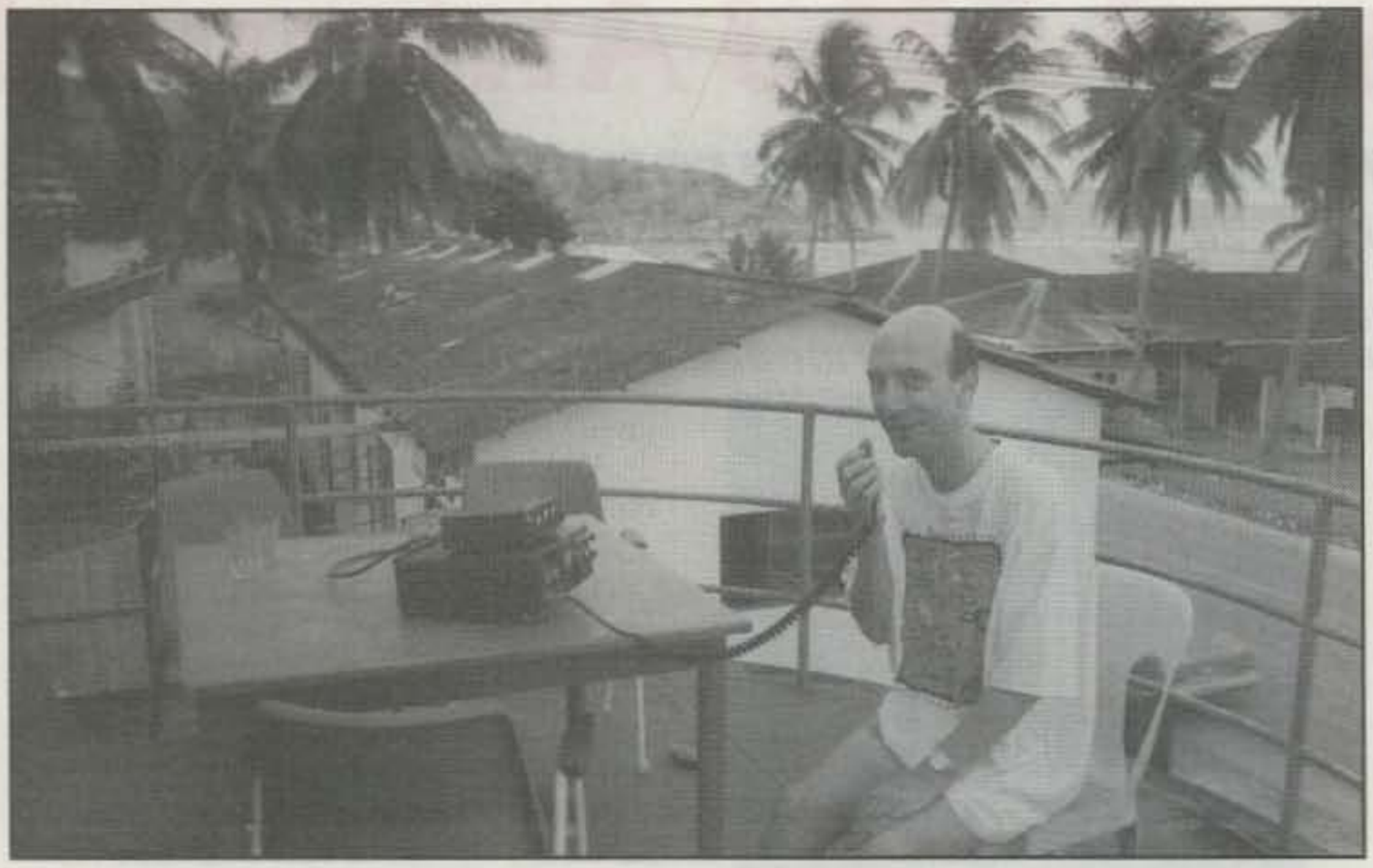
Free MFJ Catalog

Write or call toll-free . . . 800-647-1800

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH (8324)
• 1 year *unconditional* guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • ***Free*** catalog

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon-Fri
FAX: (601) 323-6551; **Add s/h**

MFJ . . . making quality affordable



VK9XZ on the balcony of the VQ3 Lodge.

nessman and amateur scientist John Murray.

George Clunies-Ross thought the scientific expedition found gold, but they had actually discovered Christmas Island was rich in deposits of phosphate of lime, or guano. Eventually, after a long battle between John Murray and the Clunies-Ross family, the two parties finally decided to join forces and founded the Christmas Island Phosphate Company (CIPco).

From this time on, up until only a few years ago, the survival of Christmas Island depended entirely on the mining and processing of phosphate of lime for use as soil fertilizer.

Nowadays things are somewhat different, with the people of Christmas Island looking towards a future based on increased tourism and phosphate production limited to the processing of the "tailings" of past mining operations. Some 60% of the island has been declared the Christmas Island National Park, and a casino/resort has recently been opened, with the tourists ranging from bushwalkers interested in the amazing wildlife (Debbie and I) to high-rolling gamblers from Indonesia.

Flights to the island go from Perth twice weekly, on Saturdays and Wednesdays, either direct or via the Cocos Keeling Islands. At present Ansett Airlines is running the flights on a contract basis to the Australian government. In addition, there are regular flights from Jakarta.

While information about flights seemed readily available, when it came to accomodation, Debbie and I found everything became rather more difficult. The only accomodation we had heard of people staying at was the VQ3, a former government lodge used for business visitors to the island. Unfortunately, no one seemed to know exactly how to book this accomodation. Also, at the time we were trying to book our holiday, the long-awaited Christmas Island Casino/Holiday Resort was still yet to open. Even if the new resort did open in time for our desired November visting time, I was not too sure how the management would react to me wanting to drape antennas all over their beautiful new buildings. In the end, fate came to our rescue.

Crossing the street in a nearby Perth suburb, I noticed a sign in the window of a travel agent saying "See Christmas Island! Only $735 US ($A1097) for 8 days." As my inquiries about Christmas Island at similiar establishments had been met with blank stares, I went straight into the agency.

The travel agent turned out to be the offices of Island Bound Holidays, an independent tour operator for both Christmas Island and the Cocos Keeling Islands. They could arrange accomodation at a travel lodge on the island—the aforementioned VQ3 (!). The accomodation was in the form of simple spartan rooms not far from the sea, with shared toilets and showers, plus a week's car hire at an extra $49 US ($A73) per person.

I was shown some Polaroid snapshots of the accomodation, and it looked pretty good. "I'm a radio amateur. What about putting up aerials at the accomodation?", I asked nervously. The young lady answering my inquiries didn't bat an eyelid. "I believe they have had one or two similar people before, Mr. Ireland. I don't think it will be a problem."

It all seemed too good to be true. I hurried home to see Debbie, with photocopies of the Polaroids and my fingers firmly crossed. Island Bound was going to FAX the manager of the travel lodge, known as the "VQ3," with my request to put up antennas.

Debbie thought the place look great. A few days later Island Bound came back with the news that antennas were okay. I breathed a big sigh of relief and prepared to book. However, there was another telephone call I wanted to make first.

I was fairly sure that a friend of mine, Neil, VK6NE, might be able to shed a little more light on my island destination. Neil had been the Wireless Institute of Australia QSL Manager for all VK9 calls for some years and possibly even knew someone who had stayed at the same place.

Once again, I struck gold. Neil was extremely helpful, putting me in touch with Bob Winn, W5KNE, an old hand at Christmas Island. I wrote to Bob, who freely gave advice on everything from the best places to put up antennas at the VQ3, to the best places to eat on the island.

Bob wanted to vist Christmas himself again, about one month after Debbie and I were intending to go. I promised to leave him some stations to work, which was not going to be too difficult, as a recent survey of DXers had identified the island as being in the top 30 most wanted DXCC countries in the world.

Natural Wonders

A visit to the local library and a search on their microfiche catalog of books produced the names of two books which would tell me more about the natural and working history of Christmas Island: *Christmas Island—Naturally* by Howard Gray and *Three Islands* by M. Williams (about Christmas Island and two other phosphate islands, Nauru and Ocean Island). It was in the first of these books that I discovered what is perhaps Christmas Island's real claim to fame these days—its amazing bird life and even more remarkable population of crabs.

Christmas provides the last known habitat, in the canopy of its dense rainforest, of the Abbots Booby Bird. This strange, rather ungainly fish-eating bird is only able to take off from high trees or cliffs, and a landing on the ground means almost certain death to it. Christmas is also home to a number of beautiful birds that have only been found on the island, such as the Golden Bosun Bird, the emblem of Christmas Island, and the Christmas Island Thrush.

Living in the rainforest and along the island's scatttered beaches are some 19 species of crabs. These range from the Christmas Island Robber Crab, the largest terrestial crab on earth and fond of climbing coconut palms to knock down its favorite food, to the Red Crab, numbering some 120 million on the island and

MFJ's world famous 3 KW Antenna Tuner

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

The MFJ-989C is not for everyone. **However**, if you make the investment, you'll get the finest 3 KW antenna tuner money can buy.

Here's why . . .

Massive Transmitting Capacitors

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

Precision Roller Inductor

A precision roller inductor lets you tune your SWR down to the absolute minimum. A 3-digit turns counter plus a spinner knob gives you exact inductance control.

Ball bearings on front and back shafts give you a velvet smooth vernier feel. Steel end plates and shafts give you lifetime durability.

You won't have arcing problems with this roller inductor. That's because firm springs put considerable pressure on a plated contact wheel for excellent electrical contact.

Wide, low inductance straps are used for high current connections and a new core gives you excellent RF properties for minimum loss.

MFJ-989C **$349.95**

Cross-Needle Meter

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

Super Heavy Duty Balun

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

Ceramic Antenna Switch

You get a two wafer 6 position *ceramic* antenna switch with extra large contacts for trouble free switching.

Plus much, much more

You also get a *built-in 300 watt dummy load*, full one year *unconditional* guarantee, flip stand, all aluminum cabinet, tough baked on paint, locking compound on all nuts and bolts. 3 KW PEP. Meter lamp needs 12 volts. Compact 10¾x4½x15 in. Made in the USA. Add $13 s/h.

Don't settle for less--get yours today!

MFJ's *deluxe* 300 Watt Tuner

MFJ-949E **$149.95**

More hams use the MFJ-949E than any other antenna tuner in the world!

Why? Because you get proven reliability, the ability to match just about anything and a one year *unconditional* guarantee.

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

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

The inductor switch is designed to withstand extreme voltages and currents--it's not an underrated off-the-shelf switch that can put you off-the-air.

Each MFJ-949E aluminum cabinet is chemically etched to strongly bond MFJ's tough *baked-on* paint. You won't find a tougher, longer lasting finish anywhere.

MFJ's *new* 300 Watt Tuner

MFJ-948 **$129.95**

If you don't need a dummy load but want *all* the other features of the MFJ-949E, choose the MFJ-948 for $129.95. The MFJ-948 features a *peak* reading *lighted* Cross-Needle meter with a built-in lamp switch, one year *unconditional* guarantee and is made here in the USA.

MFJ's *smallest* Versa Tuner

MFJ-901B **$59.95**

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

MFJ's *artificial* RF Ground

MFJ-931 **$79.95**

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

MFJ's *super value* Tuner

MFJ-941E **$109.95**

The new MFJ-941E gives you a 300 watt PEP tuner that covers everything from 1.8-30 MHz -- plus you get a lighted cross-needle meter, antenna switch and balun . . . for an incredible $109.95.

Antenna switch selects 2 coax lines (direct or through tuner), random wire, balanced line or external dummy load. 4:1 balun. 1000 volt capacitors. Measures 10⅝x2⅞x7 inches.

2 Knob Differential-T™ Tuner

MFJ-986 **$289.95**

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

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

MFJ's lighted *peak* and average reading Cross-Needle meter reads forward and reflected power in 2 ranges. Current balun reduces feedline radiation and forces equal currents into antenna halves that are not perfectly balanced. Covers 1.8-30 MHz. $13 s/h.

MFJ's *random wire* Tuner

MFJ-16010 **$39.95**

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

Antenna Tuner/Artificial Ground

New!

MFJ-934 **$169.95**

Artificial ground *and* full feature 300 watt 1.8-30 MHz antenna tuner. Has lighted Cross-Needle Meter, 4:1 balun for balanced lines.

An artificial ground can turn a random wire into an effective antenna that really works.

MFJ's *mobile* Tuner

MFJ-945D **$89.95**

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

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

MFJ's *versatile* 1.5 KW Tuner

MFJ-962C **$229.95**

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

You get MFJ's lighted *peak* and average reading Cross-Needle SWR/Wattmeter. It reads forward and reflected power in 2 ranges. Covers 1.8-30 MHz.

Plus . . . 6-position antenna switch and Teflon® wound balun with ceramic feedthru insulators for balanced lines. 10¾x4½x14⅞ in. Add $13 s/h.

MFJ's *portable/QRP* Tuner

MFJ-971 **$89.95**

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle SWR/Wattmeter has two switchable ranges: 30 and 300 or *6 watt QRP range*. 6x6½x2½ in.

MFJ's *VHF or UHF* Tuners

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

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

Free MFJ Catalog

Write or call . . . 800-647-1800

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH(8324)

• 1 year **unconditional** guarantee •30 day money back guarantee (less s/h) on orders from MFJ • **FREE** catalog

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (601) 323-6551; **Add s/h**

MFJ . . . making quality affordable

The amazing Christmas Island red land crab, famous for its annual migration to the sea to spawn in Nov./Dec.

the spectacular migration of which at the start of every rainy season caught the attention of TV naturalist David Attenborough a few years ago.

Being rare DX and seeing all these rare birds and animals was making us feel better and better all the time! Mind you, Debbie was not too sure about the crabs, though.

Getting Ready

Having researched Christmas Island thoroughly, I decided to go ahead and book a fly/drive holiday for the second week in November, totaling $784 US ($A1170) each, plus the cost of a mandatory travel insurance policy for both Debbie and me. This was basically to cover the (possible) cost of flying us back to Perth in a hurry if we got sick or injured.

In the meantime, I had received another letter from Bob, W5KNE, complete with several slides of the accomodation at which Debbie and I were going to stay. The slides were excellent, showing the front of the VQ3, complete with the balcony onto which our room would open.

The balcony looked to be over 3 feet (1 meter) in height and quite sturdy, adequate for supporting a short mast or a trap vertical. My mind immediately went to work thinking about antennas.

However, there was a downside. Bob explained that the VQ3 Lodge was only a short way from the sea and not much above it in height. The body of Christmas Island rose about 820 feet (250 meters) almost immediately behind the VQ3, which faced almost due west. What this meant in practical radio terms was that the direct path to Australia and North America was completely blocked by the body of the island. Looking at the map, due south wasn't too hot either, also blocked off by the rising rainforested terraces of the island, making direct contacts with South America pretty difficult. The short path to Europe and Africa looked great though, with a clear takeoff over the sea. Also, long-path propagation to the US, very good in the early mornings in Perth at that time of the year, seemed a strong possibility.

It was too late to change our minds now. Besides, it still sounded pretty good. The operating times Deb and I had discussed were to be in the late afternoon and evening, giving us time to bushwalk and explore until around lunchtime, eat, and then have a nap and read during the heat of the day. I might not have perfect DX coverage, but all this sounded pretty close to paradise to me.

The next thing to do was think about equipment. I had an old Kenwood TS-130S at home, a simple rig I used "mobile" when traveling around Western Australia. The easiest thing to do was to take the TS-130S, rugged and reliable, but I yearned for something a little more modern and sophisticated.

I spoke with Mal, VK6LC, an experienced IOTA (Islands on the Air) DXpeditioner, asking his thoughts on the matter. Christmas Island is very hot and sticky, with humidity approaching 90% most days, and Mal pointed out to me that modern synthesized rigs do not always cope well with this kind of weather, synthesizers going out of lock unless care is taken to keep them warm and dry.

When it came down to it, I decided to stick with what I had on the basis that the TS-130S had always been reliable and I knew the rig inside and out. Even if something did go wrong, it was going to be a lot easier trying to troubleshoot a TS-130S than a modern rig with SMT (surface-mounted technology) components!

My 12 volt power supply was far too big to take with me on the trip. Luckily Keith, VK6XH, kindly lent me a Kenwood PS50 instead. My luck was certainly with me, as a few days later Neil, VK6NE, offered me a tiny Kenwood AT130 antenna tuner for the trip. All I had left to think about was an antenna system.

My first impulse was to make up a simple trap vertical for 40/20/15 meters, the bands I planned to use, with once again a friend, Alek, VK6APK, coming to my assistance and offering help with the raw materials. However, looking at a photograph of the VQ3, the balcony could be accessed by everyone who stayed at the lodge; a trap vertical was going to be all too easy for curious residents to grab hold of while I was transmitting!

Instead I opted to make up a simple 30 foot (9 meter) long telescoping mast out of aluminium tubing and use parallel dipoles for 40 and 20 meters, the 40 meter dipole doubling as 1½ wavelength antenna on 15 meters. The dipole was simply constructed from 7/.023 wire purchased from the local hardware shop and pieces of plastic water pipe as spacers.

Time was beginning to run short, with a week to go and lots of jobs to do around the house before we could leave. The days passed in a blur, and it was not until the night before our departure that, tired and rather stressed, I packed my tools, clothes, and equipment, praying I did not forget anything.

Taking Off

Our flight left at 7:30 AM on Saturday morning. Deb and I were up at 5 AM, had a swift breakfast, called a taxi, and were at Perth International Airport for our flight by 6 AM. Although Christmas Island is classified as an Australian territory, it is considered an international destination in airport terms. We did not need our passports, as Australian Citizens to go to Christmas Island, but flights to there from Australia are considered as international, not domestic.

Because of the rush in getting ready, we had not had time to have our bags weighed prior to going to the airport. It was with some trepidation that we approached the Ansett check-in counter. When our baggage, including the 4½ foot (1.4 meter) telescoping mast, was weighed, it totaled 125.6 pounds (57 kg), 6 pounds (3 kg) under the limit for two people. Excess baggage would have cost us $5.20 US ($A7.75) per 2.2 pounds (1 kg), so we were very pleased. Also, as the flight to Christmas is on a relatively small airplane, a BA-146 four-engine jet, there is not usually much of an excess allowance for the passengers, mainly people working on the island, anyway.

The flights to Christmas Island go on a circular route, taking in Learmonth in North Western W.A. (sometimes), Cocos Keeling, Christmas Island, and back to Perth. The flights from Perth go alternatively clockwise and counter-clockwise, the former stopping at Christmas Island last and the latter first, to allow passengers to go directly from Cocos to Christmas and vice versa.

Our outgoing flight was a clockwise one, getting into Christmas Island at around 3:30 PM local time. As Christmas is 1 hour behind Perth, this meant a trip of some 9 hours! However, it also meant a short 45 minute stopover at Cocos, a place my wife and I were very intrigued to see.

The flight took off as scheduled, and Debbie and I spent a very pleasant morning eating and sleeping. At around 12 noon the beautiful coral necklace of Cocos Keeling came into view through the cabin window.

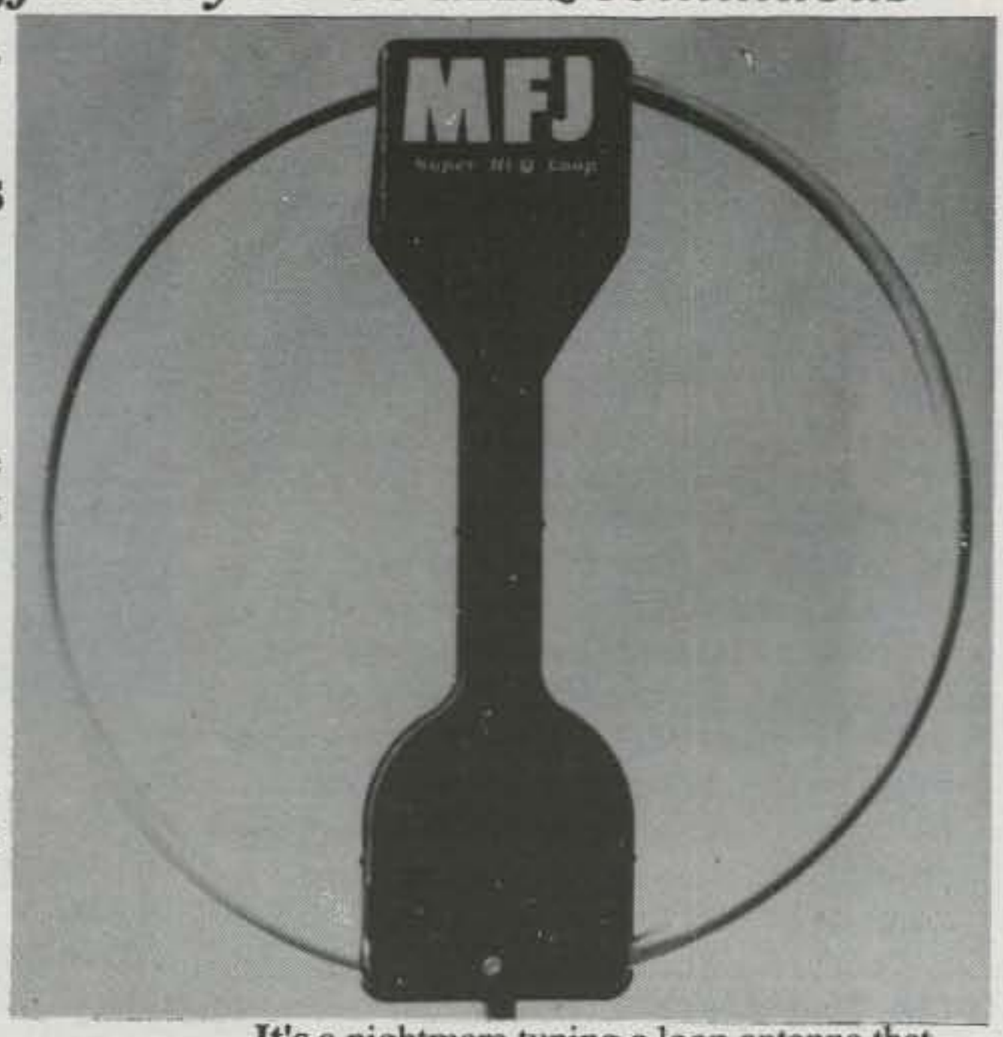
Cocos Keeling is a chain of tiny low islands surrounding a central, shallow lagoon. The islands are covered in palm trees and look idyllic in a classic Robinson Crusoe kind of way. However, it is a place mainly for sunbakers and scuba divers,

MFJ Super Hi-Q Loop™ Antenna

. . . 36 inch diameter -- it's the smallest, high efficiency 10-30 MHz continuous coverage antenna ever made for ham radio . . .

- *Tiny 36" diameter, covers 10-30 MHz continuously*
- *Automatic Band Selection™, SWR/Wattmeter*
- *Round conductor more efficient than flat strip*
- *Welded butterfly capacitor, no rotating contacts*
- *All welded construction*
- *No control cable needed*

MFJ-1786
$299.95



Only 36 inches in diameter, the *MFJ Super Hi-Q Loop™* is the smallest high efficiency 10 to 30 MHz *continuous* coverage antenna ever manufactured for ham radio.

Its rugged all welded aluminum construction is ideal for home installations where space is limited -- apartments, small lots, mobile homes, attics, closets.

You can take it with you and have it up and operating in minutes from nearly anywhere -- on trips, vacations, from hotels, DX-peditions, camping, motorhomes.

Vertical mounting gives you both low angle radiation for excellent DX and high angle radiation for close-in local contacts -- it's like having a vertical and dipole combined into one. You can also mount it horizontally for omni-directional coverage.

The *MFJ Super Hi-Q Loop™* is a remotely tuned high-Q antenna with a narrow bandwidth that reduces transmitter harmonics, receiver overloading and interference.

It does not need a ground, radials, counterpoise or antenna tuner. It covers 10-30 MHz continuously including the WARC bands with low SWR and handles 150 watts.

More Radiated Power

You radiate more power because the *MFJ Super Hi-Q Loop™* has a more efficient radiator. Its large 1.050 inch diameter round radiator has less RF loss resistance than a thin flat-strip radiator.

Built like a Tank

It's built like a tank with extra thick wall aluminum tubing, *all welded* construction, no mechanical joints, welded butterfly capacitor with no rotating contacts.

No Control Cable Needed

You don't need a separate control cable -- the coax feedline carries both RF power and tuning control signals.

Superb Tuning Capacitor

Each plate in MFJ's superb tuning capacitor is welded for low loss and *polished* to prevent high voltage arcing -- you get a smaller, lighter more refined tuning capacitor with a wider tuning range.

Tuning capacitors with unpolished plates and sharp edges *require* much greater spacing between plates to prevent arcing. The consequences? The capacitor is larger, bulkier, heavier and has more stray capacitance to limit tuning range.

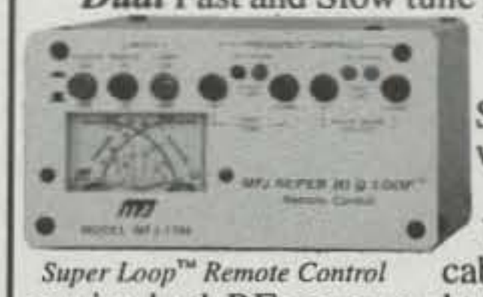
MFJ's superb tuning capacior is *welded* to the radiator for super high efficiency, has nylon bearing, anti-backlash mechanism, limit switches and a continuous *no-step* DC motor for *smooth precision* tuning.

It's a nightmare tuning a loop antenna that uses a stepper motor and is plagued with backlash -- especially, if your desired frequency is between motor steps.

A heavy duty 1/8 inch thick ABS plastic housing with ultraviolet inhibitors protects the tuning unit from the weather.

Super Remote Control (included) makes *MFJ Super Hi-Q Loop™* extra easy-to-tune

MFJ's exclusive *Automatic Band Selection™* auto-tunes the MFJ-1786 to your desired band and lets you know with a beep. *Dual* Fast and Slow tune push buttons make it easy to tune.



Super Loop™ Remote Control

Built-in SWR/Wattmeter

A two range Cross-Needle SWR/Wattmeter is built-in so you won't need a separate SWR meter.

No Control Cable Needed

You don't need a bulky control cable because the coax feedline carries *both* RF power and tuning control signals.

No Power Cord Needed

You don't need a separate power cord because it uses AA batteries (not included). You can also use an isolated 12 VDC source or 110 VAC. 6x6x3 inches.

MFJ-1782 Super Hi-Q Loop™

Same as *MFJ-1786 Super Hi-Q Loop™* but has remote control with fast tune and slow tune buttons. Separate control cable is *not* required. Does not have SWR/Wattmeter or *Auto Band Selection™*. **MFJ-1782**, $269.95.

No Matter What™ Guarantee

You're protected by MFJ's famous one year *No Matter What™ unconditional* guarantee. That means we will repair or replace your *MFJ Super Hi-Q Loop™* (at our option) *no matter what* for a full year.

Call Your Dealer for Your *Best* Price

Enjoy ham radio no matter how little space you have. Call your dealer for your *best* price and get your *MFJ Super Hi-Q Loop™* today.

MFJ *Box Fan* Portable Loop™ Antenna

MFJ-1780
$229.95

No, it's not a fan -- it's a *high efficiency* 14 to 30 MHz 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 to where you're going, set it on a table or desk, plug in your rig and enjoy rag chewing or DXing no matter where you are.

This is a *real* transmitting loop antenna using *all welded* construction for lowest loss, highest efficiency and maximum radiated power.

It uses the *same* superb all welded butterfly tuning capacitor as the *MFJ Super Hi-Q Loop™*.

It covers 14 to 30 MHz *continuously* including the WARC bands with low SWR and handles 150 watts. You don't need a ground, radials, counterpoise or antenna tuner.

Includes remote control with fast tune and slow tune buttons. Separate control cable *not* needed. Uses 9 volt batteries or 110 VAC.

Free MFJ Catalog
Write or call toll-free . . . 800-647-1800

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH(8324)
• **1 year *unconditional* guarantee** • 30 day money back guarantee (less s/h) on orders from MFJ • ***Free catalog***

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (601) 323-6551; **Add** $12 s/h.

MFJ . . . making quality affordable

CIRCLE 169 ON READER SERVICE CARD

and as Debbie said, it wasn't as rare DX as Christmas anyway.

We took off again and dozed until the plane finally landed at Christmas. It had seemed a very long flight indeed. Our car was waiting at the airport accompanied by Kiat, the owner of the hire car firm. After shaking hands, we followed Kiat down to the VQ3, the wind whipping a cloud of phosphate dust across the island.

The airport on Christmas is on top of the island and we drove down, passing Poon Saan, one of the three main residential areas on the island, to Settlement, the oldest one of these. The hill down from Poon Saan to Flying Fish Cove and Settlement is quite steep and not one for the faint-hearted! Settlement is a very colorful jumble of 1950/60s fibro and brick houses, mainly of governmment origin, with coconut palms and semi-feral chickens in nearly every garden. We were soon settled in at the VQ3 and feeling very tired. Resisting the temptation to put the antenna up was not too difficult. Instead, we opted for a shower, a meal and an early night.

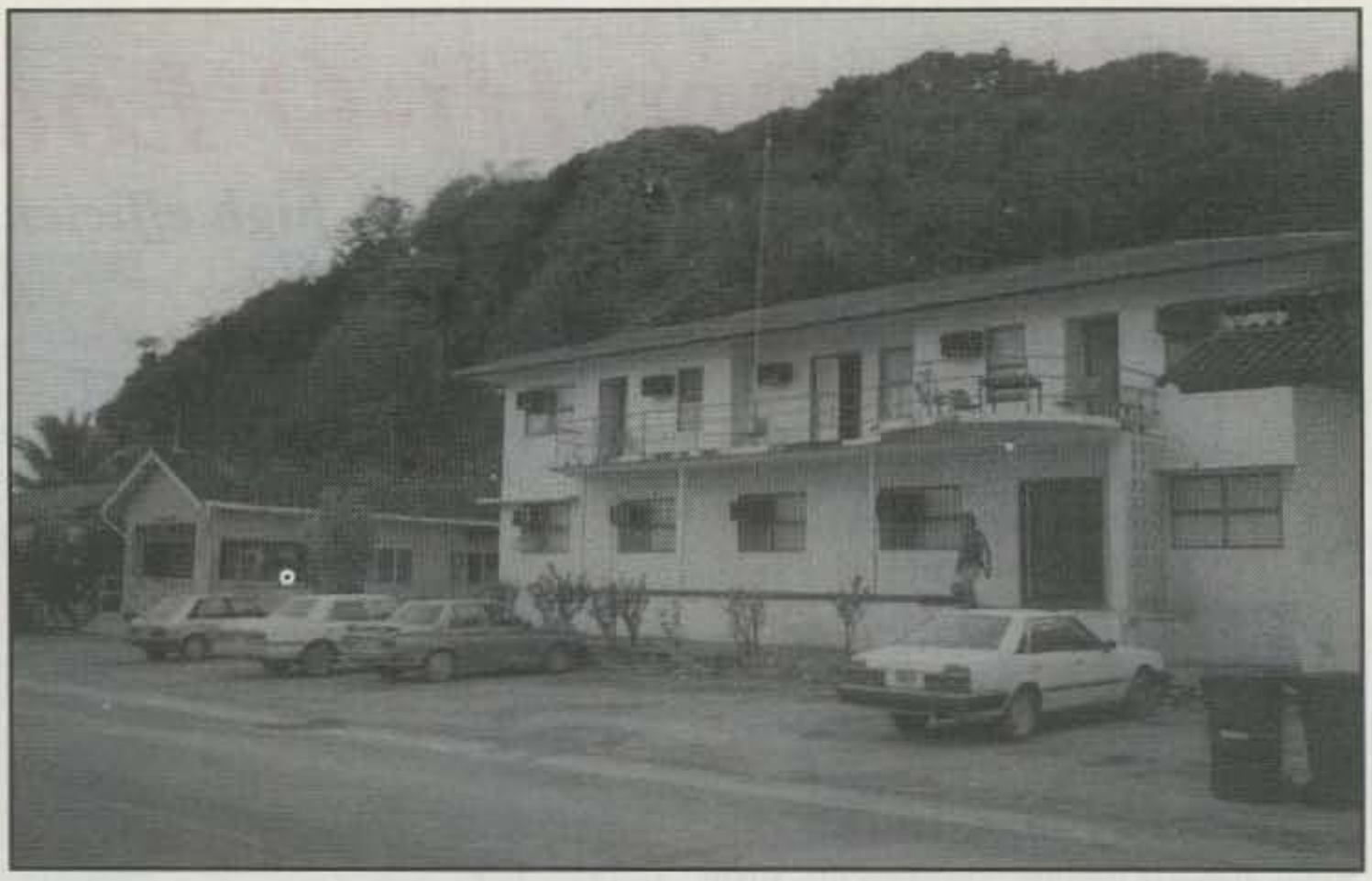
On The Air

The next morning we were awakened at about 4 AM by a scratching on the balcony door. It seemed as though someone was trying to get in. However, everybody we had met told us that crime was nearly nonexistent on the island. Mystified, I turned over and tried to get back to sleep.

By 5 AM we had given up the idea of going back to sleep and decided to take a look from the balcony. Carefully we opened the door and to our surprise we saw a bright red land crab scuttling for cover. It had made its way through the lodge, up the stairs, and was trying desperately to find its way back to the ground and its burrow—through our room, if necessary. After taking a few photographs of our nocturnal visitor and after a cup of tea, it was time to put up the antenna. As I had hoped, the mast nestled neatly against the central upright of the balcony, and after about 1½ hours of work, I had the dipole set up as an inverted-vee, with its top around 11 meters above the ground.

I quickly set up the rig and listened on 20 and 15 meters. The bands seemed pretty flat. Anyway, it was time to go and get some milk and other supplies from one of the several Chinese shops that are open on the island on Sunday. It was then I discovered that I had left something behind—the lead from my keyer to the rig, making CW operation temporarily impossible.

After doing the shopping, a brief look around Settlement, some food, and a doze to make up for our early morning call, I decided to take a look at the bands. Twenty meters still seemed pretty dead,



The VQ3 Lodge showing the VK9XZ 40/20/15 meter inverted-vee dipole.

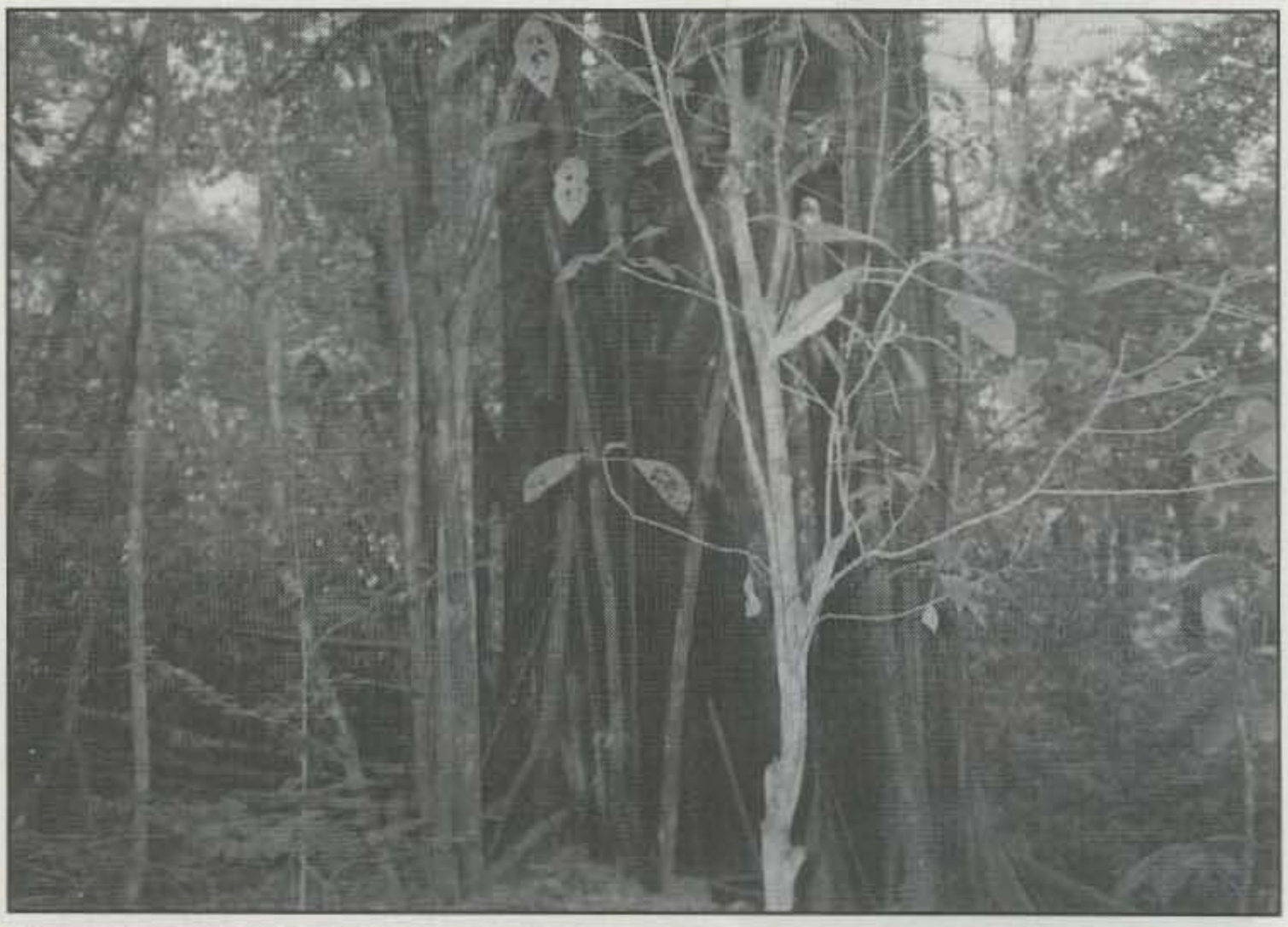
but 15 sounded as though there was a bit of life.

Five minutes later, after my second CQ call, at 0907Z I worked my first station, DX1DBT, Mario in Manilla, with a 5 × 5 report. A pileup of JA stations quickly followed, with 5 × 5 to 5 × 9 reports from all over Japan. I went QRT to get some tea, promising to try 20 meters in a few hours.

At 1230Z on 20 meters I made my first contact, with 9V1ZJ, quickly followed by VK4DLS, VI6CKB, and 9K2GS. The VKs were very weak, as were the VK6s, and although the Australians were working the USA short path, I could hear nothing at all from North America. On the other hand, the Europeans were coming through loud and clear and seemed very anxious for a contact with me. Z31CZ was followed by LY1, UA4, RA3, 9K2s YF and JC, and a string of LAs.

I finally went QRT for bed two hours later, some 70 stations in the log and with reports of up to S9. Not bad for a first effort and 100 watts and a dipole, I thought.

The following morning Deb and I settled into the pattern we were to follow for the next six days: get up at around 5:30 AM, shower, dress, and eat breakfast. While Deb was showering and we ate breakfast, I would quickly (and fruitlessly) check on 20 meters to see if the USA



Typical Christmas Island rain forest showing the Tahitian Chestnut tree shrouded in Curtain Fig creepers.

MFJ HF/VHF SWR Analyzer™

. . . covers 1.8-170 MHz . . . built-in 10 -digit LCD counter . . . smooth reduction-drive tuning . . . simple-to-use . . . inexpensive to own . . .

MFJ-249
$199.95

If you work with antennas, MFJ's revolutionary new *SWR Analyzer*™ is the best investment you'll ever make! Now you can diagnose a wide range of antenna problems instantly with one easy-to-use instrument.

What the MFJ-249 Does

The MFJ-249 gives you a complete picture of your antenna's performance anywhere between 1.8 and 170 MHz -- you can even check SWR outside the ham bands without violating FCC rules. Set the bandswitch and tune the dial--just like your transceiver. SWR is displayed instantly!

Here's what you can do . . .

Find your antenna's true resonant frequency from the shack.

Tune the antennas on your tower and watch SWR change instantly as you make each adjustment. You'll know exactly what to do by simply watching the display.

Tune critical HF mobile antennas in seconds--without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on a single band, or analyze multiband performance over the entire spectrum from1.8 to 170 MHz!

Measure inductance, capacitance, resonant frequency of tuned circuits, transmission line velocity factor/impedance/loss.Test RF chokes, transformers, baluns.

Adjust your tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-249 is really 3 test instruments in one: an accurate RF signal generator, a high resolution 170 MHz frequency counter and an *SWR Analyzer*™.

***Free* Manual**

MFJ comprehensive 18 page instruction manual is packed with useful applications -- all explained in simple language you can understand!

For free manual write or call MFJ.

Take It Anywhere

The MFJ-249 is fully portable, powered internally by 8 AA batteries or 110 VAC with MFJ-1312B, $12.95. Take it to remote sites, up towers, on DX-peditions--anywhere your antennas are located.

For rough service, pick up a convenient **MFJ-29**, $19.95, padded carrying pouch to keep your MFJ-249 close at hand and looking like new.

How Good is the MFJ-249?

MFJ *SWR Analyzers*™ work so well, many antenna manufacturers use them in their lab and on the production line--saving thousands of dollars in instrumentation costs! Professional installer and technicians use them worldwide.

Get More by Paying Less

With the MFJ-249, you get full 1.8 to 170 MHz coverage, simple operation, instantaneous readings, plus a high accuracy frequency counter-- all for a low $199.95.

MFJ HF/VHF SWR Analyzer™ with RF Resistance Meter

MFJ-259
$219.95

All the features of the MFJ-249 plus exclusive *MFJ RF Resistance Meter*™

Does 2:1 SWR mean 25 ohms or 100 ohms?

The new MFJ-259 tells you at a glance.

Now you can measure RF feedpoint resistance up to 500 ohms at minimum SWR -- instantly -- on MFJ's exclusive side-by-side *RF Resistance Meter*™ and SWR Meter!

Take the guesswork out of building matching networks and baluns for your antennas.

Watch the effects of spacing on radiation resistance as you adjust your antenna!

Carrying Pouch

MFJ-29
$19.95

Tote your MFJ-249, MFJ-259 or MFJ-209 *SWR Analyzer*™ anywhere with the MFJ-29 custom Carrying Pouch.

Made with a special foam-filled fabric, the MFJ-29 cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work--the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Protect your investment. The MFJ-29 is the perfect way to keep your analyzer safe and looking like new!

HF/VHF SWR Analyzer™

MFJ-209
$109.95

If you don't need a built-in frequency counter but want 1.8-170 MHz *continuous* coverage and smooth vernier tuning, choose MFJ-209.

Same as MFJ-249 without LCD frequency counter. Has jack for external frequency counter.

Dip Meter Adapter

MFJ-64
MFJ-65
$19.95 *each*

Plug a dip meter coupling coil into your *MFJ SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Order **MFJ-64** for 1.8-30 MHz or **MFJ-65** for 30-170 MHz.

With a dip meter you'll save time and take the guesswork out of winding coils, measuring inductance and capacitance, measuring velocity factor and electrical lengths of coax. You can use it to determine resonant frequency of tuned circuits and measure Q of coils.

Free MFJ Catalog

Write or call . . . 800-647-1800

10-160 Meter HF SWR Analyzer™

MFJ-207
$79.95

If you're an HF man, this compact MFJ-207 *HF SWR Analyzer*™ will help you build 10-160 Meters antennas that'll make working DX almost routine.

Just plug in your coax to find the SWR of any HF antenna on any ham band 10-160 Meters. Has jack for external frequency counter. Use 9 volt battery or 110 VAC with MFJ-1312B, $12.95. 7½x2½x2¼ inches.

2 Meter VHF SWR Analyzer™

MFJ-208
$79.95

MFJ-208 2 Meter *VHF SWR Analyzer*™ finds the SWR of any antenna from 138-156 MHz.

Jack for external frequency counter. Use 9 volt battery or 110 VAC with MFJ-1312 B, $12.95. 7½x2½x2¼ inches.

For Commercial VHF Radio

Same as MFJ-208 but for commercial VHF. **MFJ-217**, $79.95, covers 30-50 MHz and **MFJ-218**, $79.95, covers 150-170 MHz.

440 MHz UHF SWR Analyzer™

MFJ-219
$89.95

The New MFJ-219 *UHF SWR Analyzer*™ lets you read the SWR of any antenna from 420 MHz to 450 MHz--just plug in the coax of your antenna, set the frequency and read the SWR on the MFJ-219.

The MFJ-219 uses the latest high-tech microwave integrated circuits and microstrip technology to produce an affordable *UHF SWR Analyzer*™ for only $89.95

Has jack for external frequency counter. Use 9 volt battery or 110 VAC with MFJ-1312B, $12.95. 7½x2½x2¼ inches.

MFJ Bandswitched Dip Meter™

MFJ-203
$99.95

The MFJ-203 is a sensitive *Bandswitched Dip Meter*™ that covers all hams bands from 160-10 Meters. There are no plug-in tuning coils to keep up with or break.

Has detachable coupling coil, dual FET oscillator, op-amp meter amplifier and jack for external frequency counter. Use 9 volt battery or 110 VAC with MFJ-1312B, $12.95. 7½x2½x2¼ inches.

Antenna Resistance Analyzer™

MFJ-205
$89.95

Measure the feedpoint resistance of your antenna at its resonant frequency directly from the MFJ-205 calibrated resistance meter.

It's great for designing impedance matching networks for your antenna.

Reads up to 500 ohms RF resistance. Covers ham bands 160-10 Mtrs.

Jack for frequency counter. 7½x 2½x2¼ inches. Use 9 volt battery or 110 VAC with MFJ-1312B, $12.95.

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH(8324)

• 1 year **unconditional** guarantee •30 day money back guarantee (less s/h) on orders from MFJ • **FREE** catalog

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (601) 323-6551; **Add s/h**

MFJ . . . making quality affordable

Prices and specifications subject to change © *1993 MFJ Enterprises, Inc.*

CIRCLE 165 ON READER SERVICE CARD

was coming through on the long path. We would then set off for our walking destination, wherever that was to be, armed with maps, shady hats, sunscreen, mosquito repellent, our first aid kit, and plenty of water. We walked, explored, and took photographs of the amazing, bold wildlife until midday, when we returned to the VQ3 Lodge for a shower and a rest before lunch. A nap followed, with reading and games of Word Yahtzee until about 0830Z. Fifteen meters then opened to JA, the propagation swinging to short path Europe in about one hour.

After a couple of hours on the air, Deb and I went for tea at one of the several eating places on the island. With the population of Australian/European, Chinese, and Malay ethnic groups, there was plenty of variety in the food to be had on the island in casual, low-key surroundings.

After a short walk and a cup of tea, it was back on the air for a couple of hours, 15 meters if it was open, as signals and the noise level seemed better there, or 20 meters if 15 was closed. We lived like that every day, and it was great! Perhaps not the way a died-in-the-wool DXpeditioner would operate, but then it was a holiday with radio thrown in, not a true DXpedition.

With my low power I opted mainly for working same frequency rather than split. Although this is against conventional wisdom, I found that the tactic tended to keep the less well-mannered in check to some extent, because they had to be quiet to hear me. Also, the huge pileup on my frequency tended to keep other stations in the area off it!

When I worked split, although I could work stations quicker for a little while, someone with a deaf receiver always ended up top of my transmit frequency and it was very hard to drive the operator away with 100 watts!

By the last day there were over 500 stations in the log—about 75 JAs, 16 Australians, and a few African stations, including SU, 5Z4, TL8, EL2, and EA9. A fair number of stations in Southeast Asia had also been worked, but the Europeans numbered well over 350.

With the non-existent long-path propagation during our stay, not one single North American station had been worked. I did not know whether to laugh or cry, having promised several friends in the USA I would remove VK9 from their wanted lists. It was not to be. There was nothing I could do about the propagation and that was that. Even a beam and a linear would not have made any difference. However, I had done really well on 15 meters into Europe, even working a lot of the "little pistols" who were using 100 watts to a vertical or a dipole. In fact, one of the strongest signals I worked from Europe had come from a DJ station using 100 watts and a vertical! Also, to my pleasure

A Christmas Island robber crab, which is very fond of climbing coconut palms to knock down coconuts!

and surprise many old G-friends in the UK had come up and made contact, giving them a new country in many cases.

Going Home

It was very sad packing up the station on Saturday morning to catch the flight back home that afternoon. We had had such a good time on Christmas Island. A very special thanks to P29DX, W5KNE, and VK6s NE, XH, LC, UE, APK, and BFI for their help and encouragement in getting there.

Even though my QSO rate did not set the world on fire, I was delighted with the excitement in the voices of those to whom I had given a new country. I was also proud I had not upset anyone on Christmas Island with my activities and had been totally TVI free.

These days the emphasis on visits to rare DX countries seems almost entirely on massive amounts of people, equipment, and QSOs, with large budgets and operators working around the clock. Sometimes this type of operation can cause conflict with local people and other visitors due to TVI and aggressive attitudes.

Although the desires of a large amount of DX operators for a contact are satisfied by this kind of expedition, it is often difficult for others to follow in their footsteps. On Christmas Island, thanks to the disciplined operations of people such as Bob, W5KNE, who have visited the island in the past, the attitude of the local people is one of interested curiosity and cooperation.

So if you are an adventurous soul and would like to go to unspoiled Christmas Island and stay at the VQ3, leave the linear and TH6DXX at home. Take a TS50S and a dipole and go look at the crabs, walk in the jungle, and see the amazing wildlife and beaches. That way a lot of operators will be able to go for a long time in the future, and everybody will eventually get to work Christmas Island. ■

RADIO VOICE MAIL IS HERE!

Never miss an important message again! Why not use the same technology we've been using for years on the telephone? NOW YOU CAN! The HALCO RVM-100 Radio Voice Mail Controller connects between your VHF or UHF Radio and a standard telephone answering machine. Let the RVM-100 take those calls when you just can't get to the radio.

To leave a message, a user simply sends your chosen DTMF tone sequence. The RVM-100 recognizes the sequence and triggers the answer machine to record the user message.

The RVM-100 features:

- Simple hookup to the radio (audio and PTT line)
- Standard RJ-11 connection for the answering machine
- Easy operation
- Low cost
- HAL Communications high quality standards
- And - it's made in the U.S.A.

Put the HALCO RVM-100 on the job when you're not available.

HALCO RVM-100 . . . . ONLY $169.

HALCO
Division of
HAL Communications Corp.
P.O. Box 365
Urbana, IL 61801-0365
Phone (217) 367-7373 FAX (217) 367-1701

VISA
MasterCard

NEW
From HAL

CIRCLE 140 ON READER SERVICE CARD

CQ REVIEWS:

The RF Concepts VHF1-60 and RFC-2/70H Amplifiers

BY JOE LYNCH*, N6CL

In the past year RF Concepts, a division of Kantronics Company, Inc., has introduced virtually a whole new product line of RF amplifiers. The two amplifiers I reviewed cater to two different markets. The first, the VHF1-60, is targeted for the handheld user who finds that the low power of the handheld is just not satisfactory. The second, the RFC-2/70H dual-band amplifier, is for the user who needs more power to hit fringe repeaters or to work direct on FM either on 2 meters or 70 cm. First we will cover the VHF1-60.

The VHF1-60 Amplifier

As simple in composition as the VHF1-60 amplifier is, it contains a few sophisticated features designed to prevent breakdown, both from normal use and misuse, and with the optional helical filter installed, to prevent radiation of unwanted signals.

At the input stage of the VHF1-60 is a tuned circuit that detects the frequency of the applied signal. If that signal falls outside of the frequency range, which is just slightly above and below the 2 meter band, an op-amp is kept high, thereby starting a chain of events that will prevent voltage from being applied to the driver stage and keeping the change-over relay from engaging, ultimately preventing the amplifier from being used. That change-over relay also helps prevent misuse of the amplifier. Its principal job is to control the routing of the signal either around or through the amplifier. However, the amplifier is designed so that both the input and output sections of the relay must be engaged in order for the voltage to be applied to the driver stage.

We are all concerned about SWR. So is the design of this amplifier. At the output stage a sample voltage from both the forward and reflected voltages is detected and summed. The sum of these voltages is sent to a stage that compares it with a reference voltage. As the summed voltage increases over the reference voltage, a voltage is sent to start cutting off the control transistor that sets the voltage to the drive stage. The result is the higher the SWR, the higher the control voltage, the less voltage that gets to the drive transistor, and thus the lower the output power of the amplifier.

This same summing voltage also keeps the output steady with increased power input. Because the comparator stage is looking at the total of the summed voltage, it doesn't care that the voltage is only from forward power. Therefore, as the forward power increases the sample voltage increases, thereby crossing that threshold in the comparator stage, which in turn starts shutting down the driver control transistor, with the resultant shutdown of the driver transistor and subsequent lowering of the power output.

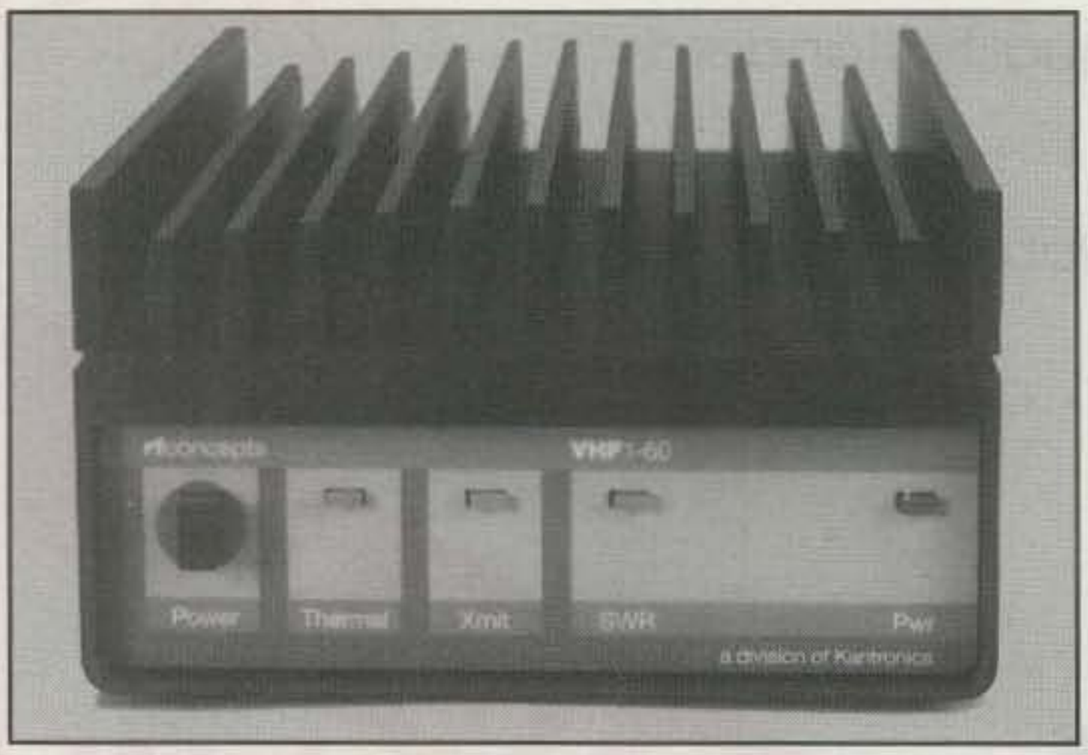
With these protective stages in place, however, it is still possible to overdrive, and thus damage, the driver transistor. It is rated at 10 watts maximum input, but the manual indicates no more than 8 watts should be applied to keep from damaging the driver.

The VHF1-60 does not include a pre-amp, an item that in spite of some initial customer criticism is not missed. And if you have ever put an external antenna on a handheld radio, you would know why.

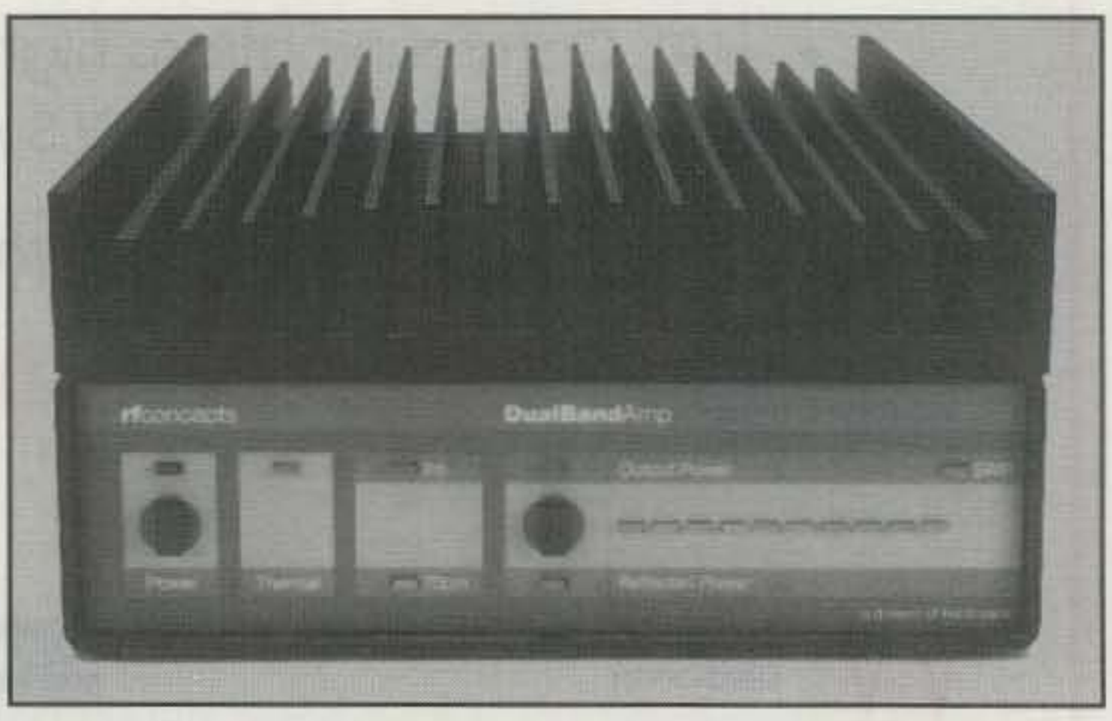
The wide-open front-ends of almost all handhelds are such that a pre-amp would just saturate them. With a pre-amp you will pick up every unwanted signal that you do with your external antenna, only much louder. Therefore, I believe that purposely leaving out the pre-amp on this and their other low-power amplifiers designed to be principally used with handhelds is a very wise decision.

I used the VHF1-60 with my Yaesu FT-

P.O. Box 73, Oklahoma City, OK 73101



The VHF1-60 amplifier is targeted for the handheld user who wants more power than the hand-held alone has to offer.



The RFC-2/70H dual-band amplifier is for the user who needs more power to hit fringe repeaters or to work direct on FM on 2 meters or 70 cm.

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**

FL7000	500 watt HF amplifier ..	**Call**
FT-11	2m tiny hand-held	**Call**
FT-290	2m all-mode XCVR	**Call**
FT-411	2m hand-held	**Call**
FT-416	2m hand-held	**Call**
FT-470	2m/70cm hand-held	**Call**
FT-530	2m/70cm hand-held	**Call**
FT-650	12-6m all-mode	**Call**
FT-747	HF all mode XCVR	**Call**
FT-840	HF all mode XCVR	**Call**
FT-2200	2m FM mobile (45W) ..	**Call**
FT-2400	2m FM mobile (45W) ..	**Call**

Please call for more Yaesu items.

KENWOOD

TS-950SDX
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**

TS-50S
A tiny 100 watt all-mode HF XCVR with 100 memories, general coverage RX, multifunction hand microphone, and much more! The TS-50 is the smallest HF radio in the world; a top-notch HF mobile performer ..... **Call**

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 seperation kit ..... **Call**

TH-22	2m tiny hand-held	**Call**
TH-28	2m hand-held	**Call**
TH-78	2m/70cm hand-held	**Call**
TM-241	2m FM mobile	**Call**
TM-732	2m/70cm mobile	**Call**
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**

Please call on other Kenwood items

AEA

Isoloop HF loop antenna	**329**
MM-3 / PK-232	**169/315**
PK-900 / PK-88	**449/139**
PCB-88 / SWR-121	**149/359**

AMERITRON

AL-80B / AL-82	**1049/1695**
AL-811 / AL-811H	**585/695**
AL-1500 / AL-1200	**2150/1695**
ALS-500M / ALS-600	**695/1120**

ASTRON

MODEL	AMPS	ICS	PRICE
RS-20A	16	20	**90**
RS-20M	16	20	**112**
RS-35A	25	35	**144**
RS-35M	25	35	**162**
VS-35M	25	35	**179**
RS-50A	35	50	**219**
RS-50M	35	50	**239**
VS-50M	35	50	**249**

A=Plain M=Meters V=variable DC

KANTRONICS

KAM+	all-mode TNC	**309**
KPC-3	tiny packet TNC	**110**

Please call for Kantronics software.

RF CONCEPTS

2-23	2m amp (2>30)	**129**
2-315	2m amp (30-40>150-170) .	**259**
2-417	2m amp (45>170)	**249**
2/70	2m/70cm amp (2>30)	**219**
2/70H	2m/70cm (20>200/125) ..	**729**
4-110	70cm amp (10>100)	**330**
4-310	70cm amp (30>100)	**310**
VHF1-60	2m amp (1>60)	**229**

MFJ

207 / 208 / 249 / 346 ...	**79/89/179/169**
401 / 407 / 422B / 451 ..	**49/69/119/79**
490 / 492 / 493 / 564 ...	**149/89/129/49**
815 / 817 / 901B / 945D ...	**69/89/59/89**
941E / 948 / 949E	**99/119/139**
962C / 986 / 989C	**209/259/299**
1224 / 1268 / 1284	**89/49/25**
1278B / 1270B / 1289	**259/119/59**
1728 / 1786 / 1796	**24/219/165**

Please call for other MFJ products

COMET

B10 / B20 / B20NMO	**30/44/44**
CA2X4FX / CA2X4MAX	**90/160**
CA2X4WX / CA712EF	**130/90**
FL62S / FL67S	**64/80**
SG5 / SG5NMO	**53/53**
SG7 / SG7NMO	**75/75**

DIAMOND

F142A / F22A / F23A	**120/99/145**
NR770HA / NR770HNMO	**57/60**
NR770RA / NR790A	**57/85**
X200A / X300A	**133/149**
X500HNA / X510MA	**219/179**

BUTTERNUT

HF2V / HF6VX / HF5B ...	**149/159/259**
HF9VX 80-6m, 9 band vertical ...	**199**

• New! Butternut CPK add-on kit •
No radials for HF6VX / HF9VX **49**

M² ENTERPRISES

2M7 / 2M12 / 2MCP14	**89/116/143**
2M5WL / 2MCP22	**159/199**
2M18XXX / 432-9WL	**206/135**
440-18 / 436CP30	**99/206**

MIRAGE

B108G / B215G	**179/289**
B1016G / A1015G	**289/319**
B2530G / B2560G	**549/879**
D1010N / D3010N	**329/309**

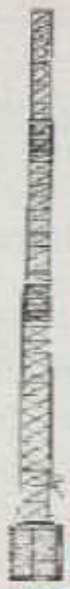
ALINCO

DJ-180T / DJ-580T	**209/389**
DR-130T	**309**
DR-600T / DR-1200T	**599/245**

TIMEWAVE

DSP-9 DSP filter (standard) ...	**169.95**
DSP-59 DSP filter (deluxe)	**279.95**

U.S. TOWERS



- **All steel construction.**
- **Towers all self-support.**
- **Highest quality, best selling crankups available.**

MODEL	MIN.	MAX.	WINDLOAD	PRICE
MA-40	22'6"	40 FT.	10 SQ. FT.	629.00
MA-550	22'1"	55 FT.	10 SQ. FT.	999.00
MA-770	23'10"	71 FT.	10 SQ. FT.	2249.00
MA-850	24'6"	85 FT.	10 SQ. FT.	3489.00
TX-438	22'6"	38 FT.	18 SQ. FT.	919.00
TX-455	21'0"	55 FT.	18 SQ. FT.	1385.00
TX-472	23'8"	72 FT.	18 SQ. FT.	2279.00
TX-489	24'4"	89 FT.	18 SQ. FT.	3959.00
HDX-538	22'6"	38 FT.	30 SQ. FT.	1179.00
HDX-555	22'0"	55 FT.	30 SQ. FT.	2079.00
HDX-572	23'8"	72 FT.	30 SQ. FT.	3559.00
HDX-589M	24'8"	89 FT.	30 SQ. FT.	7119.00

In CA add 6% sales tax, please call for an accurate shipping quote.

ROTATORS

Orion OR-2300 (35 Sq.')	**999**
Orion OR-2300D (35 Sq.')	**1099**
Telex HAM IV (15 Sq.')	**355**
Telex Tailtwister (20 Sq.')	**420**
Telex HDR300 (25 Sq.')	**900**
Yaesu G500 (elevation)	**259**
Yaesu G800S (21 Sq.')	**309**
Yaesu G800SDX[A] (21 Sq.')	**379**
Yaesu G1000SDX[A] (23 Sq.')	**459**
Yaesu G2700SDX[A] (34 Sq.')	**879**
Yaesu G5400[B] (az./el.)	**479**
Yaesu GS-23[A] RS232 control	**299**
Yaesu GS-232[B] RS232 control	**475**

Please call for prices other rotators.

CUSHCRAFT

13B2 / 17B2 / 26B2	**Call**
10-3CD / 10-4CD	**Call**
12-4CD / 40-2CD	**Call**
15-3CD / 15-4CD	**Call**
20-3CD / 20-4CD	**Call**
A3S / A4S / AP8A	**Call**
A449-6 / A449-11 / AR-2	**Call**
AR-6 / AR-10 / AR-270	**Call**
ARX-2B / ARX-450B	**Call**
CS-28M / CS-147M	**Call**
CS-270M / CS-450M	**Call**
D3W / D40	**Call**
R5 / R7 / AV5	**Call**

Please call for Cushcraft prices.

TELEX / HYGAIN

TH11DXS	5 beam	**850**
TH7DXS	3 band beam	**650**
TH5MK2S / EX-14		**530/410**
218S	satellite system	**325**

Please call for Hygain crankup towers.

ALUMINUM

6063-T832 DRAWN TUBING

O.D.	WALL	I.D.	COST
.375"	.058"	.259"	.35/Ft.
.500"	.049"	.402"	.45/Ft.
.500"	.058"	.384"	.50/Ft.
.625"	.058"	.509"	.55/Ft.
.750"	.058"	.634"	.65/Ft.
.875"	.058"	.759"	.75/Ft.
1.000"	.058"	.884"	.80/Ft.
1.125"	.058"	1.009"	.90/Ft.
1.250"	.058"	1.134"	1.10/Ft.
1.375"	.058"	1.259"	1.20/Ft.
1.500"	.058"	1.384"	1.40/Ft.
1.625"	.058"	1.509"	1.60/Ft.
1.750"	.058"	1.634"	1.80/Ft.
1.875"	.058"	1.759"	1.90/Ft.
2.000"	.058"	1.884"	1.95/Ft.
2.125"	.058"	2.009"	2.05/Ft.

In 6' and 12' lengths; 6' ship via UPS, 12' ship via truck or air freight collect.

6061-T6 EXTRUDED TUBING

.188"	Solid	----	.15/Ft.
1.125"	.058"	1.009"	.70/Ft.
1.250"	.058"	1.134"	.85/Ft.
2.000"	.120"	1.760"	2.60/Ft.
2.000"	.250"	1.500"	4.10/Ft.
2.500"	.120"	2.260"	3.25/Ft.
3.000"	.065"	2.870"	2.20/Ft.
3.000"	.120"	2.760"	3.85/Ft.

In 6', 12', and 24' lengths; 6' ship UPS, 12' and 24' ship truck / air collect.

ROHN TOWER

25G / 45G / 55G	**65/149/197**
A25AG2 / 25AG3 / 25AG4 ..	**94/94/95**
45AG2 / 45AG4	**180/186**
AS25G / AS455G	**30/74**
EF2545 / EFBX	**375/399**
FK2548' / 58' / 68' .	**1350/1450/1485**
FK4544' / 54' / 64' .	**1775/1950/2075**
GGK25G2 / GGK45G2	**325/350**
HBX40 40' tower (10 Sq.')	**325**
HBX48 48' tower (18 Sq.')	**450**
HBX56 56' tower (10 Sq.')	**589**
HDBX40 40' tower (18 Sq.')	**429**
HDBX48 48' tower (18 Sq.')	**579**
TB3/TB4	**75/90**

COAX & CABLE

ANDREW HELIAX®
1/2" ..... **2.49/Ft.** 7/8" ..... **5.99/Ft.**
connectors: 1/2" .. **32.00** 7/8" **78.00**

COAX

9086 (9913 equivalent)	**.49/Ft.**
9096 (stranded 9086)	**.65/Ft.**
RG-213/U (8267 equivalent	**.39/Ft.**
RG-8X (mini RG-8/U)	**.25/Ft.**
RG-58C/U	**.24/Ft.**

BARE COPPER WIRE

14 gauge stranded	**.10/Ft.**
14 gauge flex-weave	**.15/Ft.**

ROTOR CABLE

7 conductor (2-#18, 5-#22)	**.20/Ft.**
8 conductor (2-#18, 6-#22)	**.25/Ft.**
heavy duty 8 (2-#16, 6-#18)	**.45/Ft.**

PHILLYSTRAN

NONCONDUCTING GUY CABLE

HPTG1200I (1200#)	**.39/Ft.**
HPTG2100I (2100#)	**.48/Ft.**
HPTG4000I (4000#)	**.69/Ft.**
HPTG6700I (6700#)	**.89/Ft.**
end kits 2100/4000/6700	**4/5/6**

GUY HARDWARE

3/16EHS guywire (3990#)	**.18/Ft.**
1/4EHS guywire (6700#)	**.21/Ft.**
3/16CCM cable clamp	**.55**
1/4CCM cable clamp	**.65**
1/4TH thimble	**.55**
3/16 preformed big grips	**2.99**
1/4 preformed big grips	**3.49**
500D guy insulator	**2.29**
502 guy insulator	**4.49**
3/8EE turnbuckle	**8.95**
3/8EJ turnbuckle	**9.95**
1/2X9EE turnbuckle	**11.95**
1/2X9EJ turnbuckle	**12.95**
1/2X12EE turnbuckle	**13.95**
1/2X12EJ turnbuckle	**14.95**
GAR30 / GAS604 Anchor	**30/20**
Klein safety belt (S M L XL)	**69.95**

CARBON STEEL MASTS

WALL	5'	10'	15'	20'
.12	29	55	82	99
.18	49	95	139	179
.25	–	129	–	249

Don't be fooled by aluminum masts! The typical yield strength of our 2" O.D. galvanized steel masts is 87,000psi.

PRICES, SPECIFICATIONS, AND STOCK QUANTITIES ARE SUBJECT TO CHANGE WITHOUT NOTICE. PRICES LISTED DO NOT INCLUDE SHIPPING COSTS. TEXAS RESIDENTS ADD 8.25% TAX.

ORDER TOLL FREE: (800) 272 - 3467
LOCAL AND TECHNICAL HELP: (214) 422 - 7306 FAX: (214) 881 - 0776
C.O.D.
MC / VISA
TEXAS TOWERS
1108 Summit Avenue, Suite #4, Plano, TX 75074
M-F: 9AM-5PM
SAT.: 9AM-1PM

411 handheld while driving around in my 1975 Chevy panel van. The handheld-amplifier combo worked just great. However, I was a bit concerned that I had no place to put the amplifier other than setting it, unsecured, on the floor or in the passenger's captain's chair, which was not possible when I had a passenger.

The RFC-2/70H Amplifier

The dual-band RFC-2/70H amplifier appeals to a narrower market—that of the user who needs more power to hit fringe repeaters or to work direct on FM either on 2 meters or 70 cm, as we said before. The amplifier uses the Motorola MRF 175GU, a high-power dual-gate FET internally configured as a push-pull device. Because they use the 175, they must find a way of supplying 28 VDC. This they do through a built-in power supply that converts the 12 VDC to the required 28 VDC. However, should you desire to operate the amplifier from 28 VDC (and less current), you may do so by moving a couple of internal jumpers.

Although the amplifier is broad-banded, through the use of detection circuits in the input, the amplifier is "locked out" when it detects a signal that is outside either of the two bands.

The one aspect of this amplifier that I found a bit objectionable is that there is no way of hard keying it. Therefore, in its present design it is not usable on SSB. There are a couple of "quick fixes," however.

The first, and the least invasive, is to add two 10 µF capacitors (one each on each control line) alongside the 470 pF capacitors on the input detection circuit, thereby increasing the time constant that voltages are present on these lines. The result would be that the amplifier does not drop out as quickly after the user stops talking. However, the time constant value might not be enough for some and too much for others. Some experimentation with capacitance values would be necessary, therefore, in order to find the right one for your situation.

The other way of modifying the amplifier is to run lines from the input control lines to jacks (preferably RCA-type phono jacks) and ground the "shield" side of these jacks. You would then use your keying lines in your transceiver to "short," and thus ground these control lines when you were transmitting with it.

A couple of cautions: First, if you install the capacitors, make sure that the capacitors are properly installed according to their polarity. Second, any modifications should only be performed by qualified technicians.

Here is another aspect of the amplifier to consider. While it is broad-banded, no provisions exist for operation on 222 MHz. Could a future addition of the amplifier be designed to work on all three bands?

As I am partial to the weak-signal portion of the band, I see a market potential for this amplifier within that community. With the changes in FCC rules concerning the 222 MHz amateur band, I feel that there will be an increased interest in that portion of the band. If this amplifier were redesigned for all three bands and SSB, it could appeal not only to users of the 222 MHz band, but to weak-signal users in general.

Because the RFC-2/70H outputs high power, you must take precautions when using this amplifier. One caution is in the selection of a mobile antenna. Most mobile antennas are not designed to operate with 200 watts on 2 meters and 125 watts on 70 cm applied to them. The RFC-2/70H comes with UHF-type SO-239 connectors installed. However, for a little extra you can order yours with type-N connectors installed.

The suggested retail price of the VHF1-60 is $259.95, and the RFC-2/70H is $849.95. For more information on these two amplifiers, contact RF Concepts, division of Kantronics Company, Inc., P.O. Box 11039, Reno, NV 89510-1039 (702-324-3290, FAX 702-324-3289). ■

OUTBACKER®

Plug Into DX!

- 8 Bands On 1 Whip, 3.5-30MHz
- Quick & Easy QSY — No Coils To Change
- Polyurethane Coated Shaft
- Trunk Lip Mountable Perth®
- No Tuner Needed

★ Mobile ★ Portable ★ Condos
★ Marine ★ R.V.

In Stock
4', 6', 2 Piece, High Power Models
And The <u>Ultimate</u> Perth®
At Leading
Amateur Radio Stores

Technical Info
Tech Talk Time
5-10 EST
OUTBACKER
ANTENNA SALES
Don Arnold, WD4FSY/VK2IBB
330 Cedar Glen Circle
Chattanooga, TN 37412
Phone/FAX
(615) 899-3390

Worldwide Contact
TERLIN AERIALS
5 Yampi Way
Willetton, W.A. 6155
Australia
Tel (011) 619-354-5444
FAX (011) 619-457-7737

Dealer Inquiries Invited
For <u>Outside</u> North America

"...It takes a whammin' & keeps on hammin..."

Gordon West

Gordon West, WB6NOA
"It's what we use at Radio School Classes..."

CQ SHOWCASE

Timewave Technology DSP Filters

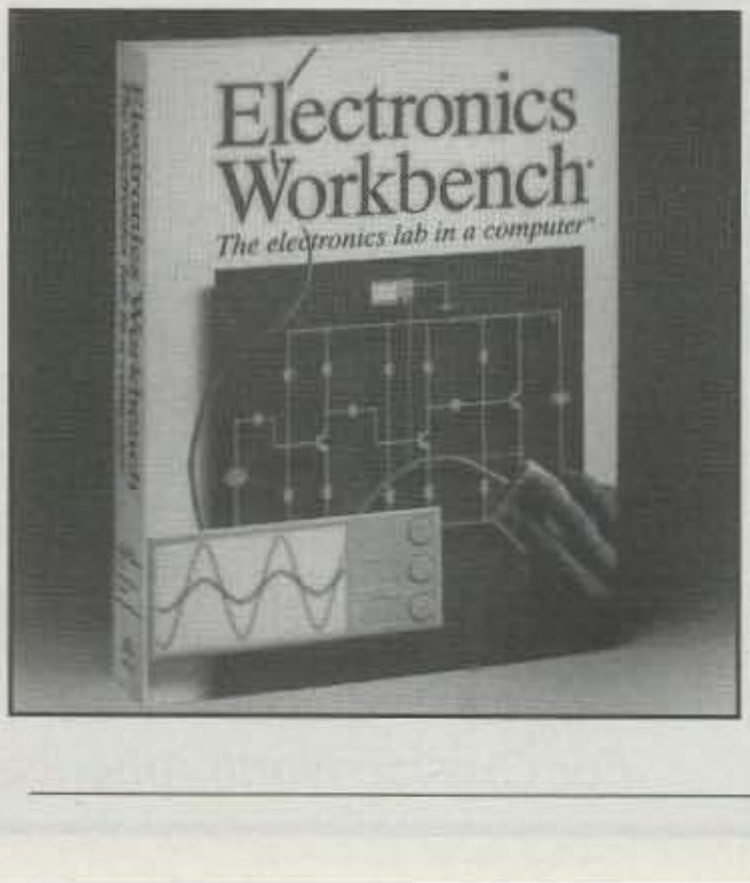
Timewave Technology has announced two new digital signal processing filters. The TW DSP-9 and DSP-59 both feature unlimited heterodyne elimination, random noise reduction, plus different filter choices all operational at the same time. Processed signal takes 10 to 30 ms and goes through a 16-bit A/D D/A converter. The CPU is a16-bit Sigma Delta, allowing all processed audio to be in real time for PACTOR, AMTOR, and full QSK.

