

ICD 08241

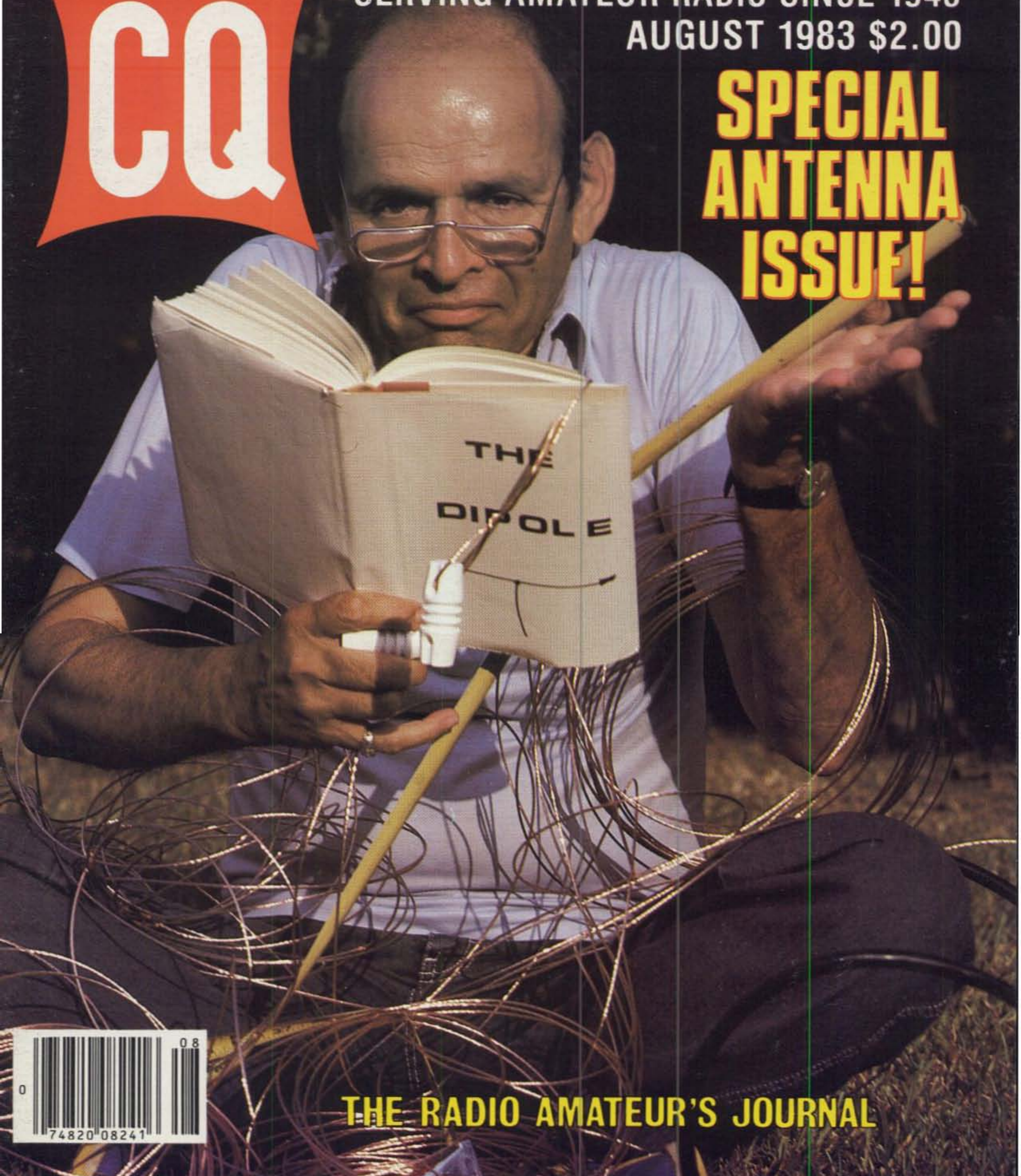
Amateur Radio

SERVING AMATEUR RADIO SINCE 1945

AUGUST 1983 \$2.00

CQ

SPECIAL ANTENNA ISSUE!



THE RADIO AMATEUR'S JOURNAL

FM "Dual-Bander"

NEW



2 m & 70 cm in single compact package, LCD, 25 W, optional voice synthesizer.

TW-4000A

KENWOOD's TW-4000A FM "Dual-Bander" provides new versatility in VHF and UHF operations, uniquely combining 2 m and 70 cm FM functions in a single compact package.

TW-4000A FEATURES:

- **2 m and 70 cm FM in a Compact Package**
Covers the 2 m band (142.000-148.995 MHz), including certain MARS and CAP frequencies, plus the 70 cm FM band (440.000-449.995 MHz), all in a single compact package. Only 6-3/8 (161)W x 2-3/8 (60)H x 8-9/16 (217)D inches (mm), and 4.4 lbs. (2.0 kg.).
- **Large, Easy-to-Read LCD Display**
A green, multi-function back-lighted LCD display for better visibility. Indicates frequency, memory channel, repeater offset, "S" or "RF" level, VFO A/B, scan, busy, and "ON AIR." Dimmer switch.
- **25 Watts RF Power on 2 m/70 cm.**
Hi/Lo power switch.
- **Optional "Voice Synthesizer Unit"**
Installs inside the TW-4000A. Voice announces frequency, band, VFO A or B, repeater offset, and memory channel number.
- **Front Panel Illumination**

- **10 Memories with Offset Recall and Lithium Battery Backup**
Stores frequency, band, and repeater offset. Memory 0 stores receive and transmit frequencies independently for odd repeater offsets, or cross-band operation.
- **Programmable Memory Scan**
Programmable to scan all memories, or only 2 m or 70 cm memories. Also may be programmed to skip channels.
- **Band Scan in Selected 1-MHz Segments**
Scans within the chosen 1-MHz segment (ie., 144.000-144.995 or 440.000-440.995, etc.). The scanning direction may be reversed by pressing either the "UP" or "DOWN" buttons on the microphone.
- **Priority Watch Function**
Unit switches to memory 1 for 1 second each 10 seconds, to monitor the activity on the priority channel.
- **Common Channel Scan**
Memory 8 and 9 are alternately scanned every 5 seconds. Either channel may be recalled instantly.
- **Dual Digital VFO's**
Selectable 5-kHz or 10-kHz for 2 m, and 5-kHz or 25-kHz for 70 cm. Depress "UP" or "DOWN" key on the front panel for band change in 1-MHz steps.
- **16-Key Autopatch UP/DOWN Microphone (Supplied)**
- **Repeater Reverse Switch**

- **High Performance Receiver/Transmitter**
GaAs FET RF amplifiers on both 2 m and 70 cm, high performance MCF's in the 1st IF section, provide high receive sensitivity and excellent dynamic range. The high reliability RF power modules assure clean and dependable transmissions on either band.
 - **Rugged Die-cast Chassis**
 - **Optional Two-Frequency CTCSS Encoder**
Easily mounted inside the radio, allows DIP switch programming of two different tone frequencies, for 2 m and 70 cm.
 - **"BEEPER" sounds through speaker.**
 - **Easy-to-Install mobile mount**
- TW-4000A accessories:**
- **VS-1 Voice Synthesizer**
 - **TU-4C Two-Frequency Programmable CTCSS Encoder**
 - **KPS-7A Fixed station power supply**
 - **SP-40 Compact mobile speaker**

More information on the TW-4000A and TS-780 is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

KENWOOD

...pacesetter in amateur radio

All mode "Dual-Bander"

TS-780

2 m & 70 cm all mode, dual digital VFO's, 10 memories, scan, IF shift...

TS-780 FEATURES:

- USB, LSB, CW, FM all mode, covering the 2 m band (144.000-148.000 MHz) and the middle 70 cm band (430.000-440.000 MHz). UP/DOWN band switch.
- Dual digital VFO's with normal/tight drag switch. VFO steps in 20-Hz, 200-Hz, 5-kHz, or 12.5-kHz, plus "FM CH" channel-
- ized tuning. Split (cross) frequency operation possible. F. LOCK switch provided.
- 10 memories include band and frequency data, backed up by internal batteries (not supplied). Battery life exceeds one year. Memories 9 and 10 for priority instant recall.
- Band scan, with selectable 0.5, 1, 3, 5, and 10-MHz scan bandwidth.
- Memory scan selectable for all memories, or 2 m or 70 cm only.
- IF shift circuit rejects adjacent interference.
- High sensitivity and wide dynamic range • 7-digit

fluorescent tube digital display
• 10 watt RF output • 2 m \pm 600-kHz TX offset switch with reverse switch • Tone switch for optional TU-4C two frequency tone

encoder unit • VOX and semi break-in CW built-in • FM center-tune meter • Noise blanker for SSB, CW.

Subject to FCC approval





R-600

"Now hear this"...digital display, easy tuning

The R-600 is an affordably priced, high performance general coverage communications receiver covering 150 kHz to 30 MHz in 30 bands. Use of PLL synthesized circuitry provides maximum ease of operation.

R-600 FEATURES:

- 150 kHz to 30 MHz continuous coverage, AM, SSB, or CW.
- 30 bands, each 1 MHz wide, for easier tuning.
- Five digit frequency display, with 1 kHz resolution.
- 6 kHz IF filter for AM (wide), and 2.7 kHz filter for SSB, CW and AM (narrow).
- Up-conversion PLL circuit, for improved sensitivity, selectivity, and stability.

- Communications type noise blanker eliminates "pulse-type" noise.
- RF Attenuator allows 20 dB attenuation of strong signals.
- Tone control.
- Front mounted speaker.
- "S" meter, with 1 to 5 SINPO "S" scale, plus standard scale.
- Coaxial and wire antenna terminals.
- 100, 120, 220, and 240 VAC, 50/60 Hz. Selector switch on rear panel.
- Optional 13.8 VDC operation, using DCK-1 cable kit.
- Other features include carrying handle, headphone jack, and record jack.

Optional accessories for R-600 and R-1000:

- DCK-1 DC Cable kit.
- SP-100 External Speaker.
- HS-6, HS-5, HS-4 Headphones.
- HC-10 Digital World Clock.



R-1000

High performance, easy tuning, digital display

The R-1000 high performance communications receiver covers 200 kHz to 30 MHz in 30 bands. An up-conversion PLL synthesized circuit provides improved sensitivity, selectivity, and stability.

R-1000 FEATURES:

- Covers 200 kHz to 30 MHz.
- 30 bands, each 1 MHz wide.
- Five-digit frequency display with 1-kHz resolution and analog dial with precise gear dial mechanism.
- Built-in 12-hour quartz digital clock/timer.
- RF step attenuator.
- Three IF filters for optimum AM, SSB, CW.
- Effective noise blanker.
- Tone control.
- Built-in 4-inch speaker.
- Dimmer switch.
- Wire and coax antenna terminals.
- Voltage selector for 100, 120, 220, and 240 VAC. Operates on 13.8 VDC with optional DCK-1 kit.



TS-130SE

"Small talk"...IF shift, Processor, N/W switch, affordable.

A compact, all solid-state HF SSB/CW transceiver for mobile or fixed base station, covering 3.5 to 29.7 MHz.

TS-130SE FEATURES:

- 80-10 meters including the new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.

- TS-130SE runs 200 W PEP/160 W DC input on 80-15 meters, 160 W PEP/140 W DC on 12 and 10 meters. TS-130V version at 25 W PEP/20 W DC, all bands, also available.
- Digital display, built-in.
- IF shift circuit.
- Speech Processor, built in.
- Narrow/wide filter selection on CW and SSB with optional filters.
- Automatic SSB mode selection (LSB on 40 meters and below, USB on 30 meters and up). SSB reverse switch provided.

- RF attenuator, built-in.
- Effective noise blanker.
- Final amplifier protection circuit assures maximum reliability. Output power is reduced if abnormal operating conditions occur. For very severe operations, optional cooling fan, FA-4, is available.
- Dimensions: 3-3/4 H x 9-1/2 W x 11-9/16 D (inches). Weight: 12.3 lbs.
- Other features: VOX, CW semi break-in with sidetone, one fixed channel, and 25 kHz marker.



Optional DFC-230 Digital Frequency Controller

Frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Four memories and digital display. (Also operates with TS-120S, TS530S, and TS-830S.)

Optional accessories:

- PS-30 matching power supply (TS-130SE).
- KPS-21 power supply (TS-130SE).
- PS-20 power supply (TS-130V).
- SP-120 external speaker.
- VFO-120 remote VFO.
- FA-4 fan unit (TS-130SE).
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters.
- YK-88SN (1.8 kHz) narrow SSB filter.
- AT-130 antenna tuner.
- MB-100 mobile mounting bracket.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS

1111 West Walnut, Compton, California 90220

You've got to get a Santec to get it right!



Compare Santec to anything you like, and you'll see — you've got to get a Santec to get: ■ memory channels which store standard repeater offsets for instant recall ■ less than 10 ma drain in receive to conserve power while you're monitoring ■ extremely wide power options of 0.1 W, 1.0 W or even 3.5 W for varying conditions ■ an accurate 24 hour clock for instant reference ■ and a full two year extended service plan which no one else will match.

When you get a Santec, you also get: ■ the widest frequency range of any handheld ■ odd offsets other than ± 600 kHz ■ variable step sizes in bandscan ■ a 500 ma battery with charger ■ a full six digit back-lighted LCD display for full frequency readout plus the memory channel number ■ the easiest keyboard entry of any handheld ■ eight modes of scan, search, manual control and open scan ■ the ability to change batteries without losing memory data ■ easily programmable bandscan ■ a frequency lock switch on the keyboard ■ an automatic low battery indicator ■ and much more.

FEATURE	SANTEC ST-144	YAESU FT-208	KENWOOD TR-2500
Size (mm)	68 x 170 x 47	61 x 168 x 49	66 x 168 x 40
Weight with Batt.	600 gm	720 gm	540 gm
Readout	LCD (full 6 digits)	LCD (4 digits)	LCD (4 digits)
Memory Channels	10	10	10
Memory of Offsets	YES	NO	NO
Memory Backup	YES, Capacitance	Yes, Lithium Batt.	Yes, Lithium Batt.
Scan (mem. & band)	YES	Yes	Yes
Search Mode	YES	NO	NO
Step Size	5-100 kHz	5 or 10 kHz only	Any 5kHz multiple
Battery	Quick Change Pack 500 ma-hr, 9.6 V	Quick Change Pack 450 ma-hr, 10.8 V	Slide-on Pack 400 ma-hr, 8.4 V
Frequency Coverage	142-148.995 Tx (149.995 optional) 142-149.995 Rx	143.5-148.495 Tx/Rx	143.9-148.995 Tx/Rx
Power (max)	3.5 W High 1.0 W Med. 0.1 W Low	2.5 W High 0.2 W Low	2.5 W High .3 W Low (approx.)
Priority	YES (in Mem/Scan)	Yes (Priority Ch.)	NO
Clock	YES	NO	NO
Computer Current Saver	YES (<10 ma)	NO (20 ma)	NO (27 ma)
Display	6 Digits + Mem. #	4 Digits + Mem. #	4 Digits + Mem. #

New! Affordable Price! See your Authorized Santec Dealer for details.

Competitors' specifications were obtained from published specifications sheets, and they are subject to change without notification to Santec or Encomm, Inc.

Shown with optional SM-3 speaker microphone.



Accessories for SANTEC Handheld Radios
clockwise from upper left:
Leather Case (ST-LC)
Base Charger & Power Supply (ST-5BC)
Remote Speaker (MS-50S)
Mobile Charger (ST-MC)
Speaker Microphone (SM-3)

The ST-144 μ P is approved under FCC Part 15



©1982, Encomm, Inc.
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone: (214) 423-0024 • TLX 79-4783 ENCOMM DAL
Repairs, Parts & Service Available

Export orders invited.

All stated specifications are subject to change without notice or obligation.

Encomm, Inc.
2000 Avenue G
Suite 800
Plano TX 75074

Please send me more information about:
 The ST-144/ μ P
 Authorized SANTEC Dealers

NAME

CALL

ADDRESS

CITY

STATE ZIP

CQ

YOU MAY SEND A DUPLICATE OF THIS FORM.

MASTHEAD

EDITORIAL STAFF

Alan M. Dorhoffer, K2EEK
Editor
Gail M. Schieber
Associate Editor
Lew McCoy, W1ICP
Technical Representative

CONTRIBUTING STAFF

Frank Anzalone, W1WY
Contest Chairman
John A. Attaway, K4IIF
Chairman, CQ DX Committee
Steve Bolia, N8BJQ
WPX Contest Director
Larry Brockman, N6AR
Robert Cox, K3EST
W.W. Contest Directors
Hugh Cassidy, WA6AUD
DX Editor
Theodore J. Cohen, N4XX
Washington Commentary
Leo Haijsman, W4KA
WAZ Awards Manager
Dave Ingram, K4TWJ
Amateur Specialties
George Jacobs, W3ASK
Propagation Editor
Dorothy H. Johnson, WB9RCY
USA-CA Director
Norman Koch, K6ZDL
WPX Award Manager
Donald McClenon, N4IN
160 M. Contest Director
Karl T. Thurber, Jr., W8FX
Antennas
Adrian Weiss, K8EEG/Q
QRPP Editor
Bernie Welch, W8IMZ
Contest Advisor
Bill Welsh, W6DDB
Novice Editor
Billy Williams, N4UF
CQ DX Awards Manager

BUSINESS STAFF

Richard A. Ross, K2MGA
Publisher
Dorothy Kehrwieler
Assistant to Publisher
Jack M. Gutzeit, W2LZX
National Advertising Manager
Herb Pressman
Asst. Advertising Mgr.
Arnold Sposato
Advertising Representative
Arlene Caggiano
Accounting
Cheryl Chomicki
Customer Service

PRODUCTION STAFF

Dorothy Kehrwieler
Production Manager
Elizabeth Ryan
Art Director
Pat Le Blanc
Phototypographer
Hal Keith
Illustrator

Offices: 76 North Broadway, Hicksville, NY 11801
Telephone: 516 681-2922. CQ (ISSN 0007-893X) is published monthly by CQ Publishing Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices: Domestic—one year \$16.00, two years \$29.00, three years \$42.00; Canada/Mexico—one year \$18.00, two years \$33.00, three years \$48.00; Foreign—one year \$20.00, two years \$37.00, three years \$54.00; Foreign Air Mail—one year \$73.00, two years \$143.00, three years \$213.00. Entire contents copyrighted CQ Publishing Inc. 1983. 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: Len Waldman, KA4MGH, of Miami, Florida, is shown puzzling over the construction of a wire dipole antenna. Photo by Larry Mulvehill, WB2ZPI.

AUGUST 1983

VOL. 39, NO. 8

FEATURES

THE OPEN-SLEEVE ANTENNA: DEVELOPMENT OF THE OPEN-SLEEVE DIPOLE AND OPEN-SLEEVE MONOPOLE FOR H.F. AND V.H.F. AMATEUR APPLICATIONS	Roger A. Cox, WB0DGF	13
PARALLEL VERTICALS: A BROADBAND ANTENNA COVERING SIX BANDS WITHOUT TRAPS	Robert H. Johns, W3JIP	20
CQ REVIEWS: THE FLESHER TU-170A RTTY TERMINAL UNIT	Lew McCoy, W1ICP	24
DEVELOPMENT AND CONSTRUCTION OF "V" BEAM ANTENNAS	Robert F. Zimmer, K4JZB	28
HIGH-CLAIMED SCORES FOR THE 1983 CQ WW WPX S.S.B. CONTEST	Steve Bolia, N8BJQ	36
BUILD A 2 METER J-POLE ANTENNA FOR \$3.98	Jerome T. Magee, KA0MSI	38
BUILD A RESONANCE DETECTOR	Rudolph E. Six, KA8OBL	40
WRITING ANTENNA DESIGN PROGRAMS FOR YOUR PERSONAL COMPUTER	Philip S. Rand, W1DBM	44
CONSTRUCT A PEAK-READING LED R.F. WATTMETER	R. David Beard, WA4QGA	48
DATeline . . . WASHINGTON, D.C.: THE INS AND OUTS OF THE WASHINGTON SCENE	Dr. Theodore J. Cohen, N4XX	52
CONFIDENTIAL: FOR ANTENNA TUNER USERS ONLY	Jerry Volpe, KB8ZO	56
THE FORGOTTEN ANTENNA	Carl C. Drumeller, W5JJ	60
NOVICE: MILITARY RADIO FREQUENCY TRANSMISSION LINES	Bill Welsh, W6DDB	67
ANTENNAS: MORE RANDOM HEADINGS, PART IV	Karl T. Thurber, Jr., W8FX	76
LATITUDE AND LONGITUDE CALCULATIONS	Thomas R. Sundstrom, W2XQ	82
CQ SHOWCASE: NEW AMATEUR PRODUCTS		84
THE UNCONVENTIONAL SLOPING "L" ANTENNA FOR 160 METERS	Walt S. Gradzki, KB2MF	86
THE WORLD OF IDEAS: SELECTION AND USE OF TODAY'S "DREAM RIGS"	Dave Ingram, K4TWJ	108

DEPARTMENTS

AWARDS: STORY OF THE MONTH—DAVID S. SHORT, W5PWG	Dorothy H. Johnson, WB9RCY	54
DX: GETTING THROUGH THE PILE-UPS; SPRATLY; DOV GAVISH, 4Z4DX, 5B WAZ NO. 23	Hugh Cassidy, WA6AUD	90
PROPAGATION: DX CHARTS FOR AUG. 15 THROUGH SEPT. 15	George Jacobs, W3ASK	102
CONTEST CALENDAR: CONTESTS FOR AUG. AND EARLY SEPT., RESULTS OF THE 1982 EUROPEAN WAEDC PHONE AND 1982 SAC CONTESTS	Frank Anzalone, W1WY	111
ZERO BIAS	4	ANNOUNCEMENTS 8
OUR READERS SAY	6	HAM SHOP 115

It looks as though the ARRL is going out of its way to prove that the old adage is true; you know, the one that says "if you don't learn from history, you're bound to repeat it." During the CB growth and boom, CBers became the official pariahs, and Newington's evangelical approach to converting them to amateur radio was far less than inviting. Alienation and damnation do nothing to win friends and influence people. We lost a "handle" (pardon the pun) on quite a number of prospective new amateurs. It truly became a case of "Us against Them" and "Us" didn't come out looking any too good.

At the last board meeting, the ARRL "proposed that no applicant be afforded Full ARRL Membership unless their license class shall have required Morse Code as a requirement." I guess that this is a preparatory admission that the code-free license is probably going to go through, and that if it does, "We'll show them." I'm sure that this potential second generation of "Second Class Citizens" will rush out to join the League, too.

While I don't think that anyone really expects the same numbers of people to flock to this new license, *if and/or when* the license class goes into effect, the net result will be that the ARRL will then represent a smaller and smaller percentage of all *licensed* amateur radio operators. Now they represent about 20% of all licensed amateurs, and it is foreseeable that that number can drop to 5 to 10%. The shrinking coterie that now exists could create an opening for a competing national organization a year or so down the road.

The wagons have truly been drawn in a circle. However, it appears that only the Indians are winning the battles. It seems foolish to create another "Little Big Horn" that in no way will help either amateur radio or the ARRL.

I hope that the ARRL sees fit to mellow their attitude this time, while there is time. The proposal is in committee at this writing. Hopefully they will decide to shelve this idea.

Travels With CQ

Compared to Dayton, the Birmingham Hamfest is quiet . . . almost anything else is. While the economy is not exactly thriving in the Birmingham area, the spirit is high and the folks are just as enthusiastic. We did get the usual weekend rain, but the fleamarket for this one was indoors and air conditioned, so there was no inconvenience or discomfort in perusing the wares. As usual, there were plenty of bargains to be had. Dave Ingram was there, and I did get a chance to see Karl Thurber, too. CQ was well represented at this one.

The following Friday Dick and I were supposed to leave for the Rochester Hamfest. I say supposed to because in the typical last-minute rush we arrived at LaGuardia Airport only to realize that our plane was to leave from Kennedy. After a wild cab ride to Kennedy (right out of a movie chase scene) we found out that we could get on the plane, but our luggage and cartons couldn't; they wouldn't get there until the next afternoon, way too late for the one-day event. I'm sorry that we didn't make it, as I understand from the folks who got there that it was a very good show. We'll make better plans for next year and allow more time. That Sunday Dick and I were at the LIMARC flea-market out on Long Island. This flea-market has grown steadily over the years and now attracts quite a few commercial exhibitors.

Somewhere between the LIMARC flea-market and the Dallas HamCom came the news that Wayne had sold out. A California-based publisher of computer magazines reportedly bought Wayne Green Enterprises for between 16 and 60 million dollars, depending on who you talk to. Either way it's a lot of money. What will happen to 73, which has not been as popular or profitable lately, is anybody's guess.

The Dallas HamCom was bigger than ever. I did get to spend an extra day in Dallas, as I arrived on the Thursday before the show. I know that Texas likes to do everything big, but it's hard to reconcile that Dallas has bigger highways and far more traffic problems than we do in New York. On that Thursday I went to visit the home of Encomm, Inc. They market the Santec HTs, the Welz line, and now the KDK amateur transceivers. I had lunch with Encomm's President, Tom Gentry, K5VOU. He's also one of the guiding forces behind HamCom and its growth over the last six years. Later that afternoon I went over to Texas Towers. Gerald Williamson, K5GW, has built up a nice business over the past few years. He's as pleasant and easy going in person as he was to the customers who were calling in while I was there. We had dinner later that evening and talked about homebrewing and the upcoming show.