The TW DSP-9 has three SSB/AM/FM filters and the CW filters are 500, 200, and 100 Hz widths. The TW DSP-59 can handle all modes of receiving data and voice. It has 320 filter combinations and a variable mode for the user to set to personal preferences. For more information, contact Timewave Technology Inc., 2401 Pilot Knob Rd., St. Paul, MN 55120 (612-452-5939, FAX 612-452-4571), or circle number 101 on the reader service card.

Electronics Workbench Ver. 3 From Interactive Image

Electronics Workbench, a simulated lab for teaching electronics, is now available in Version 3. It fits into virtually every curriculum and complements any real lab, maker says. MS-DOS, Windows, and Macintosh versions are available. The software tool simulates analog and digital circuits as well as test equipment such as an oscilloscope and a Bode plotter for spectrum analysis. Version 3 expands the previous selection of analog and digital parts by adding new components including JFETs and MOSFETs plus controlled sources and switches. Real-world models have also been added.

Electronics Workbench sells for $299US ($329CDN) and includes an analog and digital module. Existing customers can upgrade to the new MS-DOS version for $79US ($99CAN). For more information, contact Interactive Image Technologies, 700 King St. West, Suite 815, Toronto, ON Canada M5V 2Y6 (416-361-0333; FAX 416-368-5799), or circle number 102 on the reader service card.



Optoelectronics Model DC440 Communications Decoder

The Model DC440 from Optoelectronics reads 50 subaudible (CTCSS) tones, 106 digital (DCS) codes, and 16 Touch Tone™ (DTMF) characters simultaneously. Some applications include two-way communications testing, repeater monitoring, updating older service monitors, enhancing recreational monitoring, as well as security and surveillance monitoring. The DC440 monitors the demodulated audio output from a communications receiver, service monitor, scanner, or interceptor. Six operating modes are available. A serial data jack permits connection to a PC serial port using the model CX12 RS-232C interface. There is a complete set of control codes to permit remote operation from a PC.

The DC440 is 1.8"H × 4.5"W × 4"D. Three front-panel pushbutton switches are for power, mode, and recall. The cabinet is anodized aluminum with polycarbonate overlays on the front and rear panels. The LCD display is 2 × 16 character EL backlit. The unit is priced at $259. For more information, contact Optoelectronics Inc., 5821 NE 14th Ave., Ft. Lauderdale, FL 33334, or circle number 103 on the reader service card.

Spectrum Model HRC-10™ Handheld Repeater Controller

The HRC-10 from Optoelectronics converts a single- or dual-band radio into a full-feature simplex or duplex repeater system. The unit features include voice IDer, hang and time-out timers, telemetry tones, digital voice operated squelch (DVOS™), and private voice mail slot. A DTMF command interface provides remote-control capabilities and allows the user to program the operating parameters of the controller.

The HRC-10 can be connected to most handheld and mobile radios using only the speaker and microphone connectors. It can be powered by an internal battery or external DC supply. For more information, contact Spectrum Electronic Products, 4740 Scotts Valley Drive, Scotts Valley, CA 95066 (408-438-2788; FAX 408-438-6027), or circle number 104 on the reader service card.

FBenterprises Repeater Maps

FBenterprises has updated their Repeater Maps to the 1994/95 edition. The maps are available for all 50 U.S. states, as well as all Canadian provinces, Central American countries, and islands in the Caribbean. The map for California is split into northern and south-

ern California, so specify which part you need. The maps show 2 meter repeaters in full color on the fron of the card, with the bands between 220 and 1.2 GHz shown on the back. The newly updated cards now include information on which repeaters offer autopatch, and the CTCSS tones for those repeaters which require them.

The cards are 5.5" × 8.5" and are plastic laminated. They retail for $3.95 and are sold direct or through dealers. For more information, contact FBenterprises, 23801 NW First Ave., Ridgefield, WA 98642-8830 (800-377-2339), or circle number 105 on the reader service card. A catalog is available from this address for $2.00 (refundable with purchase).

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

Network Operating System (NOS) and More

We have several topics to cover in this installment of the "Packet User's Notebook." One of the topics we have not discussed in a long time is TCP\IP, and interest is growing in the area of Network Operating Systems (NOS).

NOS, as it is now known, began with the KA9Q TCP\IP networking system. When Phil Karn, KA9Q, created the system, he targeted the amateur radio digital user to make the most use of it. Instead, TCP/IP, or NOS, has made most gains in the commercial world of data communications. In less than five years NOS has become a worldwide method of digital communications and has opened a new addressing scheme that in some ways has put the telephone numbering scheme to shame. NOS implements a completely different automatic routing system. As one of the IP address coordinators in Virginia, I'm beginning to see more activity in the area of NOS. There has been more growth in one year than I've seen in the past four years combined. NOS has come of age.

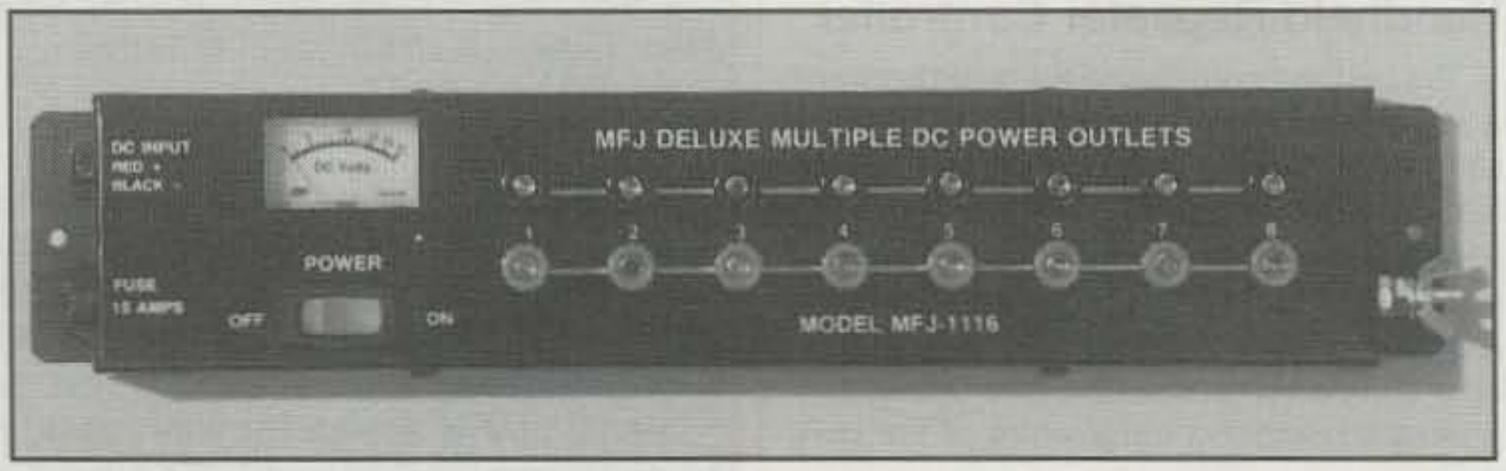
In the world of packet radio NOS is not applied in the same manner as the AX.25 packet standard. NOS utilizes the KISS command that is inside most of the more recent TNCs and packet data controllers. Turning on the KISS command does not place you in the NOS mode, however. You must turn KISS on before you can load the NOS programs and associated NOS operating software.

To operate NOS you must remember that at the present time, although you are in the KISS mode, NOS must still use the AX.25 protocol. In effect it is like putting a firecracker inside a blanket. The bang is there, but the blanket subdues the sound. Hopefully this will soon change and allow for more flexible operation of the NOS applications.

Information Abounds

Along with Phil's brain-child have come many improvements in the NOS climate from other digital communication authorities. Rather than go into a lengthy discussion of NOS, the reader who has a genuine interest in it should obtain the book *NOSintro* by Ian Wade, G3NRW.

211 Luenburg Drive, Evington, VA 24550



The MFJ Deluxe DC distribution panel incorporates a 0–25 voltmeter, enabling the author to monitor DC voltage at the operating position.

In my opinion, Ian has taken much of the guesswork out of NOS operating so the new user can begin operating TCP\IP much faster. The book is available for around $20 US, plus shipping and handling, from Rosewood Company, "Books for the Amateur Radio Operator," P.O. Box 229, Elko, SC 29826 (orders 1-800-875-7762; more info 803-266-4759). The company is run by Ray (WA4OMM) and Kathleen (KB4HWC) Thomas. Again, the title of the book is *NOSintro,* and it is published by Dowermain in the United Kingdom. Ian's internet address is as follows: *ian @ g3nrw.demon.co.uk* (lowercase as shown).

Cut and Paste

Before we get into this month's main topic, there is another item I must discuss.

In the January column I created a monster by burning the night oil to turn out what I thought would be a timely interface column, since many packeteers probably had received a new digital controller for Christmas. In the early morning hours, or in my haste, I did a no-no and "cut and pasted" a drawing from one section of my AUTOCAD/LT™ into another section and set the text for that drawing for the wrong set of transceivers. Several packeteers, including some of the folks at ICOM, pointed out the error of my ways, and I hereby will attempt to set the "drawing" straight.

Fig. 1 defines how the ICOM IC-290, IC-28, and IC-255 should be interfaced to a TNC-2 or clone. Please note that pin 5 is the PTT line, and not pin 2 as shown in the earlier (January '93) column. Table I is a description of how the ICOM VHF transceivers would be connected to the TNC-2 5-pin DIN connectors.

Solar Power

This month I'm going to cover a subject that has generated a lot of interest. In my book *The Packet Radio Operator's Manual* from *CQ*, I cover this and many other topics related to the application of alternative power sources.

Solar energy has become a topic that no longer looms in the future for us, but has truly become a reality that we amateurs can use, and most of all is afford-

	ICOM 8-pin Mic PIN #	TNC-2 5-pin DIN PIN #
AFSK from TNC	1	1
MIC (shield)	7 (if used)	NC
Push To Talk	5	3
Ground (Rx & PTT)	6	2
Receive Audio (AF)	8*	4
**External Speaker		

**Not available on all ICOMs.*
***Not all ICOM VHF transceivers provide receive audio at pin 8.*

Table I– How ICOM VHF transceivers would be connected to the TNC-2 5-pin DIN connectors.

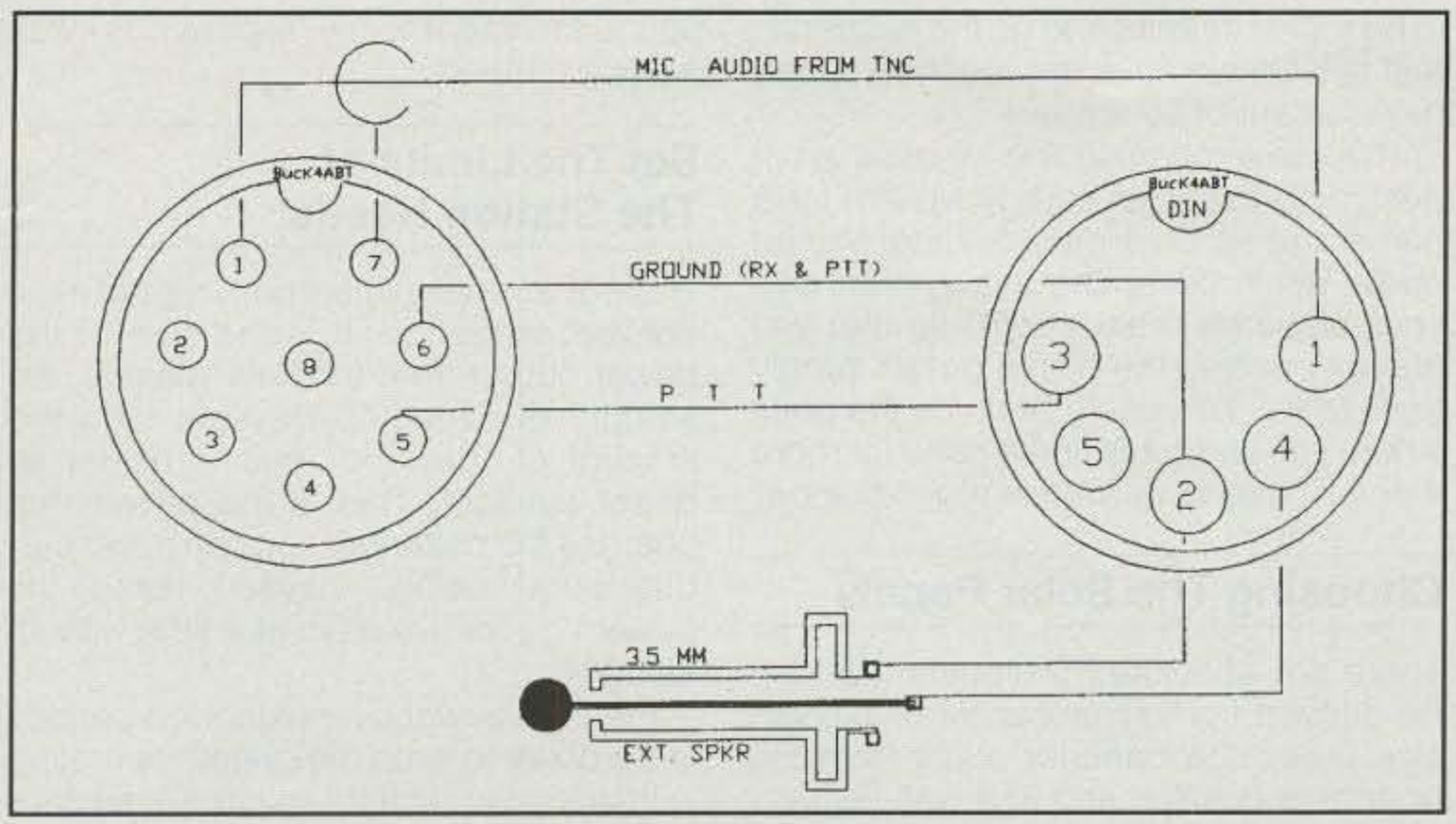


Fig. 1– The ICOM IC-290, IC-28, and IC-255 interfaced to a TNC-2 or clone.

able. It is one means of alternative power that we can use to run our remote packet nodes, and even better, our home stations. Either way, we conserve energy by using a utility that is there for the taking. Free electricity is the basis of this month's main topic.

After the initial investment for the photovoltaic panels, batteries, and regulators, we have arrived. Many times I've heard repeater operators complain because they lost utility power, or the following excuse has been used: "There is no power available at the site."

If the site is at a good elevation and there is ample sunlight, then by all means there is available power! There is one task we must perform first, and that is the conversion of that energy into a usable form of power. Power comes in different types and from many sources. The easy part is converting it into power that we can harness and use.

Although there are many kinds of energy sources—such as water, wind, organic, sunlight, and others—for our discussion I will concentrate on the source that is most available to us on a day to day basis—the sun.

Converting the sun's energy is easy enough, and in the long run it is the most economical. If we go about the task of harnessing and storing this energy, we soon discover another benefit that we had not considered before.

Maintenance

The system I use at my QTH in the day to day operation of my station(s) includes powering two HF (all band, 100 watts each) transceivers, two VHF transceivers, and a UHF transceiver. In addition, the solar system at this QTH is powering five terminal node controllers (TNCs).

So what's new? Well, here is the best part of all. The 200 amp, 14 volt battery bank and the two 2 by 4 foot solar panels have supplied these transceivers and TNCs with power for more than a year with no maintenance. Well, maybe I did go out to the solar panel stand and wipe the snow or residue from the solar panels a couple of times.

It is important to make minor adjustments to the angle of the panels from summer to winter, and in the spring I have to readjust the panels upward from the southern angle I had set earlier for the winter soltice.

Many amateurs who visit my QTH ask if I have ever had to supplement the solar panels with a battery charger in order to have enough power to take me through overcast days. The answer: absolutely not! In fact, I have enough reserve power in the system to allow the use of the VHF transceivers 24 hours a day. The system has operated the transceivers and TNCs up to four days without sunlight (overcast days), and the system has stayed alive and running well.

We have an X1J node atop a mountain in north Georgia that has been running for more than four years. The only maintenance to the node has been to change the EPROM in the TNC to upgrade it to the X-1J firmware.

What About Field Day?

Think about this for a moment: Solar power is not reserved for "fixed" use only. Field day activity is one of the ways you can put this kind of energy to work and make extra contest points while doing so.

Building a solar-powered station, packet node, or even a voice repeater can become a useful and beneficial project. Try it for yourself, your club, or for the Local Area Network (LAN) and discover how easy it is to put this limitless source of "free" energy to work for you. This is one time you will feel the "rush" as the

results suddenly create a great feeling of pride and accomplishment.

System Considerations

As my solar project here at this QTH gathered momentum, I discovered some unseen design drivers that I had to consider. There are a number of components that go into the formula that will ultimately render the final resolution. And although there are not many items that make up the solar power system, there are items that are to be attached to your power supply.

Here is the first consideration the packeteer should look at when buying a power supply. What size power supply (current and voltage) do I need to handle my transceiver, TNC, etc.? There are always the add-ons that come later, so we include some overhead for that requirement. In this case the new packeteer adds the demands of the transceiver, TNC, and an extra 5 amps for later expansion, etc. If the transceiver is a 45 watt output unit and the TNC is an all-mode device, the following numbers might apply:

- Transceiver power requirements: 13 volts DC at 9 amps.
- All-mode TNC power requirements: 13 volts DC at 1 amp.
- Total power for both units: 13 volts DC at 10 amps.

With the add-on power requirement(s), the current demand can go to 15 amps. If the user should add a 150 watt power amplifier, that power demand suddenly jumps by another 25 amps. We don't have to be rocket scientists to do the arithmetic that tells us we have approached a load requirement of 50 amps.

This same rationale is to be used when designing the solar energy system for a home station or a mountaintop packet node. When designing this system give yourself some "head-room" so that you are not pushing the (solar) power supply to its limits. This could become the point where you suddenly find a need for more than just casual or routine maintenance.

Choosing The Solar Panels

There are absolute maximums that can be derived from solar panels of a given size. Keep the batteries away from the operating position and in a well-ventilated space. Do not set the batteries on a concrete floor or on earth/soil. A wood pallet or a support frame made from metal angles will suffice.

Use wire that is large enough and that has heavy insulation so current loss in the wire does not become a problem. If the batteries are located outside, it's a good idea to place them into some kind of ventilated enclosure to reduce terminal oxidation and for heat dissipation.

Another consideration is the type of battery being employed. I selected the GEL type (Dynasty) lead-acid batteries mainly because this minimizes the degree of battery maintenance required. I found a source of large-capacity sealed batteries at VolTex Batteries Inc., in Doraville, Georgia. Chuck Beckham, N4XZV, ships batteries to many parts of the world, so the shipment to my Virginia QTH was a not a problem.

Set The Limits of The Station Needs

There is a limit that must not, I repeat *must not*, be exceeded. It is the sum of the power output from the solar panels, the amount of expected daylight, and the amount of "daylight" that is useful as direct sunlight. This is the power that charges the batteries. You can never outguess the weather—*never*. I've seen the system go for five days at a time without sunlight.

Reserve power over extended periods is the driver to keep the system operating with little or no sunlight—up to seven days if possible. That number might make some folks cringe, but when you have a week without sunlight, you soon learn (the hard way) that it is necessary to have as many days reserve as possible in the (solar) power plant.

Putting It All Together

Tying this system together is not difficult. However, it is not something you undertake in one evening. There are some precautions which must be considered and applied before proceeding.

When using photo-voltaic (solar panel) devices that are designed to supply charging voltage for a large battery bank, we should remember this step first: 14 to 16 volt solar panels can sometimes generate voltages in excess of 20 volts direct

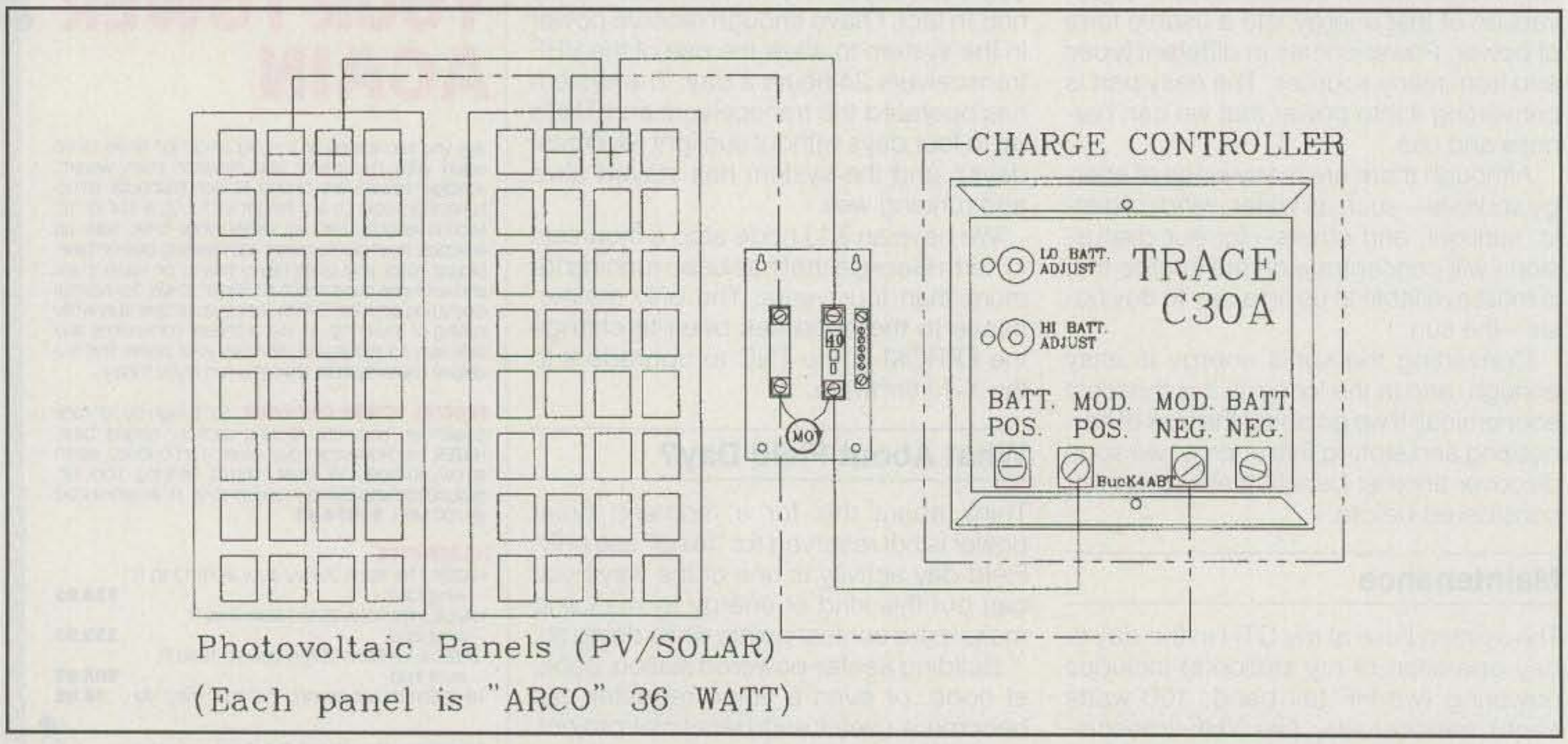
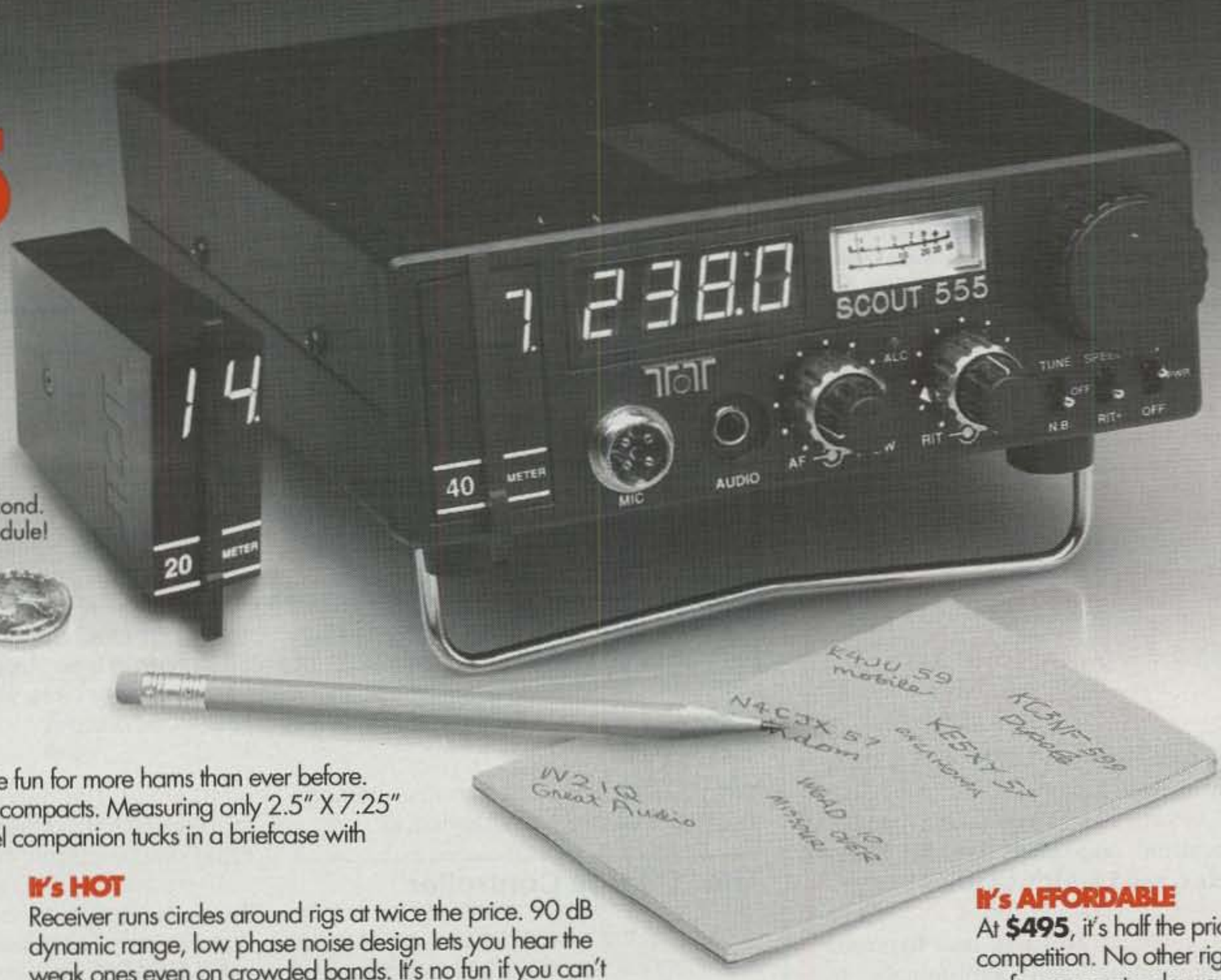


Fig. 2– The "Charge Controller" appears as the second device after the PV (solar) panels. The charge controller and the PV disconnect panel are both grounded to a common ground buss. Notice the MOV across the "disconnect" contacts. The metal oxide varistor (MOV) serves two purposes. One purpose is to alter any spikes on the DC line, and the second is to trip the disconnect breaker in case of peak surge, such as lightning.

SIMPLE, AFFORDABLE & FUN

DESIGNED FOR ONE REASON . . . TO HAVE FUN!
AND BOY DOES IT DELIVER!!!

$495



- Change bands in a second. Just plug in desired module!

It's SMALL
Makes mobile or portable fun for more hams than ever before. Fits almost any car, even compacts. Measuring only 2.5" X 7.25" X 9.75", this five lb. travel companion tucks in a briefcase with plenty of room to spare.

It's HOT
Receiver runs circles around rigs at twice the price. 90 dB dynamic range, low phase noise design lets you hear the weak ones even on crowded bands. It's no fun if you can't hear em!

It's SIMPLE
Just sit down and operate. Master every feature in minutes - no modern rig is as easy to use. Change band modules in a flash to work 160-10 meters including WARC.

It's AFFORDABLE
At **$495**, it's half the price of the closest competition. No other rig packs so much performance at so low a price. Have fun on HF without spending a fortune.

It's NOT A TOY
Crystal mixing (no synthesizer) coupled with meticulous circuit design yields sparkling clean receive audio. And you'll marvel at the un-solicited compliments on transmit audio.

MADE IN USA

- Patented "Jones" Filter provides variable bandwidth 9 pole crystal filter - 500 Hz to 2.5 kHz. The right filter for every condition at the touch of a knob.
- "SYNCHRO-LOCK" software keeps VFO virtually drift free regardless of temperature variations.
- Optional Noise Blanker
- SSB and CW 50 Watts Output Adjustable To 5 Watts
- Runs Off 12-14 VDC TX -10 Amps, RX -.6 Amps
- Receive Offset Tuning
- Built-in Iambic Keyer with Legendary QSK. Speed adjustable on front and shown in display.

$495* Includes one band module of your choice

$25* Each additional band module

SCOUT ACCESSORIES:

MODEL		PRICE*
296	Mobile Bracket	$15.00
297	Noise Blanker	$19.50
937	11 Amp Power Supply	$79.00
938	Tiny Switching Supply (Only 3 lbs.!)	$95.00
700C	Hand Mike	$39.95
607	Weighted Key Paddle	$39.00
291	Antenna Tuner	$89.00

VISA, MC, DISCOVER

*Plus shipping and handling; call toll-free for charges.

CALL 1-800-833-7373
Telephone Hours:
9:00 AM - 5:30 PM Eastern

...America's Best!
TEN-TEC

1185 Dolly Parton Parkway
Sevierville, TN 37862 USA
Office: (615) 453-7172
Fax: (615) 428-4483
Repair Dept.: (615) 428-0364

KITS ARE BACK!
Introducing TR Kits
A new division of Ten-Tec
Call 615-453-7172
to request your
kit catalog

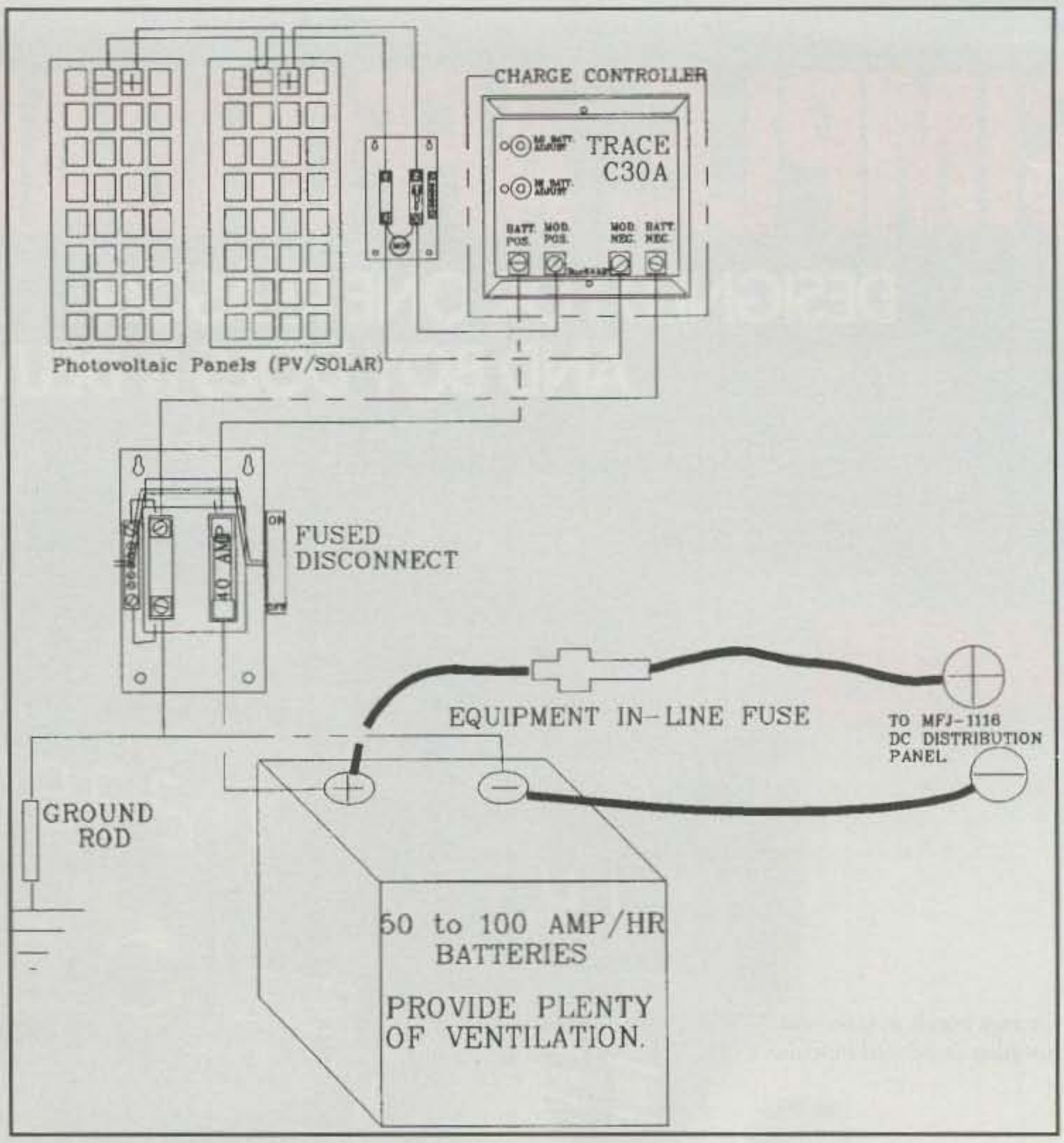


Fig. 3– Ground PV panels and all disconnect grounds to a common ground rod. The battery is the "deep-cycle," lead-acid, maintenance-free type. Note the in-line equipment fuse. When more equipment is added, it may be necessary to add a DC distribution panel with separate circuit breakers.

current. This alone could cause damage to expensive electrical device(s).

The "Charge Controller"

Looking at the system flow diagram in fig. 2, we find a device labeled C30A. This device appears as the second item after the solar (photo-voltaic PV) panels and follows the first disconnect panel. It is called a "charge-controller." This device can be the C30A charge controller by "TRACE" or the M8 by "SUN." In this text I'll describe the M8, and fig. 3 describes the C30A.

If the M8 is used, connect the "brown" wire to the battery negative (–) post and the "orange" wire to the positive (+) post. The manufacturer recommends using a 15 amp in-line fuse in the orange wire. The "red" wire is attached to the positive terminal of the solar panel, and the "white" wire attaches to the solar panel negative (–) lead.

If the Sun Selector M16 is used, it is recommended that a 25 amp fuse be used in the orange wire. The M16 is to be used when the charging currents are above 8 or 10 amps. The maximum charging current should not exceed 20% more than the rated device current-handling capability.

There are four LED status indicators on the SUN charge controller. The following describes their definition and purpose:

PV READY: Illuminates when the solar panel is emitting sufficient energy to charge the battery.

ANALYZING: Illuminates when the controller has temporarily suspended the charging current to the battery. This is to allow proper chemical (action) mixing inside the battery, which in turn prevents cell damage. In 30 to 60 seconds the charging LED will re-engage.

CHARGING: Illuminates when full charging current is flowing to the battery.

FINISHING: Begins a slow flash rate as the battery reaches full charge. As the battery voltage rises, the flash rate of the LED will increase. This can be used as an indicator to determine battery charge/ voltage swing condition.

We learned that the best precaution is never to connect a solar panel directly to the battery without a "governor" (charge

controller) to maintain a prescribed level of voltage and current.

Now that we have covered the battery considerations, it's time to look at the "load" application. Before the battery we inserted the "charge controller," which in reality protects the down-stream load (equipment).

"Load Disconnect" Equals Added Protection

In the system we have assembled here I added a second disconnect panel. Included in this panel are the fuses that are the watch-dog for other down-stream equipment. After the battery bank I've added another fuse and disconnect panel as further insurance for the system and to allow maintenance protection. Let's call the second disconnect the "Load Disconnect," as it will remove the load from the batteries while they are being charged to full capacity.

When the load is reconnected to the system, it will be at optimum performance. Our load disconnect can also be used to provide protection for the battery(s) and other energy-conserving devices up stream by preventing deep discharge that could cause permanent damage to the batteries.

The final DC distribution is achieved through the use of a multiple-output Deluxe DC Distribution Panel (MFJ-1116, $44.95). The reason I use this particular DC distribution panel is because it incorporates a 0–25 voltmeter. This enables me to monitor the DC voltage at the operating position.

Wrap Up

So without great fanfare we have built a digital store and forward station on a remote mountaintop where no man-made electrical power existed.

One final precaution: When working with lead-acid or any other storage cells, it is a good idea to allow plenty of ventilation and to vent harmful gases during periods of high charge rates. This is one reason why I use the sealed type (Johnson-Controls/Dynasty) batteries. These batteries have little or no gas emissions.

Equipment Sources

Solar Panels and Devices: Fowler Solar Electric, Inc., 13 Bashan Hill Road, P.O. Box 435, Worthington, MA 01098 (413-238-5974).

DC Distribution Panel (MFJ-1116): MFJ Enterprises, Inc., 921 Louisville Rd., Starkville, MS 39759 (800-647-1800).

Batteries and Accessories: VolTex dba/VBI Marketing, 14 Steve Drive, Doraville, GA 30340 (404-448-6021).

de BucK4ABT @ WD4ELJ.VA.USA.NA

MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

A Visible Laser Diode Driving Circuit

In somewhat of a departure from the normal type of components and circuitry usually described in this column, this month we will look at a simple circuit that can be used to drive the solid-state visible laser diodes that are becoming more and more available. These units are fall-outs of devices intended for CD players, optical bar-code readers, and visible alignment devices of all sorts. Some have been selling for less than $10, and I am sure most avid experimenters have thought about using one at some point.

Those of you who have experimented with helium neon (HeNe) devices in the past are familiar with the need for a high-voltage supply to start and maintain this type of laser. By comparison, the solid-state diode operates on very low voltages, is considerably smaller, and depending on the wavelength of the unit you choose, gives as much light as its HeNe counterpart. The units you want for our experiments operate at a wavelength of between 600 and 780 nanometers (abbreviated nm). The brightest will be the ones at 630 to 640 nm, followed by the ones at 650 to 680 nm. Devices with operating wavelengths between 700 and 800 nm will be very dim and hard to see. Diodes operating above 800 nm will be totally invisible. As a point of reference, HeNe lasers operate at 632.8 nm.

Before describing the circuit, let me just give you one word of warning regarding lasers in general. **Never, never, never stare directly at the output of a laser diode or gas tube, even for a second!** The light produced by any laser, including invisible infra-red (IR) devices, can easily be focused onto the retina of your eye into a spot that is small enough and powerful enough to destroy individual cells. *Enough "quick glances" and you can wind up with real eye problems that cannot be corrected!* This also goes for reflections from mirrors or other shiny surfaces. Always look at the output after projecting it on an index card or a piece of white paper. If the laser is working, there will be plenty of light present, and you will not have any problem seeing what is going on. Neither *CQ* nor myself will be responsible for any problems caused by not heeding this warning! Just as you would not connect yourself to the 115 VAC line, or touch a 600 volt B+ line in your kilowatt amplifier, don't even consider looking at the output from any laser, no matter how low you may think the output power is. The US Government Bureau of Radiological Health (the BRH) indicates that ½ milliwatt is dangerous! If you have any doubts about the above warnings, don't even start working with lasers. Skip this column and come back next month.

c/o CQ magazine

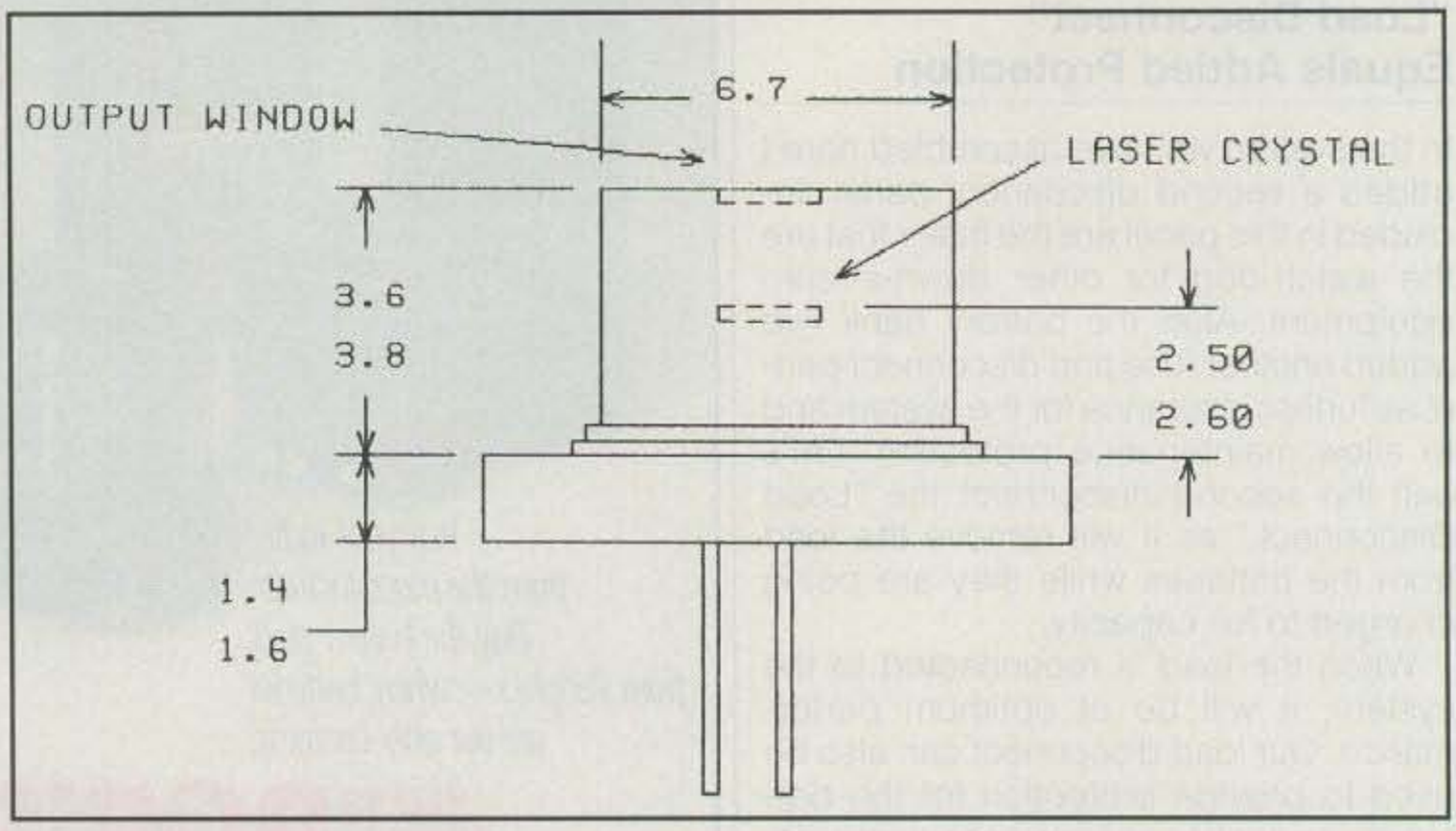


Fig. 1– Outline drawing of typical laser diode.

Now let's look at what we will be working with. Fig. 1 is an outline drawing of a typical solid-state laser diode. As you can see, mechanically the diode is housed in a package that is similar to a power transistor case, but with very specific mechanical dimensions. This is to aid in mounting and aligning the unit in critical applications such as CD players and the like. For our applications a tight-fitting hole drilled in a piece of aluminum angle stock will do very nicely. Once you press the laser into such a device, the entire assembly can then easily be mounted to a circuit board.

As you can also see from fig. 1, the laser consists of the light-emitting portion and a monitor photodiode next to each other in the same housing. The reason for this is laser diodes are very temperature dependent. The output power can easily vary by a factor of ten to one with a small ambient temperature variation, so some form of stabilizing circuit is necessary. The photodiode is the heart of that circuit.

Fig. 2 shows the schematic diagram of a typical laser-diode stabilization circuit. The circuit seems to be drawn "upside down," as the laser package is connected to a plus voltage, rather than the minus of most conventional circuits. As can be seen from the schematic, the input consists of a 6.8 volt zener diode and PNP transistor forming a simple regulator with an output of about 6 volts for the rest of the circuit. The PNP transistor is not critical, but should be mounted to a small heat sink, as it will probably dissipate ½ watt or so. The op-amp is a conventional low-speed device that produces a voltage at its output that is a combination of a reference set by the 500 ohm pot and the feedback light signal from the photodiode in the laser package. This output is then applied to the base of the NPN driver transistor, which controls how much current flows through the laser. It's a good idea to also heat sink this transistor.

Once the circuit is built and triple checked, you can connect the laser diode. Putting a piece of transparent tape over the output window of the diode is a good idea at this point. Before applying power, first turn the 500 ohm pot so that the arm is fully toward the 330 ohm/8.2K ohm resistor side of the circuit. Now apply a 9 volt input and slowly turn the 500 ohm pot until the laser just lights. At this point, if you have a light meter you can adjust the laser output to the desired level (within the specified range of the diode). If not, you should connect a 10 ohm ½ watt resistor in series with the collector of the NPN transistor and the –6 volt B-line. Every 100 millivolts of drop across this resistor equals 10 milliamperes of current through the laser diode. Set the 500 ohm

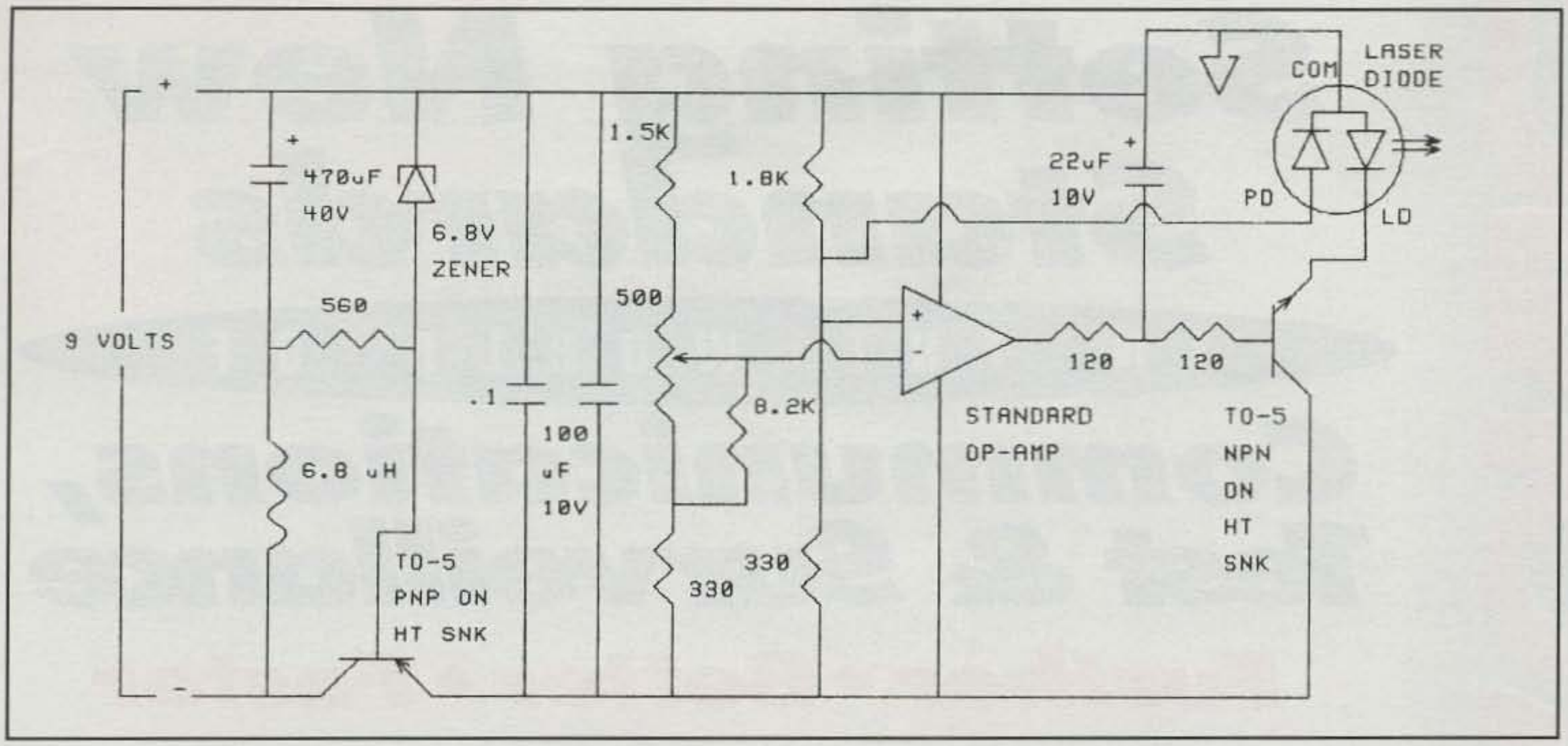


Fig. 2– Solid-state laser-diode control circuit.

pot so that you are just above the threshold current of the laser for best operation. Setting it too high will damage the laser. **Again, do not look into the laser beam.** If you change laser diodes, you must readjust the circuit for each new device by measuring the curent in the same manner as just described.

The circuit described is a proven way to experiment with laser diodes and is suitable for a wide range of devices from many manufacturers. By consulting the data sheets for any devices you have (a must if you do not want to blow out anything), you will immediately see where to set the operating current. You can then experiment with lenses, optical fibers, and the like, and will do well to visit the local library for information on what else you can do with these unique devices.

73, Irwin, WA2NDM

Setting New Standards

IN THE WORLD OF

Communications, Test & Surveillance

Further • Better • Faster

Model 3000A **$329.**

Worlds most highly advanced hand held counter.

- Digital Filter: Reduces false counts - no loss of sensitivity
- Digital Auto Capture - auto hold & store; works even near strong RF Fields
- Stores and recalls frequencies
- 5-6 hour battery operation
- Fast - 250 million counts per second for high resolution - 250 MHz direct count
- 10 Hz to 3 GHz
- Ultra sensitive bargraph w/ 16 segment display
- Multi-Function Counter with Frequency, Period, Ratio and Time Interval
- Optional ± .2 PPM TCXO- $100.

Model M1 **$229.**

Full Range Pocket Sized Counter

- Digital Filter
- Digital Auto Capture - Auto Hold
- Stores & Recalls Frequencies
- 4-5 hr. battery operation
- 10 Hz to 2.8 GHz
- 10 digit LCD with EL backlight

Model 8040 **$679.**

Multi-Function Bench/Portable Counter Measures Frequency Period, Ratio, Time Interval and Average.

- Digital Filtering to eliminate false counts
- Auto Capture/Auto Hold
- 16 Segment Signal Strength Bargraph
- Dual 50 OHm and 1 Meg OHm input amplifiers with AC/DC Coupling, ± Polarity, Triggers Level Adj., Low Pass Filter and Attenuator
- .05PPM, 0-50°C Ovensized Time Base Option
- Internal/External Clock Input
- RS-232 Serial Computer Interface

800 • 327 • 5912

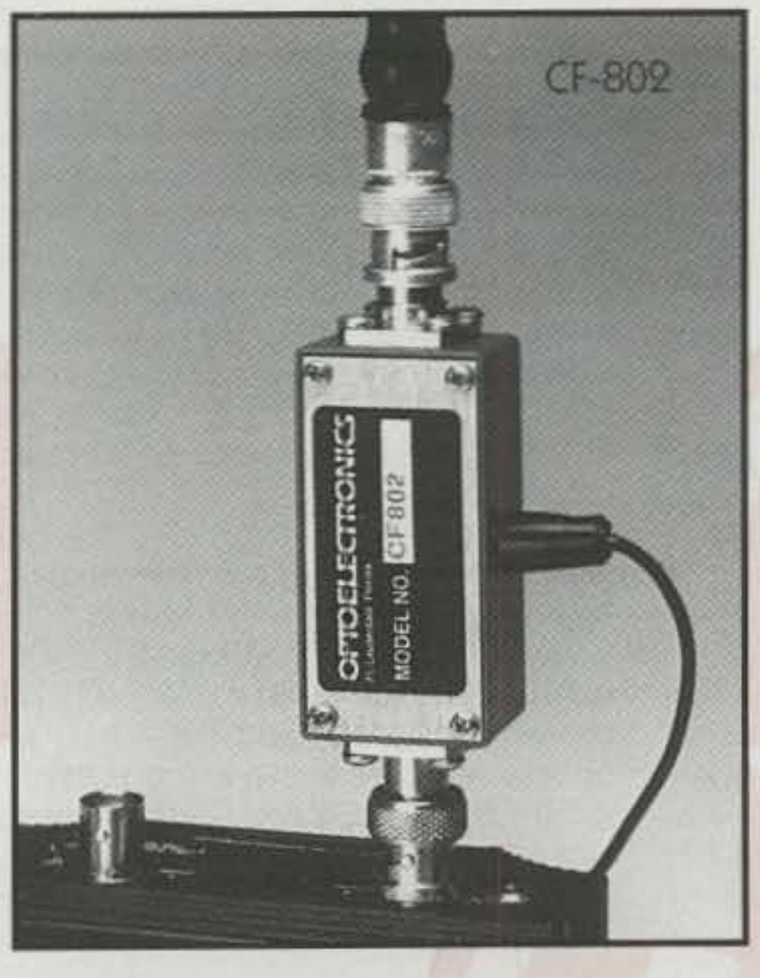
(305) 771-2050 • FAX (305) 771-2052 • 5821 NE 14th Ave, Ft. Lauderdale FL 33334

Model DC440 Decoder $259.

- 50 Sub-Audible (CTCSS)tones
- 106 Digital (DCS) Codes
- 16 Touch Tone (DTMF) charaters/126 character recall
- Serial Data Interface
- Update older service monitors
- Ideal for testing two way radios
- Tone log software available
- Exceptional 2x16 character backlit display
- Small size - 1.8" x 4.5" x 4" deep

Model 3300 MiniCounter $129.

- Super Compact
- 10 digit LCD - longer battery life
- 1 MHz to 250 MHz direct count for high resolution (1 Hz/Second)
- Maximized Sensitivity
- Hold Switch to lock display
- Ni-Cad plugs into board - no soldering to change outpack



Model CF-802 $149.

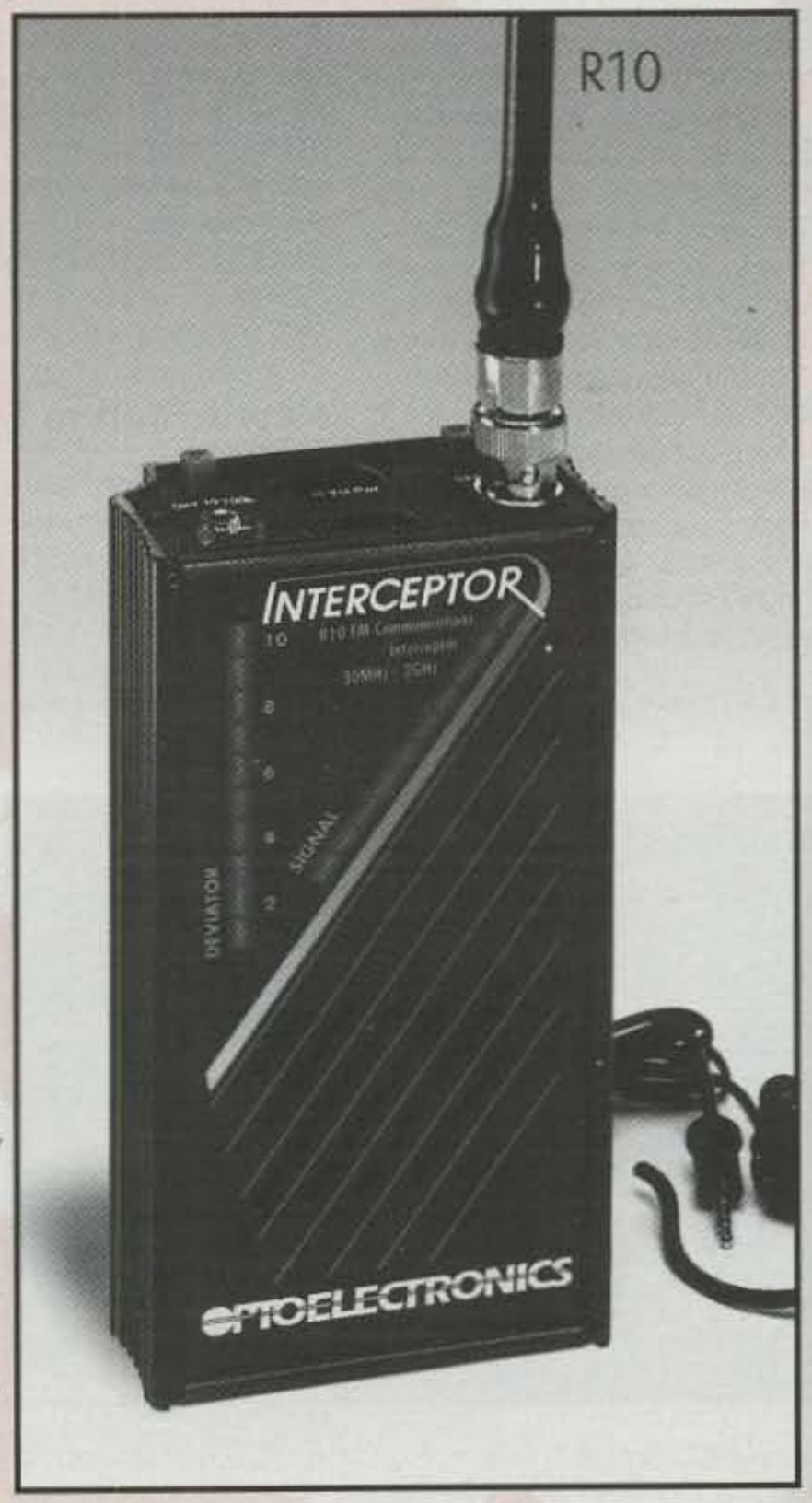
835 MHz ± 10 MHz filter/amplifier. 10 times the pick-up distance when used with our counters or R-10.

Model R-10 $359.

The R-10 is a unique FM Communication Test Receiver with security and surveillance applications. 30 MHz to 2 GHz. Measures deviation and relative signal strength. Demodulates FM

Model APS104 $995.

Tunable band pass filter covers 10 MHz to 1,000 MHz. Tunes continuously over more than 5 octaves. Increase pickup distance 10 times. Ultimate Security Sweeper.



MADE IN THE U.S.A

5% Ship/Handling (Max $10) U.S. & Canada. 15% outside continental U.S. Visa Master Car d, C.O.D., Cash or Money Orders only. All specifications and prices are subject to change without notice or obligation.

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Swing into Spring '94

Spring is in the air, and as *CQ* readers know, spring also spells "antennas." But first, before we dig into antennas this month, let's recount a recent trip your columnist took.

CQ Visits the Golden Triangle

I know what comes to mind for many of you when you think of the Golden Triangle—the never-never DX land where China, Laos, Thailand, and Burma meet or are close by. To others, the Golden Triangle is the Pittsburgh, Pennsylvania business center, where the Allegheny and Monongahela Rivers join to form the Ohio. But there's another Golden Triangle, and it's the Triangle we visited recently.

We're speaking of the rapidly developing high-tech area in northeast Mississippi, the triangular-shaped area around Mississippi State University (MSU), Starkville, and Columbus, Mississippi. At the invitation of Martin F. Jue, K5FLU, founder and president of MFJ Enterprises, XYL Millie, KD4SHM, and I spent an enjoyable day visiting the area. Our visit included MSU (which lays claim to being one of the "top 100" research universities in the country) and tours of the MFJ and Ameritron plants.

The MFJ success story has long fascinated me, since I remember their small ads in the early 1970s when MFJ had but two or three products such as audio filters and a few other simple gadgets and accessories. Today MFJ is the "accessory king" of amateur radio, with hundreds of amateur radio accessories and other goodies in their catalog. MFJ is also pursuing development of solid-state, high-power linear amplifiers and RF-based medical equipment. Amazingly, while many of MFJ's parts necessarily are purchased overseas, practically everything is manufactured in the USA in their plant. However, they are able to keep prices down, often lower even than overseas competitors.

289 Poplar Drive, Millbrook, AL 36054

MFJ was formed by Martin F. Jue, K5FLU, in 1972 while teaching at MSU, having graduated from there a few years before. He teamed up with Steven Pan, an MSU grad student who is now KF5C and MFJ vice-president, to form the embryonic company. Martin continued to teach at MSU until MFJ was safely off the ground.

From a small cottage shop operation MFJ grew to employ about 140 today and to be one of the largest employers in Starkville, a city of about 18,000 (not including the nearby university student population, which would nearly double that figure). A few years ago MFJ acquired the Ameritron line of linear amplifiers, antenna tuners, coaxial switches, and other products. They moved it from Ohio to a manufacturing facility in Starkville on Willow Road, a few blocks from the MFJ plant.

MFJ is set up mainly for sales through dealers, so they don't have a sales showroom. They do, however, welcome visitors at their main plant at 921 Louisville Road, Starkville, MS 39759. If you're passing through, drop in. MFJ's friendliness is contagious.

New Antenna Stuff

Raycom Antennas. Raycom Corporation is committed to delivering high-quality amateur products, a line which grew out of their marine electronics business. A new catalog is available for the asking, and it includes Yagi beams, phased arrays, and rotatable dipoles for HF use. Also offered are various RF accessories such as phasing networks and assemblies as well as field strength meters.

For more information and a free catalog, contact Raycom Corporation, 840 Juniper Cres. Sw. 101, Chesapeake, VA 23320 (1-800-722-0239).

Longwave Receiving Accessories. While the technological imperative is toward ever-higher operating frequencies, there continues to be considerable amateur and SWL interest in the other end of the RF spectrum—the fascinating region below the standard broadcast band. A great deal of interest is focused on the so-called "1750 meter band," where low-power, license-free transmissions are allowed (with certain restrictions).

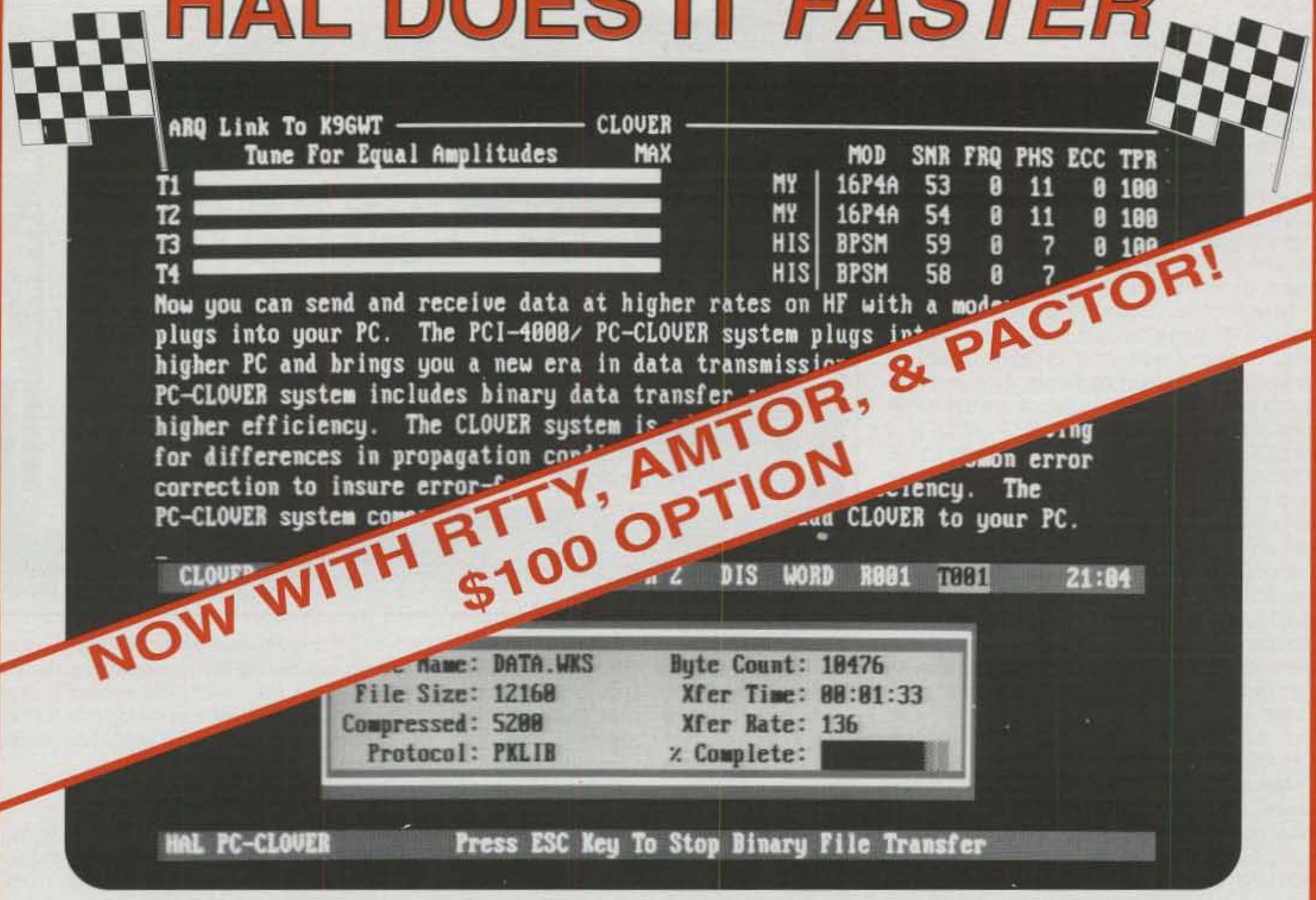
Curry Communications offers several LF and VLF receiving accessories. One is the LF2A compact active (amplified) antenna system, designed for optimum low-frequency reception in noisy environments. The $155 active antenna covers 4 kHz to 450 kHz. Broadcast-band intermodulation, often a real problem in urban and suburban areas, is virtually eliminated using a proprietary, 10-element antenna filter. Gain is continuously adjustable from 0 to +30 dB to eliminate receiver overload from strong local signals and enhance desired signals for improved DX reception.

Curry also offers the ANB-1089 long-wave receiving processor, a continuously tunable, balanced preamplifier providing 20 dB gain from 10 to 450 kHz; it's about $108. Other low-band products include the SSBR2 1750 meter receiver kit ($189) and the 80-AU receiving upconverter and active antenna that converts the entire LF/VLF band to the 80 meter amateur band; it's $59.95 in kit form or $72 wired and tested.

Here's MFJ founder and president Martin F. Jue, K5FLU, at his desk at the Louisville Road plant in Starkville, Mississippi. Martin is surrounded not only by thick stacks of papers, but also by many of the newest MFJ products with which he can tinker in between business sessions. (W8FX photo)

Here at the Starkville facility an MFJ technician is busy giving a final quality-control check to an item ready to come off the production line, before being released to inventory and eventually shipped to dealers. (W8FX photo)

HAL DOES IT *FASTER*



NOW WITH RTTY, AMTOR, & PACTOR!
$100 OPTION

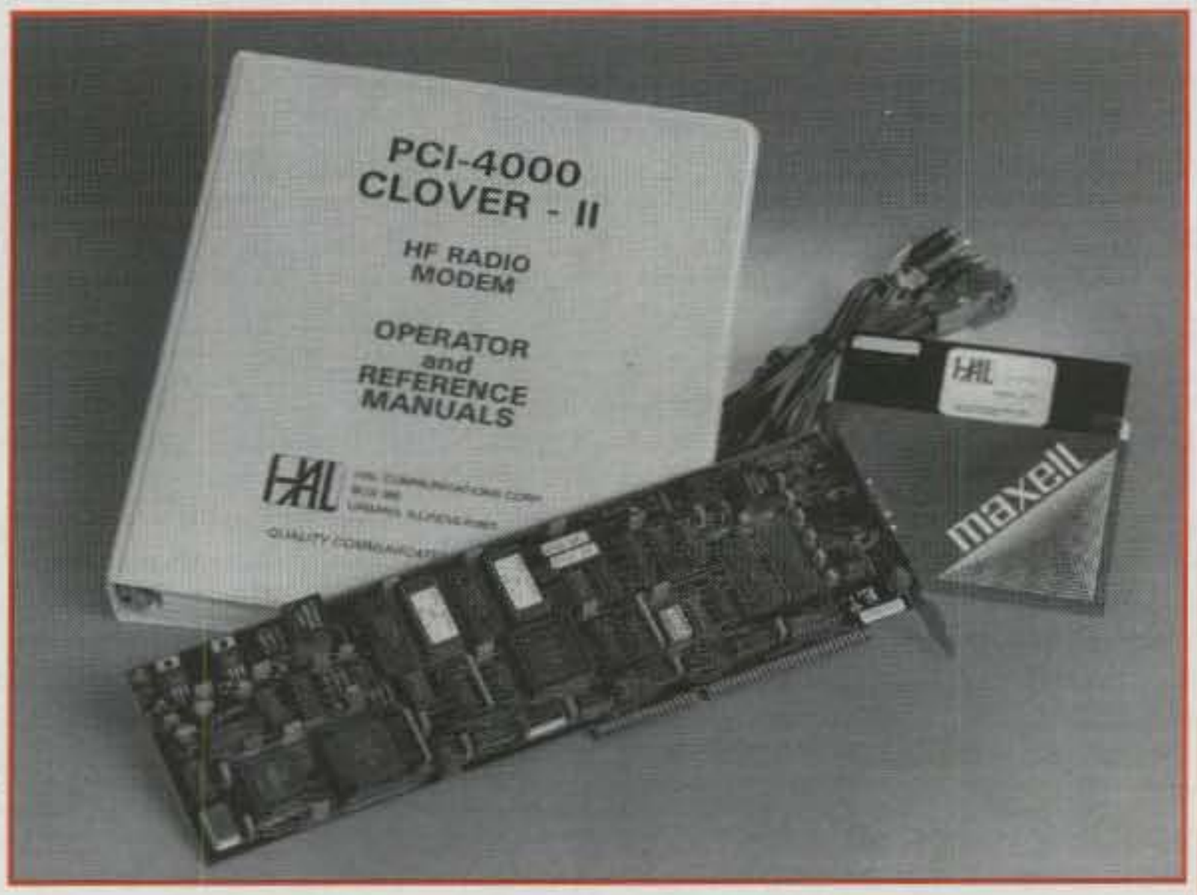
Rev up your HF data with the PC-CLOVER system from HAL. CLOVER is the revolutionary modulation technique designed for the HF band. It uses 4 tones, up to 16 phases and 4 amplitudes to really SCREAM on HF. And, it does all this in a 500 Hz bandwidth.

Supercharge your station with CLOVER. All you need is your HF radio, 286 or higher PC, and the PCI-4000/PC-CLOVER system from HAL.

Don't be left in the dust. Call HAL and order your PC-CLOVER system and get ready for SPEED.

Order Factory Direct and Save.
Call HAL at (217) 367-7373
List Price $995.
Amateur Net $895.

MasterCard VISA



HAL Communications Corp.
P.O. Box 365
Urbana, IL 61801
Phone (217) 367-7373
FAX (217) 367-1701

CIRCLE 172 ON READER SERVICE CARD

For detailed spec sheets, contact Curry Communications, 737 North Fairview St., Burbank, CA 91505 (818-846-0617). The Curry units also are available from LF Engineering Co., Inc., 17 Jeffry Road, East Haven, CT 06513 (203-248-6816). A free low-frequency communications catalog is available from LF Engineering.

Oren Elliott Products Catalog. In "the good old days" obtaining variable capacitors for construction projects was easy. Often a good selection was as close as your nearby parts house. Now inexpensive and readily obtainable variable capacitors and other precision parts are almost a thing of the past.

Nevertheless, Oren Elliott Products (OEP) offers a 35-page catalog of variable capacitors, vernier drives, and variable inductors available at reasonable prices even in small quantities. Included in their stock are the miniature ATM-style air variables; APC-, APL-, and APL-DE-style compact tuning capacitors ("air trimmers") in which the rotor and the stator are held in place by a heavy-duty ceramic insulator; the miniature MAPC-style variable capacitor; and several others, including high-power transmitting types. Several versions of most capacitors are stocked, differing in shaft length, flats on shafts, tapped mounting holes, trimmer positions, and other mechanical and electrical characteristics. Also offered are vernier reduction drives and variable inductors.

For a catalog, contact Oren Elliott Products, Inc., 128 West Vine, P.O. Box 638, Edgerton, OH 43517 (419-298-2306).

Metal & Cable Corp. Products and Services. David Klein, KE8QM, the company's chief metallurgical engineer, sent a flyer showing his aluminum stock, which includes both 6061-T6 drawn seamless tubing (in 12 ft. lengths) and 6061-T6 extruded seamless tubing (in 12 and 24 ft. lengths). The flyer quotes reasonable prices on these stocks from 1/4 inch to 3 inch diameter.

The flyer also includes information on the commercial metal services side of the business. Besides selling aluminum stock, the firm also is a full-line distributor of various ferrous and nonferrous metals and custom-manufactured wire and cable. They also offer metallurgical engineering services, metal fabrication, custom machining and processing, and heat treating and brazing. (Metal & Cable Corp. also can supply inexpensive pre-cut aluminum pieces for the heavy-duty metal H-frame at the heart of the "Impossible Dream Whip HF Mag Mount" described by Ed Karsin, W3BMW, in December 1992 *QST*.)

For more information and a flyer, contact Metal & Cable Corp., Inc., 9241 Ravenna Rd., Unit C-10, P.O. Box 117, Twinsburg, OH 44087 (216-425-8455).

New Valor Pro-Am Products. Valor Enterprises has been in the antenna manufacturing business for years, in the early stages focusing on CB, commercial, and cellular antennas and accessories. Recently Valor's emphasis has broadened to better encompass the amateur market. Currently Valor offers not only amateur mobile and fixed station antennas, but also mounts, cables, adapters, dummy loads, and other antenna accessories.

Valor has introduced several new Pro-Am ("PROfessional AMateur") products in the past year. One new product is the MICRO MAG™ mobile antenna. It's a compact model with a built-in mag mount for 144–148 MHz or 440–450 MHz operation; another handles dual-band 144 and 440 MHz use. Another new product is the Glasmaster™ glass mount antennas for on-glass windshield mounting and covering 2 meters, or both 2 meters and 70 cm. Remount kits are available for both Glasmasters.

For more information and spec sheets, contact Valor Enterprises, Inc., 1711 Commerce Dr., P.O. Box 601, Piqua, OH 45356-0601 (513-778-0074).