The next morning I went over to see the gang at AGL Electronics. I saw Gordon Fogg, N5AU. His antenna farm was on our cover a year or so ago—the cover with the great sunset and all of those towers. I also talked with Bob Alexander, W5AH, who works at AGL. Bob has an article coming up next month on a neat 30 meter update for the FT-901.

I then had a quick hour in the sun at the hotel pool before I went to pick up Dick and Jack at the airport. With Dallas traffic that meant a 4½ hour round-trip ride. We

had a good time as usual that weekend at HamCom. There were more commercial exhibitors this year, and the fleamarket appeared to be twice the size of last year's. It was a very busy show for all.

Sunday Jack left for New York and Dick and I flew to Chicago for the Consumer Electronics Show (CES). If you can picture a show that is about five times the size of Dayton that has exhibits which run into the hundreds of thousands of dollars, then you might have an idea of CES. It was a mind-boggling day of seeing what will be available to the public next year.

Next week I'll be off to Washington, D.C. for the amateur radio luncheon at AFCEA. Then on the 17th we leave for the Atlanta Hamfest. I'll report on both of these events next month. I can say, though, that after six months of traveling this year I have noticed a definite upward trend in the economy and in the spirit of those who attend shows. I'd like to be able to say that the whole country is thriving, but obviously I can't. However, I think that the worst is over and that the rebuilding efforts will take a little while to filter throughout the land. All of the signs and the will and determination for a recovery are there.

Errata

The first promotional issues of our Spanish edition, *CQ Radio Amateur*, arrived, and they look great. Many of our authors and columnists can now see what their articles look like in Spanish, and they can also amaze their friends by telling them that they are bilingual (a hidden talent). Although the focus for this magazine will be Spain and South and Central America, copies will also be available here in the U.S.

All in all it's been a very busy month for CQ and for amateur radio in general. By next month we should know whether there will be four amateur radio magazines or three, so you're all free to speculate on that one. These certainly are exciting times. I'd also like to leave you with the reminder that Dr. Owen Garriott, W5LFL, is set to operate from the mobile as STS-9 Spacelab lifts off on September 30th. Don't ask me what countries or counties this will count for, but it is conceivable that Owen could work WAZ, DXCC, and USA-CA all on 2 meters. There should be complete details in most of the magazines in September.

As summer begins to draw to a close, be good to yourself and amateur radio by getting out there to support your local radio club and hamfest. Your participation does make a difference.

73, Alan, K2EEK

Introducing the **hy-gain**® EXPLORER 14

Remarkably Compact, High Performance Broadband Tribander with Quad-Band Option

New Para-Sleeve Design

The Explorer 14 is a new antenna design we call PARA-SLEEVE which uses an "open-sleeve" dipole optimized for maximum bandwidth and directivity. Here is the concept. A central dipole, driven directly by the transmission line, has a 1/2 wave resonance on the lowest operating frequency. Two shorter sleeve elements, tightly coupled to the central dipole, modify its impedance to create a 1/2 wave resonance to the highest operating frequency. This para-sleeve system is expanded by the addition of 15 meter traps and 20 meter element tips. A revolutionary new concept for HF tribanders. So unique, we've applied for a patent.

Broadband Performance

The Explorer 14 will load solid state transceivers to maximum output with VSWR below 2:1, eliminating the need for an antenna tuner. You'll have edge to edge broadband

performance on 20, 15 and 10 meters with gain and front-to-back ratio competitive to giant tribanders that cost twice as much or more. You'll be able to work stations you cannot even hear with a dipole antenna. And, the Explorer 14 handles maximum continuous legal power with a respectable safety margin.

Short Boom Save Space and Money

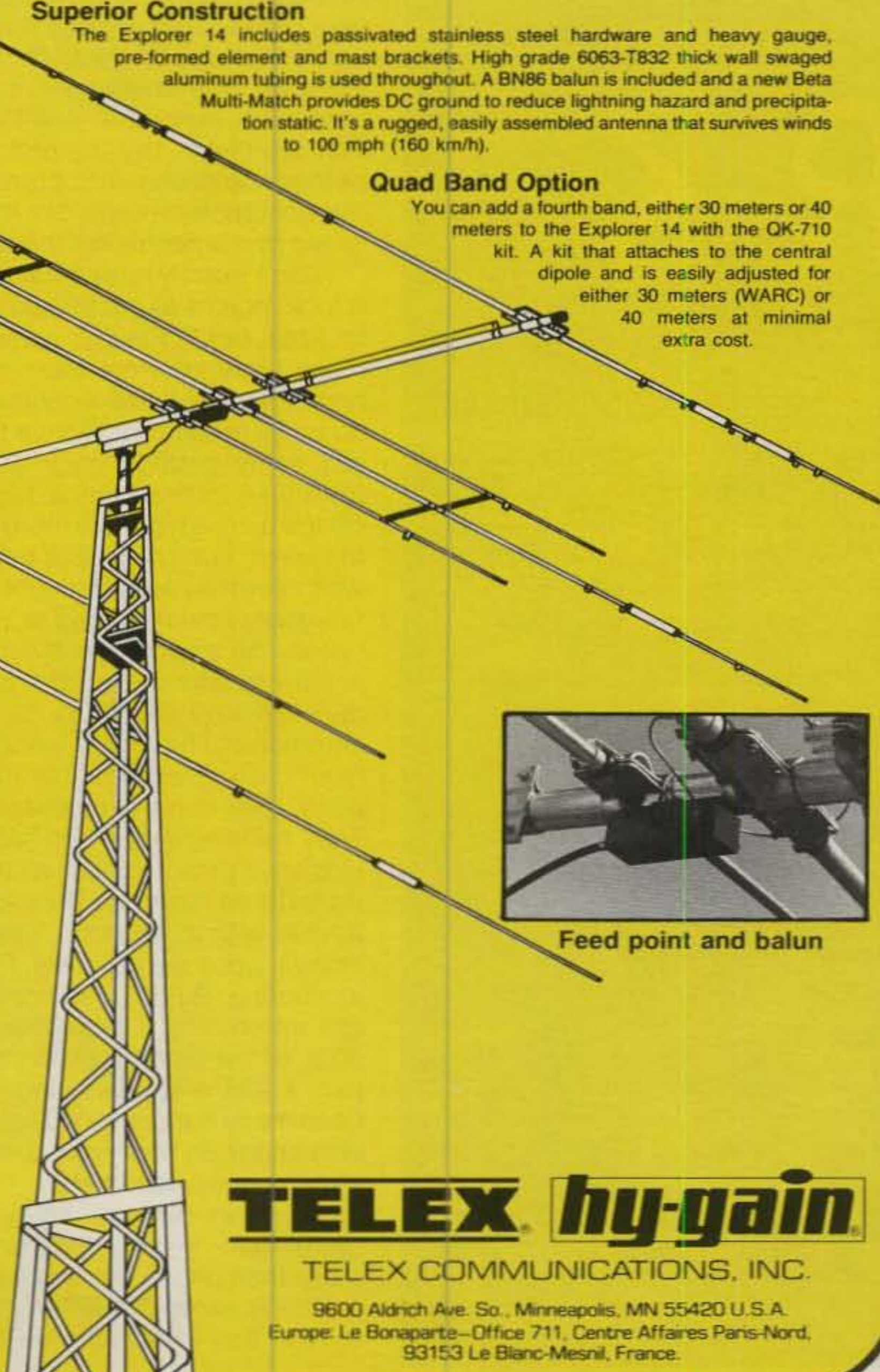
If your space or budget was too limited for a long boom tribander, chances are the Explorer 14 will fit both. The boom is only 14' (4.3 m) long and the turning radius requires only 17'3" (5.3 m). The compactness of the Explorer 14 reduces its overall weight and windload surface so you can mount it on a roof tripod, a mast or a tower. For Example, the Hy-Gain CD-45II rotator and HG52 tower are a perfect match for the Explorer 14. This saves you the cost of an extra heavy duty rotator and tower.

Superior Construction

The Explorer 14 includes passivated stainless steel hardware and heavy gauge, pre-formed element and mast brackets. High grade 6063-T832 thick wall swaged aluminum tubing is used throughout. A BN86 balun is included and a new Beta Multi-Match provides DC ground to reduce lightning hazard and precipitation static. It's a rugged, easily assembled antenna that survives winds to 100 mph (160 km/h).

Quad Band Option

You can add a fourth band, either 30 meters or 40 meters to the Explorer 14 with the QK-710 kit. A kit that attaches to the central dipole and is easily adjusted for either 30 meters (WARC) or 40 meters at minimal extra cost.



Lew McCoy, W1ICP, is among the most authoritative writers in amateur radio. For over 30 years he served on the ARRL technical staff with his last position as assistant senior technical editor. Presently he is the technical writer for CQ magazine. Here is what he had to say about the Explorer 14:

"In my opinion, with Explorer 14, Hy-Gain produced a truly high gain, high performance antenna in a small package. The "para-sleeve" design provides the amateur a whole new ball game, particularly in the area of broadbanding. I was really surprised when I actually verified the gain, front-to-back and bandwidth during my recent visit to the Hy-Gain labs and antenna range in Lincoln, Nebraska. The Explorer 14 is a winner."

Specifications:

Frequencies of operation:	Electrical		
	20M	15M	10M
Under 2:1 VSWR (MHz)	14.0-14.35	21.0-21.45	28.0-29.7
Maximum F/B Ratio (dB)	27	27	21
Maximum Gain (dB)	7.5	8.0	8.0
Maximum Power	Maximum Legal DC Ground		
Mechanical			
Boom Length	14'1 1/2" (4.3 m)		
Turning Radius	17'3" (5.3 m)		
Net Weight	43 lbs. (19.5 kg)		
Wind Surface Area	7.5 sq. ft. (.69m ²)		



Feed point and balun

TELEX hy-gain

TELEX COMMUNICATIONS, INC.

9600 Aldrich Ave. So., Minneapolis, MN 55420 U.S.A.
Europe: Le Bonaparte-Office 711, Centre Affaires Paris-Nord,
93153 Le Blanc-Mesnil, France.

PERFECT ANTENNA?

FOR
10-15-20 METERS

VERTICAL
OMNI-GAIN
HALFWAVE
END FED
NO RADIALS
NO REFLECTED
POWER
BROADBAND
FIXED OR
PORTABLE
REMOTE TUNING
2 KW PEP
UPS SHIPPABLE

R3

R3 may be the perfect antenna for condominiums, apartments, small lots or any limited space situation. It is a great antenna for hams who are concerned about neat appearance and maximum performance.

R3's self supporting radiator is only 21ft-6.4m high x 1ft .304m wide at the base. Assembly is quick and easy for portable, marine, field day, DX-peditions, or fixed installations. It is complete with remote tuner.

AVAILABLE THROUGH
DEALERS WORLDWIDE

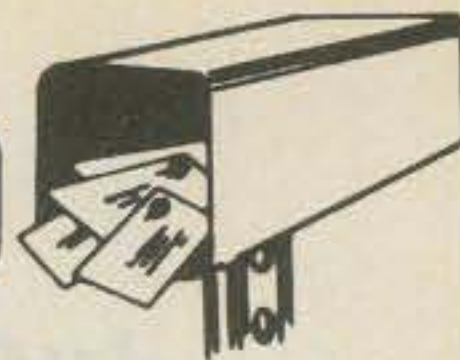


cushcraft
CORPORATION

THE ANTENNA COMPANY
P.O. Box 4680
Manchester, NH 03108 USA
TELEX 953050



Our Readers Say



An Answer To The Ultimate Question

Editor, CQ:

Since you ask, "What has happened to the thrill of communicating with another person across the miles, oceans, or continents?" (DX Column, CQ, June 1983), I thought I would take a few moments and attempt an answer. It's my answer—personal for me—and I am sure that I probably only represent a small minority of "hamdom."

Let me see. . . . I remember well the first time I drove an automobile. What a thrill! Now boring. I remember well the first time I opened a mike professionally as a disc jockey! That stage of my career has long since passed. I remember the first time I broke 80 on the golf course. I was 16 years old. A great thrill. And it still would be today if I could do it, but I can't. However, the challenger is still there. I guess it is likely that it is the challenge that maintains my interest rather than past accomplishments. I remain proud of the accomplishments, but they are relegated to mementos for the scrapbooks.