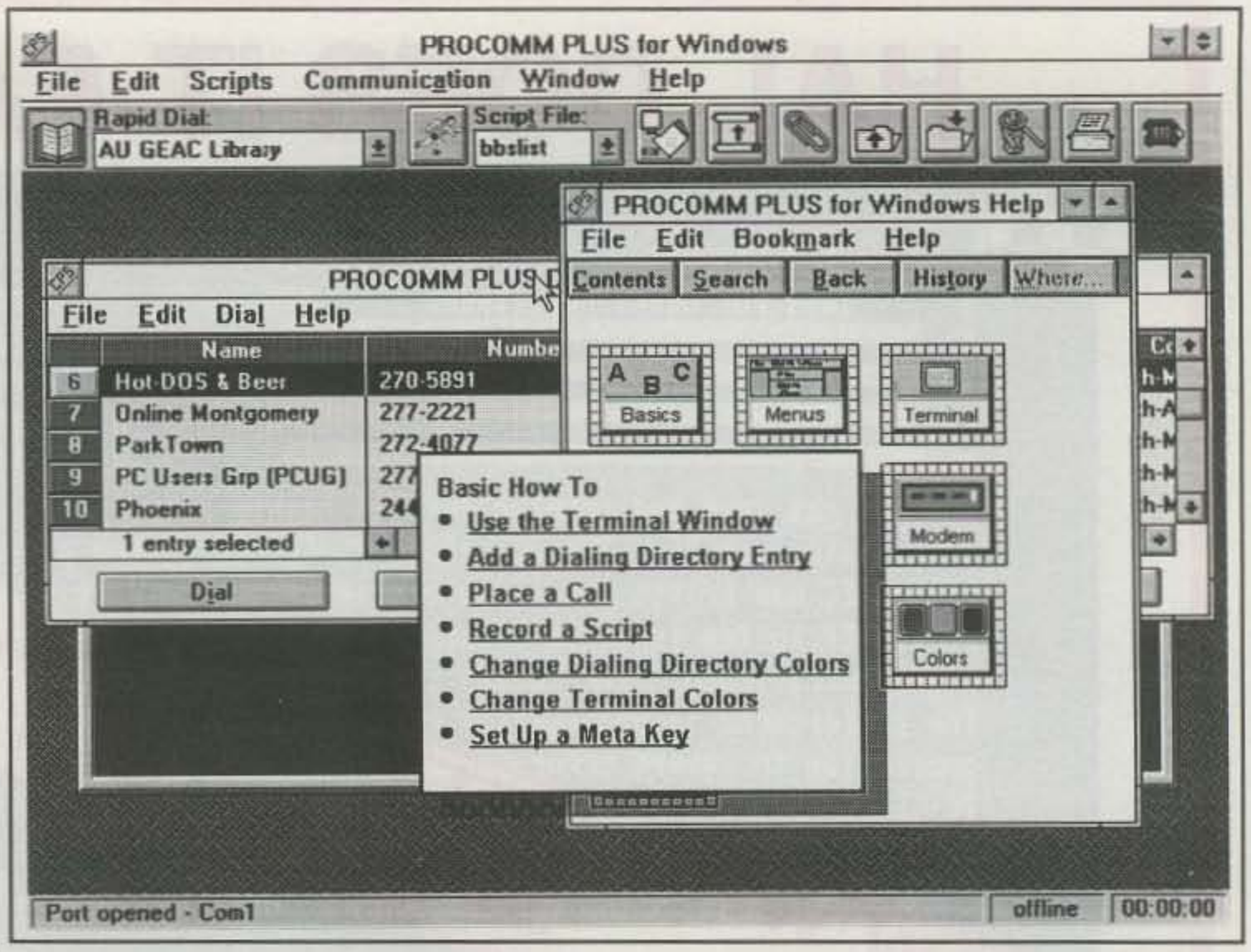


Fig. 1– PROCOMM PLUS for Windows is an outstanding PC communications program that includes 34 popular terminal emulations and 10 error-correcting file transfer protocols, including the ever-popular Zmodem. Also included is an "Action Bar"™ for easy access to program features; a fully automated dialing directory; a file clipboard; a graphical dialog box editor; keyboard remapping; a powerful script language, Windows ASPECT; a GIF utility you can use to view graphics files as you download them; and much more.

Software Topix

IONSOUND PRO. Most readers are aware of the excellent skywave propagation prediction program IONSOUND™, which we covered most recently in the June 1992 column. Jake Handwerker, W1FM, is at it again with a new program, IONSOUND PRO™.

IONSOUND PRO is a sophisticated ionospheric propagation prediction program for IBM PCs and compatibles. It has been designed with user friendliness in mind and thus is entirely menu-driven with prompting for user inputs. While it's helpful to have an understanding of propagation phenomena and the technical terms associated with ionospheric propagation, it's not necessary to successfully use the program.

The program's objective is to easily and quickly produce tabular and/or graphic predictions of radio frequency (RF) link performance between any two locations. This is accomplished by taking into account actual end-to-end operating conditions to predict frequency-band opening times. The program also provides distance and bearing information. The graphic "chirp plot" (widely recognized by military and commercial spectrum users) depicts a simulated oblique sounding and provides a useful tool for determining the best predicted frequencies for communication while showing relative delays and multi-path possibilities.

IONSOUND PRO has some important additional features above those of IONSOUND. These include a 24-hour tabular summary display, which can be printed out or saved; "new country" data file generation that lets you create personalized data files without using a separate wordprocessor; the ability to toggle displayed iongrams from their high-resolution color mode to black-and-white for printing; the addition of a small mobile whip antenna in the antenna selection menus; support for up to 12 sunspot or solar flux numbers during prediction; a "current variable" summary showing parameter highlights; and the inclusion of the GRAPH software program, a sophisticated graphics tool.

IONSOUND PRO is $75, while the classic IONSOUND STD™ program is $35; both include a printed manual. A version designed for use with the *QST* "How's DX" column, IONSOUND HDX™, is $15; its manual is on disk. All versions are available either on 5.25 or 3.5 inch DSDD/DSHD diskettes. Contact Skywave Technologies, 17 Pine Knoll Road, Lexington, MA 02173.

WB2OPA LogMaster Plus/Plus. In the April 91 column we noted the WB2OPA LogMaster, a computerized HF logging system for the IBM PC. Recently Alan Yorinks, WB2OPA, sent us its successor, LogMaster Plus/Plus.

We'll refer you to the earlier column for basic LogMaster details. But let me say that the new program has all the features of the earlier version, plus many enhancements. The new logger has a surprisingly large number of automatic features that support DX PacketCluster®

operations and multimode TNCs, and it includes online dupe checking and alerting of needed contacts. Other features are display of beam heading, *CQ* zone, ITU zone, and distance; determination of transmission mode via the transmit frequency; display of local time and GMT with a dual clock/calendar; the number of IRCs required for QSL reply and postage-spent tracking; sequential numbers appended to the RST report for contesting; and support of most computer-ready rigs.

LogMaster Plus/Plus is K1EA CT program compatible. The program also provides English/metric conversion; tracks multiple awards per QSO; offers custom report generation; displays a statistical analysis for major awards; and supports major callsign databases. There is a 50-page manual on disk.

The new program is $89.95; it's available on 5.25 or 3.5 inch disks. A demo is $5, which is refundable with program purchase. Upgrades are free. For details, contact Sensible Solutions, P.O. Box 474, Middletown, NJ 07748 (908-495-5066).

Buerg Utilities. Last June we described LIST Enhanced by Vernon D. Buerg, N6MG; a retail product, it adds several extra features to the popular shareware programs, LIST and LIST Plus. LIST Enhanced is a $99 full-fledged file browser and viewer as well as a file, archive, and directory management program. As we noted, just about anyone familiar with the IBM PC has seen a copy of the popular $37 shareware file viewer LIST Plus. According to Vernon, the LIST series has been distributed as shareware for years and is used by about 30,000 known (registered) users and probably from 500,000 to 5,000,000 unknown users.

Recently Vernon sent us the complete Buerg Utilities catalog showing about 50 of his shareware programs in diverse categories such as disk, archiving, communications, bulletin board, printer, amateur radio programming, and miscellaneous. Most of them are readily available on computer bulletin boards, but some are not so easily found.

In the past Vernon has offered LIST Enhanced in a popular-priced bundled with the complete set of his utilities, including LIST Plus and LJ Book, along with printed documentation for the major programs. Check to see if he currently has a special package deal available. Contact Buerg Software, 850 Petaluma Blvd. North, Suite F, Petaluma, CA 94952 (707-769-5477).

PROCOMM PLUS for Windows. I have been a longtime fan of PROCOMM PLUS for DOS and recently upgraded to the Windows version. As most readers of the column know, PROCOMM PLUS has been around for some time and has earned high marks as a top-notch communications software package. PROCOMM is rather late to the Windows environment, but it has lots of powerful features that definitely made the Windows wait worthwhile.

The Windows version is perhaps the most powerful, popular, easy to use, and complete Windows communications package currently available. The new version includes 34 popular terminal emulations with full keyboard remapping, such as the DEC VT100, 220, and 320; several popular error-correcting file transfer protocols including Xmodem, Ymodem, Zmodem, Kermit, and Compuserve B+; and a fully automated dialing directory with advanced setup options for individual entries (see fig. 1).

Also included is Windows ASPECT, a powerful script command language with extensions for Windows' graphical interface; a file clipboard; an advanced host script for unattended remote access with electronic mail and file transfers; a graphical dialog box editor; a GIF viewer that can be used as you are downloading graphics files; and DDE (Dynamic Data Exchange) support for multiple client and server operation. Other impressive features include a scrollback buffer that stores up to 31 pages and "interrupt 14" support that allows you to communicate across a network to COM ports on other appropriately equipped PCs.

A particularly nice feature of the program is the setup window that makes initial setup and customization a snap, even with some of the newer, high-speed modems with many options to adjust. Another very welcome feature is the easy-to-use dialing directory that offers considerable flexibility and configurability; it's especially good if you communicate with a variety of bulletin-board systems (BBSes), where you may frequently need to change various communications parameters. On the other hand, some nonstandard user interface conventions make the Windows version of PROCOMM PLUS somewhat less intuitive to use than its sister DOS equivalent.

The PROCOMM PLUS for Windows suggested retail price is $179, though it is available widely "on the street" for much less. For more information, contact Datastorm Technologies, Inc., 3212 Lemone Blvd., P.O. Box 1471, Columbia, MO 65205 (314-443-3282).

Norton Speedcache+ V4.0. Speaking of CD-ROM based software, you probably will eventually become dissatisfied with the slow CD-ROM performance you enjoy relative to your zippy hard disk drive. Basically CD-ROMs are s-l-o-w critters, with data access about 1/25 as fast as your hard disk. As a result complex data searches can take an inordinately long time to complete. Aside from buying a faster (and more expensive) CD-ROM drive, there's little you can do to make the CD-ROM zip along more speedily, except to use a software-based cache with the CD-ROM.

Unfortunately, most popular, currently available software caches don't work with CD-ROMs—that is, they don't cache the CD-ROM drive. Microsoft's SMARTDrive, for example, which comes with Windows and DOS 6, does not cache a CD-ROM. It takes a specially designed software cache to do this.

One of the few software caches that handle CD-ROM drives is Symantec's The Norton Speedcache+ v4.0, an all-in-one cache for hard disk drives, CD-ROMs, and various removable media drives, working under both DOS and Windows. This cache claims to be the fastest hard disk and CD-ROM cache you can buy, and it supports truly huge caches—up to 23 MB. Generally, the larger the size of the cache, the better it performs (up to a point of diminishing returns), speeding up PC performance to provide lightning-fast access to data and programs, even those residing on CD-ROM.

The publisher makes some impressive claims about Speedcache. Symantec asserts that it's several times faster than Microsoft's SMARTDrive, and that it can speed up DOS, Windows, and CD-ROM drives up to an amazing 4000 percent. I could not verify these claims when I tried out Speedcache, although the cache did seem faster than SMARTDrive and it cached my CD-ROM drive very nicely.

The Spectra-Com precision time piece offers high-accuracy clock functions at a reasonable cost. It is battery-operated and claims +/–1 second short-term accuracy, or within 2 minutes per year or better. Its face parallels the broadcast format of National Institute of Standards and Technology (NIST) radio station WWV. (Photo courtesy JZO Research)

There is a small penalty to pay in using Speedcache, in that the program's "CD-ROM extensions" take up additional memory. Also, despite the intelligent setup program, I had to make several memory-juggling and cache fine-tuning adjustments; it's more complicated to adjust than SMARTDrive. On the plus side, Speedcache comes with two useful utilities. These are (1) Speedcache+ Assist for Windows, to let you view cache statistics and view and make changes to option settings; and (2) Disk Performance Tester for Windows which helps you evaluate the performance of disk drives, CD-ROMs, and your cache.

If you want to cache your CD-ROM drive, and don't mind some fine-tuning and tweaking, Speedcache may be for you. It's from Symantec Corporation, 10201 Torre Avenue, Cupertino, CA 95014-2132 (1-800-554-4403).

From the Bookshelf

Octavia Company Update. In the November 1992 and April 1993 columns we described the hardcopy and software callsign databases for Russia and the former Soviet republics offered by Octavia Company. It's time for an update on the distinctly capitalistic saga of its founder, Valery Kharchecko, RA6YR.

In 1988 Valery attempted to form a cooperative to publish the first callsign directory. His application was refused by state officials, who were unfamiliar with the terms "software" and "marketing." Despite the official resistance, his first Russian callsign directory was published in May 1989.

After perestroika took hold in 1991, he founded Octavia Company, a "limited liability" firm. It has continued to publish the softcover *CIS Callsign Directory* and later released the R&R Callsign Database software as a shareware product for IBM PCs and compatibles. The address data also has been included in j-Com's DXQSL HamBase. Octavia also publishes the *QSL Manager Review*, a hardcover directory containing over 47,000 QSL managers.

You can contact Octavia directly if you wish; its address is Octavia Company, Ltd., P.O. Box 40, 352700, Maikop, Russia. However, Valery has worked out a more convenient arrangement for handling his products in North America with j-Com, 793 Canning Pkwy., Victor, NY 14564 (716-924-0422). The *CIS Callsign Directory* is $10 plus $3 shipping and handling; registered users of the R&R Callsign Database shareware may purchase the directory for $7 plus S&H. The QSL Manager Review is $10 plus $3 S&H. The R&R shareware is available on disk for $5.95, postage paid from j-Com; registration is $15. You also can download the archive R&RCALLS.EXE from the Mountain Retreat BBS at 408-335-4595 or the archive RCALL.EXE from the CompuServe HamNet, Library 6.

Postscript: Now that Valery is an entrepreneur, he's noticed what many U.S.-based shareware authors have known for a long time: the low rate of shareware registrations. He says that since December 1992 several hundred amateurs have downloaded the shareware from the two online sources noted as well as many other ham-radio-oriented BBSes. But as of last July, only eight users have sent in their $15 registration payment. So as we've said before, if you appreciate good shareware and use it, pay for it and register your copy with the author.

The World Scanner Report. In previous columns we noted the Scanner Modification Handbook, Volumes 1 and 2, authored by Bill Cheek. In those books scanner expert Cheek showed how the nontechnical hobbyist could make relatively simple equipment modifications and changes to emerge with a much-enhanced scanner. Volume 2 also included a listing of all known VHF/UHF scanning radios to date, alignment instructions, guidelines for purchasing used scanners, and using a VCR to record scanner output. Later we noted Bill's venture into scanner hardware and software with the HB-232 Scanner/Computer Interface, a scanner controller and data acquisition system.

Bill also is editor and publisher of *The World Scanner Report* (WSR). It's for hobbyists who like to follow the latest technology in scanning "from DC-to-daylight." Its objectives include promoting and encouraging growth of the scanning hobby, incorporating the latest technology into scanners, disseminating knowledge about that technology, and supplementing and updating the material contained in the

author's scanner books. WSR covers scanner technology and engineering from a hardware standpoint, but not in an overly complicated manner. It offers guidelines, procedures, and methods to extract high levels of performance from VHF-UHF scanners, getting into scanner "hacking" and modifications in detail. Troubleshooting, problem diagnosis, alignment, and maintenance also are covered.

A 6-month, 5-issue subscription is $15; a 1-year, 10-issue sub is $25; and a 2-year, 20-issue sub is $45. Contact Bill Cheek at COMMtronics Engineering, P.O. Box 262478, San Diego, CA 92196.

New PC Books from Prentice Hall. The computer books offered by Prentice Hall Computer Publishing have grown considerably in number as PHCP absorbed technical publishers such as Que, Sams, New Riders, Brady, Hayden, and Alpha. I receive copies of many of their latest computer titles, and almost without fail I find them interesting. There are too many "goodies" to properly review here, but I'd like to highlight a few of their books.

As a Windows user who wants to optimize the way it performs and customize it to my liking, I was impressed with the New Riders Publishing (NRP) title *Ultimate Windows 3.1*, by Richard Wagner, Jim Boyce, Forrest Houlette, Randall Kennedy, and Kevin Stoltz. This monster book-disk combination (1032 pages, $39.95) includes three disks crammed with Windows shareware; the combo is designed to help you keep pace with the avalanche of new Windows hardware and software that's flooding the market.

A second PHCP book, with the Sams imprint, is *Memory Management for All of Us, Deluxe Edition*, by John Goodman, Ph.D. This massive, 1170-page book ($39.95) covers all aspects of PC memory. Special boxed tips, notes, and cautions simplify your search for answers to common DOS and Windows memory problems. Separate sections deal with memory "gremlins" and PC optimization. A disk of related utility programs is included.

For a catalog of PHCP titles, contact Prentice Hall Computer Publishing, Simon & Schuster Business and Professional Group, 11711 North College Ave., Carmel, IN 46032 (1-800-858-7674).

Three from Osborne McGraw-Hill. It will be a long time before I "outgrow" Windows and need an operating system or interface with more muscle. Windows NT is, of course, the next step up the Microsoft ladder. It reportedly has many advantages over basic Windows; these include a built-in operating system (you don't need DOS to run it); compatibility with a variety of other operating systems; true multitasking; full 32-bit operation; built-in networking features; and much more.

If you're "into" Windows NT or about to jump in, let me suggest a trio of excellent books. The basic "bible" is *Windows NT: The Complete Reference*, by Allen L. Wyatt (658 pp., $29.95). Another solid, basic reference is *Windows NT Inside & Out*, by Tom Sheldon, a long-time Windows author (530 pp., $27.95). And if you are going to do programming, consider *Windows NT Programming Handbook*, by Herb Schildt, a well-known C/C++ programming authority (300 pp., $29.95).

For a computer books catalog, contact Osborne McGraw-Hill, 2600 Tenth Street, Berkeley, CA 94710 (1-800-227-0900).

Short Bursts

Romancing the Clock. The high-quality, battery-operated Spectra-Com WWV-format "Universal Time Piece" designed for wall mounting is offered by JZO Research.

The clock's distinctive face is in hours, minutes, and seconds in a dual 12 and 24 hour format, portrayed in five colors (white, black, red, yellow, and blue). As can be seen in the accompanying photo, the clock's face parallels National Institute of Standards and Technology (NIST) radio station WWV's hourly format; this helps you determine when time, frequency, and other key data are presented. The station's 500 Hz, 600 Hz, and 440 Hz tones are shown with yellow, blue, and red bands, respectively; silent and UTC announcement periods are displayed, as are the "tick data" within each second.

The clock, which has a black case, is 10 inches in diameter and weighs 1.5 pounds. It has a precision, quartz-controlled motor that reportedly is accurate to +/–1 second over the short term, or within 2 minutes per year or better.

The clock is priced at $29.95 plus $4.50 shipping and handling. For more information, contact JZO Research, 7140 Colorado Avenue North, Minneapolis, MN 55429.

Wrap-Up

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

Overheard: It's usually the case that the easier something is to do, the harder it is to change later.

73, Karl, W8FX

AWARDS

BY NORM VAN RAAY, WA3RTY

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we salute Danny Rozas, KC5P, USA-CA All Counties #680, November 5, 1990.

"After serving in the military for about a year in Germany, I was sent to Radio-Teletype School in Lengreis near the Austrian border. While there, my Army buddy, who had a General class license, gave me my Novice test, and after a few weeks of waiting I received my first license.

"The years passed, and my license expired without my being active. Then in 1970 I got the bug again and decided to try for another license. I passed the exam the first time and received my Advanced class amateur license. I was still not very active until 1979, when I upgraded to Extra class and received my present call. Then the fun began, as I started working WAS and DXing. Pretty soon I became involved with the Century Club and then the YL System. Soon I had a closet full of awards and certificates.

"One day I visited 14.336 MHz (the County Hunters Net) and pulled Paul, WA3TUC, off frequency. He was kind enough to send me information on County Hunting. I immediately joined MARAC and started hunting counties. I had about 500 counties confirmed from previous QSOs when I started to get serious about working toward USA-CA. Less than three years later that dream was realized.

"My USA-CA plaque and award certificate sit proudly on the fireplace mantle. I am now working toward a CW endorsement and am having a ball trying to achieve that end. I also started for my second time around.

"Thanks to all who have helped me get all those counties. There are too many to name. I hope in some way I can repay all the mobiles and net control stations who have helped me over the years. Thanks again, and good mobiling!—73, Danny"

CQ congratulates Danny Rozas on his achievement.

The operating position of Danny Rozas, KC5P, USA-CA All Counties #680.

Special Honor Roll

Neil B. Vince, KA7JAS
USA-CA All Counties #825
Mixed Band and Mode
December 9, 1993

Dennis L. Hall, KK7X
USA-CA All Counties #826
Mixed Band and Mode
December 22, 1993

Honor Roll

3000		2500		2000		1500	
KA7JAS	847	KA7JAS	925	N8HKJ	1001	N8HKJ	1090
KK7X	848	KK7X	926	KA7JAS	1002	KA7JAS	1091
				KK7X	1003	KK7X	1092

1000		500	
KA7JAS	1302	N4SLU	2733
KJ8F	1303	KA7JAS	2734
WB5LBJ/DU	1304	JA1WTI	2735
KK7X	1305	HA9PP	2736
		KK7X	2737

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.

Awards Issued

Neil B. Vince, KA7JAS, submitted a completed book to qualify for USA-CA 500 #2734, USA-CA 1000 #1302, USA-CA 1500 #1091, USA-CA 2000 #1002, USA-CA 2500 #925, USA-CA 3000 #847, and USA-CA All Counties #825, all Mixed Band/Mode.

Dennis L. Hall, KK7X, also submitted his book and received a nice Christmas present: USA-CA 500 #2737, USA-CA 1000 #1305, USA-CA 1500 #1092, USA-CA 2000 #1003, USA-CA 2500 #926, USA-CA 3000 #848, and USA-CA All Counties #826, all Mixed Band/Mode.

Ron Sweeney, N8HKJ, submitted a computer printout to qualify for USA-CA 1500 #1090 and USA-CA 2000 #1001.

Sharon Matarello, KJ8F, moved up to USA-CA 1000 #1303.

Clarence Green, WB5LBJ/DU, qualified for USA-CA 1000 #1304.

The following submitted their first books to qualify for the basic level of USA-CA award:

David Rye, N4SLU, USA-CA 500 #2733.

Toshio Nakamura, JA1WTI, USA-CA 500 #2735.

Istvan "Steve" Szecsi, HA9PP, USA-CA #2736.

Endorsement: Mike Eilers, K8OOK, has submitted documentation for contacting at least 500 stations on 160 meters and 75 meters. This makes seven bands on which Mike has at least 500 confirmed contacts. Congratulations, Mike, on your dedication and persistence.

Note: We have been informed that some folks are adding their USA-CA achievements to their QSL cards without indicating the level (500, 1000, 1500, 2000, 2500, 3000). It's okay to use USA-

Box 76, Pleasant Mount, PA 18453-0076

KENWOOD

...pacesetter in Amateur Radio

Venture

A new realm in HF communications

Offering superb TX/RX performance plus exceptional signal purity, Kenwood's TS-950SDX establishes a new benchmark for HF communications.

- **Built-in DSP (digital signal processor)**
- **Dedicated Power MOS FET final section**
- **User-friendly menu system**
- **Automatic antenna tuner built-in**
- **AIP (Advanced Intercept Point) system**
- **Ultra-fine (1Hz) tuning**

- **Super stability with reliability**
  The Power MOS FET final section is conservatively rated at 150W (40W in AM mode). This increases reliability and lowers distortion.
- **Wideband general coverage receiver**
  The TS-950SDX covers all Amateur bands from 160 to 10 meters. The receiver covers 100kHz to 30MHz.
- **100 memory channels with multi-scan functions**
  Enabling independent storage of TX and RX parameters, the 100 memory channels may be scanned with such conveniences as programmable memory channel lock-out and continuous control of scan speed.
- **Built-in DSP**
  The digital signal processor replaces conventional analog circuitry for processing the TX signal in the SSB, CW, AM, and FSK modes. Reception is also enhanced: digital PSN detection and digital audio filtering help to eliminate interference and improve audio quality.
- **Power MOS FET final section**
  The TS-950SDX ranks as the first Amateur Radio transceiver to feature an FET final section. Superior linearity results in greatly improved TX performance.
- **Dual-frequency receive**
  The TS-950SDX can simultaneously receive two frequencies within 1MHz of each other. To facilitate split-frequency operations, front panel controls include M/S (main/sub) select and an RX◂ ▸SUB key for instantly swapping the two frequencies. A 500Hz CW filter is included in the sub receiver.

TS-950SDX

HF Transceiver

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

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

93ARD-0623

The QRPp Low Power Award offered by Earth Friendly Technologies.

CA on your QSL cards, but please don't mislead others by leaving out your level.

Awards

QRPp Low Power Award. Earth Friendly Technologies has announced sponsorship of the QRPp Low Power Award. The purpose of the award is to promote the enjoyment of low-power operating while demonstrating its usefulness and practicality. Successful applicants will be issued an award certificate and a unique registration number assigned to them for life (regardless of callsign changes).

By encouraging low-power operations, the sponsors believe that the art, hobby, and professions associated with RF communications will have a greater number of skilled and competent operators at their disposal. In addition, lower levels of QRM and RFI will be experienced, while less pressure is placed on the Earth's resources.

Rules: Any authorized amateur frequency and legal mode of communications may be utilized. The person/station applying for the award must demonstrate to the satisfaction of the certificate manager the following:

1. That the applicant's transmitter output power during the period of qualifying communications was accurately measured to be *less than one watt (QRPp).*

2. That the distance between the applicant's transmitting antenna and the receiving station was over 63 miles (100 kilometers).

3. That no artificial means of active relay was used to complete the communications (i.e., repeaters, satellite transponders, digi-peaters, land-lines, ans so on). However, reflections off the ionosphere, mountains, tropospheric ducts, auroral curtains, meteors, the moon, satellites, buildings, aircraft bodies, and other passive reflectors are acceptable and encouraged.

Application: Send a signed statement to the certificate manager affirming that the transmitter power was less than one watt, the distance was greater than 100 kilometers, and no artificial means of active relay was utilized. Provide the certificate manager with a photocopy of the station log, or the confirmation QSL card, clearly showing the date, time, mode, and frequency on which the qualifying communication took place. If desired, provide the certificate manager with information concerning any endorsements (such as longer distances, even lower power levels, WAC, WAS, WAZ, solar power, etc.) that you may want listed on your certificate.

Mail $4.00 US ($5.00 US foreign) along with application materials listed above to Low Power Award Manager, P.O. Box 460101, Aurora, CO 80046-0101.

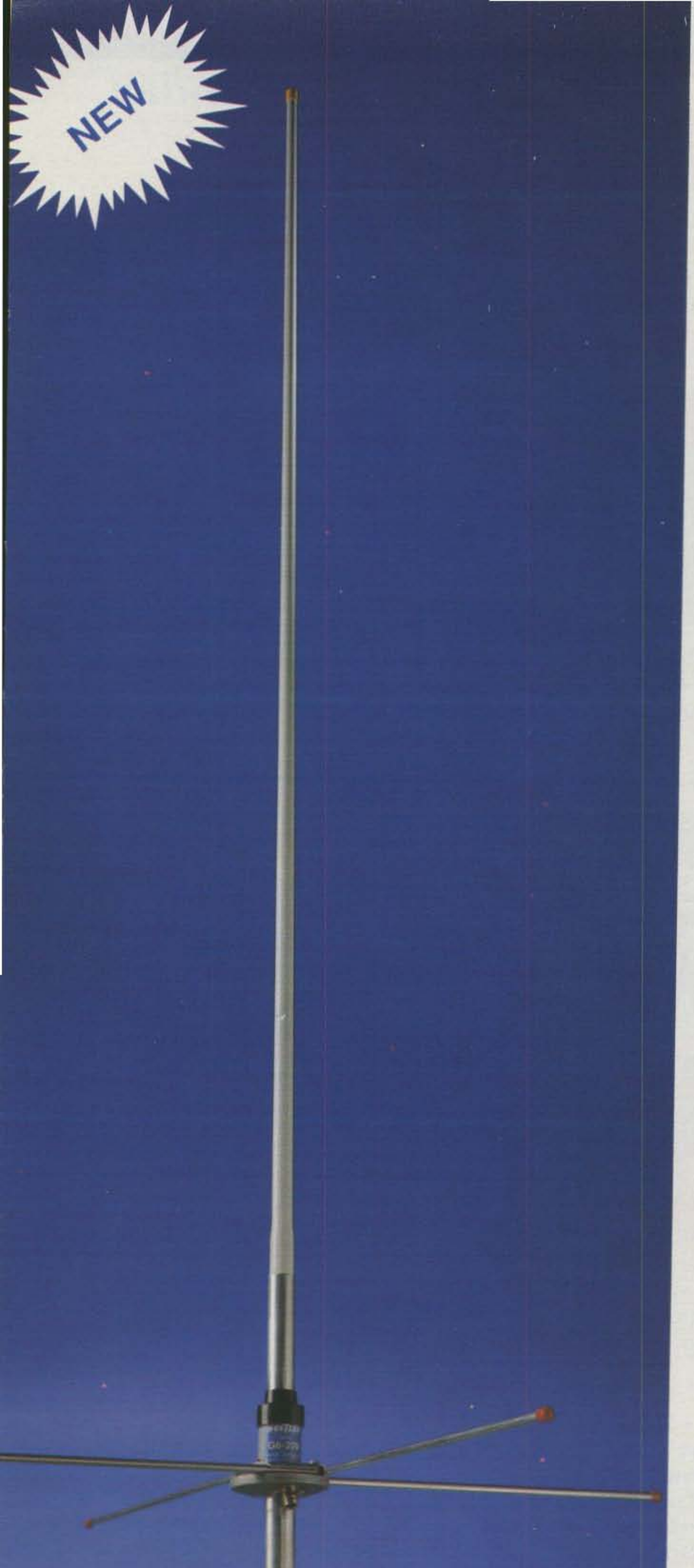
Worked New Hampshire Award. The Worked New Hampshire Award, sponsored by the New Hampshire Radio Association, will be presented to anyone showing proof of contact with New Hampshire residents in all New Hampshire counties after January 1, 1983. All bands and modes are permitted. Earth-based repeater contacts are prohibited. Endorsements will be issued for specific mode, band, or SWL achievement. QSLs will be evidence of contacts. A $2.00 US fee must accompany the QSLs. Send to NHRA WNH Award, c/o North Country Amateur Radio Club, 12 Cottage St., Lancaster, NH 03584.

Notes

I would like to expand the scope of the column by occasionally featuring amateurs who have received other significant operating awards. So if you would like to share your County Hunting or other award achievements, or know of someone you feel should be featured, send me a write-up along with a photo and perhaps I'll use it in the future.

Also remember that information about available operating awards can be sent to my address at the beginning of this column. If possible, send along a certificate or photo of the award so we can include that too.

73, Norm, WA3RTY



HUSTLER®

NEW DUAL BAND 2 METER/440 MHz. G6-270R

The high performance of our well known G6-144 and G6-440 are combined in our new 2 meter/440 dual band vertical, model G6-270R.

A sleek, one piece tapered fiberglass radome eliminates the intermodulation and mechanical problems associated with two and three piece UHF radome designs.

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

The antenna is shunt-fed and D.C. grounded for lightning protection and will survive winds to 100 mph.

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

Model G6-270

Specifications:

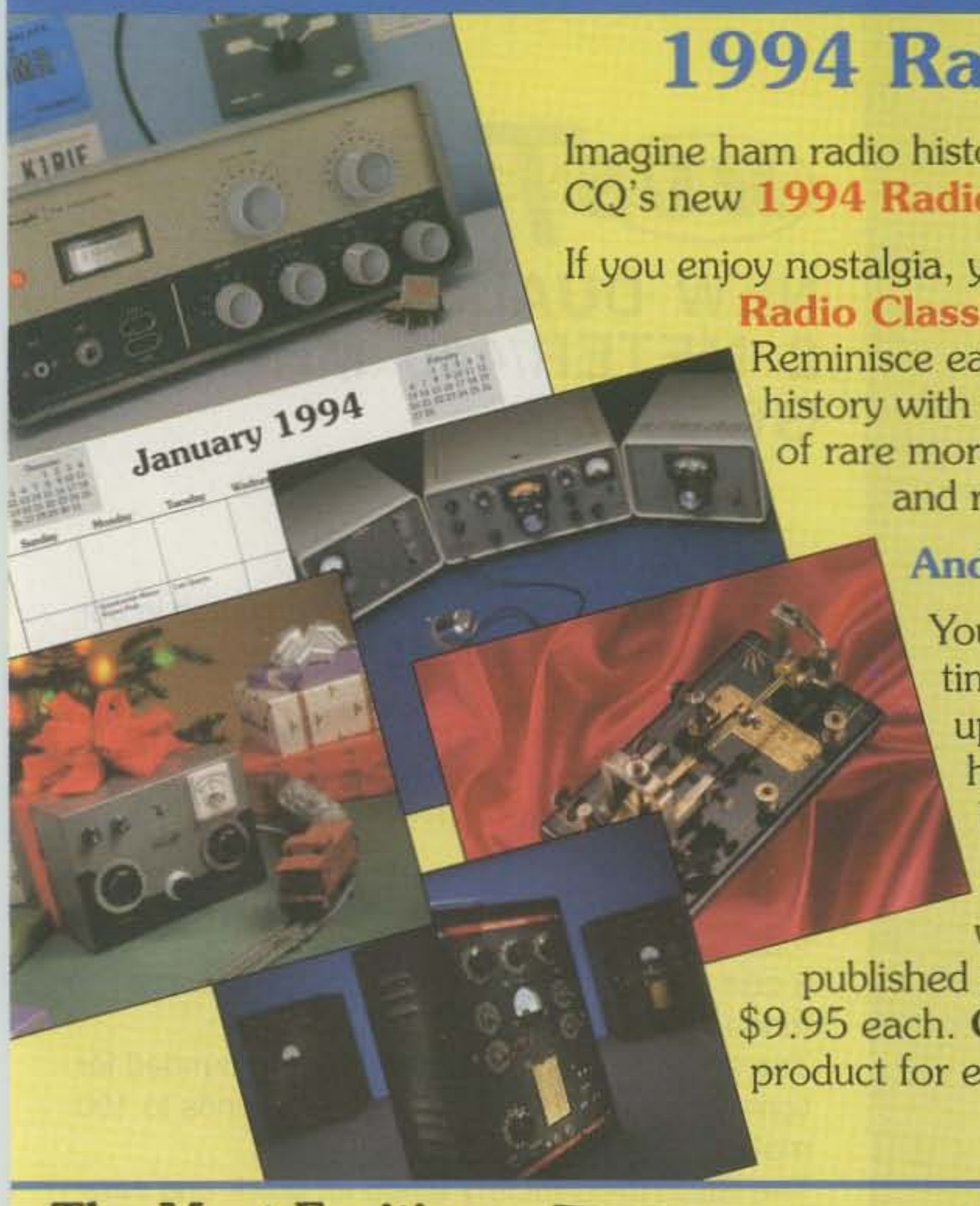
Gain:	6 db VHF 6 db UHF
Bandwidth:	10 MHz UHF 3MHz VHF
Design:	4x5/8 wave collinear 440 5/8 over 5/8 collinear 2 meters Shunt fed-DC ground
Length:	100 inches
Weight:	6 lbs
Wind Survival:	100 mph
Mounting:	Includes hardware for 1-1/2" dia. mounting mast Mounting plate will accept 2" U-bolts, not included.
Termination:	Type N female

NEWTRONICS ANTENNA CORP.

One Newtronics Place
Mineral Wells, Texas 76067
817-325-1386

CIRCLE 156 ON READER SERVICE CARD

CQ, THE LEADER IN INNOVATIVE AMATEUR RADIO PRODUCTS, HAS DONE IT



1994 Radio Classics Calendar

Imagine ham radio history being displayed on your wall with CQ's new **1994 Radio Classics Calendar**

If you enjoy nostalgia, you'll want CQ's **1994 Radio Classics Calendar**. Reminisce each month about radio history with striking color photography of rare morse keys, antique radios and radio tubes.

Specially Priced at ONLY $9.95

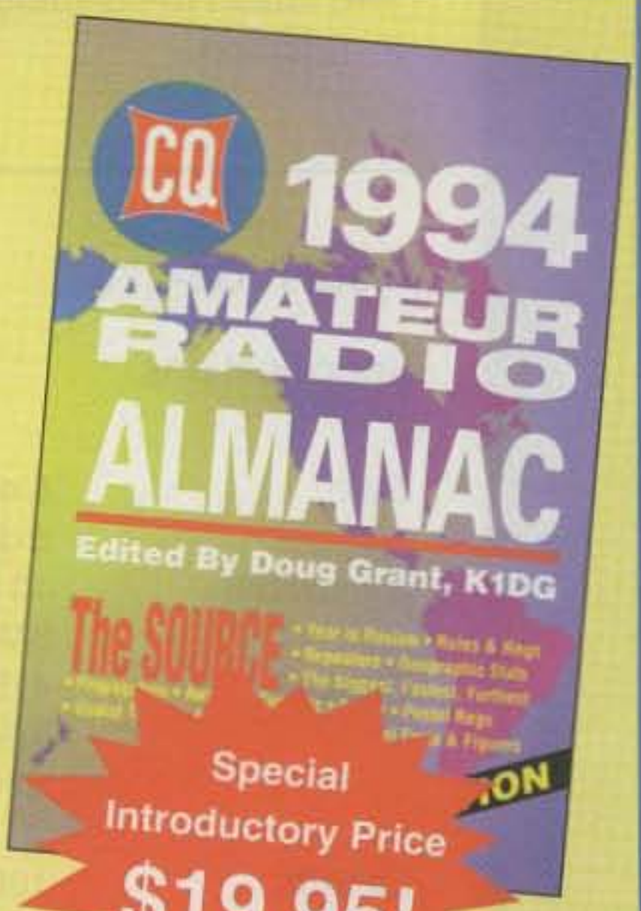
And there's more . . .

You'll refer to your **1994 Radio Classics Calendar** time after time as you search for the schedules of upcoming ham events and conventions. Public holidays and useful astronomical data will be right by your side, too!

Fifteen months of use (Jan 94 through Mar 95) with custom photography that has never been published anywhere else. And all at the low price of only $9.95 each. **CQ's 1994 Radio Classics Calendar**—a great product for every nostaligia buff.

The Most Exciting Ham Radio Book in Years!

CQ's 1994 Amateur Radio Almanac



There's Absolutely Nothing Else Like It!

If you're like most hams, you'll be fascinated by the thousands of facts, tables, graphs, maps, and other information to be uncovered in the **CQ 1994 Amateur Radio Almanac.**

CQ's 1994 Amateur Radio Almanac is a resource you'll refer to over and over again. At only $19.95 this is *the one book you can't pass up.*

Over 500 Pages!!!!!

The SOURCE • Year in Review • Rules & Regs • Repeaters • The Biggest, Fastest, Furthest • Geographic Stats • Propagation • Awards • Contests • Space • Postal Regs • Useful Tables • Silent Keys • Thousands of Facts & Figures

The Latest Addition to CQ's Video Library!

Getting Started in Contesting

Whether you're a newcomer to contesting or an experienced veteran, CQ's **Getting Started in Contesting** is for you! You'll get advice and operating tips from some of contesting's most successful competitors, including Ken Wolff, K1EA, Dick Newell, AK1A, and CQ's own contest columnist, John Dorr, K1AR.

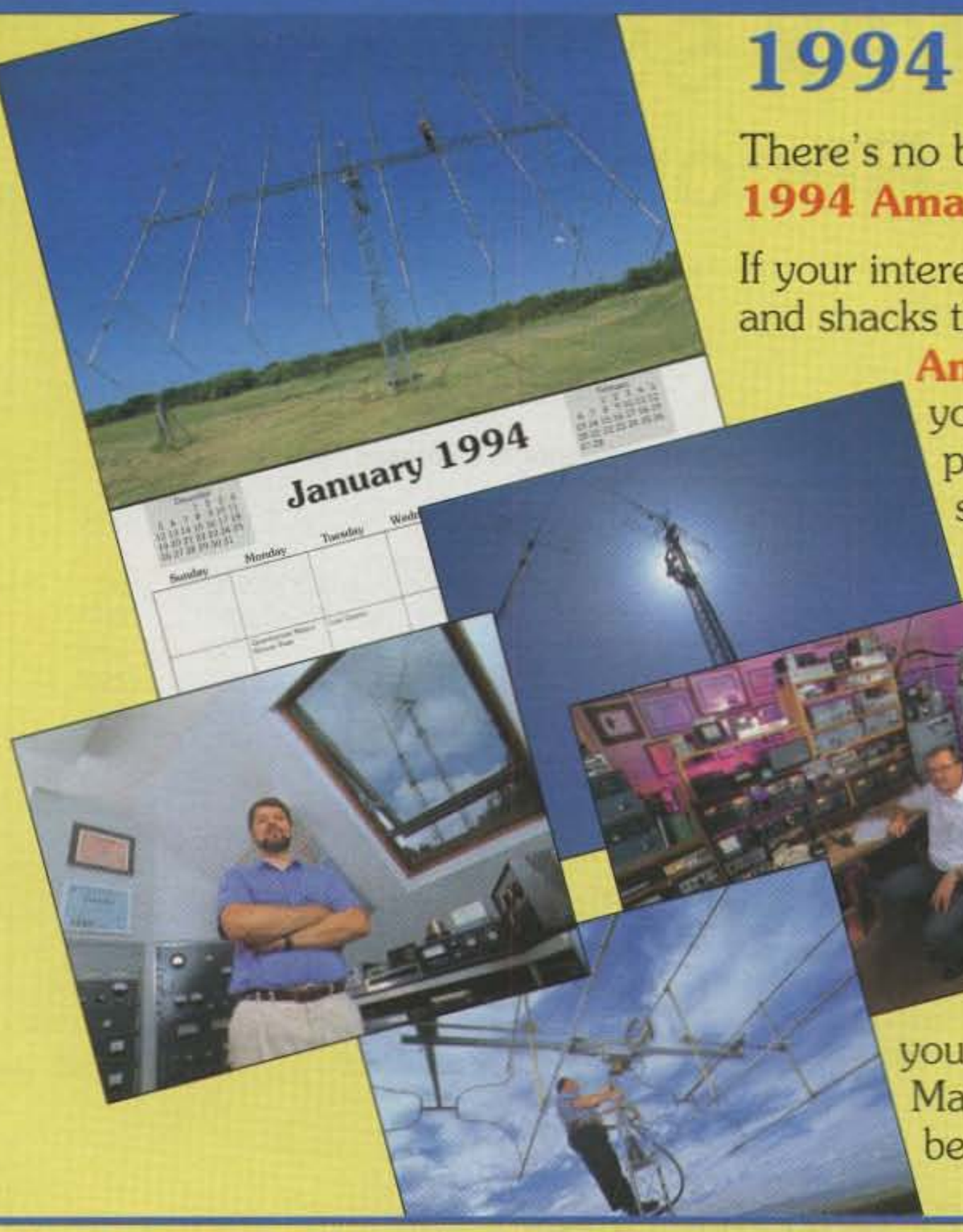
Here's just a sample of what you'll see:

- What contesting's all about
- Explaining contest jargon
- Tips for beginners
- Competing from a small station
- Operating secrets from the "pros"
- VHF/UHF contesting
- Live QSOs from world class stations

Send for your contest video tape today and watch your scores climb!

At only $19.95 you can't afford to be without **Getting Started in Contesting**.

AGAIN!! THERE'S PLENTY NEW FROM CQ . . . AND IT'S ONLY THE BEGINNING!!



1994 Amateur Radio Calendar

There's no better addition to your shack or office than CQ's new **1994 Amateur Radio Calendar.**

If your interest is towering antennas with stunning scenery and shacks that go beyond belief, then the **1994 Amateur Radio Calendar** is for you. Envision professional color photographs of some of the biggest stations in the world!

Specially Priced at ONLY $9.95

CQ's 1994 calendars contain valuable information for the active ham.

CQ's **1994 Amateur Radio Calendar** contains dates for major operating events and conventions. In addition, it's chock-full of public holiday and commemorative dates plus valuable astronomical information.

With CQ's **1994 Amateur Radio Calendar** you actually receive 15 months of use (Jan 94 through Mar 95)—and with all-new photography that can't be beat! At only $9.95 each, this is a real bargain from CQ!

YES! Rush me my new book(s)/calendar(s)/video right away. Here's my order:

QTY	TITLE	Unit Price	Total Price
	1994 Amateur Radio Almanac	$19.95	
	1994 Amateur Radio Calendar	$ 9.95	
	1994 Radio Classics Calendar	$ 9.95	
	Getting Started in Contesting Video	$19.95	
		Subtotal	
		Shipping/Handling	
		Total	

Please add $2 shipping & handling for orders under $10. For orders $10 to $50, add $4 S/H. FREE shipping for orders over $50.

Name _____ Callsign _____

Address _____

City _____ State _____ Zip _____

MC/VISA/AMEX/Discover # _____

Form of Payment: ☐ MC ☐ VISA ☐ AMEX ☐ Discover ☐ Check ☐ Money Order

Please Mail your orders to:
CQ Communications, Inc., 76 North Broadway, Hicksville, New York 11801-9962

Order Toll Free 800-853-9797

CQ Communications, Inc., 76 N. Broadway, Hicksville, NY 11801

516-681-2922 FAX 516-681-2926

CQ World-Wide WPX SSB Contest All-Time Records

The contest is held each year on the last full weekend of March. The All-Time Records will be updated and published annually. Data following the calls: year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	UL7ACI('91)	331,008	128
3.5	OH1RY/CT3('85)	2,816,754	453
7.0	NP4A('86)	6,668,184	654
14	ZZ5EG('88)	8,219,627	871
21	ZPØY('90)	12,070,245	955
28	ZW5B('92)	13,006,917	959
AB	HC8A('92)	24,809,300	1060
QRP/p	VP2EXX('90)	6,727,444	779

Multi-Operator Single Transmitter

	HC8A('93)	32,502,677	1107

Multi-Operator Multi-Transmitter

	ED8ACH('91)	47,278,236	1319

U.S.A. RECORD HOLDERS

Single Operator

1.8	K5UR('85)	122,664	228
3.5	K1ZM('92)	1,266,844	422
7.0	KC7EM('92)	1,396,646	397
14	K2VV('87)	3,546,294	687
21	WN4KKN/6('92)	4,538,050	814
28	WM5G('89)	4,213,127	799
AB	KM1H('92)	7,854,840	945
QRPp	KR2Q('92)	1,269,960	557

Multi-Operator Single Transmitter

	WC4E('92)	11,611,929	1113

Multi-Operator Multi-Transmitter

	WZ6Z('89)	18,737,170	1138

CLUB RECORD

Northern California Contest Club('92)	97,527,906	

QRPp RECORD

VP2EXX('90)	6,727,444	

WPX (Prefix) RECORD

UX9C('93)	1,508	

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	OH1RY/CT3('87)	290,140	163
3.5	OH1RY/CT3('85)	2,816,754	453
7.0	EA9LZ('92)	4,721,924	562
14	ED9LZ('93)	6,121,569	691
21	TR1G('90)	6,788,925	825
28	FR5DX('91)	7,543,818	831
AB	EA9AH('93)	17,387,133	951

ASIA

1.8	UL7ACI('91)	331,008	128
3.5	UF6VZ('90)	835,584	256
7.0	H24LP('87)	5,348,975	503
14	H2A('91)	6,297,464	758
21	7L1GVE('92)	6,848,136	838
28	JH1AJT('89)	4,848,480	740
AB	7Z2AB('92)	9,177,296	809

EUROPE

1.8	LZ2BE('84)	261,504	144
3.5	CT7N('92)	1,456,704	432
7.0	IO4VEQ('93)	4,184,292	654
14	LZ5W('92)	5,671,509	883
21	CT2A('92)	6,029,559	919
28	9H1EL('89)	5,882,825	787
AB	YZ9A('91)	8,518,112	928

Multi-Operator Single Transmitter

AF	EA4KR/EA8('93)	14,108,475	939
AS	TA5/NØFYR('91)	16,474,965	1005
EU	IJ4R('91)	16,027,956	1146
NA	VP2EC('92)	24,409,580	1115
OC	PØX('93)	13,440,570	858
SA	HC8A('93)	32,502,677	1107

NORTH AMERICA

1.8	CG3MFA('85)	319,140	162
3.5	VA3EJ('91)	1,950,592	448
7.0	NP4A('86)	6,668,184	654
14	TI2CC('87)	5,491,290	790
21	FG5R('89)	9,936,240	912
28	J68AX('92)	4,709,985	651
AB	KP2A('93)	16,694,570	1006

OCEANIA

1.8	T32AF('83)	16,872	37
3.5	AH6AZ('88)	492,030	231
7.0	T32AF('93)	3,995,928	437
14	KG6DX('90)	4,558,527	733
21	AHØK('92)	7,206,850	698
28	P2ØA('92)	5,184,625	703
AB	WR6R/KH6('93)	9,803,972	758

SOUTH AMERICA

1.8	YV5JEA('84)	40,320	63
3.5	YV3A('91)	1,664,476	362
7.0	YV5A('91)	3,460,900	530
14	ZZ5EG('88)	8,219,627	871
21	ZPØY('90)	12,070,245	955
28	ZW5B('92)	13,006,917	959
AB	HC8A('92)	24,809,300	1060

Multi-Operator Multi-Transmitter

AF	ED8ACH('91)	47,278,236	1319
AS	UX9C('93)	15,078,492	1508
EU	HG73DX('91)	30,664,095	1337
NA	VP2EC('87)	37,446,109	1147
OC	FKØAW('89)	26,538,972	1002
SA	ZZ5EG('87)	38,096,250	1250

JRC

JRL-2000F

Fully Automatic MOSFET HF LINEAR AMPLIFIER

- 1 kW No-Tune Power Amplifier
- 48 MOSFETs Single Ended Push-Pull (SEPP) Design
- Built-In Automatic Antenna Tuner
- High-Efficiency Switching Power Supply

The JRL-2000F is the world's first MOSFET HF linear amplifier, designed using the same high technology found in JRC's professional high-power radio transmitters. Featuring a heavy-duty power amp that incorporates 48 RF power MOSFETs to ensure low distortion and clean output up to 1,000 watts (100% duty cycle, 24 hour) SSB/CW, plus a high-speed automatic antenna tuner with memory capacity of 1820 channels for instant QSY. Plus a high efficiency switching power supply (80V-264V) with power factor correction to supress AC line currents, an automatic antenna selector for up to four antennas and a wireless remote control unit.

JRC Japan Radio Co., Ltd.

430 Park Ave, 2nd Floor New York. NY 10022
Phone : (212)355-1180 Fax : (212)319-5227
Telex : 961114 JAPAN RADIO NYK

CIRCLE 2 ON READER SERVICE CARD

"Our permanent solutions ma

Icom IC-2410H
Dual-Band Mobile (2m/440 MHz)

Was $719...Now $699

Icom introduces simultaneous receive of 2 frequencies in the same band. Combine this breakthrough with simultaneous dual band receive capability and you have a list of features found nowhere else. Not only can the IC-2410H search for other signals within the band in use but also can stand by on 2 frequencies in the same band. Combine this with compact size (only 5.5" x 1.6" x 6.9") and a whole host of features including remote control operation and 36 memories. Remote control from any HT is a snap with the UT-55 option and with the optional UT-66 a voice announces the accessed-band frequency back to you! 45 W of clean power.

UT-55: DTMF Encoder/Decoder $42
UT-66: Voice Synthesizer Unit ...$42
UT-67: Tone Squelch Unit.....$68

Icom 229H
2M Mobile

Was $399...Now $389

The XC-229h is a 50 watt two meter mobile with 14 auto-dial memories for working your favorite repeaters phone patch. It also includes CTCSS encode, 20 memories, AM aircraft receive, four power levels, multiple scan modes, and a 20 dB RF attenuator.

AEA PK232MBX
Multi-Mode Controller

$299

With over 50,000 units sold worldwide, the PK-232MBX is the world's leading multi-mode data controller. Combining all amateur data communication modes in one comprehensive unit, the PK-232MBX offers Morse code, Baudot, ASCII, AMTOR/SITOR 476, PACTOR, and 625, HF and VHF Packet, WEFAX receive and transmit, as well as commercial standard NAVTEX/AMTEX automated marine/ARRL information services. The PK-232MBX provides any RS-232 compatible computer or terminal with complete amateur digital operating capabilities. All decoding, signal processing and protocol software is on ROM in the PK-232MBX. Only a simple terminal program is required to interface the PK-232MBX to your computer. The PK-232MBX package includes an RS-232 interface cable that connects the unit directly to the RS-232 port of the computer.

Alinco DJ-180T
2m FM HT

$209

The new DJ-180T is simple to operate and built to last. It has a huge array of features that are easy to learn and use with the intelligently-laid out keypad. It transmits on the entire 144 to 148 MHz 2m band and receives from 130 to 174 MHz. It provides 2 W of power output (5 W with optional 12.0 V battery). It's LCD display is lighted and 10 memories are at your disposal (up to 200 available with upgrades). Measures 5.2" x 2.3" x 1.3".

Alinco DJ-180TH (With Built-In 12 V Battery For 5 W) Only $249

Accessories:

ESC 19 Carrying case	$19
EBN-22N 12.0 V / 700 mAh battery	$72.95
EDH-12 DC Jack Adapter	$11

Icom IC-2GAT
2M HT

Was $339
Now $299

The IC-2GAT is the only handheld on the market which gives you 7 watts capability. It also includes 20 memories, CTCSS encode, call channel, multiple scan modes, and a rugged durable design.

Icom IC-P2AT
Handheld Transceivers P2AT 2m HT

Was $349...Now $339

This palm-sized HT's feature a big speaker and a big display for easy viewing. The innovative Ai key deverly adapts to your operating style. Every time a secondary function on the keyboard is activated, the Ai learning function assigns it to the Ai key. This is convenient for accessing a previously-used function rapidly. The Ai key also memorizes the order of used functions for assigning your favorite function to the Ai key manually. It's also the only HT that evaluates your knowledge level with a 15 question test and customizes its operation based on your answers! Features such as 100 memory channels + 1 call channel, lighted keypad, 24 hour clock, 5 W of power (with optional battery or 12 V), and auto dialing capability are also standard in these HT's at the cutting-edge of technology!

Popular Options:

BP-112: 7.2 V 700 mAh Battery Pack	$68
BP-113: 7.2 V 1200 mAh Battery Pack	$90
BP-114: 12 V (5 W) Battery Pack	$104
BC-80A: Rapid Charger	$132
CP-12: Cigarette Lighter w/noise filter	$21
LC-91: Carrying Case for Radio w/supplied BP-111 Battery	$25
LC-92: Carrying Case for Radio w/BP-110/112	$17
LC-93: Carrying Case for Radio w/BP-113/114	$17

Icom IC-3230H
Dual Band Mobile (2m/440 MHz)

Was $659...Now $639

While hiking, fishing, shopping or any remote activity, you can transmit/receive with your handheld through the IC-3230H in your vehicle. All of the power and features of the IC-3230H are in your hand! This revolutionary dual band mobile is fully remotable with the optional UT-55 from its mic or any handheld with DTMF. The UT-66 option will announce the frequency back over the HT! Cross band repeat enables you to receive a signal on one band and re-transmit on the other. This allows your mono-band handheld to operate on another band, while extending your range. The IC-3230H also has full duplex, 36 memory channels and 14 auto dialing memories. 5.5" x 1.6" x 6.5".

UT-55: DTMF Encoder/Decoder	$42
UT-66: Voice Synthesizer Unit	$42
UT-67: Tone Squelch Unit	$68

MFJ-249 *SWR Analyzer With LCD Frequency Counter*

$169 with Free AC Adapter

MFJ's newest, most versatile SWR Analyzer covers more frequencies than any MFJ Analyzer before: 1.8 to 170 MHz continuously. It has a built in 10-digit frequency counter that makes reading SWR in the sun easy. You get three instruments in one... a low distortion RF signal generator, a high accuracy 170 MHz frequency counter, and an SWR Analyzer. Measures 4" x 2 1/2" x 6 3/4".

MFJ-29 Carrying Case $19.95

Export Sales Welcome!

Bearcat BC 2500 XLT
400 Channel Portable Scanner-With 800 MHz!

$375

This new one from Bearcat has coverage from 25 MHz to 1.3 GHz* with 400 channels to put those frequencies in! It even includes a VFO knob for up-down frequency control. Other features include weather search, turbo scan, reception counter, step select, rechargeable NiCad battery with AC adapter and an illuminated LCD display. 20 priority channels and 20 separate channel banks complete today's best handheld scanner. *Cellular Blocked, modifiable.

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!

Prices Limited To Stock On Hand

Call Toll Free: 800-527-4642

HEIL SOUND · GRUNDIG made for you · AEA · CREATE · ANLI Antenna · DAIWA · MFJ · AOR · ALINCO · EDCO · ICOM

ke your problems temporary."

Racal-Dana 9008

AM/FM Modulation Meter $895

Carrier Frequency range from 1.5 MHz to 2 GHz; input level from 5 mV rms to 1 V rms with level setting fully automatic; input impedance of 50 Ω. FM Deviation range from 1.5 to 100 kHz peak f.s. (positive, negative and mean deviation measurements can be made). Modulation range from 50 Hz to 30 kHz. AM Modulation Depth range from 5 to 100% f.s.d. (peak, trough, or mean amplitude relative to carrier measurements may be made). Modulation frequency from 50 Hz to 30 kHz. Outputs include: IF out, AF out, and DC out. Remote controllable.

Wavetek DM15XL

Digital Multimeter $59

This versatile hand-held Digital Multimeter provides all basic measurements of DC and AC Volts, DC & AC Current to 10 Amps, and Resistance. Readout is providing by a 3 1/2 digit LCD display. Other features include Auto Polarity, Over-Range indicators, Auto Zero, Diode Tester, and an Audible Continuity Tester. Plus the ability to make Logic measurements of high and low TTL logic pulses. A great safety feature is also built into the DM15XL which warns the operator if the test leads are plugged-in incorrectly for making current measurements. Comes complete with one pair of test leads, one spare fuse, battery, and operator's manual. 6.1" x 2.8" x 1.3".

Collins 651S1

HF Receiver $1195

High quality, professional grade communications HF receiver. Provides 297,500 channels in the 250 kHz to 29.9999 MHz frequency range. Standard operating modes of the 651S1 are AM, SSB, and CW. Standard IF filter bandwidths are 6 and 16 kHz, 2.7 kHz USB, and 2.7 kHz LSB.

ESI 815AF

Impedance Bridge $299

The 815AF Impedance Bridge is a portable, self-contained instrument designed to measure resistance (to 12 MΩ), inductance (to 1200 mF) and storage factor "Q" of inductors (to 1000), capacitance (to 1200 mF) and dissipation factor "D" of capacitors (to 1.05) easily and accurately. Internal generator makes measurements at 1 kHz and also has external generator capability for measurements at other than 1 kHz. Features include null meter, decade readout, zero check function, and protective cover.

HP 8640B/003

AM/FM Signal Generator $1995

This 8640B/003 covers the frequency range of 0.5 to 512 MHz and gives the user an internal audio oscillator for AM/FM modulation. Calibrated power output is from +19 to -145 dBm. Noise is extremely low beyond the 10 kHz offsets, at a 20 kHz offset from the carrier, CB phase noise is <-130 dBc. Frequency stability is <0.05 ppm/hr in the locked mode while accuracy is quite high using the 6 1/2-digit readout. AM/FM modulation is calibrated and metered. Option 03 provides reverse power protection. Call for more information and other available options!

WANTED

WE WANT THE FOLLOWING TYPES OF EQUIPMENT:

WE NEED QUALITY USED TEST EQUIPMENT!

AVAILABLE

TRADE FOR THE FOLLOWING TYPES OF EQUIPMENT:

WE WILL TRADE FOR ALL NEW HAM EQUIPMENT

Call, write or fax for a FREE copy of our latest catalog!

SPECIAL PURCHASE

Tektronix 465M

100 MHz Dual Trace Portable Oscilloscope

$695

Why Pay Over $1200 For A New 50 MHz Or 60 MHz Dual Trace Oscilloscope, When You Can Own A Tektronix 100 MHz Scope For Only $695?

CALIBRATED! 90-DAY WARRANTY! INCLUDES TWO SWITCHABLE X1/X10 PROBES AND MANUAL PLUS...TUCKER QUALITY!

This is the first time we have been able to offer such a quality scope, with its' excellent bandwidth for this super-low price. You must act now- quantity is limited! Tektronix built these instruments rugged, with ease of serviceability in mind. They were built to work in such extreme temperatures from Tulle, Greenland to Mojave, California. They tested it to work at 15,000 feet, and subjected it to 30g's shock, why, they even dropped tested it from eight inches on each corner and face, a total of 14 drops. That's why we think you will get years of carefree service from it. This instrument would be just as home in a Fortune 500 company's test lab or some individual's Ham Shack. Since it draws only 60 watts of power, with a small 12 volt inverter, you can work on boats' radios and radar, cars' 2-way radios, and if you have an airplane you can probably figure a way to work on your instruments and radios. Includes probes and manual.

SPECIFICATIONS:

Vertical Section:

- Bandwidth: DC to 100 MHz with or without probe
- Bandwidth limit mode: bandwidth limited to 20 MHz
- Rise time: 3.5 nS or less
- Deflection Ranges: 5 mV/div. to 5 V/div. in 10 ranges (1-2-5 sequence)
- Max. Input Voltage: ±250 VDC peak AC at 50 Hz
- Display Modes: CH 1, CH 2, (normal or inverted), Alternate, Chopped (250 Hz rate), Added, X-Y

Horizontal Section:

- Time Base A: 0.5 S/div. to 0.05 µS/div. in 22 steps (1-2-5 sequence). X10 magnifier extends fastest sweep rate to 5 nS/div.
- Time Base B: 50 mS/div. to 0.05 µS/div. in 19 steps (1-2-5 sequence. X10 magnifier extends fastest sweep rate to 5 nS/div.
- Mixed Sweep Accuracy: A portion: ±4%; B portion: ±2%
- Horizontal Display Modes: A, A intensified by B, B delayed by A, mixed

Sweep Section:

- Calibrated Delay Time: Continuous from 0.1 µS to a least 5 S after the start of the delaying A sweep
- Differential Time Measurement Accuracy: For measurements of two or more major dial Divs.: +15° C to +35° C, 1% +0.1% of full scale

Power Requirements:

100 V to 132 V or 200 V to 264 V RMS. 48 Hz to 440 Hz. Maximum power consumption of 60 W at 115 V, 60 Hz

Weight: 27 lbs

Size: 13.6"W x 7.0"H x 24.4"D

DON'T BE LEFT OUT!

We're Not Sure How Long We Can Supply The Tek 465M At The $695.00 Price.

We're going to sell all of our existing stock at this price, when they are gone, we either won't have anymore for sale or the price may go up! A lot of our customers were disappointed last year when we ran out of the USM338's, and if you have seen our recent catalog, we had to increase the price because of increased cost for us to obtain them. Don't hesitate!! Get your order in today!!

TUCKER ELECTRONICS & COMPUTERS

• 1717 Reserve Street
Garland, TX 75042 OR
• P.O. Box 551419, Dallas, TX 75355-1419

Phone:
• In Dallas 214-348-8800
• 214-348-0367: 24 Hour Fax Line

DRSI EMOTO JIM SIGMA Nover ASTRON CORPORATION Bearcat SANGEAN pro·am

CIRCLE 3 ON READER SERVICE CARD

VHF PLUS

BY JOE LYNCH, N6CL

ALL ABOUT THE WORLD ABOVE HF

What Is A Typical VHF+ Station?

VHF PLUS CALENDAR

February 28	Perigee.
March 5	Last quarter moon.
March 6	Very poor EME conditions.
March 12	New moon.
March 13	Very poor EME conditions.
March 15	Apogee.
March 20	First quarter moon. Very poor EME conditions.
March 27	Full moon. Very good EME conditions.
March 28	Perigee.

Operating on the VHF+ frequencies originally was quite a challenge. Before World War II almost all operation was experimental. Even until the mid-1970s most operation was reserved for the operator who was challenged by the unknown frontiers of the bands. With the development of the FM repeater, however, these bands flourished with activity, and the emphasis shifted away from exploration and toward the day-to-day communication now so common on the bands.

Nevertheless, so-called "weak signal" operators never went away. While their activities seemed to be confined to particular portions of the band, they continued. Because of contests and awards programs, particularly the VUCC, the weak-signal segment has been experiencing growth. Today certain manufacturers recognize that there exists a niche market and are supplying equipment for the bands.

Putting together a station for the VHF+ frequencies is in some ways similar to building an HF station, particularly for the lower VHF+ frequencies such as 6 and 2 meters. However, except for 70 cm, for most of the other bands you probably will have to consider building your radio, either by designing it by yourself or by assembling a kit.

The most popular VHF+ frequency is 6 meters, followed closely by 2 meters. There are currently available single band transceivers, as well as HF transceivers that include 6 meters. There are also several suppliers for antennas for this band. For 2 meters there are also single band radios, plus multiple band radios that include this band. For 135 cm, because of the previous uncertainty of the band, most manufacturers have pulled out of supplying equipment for it. For 70 cm there are manufacturers who supply multiple band radios, some of which are also designed for satellite work and some of which are these same radios used for 2 meters.

Almost all of these commercially available radios are powered by 12 VDC. Even most of the ones that accept power from commercial sources also can accept power from 12 VDC sources. This feature means that these radios can be used mobile or in a Rover operation.

Few radios are commercially available for the 902 MHz band or for any band above 2300 MHz. The principal selection of equipment comes from a couple of manufacturers who supply kits.

Most VHF+ transceivers are capable of running at least 10 watts output, which means that you might want to consider a linear (brick) amplifier—more on them a bit later.

Almost all are capable of operating on all modes, although very few do not include FM operation. Some who don't, offer it as an option.

Most transceivers have built-in filters for more selective reception, or they have provisions for adding them later.

For CW all transceivers have a built-in side tone or feed back a sample of the signal through the audio section for you to hear what you are sending. Some transceivers even have built-in keyers.

Most transceivers come equipped with a microphone. Although there is a jack available for headphones, none come with them. Some transceivers are shipped computer controllable; others are upgradable to be computer controlled.

Other features in some transceivers include direct frequency entry, memories, multiple noise limiters, digital voice readout, digital recorders, digital signal processing, built-in preamp, microphone processor, and ports for a separate receiver antenna and computer control operations.

So you see, you have many choices and decisions to make when selecting a radio.

Next let's examine brick amplifiers. Brick amplifiers are available at different power levels, from 30 watts to 350 watts. There are also high-power tube-type amplifiers that are capable of running the "legal limit" on these frequencies. While the power levels of the brick amplifiers are not very high, the RF produced by any one of these amplifiers should still be considered dangerous. The tube type especially should be considered lethal. Therefore, if you've purchased an amplifier and are not sure of any aspect of its installation, get competent help. For that matter, if you are unsure of any aspect of installing any part of your amateur station, get help!

The next aspect of your station to consider is the antenna. Let's look at antennas for each individual band.

For 6 meters, a 2-element quad or a 3-element Yagi antenna is more than adequate for most operation. Even a dipole or a vertical antenna can be used with some success during good sporadic-E openings. However, if you want to consider working long-haul DX, you might also want to consider more elements. Remember, though, the more elements, the more the gain and the narrower the beamwidth of your antenna. Because of the often rapidly changing aspects of sporadic-E propagation, signals may be coming to you from one direction one minute and then from an entirely different direction the next.

Should you be using a high-gain antenna, you might think that the band has died, when in reality only the propagation has shifted. In order to keep up with the changes in propagation, you will have to rotate your antenna quite often during a band opening.

If you are considering the exotic mode of EME communication, however, then multi-element and stacked-array antennas are definitely necessary. Because much of the signal is lost getting there and back, you will want to direct as much of your signal as possible at that small target in the sky.

For 2 meters the antennas get a bit more elaborate. Before investing in an antenna, however, you might want to ask yourself on what type of operation will you be concentrating your efforts. If you are principally going to work meteor scatter, then you will want an antenna that has somewhat of a wide pattern. Typically the shorter boom (12–17 feet long) multi-element beams will satisfy this requirement. However, if you want to work EME, then the long-boom, higher gain antenna will be necessary. Nevertheless, there are exotic antennas that have been built for this purpose. Paul Kelley, N1BUG, has built one such antenna array, which includes 24 four-element quads. With it he has enjoyed much success "on the moon."

Antennas for 135 cm are very similar to those for 2 meters. Multi-element antennas are available for this band. Should you wish to confine your contacts to terrestrial propagation, then a single Yagi will suffice. However, if you wish to work EME, then you will want to consider stacking these antennas.

Yagi antennas for 70 cm contain many more elements for the same physical boom length than do 2 meter antennas. These antennas are, by design, higher gain and narrower beamwidth as compared to their 2 meter counterparts. For EME purposes stacking more than one Yagi is required. In addition, this band is high enough in frequency that a dish becomes a real consideration.

For 33 and 23 cm terrestrial communications loop antennas become attractive options. For EME work, however, a dish is almost a must.

For bands higher than 23 cm the gain versus size issue comes down on the side of size.

P.O. Box 73, Oklahoma City, OK 73101

Call the Dealer that stocks the entire YAESU line...*that's* AES®!

YAESU FT-1000 • 200W – 9-band, all-mode HF transceiver with 100kHz-30MHz receive, 99 memories, built-in antenna tuner with memories. Built-in AC ps. 6"h x 16"w x 15"d, 58 lbs..... **SPECIAL** ☎
YAESU FT-1000D • Deluxe version with dual bandpass filter for crossband receive, temperature compensated crystal oscillator, 2.4kHz/2KHz SSB filters and 500Hz CW xtal filter..... **SPECIAL** ☎

YAESU FT-990 • 100W – all mode 160-10M HF transceiver with 100kHz-30MHz receiver, 99 memories. Built-in antenna tuner and AC power supply. 12¾"w x 4½"h x 11½"d, 30 lbs ..... **SPECIAL** ☎
FT-990DC • No AC ps or CW filter..... **SPECIAL** ☎

YAESU FT-890 • 100W 160-10m all mode transceiver with 100kHz-30MHz receiver. Optional internal automatic antenna tuner. 13.5VDC @ 20A. 9⅜"w x 3⅜" x 9½"d, 12.3 lbs.....☎
YAESU FT-890/AT • w/ant tuner .....☎
NEW! **YAESU FT-840** • HF transceiver.....☎

YAESU FT-747GX • Compact 100W, 160-10M SSB/CW base or mobile transceiver with 100kHz-30MHz receiver, and optional FM transmit/receive. 12V DC @ 20A. 3¾"h x 9½"w x 9½"d, 7 lbs.....☎

YAESU FT-650 • 100W – 6, 10 and 12 meter all mode with 24.5–56.0 MHz receive. 105 memories: 99 for channels, 4 programmable scan memories and 2 priority channels. Built-in AC supply or 12V DC.@ 18A. 5¼"h x 11¼"w x 11¾"d, 18 lbs.....☎

YAESU FL-7000 • Solid-state, 160-12M. linear with built-in automatic antenna tuner and power supply. 70W drive for 600W output. Full break-in for CW, HF Packet and AMTOR. Auto. selection of 4 antennas with opt. unit. 5"h x 15"w x 15"d, 66 lbs.....☎

YAESU FT-736R • All-mode, 2M/430 multi-band VHF/UHF. Optional. modules for 50MHz, 220MHz, and 1.2GHz. 10W on 50MHz and 1.2GHz, 25W. on 2m and 440 MHz. Built-in AC ps, or 12V DC w/optional power cord. 5⅛"h x 14½"w x 11½"d, 19.8 lbs .....☎

MK II's 2½W, FM, SSB/CW portable. Requires 12V DC @ 1.1A, or opt. battery case with 9 (C) cells or nicads. DTMF mic with up-down control, dual VFOs, 10 memories with scan. Offset tuning, LCD display. 2⅛"h 6¼"w x 7½"d, 2.6 lbs.

FT-290R MK II • 2 meters, 25W.....☎
FT-690R Mk II • 6m, 50-54MHz, 10W.....☎
FT-790R Mk II • 430-450MHz, 25W .....☎

YAESU FT-5200 • 2m/440MHz FM mobile. Covers 140-150 (tx), 140-174 (rx) & 430-450MHz. 32 memories, CTCSS encoder. (2m) 50/5W, (70cm) 35/5W. Cross band full duplex. DTMF mic., detachable front panel for remote. 5½"w x 1⅝"h x 6"d, 2 lbs..... **SPECIAL** ☎
FT-5100 • Like 5200 w/o remote cap .....**SPECIAL** ☎
FT-6200 • 35/10w, 440MHz/1.2GHz .....☎
FT-2200 • 50w 2m FM xcvr w/TTP mic .....☎
FT-7200 • 35W 440MHz FM/TTP.....☎
FT-912RH • 1.2GHz, 10W, 12VDC @ 4A.....☎
YAESU FT-2400H • Rugged 2m FM mobile. 50W/25W/5W. Receives 140-174MHz (140-150MHz tx). 31 memories, CTCSS encoder, 5 scan functions. Programmable call channel, auto. offset. Backlit DTMF mic. 6"w x 1⅞"h x 7"d, 1½ lbs .....**SPECIAL** ☎
YAESU FT-7400H • 35W 440MHz FM .....**SPECIAL** ☎
FT-712RHT/C8 • 35W 440MHz FM....**CLOSEOUT** $309.95
DVS-1 • Memory module for 712. **CLOSEOUT** 49.95

Due to foreign currency fluctuations, please ☎ Call Toll Free for Prices.

MasterCard VISA DISCOVER NOVUS American Express Cards

YAESU FT-411E (C) • 2m, 140-150MHz (tx), 140-174MHz (rx). 2½w FM HT. LCD, keypad and rotary-dial frequency entry. 5½"h 2¼"w x 1½"d, .85 lb.....☎
YAESU FT-811 (A) • 2w, 430–450 .....**CLOSEOUT** $259.95
YAESU FT-911 (A) • 1w, 1.2GHz.....☎
YAESU FT-416 Black 2m FM HT/batt/chgr.....**SPECIAL** ☎
YAESU FT-816 Black 440 FM HT/batt/chgr.....☎
YAESU FT-470 (B) • 2m/440MHz, 2.3w, FM HT. Similar to FT-411/811. Simult. receive, both bands, 42memories. 6½"h x 2¼"w x 1½"d, .88 lbs .....**CLOSEOUT** $354.95
FT-470 –less $25 Coupon (until Sold Out!)
YAESU FT-815 (D) • 70cm, 2W, 430-450MHz receive and transmit. Dual VFOs, 41 tunable memories. 2⅛"w x 5¾"h x 1⅛"d, 12½ oz..... **CLOSEOUT** $329.95

Following are similar to FT-815 but without TTP

FT-26/25 • 2-meters, 2W, 130-174MHz receive and 140-150MHz transmit.....☎
FT-26/27 • 2-meters, 5W, 130-174MHz receive and 140-150MHz transmit.....☎
FT-76/25 • 70cm, 2W, 430/450 MHz.....☎
YAESU FT-23R-17 (E) • 2m FM HT 2.5w ouput, rotary dial frequency entry, LCD display, 10 memories, scanning, priority. 4⅛"h x 2⅛" x 1⅜"d, 1 lb .....☎
FT-23R-12 • as above but 2m, 5w.....☎
FT-33R • 220 MHz FM, 5w .....☎
FT-530 • 2m/440 FM HT w/TTP ..... **SPECIAL** ☎
NEW! **FT-11R** (2m) **and FT-41R** (440) Handhelds ☎

FRG-100B • Shortwave receiver.....☎

ANTENNA ROTORS

G-400RC • Light/med. duty, 11 sq. ft.**CLOSEOUT** $249.95
G-500A • Elevation rotor, 12 sq. ft.....☎
G-800S • Med/hvy duty, 21 sq. ft., 450° rot.....☎
G-800SDX • Med/hvy duty, 21 sq. ft, presets.....☎
G-1000SDX • HD, 21 sq. ft, 450° rot/presets .....☎
G-2700SDX • HD, 34 sq. ft, 450° rot/presets .....☎
G-5400B • Light/med, 11 sq. ft. az/el combo .....☎

YAESU Coupon Promotions!

$100 Off FT-1000D/FT-1000 • FT-890AT/FT-890 FT-990/FT-990DC
$50 Off FT-2400H • FT-747GX • FT-840
$20 Off FT-2200

Coupons good through March 31, 1994

AES BBS–(414) 358-3472 (8-N-1 up to 9600 baud)
Prices • Specials • Important Information • More!

Order Toll Free: 1-800-558-0411 *FAX: (414) 358-3337*

AMATEUR ELECTRONIC SUPPLY® Inc.

5710 W. Good Hope Road; Milwaukee, WI 53223 • Phone (414) 358-0333

AES® BRANCH STORES

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
1-800-321-3594

ORLANDO, Fla 32803
621 Commonwealth Ave
Phone (407) 894-3238
1-800-327-1917

CLEARWATER, Fla 34625
1898 Drew Street
Phone (813) 461-4267
No Toll Free Line

LAS VEGAS, Nev 89106
1072 N. Rancho Drive
Phone (702) 647-3114
1-800-634-6227

Since 1957

Therefore, those who experiment on these higher microwave frequencies tend to use a dish.

As for feedlines, above 2 meters all coax cables present nearly unacceptable attenuation problems. Therefore, you must look at hardline as a possible solution for feeding the antenna. Even for 6 and 2 meters extremely low-loss coax cables and connectors are a must.

ZLS in 6 Meters, Again!

Both Al Ward, WB5LUA, and his son, Bryan, N5QGH, reportedly worked ZL1ANJ and ZL2TPY in what appears to have been a multi-hop sporadic-E opening around 0030–0100 UTC on 13 January. Also, Herb Spoonts, W3IWU, reported that he heard Randy Zerr, N7JJS, working Kerry, ZL2TPY, and bits and pieces of Kerry's transmissions. Additionally, Herb reported that about 15 minutes after hearing Randy he faintly heard Martin, ZL1ANJ. Herb also reported that he could hear the ZL video until 0200 UTC. Herb goes on to report that he heard XE1J at about the same time.

Was this multi-hop sporadic-E, or multi-hop sporadic-E with a TE link-up? Herb counts at least eight hops between him and ZL. It's only speculation.

W3XO Reports on FAI

I received the following report from Bill Tynan, W3XO, concerning an FAI opening on 2 meters. Perhaps this is a bit of a coup, having the former VHF editor for *QST* writing a portion of the *CQ* column, but I won't make a big deal of it, hi!

"Mid Winter FAI Opening: Last evening I experienced my first actual observation of what has become known as Field Aligned Irregularities, or FAI (although I am still not certain that this is the proper term for the phenomenon). During the evening we had one of the best winter 6 meter Es openings I have seen in some years. Actually, it may have been a continuation of an opening earlier in the afternoon, when I worked XE2HWB DL44 at 2030Z 12/19.

I don't know when the evening opening began, but I logged my first contact (VE7RJ DN09) at 0228 12/20. I went on to work K6KLY (CM87, 0231), W5FF (DM64), KB7UWC (CN96), WB2ODH/6 (DM04), K7ICW (Las Vegas ?), VE7FEI (CN88), KA7MCX (CN87), KE7CX (?), WB9AJZ/6 (?), KJ6HI (?), KE7GH (DM43), WØLSD (DM68), K7UU (?), and KE7SW (CN87)—the last one at 0318.

"I then took out some time for an AMSAT related phone call. When I started listening again, I heard stations to the west warning of the "possibility of FAI." So I started paying more attention to 2 meters.

"At 0431Z I completed a CW contact with WE7L DM43 on 2. I gave him a 55A, but that was probably a little optimistic. Then at 0446 I worked NIIRZ/5, Socorro, NM DM64 on 6 meters. He was S-9, running only 10 watts to a vertical. At 0451 I worked Dave Batcho, N5JHV, in Las Crucces, NM, about 200 miles to the south, who runs high power and a 9-element Yagi. Dave was about 5-5 with an aurora sound to his signal. He said that he had heard WE7L working someone. We moved to 2 meters but heard nothing. At 0459Z I worked AA7A, DM43, on 2 meters. He had a good strong signal. I gave him a 55A. At 0539 I worked W7RV on 2 meters, giving him a 33A. I gave "A's" because the stuff sounded so much like aurora.

I was hampered because my rotator has been on the fritz and the antenna points wherever the wind takes it. It was at about 300 degrees when I looked earlier in the evening before it got dark. That should be about the right direction for this mode of propagation. Nevertheless, I was unable to optimize signals by pointing the beam. During the time I was working the 2 meter stations I was running 150 watts to a solid-state amp.

"Later I heard N5JHV (I believe via tropo, because he had a T-9 note). When he didn't come back I spent a few minutes hooking up the 8930s (700 watts). But by the time I got it going, things were about over. I did work KN5S, also Las Cruces, on 6 meters at 0615Z. He was quite weak with an auroral-like sound. How he heard my 50 watts I'll never know. Anyway, I got him to try 2 meters. "However, nothing came of it.

"Others I know who were in on the 2 meter opening included KB5IUA, KB5NFN, and WF8C/5, all EL29 (Houston area). Altogether quite an evening.—73 de Bill Tynan, W3XO/5"

Does Lightning Cause Sporadic-E? (cont.)

My lead topic in the January column brought a quick response from Sid Lieberman, WA2FXB. With his letter he sent me copies of papers he presented at the 1986 Mid Atlantic and Northeast VHF conferences and a copy of a study he did of sporadic-E openings between 1970 and 1975. In them he theorizes that sporadic E and lightning are caused by vagaries of the Sun.

Not a week later I received a letter from Jim Stewart, WA4MVI, along with a copy of an article he published in February 1984 *QST*. He equally insisted that lightning does indeed cause some sporadic-E, and that as an ex-FAA employee he had access to information to prove his position.

About the same time I received a letter from Pete Petri, WA5JCI, explaining that there is not as much unknown about the troposphere as believed by Sentman and Wescott. And that because of his observations via baloon launches, he believes there is not much to support the belief that lightning causes sporadic-E.

With these two opposing views, both equally convinced that they are right, one has some very interesting ideas to ponder. Perhaps one of the questions we should also be asking is "Does sporadic-E cause lightning?" Nevertheless, I will devote more to a future column on this very controversial subject.

The Rover Controversy Continues

I received the following E-mail communication from Tom Trent, AA7NH, in Oregon, who has a bit different perspective on Rovers.

"**Rovers in VHF Tests**: I enjoy your column in *CQ*, and am an active VHFer here in the northwest. I have done a lot of roving, as well as many grid expeditions during non-contest times. The past two years have limited my treks to contest times, due to the demands of graduate school. My old call was WA6PZL, in Southern California, and together with N6ENU have put DM31, 32, 36, 37, 24, 25, 16, 17, 18, 19, 07, 08 and CM96, 95, and 94 on the air, more than once in many cases.

"We liked to do this even before there was

Here's your *new* 2-meter hand-held...

...that also works on 70 cm!

STANDARD'S C178A is a superb full-featured 2-meter rig — and it transmits and receives on 438-450 MHz as well! You get up to 5 watts output on 144-148 MHz, plus 50 mW out on the 70 cm band — plenty for hamfests or to work into nearby repeaters! All this, with Standard's unsurpassed performance and reliability.

LOOK AND COMPARE:

- 110-174 + 320-475 MHz receive (AM programmable for aircraft)
- 144-148 + 438-450 transmit (expandable for CAP, MARS)
- Best intermod rejection of any hand-held!
- Up to 5W out (4 programmable power levels) on 2 meters; 50 mW on 70 cm
- 40 memories, plug-in expandable to 200
- Dual frequency watch (4 modes)
- 7 scan modes; all programmable for Pause, Busy or Hold
- CTCSS encode/decode built-in
- Ten 15-digit DTMF memories
- DTMF Paging/Coded Squelch

Plus ... 2.3-15 VDC operation; 8-step battery save; call channel; one-touch squelch off; auto power off; PTT and keyboard lock; and much, much more!

For further information on the C178A or any of the many other fine Standard products, please contact your nearest Standard dealer today. Specifications, features and price are subject to change without obligation or notice.

STANDARD Amateur Radio Products, Inc.
P.O. Box 48480
Niles, Illinois 60714
Tel. (312) 763-0081 Fax (312) 763-3377

CIRCLE 150 ON READER SERVICE CARD

C178A Accessories:

CAW150 Mobile power cable with cigarette lighter plug
CAW151 Base station power cable
CAW152 Mobile cable, cigarette lighter plug and noise filter
CAX03 Bottom cover
CBT171 Battery case (6 cell)
CBT175 Battery case (2 cell)
CHP111 Headset microphone
CHP150 VOX microphone
CLC171 Standard carrying case
CLC172 Large carrying case
CLC555GN Green pouch
CLC555OR Orange pouch
CMB112 Mobile bracket
CMB600 Helmet clip for CHP150
CMC150 Mobile charger
CMP111 Speaker microphone
CMP113 Tie pin microphone
CMP115 Mini speaker microphone
CMU161 200 channel memory
CNB171 7.2V 700 mAh NiCad battery
CNB172 12V 600 mAh NiCad battery
CNB173 7.2V 1100 mAh NiCad battery
CSA181A Rapid desk charger

SR STANDARD®

a rover class. I was also more or less a 'captive' rover for the N6CA group in 1987; although I worked all comers, N6CA knew when I would be on from HF laison. Since my move to Oregon in 1991 I have put on CN93, 94, 83, DN02, 03, 04, 14, 15, 24, and 25.

"It is great to see so many rovers active now, and I think the inclusion of the rover class has had a positive impact on VHF and VHF contesting. That being said, I must say I have a real big problem with the 'rover squared' idea.

"This type of operation can sure run up a big score, but it does little to stimulate activity, which seems to me to be one of the purposes of VHF contests. My roving activity has always had the goal of providing other VHF stations with contacts in grids that have no activity, giving some their number 100, or their last in the area grids.

"Here, I usually poll the locals to see what grids they need (there are many out here!) and plan a trip from there. I have found many to be generous with a few bucks for gas, etc., as well. My next activity will probably be from some of the coastal grids in Oregon, and CN83 needs another good effort.

"I am not sure what, if anything, can be done to regulate 'rover squared' operation and its blatant violation of the spirit of the contest rules. Any regulation would hurt the rest of us. I wonder if these operators are regulars on the VHF/UHF bands. If they are, I would think they would get chewed out for going out to a bunch of grids and not allowing enough people to work them. I realize that my attitude is partially a result of living on the west coast and the northwest in particular, where there are so few stations to work that every effort must be made to get them all from every grid on each band.

"My totals from two or three grids can sometimes beat the high single-op and even multi-op scores in some tests, with only two bands. A 'rover squared' scenario would be ridiculous!

"Hope I'm not taking up too much of your time getting this off my chest! I have been inactive for the past two months due to a move, but will be back with a vengeance. Bill, NØXX, is designing some Yagis for me and the tower is waiting to go up. Now if my professors would only lighten up a little! Will send activity reports as soon as I'm on; there is a good deal of 2 meter SSB activity this winter in Oregon, quite unusual. 73 de Tom Trent, AA7NH."

. . . But Roverring Is Supposed To Be Fun!

Perhaps because of the controversy surrounding Rover operation, we are losing sight of the fact that this is just a hobby and is supposed to be fun. Recently, I received a copy of an article that my friend Jim Rudnicki, NZ7T, submitted to "The Dummy Load," his local newsletter in Utah. I am sharing it in this column because Jim, as a novice in rover operations, presents a fresh and amusing facet of being a rover.

"Rovering from Cement: Before you dismiss this article as another tadpole/dipole fish story, let me explain; As you may (or may not) have noticed, I was gone for several weeks. The FAA in its infinite wisdom had sent me off to Oklahoma City for two weeks of fun in the sun. Not wanting to sit around on the weekend with nothing to do, I decided to learn about the vagaries of sporadic-E radio-wave propagation on the VHF bands.

"I had the pleasure of meeting Joe Lynch, N6CL, the Oklahoma Section Manager, and VHF Columnist for *CQ* magazine. Joe was kind enough to invite me along as a guest operator for his rover operation during the ARRL VHF QSO Party held on June 11–12.

"A rover is a mobile station with one or two operators who operate on as many VHF/UHF bands as possible, from as many Maidenhead Grid Locations as possible, during a VHF contest. While this sounds well and good, my experience from this weekend defines roving as two crazy hams careening all over central Oklahoma in an old van, operating while mobile, searching for a quiet, out of the way spot, setting up antennas, contesting, packing up, then off over hill and dale to repeat the process several times!

"The day started innocently enough; Joe picked me up in his van around 10 AM, and we proceeded southwest into central Oklahoma. At this point there didn't seem to be any real urgency to this roving at all. We stopped after a while and put oil, gas, and water into the van. Joe asked, 'What time is it?' After I told him it was 20 minutes before contest time, the pace accelerated dramatically. Joe started quickly hooking up the Yaesu FT-726, amplifiers, and SQLOOP and whip antennas. Innocently I asked, 'Are you going to operate while you drive?' Joe replied, 'Of course not, you are!'

"'I am?,' I said. 'I don't even know anything about this type of contest?' After the initial shock wore off, we were on our way, making contacts. Joe was navigating in and around Chickasha looking for a quiet spot that wouldn't upset the local farmers, and I was leaning sideways out of my seat operating the FT-726, which was on the floor between us—which brings me to the first major question of the day: How in the heck do you hold the VFO knob still while driving on a washboard road, much less hear what's going on on the radio?

"After our first few contacts on 6 meters, I was well into the swing of things. Six meters was open via sporadic-E propagation into the east coast, and we were making contacts with just a mobile whip. With luck like that I couldn't wait until we stopped and put up the beam! But our luck didn't hold. Near Verden (Grid Square EM05) we stopped and put up the beam, but by that time the band had gone dead. Really dead. That's why it's known as `sporadic-E!'

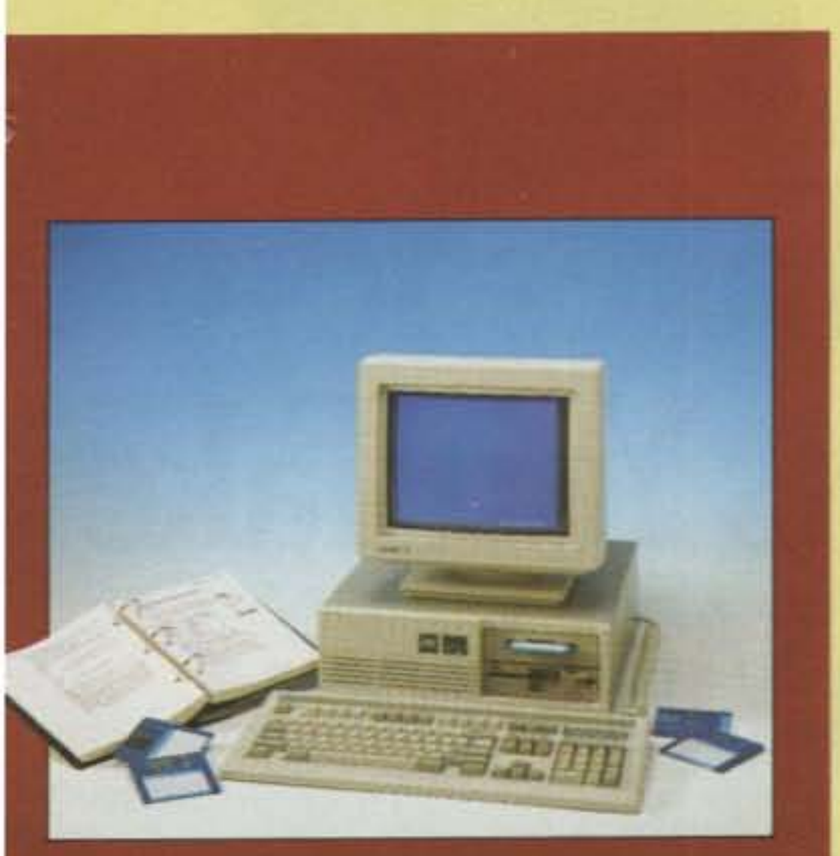
"Oh well, not to worry. We just packed everything back up and headed back into Chickasha for more gas, oil, water (for the van), and some burgers (for us)! Contesters do get hungry!

"Our next stop was near Cement, OK, in Grid Square EM04. Cement is a *very* small town, and we didn't have to try very hard to find a quiet spot. We set up shop on a quiet dirt road between some wheat fields, lashed our 2 meter beam to a large convenient fencepost, and put the 6 meter beam on a tripod on top of the van.

"This time, after the beams were up, 6 meters was wide open. We made well over a hundred contacts on 6 meters, and also made several contacts on 2 meters. It was truly amazing how good the propagation was on 6 meters. We worked stations from New York to Nevada, and as far north as Ontario, Canada. The only problem we had was that after all that driving around I had completely lost my sense of direction. (Those of you who have known me for a long time probably are not surprised!)

"At one point Joe asked me to point the 2

Examiner!



- create exams for all written and Morse code exams with ARRL computer software.
- use the multiple-choice Morse code exam format, at your VE team's option.

To become an ARRL VE, please complete and return the VE Application shown.

Give us the opportunity to provide you with first-class service.

YOU DESERVE IT!

ARRL VEC

American Radio Relay League–VEC

225 Main Street
Newington, CT 06111

ARRL/VEC
VOLUNTEER EXAMINER APPLICATION FORM

Please type or print clearly in ink

Control Number
(ARRL/VEC will assign)

☐ General
☐ Advanced
☐ Extra

Call: _____

License expiration date: _____

Name: _____
(First MI Last)

Mailing Address: _____

City: _____ State: _____ ZIP: _____

Day Phone: (_____) _____ Night Phone: (_____) _____

Was your license ever suspended or revoked? ☐ Yes ☐ No
Have you ever been disaccredited by another VEC? ☐ Yes ☐ No
If yes, which VEC(s) and when?
Do you have a call sign change pending with FCC? ☐ Yes ☐ No
Do you have any kind of Form 610 pending action with the FCC? ☐ Yes ☐ No

Person to contact if you cannot be reached? _____ _____
(name) (phone)

Mailing address where UPS or daytime delivery is ***reliably*** possible:

_____ _____
(name) (street address)

_____ _____ _____
(city) (state) (zip)

For instant accreditation, have you participated as a VE in another VEC program, and is your accreditation in that program current? ☐ Yes ☐ No
If yes, which VEC? _____

CERTIFICATION

By signing this Application Form, I certify that to the best of my knowledge the above information AND the following statements are true:

1) I am at least 18 years of age.
2) I agree to comply with the FCC Rules-(see especially Subpart F—Section 97.515 [b]).
3) I agree to comply with examination procedures established by the ARRL as Volunteer Examiner Coordinator.
4) I understand that violation of the FCC Rules or willful noncompliance with the VEC will result in the loss of my VE accreditation, and could result in loss of my Amateur Radio operator and/or station licenses, or both.
5) I understand that even though I may be accredited as a VE, if I am not able or competent to perform certain VE functions required for any particular examination, I should not administer that examination (Section 97.525[a][3]).

_____ _____ _____
(signature) (call sign) (date)

(Please attach a photocopy of your Amateur Radio license, and if applicable a photocopy of any other VEC accreditation held, to this application.)

CIRCLE 4 ON READER SERVICE CARD

Now The Company That Takes You Around The World Lets You Take The World Around With You.

The Drake SW8 – Finally, Professional Desktop Performance In An Affordable, Portable World Band Shortwave.

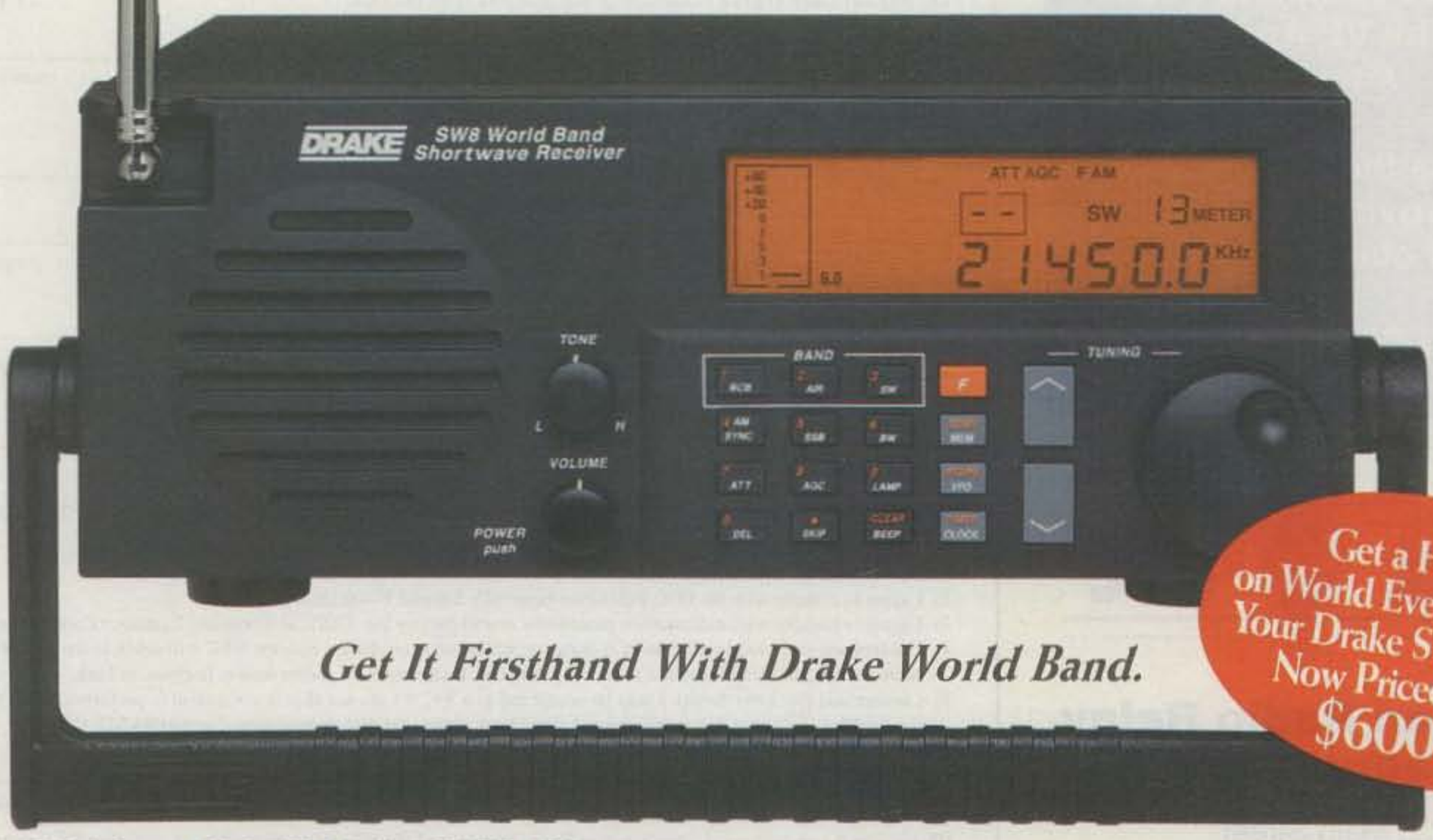
The company that has been setting the standards in premium-quality world band shortwave performance now puts top-of-the-line features and technology at your fingertips with the SW8…wherever you want to take it. Designed for both desktop use and easy portability, the Drake SW8 includes many of the same features that have made Drake a perennial favorite of experts – superb audio, versatility, and the unique combination of professional quality and functional simplicity. So tune in the world and get the best of all worlds – quality and affordability, desktop technology and portability.

The Drake SW8.

To order your SW8 direct, for more information, or for the dealer nearest you call:

1-800-937-2531

DRAKE



Get It Firsthand With Drake World Band.

Get a Handle on World Events…Order Your Drake SW8 Today. Now Priced under $600.00

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

CIRCLE 146 ON READER SERVICE CARD

meter beam towards Dallas. 'OK fine,' I said. 'Which way is Dallas? ' I had no clue. Later in the evening when the stars appeared I was able to find my way around.

"During our stint in Cement, the owner of the aforementioned fencepost showed up. What he found were two crazy hams, one hollering into a radio, 'CQ CQ Contest N6CL N6CL EM04 EM04!' and another ham hanging out the door twisting all antenna on the roof.

"The farmer was very nice and polite as he said, 'I know it's none of my business, but what in the heck are you doin'?' We kindly explained in nice general terms what we were up to. The farmer said he had never heard of anything like that, but he just wanted to be sure we weren't 'stealing his TV signals!'

"'Oh yes, and by the way that's my gate you're using to hold up your antennas.' 'Hmm,' I said. 'Would you like us to move?' The farmer said, 'Nahh, y'all just have your fun.'

"With a rather confused look in his eye, off he drove, and we got right back to work!

"Work we did! Six meters yielded dozens of multipliers well into the late night hours. Joe operated and I logged, and vice versa. Around 11 PM we decided we'd had enough for one day, and took the antennas down. Taking antennas down when your all tired out is one thing. Taking antennas down in the pitch darkness when you're very tired is another! Since we were out in the middle of nowhere, we just laid the antennas out in the middle of the road. Together we dismantled the masts, coiled coax, and threw everything in the back of the van.

"After a very long and tiring day, I arrived back at my apartment at 12:30 AM ready to fall down and sleep for a week. Joe on the other hand ventured out again on Sunday, activated two more grids, and even made some 432 MHz contacts with a 2 meter mag mount that he placed on the side of the van for horizontal polarization! Overall it was a very successful contest. We made 389 contacts in 224 grids, operating from grids EM04 ,05, 16, 06, and 15. A short breakdown follows: 6 meters, 295 QSOs, 171 grids; 2 meters, 84 QSOs, 46 grids; and 70 cm, 10 QSOs, 7 grids.

"The moral of this story is that there are many facets to ham radio. Don't be afraid to find out about the other modes and bands, and find out what folks are up to! I was lucky enough to ride with an expert (Hah!—ed) in this field, and pack a lot of learning into a long day. Of course now I have caught the bug for VHF operating, and my budget may never be the same! One of the last things Joe told me was, 'I hope to hear you on 2 meters in August during the *Perseids* Meteor Shower.' Meteor shower? Hmm, I guess that will be another story . . . 73 es happy operating, Jim Rudnicki, NZ7T."

GPS Receiver Supports Grid Locators

I first came across this product at the Microwave Update conference during last October. Charles Osborne, WD4MBK, brought his Trimble Navagation Scout GPS receiver to the conference to show its features, including that it supported the Maidenhead grid locator system. I had seen other GPS receivers before, but as a rover operator, I was impressed with the fact that this one could make the job of driving down the road and knowing where I was a lot easier.

Over last Christmas vacation I acquired one of these units and immediately was impressed with its practicality. Not only does it cover the usual degrees and minutes and degrees and seconds readouts, but it covers Maidenhead grid locators and their own version of the Maidenhead system called the Trimble Grid Locator system, plus five other systems of telling you where you are. With the Trimble Grid Locator system Trimble has added two more numbers and two more letters to give your location down to ten digits. When I first turned on the Scout, I found out that my operating desk was located at EM 15 FM 43 NK.

However, with this seemingly infinite tracking comes the confirmation of how restricted the GPS system is when it comes to reliability. Because the DOD "dirties" the GPS signals to control the accuracy to no better than 100 feet, the accuracy of these handheld units represents this variance.

Therefore, while sitting in front of the computer, my desk "moved" from EM 15 FM 43 NK to EM 15 FM 43 MS. Nevertheless, for my purpose, it is good enough to use for knowing what grid locator I am within. And it is fascinating to drive down the road and watch these sub-sub-sub squares click off.

Because Trimble has patented the inclusion of these grid locator systems as a part of their software for their GPS, their unit is the only one currently on the market offering these readouts.

Are you planning to operate EME portable? Then take the Scout with you, because within their software package is the ability to calculate the position of the sun and the moon at any time, on any day, at any location.

Are you a rover station that is working in conjunction with one of the big club stations? Then take the Scout along. Not only will you know where you are, but you can program the software to tell you where to point your antennas in order to work back to the club station *and* to tell you just how far you are from your home base (remember the 175 mile rule for club competition?).

Do you work the satellites? Then the Scout will tell you where on earth you are so that you can know how long you will be under the footprint of the satellite you are trying to work through.

Among the other items in the software is a system they call "Over and Up." Do you want to know the coordinates of a ridge in the distance? Well, with a scaled topo map and the Scout you can find this out.

The suggested retail price is $795. If that seems a bit stiff, then consider having your club buy one for its members' use.

I plan a full scale review of the Scout in a future issue of *CQ*. However, if this sketch is enough to whet your appetite, and you want one for yourself right now, then contact Trimble Navagation, 9020-II Capital of Texas Hwy N., Suite 400, Austin, TX 78759, or phone 800-959-9567.

Logging Program Now Supports Grid Locators

It seems like Christmas was the time for product surprises. Right after Christmas I received version 4 of the Electronic 2nd Op logging program. This software package, which used to be known as the N6RJ 2nd Op program, has been completely revamped.

John Fail, KL7GRF, has been the principal developer for this program since its inception. While Jim Rafferty, N6RJ, acquired the rights to the program, his position as vice president at HRO kept him too busy to work on it. When Jim became a Silent Key last year many thought that the program had been withdrawn. However, this is not the case. With John's workmanship it has been extensively revitalized.

Now the program supports grid locator and WAS record keeping. It also supports logging to 10 GHz! Instantly (assuming you are not using a slow clone as your computer) you can find out how many countries, states, and/or grid locators you have worked and/or confirmed on any of the more popular VHF+ frequencies.

I have used the 2nd Op program for several years and have always been impressed with it. I am quite pleased that John has updated it to include these new features. I hope to do a full-scale review of it in a future issue of *CQ*.

You can purchase your copy through any HRO store for $59.95, plus shipping. You can also order it direct from John at GRF Computer Services, 6170 Downey Avenue, Long Beach, CA 90805 (310-531-4852, FAX 310-630-2124).

News of Newsletters

The "220 Notes, the National 220 MHz Newsletter," which was published for so many years by Art Reis, K9XA, is in a custodialship, being held by Burt Hicks, WA6MQV. Burt reports that there has been very little news and because of his lack of time to devote to being the investigative reporter, he is looking for someone to take over as editor. If you are interested, contact him at 28221 Stanley Court, Canyon Country, CA 91350 (805-251-5558, FAX 805-251-5572).

N6CL To Be on Amateur Radio Talk Show

"Ham Radio & More," a local radio call-in talk show for the past two years, went national this past November. Since then host Len Winkler, KB7LPW, has had a number of amateur radio celebrities on the show. Now, however, he is getting to the bottom of the barrel. He has invited your editor to be on the 20 March show.

If you are interested in hearing me promote the wonderful world of VHF+, then tune in on that Sunday afternoon. "Ham Radio & More" airs locally in Phoenix on KFNN 1510 AM, from where the national broadcast originates. It can be picked up in any market by a local talk radio station. If a station in your area is not carrying it, all you need to do is contact a local station (preferably a talk radio station) and have them call the Talk America Network at 508-460-0588.

Talk America already has over 80 affiliates and you can get that list by calling Talk America or Len Winkler at 602-861-0303. The show can also be picked up via satellite Satcom C-5, Transponder 19, 6.0 audio and Galaxy 2, Transponder 3, Channel 55.4. It is the show's intention to increase the public awareness of amateur radio and thus help the hobby continue to grow.

For more information about Ham Radio & More contact Len Winkler, KB7LPW, at 602-861-0303. For sponsorship information contact Ron Cohen at KFNN at 602-241-1510.

CQ, QST Editors To Host Forum At Dayton

As of the writing of this column, Emil Pocock, W3EP, *QST*'s VHF editor and I have agreed to conduct a joint forum during the VHF Session at Dayton. Details are still being worked out, but I can say preliminarly that we will have around 50 minutes to field your questions and concerns about the VHF+ world. Hopefully, I will have more details of the other forums in next month's column.

The VHF+ Sourcebook

Those of you who make it to Dayton this year should be sure to come by the *CQ* booth. Chances are that you will find me autographing my new book, *The VHF+ Sourcebook*. When I re-entered the wonderful world of VHF a few years ago I could find no single source of information pertaining to it. I ended up consulting many different books and asking many, many questions of the sages of the bands. When I took on this column, I felt that eventually I could put together a book that had all the information for the beginner to the VHF+ amateur bands in one place.

As I am preparing this column, I am in the final stages of completing the book. My friend Terry Littlefield, KA1STC, the editor of *Communications Quarterly*, is editing the book. If all goes well between now and Dayton, the book will be completed and on the shelf.

So come by and see me at the *CQ* booth. If the book is out and you buy one, I will autograph it on the spot, no extra charge! Seriously, the book would not be possible without your support of this column. I really appreciate all that you have communicated to me concerning your activities these past few years. I look forward to continuing to receiving your correspondence in the future. Who knows? Maybe you will help me write yet another book—maybe even one on meteor scatter.

North American VHF/UHF Directory Now on Sale

Tim Marek, NC7K, has announced that he is publishing a directory of North American VHF+ operators. The directory will include names, callsigns, grid locators, and where available, phone numbers. This directory is the combination of the *Western States VHF Directory* (John Carter, KØIFL's old directory) and the unpublished 2 meter and 70 cm and above directories.

The price was not available at press time. However, if you are interested, contact Tim at 702-972-4722.

Internet Anybody?

Tim has been reporting some juicy stuff to Bob Cerasuolo, WA6IJZ, the editor of the "West Coast VHFer" newsletter, much of which he has been getting from Internet. I asked Tim how he accessed Internet, and he said that he did so through a local BBS. I am wondering if any readers have suggestions on how I can access Internet so that I can bring some of these juicy items to this column. Please let me know.

And Finally . . .

You may have noticed that I am now including whole correspondence in this column. I have acquired a scanner and some decent OCR software. Therefore, if I can scan in your correspondence and have the room for it, I might just publish the whole thing. So if you do not want to appear in print, please let me know when you write to me, and write you must. After all, that's how I make this, your column, the best in the VHF+ world.

I already have more goodies from some of you, but I will have to wait until next month to share the rest with you.

I want to thank all of you who have written or in some way communicated with me. I especially appreciate Wayne King, N2WK, correcting me on my mistakenly saying that there were no "rover squared" operations in the June contest.

As always, my telephone number is 405-528-6625; FAX number 405-528-0746; CompuServe 72124,2734. My address is at the beginning of the column. Make sure the zip code is correct in your records as 73101. For a couple of months it was showing up incorrectly in this column and the people in Blanchard, Oklahoma, were sending my mail back because they had never heard of me!

Until next month . . .

73, Joe, N6CL

DAYTON hamvention® '94

April 29, 30 & May 1, 1994

General Chairman, Dave Grubb, KC8CF

Asst. General Chairman, Ken Allen, KB8KE

✷ Giant 3 day Flea Market ✷ Exhibits ✷ Activities for the Non-Ham

Information

General Information: (513) 276-6930
or, write to
Hamvention, Box 964, Dayton, OH 45401-0964
Lodging Information: (513) 223-2612
(No Reservations by Phone)
Flea Market Information: (513) 276-6932

Lodging

Please write to **Lodging, Dayton Hamvention, Chamber Plaza, 5th & Main Streets, Dayton, OH 45402-2400** or refer to our 1993 Hamvention program for a listing of hotel/motels in the Dayton area.

Special Awards

Nominations are requested for Amateur of the Year, Special Achievement and Technical Excellence awards. Refer to the Hamvention Program for nomination form or contact Hamvention Awards Chairman, Box 964 Dayton, OH 45401-0964.

1994 Deadlines

Award Nominations: March 1
Advance Registration and Banquet
USA - April 8 Canada - April 1
Flea Market Space: February 1

Flea Market

Flea Market Tickets (valid all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. A maximum of 3 spaces per person (non-transferable). Electricity is available in a portion of the last Flea Market row for $40 additional per space. Rental tables and chairs are not available in the Flea Market. Vendors ***MUST*** order an admission ticket when ordering Flea Market spaces. Please send a separate check for Flea Market space(s) and admission ticket(s). Spaces will be allocated by the Hamvention committee from all orders received by February 1. Please use 1st class mail *only*.

Notification of Flea Market space assignment will be mailed by March 15, 1994. Checks will not be deposited until after the selection process is complete.

License Exams

Novice thru Extra exams scheduled Saturday and Sunday only. Send FCC form 610 (Aug 1985 or later) - with requested elements shown at top of form, copy of present license and check for prevailing rates (payable to ARRL/VEC) to Exam Registration, 708 Mapleside Dr. Trotwood, OH 45426

Free bus service

Free bus service will be provided between Hamvention and our satellite parking areas. In addition, some motels may offer transportation to Hamvention.

HAMVENTION Is sponsored by the Dayton Amateur Radio Association Inc.

Advance Registration

Enclose check or money order for amount indicated in U.S. dollars and type or print your name and address clearly.

Make checks payable to:
Dayton HAMVENTION Mail to -
Dayton Hamvention Box 1446, Dayton, OH 45401-1446

Flea Market tickets *Please enclose two checks*
❑ Send admission tickets **only** if flea market space(s) assigned.
❑ Send admission tickets **regardless** of flea market space assignment.

		How Many	
Admission (valid all 3 days)	_____	@ $11.00*	$_____
Grand Banquet	_____	@ $22.00**	$_____
Alt. Act. Luncheon (Saturday)	_____	@ $8.50	$_____
(Sunday)	_____	@ $8.00	$_____
Flea Market ‡ (Max.3 spaces)	_____	$30/1 space	
	_____	$60/2 adjacent	
	_____	$150/3 adjacent	$_____
Electricity	add _____	$40.00/space	$_____
Covered tent	_____	$215.00 ea.	$_____
		Total	**$**_____

Name _____ Call _____

Address _____

City _____ State _____ Zip+4 _____ – _____

Daytime Phone # ( ) _____ Evening Phone # ( ) _____

* $14.00 at door
**$24.00 at door, if available
‡ Admission ticket must be ordered with flea market tickets

Radio FUNdamentals

BY BILL ORR, W6SAI

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

The Three-Element Yagi

In my last column I discussed the advantages and disadvantages of the two-element Yagi beam. Its principal virtue is a high gain figure for a short boom. At the design frequency, gain is approximately 5 dBd. This is achieved at a boom length of less than 0.1 wavelength. Better performance is obtained with a director element than with a reflector.

The main disadvantage of the two-element Yagi is poor front-to-back ratio. Typically, it will run from 10 to 15 dB. Input impedance is about 12 to 15 ohms, depending on parasitic element tuning. This value permits a simple match system such as a gamma or hairpin match to be used.

All things considered, the two-element Yagi is a good performer for amateurs who desire a good gain figure, but are not worried about mediocre signal rejection from the rear of the antenna. It is small and light weight. In other words, it delivers a lot of "bang for the buck."

The three-element Yagi is the antenna of choice on the HF bands. It provides a little more gain than the two-element version, improved front-to-back ratio, and higher input impedance. The price paid for better performance is a longer boom and more aluminum up in the air.

Boom lengths for HF three-element Yagis usually run from 0.2 to 0.4 wavelength. Short boom designs provide good gain and front-to-back ratio, but restricted bandwidth. That is, they cover only a narrow frequency range before the SWR rises over 2 to 1 on the feedline. Wider spaced arrays provide much improved bandwidth, good gain, but poorer front-to-back ratio.

As you can imagine, designing a Yagi antenna consists largely of balancing the various attributes in a mix that is suitable for the user. Commercial antennas usually shoot for a user-friendly array. The old 204BA four-element beam is a case in point. It exhibits excellent bandwidth and SWR performance. Front-to-back ratio is very good. These attributes come at the expense of gain, which is only a little higher than that of a two-element design.

There is nothing wrong with this concept. It is easy for the user to check SWR and front-to-back, but it is difficult to check power gain. The antenna provides what the user wants to observe. And he can work plenty of DX with the antenna, so the question of power gain is secondary.

48 Campbell Lane, Menlo Park, CA 94025

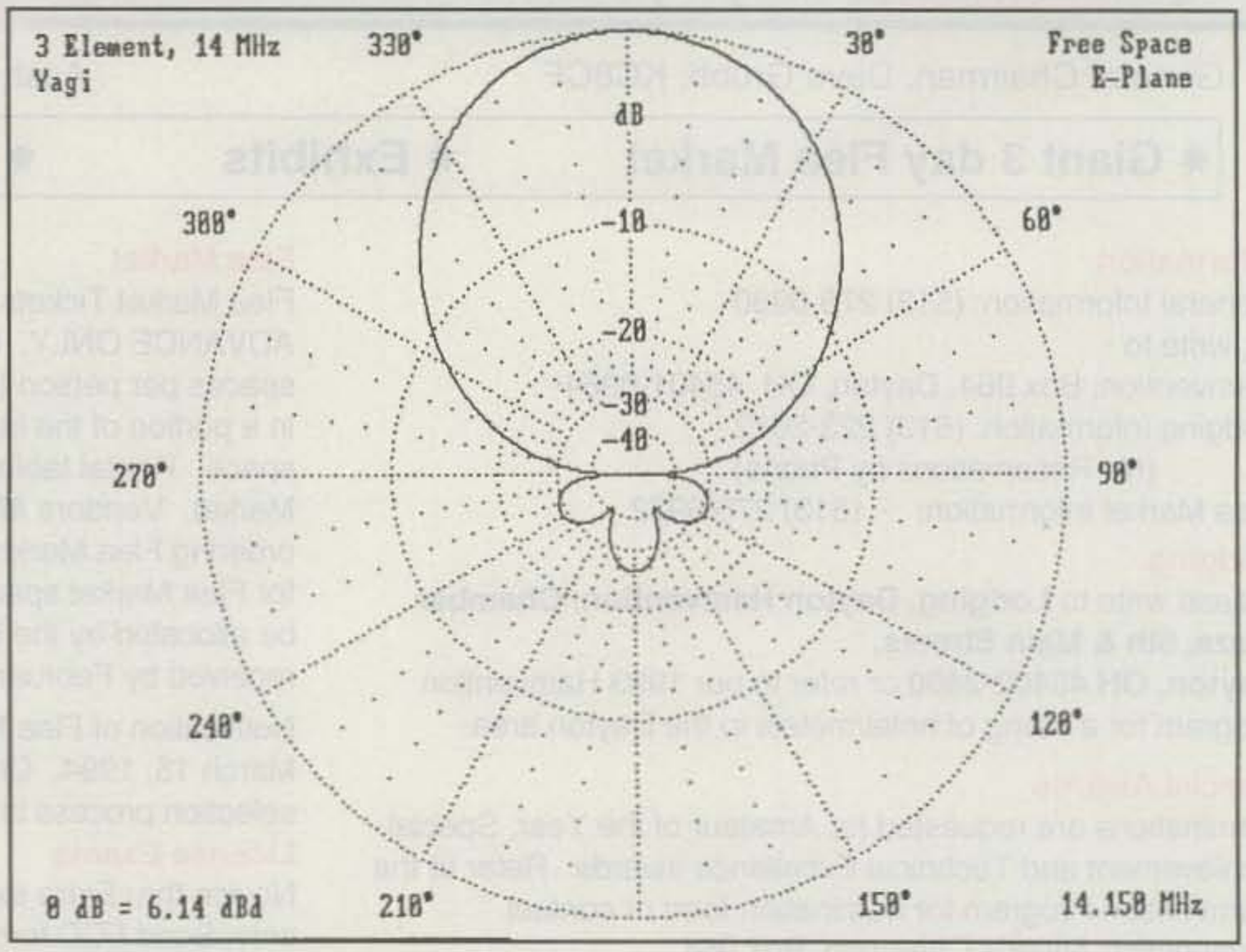


Fig. 1– Polar plot of a three-element Yagi.

Gain Figure of Merit

What are the factors that enter into antenna gain? The main factors are element lengths and spacing. If you assume the element lengths are optimized, maximum possible gain can be calculated from a gain Figure of Merit (FOM), based on antenna boom length.

One FOM study conducted by Tom Ring, WA2PHW, on an extensive collection of Yagi designs, yields this formula:

Gain (dBd) = 10 Log (5.4075B + 4.25)

where B is boom length in wavelengths.

Another FOM is proposed by Rainer Bertelsmeier, DJ9BV:

Gain (dBd) = 7.773 Log (B) + 9.28

The above formula was derived from the gain of DL6WU-design long-boom VHF/UHF Yagis.

A third gain formula is from Bill Myers, K1GQ, for HF Yagis:

Gain (dBd) = 3 Ln (B) + 9.85

The FOM does not represent the theoretical absolute-maximum gain figure, as this leads to extremely low impedances and impractical designs. The formulas were derived from gains of practical near-maximum gain Yagi designs with real-world losses and design compromises. The FOM is not intended as an overall quality rating for Yagis, as it rates gain/boomlength efficiency only. Most Yagi applications require good patterns, and this constraint always places a limit on forward gain.

Nevertheless, gain FOM provides a valuable yardstick for showing at a glance how close a particular design comes to realizing maximum possible gain.

The FOM concept is particularly helpful when used in combination with a computer-driven antenna analysis or optimization program. With a given boom length, such programs can vary element length and spacing, while displaying a FOM for each variation in the antenna.

The three-element 14 MHz Yagi design

shown in this article was derived on the Yagi Optimizer program of Brian Beezley, K6STI. The goal was to achieve maximum possible gain, consistent with good front-to-back performance, adequate SWR bandwidth, and acceptable input impedance. The WA2PHW formula gives good results for any boom longer than 0.25 wavelength, and it is used in the Optimizer program for the Yagi described here.

A Practical Three-Element Yagi For 14 MHz

Computer analysis of a Yagi antenna is an exercise in compromise. There is no free lunch, so when the designer shoots for maximum gain, for example, he forfeits front-to-back ratio or bandwidth. The trick is to balance these attributes until he achieves his objective.

The target design provides 6 dBd forward gain, better than 20 dB front-to-back ratio over the design range, and an input impedance on the order of 15 ohms or better. The FOM should be better than –1.5 dB. Boom length should be 24 feet or less. (Boom length is chosen so two 12 foot sections of tubing are sufficient.)

The design includes tapered elements, with diameters ranging from 1.25 inches at the center to 0.875 inches at the tip. The elements are mounted on small aluminum support plates attached to the metal boom with U-bolts. Either a gamma match or hairpin match may be used with the antenna.

A polar plot of the computed horizontal pattern is given in fig. 1. At the design frequency the front-to-back pattern is excellent, with three minor lobes to the rear, all of them better than 24 dB down from the frontal lobe. The "3 dB" beamwidth is about 64 degrees.

Important parameters of the antenna are shown in fig. 2. Gain varies from about 5.9 dB at 14.0 MHz to 6.4 dB at 14.3 MHz. At the design frequency (14.15 MHz) it is 6.14 dBd. This is shown in the upper-left-hand graph.

The upper-right-hand graph illustrates SWR response over the operating range. SWR is about 1.6 at the frequency extremities, falling to near-unity at the design frequency.

Front-to-back ratio is illustrated in the lower left plot. Maximum F/B is achieved near 14.12 MHz, where it peaks at 28 dB.

Input impedance falls in the 20 ohm area (lower-right graph), where a match may easily be achieved with either a gamma or hairpin match.

Power gain is about 1.3 dB less that the maximum possible amount, and this falls within the FOM limit.

This beam represents a comfortable tradeoff regarding gain, front-to-back ratio, bandwidth, and input impedance. It is possible to squeeze more gain out of

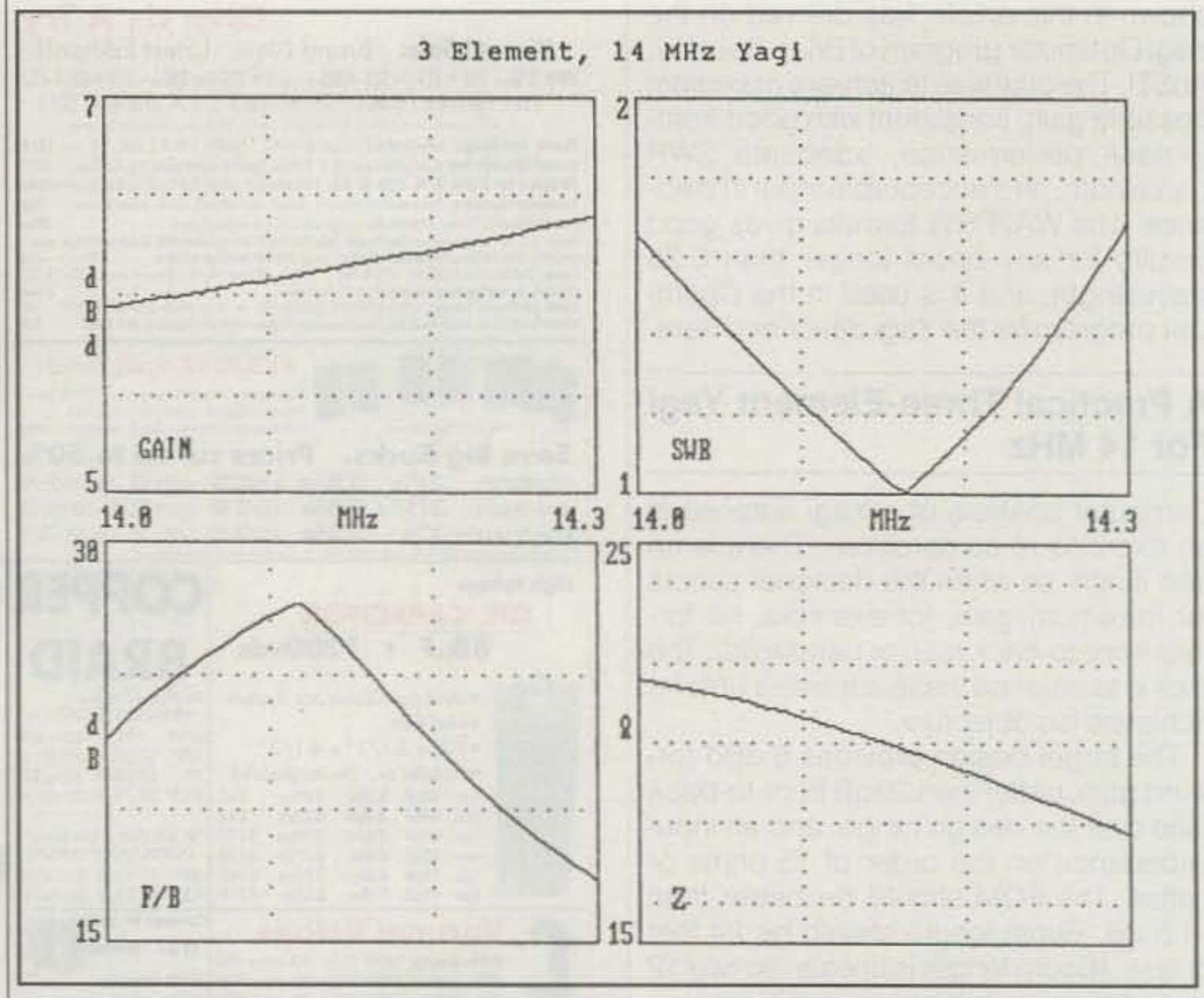


Fig. 2– Graphs for a three-element, 14 MHz Yagi. Top left, gain across passband. Top right, SWR response. Bottom left, front-to-back ratio. Bottom right, feedpoint impedance.

the three-element beam, but front-to-back ratio and input impedance must be sacrificed. I'll discuss a "maximum gain" Yagi in my next column (if I don't forget!)

Antenna dimensions are listed in fig. 3. The center section of each element is a 12 foot length of 1.25 inch tubing with a .058 inch wall thickness. The next sections are cut from a 12 foot lengths of tubing with a wall thickness of .058 inch. The sections with a diameter of 1.0 inch also have the same wall thickness. The tip sections have a wall thickness of .049 inch.

Construction details are not given here, as they are fully covered in the *Beam Antenna Handbook*, published by Radio Amateur Callbook, Box 2013 Lakewood, NJ 08701.

A Mini Flat-Top Antenna For 80 Meters

Problem: How does the 80 meter operator put up an efficient antenna in a small space? That's not easy! One idea that has proven popular "down under" is the fold-

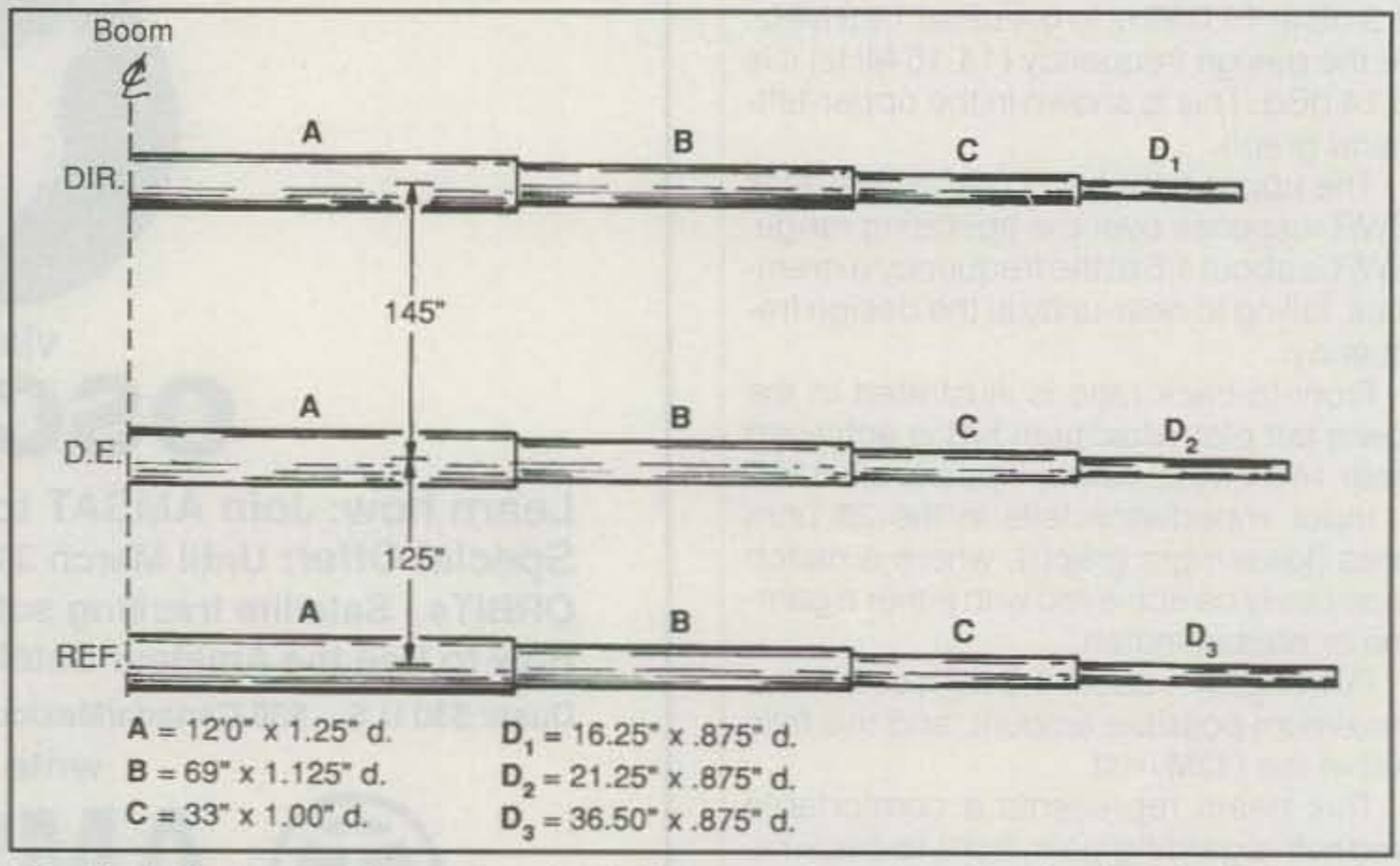


Fig. 3– Half-element dimensions (with the exception of section A, which is full length). Add 3 inches to B, C, and D for overlap when cutting the tube.

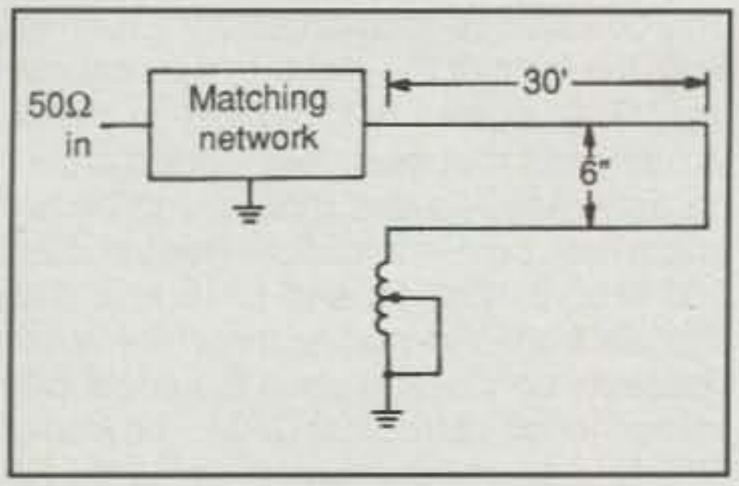


Fig. 4– Half folded dipole grounded by variable inductor. Used by ZL1AYN for 80 meter operation.

ed antenna in use by R. A. Lowe, ZL1AYN, and described in *Break-in*, a publication of the NZART. It was reprinted in the October 1993 issue of *Amateur Radio* in the "Random Radiators" column by Ron Fisher, VK3OM, and Ron Cook, VK3AFW.

This simple antenna is shown in fig. 4. It is a short folded dipole loaded by a variable inductor in the return lead. The design may also be considered as a narrow loop, and Richard Marris, G2BZQ, came up with the idea of opening the loop out to increase the efficiency of the design. His antenna is shown in fig. 5.

Loop configuation can be altered to fit the circumstances. The far end need not be folded down if sufficient space is available for a run of 20 feet or so. And the length of the feedline portion of the antenna can also be varied.

This design was intended for indoor use and was mounted horizontally across the ceiling of a room. It was slung diagonally from corner to corner and used nylon cords and plastic spreaders for support. The length of the loop should not be changed, but the amount that is bent can be adjusted to fit room size. The article states that a ground connection is recommended but may not be essential.

G2BZQ suggests that low power be used with this antenna to reduce problems of interference with nearby home entertainment equipment as well as to minimize concern over operator exposure to RF fields. For outdoor use, the basic rule of "the higher the better" applies, so a longer feeder may be necessary. Experimenters may also try increasing the width of the loop.

G2BZQ uses a simple home-made tuner unit with this antenna, shown in fig. 6.

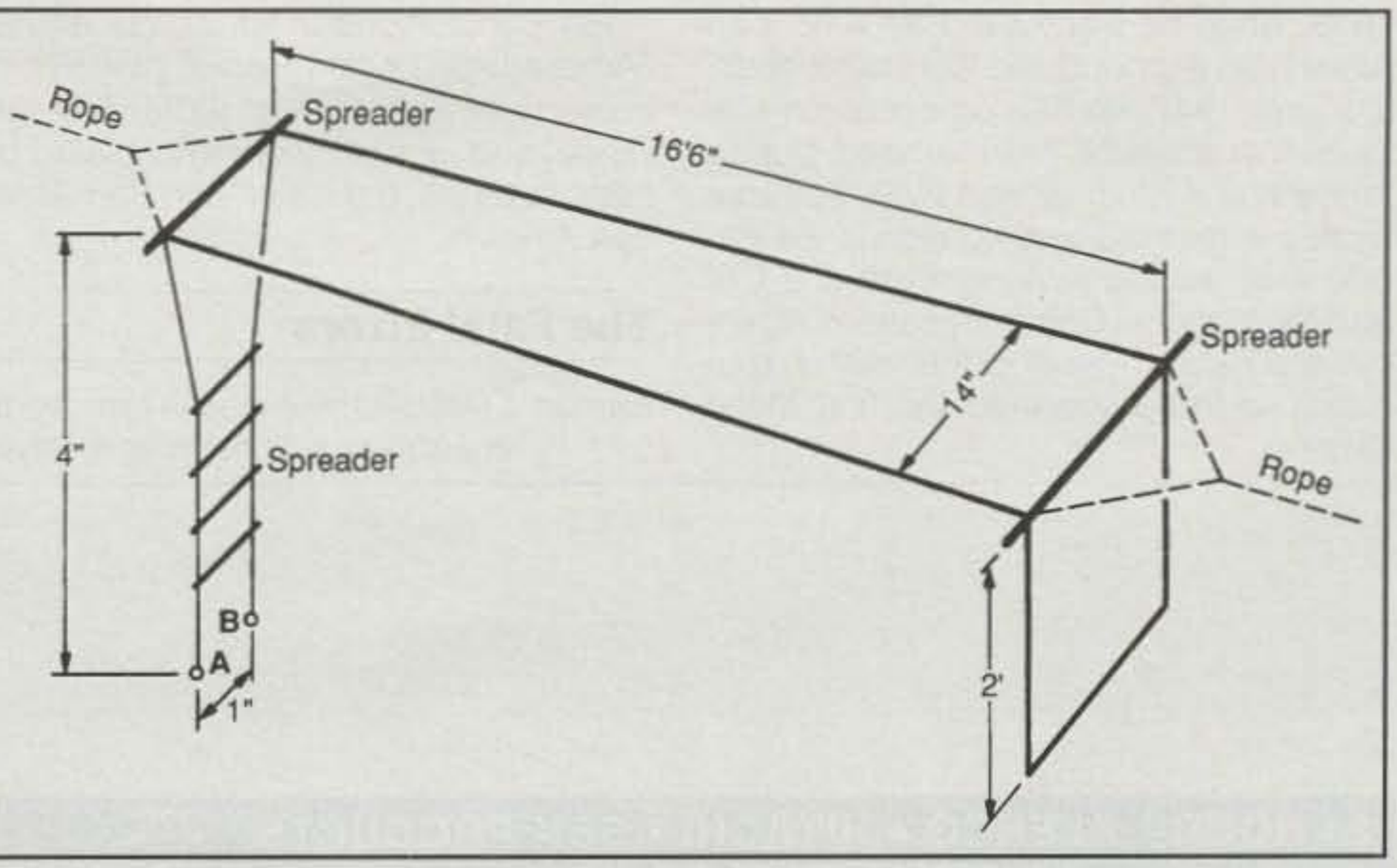


Fig. 5– Oblique view of the G2BZQ indoor 80 meter antenna. The total wire length is 46 feet 2 inches.

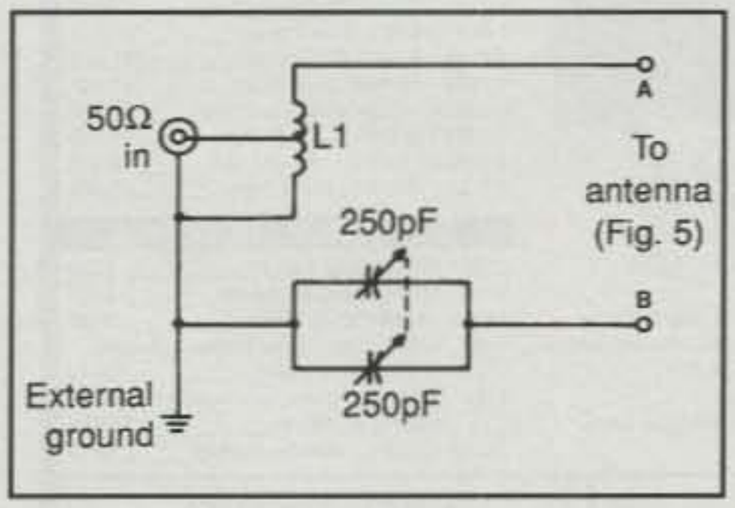


Fig. 6– Tuner for G2BZQ antenna. Coil L1 is 19 turns of #16 enamel wire wound on 1 inch diameter form. Coil length is 2 inches. Tapped 10¾ turns from ground end.

The Disappearance of Amelia Earhart: 1937

It has been a puzzle for over half a century. What happened to Amelia Earhart, who disappeared, along with her navigator, Fred Noonan, on their round-the-world flight? According to folklore, they vanished mysteriously on July 2, 1937 at about 2013 GMT (now UTC) on a flight from New Guinea to Howland Island.

Most investigators agree that contact with the plane was lost when her last transmission on 3105 kHz said she was shifting frequency to 6210 kHz. She was not heard from again, or was she?

Books and TV shows have provided possible answers to the puzzle, as have various expeditions sent over the years to find the wreckage of her plane. She was shot down, captured, and executed by the Japanese in the Marshall Islands; no, she was seen as a prisoner by other prisoners of war at a Japanese Pacific base; no, she went down in the Pacific Ocean, leaving no trace; no, she crash-landed on a remote Pacific atoll; no, she is alive and well today and in hiding.

A whole cottage industry has sprung up concerning the disappearance of this famous aviator, and even today new evidence is being produced, most of it spurious, about her baffling fate.

A recent article about this puzzle has been written by Captain Almon A. Gray (USN Ret.) in the December 1993 issue of *Naval History* magazine, published by the United States Naval Institute, Anapolis, Maryland.

I would say Captain Gray has impressive credentials to apply to this problem. He started in 1930 as a commercial radio operator, joined the Navy shortly thereafter, and served on various vessels until

1935, when he went with Pan American Airways as a ground and flight radio operator until 1942. He flew on occasion with Earhart's navigator, Fred Noonan. During World War II he dealt with Navy communications and radio navigation in the Pacific area, and later served with the CIA and the National Communications Agency, and helped develop the telecommunications that supported the first Moon landing.

His conclusions in an article entitled "Amelia Didn't Know Radio" pinpoint the comedy of errors, poor judgment, ignorance, and lack of meaningful dialog between Earhart, the Navy, and Pan American Airways.

The Fatal Errors

Earhart's fatal mistake was to remove the trailing wire antenna on her plane, relying only on a short V-shaped antenna running from the front of the plane to the rear tailfins. Gray covers this blunder in detail, pointing out that the short, loaded antenna only radiated less than a watt on her important communication frequencies: 500 kHz, 3105 kHz, and 6210 kHz. The signals from the plane, therefore, were readable only over a short distance, due to high levels of tropical QRM. The loss of 500 kHz ability prevented accurate DF bearings from being made, and precluded communication with ships and marine shore stations.

Other serious problems existed. Earhart seemed to be confused between kilocycles and meters, leading to a snafu on schedules with Navy ships placed along her route for communication and DF bearing measurements. In addition, Gray points out that improper transmitter loading by the very short antenna made audio modulation almost unintelligible.

Finally, Gray concludes that Earhart's inability to get a bearing from a Navy vessel (Itasca) was probably due to the fact that the send-receive relay in her equipment had been damaged by lightning. (I suggest that the back relay contacts may have been rendered inoperative due to corrosion brought about by the high content of salt in the atmosphere above the Pacific Ocean.)

July 2 seemed to be the end of it. However, the next day, Gray points out, a weak, distorted voice signal on 6210 kHz was heard by a radio operator on Nauru Island, as well as by the Pan-American communication station on Wake Island. The transmissions were also heard faintly at other points, but they were nearly unintelligible. Of great interest was the fact that the voice sounded like Earhart, but the motor noise of the plane was missing! A conclusion by some was that the plane had crash-landed on a remote island, but the radio equipment had survived intact. The signals gradually weakened and finally disappeared after a few hours. Bearings taken on the signals indicated an area in the Marshall Islands, to the west of Howland Island.

Searches of the area were to no avail. Nothing of importance was found. And so the Earhart-Noonan flight passed into history, leaving one of the outstanding mysteries in the long history of the Pacific.

The Mail Bag

Many thanks to the following who have written to me in the past month. I much appreciate your input! WB4HFL, K2OB, KL7CMN, K4WV, VK5BR, KW1L, W5PSA, W1IAF, I4AFQ, W6OAL, W2YYI, W6TC, VE1KD, DK5VP, W1PN, W6JJZ, K6YO and W2FMI—thanks, gang!

73, Bill, W6SAI

DOUG'S DESK

BY DOUG DeMAW, W1FB

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

Some Answers to Common Antenna Questions

My weekly mail bag contains more queries about antennas than any other amateur topic. It is not difficult to conclude that amateurs at all technical levels are willing to build antennas, even though they have little or no interest in constructing electronics gear. I am constantly amazed at how little some amateurs know about feed lines, baluns, and antennas, even though the antenna system is one of the most important parts of an amateur station. The nearest thing we have to instant antenna knowledge is *The ARRL Antenna Book* and *W1FB's Antenna Notebook*. I strongly recommend that anyone who is skimpy on antenna knowledge add these books to his or her technical library. In the meantime, however, let's go over some of the more common questions that are tossed my way from day to day.

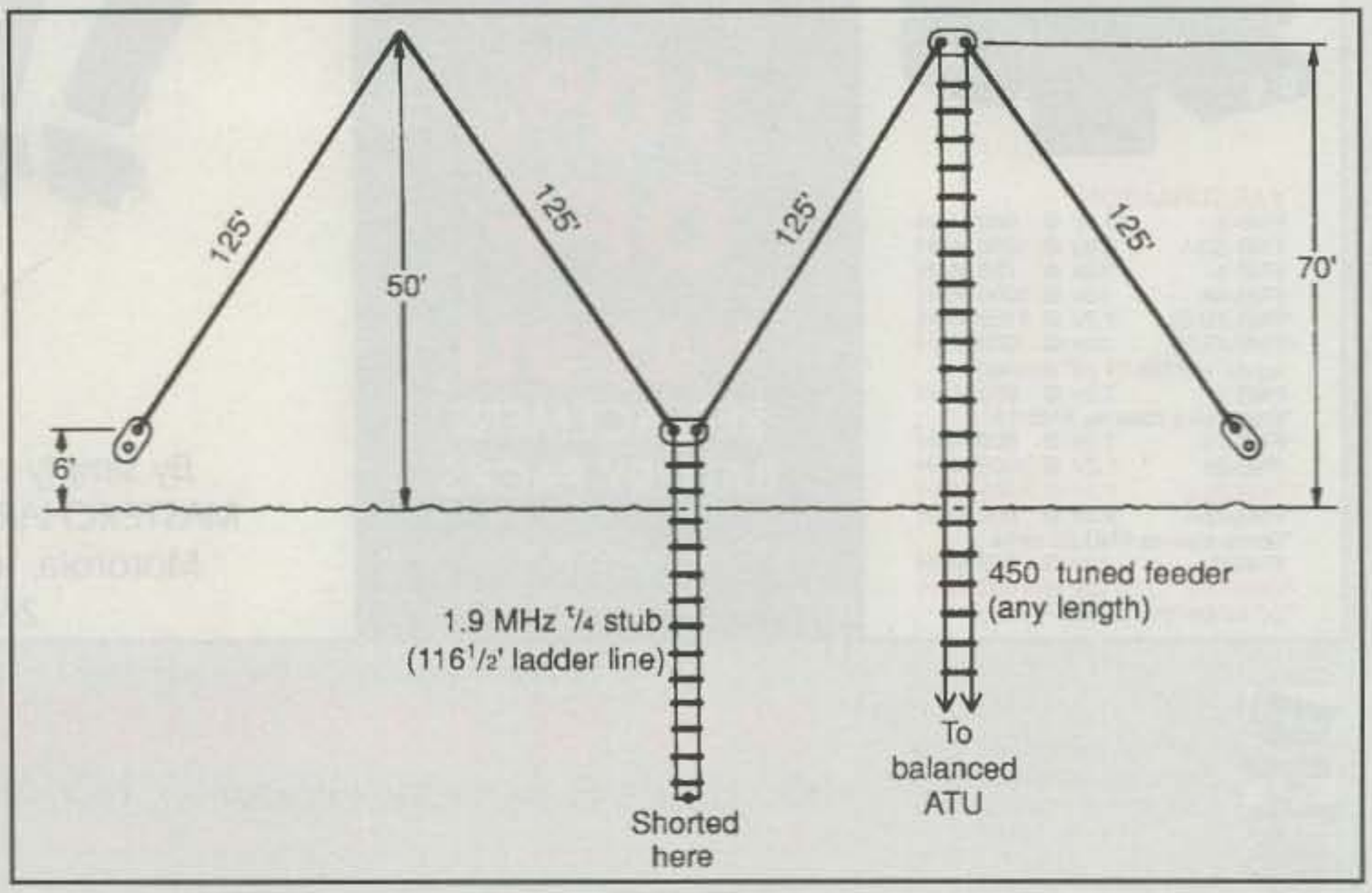


Fig. 1– Physical details of the W1FB double inverted V for 160 through 10 meters. The feed line is a section of commercial 450 ohm ladder line. Ladder line is used also for the ¼-wavelength 1.9 MHz stub.

Which Feed Line is Best?

The war of words concerning coaxial cable versus tuned feeders has been active for decades, and it is unlikely that it shall wane. From a practical point of view, both types of feeder have a rightful place in the world of antennas. The determining factor is founded on the purpose for which the antenna is designed. Certainly, there is little point in using tuned feeders for a single-band HF dipole. Conversely, if that dipole is for use on several amateur HF bands, then it makes sense to use tuned feeders, which enables the operator to use an ATU to match the system to his station equipment for the frequencies of interest. Why can't this be done with coax? A common question. It can be done with an ATU, but the mismatch at the antenna feed point at even harmonics of the dipole fundamental frequency is horrendous. Whereas it is typically 40 to 80 ohms (depending upon dipole height) at the feed point on the fundamental frequency, it can be 1000 ohms or greater at the harmonic frequencies. Feed-line losses become a significant factor under these conditions and damage can occur to the coaxial line at very high power levels. On the other hand, open-wire feeders have the least loss of all feed lines, and even if the line does not match the antenna impedance, the losses remain low.

One advantage associated with coax is that rain, snow, and ice have little effect on it. Tuned feeders, on the other hand, are greatly affected by the foregoing conditions, thereby requiring readjustment of the ATU to ensure an SWR of 1. I find this a minor inconvenience, since one readjustment generally lasts for the period of time I am on the air. Fig. 1 shows an unusual antenna system I have been using for several months. It works extremely well from 1.8 through 29 MHz, and it utilizes 450 ohm ladder line in the tuned feeder and stub system. I have not run it through a MININEC evaluation program as yet, so I can't provide the E- and H-plane patterns for the various HF bands. However, it has proven to be an outstanding antenna. The quarter-wave stub that joins the two 160 meter inverted Vees is cut for 1.9 MHz. On the harmonically related bands it acts as a shorting stub and effectively joins the two inverted Vees at the stub-attachment point. This system can be tailored easily for use from, say, 3.5 through 29 MHz in the interest of minimizing the real estate needed to accommodate it. I have room to spare on my 40 acres, so the side-by-side 160 meter inverted Vees are deployed without bending the lower ends of the legs. In effect, the antenna operates as two half waves in phase on 1.9 MHz, and on the higher frequencies it becomes, in essence, an off-center-fed inverted-Vee long wire. However, rain, snow, and ice change the feed-line properties sufficiently to require readjustment of my antenna tuner.

Commercial ladder line is much easier to work with than home-made open-wire lines. If the latter style of line is not supported in a rigid manner every few feet it can become twisted easily in the wind, and this causes a short circuit across the line. Ladder line is stiffer and has polyethylene insulation, and hence is less prone to the problems mentioned.

I have been asked what the velocity factor is for 450 ohm ladder line. I have never seen published specifications that list the value. Intuitively, I have been using 0.90 as the VF, and recent tests at 28 MHz with a dip meter and a quarter-wave section of line confirmed that my guess was within 5 percent, and that's close enough for my purposes!

Coaxial cable does not present losses that are worth considering at HF if the line is matched to the antenna. RG-58 and RG-59 lines are, of course, more lossy than the larger RG-8 and RG-11 types of coax, but the losses will not show up on the other person's S-meter unless you're using a very long run of feed line.

It is important to recognize that the impedance of a tuned feed line is not impor-

P.O. Box 250, Luther, MI 49656

tant. It can range from 300 ohms to 600 ohms without making enough difference to cause concern. I have employed 300 ohm kw twin line a number of times, and it worked nicely. I have also used 600 ohm hand-made open-wire lines, and they were also good. The true open-wire line is less subject to the effects of moisture than the lines that have polyethylene insulation. The trade-off is up to the builder.

Baluns

If ever there was a nostrum in amateur radio, it's the balun transformer. These devices have their place in a number of applications, but a balun that is added to an HF dipole serves no useful purpose most of the time. It is a passive network, and all such circuits introduce losses, however minor they may be. Baluns are sometimes promoted for HF on the premise that they (1) can reduce TVI and (2) prevent radiation pattern skewing. TVI is not caused by feeder currents, and skewing of the pattern is meaningless with dipoles that are close to ground in terms of wavelength. The typical HF-band dipole is 30 to 60 feet above ground, and this results in high-angle radiation and no directivity whatsoever on 1.8 and 3.5 MHz in particular. Pattern skewing therefore becomes meaningless under these conditions. If we could see the radiation from these antennas, it would look much like an orb that sends energy in all directions. The foregoing applies to dipoles, end-fed wires, and inverted Vees, but not to vertical radiators and inverted-L antennas.

It is not uncommon to hear some amateur remark, "I'd probably be louder if my 75 meter dipole was broadside to you." True, perhaps, if the dipole was a half wavelength above ground, which on 75 meters would be some 120 feet in the air! On 160 meters it requires a height of 250 feet to obtain the classic figure-8 directivity pattern.

Inverted-Vees with an enclosed angle of 90 to 120 degrees are omnidirectional in response. Therefore, it makes no difference what broadside direction you impose. The radiation angle is dependent upon the height of the inverted-Vee apex, as is the case with horizontal dipoles. The higher the antenna the lower the radiation angle, and hence the better the system is for DX use.

Getting back to baluns, they are prone to damage from overheating when subjected to high power under conditions of high SWR. For example, if a 75 meter dipole is resonant at, say, 3.9 MHz (the point of lowest SWR) and the operating frequency is changed to 3.8 MHz, for example, the SWR at the feed point can rise to perhaps 3:1. Correcting this malady at the transmitter with an ATU does not alter the mismatch at the feedpoint, even

though the transmitter is presented with a 50 ohm load. The mismatch at the balun causes a high level of RF voltage, and the balun can go up in smoke—quickly. If you experience "creeping" SWR (slow increases) while operating with a balun-equipped antenna, chances are that core heating is occurring as a result of a prohibitive SWR. As the core heats, its permeability changes (sometimes permanently with ferrite) and hence a change in effective inductance of the transformer windings.

When using baluns with HF beam antennas be certain to keep the leads from the balun to the antenna feed point as short and direct as possible. If not, the leads become part of the driven element and can result in detuning of the element. This explains why some amateurs have reported increases in SWR after a balun was installed at the feed point. The problem can be corrected by slightly shortening the driven element after the balun is in place.