I don't exactly remember the first QSO. It took months to get the old surplus gear to "put out." Finally, someone a few miles away answered to report my fog-horn note. The first DX contact was Canada on 80 meters. I still have the logs, and still enjoy pouring back through them from time to time. Since 1954 I've been off the air (ham bands) more than on due to career, family, etc. But that old DX bug was never far from thought. And now a few years down the road at 317 countries I'm just as addicted as ever.

Now to take a shot at answering your question—for me. Sorry, but the thrill of communicating with another *person* (your italics) across the miles is long gone. I've done it thousands of times. They're doing it now with half a watt. The kids have grown up with all the things we considered marvels. They are no longer thrilled with it, nor am I. Granted, many enjoy a good ole ragchew. Frankly, most are boring. But I'll also admit that many are interesting. I hear them often, but 99% of the time I feel no compulsion to join; I just enjoy listening. There have been many hundreds of days when the rig was on for an hour or two, or three, with nothing in the log to show for it. Just listening. I've always enjoyed listening more than talking. I've enjoyed code more than phone. Personal tastes.

I really wrote this letter to express my opinion that I wish the ARRL would add

some countries instead of deleting at every opportunity. I don't want my life-long (almost) goals to be accomplished. I want to keep chasing (DX) just like I did when I was 17. I don't think an ARRL DX Advisory Committee member should be allowed to vote on a deletion if he already has that country confirmed. Let's go back to the 200 mile shore rule. Let's add some incentive to maintain the interest of thousands of DXers.

It's only a game. It's only a hobby. It's not my career. It's not my family. It's not my only hobby. I would miss it, but I sure could give it up (as many do, from boredom).

C'mon guys. The reason I got into ham radio was to have fun. I didn't get into it to build and tinker (although that appeals to many). I didn't get into it to ragchew (as that appeals to many). I got into ham radio because I had a burning desire to *operate*. I became, in the early days, a DJ rather than an engineer (although I had a first phone at 16) for the same reason. I could tinker to my heart's content without a license. The license was required only to *operate*. The kids (and adults) did not pick up on CB to tinker; they wanted to operate, to ragchew, to work DX. Let's get some fun back in. Let's get some challenge back in.

But so much for the soapbox. So much for my one and only letter to the editor—ever. For my personal taste, CQ is by far the best magazine. It has many more features about *operating*, and the best DX column by far. WA6AUD is one of the finest writers ever to grace a periodical.

Ron Brandon, N4AH (ex-W4DUQ)
Spartanburg, SC

P.S.: What about the ultimate award for band-countries starting at 1000? I could never hope to ever "get them all." And for goodness sake, make it retroactive. Don't deny the old timers what they worked so hard for.

QRP Brings Them In

Editor, CQ:

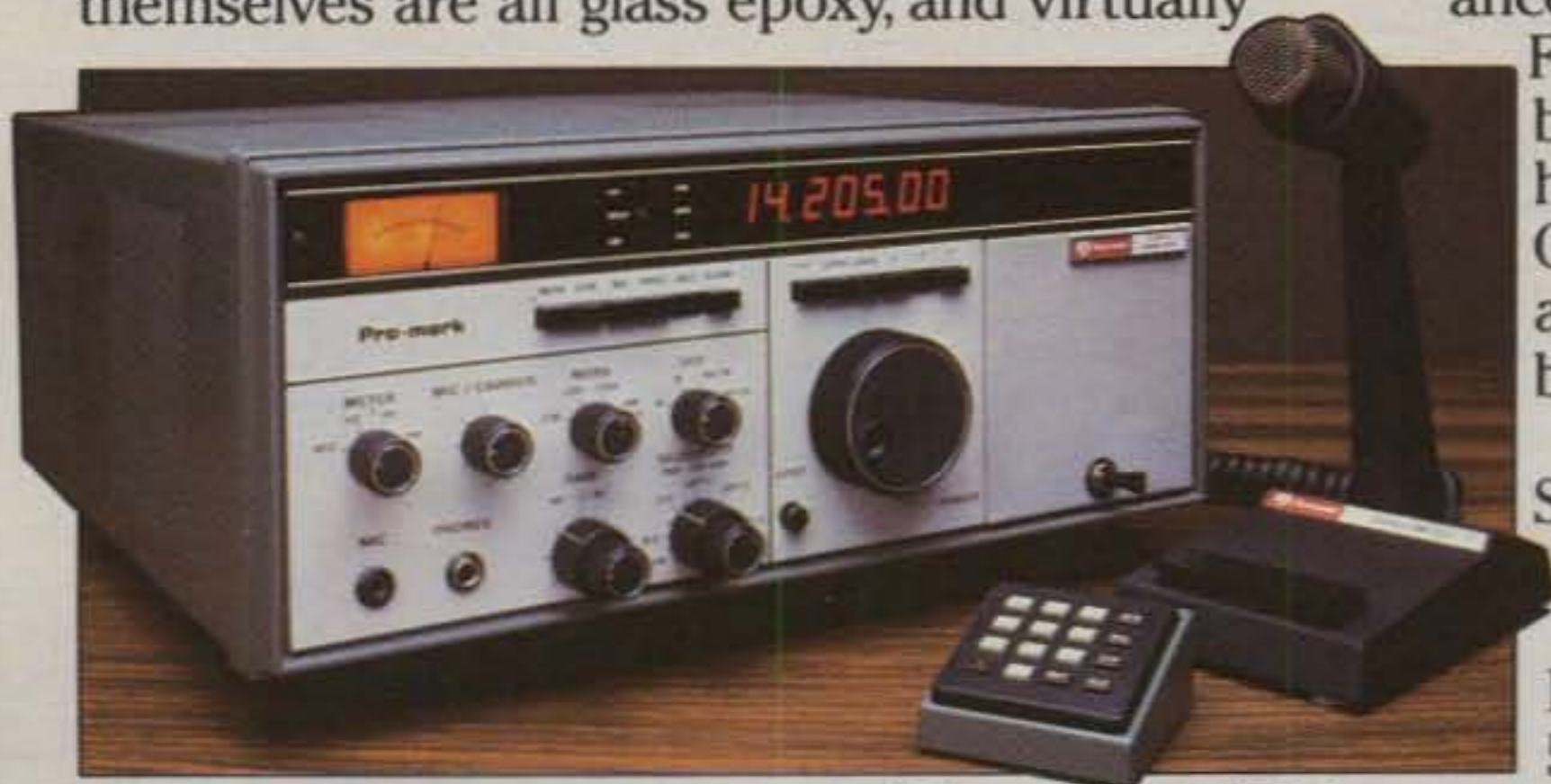
I just wanted to drop you a line to tell you how much I enjoyed your magazine the past two months (May and June 1983 issues) with the QRP articles. I enjoyed them so much that at the Dayton Hamvention I signed up for a subscription. Keep up the good work.

Charles W. Eglhaut, KA3DFK
Greensburg, PA

The real beauty of the Collins KWM-380 is behind the panel, not on it.



At Collins, we know serious amateurs won't settle for less than professional performance. So we build every KWM-380 to commercial rather than amateur standards. For example, our PC boards are connected by ribbon cables with gold-plated pinfield connectors. The boards themselves are all glass epoxy, and virtually



unaffected by temperature and humidity which cause intermittents in the more commonly used phenolic boards.

Once built, every KWM-380 undergoes 24-hour burn-in, then is aligned and tested to meet or exceed every spec on the data sheet. Which makes us very confident about warranting your KWM-380 for one full year.

The result is a radio with superior performance and lasting quality, not front-panel glitter. Frequency stability is just one example of its beauty: typically, drift is as low as 10-12 Hz per hour for normal ham shack environments. Other companies haven't matched our performance because they don't match our quality behind the panel.

Add some real beauty to your station. See the KWM-380 at your nearest authorized dealer. Collins Telecommunications Products Division, Defense Electronics Operations, Rockwell International, Cedar Rapids, IA 52498. Phone (319) 395-5963. Telex: 464-435.



Rockwell International

...where science gets down to business

CIRCLE 50 ON READER SERVICE CARD

2 for 1
Performance
from
MIRAGE

Dual-purpose power amplifiers for HT and XCVR!



- 1-10 Watts Input
- All-mode operation
- 5 year warranty

model:

B1016 (2 meters)

1W In = 35W Out

2W In = 90W Out

10W In = 160W Out

with RX preamp!

\$279.95

C106 (220 MHz)

1W In = 15W Out

2W In = 30W Out

10W In = 60W Out

with RX preamp!

\$199.95

D1010 (430-450 MHz)

1W In = 20W Out

2W In = 45W Out

10W In = 100W Out

\$319.95

There's more, and
WATT/SWR Meters, too!
See your nearest Dealer

**MIRAGE
MIRAGE
MIRAGE**
COMMUNICATIONS EQUIPMENT, INC.
P.O. Box 1393
Gilroy, CA 95020
(408) 847-1857
made in U.S.A.

Please send all reader inquiries directly.

Announcing

● **Elmer of the Year Award** - The Northern New Jersey QCWA Chapter is accepting nominations for this year's Elmer Award. The award is given to the amateur in northern New Jersey who has done the most to pass on his or her knowledge to the next generation of amateurs. Nominations may be made by any licensed amateur who resides in northern NJ. Each nomination must be accompanied by a 500 or less word statement about the nominee, and nominations must be received on or before Sept. 1, 1983. Send nominations to Gordon S. Gregory, N2IN, 8 Winding Way, Denville, NJ 07834 (phone 201-627-4426.).

● **VHF Conference Call for Papers** - Papers are invited for the 29th Annual VHF Conference sponsored by the Electrical Engineering Dept. of Western Michigan University. Paper synopses are due for selection by August 15th and final papers are due October 1st. Reports may cover the design, construction, and testing of VHF equipment, plus related areas such as propagation, RTTY, satellites, and more. Papers should be sent to Dr. Cassius Hesselberth, W8FLH, Chairman, Dept. of Electrical Engineering, Western Michigan University, Kalamazoo, MI 49008.

● **VE3VM from the Welland Canal** - The Niagara Peninsula Radio Club will be on the air from the Welland Canal using the call VE3VM weekends in July and August on 7.050-7.095 and 7.225-7.295 s.s.b. Send QSL (with s.a.s.e.) to Box 692, St. Catharines, Ontario, Canada L2R 6Y3.

● **KF2T from Oyster Creek, NJ** - The Jersey Shore ARS will operate KF2T from the Oyster Creek (NJ) Nuclear Generating Station August 6-7 from 1800-1800Z. Phone: 3930, 7230, 14260, 21260, and 28560 kHz. CW/Novice: 30 kHz up from lower band edges. VHF: 146.58. RTTY: 3640, 7085, 14085. QSL to JSARS, 619 17th Ave., South Belmar, NJ 07719 (s.a.s.e. for commemorative QSL).

● **Special Event from Mackinac Island, MI** - From 1500-2300Z August 13th the Tri-County Wireless Group will operate N8COY from the Grand Hotel's "Longest Porch in the World" s.s.b. on 7.280, 14.280, 21.380, 28.580, and f.m. 147.480. QSL with s.a.s.e. to N8COY (DXers via Bureau).

● **K2JD Special Event** - The Rochester ARA will operate using the call K2JD from Camp Good Days and Special Times, Camp Onanda, NY, on August 27-28 between 11 a.m. and 5 p.m. Phone: 80 meters 3900-3925 MHz, 40 meters 7230-7250, 15 meters 21350-21375. CW: 80 meters 3525-3550, 40 meters 7025-7050, 15 meters 21025-21075. Also 2 meter FM. For certificate send s.a.s.e. and QSL to RARA, P.O. Box 1388, Rochester, NY 14603.

● **Little House on the Prairie Commemorative** - This Special Event station will be on the air from August 27th to September 4th using the calls WA0CED and WA0AUU on 10-80 meters on the low end of the General and Novice bands. Certificate for a QSL and \$2.00 to above calls.

● **The following hamfests, etc., are slated for August:**

July 23-24, **Charleston Hamfest**, Charleston, SC. Phone 803-747-2324.

Aug. 5-7, **ARRL Rocky Mountain Div. Convention and WIMU Hamfest**, Jackson, WY. Phone

WB7AMP at 307-382-9032, or N7COA at 307-875-5324.

Aug. 7, **South Hills Brasspounders and Modulators Hamfest**, Pittsburgh, PA. Contact Andrew L. Pato, 1433 Schauflyer Dr., W. Homestead, PA 15120.

Aug. 12-14, **Austin Summerfest '83**, Austin, TX. Contact Austin Summerfest '83, P.O. Box 13473, Austin, TX 78711.

Aug. 13, **Lake Erie International Hamfest**, Dunkirk, NY. Contact Lake Erie Hamfest, P.O. Box 455, Dunkirk, NY 14048.

Aug. 13-14, **Radio Club of Tacoma Hamfair**, Tacoma, WA. Contact Grace Teitzel, AD7S, 701 S. 120th, Tacoma, WA 98444, or phone 206-564-8347.