Some HF beam-antenna manufacturers recommend installing a 6 inch OD coil of RG-8 coax at the feed point of the driven element. This device is not a balun transformer, even though it is commonly called by that name. It is a decoupling choke (RF choke) that prevents feed-line radiation, which can spoil the radiation pattern of the antenna. The addition of several ferrite sleeves over the coaxial feeder at the antenna feed point serves the same purpose, and this method is less awkward than trying to wind RG-8 cable and keep it coiled as a solenoidal choke. Ferrite sleeves for this purpose are available from Amidon Associates in Dominguez Hills, California.

Effective Antennas For Top Band

Amateurs who try 160 meters for the first time, along with those who are casual users of the band, usually try to "make do" with antennas that are designed for 75 or 40 meters. The temptation is to "force feed" the nonresonant antenna by means of an ATU. Although this makes the transmitter happy, the efficiency of such an antenna is horrible. Most signals heard with these makeshift antennas sound like QRP signals and are usually buried in the noise. The shortfall in signal strength is often enhanced by the use of a "barefoot" rig that produces 100 watts or less. Perhaps the best technique for using a 75 meter dipole on 160 meters is to short circuit both conductors of the feeder at the transmitter end of the line and treat the antenna as if it were a flat-top T fed with a single wire. If the feeder runs to the antenna vertically, the system will function much like a top-loaded vertical. However, the efficiency will be miserable unless a ground screen is used with the antenna, as is true of all high-performance verticals.

I believe that the best solution to temporary antennas for 160 meters is an end-fed wire that is either 1/4- or 1/2-wavelength overall. The greater the height above ground the better. The half-wave wire has the advantage of not requiring a ground screen or counterpoise system under it. Conversely, the 1/4-wavelength wire does need a ground system under it if good performance is to be had. Antennas of this type can take the shape of an inverted L, which results in part of the wire being erected vertically.

Another method worth considering is that of placing a 75 meter trap at each end of a 75 meter dipole or inverted Vee, and then adding sufficient wire to make the dipole resonant on 160 meters. This permits the user to employ a single coaxial feed line.

Operation on 160 meters is not unlike that on 2 meter SSB or CW. This is because on both bands we must deal with noise. The noise on 2 meters comes from within the receiver, whereas on 1.8 MHz it takes the form of man-made and atmospheric noise. The better your antenna for top band the more your signal will rise above the noise at the receiving end of the circuit.

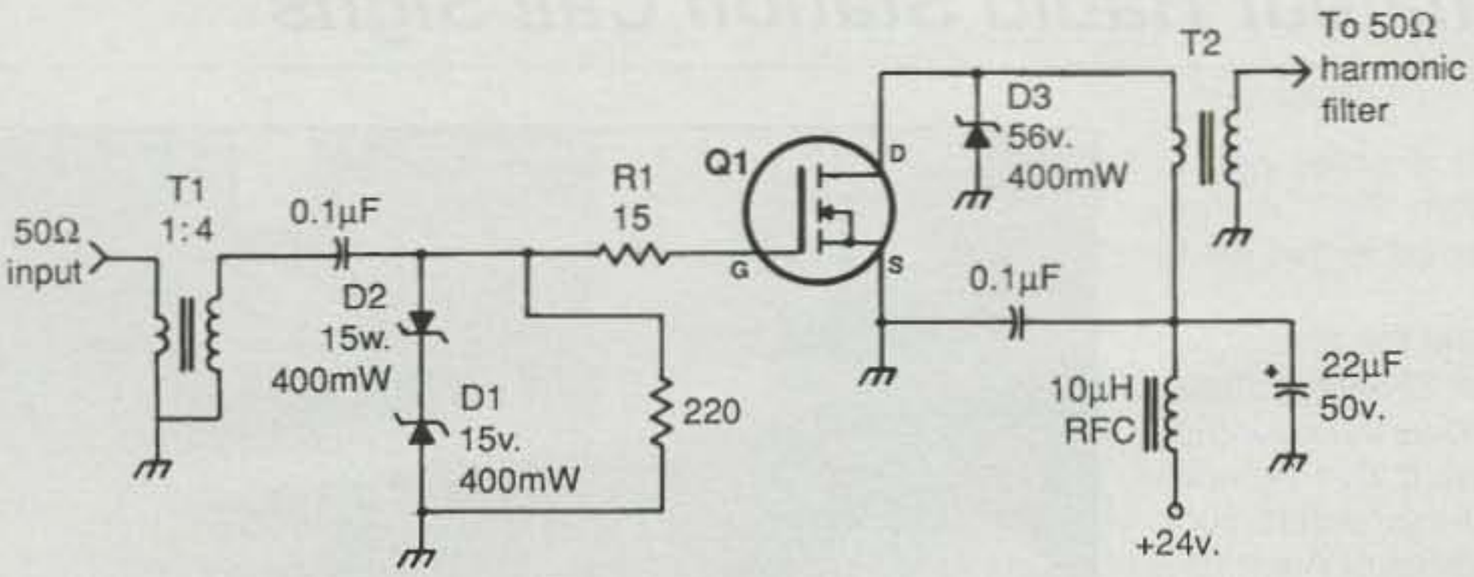
Physically Shortened Antennas

All is not milk and honey when we erect a physically shortened antenna. No compromise antenna of this type can perform as well as a full-size antenna. Despite the popularity of the G5RV dipole, full-size dipoles for the band of choice will deliver better overall performance. Trap antennas are also compromised by their reduced size. Surely, there are solutions in which there is insufficient real estate to erect a full-scale antenna, and these shorter radiators have their place for many city dwellers. However, a full-size dipole can often be used by bending the outer ends of the antenna downward or parallel to ground. The current portion of the antenna is near the feed point in a dipole, and the voltage ends can be bent from horizontal without a significant degradation in performance.

Disappointing results are often experienced when even the best of 160 meter vertical antenna systems are used for short-range communications. The same antenna can be great for DX work. This is because the inherently low radiation angle of a vertical has a "dead zone" from the edge of the ground-wave contour out to approximately 500 miles, depending upon propagation conditions at the time. The best system we can deploy for stateside communications on 160 meters is a

Correction

On page 82 of the January issue in my column there is an error in fig. 3. D1 and D2 are shown incorrectly in a back-to-back, parallel manner. They should be in series, as shown in the corrected fig. 3 included here. As originally illustrated, the diodes both conduct in the forward direction and have a voltage drop of one silicon PN junction. This would cause signal peaks to clamp at 1.5 volts rather than at 15 volts. My thanks to the sharp-eyed readers who called the error to my attention.



horizontal antenna that is not high above ground in terms of wavelength. These "cloudwarmers," as they are fondly called by their users, are effective on 1.8 and 3.5 MHz for all-around communications out to 1000 miles. There are times when they will enable the user to nab some rare DX as well. It can be seen that the choice of antennas for these lower frequencies must be founded on the type of communication desired.

Ground Radials

I can't recall how many times I have been asked about the wire gauge for buried or on-ground radials. There seems to be a general belief that the wire must have a large diameter in order to provide good performance. Not so! Radials carry small amounts of RF current (usually microamperes) and wire gauge is not an important factor. Also, whether or not the radial wires are insulated (another common question) makes little or no difference.

The larger wire gauges, plus insulation, make sense from a different point of view. Soil acids and alkalinity will consume small diameter wire within months in some locales. Insulation helps to protect the buried radials from corrosion, and the larger wire sizes take much longer to be eaten away. With regard to buried radials versus on-ground radials, I have not observed any measurable difference in the antenna field strength or impedance when using either method.

Still another common query is "How many radial wires do I need?" Some work done many years ago by Lewis, Brown, and Epstein for RCA suggested that no further increase in field strength was observed after 120 radials had been deployed. That number has been adopted as a standard by many amateurs. However, effective vertical antenna systems have long been used with as few as a dozen 1/4-wavelength radials. If I may offer a workable rule of thumb, I will suggest that you use as many radials as is practicable for your plot of ground. They need not be 1/4 wavelength long in order to have them become a working part of the ground screen, but the longer the better. If you can't deploy them linearly from the base of your vertical, fear not. I have found it necessary to wrap radials around both sides of my home, and some were as short as 50 feet for a 1.8 MHz antenna. I used a 50 foot shunt-fed tower with a 90 foot horizontal extender wire for DXing on 160 meters in the 1970s while living in Connecticut. My radial system consisted of 16 wires. Some were 120 feet long, and the shortest ones were 50 feet long. With that antenna and 100 watts I was able to confirm 72 countries in two years of winter-month operating. Oh, yes, one more thought about ground systems: One or more rods driven into the soil at the feed point of the vertical antenna do not constitute a ground system. At best, it provides a DC ground for safety's sake and establishes a reference point of sorts for the outer conductor of the coaxial feed line. Ground rods do not take the place of a ground screen. The radials need to be within the immediate field of the antenna if they are to minimize losses and ensure a low radiation angle.

Some Final Thoughts

I have attempted to answer the most common questions I have been asked about antennas. It is indeed unfortunate that these themes are not covered in detail in most antenna books. At this juncture I am giving serious thought to writing an antenna book that not only deals with antenna design, but covers the nitty-gritty subjects that are overlooked by most book authors and editors. Although I took this general approach in the *W1FB's Antenna Notebook*, there seems to be a need for expansion of the general discussion.

73, Doug, W1FB

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Worldwide Amateur Radio Station Call Signs

This alpha-numeric sequence of call signs enables one to quickly determine an amateur's country from the call sign she/he sends. American call signs are included in this list to make it complete.

The ARRL DXCC Countries List is available at the cost of two dollars from the American Radio Relay League, 225 Main Street, Newington, CT 06111-1494. This ARRL list shows the countries which provide credit towards the DXCC award. It also includes a list showing the allocation of international call sign series, such as AAA-ALZ being assigned to the United States of America.

The list in this article does not include every call sign that amateurs can use; it includes the call signs one is most likely to hear on the air. Insignificant additional letters and numbers are not included in this article's list. However, significant additional letters and numbers (such as FM7 to indicate Martinique) are included.

A listing such as AA-AL means every prefix from AA through AL. The listing TE/ TI means only call sign prefixes TE and TI, excluding TF through TH prefixes.

The numeral zero (Ø) is treated as if it is a figure ten (10), just as it is used in domestic and foreign callbooks. Notice that the zero is in the call sign prefixes of many rare DX locations. More than 25 of these zero prefixes are included in the list which follows these introductory comments. I advise you to contact "zero prefix" stations whenever you hear them. If a particular call sign prefix is used by most of the amateurs in a country, that prefix is shown following the name of the associated country. As an example, the prefix block CA-CE is shown belonging to Chile, and CE is included after the name of the country because it is the prefix that is used by most Chilean amateur radio operators.

Fourteen-year-old Mike Sultzer, KB2QCY, of New Jersey. He is a freshman in the North Huntendon High School. He has upgraded from the Novice to the Advanced class license since March of 1993. He is a QRP (low power) code enthusiast. In addition to amateur radio, Mike is an accomplished classical pianist.

73, Bill, W6DDB

45527 Third Street East, Lancaster, CA 93535-1802

A/AA–AL	U.S.A., plus U.S.A. Protectorates, etc. (also K/N/W; see KC4–KP5)
AP–AS	Pakistan (AP)
ATØ	Antarctica
AZ	Argentina (LU)
A2	Botswana (A22/A24)
A3	Tonga (A35)
A4	Oman (A41/A45/A47)
A5	Bhutan (A51)
A6	United Arab Emirates (A61)
A7	Qatar (A71)
A9	Bahrain (A92)
BT/BY/BZ	China (BY/BZ)
BV	Taiwan
CA–CE	Chile (CE)
CE9	Chilean Antarctica
CE9	South Shetland Island
CEØ	Easter Island
CEØ	Juan Fernandez Islands
CEØ	San Felix and San Abrosio
CM–CO	Cuba
CN	Morocco (CN8)
CP	Bolivia
CQ–CT	Portugal (CT)
CS3/CT3	Madeira Islands (CT3)
CU	Azores Islands
CV–CX	Uruguay (CX)
CY	Sable Island
CY	St. Paul Island
C2	Nauru (C21)
C3	Andorra (C31/C32)
C5	The Gambia (C53)
C6	Bahama Island (C6A)
C8–C9	Mozambique (C9)
DA1–DA4	Federal Republic of Germany—Foreign Armed Forces
DAØ/DB–DL/Y2–Y9	Federal Republic of Germany (no DI)
DPØ	Antarctica, German
DU–DZ	Philippines
D2–D3	Angola (D2)
D4	Cape Verde (D44)
D6	State of Comoros (D68)
EA–EH	Spain (EA)
EA6–EH6	Balearic Islands
EA8–EH8	Canary Islands
EA9–EH9	Ceuta & Melilla
EI	Ireland
EJ	Aran Island
EK	Commonwealth of Independent States (C.I.S.)
EL	Liberia
EM–EO	Commonwealth of Independent States
EP–EQ	Iran (EP2)
ES	Estonia
ET	Ethiopia

Scanners/Shortwave/GMRS/Ham

COMMUNICATIONS ELECTRONICS INC.™

Emergency Operations Center

We're introducing new Uniden *Bearcat* scanners that are just what you've been searching for. Order your *Bearcat* scanner today.

25th Anniversary Special

FREE Ni-Cad battery pack for Bearcat® 2500XLT scanner. ($57.95 value)

Get a free Bearcat rechargeable ni-cad battery pack with the purchase of your Bearcat 2500XLT scanner from Communications Electronics Inc. This coupon must be included with your prepaid order. Credit cards and quantity discounts are excluded from this offer. Offer valid only on orders mailed directly to Communications Electronics Inc., P.O. Box 1045 - Dept. CQ0394, Ann Arbor, Michigan 48106-1045 U.S.A. Coupon expires March 31, 1994. Coupon may not be used in conjunction with any other offer. Coupon may be photocopied. Add $15.00 for shipping in the continental United States of America.

Radio Scanners

Bearcat® 2500XLT-H

List price $649.95/CE price $339.95/SPECIAL
400 Channels · 20 Banks · Turbo Scan
Rotary tuner feature · Auto Store · Auto Sort
Size: 2-3/4" Wide x 1-1/2" Deep x 7-1/2" High
Frequency Coverage: 25.0000 - 549.9950, 760.0000 - 823.9950, 849.0125 - 868.9950, 894.0125 - 1,300.0000 MHz.

Signal intelligence experts, public safety agencies and people with inquiring minds that want to know, have asked us for a world class *handheld* scanner that can intercept just about any radio transmission. The new Bearcat 2500XLT has what you want. You can program frequencies such as police, fire, emergency, race cars, marine, military aircraft, weather, and other broadcasts into 20 banks of 20 channels each. The new rotary tuner feature enables rapid and easy selection of channels and frequencies. With the AUTO STORE feature, you can automatically program any channel. You can also scan all 400 channels at 100 channels-per-second speed because the Bearcat 2500XLT has TURBO SCAN built-in. To make this scanner even better, the BC2500XLT has AUTO SORT - an automatic frequency sorting feature for faster scanning within each bank. Order your scanner from CEI.

For more information on Bearcat radio scanners or to join the Bearcat Radio Club, call Mr. Scanner at 1-800-423-1331. To order any Bearcat radio product from Communications Electronics Inc. call 1-800-USA-SCAN.

Great Deals on Bearcat Scanners

Bearcat 8500XLT-H base/mobile $369.95
Bearcat 890XLT-H base/mobile . $244.95
Bearcat 2500XLT-H handheld ... $339.95
Bearcat 855XLT-H base $149.95
Bearcat 760XLT-H base/mobile . $199.95
Bearcat 700A-H info mobile $149.95
Bearcat 560XLA-H base/mobile ... $84.95
Bearcat 350A-H info mobile $104.95
Bearcat 200XLT-H handheld $199.95
Bearcat 148XLT-H base $88.95
Bearcat 100XLT-H handheld $149.95
Bearcat BCT2-H info mobile $139.95

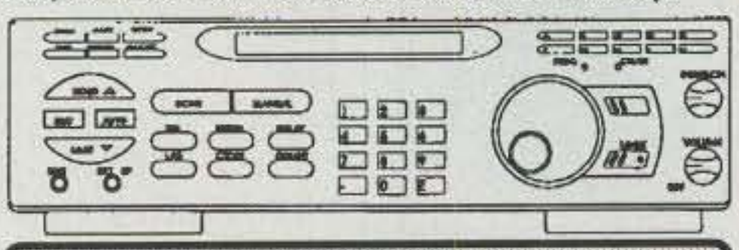
New FCC Rules Mean Last Buying Opportunity for Radio Scanners

On April 19, 1993, the FCC amended Parts 2 and 15 of its rules to prohibit the manufacture and importation of scanning radios capable of intercepting the 800 MHz. cellular telephone service. Supplies of full coverage 800 MHz. scanners are in *very* short supply. If you need technical assistance or recommendations to locate a special scanner or solve a communications problem, call the **Communications Electronics Inc. technical support hotline for $2.00 per minute at 1-900-555-SCAN.**

Bearcat® 8500XLT-H

List price $689.95/CE price $369.95/SPECIAL
500 Channels · 20 banks · Alphanumeric display
Turbo Scan · VFO Control · Priority channels
Auto Store · Auto Recording · Reception counter
Frequency step resolution 5, 12.5, 25 & 50 KHz.
Size: 10-1/2" Wide x 7-1/2" Deep x 3-3/8" High
Frequency Coverage:
25.000 - 28.995 MHz. (AM), 29.000 - 54.000 MHz. (NFM), 54.000 - 71.995 MHz. (WFM), 72.000 - 75.995 MHz. (NFM), 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) 400.000 - 511.995 MHz. (NFM), 512.000 - 549.995 MHz. (WFM) 760.000 - 823.9875 MHz (NFM), 849.0125 - 868.9875 MHz (NFM) 894.0125 - 1,300.000 MHz. (NFM).

The new Bearcat 8500XLT gives you pure scanning satisfaction with amazing features like Turbo Scan. This lightning-fast technology featuring a triple conversion RF system, enables Uniden's best scanner to scan and search up to 100 channels per second. Because the frequency coverage is so large, a very fast scanning system is essential to keep up with the action. Other features include ***VFO Control*** - (Variable Frequency Oscillator) which allows you to adjust the large rotary tuner to select the desired frequency or channel. ***Counter Display*** - Lets you count and record each channel while scanning. ***Auto Store*** - Automatically stores all active frequencies within the specified bank(s). ***Auto Recording*** - This feature lets you record channel activity from the scanner onto a tape recorder. You can even get an optional ***CTCSS Tone Board*** (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. ***20 banks*** - Each bank contains 25 channels, useful for storing similar frequencies in order to maintain faster scanning cycles. For maximum scanning enjoyment, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle's fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **BC005** CTCSS Tone Board $54.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC8500XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited warranty from Uniden. Order your BC8500XLT from Communications Electronics Inc. today.



CB/GMRS Radios

The Uniden GMR100 is a handheld GMRS UHF 2-way radio transceiver that has these eight frequencies installed: 462.550, 462.725, 462.5875, 462.6125, 462.6375, 462.675, 462.6625 and 462.6875 MHz. This one watt radio comes with flexible rubber antenna, rechargeable ni-cad battery, AC adapter/charger, belt clip, F.C.C. license application and more.

Uniden GMR100-H GMRS Handheld ... $169.95
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

Shortwave

ICOM R1-H ultra compact handheld wideband receiver $469.95
ICOM R100-H mobile 500 kHz.-1.8 GHz./121 memory $649.95
ICOM R71A-H 100 kHz.-30 MHz. base (add $39.00 shipping) $1,029.95
ICOM R72A-H 100 kHz.-30 MHz. base (add $39.00 shipping) ... $954.95
ICOM R7000-H base with 99 memory (add $49.00 shipping) . $1,249.95
ICOM R7100-H base with 900 memory (add $49.00 shipping) $1,289.95
ICOM R9000-H base 30 kHz.-2 GHz. (add $149.00 shipping) $4,999.95
ICOM AH7000-H super wideband discone type antenna $109.95
Grundig Satellit 700-H portable with 512 memory &AC adapter $449.95
Grundig Satellit 500-H portable with 42 memory & AC adapter $349.95
Grundig Cosmopolit-H with integrated mini-cassette recorder ... $179.95
Grundig Yacht Boy 230-H portable shortwave $139.95
Grundig Traveller 2-H portable shortwave $79.95
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
Sangean ATS800-H portable 20 memory shortwave $79.95
Sangean ATS803A-H portable with SSB reception & AC adapter $159.95
Sangean ATS808-H portable 45 memory shortwave $159.95
Sangean ATS818-H portable without cassette recorder $189.95
Sangean ATS818CS-H with cassette recorder $209.95
Sangean ANT60-H portable shortwave antenna $9.95

Weather Stations

Public safety agencies responding to hazardous materials incidents must have accurate, up-to-date weather information. The Davis Weather Monitor II is our top-of-the-line weather station which combines essential weather monitoring functions into one incredible package. Glance at the display, and see wind direction and wind speed on the compass rose. Check the barometric trend arrow to see if the pressure is rising or falling. Our package deal includes the new high resolution 1/100 inch rain collector part **#7852-H**, and the external temperature/humidity sensor, part **#7859-H**. The package deal is order **#DAV1-H** for $524.95 plus $15.00 shipping. If you have a personal computer, when you order the optional Weatherlink computer software for $149.95, you'll have a powerful computerized weather station at an incredible price. For the IBM PC or equivalent order part **#7862-H**. For Apple Mac Plus or higher including Quadra or PowerBook, order part **#7866-H**.

Other neat stuff

Uniden EXP9100-H 900 MHz. spread spectrum cordlessphone $299.95
ICOM GP22-H handheld global positioning system $699.95
WR200-H weather radio with storm alert $39.95
RELM WHS150-H VHF handheld 5 watt, 16 ch. transceiver $349.95
RELM RH256NB-H VHF 25 watt synthesized transceiver $289.95
Ranger RCI2950-H 25 watt 10 meter ham radio $244.95
Ranger RCI2970-H 100 watt 10 meter ham radio $369.95
Uniden LRD9000W1-H Super Wideband Laser/Radar Detector $169.95
PWB-H Passport to Worldband Radio by IBS $10.95
POL1-H Police Call for CT, ME, MA, NH, NY, RI, VT $5.95
POL2-H Police Call for DE, MD, NJ, PA $5.95
POL3-H Police Call for Michigan & Ohio $5.95
POL4-H Police Call for IL, IN, KY, WI $5.95
POL5-H Police Call for IA, KS, MN, MO, NE, ND, SD $5.95
POL6-H Police Call for DC, FL, GA, NC, PR, SC, VA, WV $5.95
POL7-H Police Call for AL, AR, LA, MS, OK, TN, TX $5.95
POL8-H Police Call for AZ, CO, ID, MT, NM, NV, UT, WY $5.95
POL9-H Police Call for California, Oregon & Washington $5.95
USAMMBNC-H magnet mount scanner antenna with BNC $29.95
USAK-H VHF scanner/VHF transmitting antenna with PL259 ... $29.95
USASGMBNC-H glass mount scanner ant with BNC connector . $29.95
USASGMM-H glass mount scanner antenna with Motorola jack $29.95

Buy with confidence

It's easy to order from CEI. **Mail orders to:** Communications Electronics Inc., Emergency Operations Center, P.O. Box 1045, Ann Arbor, Michigan 48106 U.S.A. Add $15.00 per radio for U.P.S. ground shipping and handling in the continental U.S.A unless otherwise stated. Add $8.00 shipping for all accessories and publications. Add $8.00 shipping per antenna. For Canada, Puerto Rico, Hawaii, Alaska, P.O. Box, or APO/FPO delivery, shipping charges are two times continental U.S. rates. Michigan residents add state sales tax. No COD's. 10% surcharge for net 10 billing to qualified accounts. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. We welcome your Discover, Visa, American Express or MasterCard. Call 1-800-USA-SCAN to order toll-free. Call 313-996-8888 if outside the U.S.A. FAX anytime, dial 313-663-8888. Order your new electronic equipment from Communications Electronics Inc. today.

For credit card orders call

1-800-USA-SCAN

Communications Electronics Inc.
Emergency Operations Center
P.O. Box 1045, Ann Arbor, Michigan 48106-1045 U.S.A.
For information call 313-996-8888 or FAX 313-663-8888

CIRCLE 143 ON READER SERVICE CARD

EW	Belarus, C.I.S.
EX	Georgia
F/FA–FF	France
FG	Guadeloupe
FH	Mayotte
FJ	St. Barthelemy
FK	New Caledonia
FM	Martinique
FO2-FO8	French Polynesia Residents
FOØ	Frency Polynesia Visitors
FO	Clipperton Island
FP	St. Pierre & Miquelon Islands
FR	Reunion Islands
FR/FG	Glorioso Islands
FR/FJ	Juan de Nova/Europa
FR/FT	Tromelin
FS	Saint Martin
FT8W	Crozet Island
FT8X	Kerguelen Islands
FT8Y	Antarctica
FT8Z	Amsterdam & St. Paul Islands
FW	Wallis & Futuna Islands
FY	French Guiana
G	England, United Kingdom
GB	Special United Kingdom Stations
GD/GT	Isle of Man (GD)
GI/GN	Northern Ireland (GI)
GJ/GH	Jersey (GJ)
GM/GS	Scotland (GM)
GU/GP	Bailiwick of Guernsey (GU)
GW/GC	Wales (GW)
HA/HG	Hungary
HB	Switzerland (HB9)
HBØ	Lichtenstein
HC–HD	Ecuador (HC)
HC8–HD8	Galapagos Islands (HC8)
HFØ	South Shetland Island
HH	Haiti
HI	Dominican Republic
HJ–HK	Colombia (HK)
HKØ	Malpelo Island
HKØ	San Andres & Providencia Islands
HL	South Korea Residents
HL9	U.S.A. Personnel in South Korea
HO–HP	Panama (HP)
HQ–HR	Honduras (HR)
HS	Thailand
HU	El Salvador (YS)
HV	Vatican City
HZ	Saudi Arabia
H4	Solomon Islands (H44)
H5	Republic of Bophuthatswana
I–IZ	Italy
IA5	Tuscan Archipelago
IC8	Capri & Ischia Islands
IMØ–ISØ	Sardinia (ISØ)
IT9	Sicily
JA–JS	Japan
JD1	Minami-Torishima Island
JD1	Ogasawara Island
JT–JU	Mongolia (JT)
JW	Svalbard Island
JX	Jan Mayen Islands
JY	Jordan
J2	Djibouti (J28)
J3	Grenada (J37/J39)
J5	Guinea-Bissau

J6	St. Lucia
J7	Dominica (J73)
J8	St. Vincent (J88)
K/LA–KZ	U.S.A., plus U.S.A. protectorates, etc. (also A/N/W)
KC4	Antarctica (special call signs)
KC6	Belau, West Caroline Islands
KG4	Guantanamo Bay, Cuba
KH1	Baker & Howland Islands
KH2	Guam
KH3	Johnston Island
KH4	Midway Island
KH5	Palmyra & Jarvis Islands
KH5K	Kingman Reef
KH6	Hawaii
KH7	Kure Island
KH8	American Samoa
KH9	Wake Island
KHØ	Mariana Islands
KL7	Alaska
KP1	Navassa Island
KP2	American Virgin Islands
KP4	Puerto Rico
KP5	Desecheo Island
LA–LN	Norway
LB	Norwegian Novice Stations
LJ	Norwegian School Stations
LO–LW	Argentina (LU)
LU	Antartctica—see VP8
LX	Luxembourg
LY/UP	Lithuania
LZ	Bulgaria
N/NA–NZ	U.S.A., plus U.S.A. protectorates, etc. (also A/K/W) (see KC4–KP5)
OA–OC	Peru (OA)
OD	Lebanon (OD5)
OE	Austria
OF–OI	Finland (OH)
OHØ	Aland Islands
OJØ	Market Reef
OK–OL	Czechoslovakia (OK)
OM3	Slovakia
ON–OT	Belgium (ON)
OR4	Antarctica
OX	Greenland (OX3)
OY	Faroe Islands
OZ	Denmark
PA–PI	Netherlands
PJ2/PJ9	Curaçao
PJ4/PJ9	Bonaire
PJ5/PJ8	Sint Eustatius
PJ6	Saba
PJ7/PJ8	Sint Maarten
PP–PY	Brazil (PY)
PPØ/PYØ	Fernando de Noronha Island (PYØ)
PPØ/PYØ	St. Peter & St. Paul Rocks (PYØ)
PPØ/PYØ	Trinidad & Martin Vaz Islands (PYØ)
PZ	Suriname
P2	Papua New Guinea (P29)
P4	Aruba (P43)
R/U	Commonwealth of Independent States, States
R/U	C.I.S., Russian Federation
RB/UB	C.I.S., Ukraine
RC/UC	C.I.S., Belarus
RD/UD	C.I.S., Azerbaijan

RF/UF	Georgia
RG/UG	C.I.S., Armenia
RH/UH	C.I.S., Turkmenistan
RI/UI	C.I.S., Uzbek
RJ/UJ	C.I.S., Tajikstan
RL/UL	C.I.S., Kazakh
RM/UM	C.I.S., Krygyzstan
RO/UO	C.I.S., Moldova
RP/UP	Lithuania (LY)
RQ/UQ	Latvia (YL)
RR/UR	Estonia (ES)
SA–SM	Sweden (SM)
SN–SR	Poland (SP)
SPØ	Special Polish Stations
ST	Sudan (ST2)
STØ	Southern Sudan
SU	Egypt
SV–SZ	Greece (SV)
SV/A	Mount Athos
SV5	Dodecanese
SV9	Crete
S2	Bangladesh (S21)
S5/YU3	Slovenia
S7	Seychelles (S79)
S8	Transkei
S9	Sao Tome & Principe
SØ	Western Sahara
TA–TC	Turkey (TA)
TD/TG	Guatemala (TG)
TE/TI	Costa Rica (TI)
TF	Iceland
TI9	Cocos Island
TJ	Cameroon (TJ1)
TK	Corsica
TL	Central African Republic (TL8)
TN	Congo
TP	Council of Europe
TR	Gabon (TR8)
TT	Chad (TT8)
TU	Ivory Coast (TU2)
TV–TX	France (F)
TY	Benin
TZ	Mali
T2	Tuvalu
T3Ø	West Kiribati/Gilbert Islands
T31	Central Kiribati/British Phoenix Islands
T32	East Kiribati/Line Islands
T33	Banaba Island/Ocean Island
T5	Somalia Republic (T53)
T7	Republic of San Marino (T72/T77)
T9	Bosnia-Herzegovina
U	Commonwealth of Independent States—see R/U
UA1/UA3/UA4/UA6	European Russia
UA1/4K2	Franz Josef Land
UA2	Kaliningrad
UA8/UA9/UAØ	Asiatic Russia
UB	Ukraine
UC	Belarus
UD	Azerbaijan
UF	Georgia
UG	Armenia
UH	Turkmenistan
UI	Uzbek
UJ	Tajikstan
UL	Kazakh
UM	Krygystan
UO	Moldova
UP	Lithuania (LY)
UQ	Latvia (YL)
UR	Estonia (ES)
UT	Ukraine (UB)
UY	Ukraine (UB)
VE/VO/VY	Canada
VK	Australia
VK9C	Cocos-Keeling Islands
VK9L	Lord Howe Island
VK9M	Mellish Reef
VK9N	Norfolk Island
VK9W	Willis Island
VK9X	Christmas Island
VKØ	Heard Island
VKØ	Macquarie Island
VO1	Newfoundland
VO2	Labrador
VP2E	Anguilla
VP2M	Montserrat
VP2V	British Virgin Islands
VP5	Turks & Caicos Islands
VP8	Antarctica
VP8	Falkland Islands
VP8/LU	South Georgia Island
VP8/LU	South Orkney Islands
VP8/LU	South Sandwich Islands
VP8/LU	South Shetland Islands
VP9	Bermuda
VQ9	Chagos Archipelago
VR6	Pitcairn Island
VS6/VR2	Hong Kong (VS6)
VU	India (VU2/VU3)
VU	Andaman & Nicobar Islands
VU	Laccadive Islands
VY1/VY5	Yukon Territory (VY1)
VY2	Prince Edward Islands
VY9	Canada (VE)
V2	Antigua & Barbuda Islands
V3	Belize (V31)
V4	St. Kitts—Nevis Island (V44/V47)
V5	Namibia (V51)
V6	Federated States of Micronesia (V63)
V7	Marshall Islands (V73)
V8	Brunei (V85)
W/WA–WZ	U.S.A., plus U.S.A. protectorates, etc. (also A/K/N) (see KC4–KP5)
XA–XI	Mexico (XE)
XA4–XI4	Revilla Gigedo (XF4)
XP	Greenland
XQ	Chile (CE)
XT	Burkina—Faso (XT2)
XU	Cambodia (XU1)
XV	Vietnam (XV2)
XW	Laos (XW8)
XX	Macao (XX9)
XY–XZ	Myanmar (XZ)
YA	Afghanistan
YB–YH	Indonesia
YI	Iraq (YI1)
YJ	Vanuatu (YJ8)
YK	Syria (YK1)
YL/UQ	Latvia (YL)
YN	Nicaragua
YO–YR	Romania (YO)
YS	El Salvador
YT–YU/YZ	Yugoslavia (former)
YU2	Croatia (9A)
YU3	Slovenia (S5)
YU4	Bosnia-Herzegovina (T9)
YV–YW	Venezuela (YV)

YVØ	Aves Island
Y2–Y9	Federal Republic of Germany (see DB–DL)
ZA	Albania (ZA1)
ZB2	Gibraltar
ZC4	Cyprus, U.K. Area
ZD7	St. Helena Island
ZD8	Ascension Island
ZD9	Gough Island
ZD9	Tristan da Cunha Island
ZF	Cayman Islands
ZK1	North Cook Islands
ZK1	South Cook Islands
ZK2	Niue Island
ZK3	Tokelau Islands
ZL–ZM	New Zealand (ZL)
ZL5	Antarctica
ZL7	Chatham Island
ZL8	Kermadec Island
ZL9	Auckland & Campbell Islands
ZP	Paraguay
ZR–ZU	Republic of South Africa (ZR/ZS)
ZS1	Antarctica
ZS8	Prince Edward & Marion Islands
ZS9	Walvis Bay
ZSØ	Penguin Island
ZX–ZY	Brazil (PY)
ZXØ	Antarctica
Z2	Zimbabwe (Z21)
1AØ	Sovereign Military Order of Malta
1S	Spratly Islands
2E	England (G)
3A	Monaco (3A1/3A2)
3B6	Agalagea Island
3B7	St. Brandon Island
3B8	Mauritius Island
3B9	Rodriguez Island
3C1	Equatorial Guinea
3CØ	Pagalu Island
3DA	Swaziland
3D2	Fiji
3D2	Conway Reef
3D2	Rotuma Island
3V8	Tunisia
3W8/XV	Vietnam (XV)
3X	Guinea (3XØ)
3Y	Bouvet
3Y	Peter I Island
3Y	Antarctica
3Z	Poland (SP)
4F	Philippines (DU)
4J1	Malyj Vysotskij Island
4K1	Antarctica—C.I.S.
4K1	South Shetland Island
4K2/UA1	Franz Josef Land
4M	Venezuela (YV)
4N4–4O4	Bosnia-Herzegovina (T9)
4N5/YU5	Macedonia
4P–4S	Sri Lanka (4S)
4U1	ITU Headquarters (Europe)
4U1	U.N. Headquarters (U.S.A.)
4X/4Z	Israel
5A	Libya
5B	Cyprus (5B4)
5H1	Zanzibar
5H3–5I	Tanzania (5H3)
5J–5K	Colombia (HK)
5N–5O	Nigeria (5N)
5R–5S	Madagascar (5R)
5T	Mauritania (5T5)
5U	Niger (5U7)
5V	Togo (5V7)
5W	Western Samoa (5W1)
5X	Uganda (5X5)
5Y–5Z	Kenya (5Z)
6T–6U	Sudan
6V–6W	Senegal (6W)
6Y	Jamaica (6Y5)
7J–7N	Japan (JA, etc.)
7O	Yemen
7P	Lesotho (7P8)
7Q	Malawi (7Q7)
7T–7Y	Algeria (7X2)
7Z	Saudi Arabia (HZ)
8J–8N	Special Japanese Stations (JA, etc.)
8J1	Antarctica, Japanese
8P	Barbados (8P6)
8Q	Maldive Islands (8Q7)
8R	Guyana (8R1)
9A/YU2	Croatia (9A)
9F	Ethiopia
9G	Ghana (9G1)
9H	Malta
9I–9J	Zambia (9J2)
9K	Kuwait (9K2)
9L	Sierra Leone
9M2/9M4	West Malaysia (9M2)
9M6	Sabah, East Malaysia
9M8	Sarawak, East Malaysia
9N	Nepal
9Q–9T	Zaire (9Q5)
9U	Burundi (9U5)
9V	Singapore (9V1)
9X	Rwanda (9X5)
9Y–9Z	Trinidad & Tobago (9Y)

WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Homebrew Classics From The Fifties—Part II

If last month's return visit to the fabulous fifties piqued your interest in classic low-cost rigs such as the Knight Kit Ocean Hopper, check out this month's delights. We are "bringing back to life" a neat two-tube Li'l Hopper and a slick 6AG7 transmitter, both of which can be assembled quickly at home and used on the air today for some real amateur radio nostalgia fun. Using such basic gear may have seemed like going bear hunting with only a hickory stick during eras past, but that was before we became whiz-bang operators ready to work the world with anything that connects to an antenna, right? You bet! Why, I'll even venture to bet a sharp CW operator could use our upcoming three-tube station to work almost all states before the year's end. Even if you do not reach that goal, visualize all the fun you will have in the pursuit! May our famous old-time "glow in the dark" receivers and transmitters live forever!

Our special guests on this romp back in time are once again Bill Albrant, K7YJE, and Dave Ishmael, WA6VVL. As we discussed last time, Bill shared details on Knight Kit's "economy grade" receivers such as the Ocean Hopper, Space Spanner, and two-tube DXer (which I nicknamed the Li'l Hopper) in his self-produced newsheets. Dave has restored several Hoppers, plus he built the great-looking 6AG7 transmitter shown in figs. 5 and 6. Our compliments to K7YJE and WA6VVL for their outstanding achievements. Thanks also to professional photographer Joe Veras, N4QB, for shooting pictures in this month's column.

Now let's turn back the clock to those thrilling days of yesteryear when vacuum tubes were king and rigs were actually simple (and large) enough that we could handle basic repairs at home. The time is approximately 1956, and some noticeable changes are occurring in amateur radio. Commercially made superheterodyne receivers with crystal filters have almost replaced regenerative sets, and medium-power transmitters produced by famous names such as Harvey Wells and World Radio Laboratories are very popular. Transistors, SSB, and complete single-cabinet stations known as transceivers are on the horizon. Ah . . . but such big-league setups seemed far beyond the reach of grade-school amateurs such as those of us with only pocket change and leftover lunch money to buy gear. We were straining to reach the "no frills radio" class! The big names in our world were Knight Kits, Ameco, Philmore, and the local radio repair shop owner who remembered us with junk sets for scrounging parts. Now almost 40 years later our little novice rigs are in vogue even more than when they were new. Amazing! So what is the big attraction behind these delights and how can you recapture their romance today? Read on!

4941 Scenic View Drive, Birmingham, AL 35210

In Pursuit of The Li'l Hopper

Allied Radio's Knight Kit division produced the two-tube Li'l Hopper right when their newly introduced Space Spanner began to superceding the Ocean Hopper (mid-1950s). The little pup was

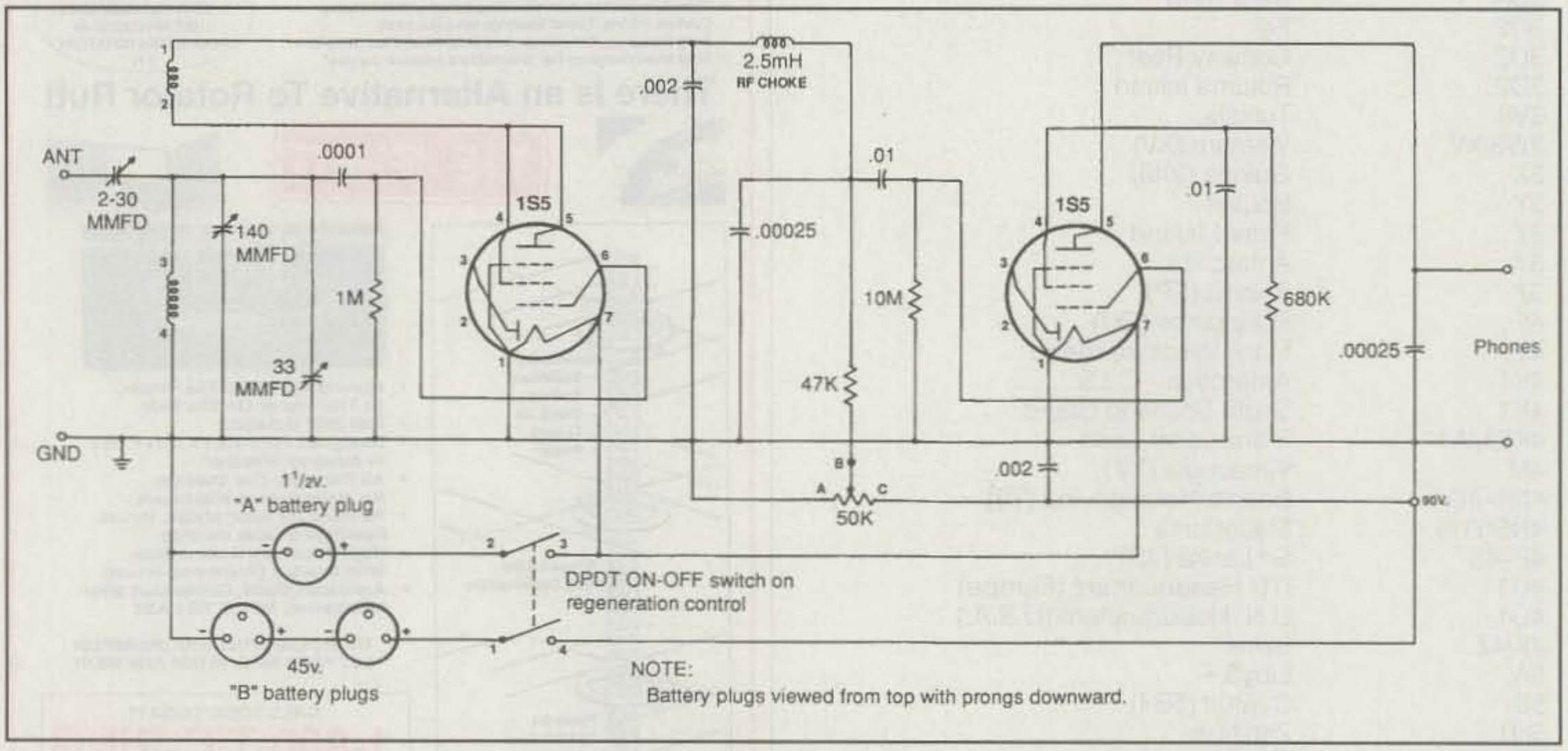


Fig. 1– Circuit diagram of Li'l Hopper receiver. Unit is the epitome of simplicity, but pulls in DX like a champ. The 1S5 tubes and other parts are easily obtained today. Note: Original Allied diagram (reproduced here for authenticity) had incorrect plug-in coil pin numbers. Correct as follows: Pin 2 (bottom of tickler) should be pin 5 and pin 4 (bottom of main coil) should be pin 2. (Diagram from which this was redrawn courtesy Bill Albrant, K7YJE)

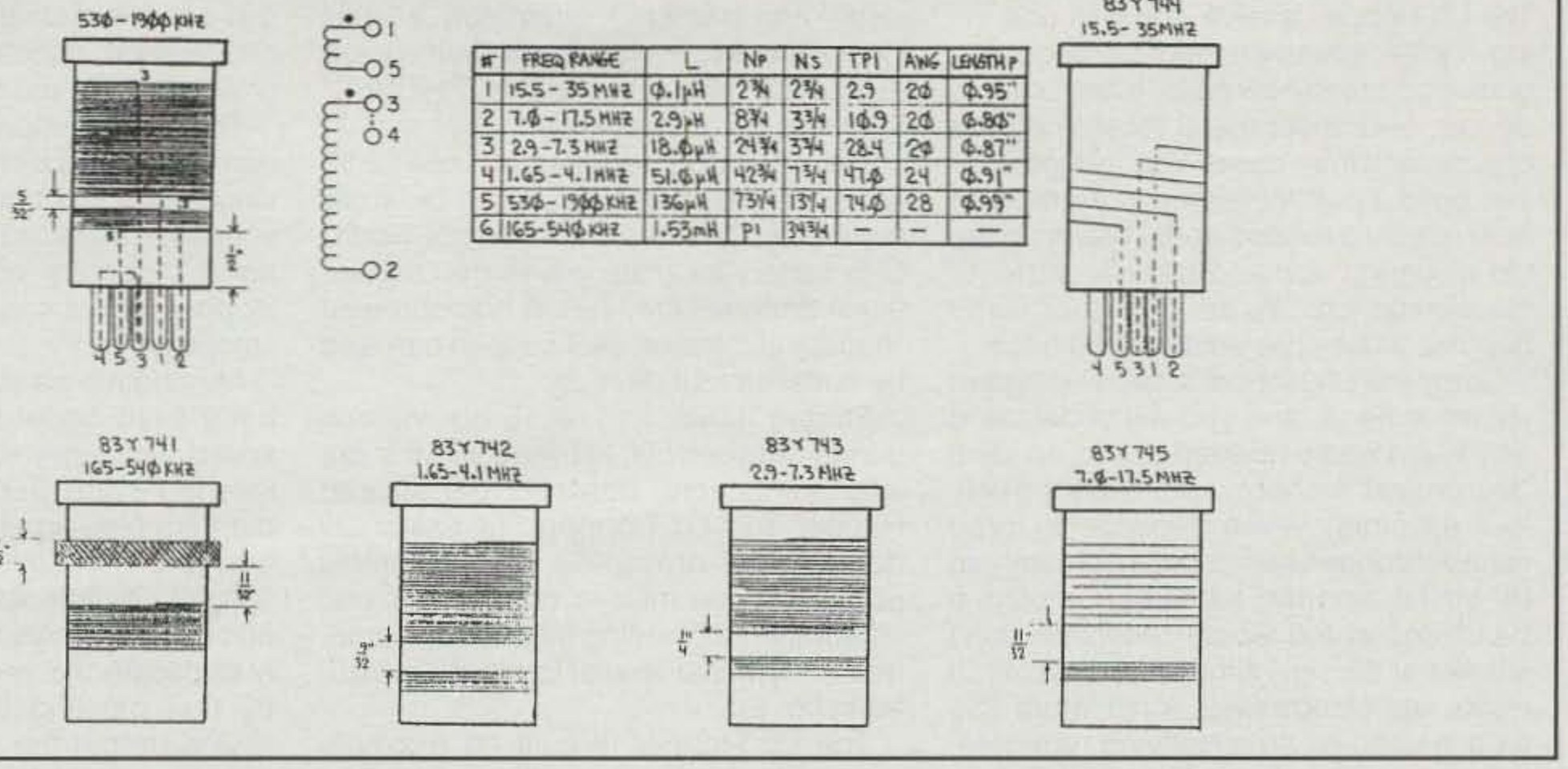


Fig. 2– Basic information for coils used in Li'l Hopper. For additional details, see last month's column.

not as heavily advertised, however, so the number of Li'l Hoppers that were sold never equalled that of its big brothers. This receiver's main attraction was its portability. You could carry it and a couple of Burgess "B" batteries almost anywhere, clip a jumper wire between it and a window screen for receiving, connect a random-length wire (of unknown SWR, no less!) to a small one-tube transmitter, and rejoice with each successful QSO. Since a protective wood case was not available for the Li'l Hopper and it did not carry a high enough price tag to encourage saving it when upgrading to a big (real?) rig, most of them ended up in the proverbial junkbox rather than in safe storage. Terrific, you say. Author Dave has kindled our

interest and left us at a dead end. No way! The Li'l Hopper is alive and well and living right in your own neighborhood disguised as brand new parts, tubes, knobs, decals, and sheet metal for making the chassis and front panel. Yes, indeed. You can build a perfect replica in a weekend from readily available parts. Warm up the old soldering iron and clear a corner of the workbench. We are going for some genuine fifties-style amateur radio fun!

Study the Li'l Hopper's circuit diagram shown in fig. 1, and you will understand why Allied Radio referred to it as an ideal "first project" for hobbyists. There are only four resistors, seven capacitors, three variable condensers, a potentiometer, an RF choke, and two tubes plus a plug-in band coil in the whole receiver! Don't snicker at the rig's simplicity, however. It works surprisingly well. A miniature 1S5 tube is used as an amplifying regenerative detector, and its output is R-C coupled to another 1S5 used as an audio amplifier. A pair of 2000 ohm earphones serves as a plate load for the "second 1S5." Do not directly substitute modern 8 ohm earphones here, as they will burn out and take the 1S5 with them.

High-impedance earphones are becoming a mite scarce today, so here are two "improvise" suggestions. A small 2000 ohm to 8 ohm transformer can be added between the "PHONES" connections and 8 ohm mini-earphones, with a slight drop in volume. Alternately, a small Radio Shack (transistor) amplified speaker can be connected to the "PHONES" terminals for audio galore.

The Li'l Hopper requires 1.5 volts for filament power (a regular D cell or larger dry cell works fine) and "90 volts worth" of B battery for plate power (ten regular 9 volt batteries are fine). A homebrewed "battery eliminator" (AC supply) can also be substituted if desired.

Plug-in coils for receiving various bands between 500 kHz and 30 MHz are interchangeable between the Ocean Hopper and Li'l Hopper. Full assembly details were presented in last month's column. If you missed that issue's vital information on winding the coils on homemade 1½ inch diameter forms, it is included in fig. 2.

The Li'l Hopper is built on a simple open-sided chassis measuring 5 by 5 by 2 inches (see fig. 3). Its 5 by 5½ inch front panel is secured to the chassis by mounting nuts and washers used to hold the bandspread condenser and regeneration controls in place. The most challenging aspect of assembly will probably be drilling holes to mount the tubes and coil sockets, and adjusting the (below chassis-mounted) antenna trimmer and pass wires for the bandset condenser. Hopefully you still have some old Greenlee chassis punches on hand. Otherwise, drill a series of small holes around the circumference, punch out the center with a chisel, and file the circle smooth.

The list of materials included in fig. 1 can be used as a shopping aid when visiting a local electronics parts house. Use your time-acquired knowledge and personal ingenuity when building the Li'l Hopper, and it should go together quite smoothly.

My original ad-sketch of the Li'l Hopper's front panel was very small and soiled with age, so XYL WB4OEE resketched it and *CQ*'s artist drew the final diagram (see fig. 4). Notice the bandset tuning is in the middle and bandspread is on the bottom left, opposite of the traditional layout. Also notice you can easily duplicate the zero to 100 calibrations by first painting the panel with black Krylon (forget the wrinkle finish; decals will not press flat on it) and then using dry transfers. You can even add the name "TWO TUBE DX'ER" and "Allied Radio" below the bandset area. Top off the receiver with pointer knobs (use a long pointer on the bandset), and you are ready for action.

The concept of operating a regenerative receiver was explained last month, so we will simply recap the process this month for clarity. First connect a single 40 to 60 foot long wire to the antenna input

ASTRON CORPORATION
9 Autry
Irvine, CA 92718
(714) 458-7277 • FAX (714) 458-0826

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •

MODEL VS-50M

SPECIAL FEATURES

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

PERFORMANCE SPECIFICATIONS

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

SL SERIES

- LOW PROFILE POWER SUPPLY

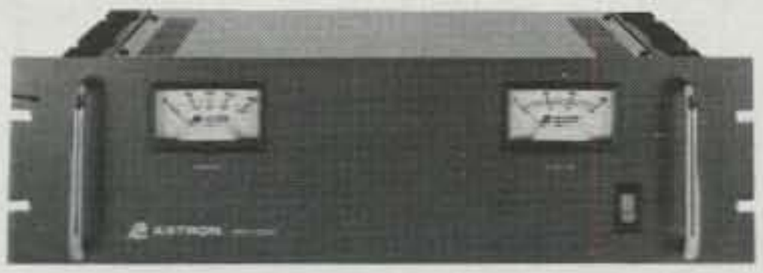
MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
SL-11A	•	•	7	11	2⅝ × 7⅛ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅛ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

RS-L SERIES

- POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-4L	3	4	3½ × 6⅛ × 7¼	6
RS-5L	4	5	3½ × 6⅛ × 7¼	7

RM SERIES



MODEL RM-35M

- 19" RACK MOUNT POWER SUPPLIES

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

RS-A SERIES

MODEL RS-7A

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

RS-M SERIES

MODEL RS-35M

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

VS-M AND VRM-M SERIES

MODEL VS-35M

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

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

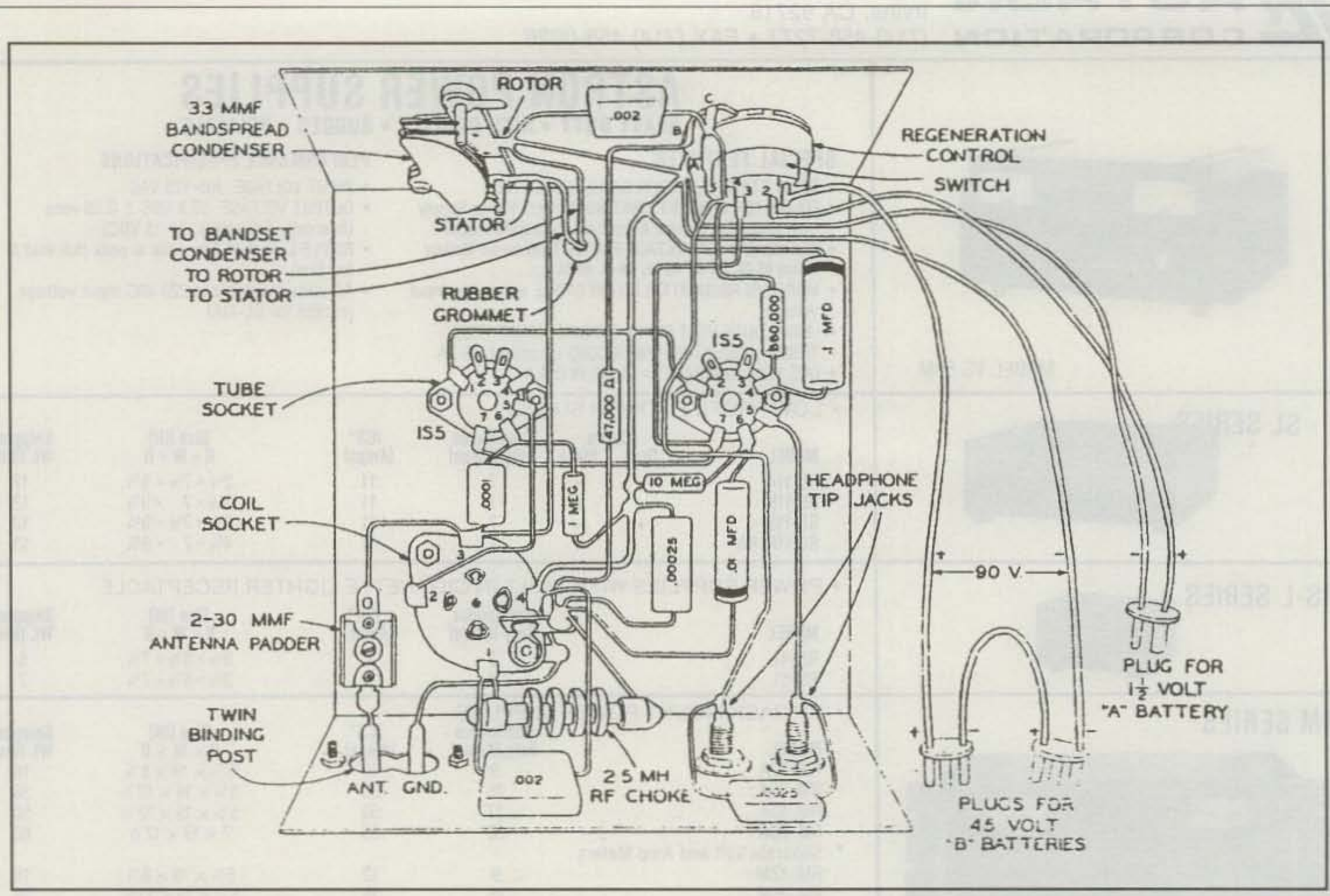
RS-S SERIES

MODEL RS-12S

- Built in speaker

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

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



- 2 1S5 Tubes
- 1 .0001 mFd mica condenser
- 2 .00025 mFd mica condensers
- 2 .002 mFd mica condensers
- 1 .01 mFd paper condenser
- 1 .1 mFd paper condenser
- 1 2 to 30 mmFd antenna padder
- 1 33 mmFd bandspread condenser
- 1 140 mmFd bandset condenser
- 1 47,000 ohm, 1/2 watt resistor
- 1 680,000 ohm, 1/2 watt resistor
- 1 1 megohm, 1/2 watt resistor
- 1 10 megohm, 1/2 watt resistor
- 1 50,000 ohm regeneration control (audio taper)
- 1 DPST switch cover
- 2 7 prong miniature sockets
- 1 4 prong wafer coil socket
- 1 Twin antenna and ground binding post

- 2 Burgess M30 "B" Batteries (45 volts)
- 1 Burgess 4F "A" Battery (1 1/2 volts)

- 1 2.5 mH RF choke
- 2 Black phone tip jacks
- 2 45-volt 3-prong battery plugs
- 1 1 1/2-volt 2-prong battery plug
- 2 1 1/4" bar knobs
- 1 2" bar knob
- 1 5x5x2" punched and formed chassis
- 1 5x5 1/2" black crackle finished panel
- 1 Set of 2 four-prong broadcast coils
- 1 Color code chart
- 1 Instruction sheet

- 1 Package of harware, containing:
  4 each—4-36 × 1/4" machine screws, 4-36 × 3/8"hex nuts, 5-32 × 5/16" machine screws and 6-32 × 1/4" hex nuts: 1 each—1/8" grommet, #6 solder lug and single insulated tie lug.

83-309 COMPLETE KIT WITH TUBES

ACCESSORIES

- 1 2000 ohm headset
- 1 Antenna kit
- 1 Short Wave coil kit (9.5 to 217 meters)

Fig. 3– Pictorial diagram for two-tube Li'l Hopper receiver. Use this guide to home-assemble a perfect replica of this regenerative marvel. (Diagram courtesy Bill Albrant, K7YJE)

and advance the regeneration control until a hiss is noticed in the earphone. Next adjust the antenna trimmer for maximum receiver noise and slowly tune the bandset control in search of signals. If you have a digital frequency counter, place its pickup probe near the Li'l Hopper's antenna connection and you can read the tuned-in frequency with high accuracy. You can also zip the bandset tuning control from zero to 100 and quick-check its full tuning range. This arrangement is also handy for zeroing to the transmitter's crystal frequency—just press the key and the stronger signal appears on the counter. Release the key and the weaker (receive) signal shows on the counter. If you do not have a frequency counter, slip the end of a one or two foot wire into your modern transceiver's antenna socket and hunt for the Li'l Hopper's signal. Use general-coverage reception, tune/hunt slowly (patience is vital), and remember to remove the short "pickup wire" before keying the transmitter.

So what type of "low tech" transmitter might you easily assemble to mate with

the Li'l Hopper? A classic homebrewed 6AG7 rig is a good match for the same time period. It can be built on a small (6 by 9 inch) pine board with the tube mounted horizontally and pointing toward the back, or you might enclose it in a fancy cabinet to compliment any Hopper, S-38 or S-40 receiver. The former approach was discussed briefly last month, so this time let's review how WA6VVL went first class by building the complete transmitter in a trim "low boy" cabinet.

The 6AG7 "Signal Squirter"

Like many of us, Dave, WA6VVL, wanted to build a copy of his first/Novice transmitter for use during Straight Key Nights and classic rig QSO parties. His enthusiasm shifted into high gear as the project took shape, and the final results became a true masterpiece in homebrewing (see figs. 5 and 6). Naturally, you can cut this project down to "simple form" if desired by using an external power supply and omitting the "magic eye" output indicator.

The transmitter's circuit diagram is shown in fig. 7, and amateurs with a fifties-era background will recognize it as a modified Pierce oscillator with P1-Network output. The 6AG7 is a sweet little metal envelope tube, but it often chirps in Pierce circuits. My solution is to try several 6AG7s and use the one which keys and sounds best. Dave went a step better, however, by using a 30 pFd variable condenser (rather than a 25 pFd fixed capacitor) between the tube's control grid and cathode, and tuning it to minimize chirp. He also included a milliamp meter (rather than a simple 50 ma pilot lamp such as many of us remember using) in the tube's high-voltage line. As an extra touch Dave tapped off the rig's output with a 10k resistor and potentiometer and added a 6E5 "magic eye" tube such as that used in fifties model radios as a tuning indicator. The 6E5 requires approximately 7.5 volts DC to close its eye. If a similar-looking 6U5 is used, –22 volts DC is required to close its eye (the 10k pot permits using either tube with a quick adjustment). A 1629 like that used in old Command set transmitters can even be used here, provided 12.6 volts is applied to its filaments. Interesting how these peak-reading indicators disappeared in the annals of time. They would certainly be handy on SSB today.

The transmitter's Pi-Net output consists of two small 365 pFd variable condensers separated by a B&W 3016 miniductor. This coil is 1 inch in diameter and is made with No. 24 wire wound 32 turns per inch. Approximately 42 turns are used for 80 meters, and 21 turns for 40 meters.

This transmitter's power supply has several good ideas applicable to other

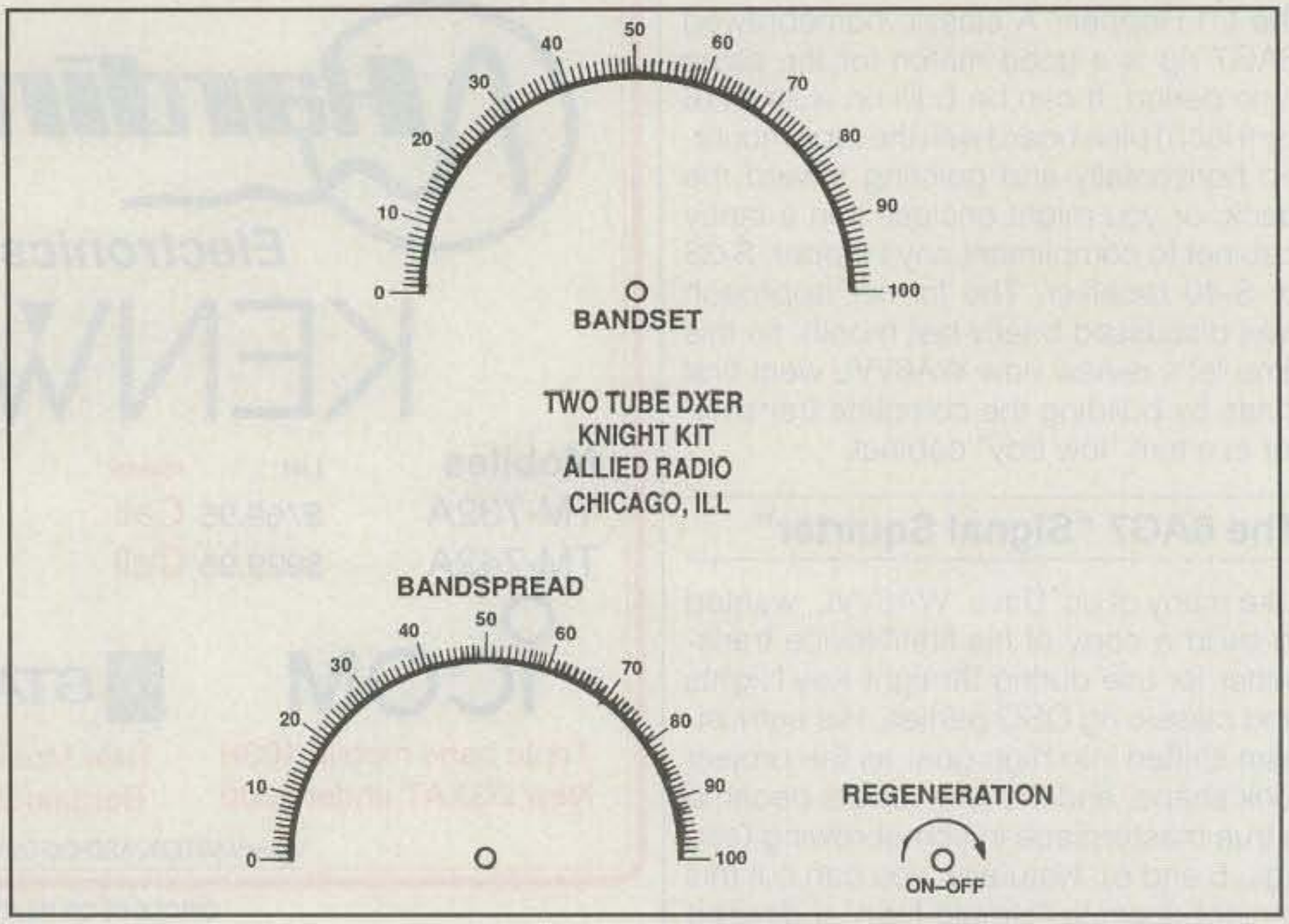


Fig. 4– Sketch of Li'l Hopper's front panel showing labeling and layout of controls.

small tube gear, so follow along on this whirlwind description. A small 300 volt transformer was not available, so Dave used one delivering 125 volts with a voltage doubler and capacitor input filter. The resultant output is 327 volts key down, which at 22 ma of plate current equals 7 watts input and approximately 4 watts output. A tap between filter capacitors nets 163 volts for the magic eye tube. Clever!

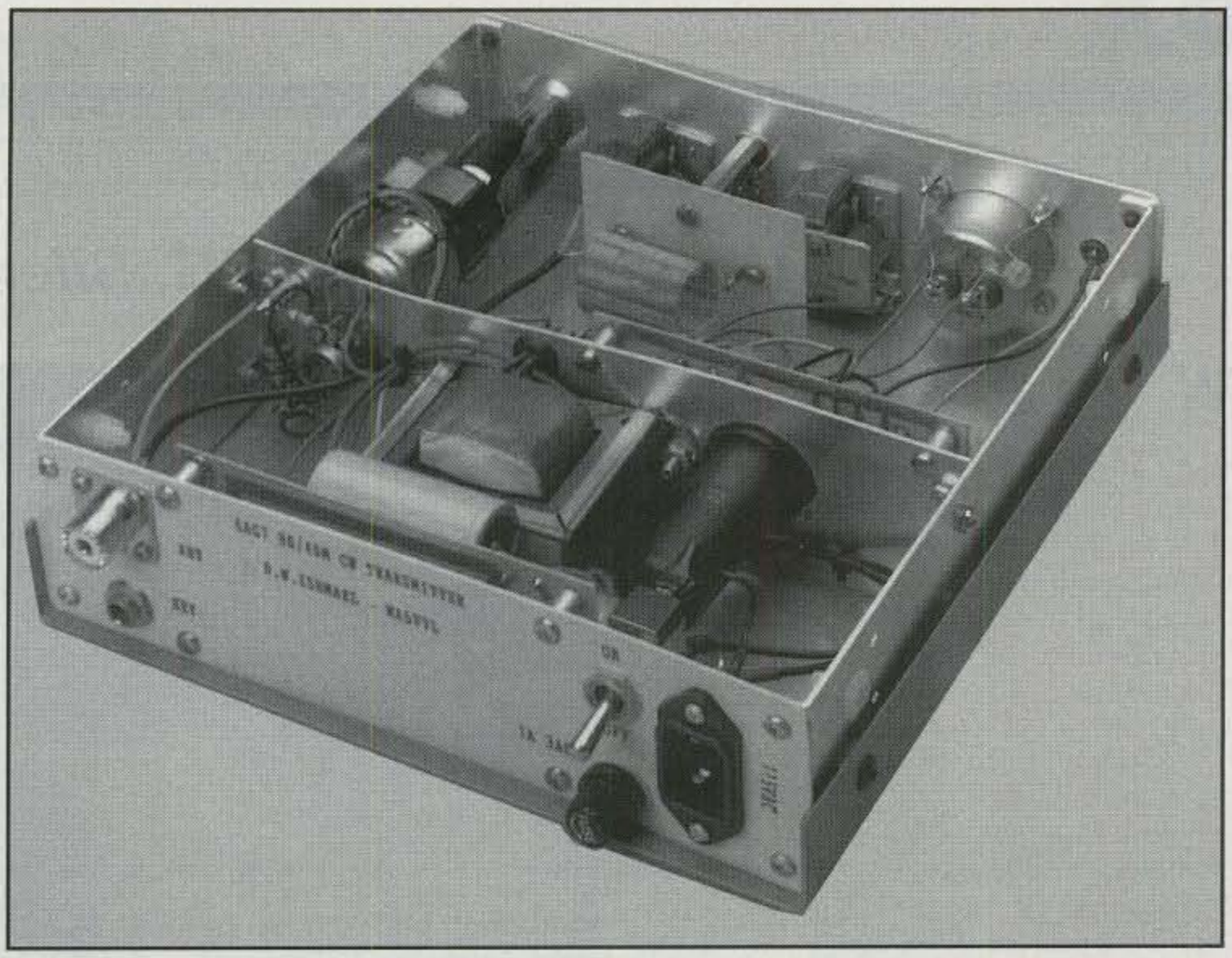
Tune-up of the transmitter is a cinch. Flip the rear switch on, pop in a crystal, wait 2 or 3 minutes for warmup, and then close the connected key and adjust the TUNE condenser for minimum current. Increase the LOAD control slowly while keeping the TUNE adjusted "in the dip" and hold at 4 watts or 22 ma of current. Recheck keying on a modern receiver, adjust the control grid's 30 pFd variable to minimize chirps, then go for the QSOs "fifties style"!

Wrap Up

Our nostalgic pursuits have once again used up available space. We will thus wrap up with some quick tips for successful classic station operation. First, a single 25 to 50 foot insulated wire (or a house window screen!) works well as a

Fig. 5– Impressive homebrew 6AG7 transmitter built recently by Dave Ishmael, WA6VVL. Cabinet measures 2.5"H × 9"W × 9"D and has front "magic eye" tube for monitoring output. The on/off switch is mounted on the rear panel. (Photo courtesy Joe Veras, N4QB)

Fig. 6– Interior view of WA6VVL's "improved reproduction" of his first transmitter (6AG7). Note pi-net output section with B&W coil 1¼ inch long by 1 inch in diameter and horizontally mounted magic-eye output indicator. (Photo courtesy Joe Veras, N4QB)



receiving antenna and averts detector stage overloading from high-power signals. Mount it near ground level to minimize interference to others from the receiver's regenerated signal. A dipole cut to your precise band and frequency range of operation and mounted at right angles to the receive antenna is suggested for the transmitter, as it minimizes harmonic radiation. Finally, a handful of crystals for each 2 or 3 kHz in your favorite range is most beneficial (the old tradition of tuning for replies to CQs has faded with time). Good luck with the gear, and we look forward to working you classic rig to classic rig in the near future.

73, Dave, K4TWJ

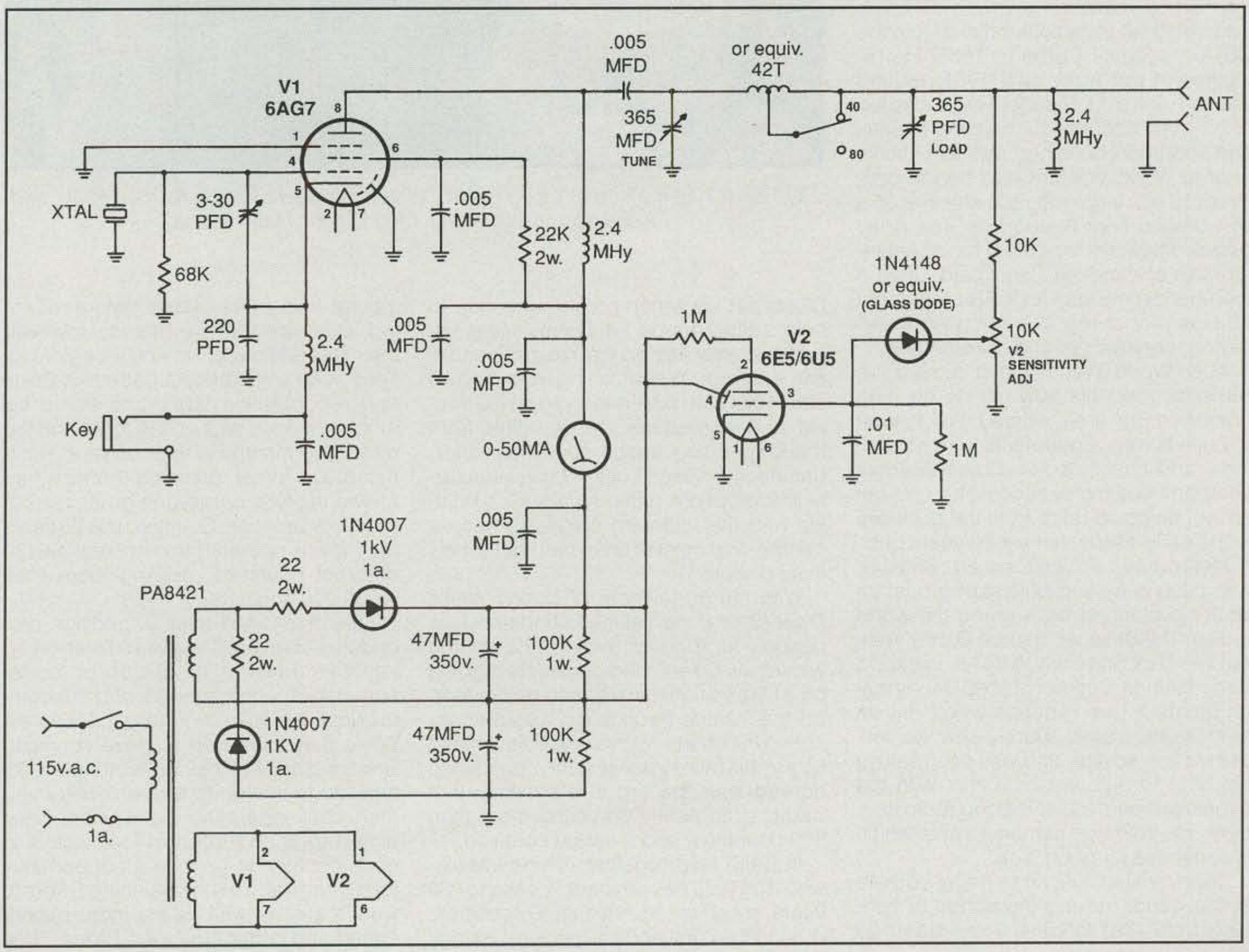


Fig. 7– Circuit diagram of the famous 6AG7, which many of us assembled as a first rig during the fabulous fifties. This version has built-in voltage-doubler power supply and output indicator. (Original diagram courtesy WA6VVL, redrawn by CQ artist)

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Lloyd Colvin, W6KG, Silent Key

Worldwide amateur radio ambassador Lloyd Colvin, W6KG, died December 14, 1993 while on a Yasme DXpedition to Turkey. His passing marks an end to nearly 30 years of tireless DX travels to 223 different countries. His story is a shining example of how some DXers put much of their lives into DX, so that the rest of us can experience the thrill of making contacts with rare and distant countries.

Lloyd was born on April 24, 1915 in Spokane, Washington. His interest in amateur radio was kindled early, thanks to articles in Boy Scout publications. He built his own rig, and earned his first amateur radio license at the age of 12. His life would be closely intertwined with radio for the next 66 years.

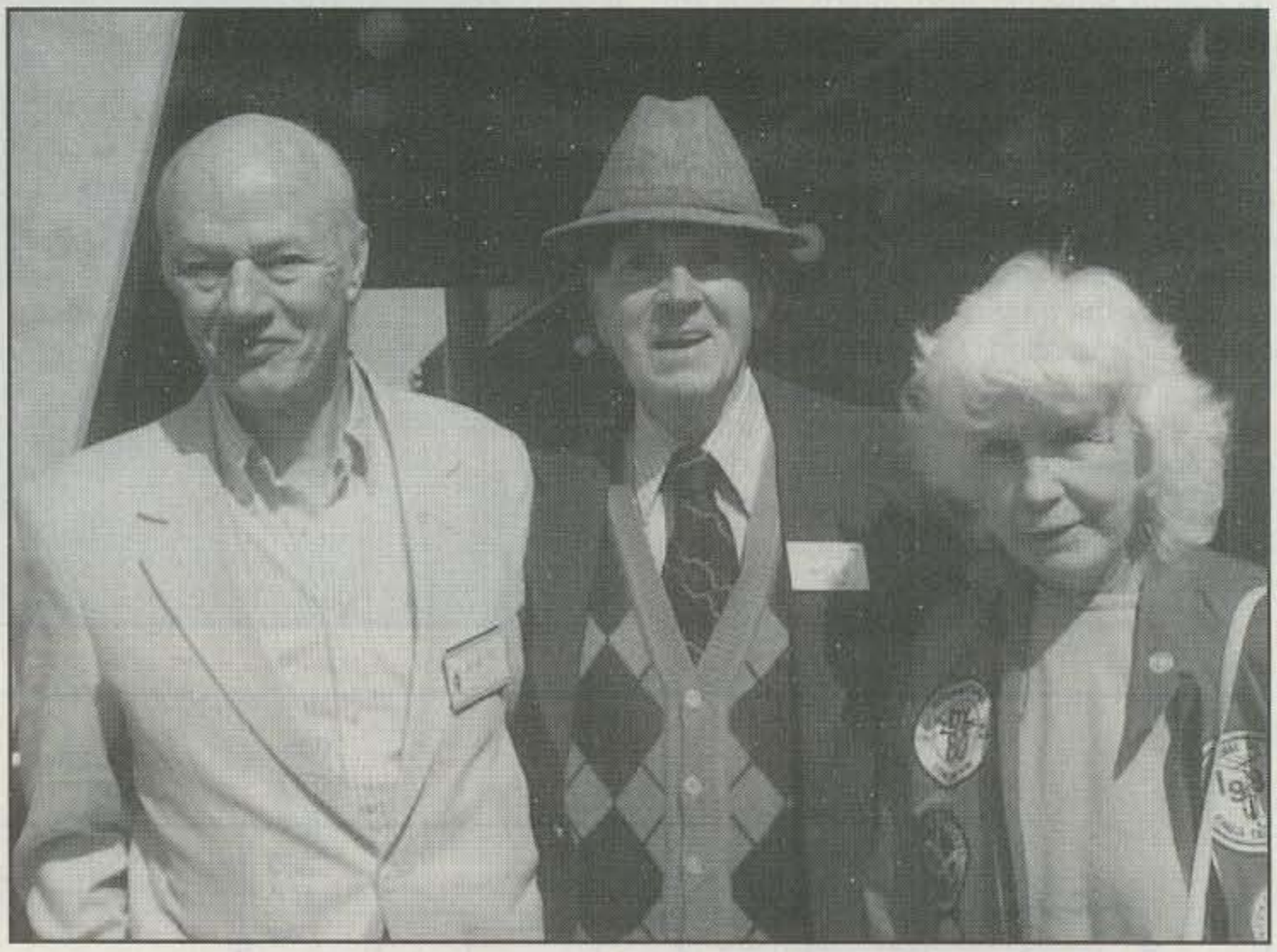
His interest in radio led him to join the US Army Signal Corps in 1938. He remained in the Army until 1961, retiring with the rank of Lt. Colonel. Radio also led to his main occupation: building houses and apartment buildings. While in Alaska prior to World War II, Lloyd began construction of a large rhombic antenna on a plot of land near Anchorage. The Army decided that plot was ideal for an antenna farm of their own, and paid Lloyd a then-handsome sum for it. Thus started a 20-plus year career of trading land, surveying, contracting, and construction.

After World War II Lloyd moved his business, and his wife Iris, to the San Francisco Bay area, where he continued to build homes, apartments, office buildings, and hospitals. His Drake Builders company was highly successful, enough so that he could retire from the business in the early 1960s, not yet 50 years old.

Meanwhile, an unlicensed Britisher was piloting a hand-built sailing boat on what he planned as a round-the-world cruise. The Britisher, named Danny Weil, ran into Dick Spencely, KV4AA, in the US Virgin Islands. Dick convinced Danny that an amateur radio license would be an asset to his travels. Danny saw the wisdom of this advice, and was soon sailing his boat to different countries with the expressed purpose of making radio contacts. His ship was named *Yasme*, which is Japanese for good luck.

Danny sailed *Yasme* to many corners of the world, making thousands of contacts from 1961 to 1964. Some stateside

P.O. Box 50, Fulton, CA 95439



CQ Hall of Fame member Lloyd Colvin, W6KG, flanked by his wife Iris, W6QL, and Ken Miller, K6IR, at the 1993 Dayton Hamvention.

DXers set up a non-profit foundation to help collect funds for Danny's travels, appropriately named the *Yasme* Foundation. Danny's DXpeditioning wound down after 1964, when he met a girl on his travels, and married her. Danny retired from the DXpedition circuit soon thereafter. (Incidently, "Good Luck" was a singularly inappropriate name for Danny's boat. He had five different ships, all named *Yasme*, and most of them met with a maritime disaster!)

With the curtailment of Danny Weil's DXpeditions, the Yasme Foundation had nobody to sponsor. Lloyd, in common with many DXers, had considered going on a DXpedition himself, and he contacted the Yasme Foundation about sponsoring his efforts. With the stipulation that he pay his own expenses, the Foundation agreed, thus starting a relationship that would span nearly 30 years, more than 100 countries, and a million contacts.

In 1965 Lloyd, together with his wife Iris, who had held her amateur license for 20 years, set off on an indefinite DXpedition. Among their first ports of call were islands in the Pacific Trust Territories such as Saipan, Yap, Truk, and Ebon.

The Colvins traveled the DXpedition trail for about three years before returning, exhausted, to the States. However, their DXpeditioning was only beginning. They soon settled into a pattern of travel and recuperation, spending about six months of each year on the road, and the remaining months in their home in Richmond, California, planning the next trip, answering QSL cards, and giving talks at radio conventions. Over the next 20 years the Colvins operated from more than 130 different countries, making more than 1,000,000 contacts.

They fine-tuned their DXpedition procedures to an art. They would first set up tentative travel plans, based on correspondence with amateurs and telecommunications officials in target countries. While they preferred to have licensing lined up ahead of their travel, they did not hesitate to first go to a rare country and then seek operating permission. They aimed to spend three to four weeks in each country, to provide an opportunity for average and even beginning DXers to work them, as well as the more experienced and better equipped DXers. They would make up to 10,000 contacts from each country before packing up their station and moving on.

WE SHIP WORLDWIDE

Barry Electronics Corp.

WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!

For the best buys in town call:
212-925-7000
Los Precios Mas Bajos en Nueva York

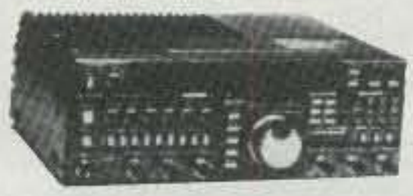
WE SHIP WORLDWIDE!

Export orders expedited.

IC-R71A, R72A, R100, R7000A, R7100A, R9000A, IC-725, 728, 729, 735, 737, 765, 781. IC229H, IC3230A, IC901A, GPS Receiver: GP-22

Wherever I go, I take my radio.
Specialist in RADIOS;
Business marine aviation,
ham radios and scanners.

KITTY SAYS: WE ARE OPEN 7 DAYS A WEEK
Saturday 10-5pm/Sunday 11-4 pm
Monday-Friday 9 to 6:00 PM
Come to Barry's for the best buys in town



CONTACT US FOR THE LASTEST IN BUSINESS AND HAM RADIOS, SHORTWAVE RECEIVERS & SCANNERS, MOTOROLA, YAESU, ICOM, KENWOOD, ALINCO, STANDARD,MAXON, RELM, BENDIX KING, SONY, SANGEAN

ICOM

"YAESU Ham and Business Radios"

FT-767GX, FT-890, FT-747GX, FT-990, FRG-8800, FRG-100B FT-736R, FT-1000D, FT-416/816, FT-530, FT-5200, FT-2400, FT-470, FT-530- FT-411E

KENWOOD

ANTENNAS
A-S, AES, Cushcraft, Hy-Gain, Hustler, KLM, METZ, Urban, MODUBLOX, TONNA, Butternut, Multi-Band

"TS-50S", TS450S/AT, R-5000, TS-850S, TM 241/A/441A, TR-751A, Kenwood Service Repair, TS140S, TS690S, RZ-1, TS-790A, TS950SD, TH-78A, TH28/48A, TM-941A, TM-741A, TM-732A, TM-641A, TM-742A.

MARINE RADIOS
ICOM M7, M11, M56, M700TY, M800
AVIATION PORTABLE ICOM A-21
MOTOROLA MARINE KING KX 99

SCANNERS
AOR: 900, 1000, 1500, 2500, 2800, 3000A
ICOM: R-1, R100, R71A, R72A, R7000, R7100, R9000
Bearcat

Budwig ANT. Products
FLUKE 77, 83, 85, 87 Multimeters

Linear Amplifier
Ameritron, Icom, Kenwood, Yaesu

YAESU	ICOM
FT-23R/26/76	IC2/3/4SAT
FT411E-811-911	IC02AT/2SRA
FTH-2008/7008	IC2/4GAT/24AT
	IC-A21/U16

ICW2A
W2IAT
P2AT/4AT

IC-H16/U16
IC2IA

MOTOROLA RADIUS COMMERCIAL RADIOS

Landmobile HT's
ICOM: U16, H16, V100, U400
MAXON, MOTOROLA,
YAESU: FTH 2008/7008
UNIDEN, REGENCY, KING,
MARINE ICOM: M7, M56, M700
AVIATION ICOM: A21 A200 H.T., TAD

TH-78A

FT-530

Telephone Autopatch
Patches telephone calls from your radio to phone line. Great for making and receiving phone calls where there are no phone lines. Simple to use. Write or fax for inquires.
Simplex, semi-duplex, full duplex, CES & CSI Models stocked: SDI-50, PPV, CS700/800/900 etc. Our service Lab will wire in systems for you if requested.

Save money on batteries. Ask for Special Prices.

MFJ-989C
8L8H, AT300, etc.

Covercraft/Coaxseal Stocked

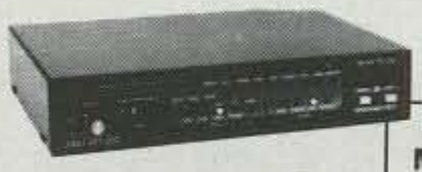
SHORTWAVE RECEIVERS STOCKED

Shortwave Receivers

• SONY • GRUNDIG
• SANGEAN • ICOM

Call 212-925-7000

Satellite telephone in suitcase for worldwide use. WRITE.



Computer Interfaces Stocked: MFJ-1270B, MFJ-1274, MFJ-1224, AEA PK-88, MFJ-1278T, PK-900, PK-232 MBX W/FAX, DRSI PRODUCTS DSP 2232

Antenna Tuners:
MFJ, AEA AT-300, ICOM, KENWOOD, YAESU.

COMMERCIAL & HAM REPEATERS STOCKED. WRITE FOR QUOTES

Kantronics
KAM PLUS, KPC 2/3/4, KPC2400, SUPER FAX II, KPC IV, Data Engine, D4-10, etc.

MOTOROLA

MOTOROLA AUTHORIZED DEALER
KACHINA COMMUNICATIONS DEALER

Radios for Business, Gov't, 2-way, etc. Stocked & Serviced,

Call for Great Prices!

ALINCO DJ580T, 120T, 162T, 460T, 180T, F1TH, DR570T, etc.

Wide selection of SW & Amateur Publications

AUTHORIZED DEALER
SONY®
Shortwave Radios Stocked
DIGITAL FREQUENCY COUNTERS
OPTOELECTRONICS model 1300 H/A, 0-1300MHz 2300, 2210 H, 0-2200 MHz, 2600H, UTC-3000, 2810

AMPLIFIERS STOCKED:
RF Concepts
Mirage
TE Systems

COMET ANTENNAS STOCKED

HEIL EQUIPMENT IN STOCK

Telephone scramblers for cellular and regular phones. $299.00 each

CAR Stereo with Shortwave Phillips DC-777 @ $499.95 in stock

BIRD Wattmeters & Elements In Stock

ANTENNAS: AEA, AlphaDelta, ANLI, Antenna Specialist, Barker & Williamson, Comet, Cushcraft, Diamond, GAP, Hy-Gain, Hustler, Larsen, Etc.

(144, 220, 440 MHz), Isoloop.

EIMAC
3-500Z
572B, 6JS6C
12BY7A &
6146B

BIRD Wattmeters & Elements In Stock

Long-range Wireless Telephone for export in stock

BENCHER PADDLES, BALUNS, LOW PASS FILTERS IN STOCK

MIRAGE/RFC Amplifiers
ASTRON POWER SUPPLIES
Belden Wire & Cable, Int'l Wire
OPTO KEYERS STOCKED

STANDARD.

JRC Short-wave radios
JST135, NRD-535D

Hy-Gain Towers will be shipped direct to you FREE of shipping cost.

Ameritron Amplifiers
AMERITRON®

MAIL ALL ORDERS TO: BARRY ELECTRONICS CORP., 512 BROADWAY, NEW YORK CITY, NY 10012 (FOUR BLOCKS NORTH OF CANAL ST., BETWEEN SPRING AND BROOME ST.)

New York City's LARGEST STOCKING HAM DEALER
COMPLETE REPAIR LAB ON PREMISES

"Aqui Se Habla Espanol"
BARRY INTERNATIONAL
FAX 212-925-7001 Phone 212-925-7000

Monday-Friday 9 A.M to 6:00 P.M.
Saturday 10- 5pm /Sunday 11- 2pm

IRT/LEX-"Spring St. Station". **Subways:** BMT-"Prince St. Station". IND-"F" Train-Bwy Station"
Bus: Broadway #6 to Spring St. Path-9th St./6th Ave. Station.

COMMERCIAL RADIOS STOCKED: ICOM, Motorola, MAXON, Standard, Yaesu. We serve municipalities, businesses, Civil Defense, etc. Portables, mobiles, bases, repeaters...

ALL SALES FINAL

We stock: AEA, Alinco, Ameco, Ameritron, Antenna Specialist, ARRL, Astatic, Astron, B&K, Belden, Bencher, Bird, Butternut, CES, Cushcraft, Daiwa, Elmac, Henry, Heil, Hustler, Hy-Gain, Icom, KLM, Kantronics, Kenwood, Larsen, Maxon, MFJ, Mirage, Motorola, Nye, Palomar, RF Products, Shure, Standard, TUBES, Uniden, Yaesu, Vibroflex, Duplexers, Repeaters, Scanners, Radio Publications

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS
HAM DEALER INQUIRES INVITED PHONE IN YOUR ORDER & BE REIMBURSED
COMMERCIAL RADIOS stocked & serviced on premises.
Amateur Radio Courses Given On Our Premises, Call
Export Orders Shipped Immediately.

Technical help offered upon purchase

FAX: 212-925-7001

The WPX Program

SSB

2427	IK1QLD	2428	N6ONO

CW

2803	HS1CDX	2804	WD6CKT

MIXED

1634	IKØNKI	1638	9A2AJ
1635	IK7NXO	1639	JH8CZB
1636	5N6/N9MDW	1640	IT9JPK
1637	HS1CDX		

Mixed: 450 IK7NXO, 5N6/N9MDW, KL7OH, HS1CDX, JH8CZB, IT9JPK. 500 IK7NXP, 5N6/N9MDW, HS1CDX, IT9JPK. 550 5N6/N9MDW, IT9JPK. 600 5N6/N9MDW, IT9JPK. 650 IT9JPK. 700 IT9JPK. 750 IT9JPK. 800 IT9JPK. 850 IT9JPK. 900 IT9JPK. 950 IT9JPK. 1000 IT9JPK. 1250 K9UQN, I1-21171. 11300 I1-21171, WA4FOT. 1350 WB4FOT. 1400 WB4FOT. 1450 I2EAY. 1600 K9UQN. 1900 KS4S. 2100 N4UH. 2300 I2EOW. 3200 W2FXA. 3250 IT9TQH. 3300 IT9TQH. 3350 IT9TQH. 3400 IT9TQH. 3450 IT9TQH. 3500 IT9TQH. 3550 IT9TQH. 3600 IT9TQH. 3650 IT9TQH. 3700 IT9TQH.

SSB: 350 WWØE, WQØH, CT1CBI. 400 N2JNZ, WWØE, WQØH, CT1CBI. 450 N2JNZ,CT1CBI. 500 N2JNZ,CT1CBI. 550 CT1CBI. 600 DL8AAV, CT1CBI. 650 CT1CBL. 700 CT1CBI. 750 CT1CBL. 800 CT1CBI. 850 CT1CBI, IKØJMS. 900 CT1CBI, IKØJMS. 950 WB4FOT, IKØJMS. 1000 WB4FOT. 1400 K2EEK, KS4S. 2050 I2EOW. 2100 LU8ESU, N4UH. 2150 LU8ESU. 3250 IT9TQH. 3300 IT9TQH. 3350 IT9TQH. 3400 IT9TQH. 3450 IT9TQH. 3500 IT9TQH, WA2HZR. 3550 IT9TQH, WA2HZR. 3600 IT9TQH, WA2HZR. 3650 IT9TQH. 3700 IT9TQH.

CW: 350 HS1CDX, WD6CKT. 400 WD8O, HS1CDX. 450 HS1CDX. 500 HS1CDX. 650 WB4FOT. 700 WB4FOT. 750 WB4FOT. 800 G3JTO, WB4FOT. 850 G3JTO, IV3PVD, WB4FOT. 900 WB4FOT. 1100 JA7FFN. 1200 IK5DEY, KS4S. 1250 I2EAY, IK5DEY. 1300 K9UQN. 1550 I7PXV. 1800 PAØSNG. 1850 PAØSNG. 3250 IT9TQH. 3300 IT9TQH. 3350 IT9TQH. 3400 IT9TQH. 3450 IT9TQH. 3500 IT9TQH. 3550 IT9TQH. 3600 IT9TQH. 3650 IT9TQH. 3700 IT9TQH.

10 Meters: 5N6/N9MDW, AA6WJ.
15 Meters: 5N6/N9MDW, AA6WJ.
20 Meters: HS1CDX, AA6WJ
40 Meters: I2EAY

Asia: 5N6/N9MDW, HS1CDX
No. Amer.: 5N6/N9MDW
So. Amer.: I2EAY, KAØZFX
Europe: 5N6/N9MDW, HS1CDX

Award of Excellence Plaque Holders: I8YRK, W4CRW, SMØAJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, IØJX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, KØJN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KBØG, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YBØTK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NXØI, W9NUF, N4NX, SMØDJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWB, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DEØDAQ, LU1DOW, N1IR, IK4GME, WX3N, KC7X, N6IBP.

Award of Excellence Plaque Holders with 160 Meter Endorsement: FM5WD, SMØDJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SMØAJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KBØG, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YBØTK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, NXØI, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DEØDXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCV.

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.

After a few years of such travels the Colvins learned the best way to pack their 400 pounds of equipment and supplies. They traveled with a medium-size suitcase each, with their clothes and personal items. A large foot-locker contained an antenna rotor, cables, 20 pounds of coaxial cable, guy wires, dipoles, connectors, etc. Their main antenna was a Hy-Gain TH3, specially modified to fit into a 6½ foot long canvas bag, 8 inches in diameter. They hand-carried both a transceiver and a kilowatt amplifier, as well as a small carry-on of radio essentials. If their checked luggage didn't arrive at their destination, they still had the basis of a station. "You can operate in your underwear," Lloyd would explain, "But you can't operate without your rig." Lloyd would practice carrying the rig and amplifier at home in front of a mirror. He tried to give the impression that the gear weighed closer to 20 pounds than the 70 pounds they actually weighed!

Once the Colvins arrived in a new country, they would scout out a suitable location for their operation. An isolated house on a hilltop, with reliable electricity, was ideal. Within a few days they would unpack and set up their station, often securing local assistance with the triband beam. Meanwhile, they would be obtaining or confirming operating permission. They tried to get local callsigns ending in KG or QL. When a DXer would tune by a pile-up and Hear "King George" or Queen Lady," he would know immediately it was the Colvins from yet another country. Their schedule put them out of the US during most of the contest season, and the Colvins regularly entered the major contests in the multi-single category, providing contesters with a valuable multiplier while providing many DXers with a New One.

Almost amazingly, the Colvins kept up this hectic pace without any major mishaps, until 1987. While in the Maldive Islands, Iris slipped on a step, fell, and broke her leg. She had to be air-lifted to Sri Lanka for medical treatment. Otherwise, their DXpeditions, while not always successful, were at least without serious incident.

Many of their DXpedition destinations were places where amateur radio was well-known and understood. In fact, many destinations had resident amateurs who assisted them in their efforts. The Colvins were not afraid to break new ground in their travels, however. In some cases they patiently had to explain to a telecommunications official what amateur radio was, and what an amateur license looked like.

In other cases they helped open up the country to amateur radio, paving the way for future operations.

Throughout their long DXpedition career, they stuck to the highest standards of ethics. They endured the disappointment (and expense) of not getting operating permission sometimes rather than risk jeopardizing future amateur radio operating by operating illegally or on unauthorized frequencies. (This was in sharp contrast to another DXpeditioner active in the 1960s: Don Miller, W9WNV.) As such they earned the unofficial title of worldwide Goodwill Ambassadors of amateur radio.

The Colvins maintained their yearly six-month DXpedition schedule into the 1990s. At 75, Lloyd was at an age when most men find any travel wearying, much less travel to a new country halfway around the world carrying 400 pounds of radio gear and antennas. Each year the Colvins came back to the States in time for the International DX Convention in Visalia, California, and the Dayton Hamvention a week or two later. Their slide shows were a regular event on the convention circuit. In fact, Lloyd's middle name was Dayton!

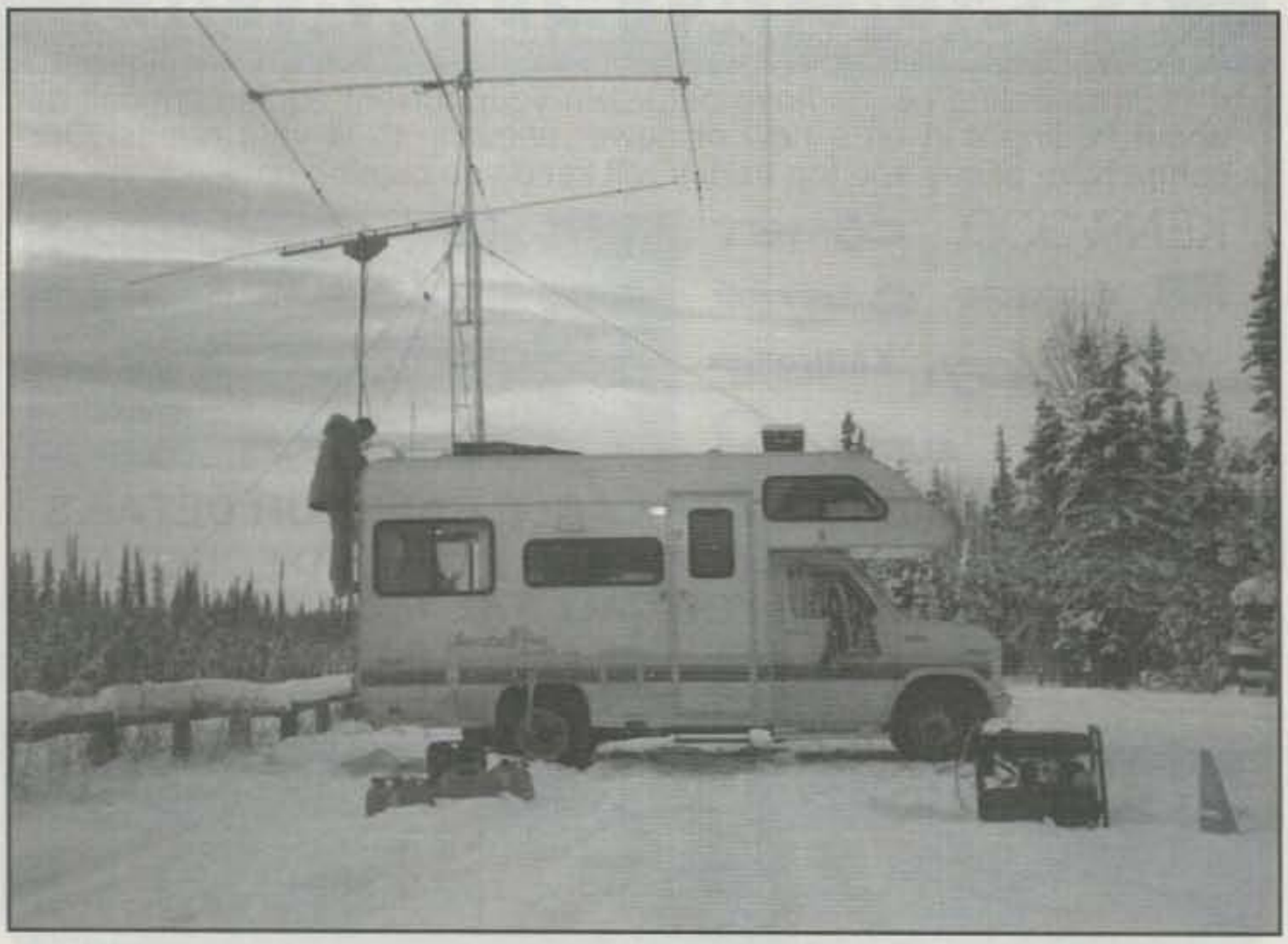
The many thousands of contacts the Colvins made each year generated thousands of QSL requests. To handle the tons of cards they received, the Colvins used a system suggested by controversial DXpeditioner Don Miller, W9WNV. The Colvins used a two-part logging system with a single line for each contact. They kept the original log, and mailed the carbon copy back to the Yasme Foundation in California. The carbons were lightly coated with dry glue. Each contact could be trimmed out and quickly affixed to a QSL card for that operation. Over the course of more than 25 years, the Colvins sent out more than 500,000 such distinctive red-and-white QSLs.

They also kept all the incoming cards, amassing what must be the largest QSL card collection in the world. All their cards are stored alphabetically in more than 400 file cabinets in their Richmond home. Visitors to their annual 4th of July open house eagerly search out their own cards, sent to the Yasme Foundation over the years. The two tons of cards represent more than four years of full-time, eight-hours-a-day effort to answer, sort, and file. While they never employed any secretarial help, the Colvins did have some volunteers from the local area to share the burden of their QSLing. (Anyone still needing a card can confirm a Colvin contact through the Yasme Foundation address: P.O. Box 2025, Castro Valley, CA 94546.)

In addition to DXpeditioning, Lloyd was also a DXer himself, proudly on the top of the Honor Roll, having worked all current DXCC countries and dozens of deleted

CIRCLE 19 ON READER SERVICE CARD

CIRCLE 116 ON READER SERVICE CARD



NL7VJ and NL7TB braved sub-zero temperatures and a blizzard to operate as VY1QST in the ARRL SSB Sweepstakes in November. QSL to NL7TB.

ones. He also earned the very first Worked All Prefixes certificate from *CQ* magazine. Lloyd and Iris were honored in November 1976 by election to the CQ DX Hall of Fame, joining fellow DXpeditioners such as Danny Weil and Gus Browning, W4BPD.

Lloyd suffered a massive stroke while on yet another Yasme DXpedition, this time to Turkey. While his family made arrangements to fly him back to the US for more medical treatment, he passed away on December 14. He is survived by his wife Iris, W6QL, daughter Joy Gilcrease, and granddaughters Justine and Vanessa Gilcrease. His remains were scattered at sea. He will be missed.

DX Operations Approved For DXCC Credit

Bill Kennamer, K5FUV, DXCC Specialist, reports the following operations are accredited for DXCC, as of the given start date:

3D2UF, 20 Nov. 1992; **4J1FM**, 21 Oct. 1992; **4J1FW**, 21 Oct. 1992; **5W1VL**, 25 Nov. 1992; **6O/FE1LVR**, 18 Jan. 1993; **A61AF**, 3 Aug. 1993; **C56V**, 30 Oct.1993; **C56/KF7AY**, 28 Oct. 1993; **C56/AA7NO**, 28 Oct. 1993; **C56/N7BG**, 28 Oct. 1993; **KH2/N6SVL**, 5 Nov. 1993; **KH6/N6SVL**, 3 Nov. 1993; **V51/DJ2ZS**, 17 Aug. 1993; **V51/DJØWQ**, 17 Aug. 1993; **V51/DK2WH**, 21 July 1993; **V63UF**, 10 Nov. 1993; **V73UF**, 17 Nov. 1993; **YA1AR**, 5 Dec. 1992; **ZK1AUF**, 17 Nov. 1992; **ZL/N6SVL**, 11 Nov. 1992; **ZS9/DJ2ZS**, 6 Aug. 1993; **ZS9/DJØWQ**, 6 Aug. 1993; **ZSØPI**, 28 July 1993. Also: **4S7/OH2VZ**, 13 Aug. 1993; **5R8DP**, 12 Mar. 1993; **9ER1TA**, 19 Oct. 1992; **9ER1TB**, 19 Oct. 1992; **A35HX**, 25 Feb. 1993; **E31A**, 2 Aug. 1993; **E35X**, 31 May 1993; **HSØZBJ**, 1 Oct. 1993; **J3/CT3FN**, 21 May 1993; **S21ZD**, 5 Sept. 1992; **S21ZL**, 7 Mar. 1993; **T5YOU**, 3 Sept. 1993; **ZF2VA**, 28 Apr. 1993; **ZK19HX**, 19 July 1993; **ZK2XH**, 26 July 1993.

In other DXCC news the ARRL Awards Committee voted 6 to 1 in favor of accepting a DX Advisory Committee recommendation to create an **Honor Roll for RTTY DXCC.** Qualification for the new Honor Roll is the same as for Mixed Honor Roll: 319 current (not deleted) countries. This action makes Honor Rolls for all DXCC mode awards. The RTTY DXCC accepts contacts made using Baudot, ASCII, Amtor, and other non-CW digital protocols. Persons who qualify for RTTY Honor Roll will be recognized based on their RTTY DXCC records; no other action is required.

Up-Coming DXpeditions and DX Operations

Seven members of the Glen Canyon (Arizona) Wireless Association will stage a two-week DXpedition to the South Cook Islands ZK1 March 4–17. They will start on the island of Rarotonga (OC-013 for Islands On The Air) March 4–10, including a multi-single entry in the ARRL SSB DX Contest March 5–6, under the call **ZK1AVY**. Outside the test they'll be on all bands and modes, running a couple of stations simultaneously. March 10–17 they'll move over to Aitutaki Island (OC-083), again on all bands and modes. Callsigns, and stateside calls, are: **ZK1AVY** (AA7VY); **ZK1MTF** (WA7MTF); **ZK1AIQ** (KD3IQ); **ZK1WTU** (N7WTU); **ZK1XYR** (N7XYR); **ZK1ZRD** (N7ZRD); and **ZK1AYR** (KC5AYR). QSL all ZK1 calls to Dan Brown, N7WTU, P.O. Box CC,

The WAZ Program

Single Band WAZ

15 Meter SSB

457	LU9DBK	459	JE1VTZ
458	JH3GRO	460	KM1E

20 Meter SSB

936	OE7SEL	939	KM1E
937	PR7CPK	940	XE2JFP
938	KA6SPQ	941	N5PHT

10 Meter CW

139	JH2QAY

12 Meter CW

11	DJ5JH

17 Meter CW

11	HB9ALO	12	W9LKJ

All CW

38	KC6X	40	W9KDX
39	OE5BWN	41	KA1CB

RTTY

84	GØARF	86	ON7SD
85	SM5FUG	87	OH2DW

All Phone

620	N3RC	621	W6IEG

All Band WAZ

SSB

4127	N3RC	4135	N4HID
4128	HB9BCK	4136	HK6ISX
4129	WWØE	4137	IK5JJQ
4130	IKØOHU	4138	VY2RO
4131	IK8JVG	4139	N1CVG
4132	IØYQV	4140	EA9PB
4133	N4SPQ	4141	WØFQV
4134	W9KDX		

CW/Phone

7409	KI4UZ (CW)	7417	SM5SWA (CW)
7410	JA1AEC	7418	AA2DV
7411	4X1EL (CW)	7419	WA2HZT
7412	W5KCR	7420	DL2HUC
7413	WA4FTM (CW)	7421	DL3JSW
7414	OZ4AAL	7422	WA3GOS
7415	AA7NO	7423	DL2AXA
7416	ZL3JU		

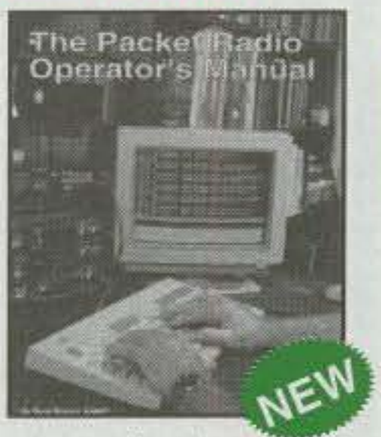
Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4¼ x 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Rd., Sudbury, MA 01776. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all *CQ* awards is $4.00 for subscribers and $10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

CQ Books and Videos

The Quad Antenna

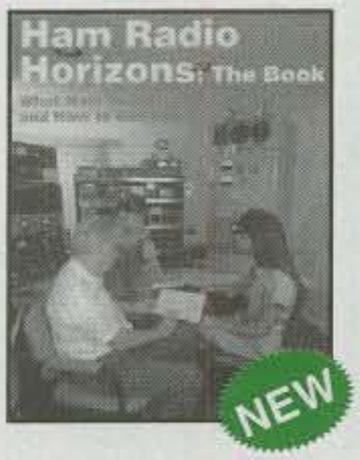
Hams love antenna books and this book is no exception. Written by world renowned author Bob Haviland, W4MB, The Quad Antenna is the authoritative technical book on the design, construction, characteristics and applications of Quad Antennas. Discover how to easily build a quad antenna for your station that will help you fill your logbook with rare DX that you have only dreamed about before. **Order No. QUAD..... $15.95**

The Packet Radio Operator's Manual



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. **Order No. PROM..... $15.95**

Ham Radio Horizons: The Book



Written by Peter O'Dell, WB2D, this is a book about ham radio that every beginner can enjoy! If you want to get in on the fun and excitement of Amateur Radio, Ham Radio Horizons is the perfect way to get started. HRH is full of tips from expert hams in: DXing, Contesting, Serving the Public, Ham Radio in Space, Experimenting, Digital Communications — you name it! This exciting book is an excellent gift to a prospective ham or for use in your club's licensing classes and library.

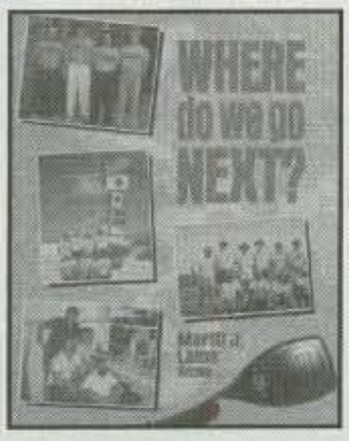
Order No. BHOR..... $12.95

The Vertical Antenna Handbook

Take advantage of the 20 years of research and practical experience of naval communications engineer Capt. Paul H. Lee, USN(ret), N6PL. Learn the basic theory, design, and practice of the vertical antenna. Discover easy construction projects such as a four-band DX vertical or a broadband array for 80 meters. Ever wonder how to build a functional directive vertical system? Paul Lee can get you started today!

Order No. VAH..... $9.95

Where Do We Go Next?



Ever dream about what it's like to go on a DXpedition? Have you ever imagined thousands of stations calling only you? No one can tell his story in a more compelling way than world famous DXpeditioner Martti Laine, OH2BH. Whether it's from the wind-mills of Penguin Island or the volcanoes of Revillagigedo each chapter conveys a unique story that you won't be able to put down.

Order No. WGN .....~~$22.95~~ **SPECIAL.....$15.95**

The Shortwave Propagation Handbook

There's simply nothing like it — the authoritative book on shortwave propagation. Developed by CQ propagation columnist George Jacobs, W3ASK and Ted Cohen, N4XX, The Shortwave Propagation Handbook is your source for easy-to-understand information on sunspot activity, propagation predictions, unusual propagation effects, and do-it-yourself forecasting tips. As an active ham, you can't afford to be without this one! **Order No. SPH $9.95**

Keys, Keys, Keys

Enjoy nostalgia with this visual celebration of amateur radio's favorite accessory. Written by the well-known author and CQ columnist Dave Ingram, this book is full of pictures and historical insight that only K4TWJ can provide. If you've ever wondered about the old days of Morse, this book's for you.

Order No. KEYS..... $9.95

Get Started with CQ's New Video Library!

Also Available In PAL format

Getting Started in Packet Radio

This video will help de-mystify the exciting but sometimes confusing world of packet radio. Learn how to get started using your computer on the radio. Included are step-by-step instructions on making packet contacts and using packet bulletin boards, networks and satellites. **Order No. VPAC.. $19.95**

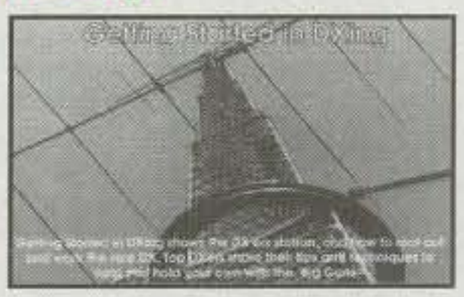
Getting Started in Ham Radio

This is a fast-paced video introduction to the fascinating world of ham radio. CQ's experts show how to select equipment and antennas; which bands to use; how to use repeater stations for improved VHF coverage; the importance of grounding and the basics of soldering. How to get the most out of your station, whether it's home-based, mobile or handheld. **Order No. VHR $19.95**

Getting Started in Amateur Satellites

Learn with this video how veteran operators set up their satellite stations. Find out how to locate and track ham satellites with ease. Watch operators access current satellites and contact far ranging countries around the world. This video is filled with easy to understand advice and tips that can't be found anywhere else . **Order No. VSAT..... $19.95**

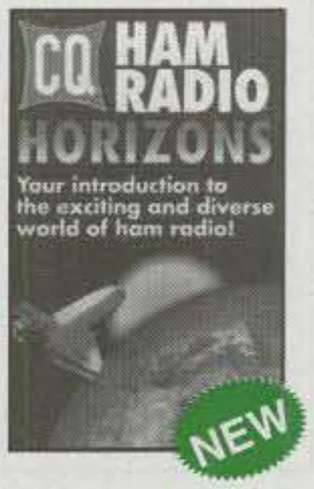
Getting Started in DXing



Top DXers share their experience with equipment, antennas, operating skills, and QSLing. You'll see hams work rare DX around the world. If you're new to DXing, this video is for you! All this valuable information may well give you the competitive edge you need to master the exciting world of DXing.

Order No. VDX..... $19.95

Ham Radio Horizons: The Video



This introduction to Amateur Radio is an excellent complement to the Ham Radio Horizons book. Enjoy seeing all aspects of ham radio ranging from what it takes (and costs) to get started to how you can get your ham license. Designed for the general public, HRH is ideal for public events, presentations to community groups and as an opening to your club's licensing courses! There's no better way to introduce someone to ham radio.

Order No. VHOR.....$19.95

For Fastest Service,
Order Toll Free 1-800-853-9797
Or FAX 516-681-2926
Also available at your local dealer!

YES! I want to learn from the experts. Rush me my book(s)/video(s) right away!

Qty	Item #	Description	Price	S & H	Total Price

Please add $4 shipping & handling per item ordered. FREE shipping & handling for orders $50 and over.

Please make your check or money order payable to: CQ Communications, Inc.

Name _____ Callsign _____

Address _____

City _____ State _____ Zip _____

MC/VISA/AMEX/Discover # _____ Expires _____

Form of payment: ☐ MC ☐ VISA ☐ AMEX ☐ Discover ☐ Check ☐ Money Order

Please mail your orders to:

CQ Communications, Inc., 76 North Broadway, Hicksville, New York 11801-9962

5 Band WAZ

As of November 30, 1993, 368 stations have attained the 200 Zone level.

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

None

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)	IK2GNW, 199 (1)
K6YRA, 199 (34)	W9CH, 199 (26)
PY7ZZ, 199 (34)	AC0M, 199 (34)
K0CS, 199 (34, 40m)	G3MXJ, 199 (12)
AA4KT, 199 (26)	IK8BQE, 199 (31)
K7UR, 199 (34)	W6TC, 199 (34)
NA0Y, 199 (26)	SM6AHS, 198 (12, 31)
VE7DX, 199 (34)	K1ST, 198 (19, 26)
W0PGI, 199 (26)	4X6DK, 198 (4, 6)
W2YY, 199 (26)	AB0P, 198 (23, 34)
W9WAQ, 199 (26)	UA3AGW, 198 (1, 12)
K6EID, 199 (34)	KL7Y, 198 (34, 36)
W1JR, 199 (23)	VO1FB, 198 (19, 27)
W8SEY, 199 (26)	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)

The following have qualified for the basic 5 Band WAZ Award:

HB9BGV, 176 Zones	ND6G, 186 Zones
N7MC, 196 Zones	KM1E, 171 Zones

Endorsements:

KC6X, 178 Zones	W6TC, 199 Zones
HB9DDZ, 184 Zones	

867 Stations have attained the 150 Zone level as of November 30, 1993.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

Page, AZ 86040, with self-addressed envelope and US$1, please. (Non-US DXers may include an IRC instead of US$1.) Please note the ZK1 callsign on the outer envelope.

Holger Hannemann, DL7VTM, and other Germans will travel to Zambia 9J March 14 to April 6. Holger will use the call **9J2TM**, and Lutz, DL7VLA, will operate as **9J2LA**. Birgit (ex-Y58AO) will also seek a 9J callsign. The young German team will work 160–10 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 WPX SSB Contest March 26–27. QSL via DL7VRO.

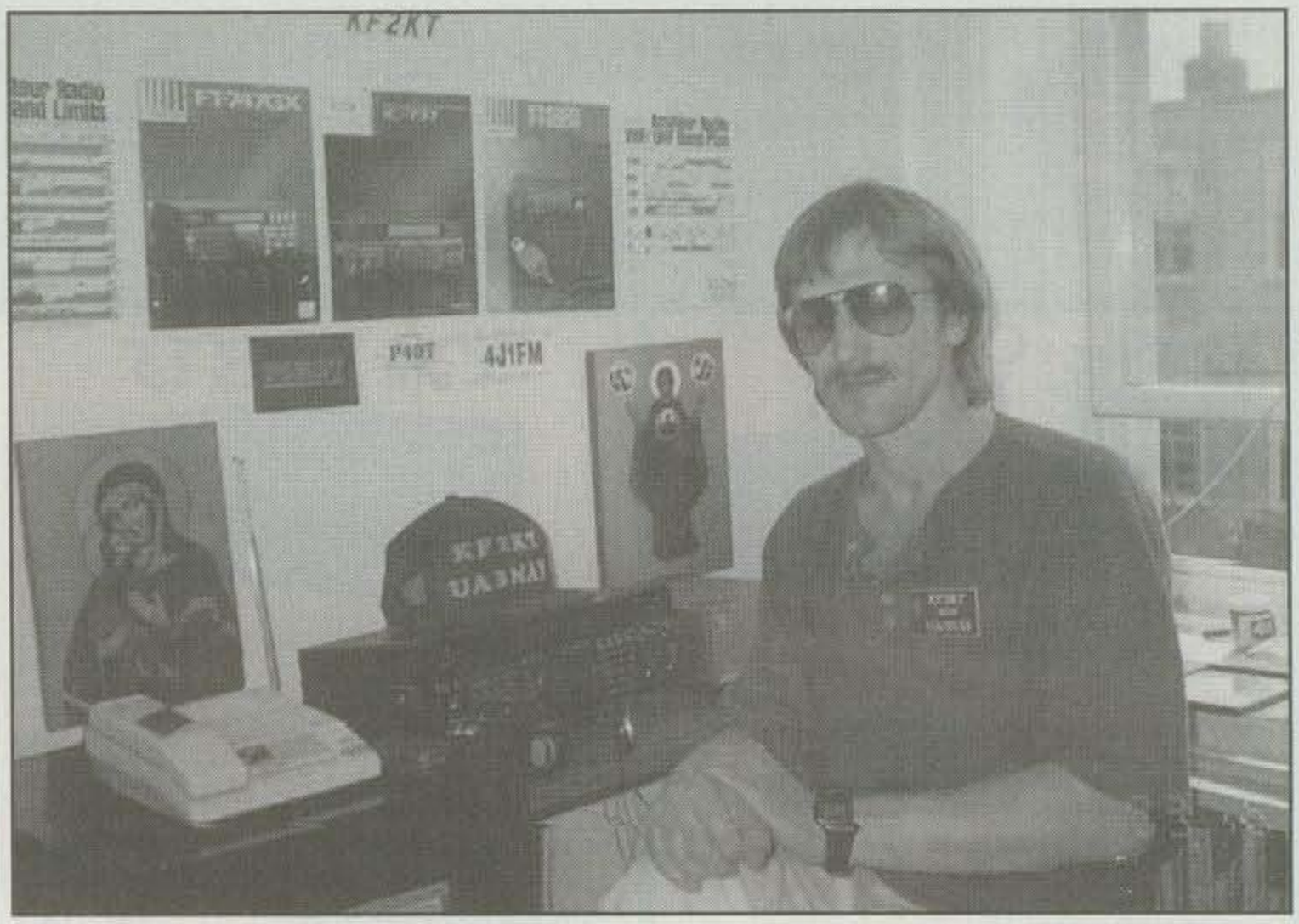
The **BV0ARL/BV9P** Pratas Island DXpedition almost made it on the air in late December. The operators and their gear were bounced from the flight to Pratas at the last minute by military personnel. Their operation from this potential new DXCC country has been postponed to late February or early March, according to Martti Laine, OH2BH/VR2BH.

How many QSL cards does a DXpedition receive? Here are some of the cards from the Desecheo KP5 operation of last year, flanked by QSL helpers Steve, KD5ZD, and Orin, N5ORT.

Finally, while not a DXpedition, there has been an increase in DX activity from Pitcairn Island VR6. There are now 12 licensed amateurs on Pitcairn out of a total population of 59! This must be the highest percentage of licensed amateurs of any continuously occupied country! They have formed the Pitcairn Amateur Club and are now using the club callsign **VR6PAC**. A good place to look for a Pitcairn contact is on 21290 kHz at 1600Z Monday, alternate Tuesday. Irma Christian, VR6ID, skeds QSL manager Paul Minning, N6IBP, at this time, and they welcome visitors after handling their QSL duties.

Visalia Convention

The 1994 International DX Convention will be held April 15–17 at the Holiday Inn-Plaza Park, in Visalia, California. Preregistration (prior to March 15, 1994) is $45, and includes the Saturday evening banquet and Sunday morning brunch, as well as all the programs, cocktail parties, and more. Send your check, made out to the International DX Convention, to registrar Don Bostrom, N6IC, 4447 Atoll Ave., Sherman Oaks, CA 91423. Tentative program for Saturday evening is the 1994 Peter I Island DXpedition. Other note-



Nick, KF2KT, is ex-UA3NAY, now living in Brooklyn. Nick is the new QSL manager for the South Shetland station 4K1F. He has worked 248 countries in the first five months of operation.

worthy events include the Friday morning golf tournament and the Friday evening cocktail party sponsored by The DX Bulletin. The Holiday Inn's telephone number is (209) 651-5000. If they're sold out, try the Radisson in downtown Visalia at (209) 636-1111, or the nearby Lamplighter Hotel at (209) 732-4511.

Trivia answer: There are three DXCC countries that span more than one continent. Turkey lies in both Europe and Asia, and the Maldives 8Q are in both Africa and Asia. Also, Antarctica stations can be in different continents, depending on where the station is located. The continents in the southern hemisphere meet at the South Pole. Russia spans two continents, but is two separate DXCC countries: European and Asiatic Russia. Italy has some islands in Africa's Zone 33, but for continent purposes these islands are considered European.

QSL Information

QSL the Czech Republic special contest station **OL1A** via Pavel Valach, OK1DWX, Box 99, 37701 Jindr. Hradec, Czech Republic. Use this route for **OL1HQ** as well.

The direct address of Paco, **EA8AB**, is Mr. F. Bernabeu Perez, Garc Vega 40, Urb. Santiago 1, 10 Izda, 38005 Santa Cruz De Tenerif, Canary Islands, Spain.

QSL **VP9/WA2MEQ** direct to Lou Wilson's new address: 316 Ellis Lane, West Chester, PA 19380.

QSL **DU7LA** to Peter Sils, P.O. Box 901, Cebu 6000, Philippines.

QSL the November 1993 Cayman Islands operations as follows: **ZF2WW** via Roger Western G3SXW, 7 Field Close, Chessington Surrey, KT9 2QD, England, or via the RSGB (UK) bureau. QSL **ZF2VP** via KC7V, **ZF2VX** via K5VT, and **ZF2VY** via K7GE.

QSL the November 1993 Anguilla operations of **VP2E/N2TPH** and **VP2E/N4CD** via Bob Voss, N4CD, 3133 Charring Cross, Richardson, TX 75025.

QSL Guam operators Ricky, **KH2HB**, and Lorena, **KH2HM**, Martin via APDO 2166, Balboa, Republica de Panama.

The QSL cards for **4U1UN** (and other United Nations headquarters callsigns) are being worked on by hand, to get the huge backlog answered. Please **don't** send duplicate cards to W8CZN. Computer logging at 4U1UN will eliminate delays in the future. Thanks for your patience.

QSL cards for the 35,000 **ZB2X** contacts Jorma Saloranta, OH2KI, has made from Gibraltar will arrive via the bureau system. If you need a speedier reply, QSL direct to Jorma at Karhutie 39, 00800 Helsinki, Finland.

KJ6TC finally received the computerized logs for his **9K2WR** operation and will start processing QSL requests.

Anyone still needing a **4J1FM** QSL card should try again via P.O. Box 1036, Sun City, AZ 85372-1036.

SU2MT is Mohamed Tartoussiah, P.O. Box 1616, Alexandria, Egypt.

German airmail costs are now DM3 for a 20 gram letter to the US. This is your return airmail-weight envelope and about

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Currently there are 329 countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

K2TQC	329	N6AR	328	K9IW	326	WA8DXA	323	I2QMU	320	W5OG	315	KB4HU	308	YV5ANT	294	HA5NK	278		
K1MEM	329	W2FXA	328	W7ULC	326	K9AB	322	N6AV	319	WB5MTV	315	KB4HU	308	KB3X	289	WB6OKK	277		
W9DWQ	329	YU1HA	328	N7MC	326	IT9QDS	322	AA6AA	319	I5XIM	314	IK2ILH	307	VE1RJ	288	KA3R	277		
N4MM	329	SM6CST	328	WØHZ	326	IT9ZGY	322	DJ2PJ	319	WA2HZR	312	K1VHS	306	WG5G/QRPp	288	W3HQU	276		
K2FL	329	AA4KT	328	W9WAQ	326	K4XO	321	N5FW	318	W4OEL	312	KA7T	306	W7IIT	287	WF9K	276		
DL1PM	329	N4JF	328	WØSR	325	OK1MP	321	N6CW	318	NC9T	311	N1HN	306	KØHQW	286	N5FG	275		
K3UA	329	W2UE	328	KB8DB	325	N2KW	321	W8XD	318	OH3NM	311	W8URM	305	CT1YH	284	K7JYE	275		
K9BWQ	329	K8NA	328	WA4JTI	324	G4BWP	321	K9TI	317	VE7CNE	311	WA4DAN	302	N4OT	284				
K9MM	329	WA4IUM	328	ON4QX	323	VE3HO	321	W1WAI	317	AA2X	311	KA2DIV	301	WB4UBD	284				
K2ENT	329	KZ4V	328	K6LEB	323	IT9TQH	321	K1HDO	317	K4CXY	310	G3KMQ	301	HB9DDZ	284				
K2OWE	329	K8LJG	327	PAØXPQ	323	WØJLC	321	K2JF	316	KUØS	310	WA8YTM	300	KP4P	283				
K4CEB	329	WØIZ	327	K9QVB	323	WB4RUA	320	Y33VL	316	VE7DX	310	YU2TW	300	KF5PE	282				
I4EAT	329	EA2IA	327	N7RO	323	K4IQJ	320	N4AH	316	K2JLA	309	KA5TQF	295	W2LZX	279				
K6JG	328	IT9TGO	326	W7CNL	323	F3TH	320	W3BBL	315	W6DN	308	OZ5UR	295	HB9AFI	278				

SSB

K4MZU	329	K5TVC	328	WB3DNA	327	YV5CWO	323	WD8PUG	321	KB3OQ	317	EI6FR	312	KA4RAW	303	OK1AWZ	287		
K2TQC	329	I8ACB	328	DL6KG	327	TI2HP	323	KI3L	321	YV1CLM	317	N1ALR	311	WA9BDX	303	IK8BMW	286		
K2FL	329	N6AHU	328	I2QMU	327	VE7WJ	323	KR9O	321	LU7HJM	317	XE1ZLW	311	KD5ZD	303	N8BJQ	285		
W9DWQ	329	N6AR	328	WØSR	326	I8XTX	323	VE3HO	321	K4JLD	317	KF8VW	311	RA2YA	302	W6SHY	285		
W9SS	329	KSØZ	328	W4UW	326	I8YRK	323	XE1MD	321	KV2S	316	KA5RNH	310	W2LZX	302	KB5RF	284		
WA4IUM	329	W2FXA	328	K2JLA	326	N5FW	323	KB2MY	321	YT7DX	316	TI2JJP	310	KB7IVU	302	KD9CN	284		
DJ9ZB	329	YU1HA	328	K2JF	326	TI2CC	323	KB1JU	321	WA9RCQ	316	I8IYW	310	VE6PW	301	NU4Y	283		
WB1DQC	329	WA4JTI	328	WB5TED	326	K4PQV	323	K9QVB	320	KB9OC	316	ZL1BOQ	310	NO4J	301	VE3IMO	283		
XE1AE	329	WD8MGQ	328	W6BCQ	326	I4LCK	323	KB5FU	320	KB8O	316	W3SOH	310	WP4AFA	301	XE1ILI	283		
EA2IA	329	XE1L	328	PAØXPQ	326	N2KW	323	AA4AH	320	WB2JZK	316	N6AHV	309	WA5SUE	301	K2EEK	283		
K2ENT	329	W6EUF	328	WB4UBD	326	AA5NK	323	G4GED	320	EA3EQT	316	KP4P	309	YU2TW	300	YC3OSE	282		
OZ5EV	329	K8LJG	328	PY4OY	326	WA4WTG	323	NJØC	320	VE2GHZ	316	XE1MD	309	WT4T	300	YV1JV	282		
KA3HXO	329	KB4HU	328	W2CC	326	KØHQW	323	K7EHI	320	IK7DBB	315	WA8YTM	309	W7KSK	300	WB2NQT	282		
CX4HS	329	YV1AJ	328	WZ4I	326	SM6CST	323	W6NLG	320	KC2FC	315	CE7ZK	309	VE3FJE	300	VE4MT	282		
F9RM	329	YV1KZ	328	SV1ADG	326	I8KCI	322	IK8GCS	320	WA5HWB	315	KP4EQF	309	AB4UF	300	EA8TE	282		
I4EAT	329	K8NA	328	W2FGY	326	IØAMU	322	N5FG	320	WB4DBB	315	IØSGF	309	I8IGS	299	VE3NUP	281		
KB8DB	329	OE3WWB	328	I2EOW	326	K4CXY	322	W6MFC	320	HR1KAS	314	N5HSF	309	K5DUT	299	WAØQII	281		
VE3XN	329	VE3MR	328	W4EEE	325	K9AB	322	WB4PUD	320	OH5KL	314	W8URM	308	I2ZGC	299	VU2DVP	281		
YU1AB	329	VE3MRS	328	K9IW	325	KD8V	322	K4SBH	320	WDØDMN	314	N6AV	307	NW5K	299	W8/DL2SCA	281		
VE1YX	329	OE2EGL	328	IKØIOL	325	G4ADD	322	KB7VD	320	ZS6AOO	314	WD5P	307	WB6GFJ	299	LU6FAZ	281		
N4MM	329	W4NKI	328	IT9TQH	325	LA7JO	322	WE2L	320	F6BFI	314	TI2TEB	307	Y33VL	299	KB5MRT	281		
N7RO	329	KZ4V	328	WA4ECA	325	OA4ED	322	WØULU	320	W5GVP	314	VE3DLR	307	KJ9N	298	NXØI	280		
YS1GMV	329	EA4DO	328	K9HQM	325	I4WZK	322	CX1TE	319	N6PTI	314	KX5V	307	VE3CKP	297	YU1TR	280		
K9MM	329	K3UA	328	KC5P	325	K8YVI	322	K9TI	319	PY2DBU	314	XE1MDX	306	EA5RJ	296	WN5K	279		
4Z4DX	329	VE3GMT	328	K1HDO	325	I8SAT	322	K1UO	319	K7TCL	314	VK3JF	306	HP1JC	296	4X6DK	279		
ZL1AGO	329	K9BWQ	328	N4KEL/M	325	I8LEL	322	WB6OKK	319	K4LR	313	EA2AOM	306	VE3XO	294	KAØZFX	279		
KF7SH	329	IK8CNT	328	W5LLU	325	W6DN	322	KF5AR	319	W1LQQ	313	4X4JO	306	KJ6GC	294	HA5NK	279		
ZS6LW	329	WØYDB	327	AI8M	324	IK1GPG	322	KD5ZM	319	I8INW	313	N4KE	305	WB4UHN	294	VU2CVP	278		
VK4LC	329	W7OM	327	VE2PJ	324	KE5PO	322	I1POR	319	K8CMO	312	K3LUE	305	IT9VDQ	293	VE7HAM	278		
YV5AIP	329	WØSFU	327	XE1CI	324	W7ULC	322	KQ9W	318	K8NWD	312	WA6DTG	305	W8AXI	293	K4BYK	277		
ZL3NS	329	IT9ZGY	327	W7FP	324	WS9V	321	WB6PSY	318	ZS6BBY	312	WF9K	305	OA4QV	293	WN5MBS	277		
KZ2P	328	N4JF	327	W5XQ	324	AI8S	321	WB3CQN	318	WA9IVU	312	NI5D	305	AA2FN	293	CT1AHU	277		
K6YRA	328	AA4KT	327	K2ARO	324	VE4AT	321	9H4G	318	KA5TQF	312	G4NXG/M	305	TI2LTA	292	KG6LF	277		
K6JG	328	KC8EU	327	VE7DX	324	ON5KL	321	ZL1BIL	318	K3NEE	312	KJ6HO	305	K9EC	292	YB1RED	277		
WA6OET	328	KM2P	327	K6WR	323	IK8BQE	321	WA6DTG	318	WDØBNC	312	WA1DHM	304	CP5NU	290	WØIKD	277		
DL9OH	328	WD8PUG	327	WA3HUP	323	WA4DAN	321	NC9T	318	N5ORT	312	ACØA	303	CT1EEB	290	EA5GKE	276		
CX1TE	328	KE4VU	327	K9HDZ	323	AA6AA	321	YV5IVB	318	IN3ANE	312	KB9LN	303	WA3KKO	290	VE2DRN	276		
K5OVC	328	LA7JO	327	KØGT	323	K7LAY	321	OE7SEL	318	4N7ZZ	312	AB4PY	303	I4UFH	289	NX4Y	275		
AA6BB	328	K7LAY	327	K4MQG	323	KB3X	321	W3GG	317	F1OZF	312	I4CSP	303	YB1RED	289	AB4NS	275		
KA6V	328	VE2WY	327	OK1MP	323	KE4HX	321	XE1XM	317	K1VHS	312	N6RJY	303	TI5RLI	287	DK5WQ	275		

RTTY

K2ENT	307
WB4UBD	275
K3UA	261
NI4H	252
KE5PO	228

five QSL cards. This requires two IRCs.

QSL **PYØFM** in November and December 1992 via AH3C, and the March 1993 operation via PY5CC.

T9 Bosnia-Herzegovina cards may be sent to Aleksandar Radosav, T92X, Titova Lamela C, 72240 Kakanj, Bosnia-Herzegovina, Europe. He is HF manager for T9. He also requests financial assistance for Amateur Radio Aid, via his QSL manager Lonnie Miller, KA9WON. QSL **ZA1AC** via Ron Vincent, KF4D, at Route 2, Box 117, Carthage, MS 39051. His *Callbook* address is wrong.

The **YA5MM** QSL cards have all been mailed out. If you haven't received your card, try again via Todor Dikov, LZ1HA, P.O. Box 321, 1000 Sofia, Bulgaria. US$1 is appreciated for return postage.

QSL the Sint Maarten operations of **PJ7/WA7LNW, PJ7/OH2LVG**, and **PJ8X** via KE7LZ.

The **N9NS/KH5K** and **N0AFW/KH5** direct QSLs have been answered. If you haven't received your card(s), try again.

QSL the Bosnia-Herzegovina radio club station **T91ELS** (ex-YU4ELS) via operator Marin Pavlovic, P.O. Box 22, Siroki Brijeg, via Split, Croatia.

Robert, **3B9FR**, is back on the air, and answering QSLs, after a nearly two-year hiatus. He promises to QSL 100% for all contacts from 1990 to the present via P.O. Box 31, Rodriguez Island, via Mauritius Island, Indian Ocean.

Dennis Green, **ZS4BS**, since December, 1991, says he gets cards for the previous holder of ZS4BS, who is now **ZS1ADV.** QSL the pre-December 1991 contacts with ZS5BS to Mr. A. S. Boldireff-Strz ZS1ADV, 12 Mauritius Street, Stellenberg 7530, Republic of South Africa.

Shirali Allajarow, UJ8KAC, says he can help with QSLs for **Tadzhikistan UJ8** amateurs, including UJ8JX, UJ8JCQ,

and UJ8JMM. Contact him via Boc 6655, Komerovo-20, 650020 Russia.

The **Moldavian** QSL bureau is under the management of Valery Metaxa, UO5ODA, soon to be **ER1A**. The bureau's address is P.O. Box 6637, Kishinev 277050, Moldava. QSL UO5ODA and ER1A via FD1JOE, direct only however.

ZD8M can be confirmed direct to Ascension Island via Box 73, or to G3UOF, whose *Callbook* address is not correct. Send QSL cards to S. Frobisher Mews, Churchtown, Gloucester, GL3 1NQ, England.

TA3ZH is Cornelius Booker, KC6RZW; QSL to his stateside call.

QSL **5K3W** via Francisco Hennessey, HK3SGP, P.O. Box 5028J, Bogota DC, Colombia.

5V1JB's direct address is Jay Brillhart, BP 8, Anie, Togo, Africa.

QSL **NH6MG/TG1** direct to David Stutz, Apartado 79, Huehuetenango, Guatemala. He like amateur radio magazines for use in his English classes.

Shoji Miyake, JA6EGL, handles cards for his operations as **KK6WW, KK6WW /ZL3, KC6SM, V63MK, T26CW, VK1CW**.

Goran Lundell, SMØCMH, says he handles his own cards for his regular operations from Kalymnos Island in the Dodecanese as **SV5/SMØCMH**, either direct or via the bureau, depending on postage received. However, he reports that some mail has been opened or diverted on the way to him; if you haven't received your card, try again: Algovagen 11, S-133 36 Saltsjobaden, Sweden. 73, Chod, VP2ML

QSL Information

3A/GØSLY to WA3CGE
3D2CC to VE6AKV
3D2MQ to IV3DHD
3V8AS to IK5GQM
4K2MAL to UA4RC
4N7ZZ to YU7FIJ
4U1UN to W8CZN
4X/S59PR to 9A2AJ
5R8DG to F6FNU
5T5JC to F6FNU
5X1C to WB1DQC
5Z4FO to KB4EKY
6V6U to K3IPK
7Q7LA to GØIAS
7Q7RM to GØIAS
7X4AN to DJ2BW
8R1RPN to OHØXX
9D2UU to LZ2UU
9J2HN to JH8BKL
9K2GS to WB6JMS
9K2ZZ to W8CNL
9L1CF to W5TXV
9M8DB to NØEAS
A22DB to K8DIU
A22MN to WA8JOC
A41KJ to N5FTR
BV2A to K2CM
C21/ZL1AMO to ZL1AMO
C31LL to C31LBB
C31SD to CT1AMK
C5ØBI to 6W6JX
C53HG to W3HCW
C91AI to CT1DGZ
C91AJ to CT4RM
C91J to W8GIO
CE3MMV/9 to EA8BGY
CH2MCZ to VE2QK
CH3HO to VE3HO
CH9NS to VE1NS
CQ9M to G3PFS
CYØSAB to VE1CBK
D2SA to F6FNU
DØØGVN to DL1JCW
EA6/N6RA to N6RA
EA8BWW to EA8BGY
EA8EA to OH2MM
EL2PP to N2CYL
ER1AM to SP9HWN
ER5GB to UO5KGB
EW/R3AN to GW3CDP
FG5BP to KA3DSW
FG5EZ to F6FDU
FG5FR to F6FNU
FG5FZ to F6FNU
FH/F5NCU to F5NZD
FJ/F6HWU to F6HWU
FK8GJ to F6CXJ
FO4OK to FO5GW
FS/W2QM to W2QM
HG275BCS to HA8PO
HH2PK to KA9RLJ
HKØHEP to HKØNZY
HKØOEP to HKØNZY
HP2DFU to WT3B
HR1B to NL7GP
HR1IQC to JF1NZW
HR2IQC to JF1NZW
HT1T to SMØKCR
HV3SJ to IØDUD
HZ1AB to K8PYD
J5UAI to NW8F
J68AG to WD8IXE
J68AK to W8QIO
J68AS to N9AG
JW9XG to LA9XG
JY8VJ to DL1VJ
KC4AAA to NC6J
KC6NH to JK1QHK
KG4CB to WD9APE
KG4DX to KØIEA
KH4/N7TNL to W1OO
OHØBBF to OH2BBF
OY1R to WJ2KF
P4ØN to K1TO
PJ2/OH6XY to OH3GZ
PJ5JP to K1BXE
SØ1MZ to EA2JG
S21ZG to W4FRU
S79KMB to KN2N
S79MX to HB9MX
SPØAX to SP2FAP
T32AX to N6NVZ
T32BE to WC5P
T94ON to DL8OBC
T97T to SM5AQD
TI4CF to N6TR
TL8NG to WA1ECA
TM1AG to F5FLO
TU4/AA7JM to WA5TUD
TY1IJ to DJ5IO
TY8OBO to WA4OBO
TZ6FIC to F6KEQ
UB3JX to W2FXA
UIØA to G3LZK
V2/G6QQ to G6QQ
V21ZL to W2HWS
V31EN to KF8NN
V31JU to WA2NHA
V63UF to G4IUF
V73C to AH9C
VE9AA to VE1BTT
VE9DH to VE1DH
VI9XN to W5KNE
VP2E/N4CD to N4CD
VP2EDK to W1GAY
VP5/AI5P to AI5P
VP5JM to W3HNK
Y75GN to IØWDX
YL75KL to YL2KL
YL75LAT to YL1WW
YL75R to YL1XX
Z21BA to N5FTR
ZA1B to HB9BGN
ZA1J to I2MQP
ZA1Z to HB9BGN
ZD8M to G3UOF
ZD8VJ to G4ZVJ
ZD8Z to VE3HO
ZD9BV to W4FRU
ZF2ML to WB2P
ZF2VV to NX1L
ZK1NJC to JI1NJC
ZK1XE to JI1NJC
ZL7FD to DK8FD
ZS6AYE to WB1DQC
ZS9A to ZS1IS
W2USA to John Farr, KD6CLO, 8101 83rd Ave. SW, Apt. H72, Tacoma, WA 98498

CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

The Gray Areas of Contest Rules

Let me begin this month with a very strong opinion: I believe that the vast majority of contesters are completely and utterly ethical when it comes to "playing by the rules." You may recall my 1989 contest survey on operating ethics which reinforced that opinion. Here are just a few of the summary comments that were received at that time:

•"Most of the examples in your survey add more trouble than they're worth."

•"Do onto others as you wish onto you."

•"I compete against myself, so I've no reason to be unethical."

•"Contesting is like playing golf. You play the course, not your opponents."

•"After 50 years of contesting . . . Ethics are still ethics and cheating is still cheating."

•"I'll stomp and claw to make the best score I can, but I won't win on a lie."

•"Contesting only works when we are all honest."

•"Too bad to the contester who applies situation ethics to his final score."

If we took the position that everyone cheated and was guilty until proven innocent, then contesting would be a tedious affair indeed. It is, including our proper attempts to check logs, a sport built upon trust.

Over the past year or two I've noticed a few "gray area" infractions—nothing that will change the world, but a decline in the high standards we enjoy. Let's delve into the subject.

Violating The "Spirit of the Rules"

There are numerous examples of where the intent of contest rules can be stretched while still allowing for legal operation. As time has progressed, more refinement has been put into many contest rules. If you compare the CQ WW rules of the 1970s to today, for example, you'd find that the fundamentals are still there. What has changed has been the addition of numerous new clauses that were added to reflect differences in interpretation and other factors. Contest administrators are very careful to avoid defining rules in so specific terms that you need a lawyer to approve your contest entry before submitting it to the checkers!

In this year's ARRL Sweepstakes contest I heard one example of what I define as a violation of the spirit of the rules. In this case a QRP station was operating on the same frequency with a QRO friend. Each time the QRO operator made a QSO, he told the station he worked to stand by. The QRPer would, on cue, subsequently call and work him. Obviously, this enabled the QRP competitor to make many more QSOs than he would have been able to under his own efforts. Yet there is nothing in the rules that specifically states: "You cannot allow another station to stand by in a contest."

There are other examples of this, such as a single operator asking a multi-op, "Have you heard any good multipliers on the band in the past hour or so?" and so on.

Common sense should prevail here, and I encourage everyone in the contest community to think about it!

Packet Radio Abuse

Although there are probably a few "single" operators who cannot resist the temptation to "look at the screen" during a contest, the vast majority play the game by the rules. What is disturbing to me, however, is the growing trend toward using packet when you are only marginally serious about a contest. I've seen many examples of stations claiming themselves a single operator entry, with a relatively small score in the final results, while having used packet during the contest weekend. Remember, you may not be competing for a winning score, but your "assisted" efforts may eliminate someone else's chance of winning an award or some other achievement.

Contest Software Piracy

Recently I posed the question "Should contest administrators participate in the policing of bootleg contest logging software?" While it was an interesting question, most people told me that the policing of illegally copied software should fall in the hands of the authors themselves and via peer pressure, not through the "log checkers." While this is not an operating issue or one that impacts anyone's score per se, it is an issue that reflects on the contest community's ethical image as a whole. Simply put, if you are using illegally copied contest software—STOP IT! Not only is it unfair to the majority who have paid their just share, it is outright stealing from authors who have spent countless hours developing a logging environment that you now enjoy. Let's allow our pride and ethical standards to dominate on this issue by doing the right thing!

The Master Contest Calendar 1994 Edition

Based on your comments, I thought it would be helpful to publish the master contest calendar I have been compiling over the past few months. You can find it in Table I. Naturally, dates will change over time, but it should help you to plan your operating times as well as club events and other activities. If you have any additions/corrections, please forward them to me and I'll be sure to update the schedule in a future column.

Contest Activities At The 1994 Dayton Hamvention

Believe it or not, the '94 Dayton Hamvention is only two months away! As in previous years, the North Coast Contesters and Frankford Radio Club will again be hosting the "Contest Super Suite" on Thursday, Friday, and Saturday nights, April 28–30. This year's event will be located at the Stouffer Center Plaza Downtown Hotel in the Miami Room (second floor). Everyone is invited to attend!

In addition, the North Coast Contesters, FRC, and other clubs will be hosting the Second Annual Contest Banquet on Saturday night, April 30. Seating will be limited. For more information, send an SASE to: North Coast Contesters, P.O. Box 59, New Bedford, PA 16140.

Final Comments

My comments this month may seem rather negative to you. However, I believe it's healthy to be introspective once in a while, and I'd love to hear what you think.

Calendar of Events

Feb.	19-20	ARRL CW DX Contest
Feb.	19-20	YL ISSB QSO Party
Feb.	**25-27**	**CQ WW 160M SSB Contest**
Feb.	26-27	U.B.A. Belgian Contest
Feb.	26-28	YLRL YL-OM CW Contest
Mar.	5-6	ARRL SSB DX Contest
Mar.	12-13	QCWA SSB QSO Party
Mar.	12-13	Kentucky QSO Party
Mar.	12-13	Cadiz Silver Cup Contest
Mar.	13-14	Wisconsin QSO Party
Mar.	15-16	CLARA & Family HF Contest
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 Contet**
Apr.	2-3	Holyland DX Contest
Apr.	2-3	Italian YLRC XVII Int'l Contest
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	**28-29**	**CQ WW WPX CW Contest**
June	11-12	ANARTS WW RTTY Contest

March's Contest Tip

There are many factors to consider when trying to break a big pileup in a contest. One aspect sometimes forgotten is the way you call a station. If you sound like you really want to work someone (without getting carried away), you're more likely to beat the majority of stations that call with a more "laid-back" approach. Give it a try!

c/o CQ magazine

Contest	Weekend/Month	Hours
ARRL RTTY Roundup	1/Jan.	24/30
AGCW-DL QRP CW Winter Contest	1/Jan.	15
Michigan QRP Club CW Contest	1/Jan.	36
LIONS-on-the-air CW Contest	1/Jan.	36
NCJ N.A.QSO Party-CW	2/Jan.	10/12
JA Int'l CW Contest (160,80,40M)	2/Jan.	48
LIONS-on-the-Air SSB Contest	2/Jan.	36
NCJ N.A. QSO Party-SSB	3/Jan.	10/12
HA DX CW Contest	3/Jan.	24
CQ WW DX 160m CW Contest	**4/Jan.**	**42**
ARRL VHF Sweepstakes	4/Jan.	33
REF CW Contest	4/Jan.	36
U.B.A. SSB Contest	4/Jan.	24
ARRL Novice Round-Up	4/Jan.–1/Feb.	—
NCJ N.A. Sprint-CW	1/Feb.	4
YL-ISSB CW QSO Party	1/Feb.	48
Vermont State QSO Party	1/Feb.	24
Maine State QSO Party	1/Feb.	48
QCWA QSO Party-CW	1/Feb.	25
Classic Radio Exchange	1/Feb.	48
NCJ's N.A. Sprint-SSB	2/Feb.	4
Utah 160m Challenge	2/Feb.	48
EA RTTY Contest	2/Feb.	24
Dutch "PACC" Contest	2/Feb.	24
YLRL YL-OM SSB Contest	2/Feb.	24
New Hampshire QSO Party	2/Feb.	18
ARRL DX CW Contest	3/Feb.	48
YLRL YL-OM CW Contest	4/Feb.	24
CQ WW DX 160m SSB Contest	**4/Feb.**	**42**
REF SSB Contest	4/Feb.	36
RSGB 7 MHz CW Contest	4/Feb.	18
North Dakota QSO Party	4/Feb.	24
U.B.A. CW Contest	4/Feb.	24
ARRL DX SSB Contest	1/Mar.	48
YL-ISSB SSB QSO Party	2/Mar.	48
QCWA QSO Party-SSB	2/Mar.	25
Wisconsin State QSO Party	2/Mar.	7
Bermuda Contest	3/Mar.	48
CLARA HF Contest	3/Mar.	24
Virginia State QSO Party	3/Mar.	32
BARTG Spring RTTY Contest	3/Mar.	30
CQ WW WPX SSB Contest	**last/Mar.**	**48**
Poisson d'Avril Contest	1/Apr.	—
ARCI QRP CW Spring QSO Party	1/Apr.	24
SP DX Contest	1/Apr.	36
ARRL VHF/UHF Spring Sprint-144 MHz	1/Apr.	4
JA Int'l CW Contest (20,15,10M)	2/Apr.	48
Yuri Gagarin Cup—CW	2/Apr.	24
Holyland DX Contest SSB, CW	2/Apr.	24
ARRL VHF/UHF Spring Sprint—222 MHz	2/Apr.	4
SARTG AMTOR Contest	3/Apr.	24
QST QSO Award Party	3/Apr.	24
Connecticut QSO Party	3/Apr.	28
Spring NWQRP Sprint—CW	3/Apr.	4
ARRL VHF/UHF Spring Sprint—432 MHz	3/Apr.	4
MARAC SSB County Hunters Contest	3/Apr.	48
Swiss HELVETIA Contest SSB, CW	4/Apr.	24
Georgia QSO Party	4/Apr.	28
ARI Int'l DX Contest SSB, CW, RTTY	1/May	24
MARAC CW County Hunters Contest	1/May	48
ARRL UHF Spring Sprint (902/1296/2304 MHz)	1/May	4
Texas State QSO Party	1/May	48
Oregon State QSO Party	1/May	48
10-X Int'l Spring CW QSO Party	1/May	48
CQ-M Contest SSB,CW	2/May	24
ARI A.VOLTA RTTY Contest	2/May	24
Massachusetts QSO Party	2/May	30
Nevada State QSO Party	2/May	48
Danish SSTV Contest	2/May	48
Michigan State QSO Party	3/May	24
ARRL Spring Sprint—50 MHz	3/May	4
ARAL DX Contest	4/May	14

Contest	Weekend/Month	Hours
CQ WW WPX CW Contest	**last/May**	**48**
RSGB National Field Day	1/Jun.	24
Portugal Day Contest	1/Jun.	24
ARRL June VHF Contest	2/Jun.	33
ANARTS WW RTTY Contest	2/Jun.	48
All Asian CW Contest	3/Jun.	48
SMIRK 50 MHz QSO Party	3/Jun.	48
ARRL Field Day	4/Jun.	27
R.A.C. Canada Day Contest	1/Jul.	24
Venezuela Independance Day SSB Contest	1/Jul.	48
IARU HF Championship SSB-CW	2/Jul.	24
CQ WW WPX VHF Contest	**2/Jul.**	**27**
ARCI QRP Summer Homebrew Sprint—CW	2/Jul.	4
Colombian Independence Day Contest	3/Jul.	24
SEANET CW Contest	3/Jul.	48
AGCW-DL QRP CW Summer Contest	3/Jul.	24
Venezuela Independence Day CW Contest	4/Jul.	48
RSGB IOTA HF Contest	4/Jul.	24
NCJ N.A. QSO Party—CW	1/Aug.	10/12
ARRL UHF Contest	1/Aug.	24
YO DX HF Contest	1/Aug.	20
WAE CW Contest	2/Aug.	36
Maryland-D.C. QSO Party	2/Aug.	19
SARTG WW RTTY Contest	3/Aug.	24
NCJ N.A. QSO Party—SSB	3/Aug.	10/12
SEANET SSB Contest	3/Aug.	48
New Jersey State QSO Party	3/Aug.	17
ARRL 10Ghz Cumulative Contest-Part 1	3/Aug.	24
Empire State (N.Y.) QSO Party	4/Aug.	30
NCJ N.A. Sprint—CW	1/Sept.	4
R.A.C. VHF/UHF Sprint (902/1296/2304 MHz)	1/Sept.	4
LZ-DX-Contest	1/Sept.	48
All-Asian SSB Contest	1/Sept.	48
Panama Anniversary Contest	1/Sept.	24
WAE DARC SSB Contest	2/Sept.	36
ARRL VHF QSO Party	2/Sept.	33
NCJ's N.A. Sprint—SSB	2/Sept.	4
R.A.C. VHF/UHF Sprint-432 MHz	2/Sept.	4
Montana State QSO Party	2/Sept.	48
ARRL 10 GHz Cumulative Contest—Part 2	3/Sept.	24
R.A.C. VHF/UHF Sprint—220 MHz	3/Sept.	4
Scandinavian CW Contest	3/Sept.	27
CQ WW RTTY Contest	**4/Sept.**	**48**
R.A.C. VHF/UHF Sprint—144 MHz	4/Sept.	4
Scandinavian SSB Contest	4/Sept.	27
Washington State Salmon Run	4/Sept.	31
Classic Radio Exchange	4/Sept.	48
VK/ZL SSB DX Contest	1/Oct.	24
California QSO Party (CQP)	1/Oct.	30
F9AA Cup Contest	1/Oct.	24
R.A.C. VHF/UHF Sprint—50 MHz	1/Oct.	48
VK/ZL CW DX Contest	2/Oct.	24
RSGB 21/28 MHz SSB Contest	2/Oct.	14
Illinois State QSO Party	2/Oct.	8
Ilberoamericano SSB Contest	2/Oct.	24
YLRL CW Anniversary Party	2/Oct.	24
RSGB 21 MHz CW Contest	3/Oct.	14
ARCI QRP CW Contest	3/Oct.	36
W.A.G. Worked All Germany	3/Oct.	24
All-Asian SSB Contest	4/Oct.	48
YLRL SSB Anniversary Party	4/Oct.	24
CQ WW DX Phone Contest	**last/Oct.**	**48**
ARRL Sweepstakes CW	1/Nov.	24/30
JA Int'l DX SSB Contest	1/Nov.	48
OK DX Contest	2/Nov.	24
WAE DARC RTTY Contest	2/Nov.	36
ARRL EME Contest	2/Nov.	48
ARRL Sweepstakes SSB	3/Nov.	24/30
CQ WW DX CW Contest	**last/Nov.**	**48**
ARRL 160m DX Contest	1/Dec.	42
ARRL 10m DX Contest	2/Dec.	36/48

Table I– Generic contest schedule (as of February 1994). (Source: CQ 1994 Amateur Radio Almanac.*)*

Although I've said this before in previous columns, it may surprise you to learn that I'm one of those guys who answers every single bureau QSL card! At last count, my personal QSL collection exceeds 40 shoeboxes (size 8!). While most of these cards were answered in the old-fashioned way with log and pen in hand, nearly 13,000 of them have been computerized, making for a fascinating database of information. Time pending, I'd like to share with you some of the data I uncover during the next month. Specifically, I'll be looking at call-sign accuracy (don't worry, not the same old stuff that's been reported in the past!), QSLing trends, and other data that will be sure to make you think.