Aug. 14, **Hamfesters Radio Club Hamfest**, Willow Springs, IL. Contact N9AMY, 10220 S. 86th Ct., Palos Hills, IL 60465.

Aug. 14, **Central Kentucky ARRL Hamfest**, Georgetown, KY. Contact Bluegrass Radio Club, Inc., P.O. Box 4411, Lexington, KY 40504.

Aug. 19-21, **ARRL Pacific Div. Convention**, Reno, NV. Contact Wide Area Data Group, Inc., P.O. Box 3132, Sparks, NV 89432-3132, phone 702-358-6303.

Aug. 20, **Tioga County (PA) ARC Hamfest**, Blossburg, PA. Contact Tioga County ARC, P.O. Box 56, Mansfield, PA 16933.

Aug. 20-21, **Huntsville Hamfest**, Huntsville, AL. Contact Huntsville Hamfest, 2804 S. Memorial Parkway, Huntsville, AL 35801.

Aug. 21, **Chicago Area Computer Hobbyists Exchange and Chicago ARC Swapfest**, River Grove, IL. Call CARC at 312-545-3622.

Aug. 21, **Warren Hamfest**, Warren, OH. Contact KA8GGD, WARA, P.O. Box 809, Warren, OH 44482.

Aug. 21, **New Delmarva Hamfest**, Gloryland Park, south of Wilmington, DE. Contact Stephen J. Momot, K3HBP, 14 Balsam Rd., Wilmington, DE 19804 (s.a.s.e.).

Aug. 21, **Tippecanoe ARA Hamfest**, Lafayette, IN. Contact Lafayette Hamfest, Route 1, Box 63, West Point, IN 47992.

Aug. 21, **Finger Lakes Hamfest**, Trumansburg Fairgrounds, NW of Ithaca, NY. Contact W2CFP, 866 Ridge Rd., Lansing, NY 14882.

Aug. 27-28, **Montgomery (AL) Hamfest**, Montgomery, AL. Contact Hamfest Committee, 2141 Edinburgh Dr., Montgomery, AL 36116.

Aug. 28, **Five County Swap-n-Shop**, Flint, MI. Contact KU8H, 1204 Overland Dr., Lennon, MI 48449.

Aug. 28, **Marshall County ARC Hamfest**, Argos, IN. Contact Marshall County ARC, Box 151, Plymouth, IN 46563.

Aug. 28, **Lebanon Hamfest**, Lebanon, TN. Contact Morris Duke, W4WXQ, 210 Disspayne Dr., Donelson, TN 37214.

Aug. 28, **St. Charles ARC Hamfest**, Wentzville, MO. Contact SCARC Hamfest, P.O. Box 1429, St. Charles, MO 63301.

Aug. 28, **Central PA Repeater Assoc. Hamfest/Computerfest**, Hershey Park, PA. Contact WB3DNA, 6140 Chambers Hill Rd., Harrisburg, PA 17111.

Aug. 28, **Bluefield Hamfest '83**, Brush Fork Armory, north of Bluefield, WV. Contact Don Williams, WA4K, 412 Ridgeway Dr., Bluefield, WV 24605.

The *KLM* Spotlight on:

The new pacesetter
for tribander performance

KT-34XA

For the new age
of satellite DX

420-450-18C

See your
KLM dealer

Why wait?
Get on
30 meters (10 MHz)
Now!

30M—2 (2 element)
30M—3 (3 element)
See your KLM dealer
for details.

144-148-13LB

Maximum gain,
across the whole band

The ultimate H.F. monobanders

KLM's
"BIG STICKERS"

Broadbanded
hi-performance

Verticals

SSV
80-40-15

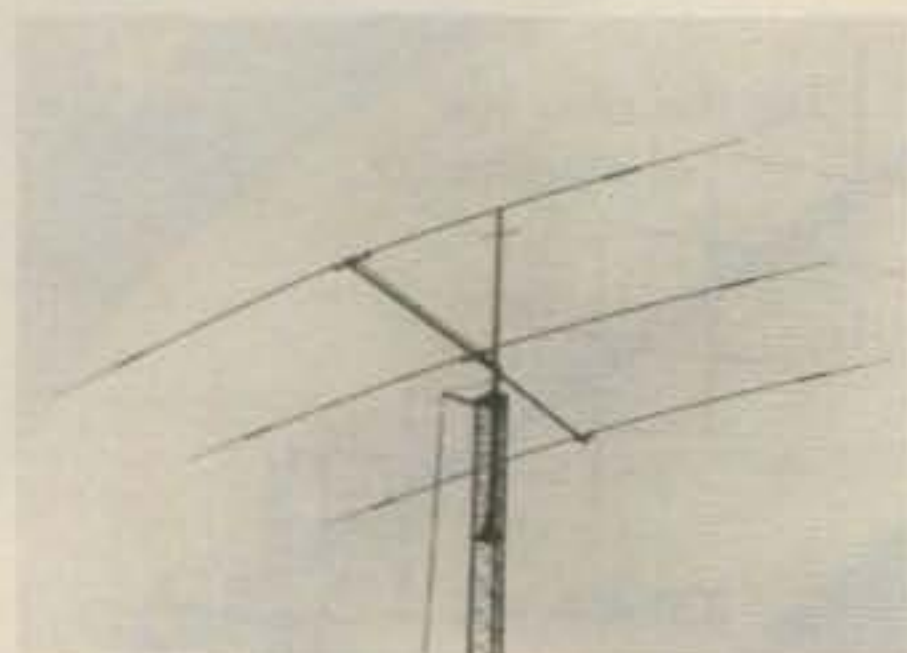
40-10V

Plus much, much more!
Write for a complete catalog

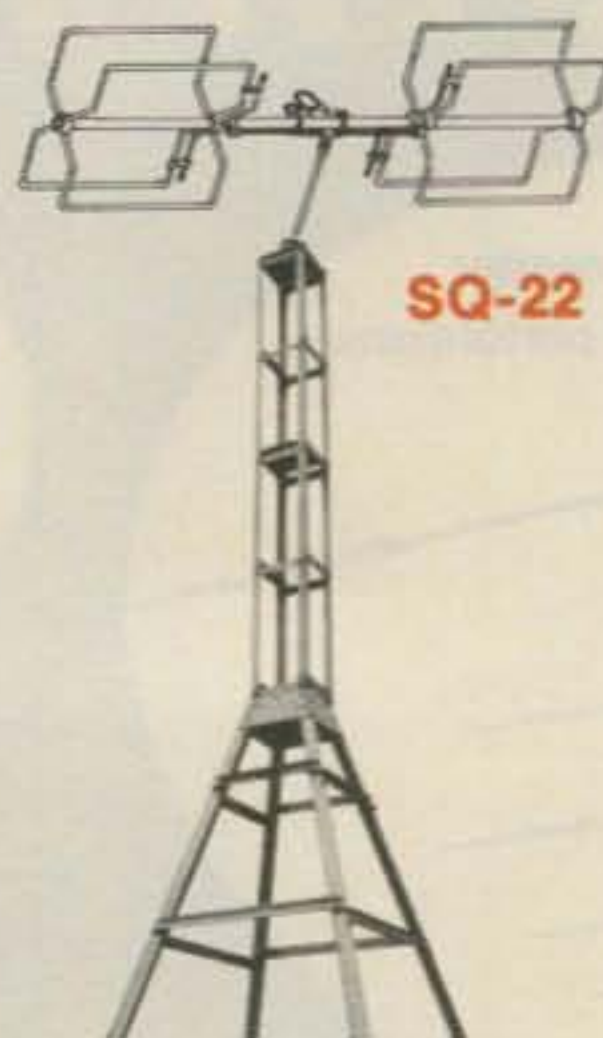
KLM P. O. Box 816, Morgan Hill, CA 95037
(408) 779-7363

DUAL DRIVE TRIBANDERS

- 20, 15 and 10 meters • Wideband. Low SWR. No tuner needed • Exclusive phased dual drive gives higher gain • Exclusive coaxial capacitors have lower losses, higher Q • Transmitter power is radiated not lost in the traps • Full power low loss balun. Gives improved beam pattern.

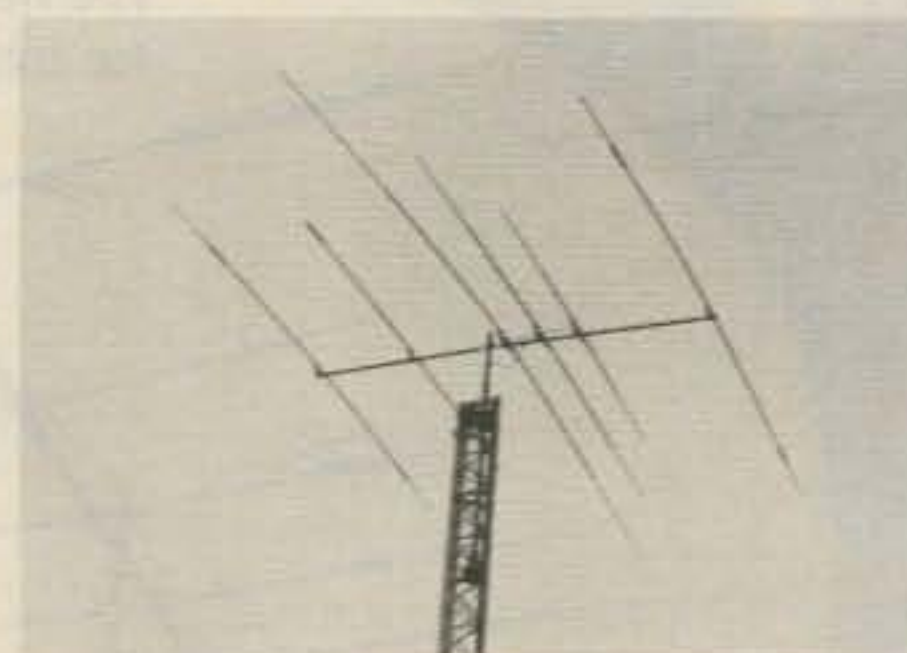


HB-33SP



SQ-22

TE-35ASP



HB-35T

TET Antenna Systems presents three full size trap multiband beams to meet every amateur need. 5 element, 4 element, and 3 element models all with the exclusive TET dual phased drive. This famous drive system originated with HB9CV and was perfected by JA3MP. When you buy TET dual drive you know you have the best. It has more gain - just like adding another parasitic element. And wide bandwidth so you can use your solid-state transceiver on both phone and CW without a tuner.

Only the highest quality materials are used throughout. All aluminum tubing is 6061-T6 alloy. Stainless steel fasteners are provided for all electrical connections. Tubing is cut and predrilled to precision tolerances for easy one afternoon assembly. Light weight and low wind area designs permit use of simpler support structures. All models feature full 3 Kw PEP power handling, VSWR typical 1.5 or less across all of 20, 15 and, on 10 meters, from 28.0 to 29.2 MHz. Drive impedance is 50 ohms and maximum element length 27'. They accommodate masts from 1½ to 2" diameter, withstand winds to 100 mph and are furnished complete with a low loss balun that easily withstands full rated power. For gain and front-to-back ratio specifications write or call the factory.

AX-210N TE-214W HB35T HB-33SP HB-43SP SSL-218 MLA-4 SQ007 SQ22 SQ61

Band	144Mhz	144Mhz	14/21/28Mhz	14/21/28Mhz	14/21/28/Mhz	144Mhz	3.5/7/14/21/28Mhz	432Mhz	144Mhz	50Mhz
Element	10x2	14x2	4/5/5	3	4	9x2	1	2x2	2x2	2
Gain	14.6dB	22.5dB	10/13/12.5dB	8.5/8.5/10dB	10/10/11dB	16.5dB	—	16dB	16dB	12dB
F/B Ratio	26dB	24dB	23dB	20dB	22dB	22.5dB	—	20dB	20dB	20dB
V.S.W.R.	1.5	1.3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Power R	500Wpep	1KWpep	2KWpep	2KWpep	2KWpep	1KWpep	250Wpep	250Wpep	250Wpep	250Wpep
Impedance	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm
Element L	1.07m	1.02m	8.4m	8.0m	8.0m	1.02m	1.8mx4	0.17m	0.57m	1.8/1.5m
Boom L	3.5m	5.7/2m	7.5m	4.0m	6.0m	3.5m	2.9m	0.54m	2.0m	1.8m
Turning Radius	1.79m	2.79m	5.56m	4.59m	5.08m	2.02m	—	0.43m	1.00m	0.90m
Wind Surface Area	0.23m ²	0.60m ²	0.75m ²	0.46m ²	0.62m ²	0.32m ²	0.05m ²	0.03m ²	0.15m ²	0.22m ²
Wind Load (EIA Std.80MPH)	23.0kg	59.5kg	75.0kg	46.0kg	62.0kg	32.0kg	5.2kg	3.0kg	15.0kg	22.0kg
Weight	4.6kg	13.7kg	24.4kg	14.1kg	19.4kg	8.6kg	3.7kg	2.1kg	3.1kg	4.7kg

TET ANTENNA SYSTEMS

AVAILABLE FROM YOUR AREA DISTRIBUTORS:
1,2,3,4,8,9 — SULTRONICS
5,6,7,0 — LUNAR ELECTRONICS

(513)376-2700
SULTRONICS
15 Sexton Dr., Xenia, Ohio 45385

LUNAR
electronics®

2775 Kurtz Street, Suite 11
San Diego, CA 92110-3171
Telephone (619) 299-9740
Telex 181747
Louis N. Anciaux WB6NMT

TEN-TEC
TEN-TEC



CLEANLINESS... **a unique CORSAIR virtue**

Cleanliness in the TEN-TEC CORSAIR means unusual spectral purity of both received and transmitted signals.

In Receive mode, even with the r.f. preamp in operation, the 3rd order intercept (at 20 kHz tone spacing) is +5 dBm. With the preamplifier off, the 3rd order intercept rises to a superlative +18 dBm and remains constant even at 3 to 6 kHz away from the pass-band.

In Transmit mode, if you look at the output of the CORSAIR on a spectrum analyzer, you note an almost complete absence of phase noise—a phenomenon which plagues most PLL transceivers. At 20 kHz from the carrier, the generated phase noise in the CORSAIR is a spectacular -148 dBc/Hz, and at 1 kHz it is -132 dBc/Hz.*

This breakthrough in circuit design, using proven crystal mixed oscillators with the latest USA solid state technology, is setting new standards of cleanliness and purity of signals. All of which means enhanced reception with less fatigue, lower noise floor, no overloading and more DX worked. And your signal will be a bit easier to read under adverse conditions. Compare.

Other virtues of the CORSAIR include:

- All solid state, broadband design
- All 9 hf bands
- Triple conversion receiver with 0.25 μ V sensitivity on all bands and better than 90 dB dynamic range
- Variable bandwidth plus Passband tuning
- Dual range, Triple mode, Offset tuning
- Variable Notch filter
- Built-in Speech Processor
- Built-in Noise Blanker
- 200 W input, 100% duty cycle
- Dual-speed QSK (full or semi)
- Many operating conveniences including headphone attenuator, cw signal spotter, 5-function meter, WWV reception, adjustable ALC threshold lighted status indicators, selectable AGC, adjustable pitch and volume of side-tone, complete interfacing.
- Full accessory line including remote VFO, keyers, microphones, power supplies, antenna tuners, ssb and cw filters.
- Reliable American manufacture and service, fully warranted.

See CORSAIR at your TEN-TEC dealer, or write for full details.
TEN-TEC, Inc., Sevierville, TN 37862

**Specifications measured by independent laboratory*

5-STORE BUYING POWER *in action!*

Unlike some retailers, when Ham Radio Outlet guarantees satisfaction there'll be no question. **YOU CAN COUNT ON IT!**

KENWOOD SPECIALS!!



TS-930S w/Antenna Tuner Plus 3 Free Bonus Items

1)-SP-930 SPKR.
2)-MC-60A MIC.
3)-YK-88C-1 FILTER.

Reg. \$2029 Value
\$1799
A \$230.00 SAVING
Free Shipment UPS (Brown).



TR-2500/
TR-3500
SAVE!

SUBSTANTIAL SAVINGS

TS-430S

Check our low prices and don't forget Free Shipment UPS (Brown).



ALL ETO ALPHA SPECIAL SALE PRICES

Example: **76PA \$1699.95**

NEW! MIL-SPEC 1030 **signal/one.**

General coverage: 10kHz-30MHz.
Power output: 150W PEP.
Built-in. AC/DC, speaker, RF clipping, Pre-IF adjustable noise blanker. Synthesized passband tuning. IF notch filter. Seven digit readout. Much more.

Ask for details.



IC-740 w/ FREE EX-238 Power Supply Plus

\$50
FACTORY REBATE
LIMITED TIME ONLY

CHECK LOW, LOW PRICE



KT-34A SALE \$299
KT-34XA SALE \$459

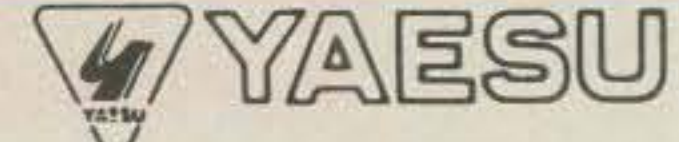
PRICES ARE FOB CALIF. EXCEPT FOR CERTAIN COMBINATIONS. PLEASE INQUIRE



W-51 SALE \$799
W-36 CALL FOR PRICE
LM-470D CALL FOR PRICE



B-3016 REG. \$239.95 SALE \$199.95
B-1016 REG. \$279.95 SALE \$249.95
B-108 REG. \$179.95 SALE \$159.95
B-23S REG. \$89.95 SALE \$79.95



CALL FOR LOW PRICES ON HAND-HELDS and all YAESU ITEMS



FT-208R

FT-708R



NEW! FT-980

FREE SHIPMENT (U.P.S. Brown) CONTINENTAL U.S.A.

ON MOST ITEMS THAT CAN BE SHIPPED UPS BROWN. THERE ARE SOME EXCEPTIONS IN ALPHA, TRI-EX AND KLM

FREE PHONE 800 854-6046

9:30AM to 5:30PM PACIFIC TIME.

OVER-THE-COUNTER, 10AM to 5:30PM.

MONDAY THROUGH SATURDAY

CALIFORNIA CUSTOMERS PLEASE PHONE OR VISIT LISTED STORES.

ANAHEIM, CA 92801

2620 W. La Palma,
(714) 761-3033 (213) 860-2040
Between Disneyland & Knott's Berry Farm

BURLINGAME, CA 94010

999 Howard Ave., (415) 342-5757
5 miles south on 101 from S.F. Airport.

SERVING HAMS BETTER.
North...south...east...west.

Bob Ferrero, W6RJ
Jim Rafferty, N6RJ
other well known hams give you courteous, personalized service.



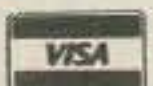
HAM RADIO OUTLET™



OAKLAND, CA 94609
2811 Telegraph Ave., (415) 451-5757
Hwy 24 Downtown. Left 27th off-ramp.

SAN DIEGO, CA 92123
5375 Kearny Villa Road (619) 560-4900
Hwy 163 & Clairemont Mesa Blvd.

VAN NUYS, CA 91401
6265 Sepulveda Blvd., (213) 988-2212
San Diego Fwy at Victory Blvd.



AEA • ALLIANCE • ALPHA • AMECO • AMPHENOL • ARRL • ASTRON
AVANTI • BELDON • BENCHER • BERK-TEC • BIRD • B & W
BUTTERNUT • CALLBOOK • CDE • COLLINS • CURTIS • CUSHCRAFT

DAIWA • DRAKE • DX EDGE • DX ENGINEERING • EIMAC
HUSTLER • HY-GAIN • ICOM • J. W. MILLER • KENWOOD • KLM
LARSEN • LUNAR • METZ • MFJ • MICRO-LOG • MINI-PRODUCTS

MIRAGE • NYE • PALOMAR • ROBOT • ROHN • SHURE
SIGNAL-ONE • TEMPO • TEN-TEC • TRISTAO • VOCOM • YAESU
and many more!

Prices, specifications, descriptions subject to change without notice. Calif. residents please add sales tax.

When an idea germinates, it's still theory until you actually get to try it out. WB0DGF took the idea and went with it through research, modeling, and testing.

The Open-Sleeve Antenna

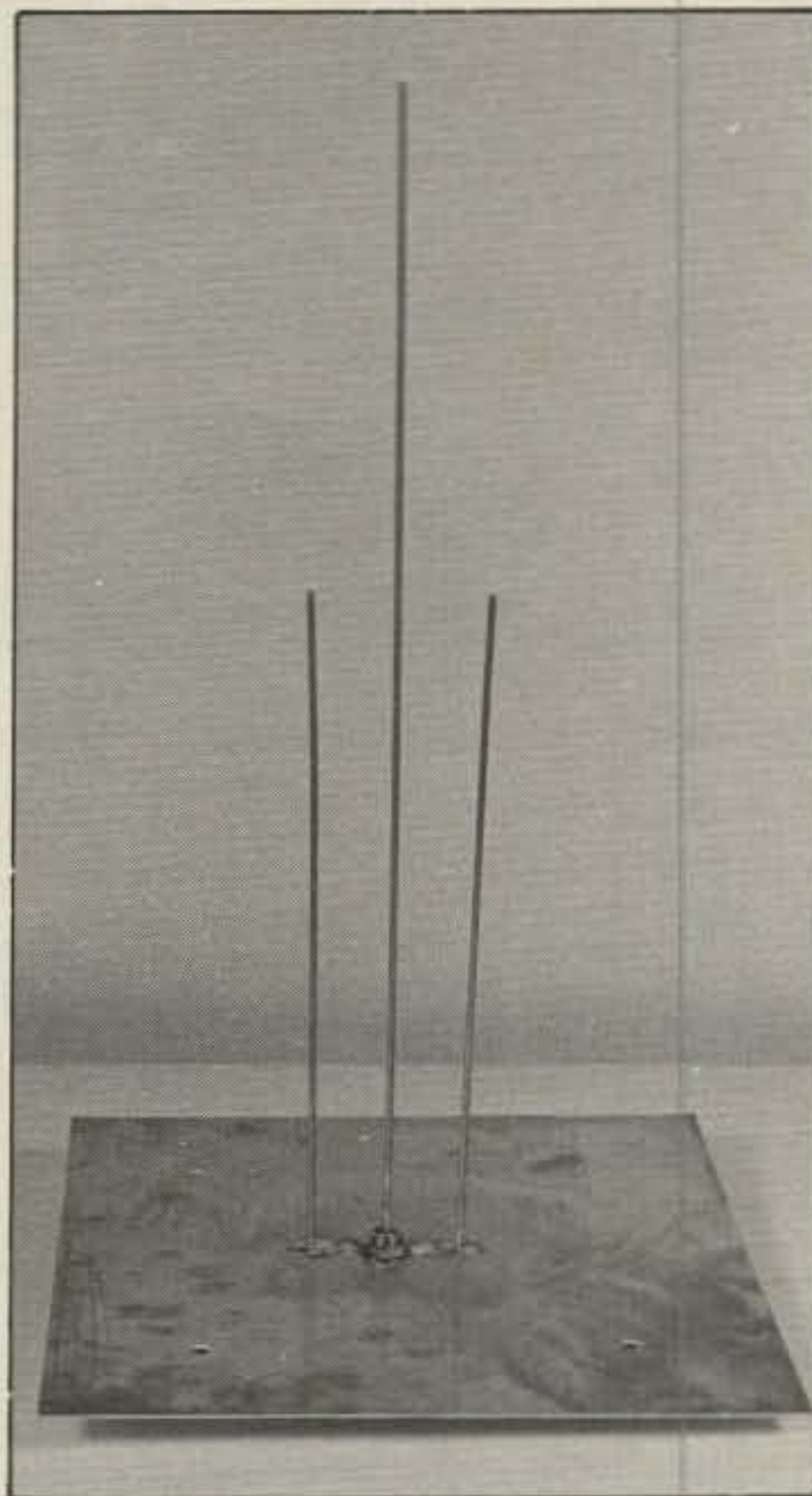
Development of the Open-Sleeve Dipole and Open-Sleeve Monopole for H.F. and V.H.F. Amateur Applications

BY ROGER A. COX*, WB0DGF

A broadband antenna for 80 meters tugged at my curiosity after the 1982 Dayton Hamvention. It was a dipole antenna sold by Snyder Antenna Corp. that exhibited a v.s.w.r. curve with two dips—a double resonance within the same band. Upon returning home and leafing through the pages of the just-arrived April '82 IEEE *Antennas and Propagation Newsletter*, I spotted a familiar v.s.w.r. curve. An antenna for military satellite communications had the same double-resonance v.s.w.r. curve as the 80 meter dipole. After closer examination of the article,¹ which explained various types of v.h.f. and u.h.f. antennas developed by the Aerospace Corporation, I told myself that the antenna with the double resonance may not use the same method in obtaining its broadband performance, but it was certainly worth further investigation. The v.h.f. antenna was an open-sleeve dipole in front of a plane reflector.

I sent for the report listed as a reference in the article. Interestingly, this report was dated January 15, 1973. That would mean that this antenna had been around for awhile, yet I had never read anything about an open-sleeve dipole.