As always, your comments are welcomed. Please remember to provide any submissions

for the June column by April 1. A few of you are beginning to catch on, but as you can imagine, you can really help by submitting your contest announcements on disk (using practically any data format) or via electronic mail. Thanks in advance!

73, John, K1AR

Kentucky QSO Party

1500Z Sat. to 0300Z Sun., March 12–13
1500Z to 2300Z Sun., March 13

This QSO event is sponsored by the Paducah Amateur Radio Association and open to amateurs around the world. Stations may be worked once per band and mode.

Classes: Single operator and multi-single/multi-multi in the categories of Novice, Technician, Technician-Plus, and Open (all licensees).

Exchange: QSO number and state (county in Kentucky), province, or country.

Frequencies: CW—1805 and 10 kHz up from the low end of the General sub-band. Phone—1850 kHz and 15 kHz up from the low end of the General sub-band. Novices use 10 kHz up from the lower end of their bands.

Scoring: Phone QSOs are worth 2 points and credit 3 points for CW contacts. Multiply QSO points times the number of Kentucky counties (maximum 120). Kentucky stations multiply QSO points by their number of states/provinces/DXCC countries.

Awards: Awards will be sent to each top operator/station class for each Kentucky and non-Kentucky entry.

Submit your log no later than April 15th to: Nancy Smith, KB4RGW, 305 Carson Way, Paducah, KY 42003.

Wisconsin QSO Party

1800Z Sun. to 0100Z Mon., March 13–14

This popular party is a shorty, only 7 hours, and it is sponsored by the West Allis Radio Amateur Club. The same station may be worked on each band and mode, and mobiles in each county change. Wisconsin stations may contact other in-state stations for QSO and multiplier credit. Only one transmitter on the air at the same time.

Classes: Single operator and multi-operator and transmitter, both fixed and mobile. And Novice/Tech, both single and multi-operator.

Exchange: RS(T) and QTH. County for Wisconsin; state or province for others.

Scoring: Phone QSOs count 1 point, 2 points for CW. Wisconsin stations multiply total QSO points by (U.S. states + VE provinces + Wisconsin counties) worked for their final score. DX contacts count for QSO points only. Others use total Wisconsin QSO points by the number of Wisconsin counties worked (maximum of 72).

Wisconsin mobiles can add a bonus of 500 points to their final score for each county outside their own from which they operate (minimum of 15 QSOs from each county).

Frequencies: CW—3550, 3705, 7050, 7125, 14025, 21150. SSB—3890, 7230, 14290, 28400.

Awards: Awards will be sent to the highest scoring single operator in each class in each state and province. *Wisconsin stations:* The top 10 single operator scorers in each class will receive awards as well as highest multi-operator in each class and highest aggregate club score. A plaque will be awarded to the highest scoring single operator in the party. Logs with more than 100 QSOs must include a separate dupe sheet for each mode with their entry.

Complete rules and entry forms are available from address below. Please be sure to include an SASE with your request. Mailing deadline for logs is March 31st to: West Allis RAC, P.O. Box 1072, Milwaukee, WI 53201.

CLARA & Family HF Contest

1700Z Tues. to 1700 Wed., Mar. 15–16

This is the 27th anniversary of the CLARA Contest, and it is open to YLs and OMs around the world on phone and CW on all HF bands. Each station may be contacted twice per band mode.

Classes: Single operator, all bands.

Exchange: Name, RS(T), QTH (Canadian province/DXCC country), and CLARA membership status (Yes/No).

Scoring: CLARA-CLARA QSOs are worth 5 points; CLARA-YL QSOs are worth 3 points; CLARA-associate OM QSOs are worth 2 points; CLARA-OM QSOs are worth 1 point.

Multiplier: Canadian provinces and DXCC countries.

Final Score: Multiply total QSO points times multiplier.

Awards: A variety of trophies and certificates will be awarded to high-scoring CLARA members, non-members, and OMs.

Send your entries no later than April 15th to: Janis Cameron, VE7AAP, 3528 11th Avenue, Port Alberni, B.C. V9Y 4Y7 Canada.

Bermuda Contest

0001Z Sat. to 2400Z Sun., March 19–20

This is the 36th year for this popular contest open to amateurs in the United States, Canada, the United Kingdom, West Germany, and Bermuda. Stations in the U.S and Canada may work the U.K., Germany, and Bermuda. The U.K. and Germany may work the U.S., Canada, and Bermuda. Activity will be on the 3.5, 7, 14, 21, and 28 MHz bands. Cross-band or cross-mode contacts are not permitted.

You are limited to 24 hours out of the 48-hour contest period. Off times of no less than two consecutive hours must be clearly indicated on the log. Participation is for single operator stations only and previous winners are no longer restricted from official entries in the contest.

Exchange: RS(T) and serial number.

Scoring: Five points for each QSO. A station may be worked on SSB and CW, but you may not take credit for an additional multiplier. Final score is the sum of QSO points times the number of countries on each band multiplied by the number of different VP9 stations worked on each band. (Note: It's each VP9 station, not each parish).

Awards: Certificates will be awarded to the top-scoring station in each country (minimum of 100 QSOs and 3 VP9s). The overall worldwide winner will receive a trophy. **Note: There is no longer a free trip to Bermuda for trophy winners.**

Use a separate log sheet for each band and a dupe sheet for logs with 200 or more contacts. A penalty of three contacts will be deducted for each duplicate contact for which points are claimed. An excessive number of claimed duplicates means disqualification. The usual signed declaration is also required.

Entries must be **received** no later than June 1st by the Radio Society of Bermuda, Box HM 275, Hamilton HM AX, Bermuda. Enclose 4 IRCs for acknowledgments.

BARTG Spring RTTY Contest

0200Z Sat. to 0200Z Mon., March 19–21

This contest is sponsored by the British Amateur Radio Teleprinter Group and is administrated by John Barber, G4SKA. The contest is open to all amateurs in four classes—single operator (all band and single band), multi-operator, and SWL.

Activity will be on all bands, 3.5–28 MHz, but no WARC. Operation is limited to 30 hours out of the 48-hour contest period. The 18 hours off may be taken at any time, but not less than 3-hour periods.

Exchange: RST plus a three-figure contact number and time in GMT (full four figures).

Points: Contacts with other stations count one point. The same station may be worked on

each band for QSO and multiplier credit.

Multiplier: Total number of countries worked on each band and number of continents worked (continents are counted once only). W/K, VE/VO, and VK call areas will be counted as separate multipliers.

Final Score: Total QSO points × country multiplier × continents worked.

Shortwave listeners must show call of station being heard, report of message being sent, and call of station being worked.

Awards: Certificates to the top-scoring stations in each class and to the continental leaders. Also in each W/K, VE/VO, and VK call area.

Use a separate log sheet for each band and a summary sheet showing the scoring, etc. Log forms are available from G4SKA; include 6 IRCs to cover postage. Logs must be received by May 29th and go to: John Barber, G4SKA, 32 Wellbrook St., Tiverton, Devon, EX16 5JW England.

Virginia QSO Party

1800Z Sat. to 0500Z Sun., March 19–20
1100Z Sun. to 0200Z Mon., March 20–21

This is the 19th year the Sterling Park ARC has sponsored this party. The same station may be worked on each band and each mode for QSO credit. VA stations may work other in-state stations for QSO multiplier credit. And VA mobiles in each county change.

Exchange: QSO number starting with 001 and QTH. County for VA; state, province, or DX country for others.

Scoring: One point for each SSB contact; two points for CW; three points for working a VA mobile. VA stations multiply total QSO points by sum of US states, VE provinces, DX countries, and VA countries. Others multiply total VA QSO points by the number of VA counties worked (maximum of 95). Mobiles add to this the bonus points for Virginia counties in which QSOs were logged.

Frequencies: CW—1805 kHz and 50 kHz up from low end of 10, 15, 20, 40, and 80 meter bands. SSB—1845, 3560, 7260, 14260, 21360, and 28360. Also Novice bands (10 kHz up from bottom of Novice sub-band and 28360).

Awards: Certificates to top scorers on each state, province, DX country, and VA county. There are six plaques as follows: top VA multi-mode, CW only, club. VA mobile, Novice/Tech, and top out-of-state station.

Logs: Indicate each new multiplier in a separate column as it is worked. Include a summary sheet showing the scoring and other pertinent information.

Mailing deadline for all entries is April 15th to: Virginia QSO Party, c/o William T. Free, W3FTG, 3627 Great Laurel Lane, Fairfax, VA 22033-1212.

CQ World-Wide WPX Contest

SSB: March 26–27 CW: May 28–29
0000Z Sat. to 2400Z Sun.

Complete rules were published in the January issue. The following are a few points to keep in mind.

You may operate 36 hours out of the 48-hour contest period as a single operator station. Off times must be a minimum of 60 minutes in length. Multi-op stations can operate the full 48 hours.

The definition of the prefix multiplier is spelled out in detail, but consider a prefix to be the letter/number combination which forms the first part of a call.

The multiplier is determined by the number of different prefixes worked and is counted *once* only, regardless of how many times it is worked on other bands.

Another point to keep in mind is that in the multi-operator, single transmitter category only one transmitter and only one band may be used during the same 10-minute period. Picking up a new multiplier on another band during the same time period is prohibited.

An alphabetical/numerical check list of claimed prefixes is a requirement and must be included with your log. Note that contest logs may be submitted on disk (MS-DOS compatible) in standard ASCII or .bin, .res, .dbf, or .wks formats. To reduce the administrative burden, please label your computer entries with a unique name (e.g., N8BJQ.BIN).

An updated trophy and plaque awards list now shows over 40 awards. Be sure to check the awards that are available.

Deadline for submitting your SSB entry is May 10th, and July 10th for the CW section. **Be sure to indicate SSB or CW on the envelope.**

All logs go to: *CQ* Magazine, WPX Contest, 76 North Broadway, Hicksville, NY 11801.

Questions pertaining to the WPX Contest can be sent to the WPX Contest Director, Steve Bolia, N8BJQ, 4121 Gardenview Drive, Beavercreek, OH 45431 USA or via packet to the following: N8BJQ @W8BI.OH.USA.NA.

Alaska QSO Party

0000Z Sat. to 2400Z Sun., March 19–20

This event is an outstanding way to work one of hardest states for WAS. Sponsored by the South Central Radio Club, this year's contest is also being used as a remembrance of the devastating 1964 Alaska earthquake.

Classes: Single operator, single operator QRP, and multi-operator for Alaska and non-Alaska stations.

Exchange: Station callsign, QSO number/category, QTH (Alaska city/US State/country or city [non-US]).

Scoring: Credit one point for SSB, 2 points for CW, and 10 points for satellite QSOs. Multiply 160 meter QSO points by three and 80 meter QSO points by two. Stations may be worked once per band and mode.

Final Score: Non-Alaskan stations multiply total QSO points by total number of Alaskan cities worked one time per mode and band. Send $1 and an SASE for a printed list of cities and towns in Alaska. Alaskan stations multiply QSO points times the total number of states and countries worked per mode and band.

Frequencies: Start operating 25 kHz above lower edge of various sub-bands on SSB and CW (e.g., 14025, 14250, 14175, etc.).

Awards: A special certificate will be awarded for the highest score in each category. Participation certificates will be sent to any station submitting a log with at least 10 Alaskan stations during the contest period.

Entries must be received no later than June 30th and are to be sent to: South Central Radio Club, c/o Jim Wiley, KL7CC, 8023 E 11th Court, Anchorage, AK 99504-2003. Enclose a large (#10) SASE to receive any awards.

STANDARD VHF & UHF Equipment in Stock at AES®

All Prices and Specifications subject to change without notice.

STANDARD C-188A 2 Meter HT • Fits in shirt pocket, keyboard has protective slide cover. Ext. receive: 115-174MHz including AM aircraft. Modifiable for MARS/CAP tx. 40-memory plug-in, optional 200-memory unit. 2.5W with standard 700mAh battery, 5W @ 12V DC. Scan: 7 types and 3 modes. Encode-decode CTCSS, autodial memories, DTMF squelch with page. 5.8"h x 2.3"w x 1.0"d, 10 oz ..... ☎

STANDARD C-288A • Same as C-188A, but 220-225 MHz transmit and 115-249 MHz *super-extended* receive ..... ☎

STANDARD C-168A 2m HT • Very small! 115-174 MHz rx. Mod for MARS/CAP tx. 40-memory plug-in unit, optional 200 memory unit. 2.5W with standard 700 mAh batt. 5W @ 12V DC. 7 scanning types and 3 modes. Encode-decode CTCSS. 4.9"h x 1.8"w x 1.2"d, 10 oz..... ☎

STANDARD C-468A • Same as C-168A but 438-450 transmit/400-474 MHz rx ..... ☎

Due to foreign currency fluctuations, please ☎ Call Toll Free for Prices.

MasterCard VISA DISCOVER NOVUS


C-188A


CCR-708A


C-528A

SR STANDARD®


C-168A

STANDARD CCR-708A • Communications Test Receiver with Spectral Display Scope (above) Wideband–50.000 to 904.995 MHz continuous full coverage. Features an LCD spectral display scope used for evaluating signal strength and tracking down nearby interfering signals. 100 direct entry storage channels. AM, Narrow FM, and Wide FM modes. Spectral display range: 100 KHz, 250 KHz, or 1000 KHz. 13.8V DC or 120V AC, supplied with telescoping antenna. 2¾"h x 7⅛"w x 7⅛"d, 4.6 lbs ..... ☎


C-558A

STANDARD C-528A 2m/440 Twin Band HT Covers 2m and 440 MHz. Extended rx: 130-174 and 400-474 MHz. Modifiable for MARS/CAP. 40 memories. 2.8W (2.5/440) with supplied 700 mAh battery, 5W @ 12V DC. 5 scan modes.full-duplex cross-band, repeat mode, Encode-decode CTCSS, DTMF squelch and page. 6.2"h x 2.2"w x 1.2d, 17 oz ..... ☎

STANDARD C-228A • Same as C-528A but covers 2m and 220 MHz with 130-174 and 200-244 MHz extended receive ..... ☎

STANDARD C-628A • Same as C-528A but covers 440 and 1.2 GHz. 400-474 MHz extended receive, 1W on 1.2 GHz ..... ☎

STANDARD C-558A 2m/440 Twin-Band HT Extended receive from 115-174 MHz (including AM aircraft) and 400-474 MHz. Mod. for MARS/CAP. 40 memory plug-in unit, optional 200 memory unit available. 2.5W transmit with standard 700mAh battery, 5W @ 12V DC. 7 scan types and 3 modes. Full-duplex cross-band, repeat mode, 10 autodial memories. Encode-decode CTCSS, DTMF squelch and page. 5.1"h x 2.2"w x 1.2"d, 12.5 oz ..... ☎

Order Toll Free: 1-800-558-0411 FAX: (414) 358-3337

AMATEUR ELECTRONIC SUPPLY® Inc.

5710 W. Good Hope Road; Milwaukee, WI 53223 • Phone (414) 358-0333

AES® BRANCH STORES

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
1-800-321-3594

ORLANDO, Fla 32803
621 Commonwealth Ave
Phone (407) 894-3238
1-800-327-1917

CLEARWATER, Fla 34625
1898 Drew Street
Phone (813) 461-4267
No Toll Free Line

LAS VEGAS, Nev 89106
1072 N. Rancho Drive
Phone (702) 647-3114
1-800-634-6227

RBS

NEW! 1994 EDITIONS (800) 457-7373

CD ROM Call Directory *Mac & IBM* US and International Calls

Here's the latest way to get names and addresses for 619,000 US and more than 250,000 International hams. Also has new to old call cross reference for 100,000 calls! 6,000 PC public domain program and data files of amateur related programs. US files include name, address, license class and date of birth. International files came from an extensive survey of foreign licensing authorities. © 1993.

❑ CD-ROM $49.95

1994 RADIO AMATEUR'S HANDBOOK by ARRL

The new 1994 edition of this classic has been revised and updated. In addition to theory and practical application ideas, hints, tips and suggestions, the Handbook includes many projects for you to build. © 1993.

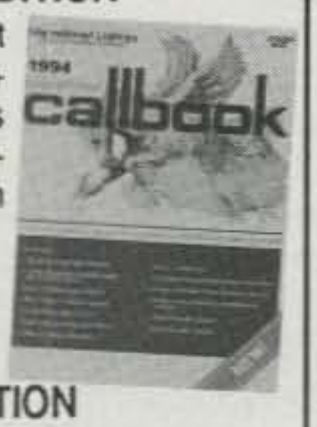
❑ AR-HB94 Hardbound $24.95

M STREET DIRECTORY '93-'94 Edition

Complete Industry Guide to AM and FM Broadcasters US and Canada. Full of helpful information for the BC SWL. Has location frequency, program formats plus much more. © 1993 over 649 pages.

❑ MST94 Softbound $32.95

1994 RADIO AMATEUR CALLBOOKS NORTH AMERICAN EDITION



Up-to-date with all the latest information from every country in North America. Includes handy aids such as QSL bureaus, time charts and much more. © 1993.

❑ CB-NA94
Softbound $29.95

INTERNATIONAL EDITION

Get an International Callbook and have the latest information on hand. Includes all countries outside of North America. Handy aids make easy work of getting QSLs. Bureaus are listed with current addresses. Get your new Callbook today! © 1993.

❑ CB-I94 Softbound $29.95

Buy'em both Save $5.00 Just $54.90
Regular Price $59.90

1993-94 REPEATER DIRECTORY

Lists repeaters by frequency, state and region. Includes helpful information about autopatch, tones and more. © 1993.

❑ AR-RD93 Softbound $5.95
❑ AR-2RD93 Buy two and save $1.95 $9.95

1994 CQ EQUIPMENT BUYER'S GUIDE

Includes all current rigs and accessories. Also has addresses for dealers as well as manufacturers. © 1993.

❑ CQ-EQP94 Softbound $4.95

1994 PASSPORT TO WORLDBAND RADIO

This book has all the latest schedules, times, frequencies and other helpful information you'll need to tune into the world. Also full of information on the newest radios and accessories for your shack. © 1993.

❑ IBS-RDI94 Softbound $17.95

For more information about an order call:
(603) 899-6957
24-hr. FAX line (603) 899-6826

ORDER SHIPPING AND HANDLING TIPS

US Orders	Mail	UPS GROUND
Up to $9.95	$3	$4
$10-$49.95	$4	$5
Over $50	$5	$6

Foreign Orders US Mail Postage plus $3 handling charge. Canadian Orders add $2 to the US Mail rate. Call or write for Air delivery rates. Prices and availability subject to change without notice.

RADIO BOOKSTORE
P.O. Box 209 - Rindge, NH 03461-0209
Telephone Hours: (8:00 am- 5:00 pm)
Call for FREE 16 page catalog

CIRCLE 41 ON READER SERVICE CARD

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Dual Anniversary

Three, two, one, and as I am writing this month's column the legendary 200 pound ball at Times Square in New York City has just ushered in 1994! The new year marks the beginning of the 50th year that *CQ* has been published. Readers of this column owe a special thanks to *CQ*, since it was this journal that pioneered propagation forecasts and predictions specifically tailored to the needs of radio amateurs. The first "Monthly DX Predictions" column appeared in the June 1946 issue, when *CQ* was little more than a year old. Edited by my good friend the late Perry Ferrell, the column was published monthly until November 1949. Then in March 1951 the monthly propagation column was resumed under my editorship.

This month's column marks the beginning of my 43rd year as Propagation Editor of *CQ*. In the field of HF propagation, elapsed time is often measured in terms of 11-year sunspot cycles rather than in months or years. By this method of reckoning, I have shared with readers of *CQ* the last years of sunspot cycle 18, the record-breaking 19th solar cycle, the complete cycles 20 and 21, and the rise and now fall of cycle 22.

I look forward to both *CQ*, and this column in particular, continuing to serve radio amateurs the world over as a useful source of interesting and reliable information for many years into the future.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for March 1994

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 4, 18-19, 28, 31	A	A	B	C
High Normal: 2-3, 9, 16-17, 20, 29-30	A	B	C	C-D
Low Normal: 1, 5, 8, 10-12 14-15, 23-24, 27	B	C	D	D-E
Below Normal: 6-7, 13, 21, 25	C	C-D	D-E	E
Disturbed: 22, 26	C	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 (C) on March 1st, good (B) the 2nd and 3rd, excellent (A) on the 4th, fair (C) on the 5th, etc.**

Solar Cycle Progress

Sunspot cycle 22 is now in its 91st month, and it continues to decline steadily as expected. The Royal Observatory of Belgium reports a monthly mean sunspot level of 35 for November 1993. This results in a 12-month running smoothed sunspot number of 60 centered on May 1993. This is a decline of three numbers from the previous month's level. During November daily levels of solar activity varied between a high of 69 observed on November 30th and a low of 10 reported for the 1st.

According to daily observations made at Penticton, British Columbia by the Dominion Radio Astrophysical Observatory of Canada, the adjusted mean level of 10.7 cm solar flux for November 1993 was 96. This results in a 12-month running number of 115 centered on May 1993. The level of 10.7 cm flux is paralleling very closely the decline in sunspot count.

During the CQ World-Wide DX CW Contest weekend the recorded sunspot number on November 27th was 39, with a 10.7 cm solar flux level of 87. On November 28th solar activity increased to a sunspot number of 53 and a solar flux level of 91. This accounted, along with stable geomagnetic conditions, for the relatively good HF propagation conditions noted during the WW CW Contest period.

A smoothed sunspot number on the order of 40 and a 10.7 cm solar flux level of approximately 112 are forecast for March 1994.

March Conditions

On March 21 the *Vernal Equinox* occurs. This is the day when the sun crosses the equator on its apparent travel into the northern sky. On this day the hours of darkness and daylight are of equal duration throughout the world. This equinoctial phenomenon has its related effects upon high-frequency radio propagation conditions throughout most of March and April. On circuits within the northern hemisphere, where it is spring, expect daytime usable frequencies to be somewhat lower than during the winter months, while nighttime frequencies should be a bit higher. For paths within the southern hemisphere, where it is fall, opposite effects will be noted.

The most interesting propagation changes should occur on the longer openings between the northern and southern hemispheres—for example, from the USA to South America, to the South Pacific, to Central and Southern Africa, etc. Because it is spring in the northern hemisphere and fall in the southern hemisphere, the ionosphere is more similar and stable than during the winter and summer seasons. This "equalization" in conditions should produce a marked improvement in openings between both hemispheres on all bands between 160 and 10 meters. The best times to look for these openings are shortly before sunrise and again shortly after local sunset on the 160, 80, 40, and 30 meter bands, and for an hour or two after sunrise and again for an hour or two before sunset on 17 and 20 meters. On 15, 12, and 10 meters check for inter-hemispheric openings towards the southeast and south from a few hours before noon through the early afternoon hours. Check later in the afternoon for openings towards the south and southwest and towards the west.

Twenty meters is expected to be the best band for DX propagation from sunrise to sunset during March, followed by 15 and 17 meters. A few 10 and 12 meter DX openings are also forecast for March, mainly to southern and tropical areas during the daylight hours.

During the period between sunset and sunrise, 30 and 40 meters are expected to be the optimum bands for DX propagation, with good openings forecast to many areas of the world. Some fairly good DX openings are also predicted for 80 meters during the hours of darkness, and some 160 meter DX openings may also be possible during this period. When propagation conditions are High Normal or better, the 20 meter band may also remain open to some areas of the world during the hours of darkness.

For specific times of DX openings for each amateur band 10 through 160 me-

11307 Clara Street, Silver Spring, MD 20902

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

(4) Opening should 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.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate *standard* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 kw PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave 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.

5. 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.

Short-Skip Propagation Chart
March & April 1994
Local standard Time
At Path Midpoint

Band (Meters)	Distance Between Stations (Miles) 50-250	250-750	750-1300	1300-2300
10	*Nil*	*Nil*	08-19 (0-1)	08-13 (1-0) 13-16 (1) 16-19 (1-0)
15	*Nil*	08-16 (0-1)	09-12 (1) 12-17 (1-2) 17-18 (0-1)	08-09 (0-1) 09-10 (1) 10-13 (1-2) 13-14 (2) 14-17 (2-3) 17-18 (1-2) 18-20 (0-1)
20	*Nil*	07-08 (0-1) 08-09 (0-2) 09-14 (0-3) 14-16 (0-2) 16-23 (0-1)	07-08 (1) 08-09 (2) 09-10 (3) 10-14 (3-4) 14-16 (2-4) 16-18 (1-4) 18-19 (1-3) 19-20 (1-2) 20-23 (1) 23-05 (0-1)	06-07 (0-1) 07-08 (1-2) 08-09 (2-3) 09-10 (3) 10-15 (4-3) 15-18 (4) 18-19 (3) 19-20 (2-3) 20-21 (1-2) 21-05 (1) 05-06 (0-2)
40	07-09 (0-1) 09-10 (0-2) 10-12 (2-3) 12-17 (3-4) 17-19 (2-3) 19-20 (1-2) 20-22 (0-1)	06-07 (0-2) 07-09 (1-4) 09-10 (2-4) 10-15 (4-3) 15-17 (4) 17-19 (3-4) 19-20 (2-4) 20-22 (1-2) 22-00 (0-2) 00-06 (0-1)	06-07 (1) 07-08 (4-2) 08-15 (3-1) 15-17 (4-2) 17-19 (4-3) 19-20 (4) 20-22 (2-4) 22-00 (2-3) 00-06 (1-2)	06-08 (2-1) 08-15 (1-0) 15-16 (2-0) 16-17 (2-1) 17-19 (3-2) 19-21 (4-3) 21-22 (4) 22-00 (3-4) 00-02 (2-3) 02-06 (2)
80	07-08 (2-3) 08-11 (3-4) 11-18 (4) 18-20 (3-4) 20-22 (2-3) 22-00 (1-2) 00-06 (1) 06-07 (1-2)	07-08 (3-2) 08-11 (4-1) 11-16 (4-0) 16-18 (4-2) 18-20 (4-3) 20-22 (3-4) 22-00 (2-4) 00-06 (1-2) 06-07 (2)	07-08 (2-1) 08-11 (1-0) 11-16 (0) 16-18 (2-1) 18-20 (3-2) 20-00 (4) 00-05 (2-3) 05-07 (2)	07-08 (1-0) 08-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-2) 22-00 (4-3) 00-05 (3) 05-07 (2-1)
160	05-07 (4-2) 07-09 (3-1) 09-17 (2-0) 17-19 (3-1) 19-20 (4-2) 20-05 (4)	05-06 (2-1) 06-07 (2-0) 07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-20 (2) 20-22 (4-3) 22-03 (4) 03-05 (4-3)	05-06 (1) 06-19 (0) 19-20 (2-1) 20-22 (3-2) 22-03 (4-3) 03-05 (3-2)	05-06 (0-1) 06-19 (0) 19-20 (1-0) 20-22 (2) 22-03 (3-2) 03-05 (2-1)

ALASKA
Openings Given in GMT

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern USA	*Nil*	22-00 (1)	22-00 (1) 00-02 (2) 02-04 (1)	06-13 (1) 07-12 (1)*
Central USA	*Nil*	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1) 00-03 (2) 03-05 (1)	07-09 (1) 09-12 (2) 12-14 (1) 07-12 (1)*
Western USA	*Nil*	20-22 (1) 22-00 (2) 00-03 (1)	19-22 (1) 22-00 (2) 00-02 (3) 02-04 (2) 04-06 (1)	06-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-15 (1) 08-10 (1)* 10-12 (2)* 12-14 (1)*

HAWAII
Openings Given in Hawaiian Standard Time

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern USA	*Nil*	08-11 (1) 11-13 (2) 13-14 (3) 14-15 (2) 15-16 (1)	02-05 (1) 05-07 (2) 07-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-21 (1)	18-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 19-21 (1)* 21-00 (2)* 00-02 (1)*
Central USA	11-15 (1)	08-09 (1) 09-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	03-05 (1) 05-08 (2) 08-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	18-19 (1) 19-21 (2) 21-01 (3) 01-04 (2) 04-05 (1) 19-21 (1)* 21-01 (3)* 01-02 (2)* 02-03 (1)*
Western USA	11-15 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	02-04 (1) 04-06 (2) 06-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-17 (4) 17-19 (3) 19-21 (2) 21-23 (1)	17-19 (1) 19-20 (2) 20-23 (4) 23-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*

*Indicates best time to listen for 80 meter openings. Openings on 160 meters are also liely 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.
Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances use the preceding Short-Skip Chart.
#See explanation in "How To Use Short-Skip Charts" in this column.

ters during March, refer to the DX Propagation Charts, which appeared in last month's column. This month's column contains Short-Skip Propagation Charts for March and April, and charts centered on Alaska and Hawaii. The Short-Skip Charts contain propagation forecasts for distances between approximately 50 and 2300 miles.

For day-to-day changes in HF propagation conditions expected in March, see the Last Minute Forecast, which appears at the beginning of this column.

VHF Ionospheric Openings

Chances look a little better for ionospheric openings on the VHF bands during this month. A seasonal increase is expected in short-skip sporadic-*E* type openings on 10 meters, and an occasional opening may also be possible on 6 meters. These openings are more likely to occur during the daylight hours over distances between approximately 1000 and 1400 miles.

There is also a good chance for some widespread auroral activity on the VHF bands, especially when the HF bands are Below Normal or Disturbed. Check the Last Minute Forecast at the beginning of this column for those days that are likely to be in these categories during March.

Not much meteor activity is expected this month, but some might be possible during minor showers that may occur March 14–15 and March 24–25.

73, George, W3ASK

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

FCC Proposes "Vanity" Station Call Signs

Special Station Call Signs To Cost $70 For 10 Years!

It all started when a persistent Texas amateur began a campaign some three years ago to obtain a station call sign he had held previously. Jim Wills, N5HCT, of Tyler, Texas has just about accomplished the impossible. He has caused Congress to adopt legislation which authorizes the FCC's Private Radio Bureau to charge a fee for special amateur station call letter combinations. Now the FCC is about to implement the authorization.

The bill was signed into law by President Clinton on August 10th as part of his much publicized Deficit Reduction Plan. Tucked away on page 57 of the Omnibus Budget Reconciliation Act of 1993 was a new way for the Federal Communications Commission to recover costs. The FCC would now be able to charge annual Regulatory Fees ranging from $6 a year (for small earth stations) to $90,000 annually for space stations in low earth orbit.

Regulatory fees in effect reimburse the FCC for the cost of its rulemaking and enforcement effort. Add another $82 million in Application and User fees and the Commission just about covers their $130 million annual budget. The money still goes to the U.S. treasury, but the amount collected by the FCC is considered by the administration when budget time rolls around. Thus, these fees are more or less a credit to the Commission's needed appropriations. The more they collect, the more influence they have at budget time.

Amateur, government, and certain non-profit stations were exempt from regulatory fees on the basis that they were "non-pecuniary." While the American Radio Relay League played a part in getting amateur stations exempted from the Annual Regulatory Fees, they too were astonished at the Congressional provision for special call signs. Jim Wills had convinced his Congressman that amateurs indeed wanted special station call letters and were willing to pay for them. Even the FCC was not aware that a provision for "Amateur Vanity Call Signs" carried a $7 annual regulatory fee until they read it in the legislation! It caught everyone by complete surprise!

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (817-461-6443)

The Inside Story!

How Jim Wills accomplished the feat is interesting. He started by filing a Petition for Rule Making in April 1990 with the FCC suggesting that amateurs be allowed to specify three call sign choices in order of preference in exchange for a $30.00 fee. The petition was denied because the FCC had no authority to collect fees from amateurs. Wills then began a letter-writing campaign to the FCC, National Telecommunications and Information Administration (NTIA), and Congress. A letter to President Bush was answered by the FCC's Private Radio Bureau stating " . . . we cannot collect a fee for any amateur service application, including a fee for unused call signs." Furthermore, any amateur service fee requirement would require legislative action by Congress.

In November of 1990 Wills wrote to Congressman Ralph M. Hall (Democrat Texas) who sits on the powerful House Telecommunications and Finance Subcommittee. The FCC's Managing Director answered Representative Hall's inquiry. " . . . Congressional intent is clear that all fees from amateur radio licensees are stricken since they do not operate for a profit . . . "

A few months later Congressman Hall wrote To Wills: "I've shared your idea with the staff of the Telecommunications Subcommittee, and they are currently conducting a inquiry . . . to determine whether such a fee would collect enough money to pay for itself." A joint letter signed by Congressman Hall and Subcommittee Chairman Ed Markey was sent to then FCC Chairman Alfred Sikes on June 12, 1992. The addition of Markey's signature to the letter certainly added renewed importance! Markey controls the FCC budget. Sikes told the legislators that a distinctive amateur station call sign program would be very expensive and that Congress has not given the FCC legal authority to collect the fees.

On January 13, 1993 Congressman Hall again wrote to Jim Wills, N5HCT, acknowledging that he had become aware that the FCC's Private Radio Bureau " . . . with or without the knowledge of Chairman Sikes . . . is already moving towards implementing a specialized call sign program. . . . the FCC will still need permission from Congress to collect fees. I'm confident that [Telecommunications Subcommittee Chairman Ed Markey] will support a legislative proposal which would allow the FCC to collect fees for specialized call signs." The provision for vanity amateur station call signs was then added to the list of Annual Regulatory Fees on which the FCC could impose a charge.

FCC Commissioners Meeting

On December 13, the FCC announced a Notice of Proposed Rule Making (NPRM) that should fulfill the desire of many amateurs for personalized or "vanity" call signs—calls that are not assigned in sequential order by the FCC's computer, but are instead composed by the licensee.

This proceeding will also take the FCC into the 20th century by investigating online filing of license applications by computer. Such electronic filing would be phased in over a period of time as yet undetermined. Vanity call signs could be available as early as this summer, however.

FCC Commissioner James H. Quello said that retired Senator Barry Goldwater, K7UGA, a high-profile supporter of Amateur Radio, encouraged him to adopt the new system.

Ever since the FCC established its sequential call sign program amateurs have deluged the FCC (and sometimes Congressional representatives) with requests for special calls, club calls, and previously-held calls. With apparently a single exception—that being the grant of K3VOA to the Voice of America club station—the FCC routinely denies these requests. The FCC's 1970s-era Honeywell computer, which costs $1 million a year for system support, cannot provide special calls or electronic filing. FCC PRB Chief Ralph Haller joked that the Smithsonian Institution may want the obsolete machine as a museum piece.

This mainframe computer will be re-

placed by a new networked, personal-computer-based system. Mr. Haller said he sees no reason why even 1x1 calls (W5Y or WW, for example) couldn't be granted!

The new call sign system will have no effect on operator privileges. Moreover, the system would not be available to new licensees. New licensees would have their initial call signs assigned by the sequential system. Then if the amateur wanted a different call, he or she could forward request and payment to the FCC.

FCC Commissioners Meeting

Newly installed FCC Chairman Reed Hundt commented that the proposed system will bring better service, higher speed, and lower costs to taxpayers. Here is the official presentation of the proposal to the Commissioners at their Dec. 13 public meeting in Washington:

(Monty DePont, Personal Radio Branch attorney, presenting:) Good morning, Mr. Chairman and Commissioners.

A few weeks ago, the 1993 Nobel Prize in physics was awarded to two Americans who, experimentally, confirmed Einstein's General Theory of Relativity. Those two scientists, Dr. Joseph Taylor and Dr. Russell Hulse, took the first steps toward their careers by becoming amateur radio operators when they were teenagers.

Dr. Taylor obtained his amateur operator license at the age of 13. He attributes his love for science to amateur radio. He is still a licensee. Although Dr. Hulse's license has lapsed, he is again interested in amateur radio.

Dr. Taylor's amateur station call sign is K1JT. The "JT" stands for Joe Taylor. Amateur operators often want to choose their own call signs. The call sign can contain their initials, a nickname, or make a personal statement of some kind.

Unfortunately, for almost 16 years we have denied requests for such vanity call signs because our automated processing system, developed in the mid-70s, can only assign call signs sequentially based on operator classes.

In September, President Clinton signed an Executive Order that directs agencies to set new customer service standards to make the federal government more customer-driven and provide the highest quality of service possible. The Private Radio Bureau, through the use of information age technology, is ready to take a significant step forward in response to the President's directive.

The Bureau, in partnership with the Office of the Managing Director, is installing a new computer system for the processing of amateur radio licenses. The new system will allow an amateur licensee to request that a specific "vanity" call sign be assigned. We also anticipate that we can soon start electronic filing of applications and eventually grant licenses electronically. These new capabilities will improve service to the public and make our operations more efficient.

The first item before you is a Notice of Proposed Rule Making that proposes rule amendments to implement a new vanity call sign sys-

tem. The cost for a vanity call sign would be $70.00, based on the fee schedule adopted by Congress in the 1993 Budget Reconciliation Act. We are requesting comments on how the system should be administered and what features it should have. The system will maintain a sequential assignment system for those amateurs not desiring a vanity call sign.

The second item merely deletes a privatized system to administer amateur club call signs. That system has not yet actually been put in place and in any event becomes moot based on the new computer capabilities at the Commission. We recommend adoption of both items and request editorial privileges.

FCC Press Release on Vanity Call Signs

The following news bulletin was issued by the FCC after the Commissioners' meeting:

The Federal Communications Commission proposed on December 13, 1993 to allow amateur radio operators to choose their own call signs. In light of this decision, the commission by separate action vacated the rule provisions that established private entity call sign administrators and reinstated the prior rules.

Each amateur station licensed by the Commission is assigned a unique call sign with the purpose of providing over-the-air identification of the station while it is transmitting. Many amateur radio operators have expressed an interest in being able to choose their own call signs, which might be their initials, nickname or a personal statement.

The Commission's current automated processing system does not have the capability to assign call signs other than sequentially. However, the Private Radio Bureau is now installing a new automated licensing system which will permit vanity call signs to be selected. Thus, the Commission proposes that such call signs be available, provided that they have not been previously assigned. At the same time, the sequential call sign system would remain in place for those radio operators who do not want a vanity call sign.

The Commission supports this proposal, which would allow amateur radio operators and the Commission to benefit from a creative use of improved technology. Amateur radio operators will be able to personalize their call sign and express themselves using the airwaves. The commission will be able to improve the efficiency of its licensing process and better serve its customers, amateur radio operators.

In the future, this new automated processing system might allow amateur radio operators to check for call sign availability on their own, through an on-line system and ultimately, amateur license applications might be received electronically. This would further ease the process for both the operators and the Commission.

The proposed rule would allow the licensee of an existing primary station to request a new, vanity call sign. The Commission would also administer a club and military recreation station sequential call sign system under the new automated licensing process. Applicants for a vanity call sign would use a new application form.

On May 11, 1993 the Commission adopted an order which amended the amateur service rules to establish call sign administrators for club and military recreation stations. At that time, the Commission believed that such a system in the private sector would make club call signs widely available and benefit the amateur community without an undue burden on FCC staff.

On June 15, 1993 David B. Popkin, W2CC, filed a Petition for Reconsideration of that action, contending that the rules adopted should have been proposed in a Notice and Comment rulemaking proceeding and asked that they not be implemented. Popkin argued that the establishment of club call sign administrators is not minor and non-controversial in the amateur radio community.

Because the proposal, adopted by the FCC two weeks ago, also will meet the needs of persons interested in obtaining a club station license, the Commission said there appeared to be merit in Popkin's argument and granted his petition. Accordingly, the Commission vacated the rule provisions that established private entity call sign administrators.

Action by the Commission, December 13, 1993, by Notice of Proposed Rulemaking.

The text of the FCC's proposal to implement vanity (licensee selected) amateur radio station call signs was released at the end of December. Essentially the rule making permits:

1. Individual amateur radio operators to apply for a specific available call sign which is appropriate for their license class. In other words, a Technician Class operator may apply for only a Group D (2-by-3) and Group C (1-by-3) call sign.

2. Licensees would use a new FCC Form 610-V to select up to ten call signs in order of preference. (If all are unavailable, the current call sign would be assigned.)

3. Club stations will also be able to choose a specific available call sign. RACES and military recreation stations are not eligible for vanity call signs.

4. The cost of a special call sign will be $70 for a ten-year term. All Form 610-V applications with fees will go to a special address in Pittsburgh, PA.

5. Amateurs holding vanity call signs who upgrade or otherwise modify their license will not be granted a new full ten-year term. Their new license will bear the original expiration date. An amateur with a vanity call sign will not be able to obtain a new ten-year term by changing his address or upgrading his license class.

6. All licensees will only have one station call sign. Their current call sign will be vacated (and immediately available for reassignment) once a vanity call sign is assigned.

7. The FCC will issue public announcements describing the vanity call sign system.

8. The current (no cost) sequential call sign system will remain in place for those who do not wish a specific call sign.

Text of The FCC Vanity Call Sign Proposal

Here is the complete text of the NPRM:

PR Docket No. 97-305
In the Matter of
Amendment of the Amateur Service
Rules to Implement a Vanity Call Sign System

Notice of Proposed Rulemaking
Adopted: December 13, 1993
Released: December 29, 1993

Comment Date: March 7, 1994
Reply Comment Date: April 7, 1994

By the Commission:

I. Introduction

1. The ardent desire of amateur operators for call signs of choice presents an opportunity for us to focus on serving an important segment of the public. By this Notice, therefore, we propose to amend the amateur service rules to authorize the use of vanity call signs as set forth herein.

II. Background

2. Each amateur station licensed by the Commission is assigned a unique call sign.[1] The assigned call sign itself conveys no frequency or operating privileges. Its only purpose is to provide for over-the-air identification of the station.[2] Nonetheless, amateur operators have a very high regard for call signs. They frequently request specific call signs with letters that represent something that is important to them, such as their initials, nicknames, or personal statements. Our current automated licensing process, however, will not support a vanity call sign system. The system is nearly two decades old and simply assigns call signs sequentially from groups of call signs according to the applicant's class of operator license and mailing address.[3]

III. Discussion

3. Information age technology is providing the capability to administer a vanity call sign system and provide better and more friendly service to our customers. The Private Radio Bureau's Licensing Division will soon be installing a new automated licensing process that will provide greater flexibility in licensing. With the added capability, we can now propose to amend the rules to implement a system whereby amateur station licensees could select call signs of their choice, provided they are not already assigned. This vanity call sign system would be in addition to the current sequential call sign system that we could continue to use for those applicants who do not want a vanity call sign.

4. The rules we are proposing herein would allow the licensee of an existing primary station[4] to request a modification of the license to show a call sign selected by the licensee. We also propose to extend the privilege to the license trustee of an existing club station. Finally, we also propose to administer a club and military recreation station call sign system under our new automated licensing process.[5]

5. Applications for a vanity call sign would use a new application form.[6] The applicant would list on the form a maximum of ten call

signs, in order of preference. The form would then be filed with the Commission.[7] We request comment on other means, such as magnetic computer disks, that applicants could use to apply directly to the Commission for a vanity call sign. The automated process would compare the applicant's list with the assigned call signs in the groups designated in the sequential call sign system for the applicant's class of operator license. The first available call sign from the applicant's list would then be assigned. If none of the call signs listed are available, the automated process would reassign the call sign that the applicant had vacated. The vanity call sign listed by the applicant must be within the framework of the sequential call sign assignment system wherein certain groups of call signs are designated for each class of operator license. Applicants, therefore, could choose call signs from the groups corresponding to their license classes or lower license classes.[8]

6. Licensees requesting vanity call signs would find it helpful to know which call signs are assigned at the time that they file their applications so that they can make prudent selections of call signs with a real possibility that their requests can be granted. Even with our enhanced licensing system, we do not currently envision on-line access by the public to check for call sign availability. We request comments on how this service could be made available.

7. The system that we are proposing should be viewed as but one step in creating a government agency that works better and costs less.[9] We note that the amateur service is on the cutting edge of information technology. Electronic bulletin boards are commonplace in the amateur service. Its volunteer examiners use modern information systems to prepare and administer paperless license examinations, to prepare examination session manifests, to maintain a licensee data base and a host of other activities. Examinees study for examinations using computer-aided instruction. Our amateur service licensee data base is widely available from entrepreneurs and bulletin boards in practically all forms of magnetic media.[10] Our goal is to accept eventually applications for licenses or call signs electronically. We may even be able to issue the licenses electronically at some future date. As a starting point, we hope to accept application data from the volunteer-examiner coordinators by the end of 1994. We request comment on the options that may be available to allow electronic data transfer as soon as possible. Ultimately, we may be able to develop a system whereby authorization occurs instantly.[11]

IV. Conclusion

8. We firmly believe in the principle that government should be responsive to user needs. Therefore, we are attempting to satisfy the desires of persons in the amateur community who want to choose their own call signs. The vanity call sign system that we have proposed is designed to be practicable to administer and simple for the amateur community to use. Accordingly, we propose to amend the amateur service rules to provide a vanity call sign system. Comments are invited on the proposal.

Comment Dates

11. Pursuant to applicable procedures set forth in Sections 1.415 and 1.419 of the Commission's Rules, 47 C.F.R. §§1.415 and 1.419, interested parties may file comments on or before March 7, 1994, and reply comments on or before April 7, 1994. To file formally in this proceeding, you must file an original and four copies of all comments and reply comments. If you want each Commissioner to receive a personal copy of your comments, you must file an original plus nine copies. You should send comments and reply comments to Office of the Secretary, Federal Communications Commission, Washington, DC 20554. Comments and reply comments will be available for public inspection during regular business hours in the FCC Reference Center of the Federal Communications Commission (Room 239), 1919 M St. NW, Washington, DC 20554.

Federal Communications Commission
William F. Caton
Acting Secretary

Appendix

Part 97 of Chapter 1 of Title 47 of the Code of Federal Regulations is proposed to be amended as follows:

Part 97—Amateur Radio Service

1. The authority citation for Part 97 continues to read as follows:

Authority citation: 48 Stat. 1066, 1082, as amended: 47 U.S.C. §§ 154, 303. Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. §§ 151-155, 301-609, unless otherwise noted.

2. In Section 97.17, paragraphs (b), (c), (f) are revised and a new paragraph (g) is added to read as follows:

§ 97.17 Application for new license.

(b) Each application for a new amateur service license must be made on the proper FCC form:

(1) FCC Form 610 for a new operator/primary station license;

(2) FCC Form 610-A for a reciprocal permit for alien amateur licensee; and

(3) FCC Form 610-B or a new amateur service club or military recreation station license.

(c) Each application for a new operator/primary station license must be submitted to the VEs administering the qualifying examination.

(f) One unique call sign will be assigned to each new primary, club, and military recreation station using the *sequential call sign system* (call sign is selected sequentially by the FCC from an alphabetized list corresponding to the geographic region of the licensee's mailing address and class of operator license). The FCC will issue public announcements detailing the procedures of the sequential call sign system.

(g) Each application for a new club or military recreation station license must be submitted to the FCC, 270 Fairfield Road, Gettysburg, PA 17325-7245. No new license for a RACES station will be issued.

3. Section 97.19 is revised in its entirety to read as follows:

§ 97.19 Application for a vanity call sign

(a) A person holding an operator/primary or club station license may request a modification of the license to show a call sign assigned under the *vanity call sign system* (licensee selects the call sign).

(b) Each request for a modification of a operator/primary or club station license to show a new call sign assigned under the vanity call

sign system must be made on FCC Form 610-V. The form must be submitted with the proper fee to the address specified in the Private Radio Services Fee Filing Guide.

(c) Each request for a renewal of a operator/primary or club station license retaining a call sign assigned under the vanity call sign system must be made on FCC Form 610-V. The form must be submitted with the proper fee to the address specified in the Private Radio Services Fee Filing Guide. To renew the license without retaining a vanity call sign, the applicant must use FCC Form 610 as specified in Section 97.21.

(d) The following persons are eligible to apply for a new vanity call sign:

(1) The holder of a valid operator/primary station license; and

(2) The license trustee holding a club station license.

(e) RACES and military recreation stations are *not* eligible for a vanity call sign.

(f) Only unassigned call signs are available to the vanity call sign system.

(1) A call sign that was previously assigned to a station whose license has lapsed is not available to the vanity call sign system for 2 years following expiration of the license.

(2) A call sign assigned to a station of a deceased licensee is not available to the vanity call sign system for 2 years following the licensee's death, or for 2 years following the expiration of the license, whichever is sooner.

(3) A call sign that is vacated by the licensee is available immediately to the vanity call sign system.

(4) The FCC will issue public announcements detailing the procedures of the vanity call sign system.

4. Section 97.21 is revised in its entirety to read as follows:

§97.21 Application for renewal, reinstatement, or modification of a license.

(a) Each application for renewal, reinstatement, or modification of an amateur service license must be made on the proper FCC form(s):

(1) FCC Form 610 to request renewal or reinstatement of an operator/primary station license. The form must be submitted to the FCC, 1270 Fairfield Road, Gettysburg, PA 17325-7245. When the applicant desires to retain a call sign that was assigned under the vanity call sign system, FCC Form 610-V must be used as specified in Section 97.19.

(2) FCC Form 610 to request modification of an operator license showing a change in operator class. The form must be submitted to the VEs administering the qualifying examination. A request for a vanity call sign may *not* be filed with the administering VEs. When the applicant desires to retain a call sign that was assigned under the vanity call sign system, the license will bear the original expiration date.

(3) FCC Form 610 to request modification of an operator/primary station license showing a change of mailing address, change of name, or change of call sign to be assigned under the sequential call sign system. The form must be submitted to the FCC, 1270 Fairfield Road, Gettysburg, PA 17325-7245. When the applicant desires to retain a call sign that was assigned under the vanity call sign system, the license will bear the original expiration date.

(4) FCC Form 610-B to request renewal of a club, military recreation, or RACES station license. The form must be submitted to the FCC, 1270 Fairfield Road, Gettysburg, PA 17325-7245. If the station has a call sign that was assigned under the vanity call sign system, FCC Form 610-V must be used as specified in Section 97.19.

(5) FCC Form 610-B to request modification of a club, military recreation, or RACES station license showing a change of mailing address, change of license trustee or custodian, or change of call sign to be assigned under the sequential call sign system. The form must be submitted to the FCC, 1270 Fairfield Road, Gettysburg, PA 17325-7245. When the applicant desires to retain a call sign that was assigned under the vanity call sign system, the license will bear the original expiration date.

(6) A reciprocal permit for alien amateur licensee is not renewable. A new, reciprocal permit may be issued upon proper application.

(b) Each application for renewal, reinstatement, or modification of an amateur service license must be accompanied by a photocopy of the license document or the original document, unless it has been lost, mutilated, or destroyed.

(c) When the licensee has submitted a timely application for renewal of an unexpired license (between 60 and 90 days prior to the end of the license term is recommended), the licensee may continue to operate until the disposition of the application has been determined. If the license expires, application for reinstatement may be made during a grace period of 2 years after the expiration date. During this grace period, the expired license is not valid. A license reinstated during the grace period will be dated as of the date of the reinstatement.

(d) Under the sequential call sign system, unless the licensee requests a change, the same call sign will be assigned to the station

ALINCO VHF & UHF Mobiles • Handhelds • Packet

Low Prices... Equipment in Stock... Same Day Shipping... No Excuses, No Waiting!

$20 Coupon thru 3/31/94

ALINCO DR-130T • 2m FM mobile, covers 144-148MHz transmit and 140-174MHz receive. 50/5W output. 20 multi-function memory channels (100 optional), 38 standard CTCSS tones (12 additional tones optional). Programmable transmitter timeout timer with 5 second warning before shut-off. Programmed memory scan, LCD display, 16 button DTMF microphone with up/down control buttons. 12V DC @ 10.5A 5½"w x 1½"h x 6"d, 2½ lbs .....**CALL** ☎

New! **DR-430T** • 440 FM xcvr w/TTP mic ..... ☎

DR-119T • A high Power, super-compact 2m mobile no bigger than a ordinary car stereo. Covers 144-148MHz transmit with receive usermodifiable for 130-174MHz coverage. Big LCD display, 14 multi-function memory channels w/lockout, 4 scanning modes. Programmable CTCSS encode/ decode. DTMF microphone with UP/DOWN buttons for frequency and memory selection. 5½"d x 2"h x 6¾"d, 2.4 lbs ☎

DR-570T • 2m/70cm Twin Band mobile. *Two radios into one!* Covers 2m/440MHz transmit with broadband receive including 130-170, 340-470 and 870-890MHz with user MARS/CAP modification. 45W out on 2m, 35W on 70cm. Full duplex cross band operation. Big, dual digital LCD display, illuminated front panel controls. Volume, squelch and tuning controls for each band. 20 memory channels, 4 scanning modes, priority. CTCSS encode/decode, internal duplexer. 16-key DTMF microphone with UP/DOWN key. 5¾"w x 2"h x 6¾"d, 3¾ lbs ..... ☎

Due to space limitations some items, especially accessories, are not listed in this ad. For info, please *Call Toll Free* or see the AES® Winter '93/94 Catalog.

Check with us for Latest "Hot Deals"and Sale Prices–New Coupons, Trades, etc.

AES BBS–(414) 358-3472 (8-N-1 up to 9600 baud)
Prices • Specials • Important Info... More!

AES® Milwaukee is an Authorized ALINCO Warranty Service Center

$30 Coupon thru 3/31/94

ALINCO DR-600T 2m/70cm Twin band FM Mobile
Two radios in one! Combines rugged construction, wide frequency coverage, and *high-tech* features to produce a dual band FM transceiver suited for both mobile and base station use. Covers 144-148 and 440-450MHz, plus receives 150-173 and 420-470MHz. Modifiable for aircraft band receive and MARS/CAP transmit. Output: 45W 2m/35W 70cm The front panel can be separated from the transceiver's main body with an optional kit for a custom installation. 40 memory channels, multi-function scanning. Remote controls from any DTMF capable 2m or 70cm transceiver. Separate VHF and UHF outputs. Full duplex cross band operation allows for transmit on one band and simultaneous receive on the other. Large dual LCD and separate volume and squelch controls for each band. CTCSS and DTMF encoders built-in. 5¾"w x 2"h x 7"d, 3¾ lbs ..... ☎

DR-1200T • A 2m Data Radio engineered for optimum Packet Radio performance and operating convenience in one compact package. Covers 144-148MHz, 25W output with high/low power select. 1200/2400 baud (modifiable to 9600 baud). Highly visible illuminated LCD with function indicators, 4 scanning modes (VFO, memory, band, priority), 14 fully programmable memory channels, programmable CTCSS encode and decode. Voice transmission with the optional microphone. Includes DC power cord and TNC interface cable. 5½"w x 2"h x 6¾"d, 2.2 lbs ..... ☎
DR-1200TH • 2m Data Radio, 9600 baud ..... ☎

Due to foreign currency fluctuations, please ☎ *Call Toll Free* for Prices...

MasterCard VISA DISCOVER NOVUS AMERICAN EXPRESS Cards

★ Low Prices ★ Large Stocks ★ Fast Service
★ Top Trades ★ Toll Free Ordering Lines
★ AES® ships to all 50 states

Over 37 Years in Amateur Radio

HOURS • Monday thru Friday 9-5:30; Saturday 9-3:00

All Prices and Specifications are subject to change without notice.

ALINCO DJ-180T (left) • 2m FM HT. Superior receive audio and tough construction with simple intuitive operation. Designed so you won't have to spend hours studying the manual. Covers 144-148MHz transmit and 130-174 MHz receive. 2.0W, 5W with opt.12V battery. Illuminated LCD display, 16 digit DTMF, 10 memories. 5⅞"h x 2⅜"w x 1⅜"d ....**CALL** ☎

***DJ-180T* – $20 Coupon**

ALINCO DJ-180TH • **5W** 2m FM HT ..... ☎

***DJ-180TH* – $10 Coupon**

ALINCO DJ-580T • The 2m/70cm Twin Band HT with **Super Audio!** 2m/440MHz tx, rx 130-174 and 410-470MHz. Mod. for MARS/CAP tx, + 118-136MHz & 800MHz rx. 40 memories, CTCSS encode/decode, DTMF encode, DSQ. Full duplex cross band repeat, 8 scan modes, autodialer, back-lit keypad. Simultaneous receive on both bands with separate squelch and volume controls. 2.5W; 5W w/12V or opt. battery. 6¼"h x 2¼ "w x 1¼ "d, 0.97 lbs ..... **SPECIAL** ☎

***DJ-580T* – $30 Coupon**

ALINCO DJ-F1T (right) • 2m Mini HT w/130-174MHz receive, 118-136MHz receive and MARS/CAP transmit with modification. 8 scan modes, autodialer, back lit keypad, 40 memories, call channel. CTCSS, DTMF encode and DSQ paging. 2.5W; 5W opt. 4 ⅜ "h x 2⅛ "w x 1½ "d, 14 oz..... ☎

***DJ-F1T* – $20 Coupon**

DJ-F1T/HP • Same as DJ-1FT but 5W with 12V 600mah nicad battery, standard..... ☎

***DJ-F1T/HP* – $20 Coupon**

New **DJ-G1T** • 2m HT. Features 440MHz receive, "Channel Scope" spectrum analyzer, more!..... ☎

***DJ-G1T* – $30 Coupon**

All Alinco Coupons expire March 31, 1994

DJ-162TD • 2.5W 2m HT/nicad & alk. case **$199.95**
DJ-560T/A • 2W 2m/440 FM HT..... **299.95**
DJ-592T • 45W/35W 2m/440 FM mobile..... **499.95**

While they Last – Hurry!

Order Toll Free: 1-800-558-0411 ***FAX: (414) 358-3337***

AMATEUR ELECTRONIC SUPPLY® Inc.

5710 W. Good Hope Road; Milwaukee, WI 53223 • Phone (414) 358-0333

AES® BRANCH STORES

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
1-800-321-3594

ORLANDO, Fla 32803
621 Commonwealth Ave
Phone (407) 894-3238
1-800-327-1917

CLEARWATER, Fla 34625
1898 Drew Street
Phone (813) 461-4267
No Toll Free Line

LAS VEGAS, Nev 89106
1072 N. Rancho Drive
Phone (702) 647-3114
1-800-634-6227

Since 1957

upon renewal, reinstatement, or modification of a station license.

(5) Current sections 97.21, 97.23, 97.25, and 97.27 are redesignated as sections 97.23, 97.25, 97.27 and 97.29, respectively.

In a separate Memorandum Opinion and Order adopted December 13, 1993 (Released December 29, 1993) the FCC invalidated the Call Sign Administrator rules adopted on May 11, 1993. Section 97.19 has now been returned to the previous version, pending a final ruling on the vanity call sign system. Section 97.29 Club and Military Recreation station call sign administration is cancelled and removed from Part 97.

Footnotes

1. Some possible amateur call sign variations are K1SS, N2WHY, W3CAT, AA4AA, KA5LAW, NB6HAM, and WC7SKI. There are almost 15 million possible combinations of letters and numbers for amateur station call signs.

2. Section 97.119(a) of the Commissions Rules, 47 C.F.R. §97.119(a), requires an amateur station to transmit its call sign on its transmitting channel at the end of each communication and at least every ten minutes during a communication.

3. See Amateur Station Call Sign Assignment System, PR-5000, Private Radio Bureau Fact Sheet #206 dated June 1991. Stations licensed to the higher classes of operator license are assigned shorter call signs. Because shorter call signs are fewer in number, they are generally considered more desirable.

4. A station licensed to an individual is a primary station. See Section 97.5(d)(1) of the Commission's Rules, 47 C.F.R. 97.5(d)(1).

5. In a related Order, adopted today, we are terminating the privately administered club call sign and military recreation system that we adopted on May 11, 1993. See 8 FCC Rcd 3594 (1993).

6. FCC Form 610-V. FCC Form 610 which is currently used by applicants would also advise licensees holding vanity call signs to submit FCC Form 610-V with the proper fee if they want to renew their license and retain the vanity call sign.

7. Section 9(g) of the Communications Act of 1934, as amended, 47 U.S.C. §159(g), specifies a fee of $7.00 per year for amateur service vanity call signs. Section 9(f)(1) allows the Commission to require payment of small fees in advance for a number of years not to exceed the relevant license term. The Commission will conduct a rule making to implement these regulations. A vanity call sign system will not be started until the issues regarding implementation of fees have been resolved.

8. In the case of a club station, the license trustee's class of operator license would apply. Because military recreation stations and radio amateur civil emergency stations (RACES) are licensed to non-amateur operators, these stations would not be included under the vanity call sign system. Persons commenting on this proposal, however, may wish to submit alternatives suggesting ways that military recreation and RACES stations might be able to be brought into a system that would afford them call signs of choice.

9. Vice President Al Gore, Report of the National Performance Review, "From Red Tape to Results: Creating a Government That Works Better and Costs Less" (1993). The Vice President's Report stresses putting people first. Serving customers are cutting costs are two of its key principles. This Notice embraces these principles by seeking ways to use efficient technologies that are now available to the Commission to provide amateur community customers with the services they desire.

10. The amateur service licensee data base is available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161 (703-487-4600 or 1-800-553-NTIS).

11. The licensee data base, for example, could serve as the instrument of authorization.

73, Fred, W5YI

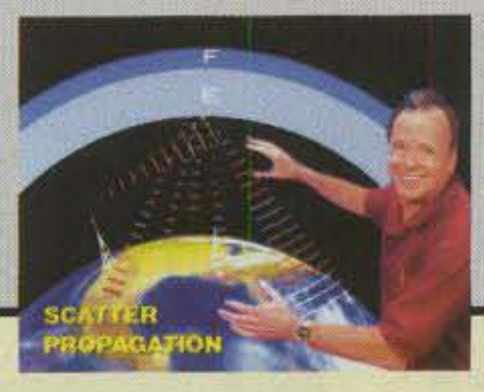
Your HAM RADIO LICENSE is only hours away with THE ARRL TECHNICIAN CLASS VIDEO COURSE

The Fast, Easy, Fun Way to Pass Your Novice- and Technician-Class FCC Written Exams!

ENJOYING HAM RADIO HAS NEVER BEEN EASIER!

Get the Best, When You Need the Best!

- Only the **American Radio Relay League** (**ARRL**), the national organization of Amateur Radio Operators, has more than 75 years experience in helping people—just like you—become hams. With our expert help, **you'll be on the air in no time!**
- The ARRL Technician Class Video Course demonstrates **every** important concept on video. You succeed because you completely understand the material, not because of rote memorization.
- Only the ARRL has the resources to make sure you have the latest, most accurate information on video. With the ARRL, you **know** your course is fully updated for the current FCC exams.
- Your course is produced in assocation with King Schools, whose award-winning "Monster Graphics" let you see your instructor and "the action" at the same time.
- With the ARRL, expert help is only a phone call away. Call us any business day, **toll-free**, to have your questions about the ARRL Technician Class Video Course or your FCC exam answered personally.



Your Complete ARRL Technician Class Home Study Video Course Includes:

- **Three exciting video tapes—five hours of invaluable instruction—covering everything you need to pass your Novice and Technician Class written exams**
- **164-page Course Book with detailed notes.**
- **Every FCC question—with correct answers and detailed explanations.**
- **Six practice exams to "tune you up" for the real exam. On the big day, you'll be relaxed—and more than ready!**

Your ARRL Technician Class Video Course is produced by King Schools, Inc., a recognized world leader in the production of exam preparation video courses. King videos work, and they get the job done for the student like no other medium can.

And your ARRL Technician Class Course is no exception. You'll witness the magic of King's 3-D animation and full screen "monster" graphics, see problems solved right before your eyes, and always be in complete control of the learning process — able to stop, rewind, and review any part of the course whenever you like.

KING SCHOOLS

Order Risk Free

We're so sure you'll do well on your exam with the Technician Class Video Course that we make this guarantee:

1. Examine your Technician Class Video Course free for 20 days. If it's not what you expected, simply return it for a full refund—no questions asked.

2. You will pass your FCC written exam with the ARRL Technician Class Video Course. If you fail your test within one year, return your course and we'll refund your money. Every penny. **You pass, or you don't pay!** (Include a dated proof of purchase and the date and location of your VEC-administered exam session when you return your course.) **And...**

3. In addition, the veteran hams at ARRL Headquarters in Newington, Connecticut, stand ready to answer your questions and provide expert advice and information. **We won't let you fail.**

NO MORSE CODE REQUIRED

Your ARRL Technician Class Video Course is all you need to pass your FCC Technician Class exam and start exploring every nook and cranny of the VHF/UHF ham bands—that's full access: all bands, all modes!

Start with a simple FM mobile rig and follow your interests wherever they lead.

Optional Exam Software Available

The ARRL Technician Class Computerized Exam Review is a fun, user friendly program that lets you choose questions by subject, or take them all.

At your command, you'll see on-screen correct answers with ARRL's detailed explanations.

Plus... the program selects unanswered or previously missed questions, tracks your progress, and gives you a personal Report Card so you can watch your score improve!

So What Are You Waiting For?

With your new license, the world of Amateur Radio awaits you. Pass your written exam now with the ARRL Technician Class Video Course...and **get in on the fun!**

1. Your ARRL Technician Class Video Course, only $99

—OR GET EVEN MORE!—

2. Your ARRL Technician Class Video Course, Plus The Technician Class Computerized Exam Review Program (A $49 Value), all only $119

To Order, Call 1-800-32-NEW HAM or Tear Out And Mail Today

OK! I want to start enjoying the World of Amateur Radio. Rush me:

- ❑ Complete ARRL Technician Class Video Course, Only **$99**
- ❑ Complete ARRL Technician Class Video Course And Technician Class Computerized Exam Review. All only **$119**

Computerized Exam Review

❑ Macintosh ❑ IBM Compatible (512k, hard drive)

Specify ❑ 3½″ ❑ 5¼″ Disks

Ship To:

Name _____

Address _____

_____

City _____

State, ZIP _____

Telephone (_____) _____

Charge To: **VHS Format**

❑ MC ❑ VISA ❑ AMEX ❑ Discover

Card No. _____

EXP _____

❑ Check or Money Order Enclosed

TOTAL PURCHASE $ _____

Shipping and Handling _____

❑ UPS Surface, $5

❑ FEDEX 2 Day Delivery, $15

❑ In CT add 6% Tax _____

TOTAL AMOUNT $ _____

The American Radio Relay League
Helping Hams Get Started Since 1914
♦
225 Main St, Newington, CT 06111
CQ 203-666-1541 • Fax 203-665-7531

OUR READERS SAY

Where Did The Pride Go?

Editor, *CQ*:

I picked up a December 1993 copy of *CQ* last night at my local grocery store and was delighted with your editorial. It made me think of my own experience in ham radio, in many ways like yours.

I got my ticket in 1964 and I did not suffer the intimidation of Mr. Finkelstein as you did, but believe I received the same feeling at the FCC Los Angeles office of J.L. Smith for my General.

We were not at the height of awareness that you were in 1954 over the Soviets, but I lived in a small town isolated in the mountains that regularly in the winter lost its power, roads, and sometimes its telephones. Amateurs played an important role in civil order during these times of heavy snowfall and thundering winds. I was WN6KXH, and I was part of the Amateur *Service*!

Like you, it became the amateur *hobby* for me as the years passed by. Last year I took the ham call letter license plates off my car because I am no longer proud to be a ham. A few years before that I nearly turned in my ticket because of the endless complaints I received over the air on my signal. A perfectly fine signal, but my fellow amateurs had nothing better to do than play "self appointed amateur radio policemen." Not everyone wants to run a modern transceiver—even if they can afford it.

Let me say a few positive things about the hobby, however. It has provided me a path to a life career in radio. It has given me countless happy hours of operating pleasure and continues to do so today. It has given me friendships with valuable people I would never have met otherwise, people who stand tall in radio, and people who have helped me in my career. At times past when amateur radio was more of a service I could be proud of, it enabled me to provide service to my community.

Bravo, Alan, for your editorial, "Zero Bias" and I wish you a happy new year(s) ahead.

Tracy "TR" Reese, WB6TMY
Santa Rosa, CA

Thanks, Bill!

Editor, *CQ*:

As a dedicated reader of *CQ*, I just wanted to write to you and let you know how much I appreciate the Bill's Basics columns each month. In particular, the recent articles on code operating practices for the beginning amateur have been most interesting and informative.

As a CW fan, I'm impressed with the fact that out of the major ham magazines that I subscribe to, *CQ* is the only one that really devotes any time to the Novice operator. The others do on occasion mention the Novices, but not to the extend that your fine articles do.

I have been operating CW for almost a year off and on and have gotten myself to the point where I can copy about 17 WPM accurately. With help like W6DDB's, I'm sure that the upgrade is about to happen for me.

I have listened to Bill many times on the air in the Novice portions of the bands and have worked him a couple of times. He always seems to have a word of encouragement and always thanks the DX stations for working the US Novice frequencies. Further, Bill's attempt to persuade the powers that be at the FCC to give the Novice operator privileges on the 30 meter band shows that he is truly dedicated to the Novice operator.

Thanks again to Bill. I certainly enjoy his columns and his service toward the Novice operator is commendable. 73 from San Antonio.

Tom Harris, KA6WAY
San Antonio, TX

One Good Ham Deserves Another

Editor, *CQ*:

In 1978 while driving around Tampa, Florida taking care of odds and ends on my day off, I talked on my 2 meter FM to a gentleman in Sun City Center, a retirement center about 35 miles south of Tampa. His name was Ted, and he said his TA33 Mosley beam antenna was out of alignment with his rotor box and asked me if I knew anyone who could climb his tower and loosen the bolts on the rotor and realign the antenna. I told Ted I wasn't doing anything that day, and I would drive down and fix it for him. I completed the job with no problems, bid Ted best wishes and 73's, and headed back to Tampa.

Years passed and I met Lee Humphries, a retired RCA electronic expert from Kennedy Space Center who loved to teach and volunteered to teach electronics to the kids at Tampa Palms Elementary School. Lee made electronics fun and interesting for the kids. I knew Lee for 12 years. He lived at John Knox Village, a retirement center in north Tampa next to the University of South Florida. One day in the fall of 1990 Lee asked me if I knew Svend Gormsen, W4SZ, who lived across the hall from him. I told Lee no, I had never met Svend, so Lee took me over to meet him.

Svend was born in Denmark and has a Ph.D. in mathematics. Svend got his Ph.D. at the University of Florida and taught there for eight years. He then moved to Virginia and taught at Virginia Polytechnic Institute as a Professor of Mathematics. Svend is also a Captain in the U.S. Navy Reserves. Svend told me that if my son, Clark Jr., ever needed any tutoring in math, he would be willing to tutor him, as he likes to teach good students. I told Svend my son needed some tutoring in second-year algebra, and Svend said to bring him over.

Svend then told me he had lived at Sun City Center and was one of the founders of the ham radio club there. I asked Svend if he knew Ted, the ham I helped in 1978. Svend looked at me for a long time and said, "Ted! That's me! Theodor or Ted is my middle name. I use Ted on the radio because it is easier for people to understand." My son, Clark Jr., went on to become a Florida Academic Scholar Award winner and received scholarships at Florida Southern College at Lakeland, Florida. Svend really helped Clark Jr. through Algebra II, Trigonometry, and Analytic Geometry!

So I say, one good ham deserves another! Thanks, Ted or Svend or W4SZ!

Clark J. Evans, Sr., WA4DLL
Clearwater, FL

New From CQ . . . Radio T-Shirts!!

High-Quality T-Shirts, made in U.S.A., pre-shrunk 100% cotton.

1

2

$17.95
per shirt
plus shipping
& handling

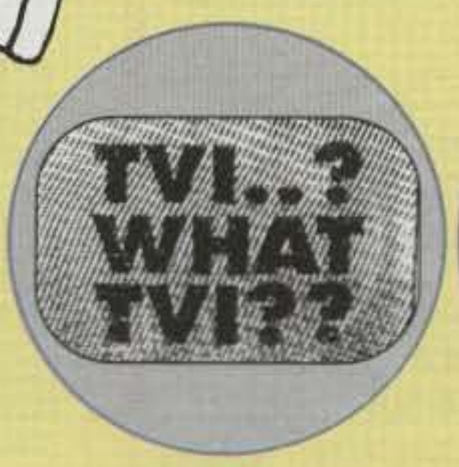
3

4

Item # 13

5

6



7

8

9

10

11

12

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

14

15

16

Yes! Rush my CQ T-Shirt(s) to me right away! Here's my order below

Name _____ **Callsign** _____

Address _____

City _____ **State** _____ **Zip** _____

Please allow 4-8 weeks delivery

Qty	Item #	Size	Price	S & H	Total
				Grand Total	

Available sizes: L, XL, XXL (add $2) Please add $2 shipping and handling per item ordered. Order 4 or more and receive free shipping.
Make your check or money order payable to: CQ Communications, Inc., 76 North Broadway, Hicksville, New York 11801
Please charge my:
MC/VISA/AMEX/Discover # _____ Expires _____ Signature _____

To Order Toll Free Call (800) 853-9797 or FAX (516) 681-2926

HAM SHOP

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 20 cents per word including abbreviations and addresses. Commercial and organization ads are **$1.00** cents per word. Boldface words are **$1.50** each (specify which words). Minimum charge $2.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Non-commercial free to *CQ* subscribers, as space permits, maximum 3 lines each. All ads must be typewritten double-spaced. Recent *CQ* mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication (example: Jan. 10th for the March issue). Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of *CQ* cannot vouch for the merchandise listed therein. The publisher reserves the right to reject any paid or nonpaid advertisement. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

QSL CARDBOXES™ & INDEX DIVIDERS, send SASE. 7-Mike Hamstuff, P.O. Box 14455, Scottsdale, AZ 85267-4455.

WANTED: Collins antiques, anything old from speakers, receivers, transmitters, and all accessories, any condition. Top $$$ paid. Rick, 1-800-462-2972 anytime.

CABLE TEST CHIPS, SA8550, SA8500-310, 311, 320, 321 (specify)—$38.95. 8580/338, 8570xxx, 8590xxx, 8590(11 button)—$69.95. TOCOM 5503/07 VIP—$33.95. ZENITH ZF1—$33.95. STARCOM 6 (except BB)—$33.95. STARCOM 7 (except M1)—$49.95. Cable Hackers Bible(s) Vol. 1 $44.45, Vol. 2 $44.45. Cellular Hackers Bible $53.95. Cellular Cloning Video $39.95. Cellular Programmers Bible $84.45. Visa/Mastercard 24-hour orderline 602-782-2316, FAX 602-343-2141. Catalog $3.00. **TELECODE,** P.O. Box 6426-CQ, Yuma, AZ 85366-6426.

CHASSIS, CABINET KITS: SASE K3IWK, 5120 Harmony Grove Road, Dover, PA 17315.

HELP! Have 30 students taking ham radio class. Need your 220 and 2 meter and HF rigs to get them on the air. Tax deductible equipment goes on school inventory. Robert Strange, K7VVU, Payson High School, 1050 South Main St., Payson, Utah 84651 (801-754-3535, FAX 489-2806).

CB-TO-10M CONVERSIONS: FM kits, frequency modification hardware, books, plans, high-performance CB accessories. Catalog $2. CBCI, Box 31500CQ, Phoenix, AZ 85046.

Ready to explore VHF/UHF operating? Get W3FQJ's **BASIC GUIDE TO VHF/UHF HAM RADIO.** Propagation, equipment, antennas, operating techniques, contests, repeaters, awards, and more. $6.95 plus $2s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva WI 53147 Visa/Mastercard welcome. US $ only.

QSL SALE! 300/$14, 500/$20, 1000/$28, 1500/$38, 2000/$48. Many Designs! Free shipping! Phone or write today for samples or ordering. Shell Printing, KD9KW, Box 50, Rockton, IL 61072 (815-629-2193 anytime).

HAM RADIO CONTESTING, by Robert J. Halprin, K1XA is a thorough, how-to treatment on the art of contesting from a ham who's been at it for more than 20 years! If you're new to the game or feel you could do better you need this book. $14.95 + $2 s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Visa/Mastercard welcome. US $ only.

KAUAI B&B VACATION FOR HAMS. Super rig. Pool and spa. Send $2 for brochure and photos to your host. Jim Reid, AH6NB. Lawailoa Retreat, 3465 Lawailoa Lane, Koloa, Kauai, HI 96756, or please phone 808-332-7984.

VIDEO SYNC GENERATOR. Restores Horizontal & Vertical sync lines from distorted analogue video formats. For Information on completed units & pricing write: R.C. Distributing, Box 552, South Bend, IN 46624. Phone: (219) 236-5776.

IMRA-International Mission Radio Assn. helps missioners—equipment loaned; weekday net, 14.280 MHz, 1:00-3:00 PM Eastern. Sr. Noreen Perelli, KE2LT, Fletcher Street, Goshen, NY 10924.

THERMOGRAPHED CARDS! Raised-print QSLs at flat printing prices. Samples: Phone 817-461-6443 or write: W5YI Group, Box 565101, Dallas, TX 75356.

INEXPENSIVE HAM EQUIPMENT Send stamp for list WA4DSO, 3037 Audrey Dr., Gastonia, NC 28054.

KNOW FIRST! Ham radio fanatics—you need THE W5YI REPORT, a twice-monthly award-winning Hot Insider Newsletter Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts. Quoted coast-to-coast! We print what you don't get elsewhere! $21.00 annually w/money-back guarantee! FREE SAMPLE for S.A.S.E. (two stamps). W5YI, Box 10101-C, Dallas, Texas 75207.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

CLANDESTINE CONFIDENTIAL NEWSLETTER: Latest info on secret broadcasters. Six issues $10 US, $13 foreign, US funds. RR4 Box 110, Lake Geneva, WI 53147.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

WANTED: Older model bugs, unusual bugs, and miniature hand keys. State price, condition. Dave Ingram, K4TWJ, 4941 Scenic View Drive, Birmingham, AL 35210.

ELECTRON TUBES: All types buy and sell. Daily Electronics, 10914 NE 35th St., #B-6, Vancouver, WA 98682. Call 800-346-6667 or 206-896-8856, or FAX 206-896-5476.

PSE QSL! An Expert's Guide to Amateur Radio QSL'ing. By CQ's Bill Welsh, W6DDB. Every imaginable facet from designing to ordering to filling them out to filing them. Card sources, postage usage, bureaus, much much more. $9.95 + $2 s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Visa/Mastercard welcome. US $ only.

FREE Ham Gospel Tracts, SASE. N3FTT, 5133 Gramercy, Clifton Heights, PA 19018.

FOREIGN AIRMAIL POSTAGE for successful QSLing! Many countries, monthly bargains, plus **EUROPEAN AIRMAIL ENVELOPES!** Samples, prices: William Plum, 12 Glenn Road, Flemington, NJ 08822. FAX 908-782-2612.

HAVE AM CAPABILITY? Join SPAM (Society for the Promotion of AM). For information and membership, send $1 and SASE to SPAM, WB6TRQ, Box 62, Potrero, CA 92063.

POST CARD QSO KIT. Converts Post Cards, Photos, to QSLs! Stamp brings circular. K-K Labels, P.O. Box 412, Troy, NY 12181-0412.

RCI-2950 OWNERS: New modification manual including Power increase, Clarifier modification, Modulation increase, Operating hints, and more. Parts Included. Only $20.00 ppd in U.S. (Missouri residents add $1.15 tax). Scott, P.O. Box 510408, St. Louis, MO 63151-0408 (314-846-0252). Money Orders or C.O.D.

WEATHER RADIO—The Complete Guide to Receiving NOAA, Volmet, Weatherfax, Weather Satellite and Other Weather Information Sources, by A.R "Tony" Curtis, K3RXK. Everything from TIS stations to Russian fishing fleet and ham emergency weather nets. $14.95 plus $2 s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147 US $ only. Visa/Mastercard.

RTTY JOURNAL published ten times per year for those interested in the Digital modes. Timely information on RTTY, AMTOR, PACKET, PACTOR, CLOVER, MSOs, Contesting, Hardware/Software for the digital modes, plus technical articles. This is a Digital operators magazine. $16 per year (foreign higher). RTTY JOURNAL, 1904 Carolton Ln., Fallbrook, CA 92028-4614.

LOW POWER COMMUNICATIONS, Vol.1—Basic QRP, by Rich Arland, K7YHA. A great A to Z how-to guide! Contesting, digital, computers, antennas, solar power, milliwatting, etc. $14.95 + $2 s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Visa/Mastercard welcome. US $ only.

Over 900 ham nets listed by name, frequency, meet time in **THE WORLD HAM NET DIRECTORY**. DX'ers, stamp collectors, UFO fans, etc., $9.95 + $2 s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Visa/Mastercard welcome. US $ only.

KENWOOD AUTHORIZED REPAIR. Also ICOM and Yaesu. Groton Electronics, 508-448-3322.

WANTED: HAM EQUIPMENT AND OTHER PROPERTY. The Radio Club of Junior High School 22 NYC, Inc. is not only the Big Apple's largest Ham club, but it is also the nation's only full-time non-profit organization working to get Ham Radio into schools around the country as a theme for teaching using our EDUCOM—Education Thru Communications—program. Send your radio to school. Your donated amateur or other property, which will be picked up or shipping arranged, means a tax deduction to the full extent of the law for you as we are an IRS 501(c)3 charity in our fourteenth year of service. Your help will also mean a whole new world of educational opportunity for children around the country. Radios you can write off; kids you can't. Start Spring off helping someone else and yourself. Please write, phone, or FAX the "22 Crew" today: The RC of JHS 22, POB 1052, New York, NY 10002. Telephone (516) 674-4072 and FAX (516) 674-9600. Young people, nationwide, can get high on Ham Radio with your help. Meet us on the WB2JKJ Classroom Net: 7. 238 MHz, 1200-1330 UTC and 21.395 MHz 1400-2000 daily.

10/11 METER RADIOS, ANTENNAS, AND MORE. RT Electronics, P O. Box 2123, Warren, Ohio 44484 (216-369-1789).

Tune in the space shuttle! **MONITORING NASA COMMUNICATIONS** by A.R. "Tony" Curtis, K3RXK, tells you how to tune in NASA on shortwave, VHF, UHF, and Satellites. Includes data on ham radio retransmissions and master list of NASA frequencies. $14.95 plus $2s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. US $ only. Visa/Mastercard.

HAM TRADER YELLOW SHEETS. In our 32nd year of publication. Buy, sell, trade ham radio equipment. Published twice monthly. Ads quickly circulate. No long wait for results. **Mailed first class.** For sample copy send #10 SASE (2 stamps). ONE YEAR SUBSCRIPTION (24 issues) $16.50. P.O.B. 2057, Glen Ellyn, IL 60138-2057, or P.O.B. 15142, Seattle,WA 98115.

COMMODORE 64 HAM PROGRAMS: 8 disk sides, over 200 Ham programs, $16.95. 29¢ stamp gets unusual software catalog of Utilities, Games, Adult and British Disks. Home-Spun Software, Box 1064-AR, Estero, FL 33928.

FOR SALE: New, Unused, in original cartons: Radio Shack DMP 130A dot matrix printer, PTC-64, C-64 printer controller. $160.00. K2EEK, CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

QSL CARDS. Fast quality service. Samples $1.00 (refundable with order). WordWise Services, 16 Kent Drive, Foxmeadow, Hockessin, DE 19707.

ANGUILLA—VP2E: Efficiency ham apartment sleeps 2 to 4, tribander, vertical 10–160M. Details, call VP2EHF 809-497-2150.

DX QSL's. THE "GO LIST." Now also on 3.5 inch disk. We make getting the QSL cards as much fun as the QSO itself. Over 5000 QSL managers. Updated and published monthly, $25/yr/USA. Disk version, over 19,000 routes, $12/USA. The **W6GO/K6HHD** QSL Manager List, POB 700 C, Rio Linda, CA 95673.

WANTED: Heathkit RX-1 "Mohawk" receiver. Would also consider Marauder/Apache/Seneca/Warrior/SB-10. Lee Blaske, AAØEF, 19555 Excelsior Blvd., Excelsior, MN 55331 (612-474-4919).

FINALLY HEAR THOSE UNREADABLE SIGNALS buried in noise, heterodynes, tuner-uppers. **REVOLUTIONARY** JPS Audio Filters, Digital Signal Processing. NIR-10: for CW/SSB satellite moonbounce reduction of white, ignition, powerline, steady static, and multiheterodyne noises—$329.95 DELIVERED continental U.S.! (Elsewhere $350.) DON'T SETTLE FOR JPS CLONES! Authorized Dealer. 24 hour orders: 1-800-328-4773. RF Accessories Catalog: send 3 stamps. DAVIS RF Co., P.O. Box 230-Q, Carlisle, MA 01741.

HEATHKIT AMATEUR RADIO REPAIR by RTO Electronics, 4166 Maple Street, Berrien Springs, MI 49103 (616-473-3201).

CIRCLE 30 ON READER SERVICE CARD

CIRCLE 129 ON READER SERVICE CARD

CIRCLE 124 ON READER SERVICE CARD

CIRCLE 49 ON READER SERVICE CARD

RADIO TRANSCRIPTION DISCS WANTED: W7FIZ, Box 724, Redmond, WA 98073-0724.

FOR SALE: CQ/Ham Radio/QST/73 magazines and binders. SASE brings data sheet. W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

RECEIVING TUBES, Used, Guaranteed: Under $2.85. Sams: 6 for $10. *CQ, QST, HR,* Ham Gear, Books, Parts. LSASE to Don Merz, 47 Hazel Drive, Pittsburgh, PA 15228.

THE COMPETITIVE EDGE FROM K1EA SOFTWARE. CT—the ultimate contest software. Runs 13 contests, interfaces to most transceivers, PacketCluster, logging and QSL programs. $69.95 plus $3 S/H. For voiceless contesting add the DVP digital voice processor board. $299.95 plus $5 S/H. Interface cable (specify radio) $44.95. Order line 508-779-5054, or FAX 508-460-6211. MC/VISA accepted. K1EA Software, 5 Mt. Royal Ave., Marlborough, MA 01752.

PacketCluster for DXers and Contesters! Multi-user, multi-node networking software features real-time messaging, announcements, DX alerts, e/mail, linking, and much more. Up to 64 users can connect to your node using a radio, TNC, and PC or terminal. Hardware also available. Pavillion Software, 5 Mt. Royal Ave., Marlborough, MA 01752 (508-779-5054, or FAX 508-460-6211).

TESLA: Man Who Harnessed Niagara Falls. Concise history AC polyphase system. $9.95 postpaid. Marc Seifer, Ph.D., Box 32-Q, Kingston, RI 02881.

WANTED: AUDIO EQUIP. 1930–1969 amplifiers, speakers, tubes, etc. Call 1-800-251-5454.

WANTED: WESTERN ELECTRIC and other audio equip. 1930–1969. Call 1-800-251-5454.

WANTED: Send us your QSL card and we'll enlarge and transfer it in original color to a quality T-shirt. Only $12.95 plus $3 s & h. Available in Sm, Med, Lg, XLg, XXLg (XXL additional $2). Cashiers check, Money Order, Cash, or Personal Check (additional 14 days delivery for Personal Check). Telephone 203-233-7277, FAX 203-236-3719. Personalized Photo, Dept. B, P.O. Box 370244, West Hartford, CT 06137.

ARUBA COTTAGE FOR RENT: 2 bdr, radio room with rig and antennas. Write AI6V.

SUPER KEYS: Quality, handling, appearance. SASE. K8XF, 9929 Fox Squirrel, Newport Richey, FL 34654-3517.

IBM SHAREWARE! Huge selection! $1.00 disk! 35¢ specials! Catalog $1.00. PMA-HS, Box 2424, Scottsdale, AZ 85252.

ELECTRON TUBES! Buy & Sell. Daily Electronics, 10914 NE 39th St. #B-6, Vancouver, WA 98682 (206-896-8856, 800-346-6667; FAX 206-896-5476).

QSL SAMPLES: 50 cents. Samcards, 48 Monte Carlo Drive, Pittsburgh, PA 15239.

1994 CALLBOOKS. "FLYING HORSE." North American, $25.95; International, $25.95. Both, $49.95. 1994 **ARRL Handbook,** $23.95. **Bencher** paddles: Black/BY-1, $59.95; Chrome/BY-2, $69.95. Postpaid. (California residents: add 7.5%.) Check/MO to D. Heise/ AA6EE—Callbook Distributor, 16832 Whirlwind/C3, Ramona, CA 92065 (619-789-3674).

"PR" CRYSTALS: Petersen Radio Company, Inc., 2735 Avenue "A," Council Bluffs, Iowa 51501 (1-712-323-7539).

LICENSE PLATE FRAMES custom made with your name and callsign, $9.95 plus $2.90 shipping (Calif. residents include your county tax). Authorized for ARRL and club badges. For information contact R & J Fial Enterprises, 5366 Camino Real, Riverside, California 92509 (909-360-0961, FAX # 909-685-8008).

HEATHKIT FANS! Remember the fun you had building them and learn about the company's history in stories and pictures. 124 pages. $9.95 ($10.71 in WA). Heath Nostalgia, 4320 196th SW, Lynnwood, WA 98036-6754.

COAX SALE! Top quality RG213/U (Belden 8267 equiv.)—$.29 per foot. Sold by the foot, 100 foot minimum. Call **TEXAS TOWERS,** 800-272-3467.

EMBROIDERED EMBLEMS, Enameled Club Pins. All Custom Designed. Free Info: Lane 4 Awards, Box 451591CQ, Sunrise, FL 33345 (305-742-8609; FAX 305-592-5854).

CODECK Original Morse Code Training Flash Cards. Fast, Fun, Easy, Inexpensive, $11.99 plus $1.50 shipping. MC/VISA. AAE, 3164 Cahaba Heights Road, Birmingham, AL 35243 (205-967-6122; FAX 970-0622).

SATELLITE EQUIPMENT: NEW 25° LNB $67.95, .7° Ku $89.00. Call for wholesale price list. Satellite Warehouse, Tucson, Arizona (1-800-851-6534; FAX 602-624-1629).

ELEGANT QSL CARDS AT LOW PRICES. Samples $1 (refundable with order). AACO, Dept. C43, 1639 Fordham Way, Mountain View, CA 94040.

HIGH QUALITY PERSONAL QSLs ensure greater returns! Customize one of 26 standard formats, or your own unique design. FREE info-packet (75¢ stamp appreciated). CHESTER QSL's, Dept. C, 2 S. Commercial, Emporia, KS 66801 (316-342-8792; FAX 316-342-4705).

PYRAMID POWER SUPPLIES & BEL-MERIT MULTIMETER SALE. All new and all at bargain prices. For flyer, send SASE to A&A Engineering, 2521 W. La Palma, Unit K, Anaheim, CA 92801.

TEN-TEC ARGONAUT II transceiver wanted in good operating condition. N9OAT, 1075 Woodbine Cir W, Galesburg, IL 61401 (309-343-3355).

XXXX CABLE TV TURN-ONS XXXX: Kits and chips for cable converters are easy to install and use. They will turn on your cable box to their full ability for as long as your test may last. Call TAZ Electronics for the best pricing and guaranteed #1 quality. 1-800-800-8532; 1-800-800-9521.

BROWNIE'S QSLs: Catalog and samples $1.00 (refundable). 3035 Lehigh St., Allentown, PA 18103.

LET A CARTOONIST put you on your own one-of-a-kind QSL card. No stock art, each drawn to order. For samples & details write G. Blevins, Box 512, Nederland, CO 80466.

DXers say **THE DX BULLETIN** is the most accurate, timely, and complete source of DX news available. $42 for 50 weekly issues. MasterCard/Visa or check to Box 50C, Fulton, CA 95439-0050 (707-523-1001). Samples free.

THE ANT FARM Quality, high-performance antennas at reasonable prices! Our 47-foot long MB-2A covers all HF bands, fully assembled; not a kit, only $40.00 ppd in 48. SASE for catalog. POB 3196, Wescosville, PA 18106.

EMBROIDERED EMBLEMS, Enameled Pins, Your Design, Free Booklet. A.T. Patch Co., Dept. 67, P.O. Box 682, Littleton, NH 03561 (603-444-3423; FAX 603-444-2371).

BANDMASTER QUADS in Worldwide Service. UHF, VHF, HF, All-Fiberglass. Free catalog. AAE, 3164 Cahaba Heights Road, Birmingham, AL 35243 (205-967-6122; FAX 970-0622).

RF ENGINEERS WANTED: SGC, a world leader in HF SSB equipment, is seeking experienced RF engineers. Experience in transmitter and receiver design, A/D converters, digital voice processing, and low noise oscillators is required. Preference to licensed amateurs. SGC, Inc., P.O. Box 3526, Bellevue, WA 98009. Principals only.

Join TAPR—Tucson Amateur Packet Radio (non-profit R&D Group). Membership benefits include: supporting the development of new communications technology, quarterly newsletter, low-priced software/shareware, 10% discount on kits and publications. $15/year (foreign higher). Visa/ MC accepted. Bonus with new membership: Mention CQ, receive TAPR Packet Radio General Info booklet ($7 value)! Call 817-383-0000. P.O. Box 12925, Tucson, AZ 85732.

CONCENTRATOR SOLAR CELLS: High-efficiency cells rated at 20ma or 40ma 555mv in direct sunlight will output up to several amps at close to one volt per cell when used with magnifying lens and a good heat sink. Data sheet included $1.25 and $2.50 each. $5.00 minimum. SASE to: James Carter, P.O. Box 23243, San Jose, CA 95193.

R.F. TRANSISTORS AND TUBES: We carry large inventory 2SC1969, 2SC2166, 2SC2312, 2SC2879, 2SC2290, MRF455, 6KV6, 6JT6A, 6146B. WESTGATE 800-213-4563.

NEW Two Meter Mobile Antenna Pattern Switcher $42.95. Morse Code Computer Interfaces for IBM or COCO $49.95. Free IBM or COCO shareware and Ham Catalog. Dynamic Electronics, Box 896, Hartselle, AL 35640 (205-773-2758, FAX 205-773-7295).

DX CONDITIONS EXCEPTIONAL: Montserrat, BWI, Beautiful Villa for Sale. Call VP2MT, 813-743-8263 mid-April onwards 809-491-5401.

QSL CARDS: Standard and custom. Your ideas or ours. Excellent quality. Foil stamping available. Many designs and type styles. Catalog and samples $1, refundable. Wilkins, Dept. B, Box 787, Atascadero, CA 93423.

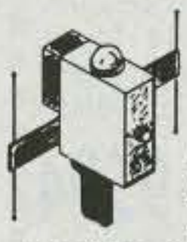
QUALITY QSLs by WX9X

WX9X

1000 QSLs priced from $28.95

Write or Call for FREE SAMPLES
Stamps Appreciated

161 W. Lincolnway
Valparaiso, IN 46383
(219) 465-7128 Fax (219) 464-7333



VECTOR FINDER

Handheld 2-mtr/220 MHz phase sense direction finder. Used with any FM xcvr. Oil compass. Type VF-142, $139.95, $3.50 S&H. Call/write for info. CA add tax.

RADIO ENGINEERS, 3941 MT. BRUNDAGE
SAN DIEGO, CA 92111 619-565-1319

CB-TO-10 METERS

We specialize in CB radio modification plans and hardware. Frequency and FM conversion kits, repair books, plans, high-performance accessories. Thousands of satisfied customers since 1976! Catalog $2.

CBC INTERNATIONAL
LOU FRANKLIN/K6NH - Owner
P.O. BOX 31500CQ, PHOENIX, AZ 85046

Multi-Band Remote Switched
TRANSCEIVER BANDPASS FILTERS
***NEW!* 6-Band (160-10), 200+ Watts**
MODEL 600
Positive or Negative Keying
$229 plus S&H

Dunestar 503/397-2918
Write , FAX or Call for more Information
P.O. Box 37, St. Helens, OR 97051

Quality Microwave TV Antennas
WIRELESS CABLE - IFTS - MMDS - Amateur TV
Ultra High Gain 50db(+) • Tuneable 1.9 to 2.7 Ghz.
- 55-Channel Dish System $199.95
- 36-Channel Dish System $149.95
- 20-Channel Dish System $124.95
- Optional Commercial Grid Antenna (not shown) Add $50.00
- Yagi Antennas, Components, Custom Tuning Available
- Call or write (SASE) for "FREE" Catalog

PHILLIPS-TECH ELECTRONICS
P.O. Box 8533 • Scottsdale, AZ 85252
(602) 947-7700 ($3.00 Credit all phone orders)
MasterCard • Visa • American Express • COD's • Quantity Pricing

Dish System
LIFETIME WARRANTY

CIRCLE 85 ON READER SERVICE CARD

THE CHOKER

Just plug it in and no more Telephone R.F.I.. Tested with 1500 watts +++! It really works!!! Patented. Send only $17.00 each
T.F. I. 1947 S. Wadsworth Blvd. Suite 231 Lakewood, CO 80227
(303) 287-0944

Aluminum Enclosures

Chassis Kits — Tower Mounted Boxes
Cabinet Kits — Rack Enclosures
Other Enclosures Assembled & Kits.

Call or write
Charles Byers K3IWK
BYERS CHASSIS KITS
5120 Harmony Grove Road, Dover, PA 17315
717-292-4901
between 6:30 & 9:30 EST Saturday 8:00 am to 4:30 pm

NEW! ALL 900 QUESTIONS!

FCC Commercial General Radiotelephone Operator License

$12.95 Only Postpaid
Complete FCC Element 1 and 3 question pools.

Answer 75 out of 100 questions and
Become an FCC licensed
Electronic Technician

Manual contains all word-for-word questions, multiple choices and correct answers that might appear on your FCC license examination.

Free Bonus! FCC Part 13 Rules
Covers new Commercial Radio exam program
Nationwide testing available!

National Radio Examiners
P.O. Box 565206, Dallas, TX 75356
VISA MasterCard call toll free:
1-800-669-9594

CIRCLE 128 ON READER SERVICE CARD

Fast & Fun G5RV QuicKits™

created by Antennas West — Box 50062-S, Provo, UT 84605

Fast & Easy to Build
- Fail-Safe visual instructions
- No measuring or cutting
- Everything included
- Finish antenna in minutes

Quality Components
- Presoldered Silver Fittings
- Kinkproof QuietFlex wire
- Fully insulated, wx sealed, no-corrode, low noise design

Tune All Bands Incl WARC

• Double Size G5RV 204 ft 160-10 Dipole	$59.95
• Full Size G5RV 102 ft 80-10 Dipole	$39.95
• Half Size G5RV 51 ft 40-10 Dipole	$29.95
• Quarter Size G5RV 26 ft 20-10 Dipole	$25.95
• Ready Made 102 ft G5RV	$50.00
• Ready Made 51 ft G5RV/2	$40.00
• 200' Dacron 250# line	$11.95

Add $5 P&H

Want Plans, Patterns, Data? Order TechNote #124-D $6.95 ppd USA
Order Hot-Line: 801 373 8425

CIRCLE 11 ON READER SERVICE CARD

BATTERIES

Nickel-Cadmium, Alkaline, Lithium, Sealed Lead Acid For Radios, Computers, Etc. And All Portable Equipment

YOU NEED BATTERIES?
WE'VE GOT BATTERIES!

CALL US FOR **FREE** CATALOG

E.H.YOST & CO.
7344 TETIVA RD.
SAUK CITY, WI 53583
(608) 643-3194
FAX 608-643-4439

CIRCLE 132 ON READER SERVICE CARD

CARRIZO SOLAR CORPORATION

Pre-Owned Photovoltaics

Framed or Unframed
Super Golds, Golds,
Bronzes & Coppers

Available from dealers
800-776-6718

COLLINS MIL.URR-390 receiver, 0.1 to 16 kc crystal filters, everything works, rock solid, $600.00 + shipping. Chris, 404-552-8434.

6–10 GHz Newsletter. SASE. Box 685, Holbrook, AZ 86025.

DACRON ROPE; WHY RISK FAILURES with aerial supports? Strong, high UV resistant, non-stretch Military type black DOUBLE (unlike our competitors' single) braided Dacron. 3/32 inch ($.06/ft.), 3/16 inch 770 lb. test ($.11/ft.), 5/16 inch ($.16/ft.). DAVIS RF CO. 24-HOUR ORDERS 1-800-328-4773, CODE 1356.

PakTERM: The intelligent way to operate your PacComm PacTOR Controller. Write for details. INTELLIGENT SOFTWARE SOLUTIONS, P.O. Box 522, Garrisonville, VA 22463.

THE DX MAGAZINE is your bi-monthly ticket to the exciting world of DX: DXpeditions, Reviews, Awards, QSL Information, News, and Opinions. 64 well-illustrated glossy pages. Only $15/year. Sample $2. Box 50C, Fulton, CA 95439-0050 (707-523-1001).

AMIGA, MACINTOSH, ATARI XL/XE/ST Amateur Radio PD software $4.00/disk. Two-stamp SASE brings catalog. SPECIFY COMPUTER! Kinetic Designs Hamware, Box 1646, Orange Pk., FL 32067-1646.

CALL SIGN DECAL: 1-1/4 inch white vinyl characters, applies to inside of auto window, $5.00. DCALL, 2102 Waterbury Dr., Uniontown, OH 44685-9770.

DIGITAL AUTOMATIC FREQUENCY DISPLAYS. Please specify radio. Business 52¢ SASE. GRAND, POB 2230, Blaine, WA 98231.

TRADING POST: Buy, Sell, or Trade—Ham, CB, and Computers or anything with electronic parts. Cost of ads is $.75 per word non-subscriber, $.45 per word subscriber. Ads must be in two weeks in advance. Sample copy $2.00 or 24 issues/year $16.00. Trading Post, P.O. Box 2076, Soldotna, AK 99669 (FAX 907-262-6828).

NEEDED FOR BC-639-A or Type R.5032A receiver: Manuals/information, antenna, and headphones/speaker. Please contact: Phil Polizzo, P.O. Box 397, Atwater, CA 95301.

FREE QSL CARDS! (Almost) Getting started offer. Receive 25 Bright Colored Personalized QSL cards. Send Call, Name, FULL Address, and County. Include $2 shipping and handling. Offer ends May 31, 1994. Four weeks delivery. One order per customer. Rusprint—CQ3, 26037 W. 220th Terrace, Springhill, Kansas 66083.

QUALITY COAX CABLES, Connectors, Antennas, and Amateur Radio Equipment. Send $3.00 for latest catalog. R. C. Kontes, 465 Croft, Idaho Falls, ID 83401-4419.

AFRAID OF FCC TESTS? Let your C64/128 drill you. All questions on 5-1/4 inch disk. With instructions. Full screen diagrams if used. Your call on screen and optional printed summary. PPD. Novice, Tech, or General $19.95. Advanced or Extra $24.95. New NOCODE (2 disks) $34.95. Ralph Parlette, WB6JOY, 27 Morning Sun, Mill Valley, CA 94941 (415-383-0507).

COLLINS cabinet painting (sri, no St. James Gray) using original paint formula and automotive process by Collins collector. Phone 804-481-5755 (eves.) or write WA4HHG at CBA brings info.

Ex-KLM RADIO-OPERATOR NAVIGATORS would like to ham with ex-R.O. navigators who worked for any airline between 1945-1965. Club PI9KLM or Karel Kostman, Lepenrodelaan 14, 1181 AK AMSTELVEEN, The Netherlands. PAØKCH.

ROSS'$$$$ NEW March (ONLY) SPECIALS: Save time and money; have model number and manufacturer ready when you call or write. KENWOOD TM-411A $330.00, TR-751A $630.00, TM-241A $348.50, TR-8400 $315.00, TM-631A $600.00. AEA Call. ALINCO Call. YAESU Call. ICOM 900A and UX-49A $700.00, 900A and UX-39A $750.00. ASTRON Call. MFJ Call. TEN-TEC 222 $30.00, 535 $1150.00, 425 $2700.00. BARKER & WILLIAMSON Call. CUSHCRAFT Call. TELEX HY-GAIN Call. KLM Call. RFCONCEPTS Call. MIRAGE Call. LARSEN Call. All Limited Time Offers. Over 9035 ham-related items in stock for immediate shipment. Mention ad. Prices cash, FOB Preston. Hours Tuesday-Friday 9:00 to 6:00. 9:00 to 2:00 PM Mondays. Closed Saturday & Sunday. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

WANTED: Nostalgic ham would like to restore and operate your vintage receivers, transmitters, or transceivers from the 1950 to 1975 era. All makes and models considered. Please write WB4IJN, 601 Black Oak Blvd., Summerville, SC 29485. All inquiries will be answered.

HAM VACATION: Rent 4 bedroom Mt. Chalet home in Spectacular Colorado Rockies. Rig included. $450 weekly. Large SASE WØLSD, Ken, Box 156, Buena Vista, CO 81211 (719-395-6547).

TRANSCEIVERS: Kenwood TS-830S $600, TS-820S $495, TS-520S $395. Yaesu FT-101EX $350. K1BW, 508-537-7195.

I.D. TIMERS: Countdown alarm with LCD, no touch auto reset/auto restart. Battery powered quartz approx. 2-1/2 × 2-1/2 × 1/2 inch, $35 shipped. Curtis Epps, KB4WUB, 1553 Mackerel Ave., Sarasota, FL 34237 (813-955-9243).

RENEW YOUR LOVE OF THE STARS. Clear Skies Newsletter, a hands-on guide for amateur astronomers. Free sample issue. 10464 Clairemont Mesa Blvd. #222, San Diego, CA 92124 (619-280-3003).

LOW BAND MONITOR: 40 - 80 - 160 Meter DX'ers Magazine. 12 Issues: U.S. = $24.00/yr. DX = $36.00/yr. VISA/MasterCard. Lance Johnson Digital Graphics, P.O. Box 1047, Elizabeth, CO 80107 (303-646-4630).

CALLSIGN MUGS: Your Call and/or Name on White ceramic mug. One side $17.95, 2 sides $20.95 (includes shipping & handling). California residents add tax. Visa, M/C, Check, or MO to Imagine That Graphics, P.O. Box 2700, Dept. H41, Anaheim, CA 92814. SASE for info. Walt, KK6RG, 714-772-7484.

ICOM-781 RAFFLE: One hundred tickets ONLY at $100 a piece. Drawing to be held at 3 PM on June 24 at the RC of JHS 22, POB 1052, New York, NY 10002. Phone 516-674-4072, FAX 516-674-9600.

TELEGRAPHERS WANTED: Know Morse? Interested in American Civil War History? Like camping? If so, we have a rewarding avocation for you. For info write HQSD, 338 Highland Drive Apt. 102, Glen Burnie, MD 21061.

USED AND NEW AMATEUR RADIO, SWL AND SCANNERS. We buy, sell, consign, and trade used equipment. Thirty-day warranty. Western Pennsylvania's newest Amateur Radio supplier. We also offer complete repairs on most types of equipment. Call for quotes. FOR HAMS ONLY. INC. Info 412-374-9744; Orders Only 1-800-854-0815. Robb, KE3EE.

AMATEUR RADIO REPAIR!!! Most makes, reasonable. Dan Rupe, W7HBF, 1302 South Uplands Dr., Camano, WA 98292 (206-387-3558).

KENWOOD R-5000: With YK-88C filter. In original packaging. Brand new, $700. Private sale. Call 309-944-5856.

PICTURE QSL CARDS of your shack, etc., from your photo or black ink artwork. 500 $28.00, 1000 $44.50. Also non-picture cards. Custom-printed cards, send specifications for estimate. Send 2 stamps for illustrated literature. Generous sample kit $2.00, half pound of samples $3.00. **RAUM'S**, 8617 Orchard Road, Coopersburg, PA 18036. FAX or phone 215-679-7238.

TUBES, COMPONENTS, Sam's, etc.. Catalog $1.00: NRQ Electronics, P.O. Box 352924-C, Toledo, OH 43635-2924.

HF AMPLIFIER KIT, 14 VDC, 4-2SC2879, 600 watt, $194.00. SASE to KD4YBC, 7824 Tiburon Dr., Largo, FL 34643.

FREE COPY OF HamAdventureS. A storyletter dedicated to letting hams share their many experiences. Or send $1.00 (refundable with order) and learn about all our products. HamAdventureS—H3, 26037 W. 220th Terr., Springhill, Kansas 66083.

WANTED: IC-SM5 Mic. K2JFE, Paul Wiegert, 625 Van Duzer St., Staten Island, NY 10304.

WANTED: Freight Service Official Guide 1990–1993. T.N. Colbert, WA8MLV, General Delivery, Burton, OH 44021.

MAXON 49-F5 FM Communicator, $25.00. Walt Grosch, KZ9F, 1735 Stoneway Court, Richfield, WI 53076 (414-628-1558).

PALOMAR Solid-State Linear 3–30 MHz, 5W in 100W out, auto TR, RCVR amp, $195. Waters 3002 Phone Patch, $60. All excellent. List $1.00 and SASE. Joe Bedlovies, P.O. Box 139, Stratford, CT 06497.

FOR SALE: *CQ/HR/73/QST* magazines. SASE for list. KA1VY, Ernie Guimares, 401 Bedford St., Lakeville, MA 02347.

WANTED: RYCOM R-2174A/URR Voltmeter and C-1180/GRC-27 Control Unit. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (1-419-448-0007).

WANTED: Kenwood DSP-100. Pse write with price including UPS to Ohio QTH. DU7LA, P.O. Box 901, Cebu 6000, Philippines.

WANTED: SWT II Kenwood Matchbox for 440 MHz (or equiv.). Richard, WAØKKC, 7139 Hardy, Overland Park, Kansas 66204.

SEEKING 2 MTR SSB TRANSCEIVER such as ICOM 202 or SANTEC LS 202A or similar. Need not be working. Mike Kulyk, 10 Pine St., Central Islip, NY 11722.

WANTED: Kenwood TS-940, TS-711A; Yaesu FT-767GX, FT-5200, FL-2100B, FTV-250, YP-150. Gyongyosi, 1044 Riverton St., No. Brunswick, NJ 08902. Please include your phone number.

WANT TO CONTACT: Ex-U.S. Navy radiomen who went to radio school during WW II. State where school attended. Bill, 419-435-4127. K8TBW@WB8LYF.#NWOH.OH.USA.NOAM.

HW-101 WANTED, working or not. KC8HF, 5354 Fox Ridge Dr., W. Bloomfield, MI 48322.

WANTED: Heath Model HP-24 AC Power Supply for Model HA-14 Amplifier. Will consider both units if necessary. N5DIJ, P.O. Box 195, Sargent, GA 30275.

WANTED: Vibroplex Presentation Model Bug. Bill, W6PRI, 408-996-7624, or *Callbook* address.

1994 Equipment Buyers Guide

There's Nothing Else Like it . . . And It's Here Today!!

The New CQ *1994 Equipment Buyer's Guide*

Completely updated, the CQ *1994 Equipment Buyer's Guide* has once again defined what a Ham Radio reference guide should be. This all-new edition is loaded with photos, product descriptions and specs on practically every piece of amateur equipment and accessory on your "wish list." And the Guide's listing of manufacturers and dealers is the only one of its kind. It's the best place to find out who makes and sells the latest in amateur products.

And, There's More in This Issue!

CQ continues its long-standing Buyer's Guide tradition of providing practical feature articles for almost every area of amateur interest. Written by some of our hobby's leading experts, such as Lew McCoy, W1ICP, Buck Rogers, K4ABT, Fred Maia, W5YI, Gordon West, WB6NOA, and John Dorr, K1AR, you'll be sure to learn valuable information from these articles. Enjoy all the insightful information on packet radio, operating amateur satellites, contesting, improving your morse code skills, the many facets of radio for the new ham, and an overview of this year's "milestones" in our hobby. Whether you're a newcomer or have been a ham for 50 years, this is a line-up you won't want to miss. And, it's all for the low, low price of only $4.95.

For Fastest Service Call 1-800-853-9797

YES! Send me ____ copies of CQ's **1994 Equipment Buyer's Guide** at $4.95 each:

Name _____ Callsign _____

Address _____

City _____ State _____ Zip _____

Send only $4.95 each (plus $2.50 shipping & handling; $3.50 foreign).

Check ☐ Money Order ☐ Visa ☐ MasterCard ☐ American Express ☐ Discover ☐

Credit card account # _____ Expires _____

Signature _____

Mail your order to: **CQ Communications, Inc., 76 North Broadway, Hicksville, NY 11801.**

For fastest service call: 516-681-2922 or FAX 516-681-2926.

WHEN LUKE TALKS AMPS, WE DELIVER . . .

24 HOURS A DAY
7 DAYS A WEEK
52 WEEKS A YEAR

LUKE HIGH CURRENT CONTINUOUS DUTY POWER SUPPLY

S40-40AMP-13.8V	$275
S55-55AMP-13.8V	$310
S65-65AMP-13.8V	$425
S80-80AMP-13.8V	$540
S100-100AMP-13.8V	$585
S35H-35AMP-28V	$445
S55H-55AMP-28V	$540
S25VH-25AMP-50V	per quote
S55VH-55AMP-50V	per quote
OPTIONAL RACK MOUNT	$75
OPTIONAL S40/S55 LCD METER	$75

- Electronic Regulated
- Fold Back Current Limit
- Dual Crowbar - Auto Reset - 1 Pico Second Latch - 1 u Second
- Input Surge Protection
- Digital LCD Volt/Amp Meter w/display hold optional
- Modular Capacitor Array
- Soft start on most models
- Made in U.S.A.
- One Year Warranty
- Over Temp Protection
- Over Temp Indicator
- Crowbar Indicator
- 120/240V all models
- Continuous duty with optional fan cooling (not required S40/S55)
- Heavy duty transformer manufactured in U.S.A.

LUKE CO.
VISA 7113 NORTH 9 MILE, LAKE CITY, MI 49651 M.C.
(616) 229-4593

CIRCLE 65 ON READER SERVICE CARD

ARK30

SYNTHESIZED QRP CW TRANSCEIVER KIT

Get Yourself the BEST Kit!

- Coils & Transfrmrs Pre-wound
- MIL Quality Silkscreened PCB's
- Complete Kit w/118 P Manual
- SMALL! 2-3/4" x 5-1/2" x 8"
- Extruded AL Chassis
- GUARANTEED TO WORK

The BEST Receiver
- Superhet Single Signal RCVR.
- Sensitivity 0.3μv, 10db (S+N) /N
- Tune 100 Hz steps, RIT +/- 500 Hz

The BEST Transceiver
- 100 milliwatts to 5 W out
- FULL QSK, built-in speaker
- Immediate Recovery AGC

*** RAVE REVIEWS ***
. . . Military grade solid. "73" Magazine
. . . stood up to Field Day conditions . . . "World Radio"
● *The ideal Traveler's rig* - just add Key, Power & Antenna ●

20, 30, or 40 METER KIT	$269.95
Optional Adj. Speed Keyer Kit	$ 39.95

VISA 301-416-0661 — To Order Call S & S ENGINEERING precisely qrp — MasterCard (FAX) 301-416-0963

CIRCLE 112 ON READER SERVICE CARD

Six Function DTMF Controller

Auto-Kall AK-4

LiTZ COMPATIBLE!

- Outputs: 2 or 3 latched, 1 or 2 momentary, 1 timed and 1 manually reset group-call latched for remote alarm
- **Different codes** for turning outputs on/off **NOT toggle on/off** like most others! • Wrong number reset
- 4-digit access code - can use * up # down
- Multiple group-call response • On-board 1-amp relay

- AK-4W (wired/tested board) **$99.00**
- AK-4C (Complete unit in metal enclosure with in/out jacks, built-in speaker, etc.) **$149.00**

Plus $5.00 shipping & handling

MoTron Electronics
310 Garfield St. • Suite 4
Eugene, OR 97402
Call Toll Free **1-800-338-9058** or (503) 687-2118
FAX (503) 687-2492

CIRCLE 77 ON READER SERVICE CARD

Quality Printing • Fast, Personal Service
Write or call for samples. (SASE appreciated.)

QSLs by W4MPY

Wayne Carroll – "The QSL Man"
682 Mt. Pleasant Road
Monetta, SC 29105 U.S.A.
Phone or FAX (803) 685-7117

PAY TV AND SATELLITE DESCRAMBLING
Our Best Yet.....1994 EDITION....Our Best Yet

Includes the latest cable box and satellite (PLUS, B-MAC) fixes. Lots of schematics and chip files (all new), bullets, ECM's, etc. ONLY $19.95. Out best yet. Other Pay TV editions, volumes 1-5 (all different). $15.95 each. The complete Wizzard. VCII PLUS hacking. $15.95. Satellite Systems Under $600. $12.95. Wireless Cable Hacking $12.95. Hacker Video $19.95. Any 3/$34.95 or 5/$52.95. Scrambling News monthly $29.95. Scrambling News Year One (176 pages) $39.95. Everything listed here and more $129.95. Includes all our information. Catalog $1. C.O.D.'s are OK. Add $6.

SCRAMBLING NEWS
1552 HERTEL AVE., #123
BUFFALO, NY 14216 Voice/FAX (716) 874-2088

VISA — MasterCard

SLOW SCAN TV with the Sound Blaster!

New! Copy 8,12,24,36 sec. B&W, 36 & 72 sec. Color (in B&W), Scotty 1 & 2 (in B&W) with your Sound Blaster compatible sound card. Requires VGA 640x480-256 colors. ONLY$40.00 - Shipping $5 Illinois residents add $2.50 tax

Harlan Technologies 815-398-2683
5931 Alma Dr. - Rockford, Illinois 61108

THIS MONTH'S GOODIE FROM THE CANDY STORE

RDC

TELEX HY-GAIN HAM -IV ROTOR $325.00

Similar Savings on Yaesu, Astron, Icom, Kenwood, Alinco, Etc. All L.T.O.

ROTOR T2X $397.00

Over 9034 Ham Items in Stock, all Prices, Cash FOB Preston.
More Specials in HAM-ADS.Looking For Something Not Listed??
Call or Write

40 YEARS IN BUSINESS

Call Today (208) 852-0830
ROSS DISTRIBUTING COMPANY
78 S. State Street, Preston, Id. 83263
Hours Tue.-Fri. 9-6 - 9-2 Mondays. Closed Sat. & Sun.

40 YEARS IN BUSINESS

HamCall CD-ROM

U.S. and International Callsign Lookup
Nearly 1,000,000 Listings
Thousands of Public Domain Programs

Includes Clubs & Military
Still $50, + $5 Shipping & Handling per Order
Works on PC and Mac

Buckmaster's HamCall CD-ROM looks up calls in seconds. U.S. calls can be searched by any element, including name, city, state, etc. A TSR is included to look up callsigns from almost any text application. Prints labels. No hard disk required, everything is on one CD-ROM! New CD-ROM disc every April and October, with updated listings and dozens of new programs!

BUCKMASTER
Publishing
Rt. 4, Box 1630-Mineral, VA 23117
703:894-5777 800:282-5628

---

5 BAND QUAD

$289 2 Element Complete
Complete Kits, Parts and Custom Building For Quads From 40m to 440MHz.
Remember Your Ideas Can Become Reality.
UPS Shippable

SEE US AT DAYTON BOOTH 645

Lightning Bolt Antennas
RD#2, RT 19, Volant, PA 16156
412-530-7396

Advertiser's Index

A & A Engineering 150
AEA/Adv. Elec. Applications 5,7
AMSAT 91
AMSOFT 151
ARRL 67,143
ARRL-VEC 84,85
ASA 124
AVC Innovations 151
Ace Communications 146
Alfa Electronics 126
Alinco Electronics 12,13
Aluma Towers 123
Amateur Elec. Supply 81,133,141
Ameritron 31
Amidon 67
Antenna Mart 124
Antennas West 149,151
Antique Electronic Supply 151
Antique Radio Classified 151
Associated Radio 117
Astron Corp 109
Atlas Radio 137
Austin Amateur Radio Supply 82
Azden 154
Azimuth Communications 117
Barry Electronics 115
Beezley, Brian, K6STI 116
Bencher,Inc 88
Bilal Co./Isotron Ants 123
Buckmaster Publishing 144,148,152
Byers Chassis Kits 149
C & S Sales 94
CB City International 149
CM Technologies 148
CQ '94 Equipment Buyer's Guide 152
CQ Books & Videos 121
CQ New Products 74,75
CQ T-Shirts 145
CQ Videos 129
CRB Research 129
CABLE X-PERTS 144
Carrizo Solar Corp 149
Case, The 129
Command Productions 116
CommPute, Inc 67
Communication Electronics 101
Communications Concepts Inc 127
Communications Quarterly 127
Computer Aided Technology 131
Cushcraft Antennas 8
Dayton Hamfest 89
Diamond Antennas 2
Down East Microwave 142
Drake, R.L. 86
Dunestar Systems 149
EDE 111
EDCO/Daiwa 10
Electronic Swith Co 102
FB Enterprises 108
Force 12 Antennas 53
G4ZPY Paddle Keys 148
GAP Antennas 144
Genesys Products Group 127
Grapevine Group, The 151
Greater Baltimore Hamfest 102
HAL Communications 47,65
"Ham" Buerger, Inc 139
Ham Radio Outlet 14,17
Ham Companion 111
Ham Station 50
Hamtronics 148
Hardin Electronics 111
Harlan Technologies 152
Henry Radio 25,99
Homebrew Amiga 1.3 Utilities 148
Hustler Antennas 73
IC Engineering 147
ICOM America, Inc ..... 11, Cov.IV
Interactive Image Tech 6
JPS Communications 35
J Com 92
Jade Products 52
Jan Crystals 34
Japan Radio 77
Jun's Electronics 122,123
K1EA Software 132
K2AW's "Silicon Alley" 123
KLM Antennas 61
Kantronics 16
Kent Morse Keys 150

(continued on page 155)

THE ADVANTAGES OF BUYING AZDEN

No matter what your frequency requirements (2, 6, 10, 220, 440), when you buy a mono-bander factory-direct from Azden, you'll enjoy these five great advantages:

POWER: Handhelds-5 watts, Mobiles- 50 watts, (25w on 220MHz, and 35w on 440MHz.) Standard!

FACTORY-DIRECT SERVICE AND TECHNICAL SUPPORT: Factory engineers and technicians perform all service, and our sales staff are hams, with years of experience.

RELIABILITY: All Azden radios are heavy-duty commercial grade (designed to MIL-STD-810),and are virtually "maintenance free".

FLEXIBILITY: We go the extra step, like CAP and MARS mods at no charge, with proper documentation.

TWO YEAR WARRANTY: The only manufacturer confident enough to offer this, everything is covered for the first year, and we only charge for labor in the second year.

MOBILES	
PCS-7000H	2 Meters
PCS-7200	220 MHz
PCS-7300H	440 MHz
PCS-7500H	6 Meters
PCS-7800H	10 Meters
HANDHELDS	
AZ-11	10 Meters
AZ-61	6 Meters
AZ-21A	2 Meters
HEADPHONES	
HS-03	With Boom Mic
DM-10	Without Mic

So whether you're buying a mobile, handheld radio or communications headset, come to Azden. We understand.

AZDEN®
COMMUNICATIONS DIVISION

TO PLACE ORDERS (ONLY) CALL: 1-800-643-7655

For literature, prices, and service call (516) 328-7501, Fax: (516) 328-7506, or write to: AZDEN CORPORATION, 147 New Hyde Park Road, Franklin Square, New York 11010.

MasterCard VISA

CIRCLE 179 ON READER SERVICE CARD

Advertiser's Index *(cont'd)*

Kenwood, USA ..... Cov. II,1,71
L & L Engineering 151
LaRue Electronics 28
Lentini Communications 142
Lewallen, Roy, W7EL 124
Lightning Bolt Antennas 152
Lucas Radio/Kangaroo Tabor Software 148
Luke Co. 152
M2 Antennas 69
MD Electronics 92
MFJ Enterprises 39,41,43,45
Mackey, James E 151
Martin Engineering, Glen 55
Match All 95
Motron Electronics 152
Mouser Electronics 52
National Amateur Radio Assoc 98
Naval Electronics 72
Nemal Electronics 97
ONV Safety Belt Co. 132
Oak Bay Technology 103
Oklahoma Comm. Center 33,147
OPTOelectronics 62,63
Outbacker Antennas 51
PC Electronics 103
PASS Publishing 58,146
PDK Inc. 147
Palomar Engineers 58,155
Patriot Communications Tech 29
Periphex Inc 59
Phillips-Tech Electronics 149
Polyphaser 108
Pouch, The 150
Pro-Am/Valor 19
QSLs by WX9X 149
QSLs by W4MPY 152
Quantum Instruments 137
RC Distributing 112
RF Connection 132
RF Enterprises 35
RF Parts 153
RT Systems 150
Radio Adventures Corp 127
Radio Amateur Callbook 46
Radio Bookstore 133
Radio Center USA 156
Radio Club of JHS 22 127
Radio Engineers 149
Radio Place, The 97,140
Radio Works 59
Radioware 93
Robert Hall Electronics 111
Rochester Hamfest 126
Ross Distributing 152
S & S Engineering 152
SGC Inc 23
Scrambling News 152
Sensible Solutions 97
Sentech Inc 142
Sescom Inc 147
Solder-It 117
Sommer Antennas 111
Spectrum International 98
Spider Antennas 139
Standard Amateur Radio 83
Surplus Sales Of Nebraska 91
Synthetic Textiles 150
TFI 149
TIC General 105
Telex Hy-Gain 129,135
Ten Tec 57
Texas Towers 49
Tucker Electronics & Computers 78,79
Tune Belt 112
US Radio 55
Universal Amateur Radio 147
Universal Manufacturing 95
VIS Study Cards 148
Vectronics 107
Versatel Communications 148
Vibroplex 140
W & W Associates 95
W5YI Marketing 34,148,149,150
W9INN Antennas 148
WJ2O Master QSO Logging Program 150
West Radio School, Gordon 87
Yaesu Electronics 9,Cov.III-IIIA-IIIB
Yost & Co. 149

Only the best companies advertise in CQ. Learn how easy it is to enjoy the benefits the great CQ audience has to offer. Call Arnie Sposato, N2IQO, at (516)681-2922 or FAX (516)681-2926.

RADIO CENTER USA

WINTER ACCESSORY SALE!

SAVE 15%-50% ON KENWOOD, ICOM, AND YAESU ACCESSORIES

KENWOOD

TS-850SAT
All Band HF Transceiver With 100 Watts; Built-In Antenna Tuner

KENWOOD

TS-50S
Super Compact 100W, HF Transceiver

SALE PRICE KENWOOD

TH-22AT
Slim, Compact, Lightweight 2 Meter Handheld Plenty Of Power, Multiple Scan Functions

YAESU

SALE PRICE

FRG-100B
50kHz-30MHz Receiver With 50 Memories and New Broadcast Band Mode

YAESU

$100 OFF

FT-1000D
Premium HF Transceiver In A Class By Itself

TS-450S
Compact HF With 100 Watts On All Ham Bands, SSB, CW, FM and FSK Modes

NEW

TS-60S
Super Compact 90W, 6 Meter Transceiver

TH-28A
2 Meter Handheld With 2.5 Watts And UHF Receive

SALE PRICE

FT-416
2M/440MHz Handheld 41 Memories, CTCSS En/Decode Built-In. Multiple Power Levels

$50 OFF

FT-990
100 Watt HF Transceiver With General Coverage Receiver

TS-690S
100W HF Transceiver SSB, CW, AM, FM, FSK Modes Plus 50W On 6 Meters

TM-742A
High Power 2M/440MHz Mobile With Wide Receiver Coverage

TH-78A
Popular 2M/440MHz HT With Full Duplex Cross-Band Operation And CTCSS En/Decode Built-In

FT-11R
2 Meter, FM Handheld. World's Smallest Size HT With Full Sized Keyboard

$35 OFF

FT-890AT
100 Watt HF Transceiver With Dual VFO's

TS-140S
Compact Entry-Level HF Transceiver With Full General Coverage Receiver

TM-732A
Compact 2M/440MHz FM Dualbander With Detachable Front Panel

TS-751A
FM, USB, LSB and CW 2 Meter Transceiver, 25 Watts And Dual VFOs.

FT-530
2M/440MHz Handheld With Multiple Power Levels, 82 Memories And Aircraft Receive

$35 OFF

FT-840
New, Compact HF Transceiver With 100kHz-30MHz Receive

TS-790A
2 Meter, 440MHz, 1200MHz All Mode Tribander

TM-241A
Easy To Use 2 Meter FM Mobile With Models For 440MHz and 1200 MHz

R-5000
100kHz-30MHz Receiver Dual VFOs, Tunable Notch Filter, SSB, CW, AM, FM, And FSK modes

cushcraft CORPORATION

A3S	$314.95
A4S	$379.95
AP8	$179.95
R5	$259.95
R7	$349.95
13B2	$ 94.95
17B2	$154.95
124WB	$ 59.95
ARX2B	$ 46.95
AR270	$ 59.95
ARX270	$179.95
A147-4	$ 39.95
A147-11	$ 59.95
A449-11	$ 54.95
A50-5	$119.95

MFJ

1270C	$115
1274	$129
1278B	$259
1704	$ 54
1786	$214
1796	$159
209	$ 94
250X	$ 27
284, 5, 6, 7	$ 22
249	$169
9015, 20, 40	$149
949E	$129
986	$239
989C	$288

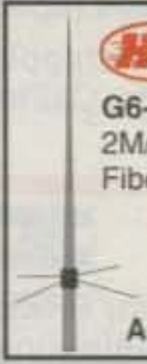
Large Stock, Call For Other Items

COMET

High Performance Base/Repeater And Mobile Antennas

25% OFF RETAIL

HUSTLER



G6-270R
2M/440MHz Fiberglass Vertical

SPECIAL PRICE
All Hustler Antennas On Sale

ASTRON CORPORATION

We Beat The Print Ads
New Low Prices!
Call Now

ALINCO
ASTRON
BENCHER
CAROL CABLE
COMET
CUSHCRAFT
HUSTLER
ICOM

BEST PRICES ON BIG NAME BRANDS

KENWOOD
LARSEN
MFJ
MIDLAND
M²
PERIPHEX
VAN GORDEN
YAESU

HOW TO ORDER

- Credit card customers: Call our 800 numbers Monday thru Friday 9:00 A.M. to 5:00 P.M., Saturday 9:00 A.M. to 2:00 P.M. CST and PST.
- No surcharge for credit cards.
- Cash paying customers: Please mail your checks to either address below.

630 NW Englewood Road
Kansas City, MO 64118
(816) 459-8832
FAX (816) 459-9341

525 E. 70th Avenue, 1W
Denver, CO 80229
(303) 288-7373

COD

1-800-821-7323 East/Midwest

1-800-345-5686 West

SPRING INTO DAYTON

At your participating
ICOM Dealer

IC-V21AT
More Features & Frequencies!
2 M/220 MHz
$50 Off!

IC-Δ1A
World's Only TriBand!
2 Meters/ 440 MHz/ 1.2 GHz
$100 Off!

IC-2iA
2 Meter Pocket Power!
$50 Off!

IC-2GXAT
7 Watts! Maximum Power in a 2 Meter Handheld!
$10 Off!

IC-X2A
440 MHz/ 1.2 GHz
$30 Off!

IC-W2A
2 M/440 MHz
$165 Off!

Dual Band Dynamos!

SAVE $100 ON THE IC-728 COMPACT HF TRANSCEIVER

"...among the best you'll ever find in the major entry level market" QST Jan 93

Shown with the optional AT-160 Antenna Tuner

IC-737
$100 Off!

The People's Choice!
VOX Unit Now Available!

IC-725
$50 Off!

Entry Level Excellence!
HF Transceiver with General Coverage Receiver

IC-735
$75 Off!

Versatile, Compact Performer!
HF Transceiver with General Coverage Receiver

IC-2330A
$150 Off!

2 M/220 MHz Mobile
2 Great Bands!

• INSTANT CASH COUPON •

SPRING INTO DAYTON!

Use this coupon like cash when purchasing any of the ICOM radios listed below! Enjoy immediate savings - there's no rebate to mail in!

IC-2iA	$50	IC-V21AT	$50
IC-2GXAT	$10	IC-W2A	$30
IC-2330A	$150	IC-X2A	$165
IC-725	$50		
IC-728	$100		
IC-735	$75		
IC-737	$100		
IC-Δ1A	$100		

ICOM

LIMITATIONS:
- Offer good on applicable purchases from 1/16/94 through 3/31/94.
- Only ICOM radios and their respective discount amounts listed on this coupon are valid for this offer.
- Offer valid on new ICOM radios only.
- Offer valid only if redeemed at an Authorized ICOM Dealer.

DEALER INSTRUCTIONS: mail a copy of ICOM radio purchase invoice (with date, customer name/call, address, model purchased & serial number) plus this coupon (with appropriate radio amount checked off) to ICOM America, Inc. for dealer credit.

DIAL 1 (206) 450-6088
for free product literature.

Experience the Quality ©

CIRCLE 174 ON READER SERVICE CARD

ICOM®

The world's greatest DX-p

4J1FS M-V Island
Northwest Russia, 1989
First joint Finland-
Soviet-USA DX-pedition

ZA1A IARU Albania Project, 1991 Re-birth of
amateur radio in The Most Wanted Country

World's First DX-p

As dawn's faint pink tinge topped snowcapped K2, I pulled the collar of my parka snug around my neck against the chill of the makeshift room, adjusted my headphones, and took a sip from the steaming mug beside my key. Pausing for a moment, I considered the glowing FT-1000 in front of me. My stomach jumped in anticipation as I leaned forward and made my first call.

"CQ, CQ, CQ,
this is AP2XX Portable on K2,
Himalaya DX-pedition listening
200 to 205, QRZ?"

9MØS Spratly Island DX-pedition, 1993
DX excitement in the South China Sea

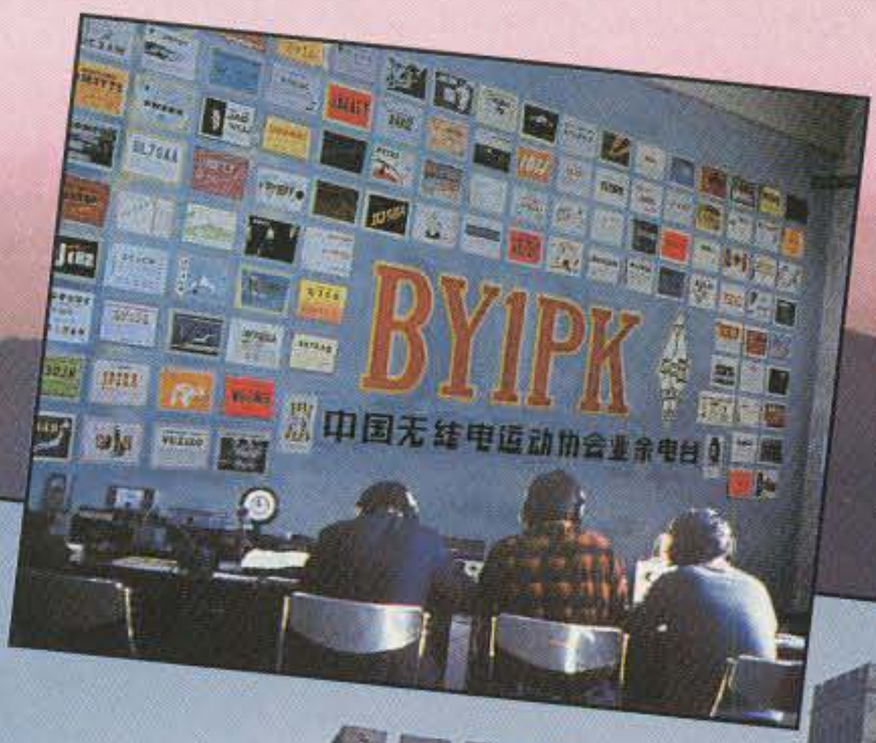
FT-1000

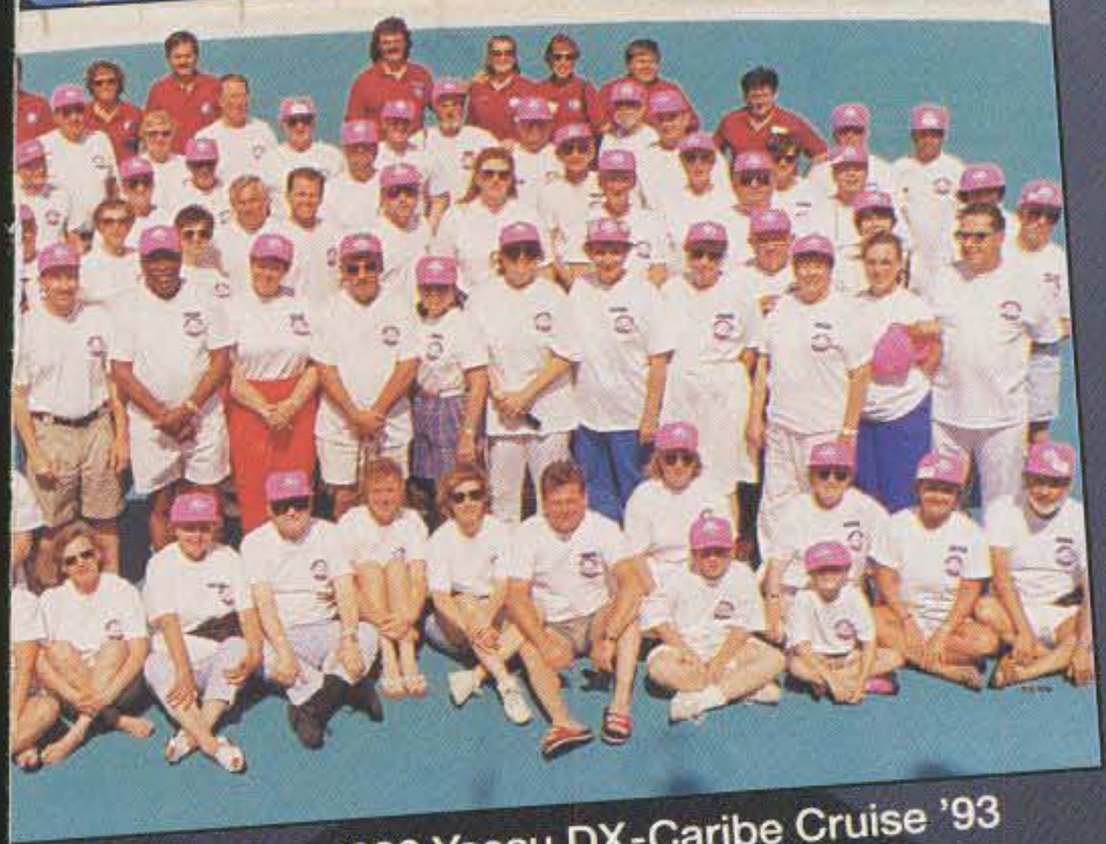
FT-990

FT-890

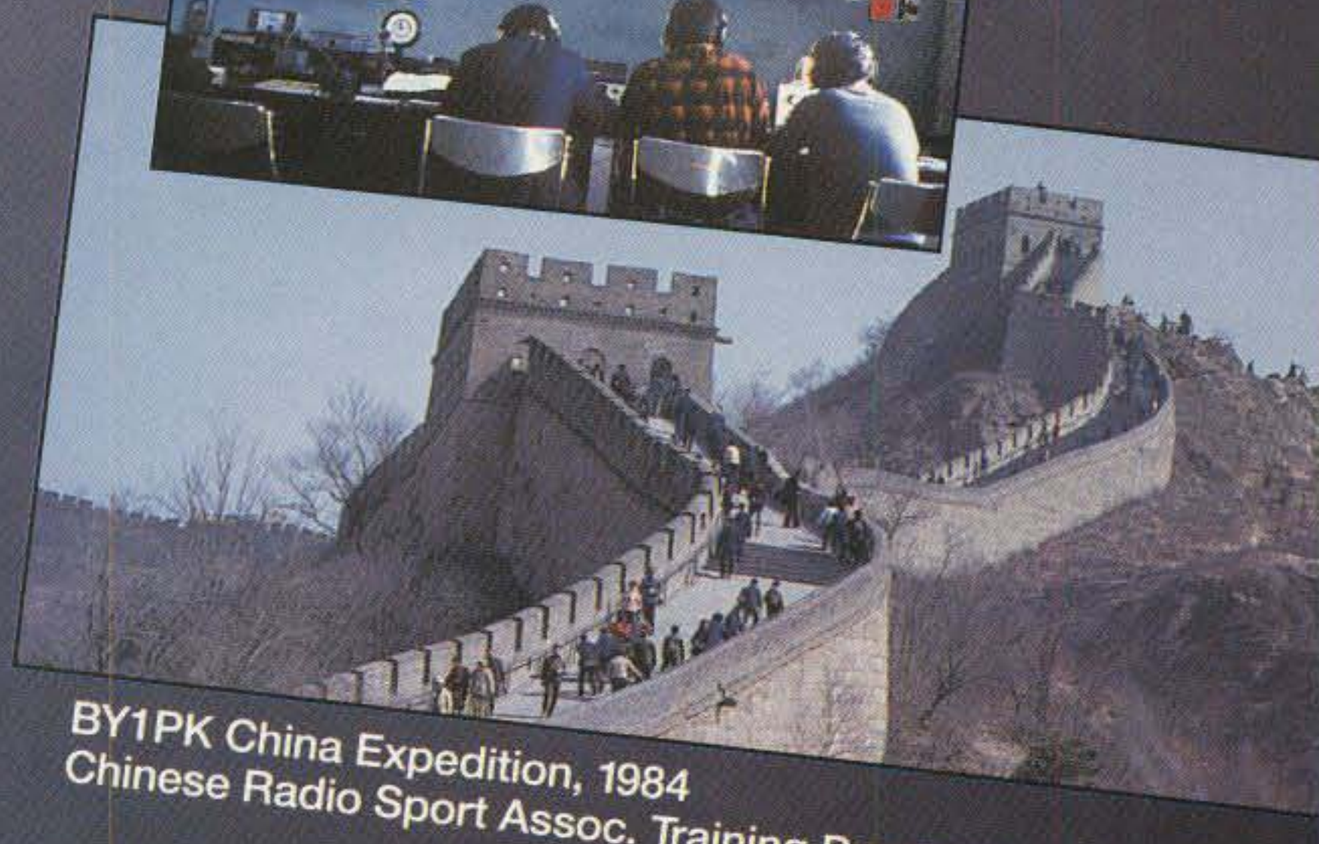
Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

peditions demand Yaesu.





pedition Cruise, 1993 Yaesu DX-Caribe Cruise '93



BY1PK China Expedition, 1984
Chinese Radio Sport Assoc. Training Program

The band erupted before my eyes and ears. Fragments of calls. Jumbled voices. Numbers and letters from an unseen choir. Poised, I took a deep breath and jabbed PTT.

"Kilo Bravo 6 Yankee Zulu Delta, you're five-nine, QSL?"

Back came the crystal clear voice from on far.

"Roger, Roger, you're fifty-nine, thanks for the New One!'

I relaxed. The band was mine.

Nothing compares with that first moment – and nothing compares with Yaesu HF equipment for making each DX-pedition day the most memorable of your life. Demand Yaesu HF – the choice of the world's greatest DX-peditions. No matter which side of the pile-up you're on.

XYØRR Myanmar (Burma) DX-pedition, 1991
"CQ DX" from the "Golden Triangle"

YAESU

Performance without compromise.℠

FT-840

FT-736R

FT-11R/41R
2m/70cm Handhelds

- **Frequency Coverage:**
  Wide Receiver Coverage:
  FT-11: 110-180 MHz RX,
  144-148 MHz TX
  FT-41: 430-450 MHz RX/TX
- Selectable Alpha Numeric Display
- New Compact Battery Design
  4.8V produces 1.5 Watts
  9.6V produces Full 5 Watts*
- 150 Memory Channels
  (75 when Alpha Numeric)
- AM "Aircraft" Receive
  (110-136 MHz)
- Small Compact Size w/ Easy Operation (measures only: 4"H x 2¼"W x 1"D)
- Rx/Tx Battery Savers
- High-efficiency MOS FET Power Module
- Large Back-Lit Keypad and Display
- Up/Down Volume/Squelch Controls
- Built-in DTMF Paging/Coded Squelch
- Automatic Power Off (APO)
- **Accessories:**
  FNB-31 4.8V, 600 mAh Battery
  FNB-33 4.8V, 1200 mAh Battery
  FNB-38 9.6V, 600 mAh Battery
  FBA-14 6 AA Size Battery Case
  FTS-26 CTCSS Decode Unit
  NC-50 Dual Slot 1-Hour Desk Charger
  CA-10 Charge Adapter (required w/ NC-50)

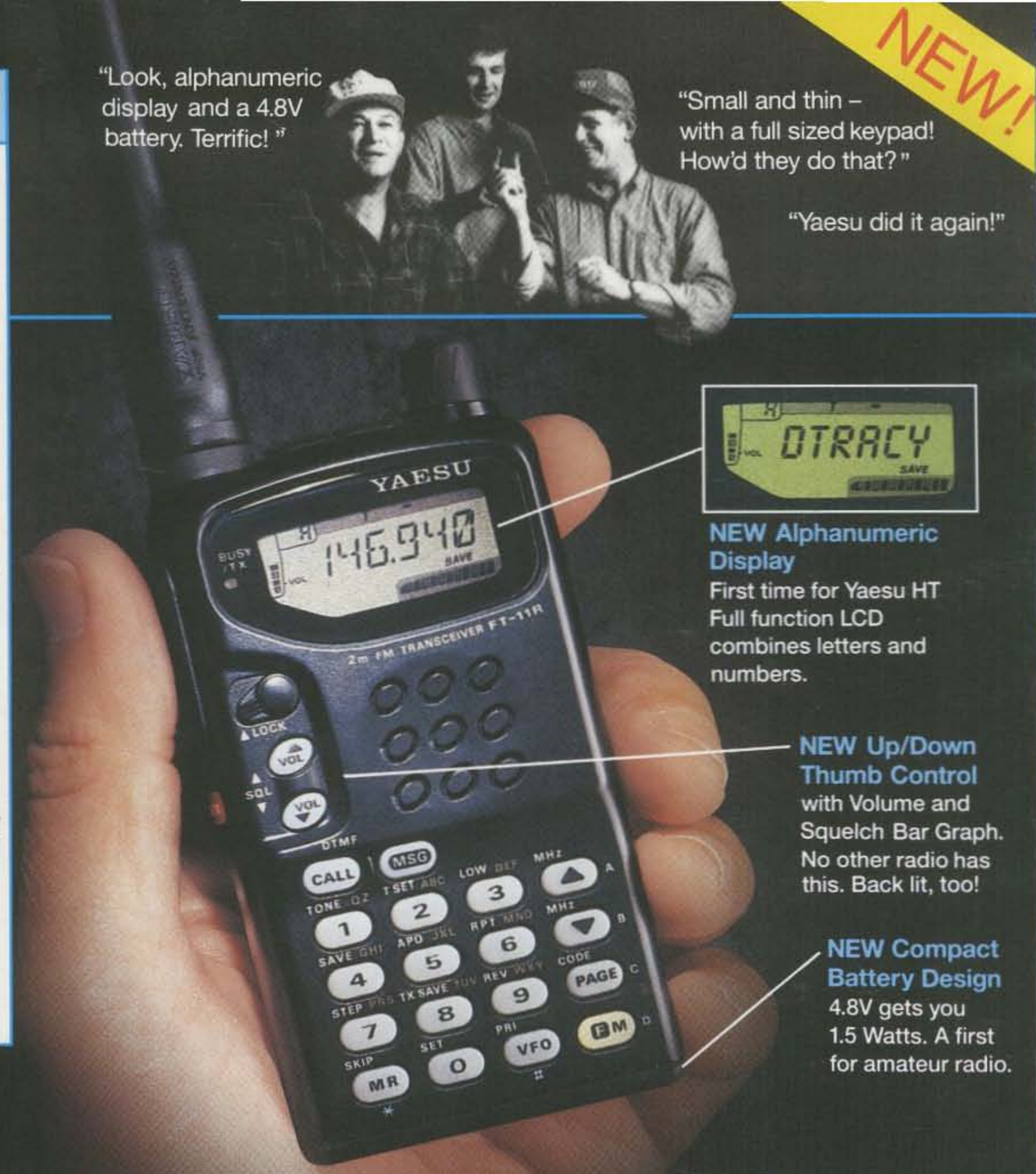
*FT-11 Only.
FT-41, 3.5 Watts

"Look, alphanumeric display and a 4.8V battery. Terrific!"

"Small and thin – with a full sized keypad! How'd they do that?"

"Yaesu did it again!"

NEW!



NEW Alphanumeric Display
First time for Yaesu HT Full function LCD combines letters and numbers.

NEW Up/Down Thumb Control
with Volume and Squelch Bar Graph. No other radio has this. Back lit, too!

NEW Compact Battery Design
4.8V gets you 1.5 Watts. A first for amateur radio.

Get a grip on this!

World's smallest size HT with a full sized keypad
Measures only: 4"H x 2¼"W x 1"D

"Small" is relative, isn't it? It could mean size – which in this case it does. And, it could mean "reduced", which it doesn't! Nothing missing from the hot new FT-11R HT from Yaesu except bulk! You're going to wonder just how all the features of this full-function radio fit in. Until you remember Yaesu pioneered 2-way radio micro technology.

To see what this really means to you, check out all the new features. Like the alphanumeric display. This Yaesu HT first, lets you tag your favorite frequency by name, call sign or number. Or, the new "voltage stingy" battery. It's an industry first for amateur radio. Smaller and compact, the 4.8V battery gives you 1.5 watts on TX. And, if that's not enough, there's an optional drop in, dash mount battery charger.

You see it's not a small time performer. Just small sized. The FT-11R. Another small example of Yaesu superiority. See your dealer today!

YAESU
Performance without compromise.℠