The first thing that came to my mind when I saw the term *open-sleeve dipole* was the conventional sleeve dipole where you strip the insulation off the end of a length of coaxial cable. Then you fold a $\frac{1}{4}$ wavelength of braid back upon the cable to form a center-fed $\frac{1}{2}$ -wavelength dipole. I knew that this antenna doesn't work well unless the ratio between the folded-back shield and the coaxial shield is increased. This is the basis for the sleeve decoupling system used on many v.h.f. antennas. I thought that this was



Modeling antennas need not be all that complicated. Here is a version of the open-sleeve antenna as modeled by the author, WB0DGF.

probably not the same as the open-sleeve dipole.

Upon inquiry, I was told that a sleeve antenna can take another form. I was also told to go look in a book entitled *VHF Techniques*.² This was a fairly old book, being published in 1947. Consequently, it was not in my collection of antenna books. Luckily I was able to borrow it from a colleague so that I could find out what a sleeve antenna was.

The book's definition of a sleeve antenna is as follows:

"An electromagnetic radiator is termed a sleeve antenna when it incorporates a tubular conductor, i.e., sleeve, of which the exterior is used as a radiating element and the interior as the outer conductor of the coaxial transmission line that feeds the antenna."

So far this sounds like the familiar sleeve decoupler. Reading on: "The length of the sleeve may be any portion of the total length of the antenna." This seemed totally different from the $\frac{1}{4}$ -wavelength sleeve decoupler. The book went on to describe various forms of the sleeve monopole as shown in figs. 1 and 2.

Continuing from the book:

"It will be noticed that each of these has been shown to possess a sleeve with the inner diameter substantially less than the outer. In each case a crosshatched region between the walls of the sleeve is shown. It is evident, from consideration of the structures, that the performance of the antennas will in no way depend upon whether the crosshatched regions are empty or are filled with metal, since they are separated from all fields by continuous metal surfaces. This matter has been brought out to distinguish the sleeve antenna as defined here from the type of antenna shown in figure 3, which also involves a "sleeve" element but which differs in that the sleeve is used as a choke and the space corresponding to the crosshatched regions of figure 2 must be empty in order that the choking effect take place. Antennas of this latter type are usually forms of center-fed cylindrical dipoles, and the purpose of the sleeve is merely to permit feeding them with coaxial transmission line."

Now I knew the difference between the two types of sleeve antennas. The book also went on to describe how the sleeve dipole evolved from the sleeve monopole. Some of these are shown in fig. 4.

The impedance of the sleeve dipole (or

*3451 Dudley, Lincoln, NE 68503

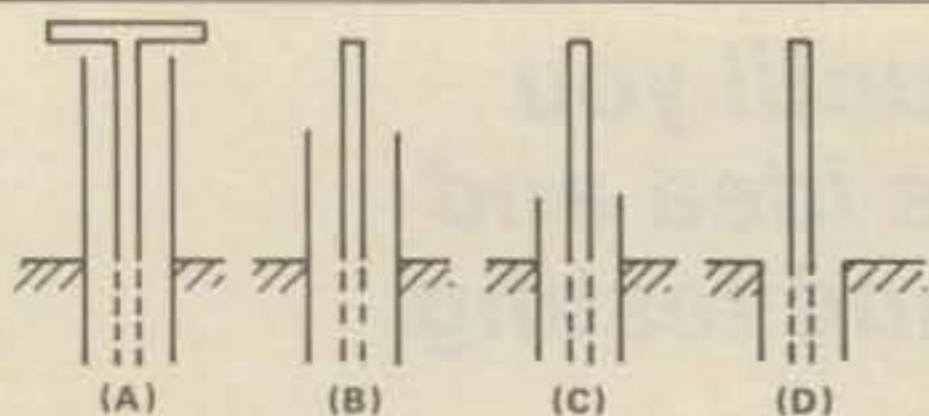


Fig. 1- Sleeve-stub antennas with uniform cross section.

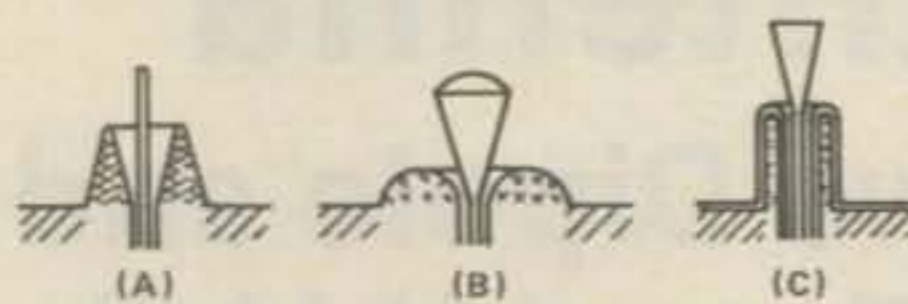


Fig. 2- Sleeve-stub antennas with non-uniform cross section.

sleeve monopole) can be optimized with the use of tapered elements, as shown in fig. 4 (C), (D), and (E). Also, the radiation pattern can be controlled by the maximum length of the dipole. As shown in fig. 5, I could not allow the maximum length ($2L$) to exceed 1.0 wavelength at a given frequency without introducing major sidelobes into the radiation pattern.

Although the book made a very good argument for an antenna that exhibits rugged mechanical construction and favorable broadband characteristics, I could not justify to myself using this type of antenna in anything other than certain v.h.f. or u.h.f. antennas. It would be a very bulky antenna on any frequency less than 100 MHz, and tuning the antenna by changing the sleeve taper or diameter ratio would be a very time-consuming process.

The Open-Sleeve Antenna

Luckily the Aerospace Corporation report³ arrived before I lost interest in the design; and upon reading it, I was amazed at the simplicity and flexibility of the construction.

The basic design of an open-sleeve dipole consists of a conventional center-fed dipole with two shorter parasitic sleeve elements closely spaced on both sides and parallel to the center-fed dipole. The length of the center-fed dipole corresponds to a half wavelength at a frequency f_1 , and the lengths of the sleeves correspond to half wavelengths at a higher frequency, f_2 . As shown before in the conventional coaxial sleeve dipole, the ratio of f_2 to f_1 cannot exceed 2:1 without creating significant sidelobes. Typical spacing between the sleeve elements and the central dipole is on the order of 4-12 times the diameter of the elements. A comparison of the v.s.w.r. response of a typical open-sleeve dipole with that of a conventional cylindrical dipole of the same dimension is given in fig. 6.

I could easily see the noticeable increase in bandwidth obtained by this design. The report states that an open-sleeve dipole can be operated over a bandwidth of 1.8:1 as compared with an operating



Fig. 3- Center-fed coaxial dipole.



Fig. 4- Evolution of sleeve-dipole antennas from sleeve-monopole antennas.

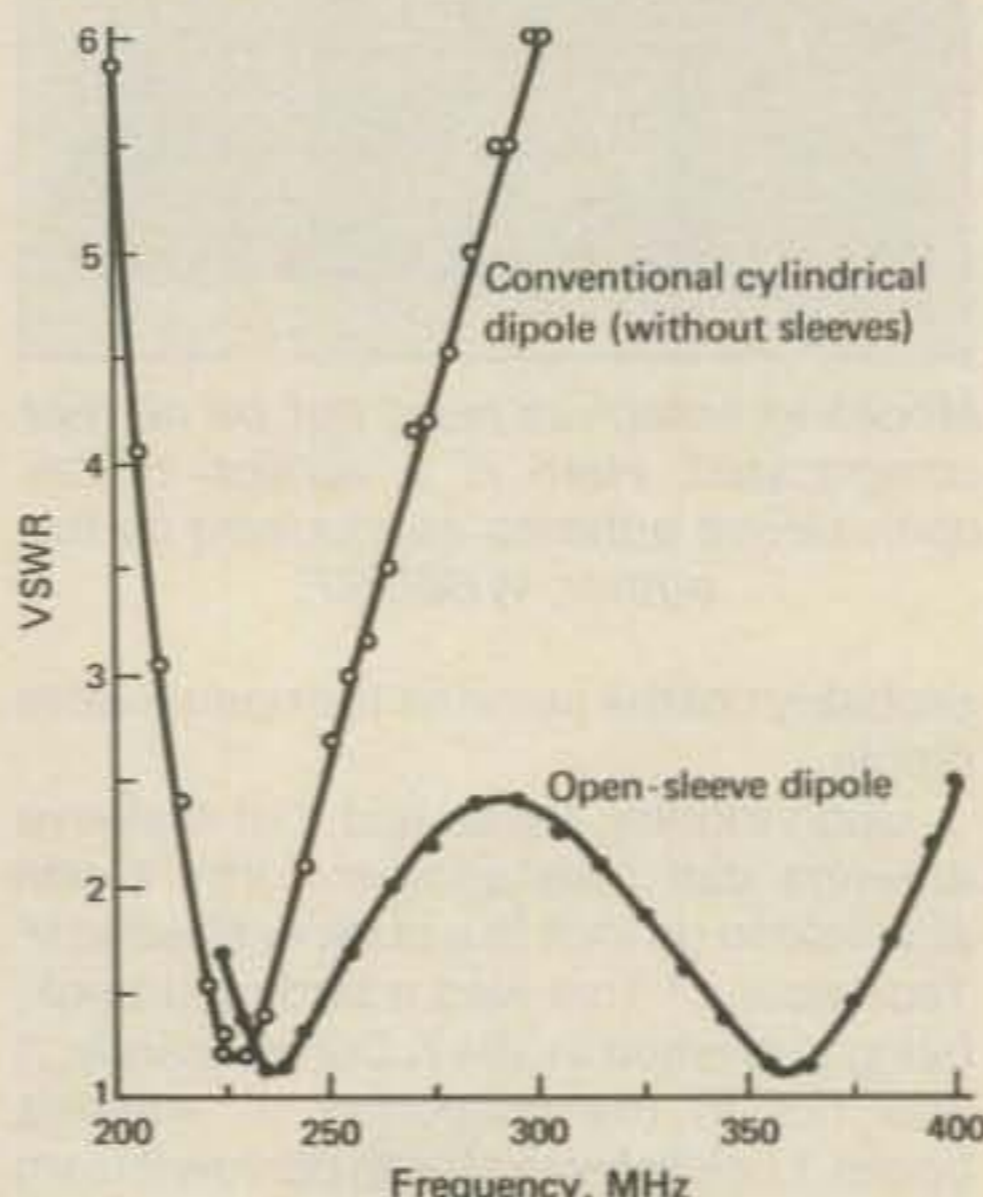
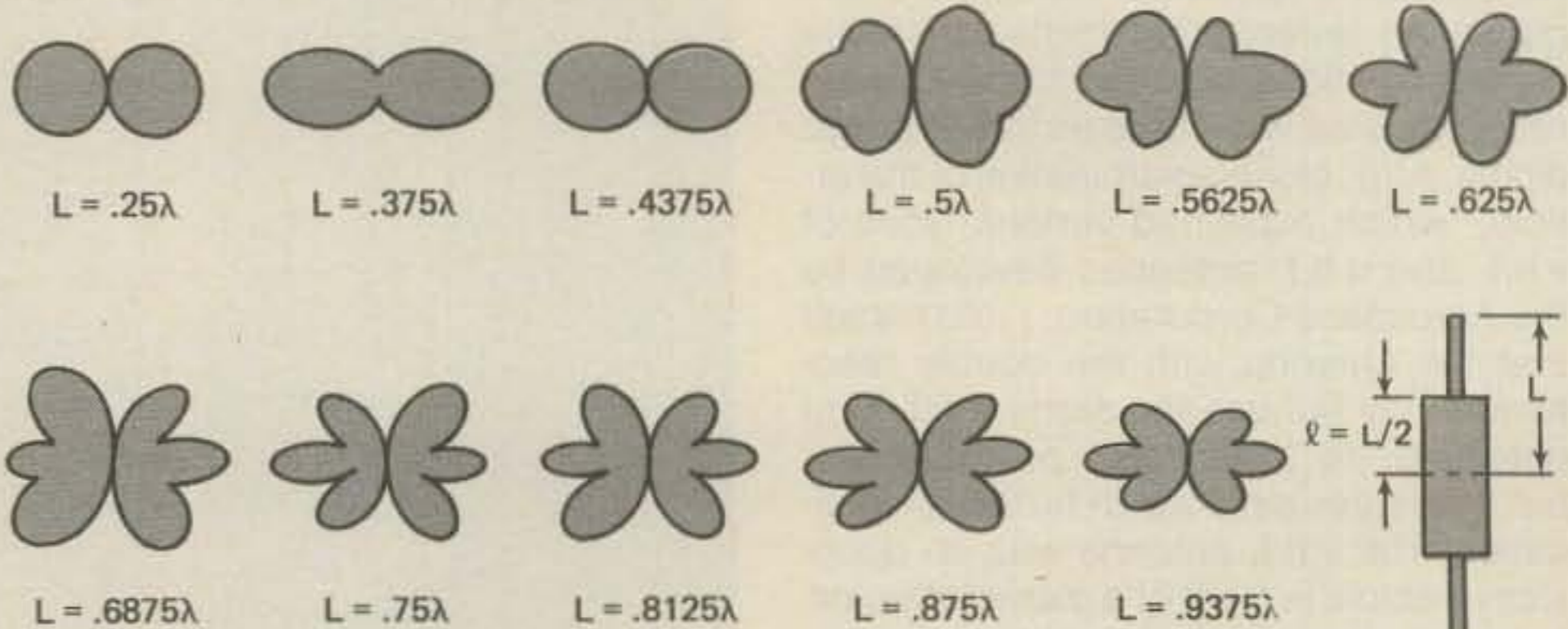


Fig. 6- V.s.w.r. response of an open-sleeve dipole and a conventional dipole.

bandwidth of 1.25:1 for a conventional cylindrical dipole.

What this means is that a cylindrical dipole that was constructed to cover 100 to 125 MHz could, with the addition of the appropriate sleeve elements, be made to cover 100 to 180 MHz instead. Pattern, gain, and impedance variations would be similar to those of the cylindrical dipole alone, but only over a much wider frequency range.

The possibilities of various broadband v.h.f. and u.h.f. antennas were tremendous. I could now cover 88-158 MHz, 138-248 MHz, 225-405 MHz, and 450-810 MHz, each as a separate broadband antenna. But these incredible bandwidths could also be achieved by very large diameter cylindrical monopoles and structures such as discones. What I needed to do was to take a look at the physical size of the antenna structures and compare them.

Size vs Bandwidth

Various open-sleeve dipole arrangements have been described by H.E. King and J.L. Wong.⁴ From the information presented in their article, I could see that I would need dipole element diameters of at least 1.125 inches in order to cover 225-400 MHz under 2.5:1 v.s.w.r. Overall dimensions of the antenna would be 5.125 inches wide, 1.125 inches thick, and 20.375 inches long. Scaling this an-

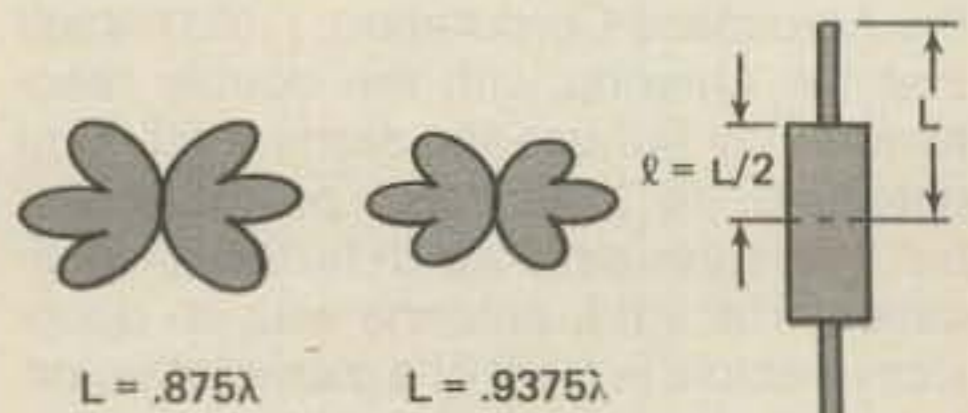


Fig. 5- The measured field patterns of a sleeve dipole. (Note: $1 = 0.5L$, $D = 0.25L$, $d = 0.5D$.)

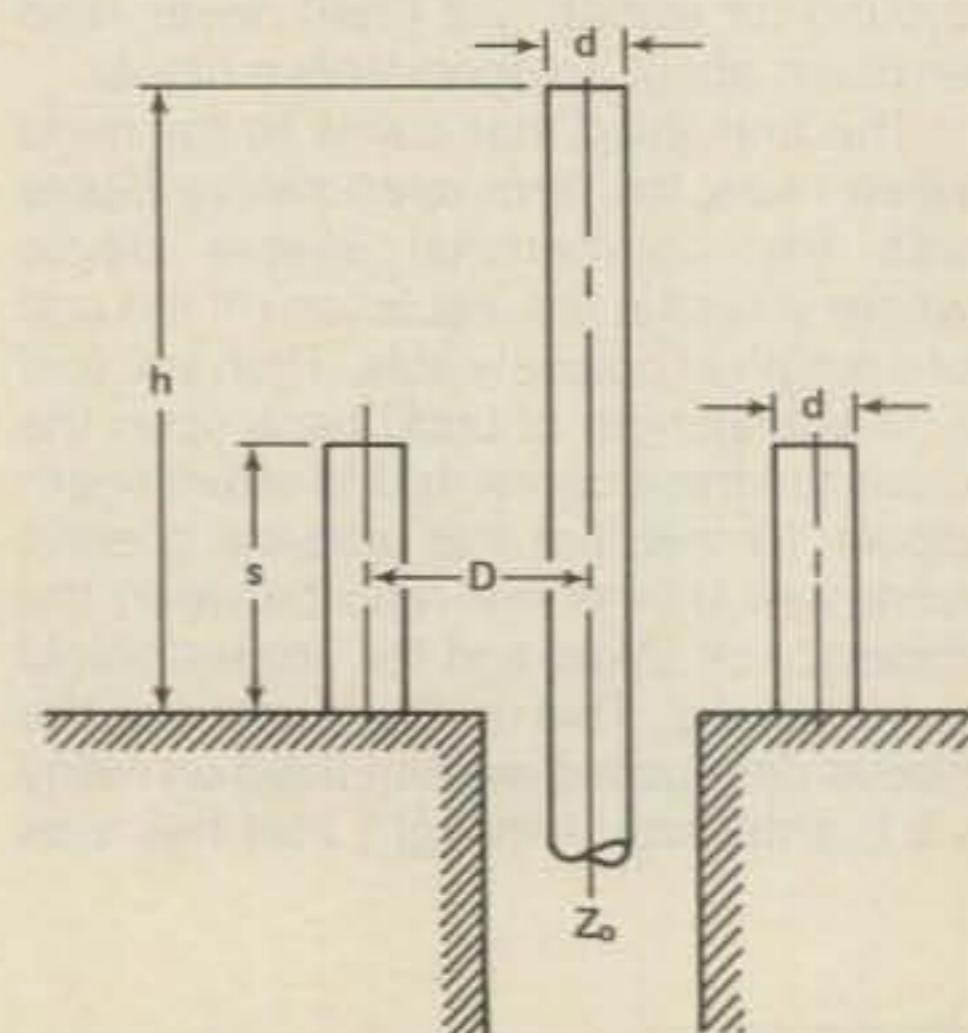


Fig. 7- An open-sleeve monopole.

MFJ

ANTENNA TUNERS

16
MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



Ham Radio's most popular antenna tuner. Improved, too.

\$89⁹⁵
(+ \$4)

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.

Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has

SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, \$79.95 (+ \$4), like 941C less balun. MFJ-945, \$79.95 (+ \$4), like 941C less antenna switch. MFJ-944, \$79.95 (+ \$4), like 945, less SWR/Wattmeter. MFJ-943, \$69.95 (+ \$4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, \$3.00.

MFJ-900 VERSA TUNER



MFJ-900

\$49⁹⁵
(+ \$4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, \$59.95 (+ \$4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, \$39.95 (+ \$4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II



MFJ-949B

\$139⁹⁵
(+ \$4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load. SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III



MFJ-962

\$229⁹⁵
(+ \$10)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, \$189.95 (+ \$10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, \$4.95.

MFJ-984 VERSA TUNER IV



MFJ-984

\$329⁹⁵
(+ \$10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, \$239.95 (+ \$10), like 984 less ant. switch, ammeter.

MFJ-982, \$239.95 (+ \$10), like 984 less ammeter, SWR/Wattmeter. MFJ-980, \$209.95 (+ \$10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V



MFJ-989

\$329⁹⁵
(+ \$10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf-6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al. cabinet. Tilt bail.

CIRCLE 89 ON READER SERVICE CARD

To order or for your nearest dealer

CALL TOLL FREE,  
800-647-1800

For tech. info., order or repair status, or calls outside continental U.S. and inside Miss., call 601-323-5869.

- All MFJ products unconditionally guaranteed for one year (except as noted).
- Products ordered from MFJ are returnable within 30 days for full refund (less shipping).
- Add shipping & handling charges in amounts shown in parentheses.

Write for FREE catalog, over 80 products

MFJ ENTERPRISES, INCORPORATED

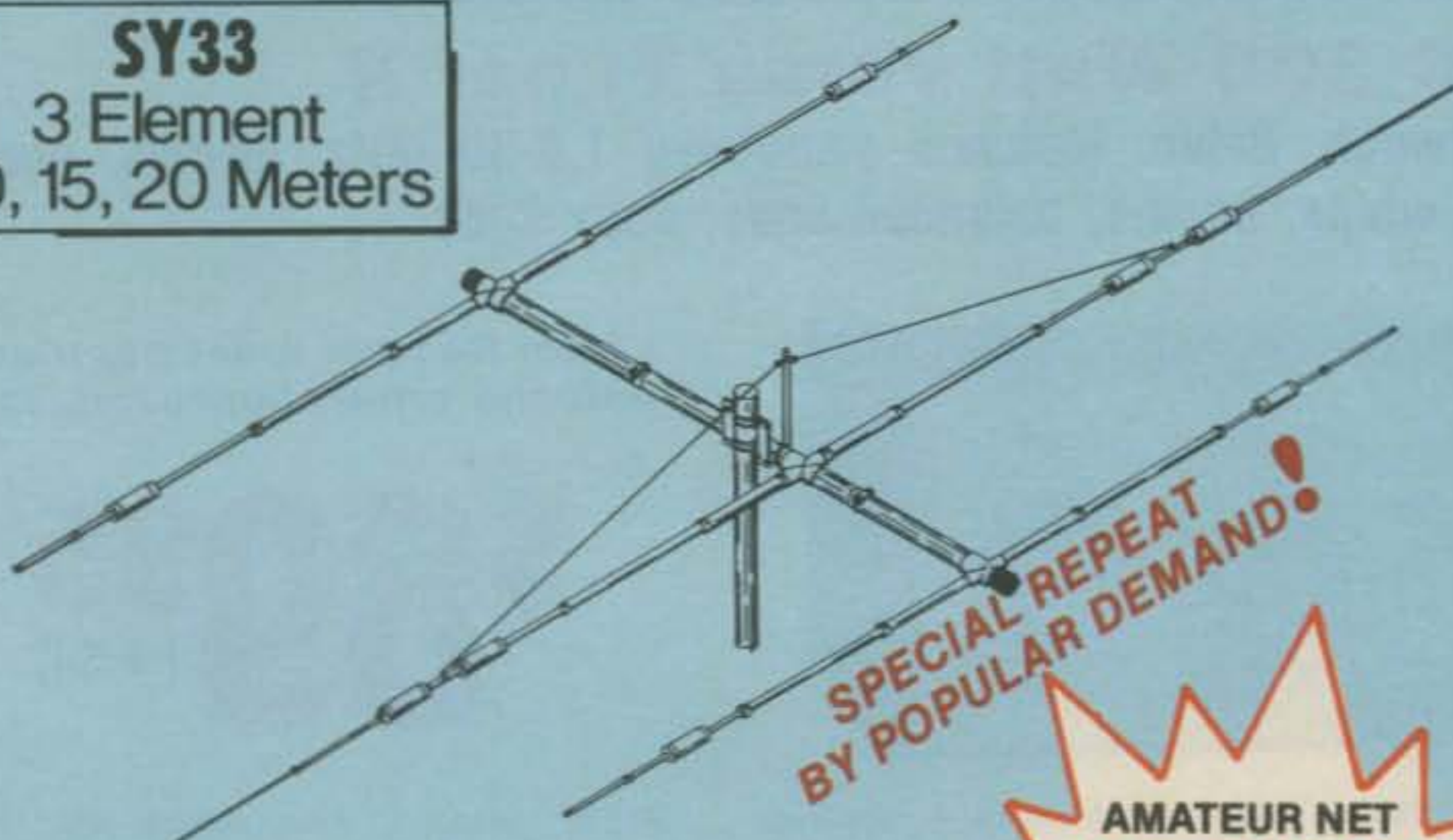
Box 494, Mississippi State, MS 39762

Say You Saw It In CQ

WILSON ANTENNAS ARE BACK...

AND **MACO** IS THE MANUFACTURER

SY33
3 Element
10, 15, 20 Meters

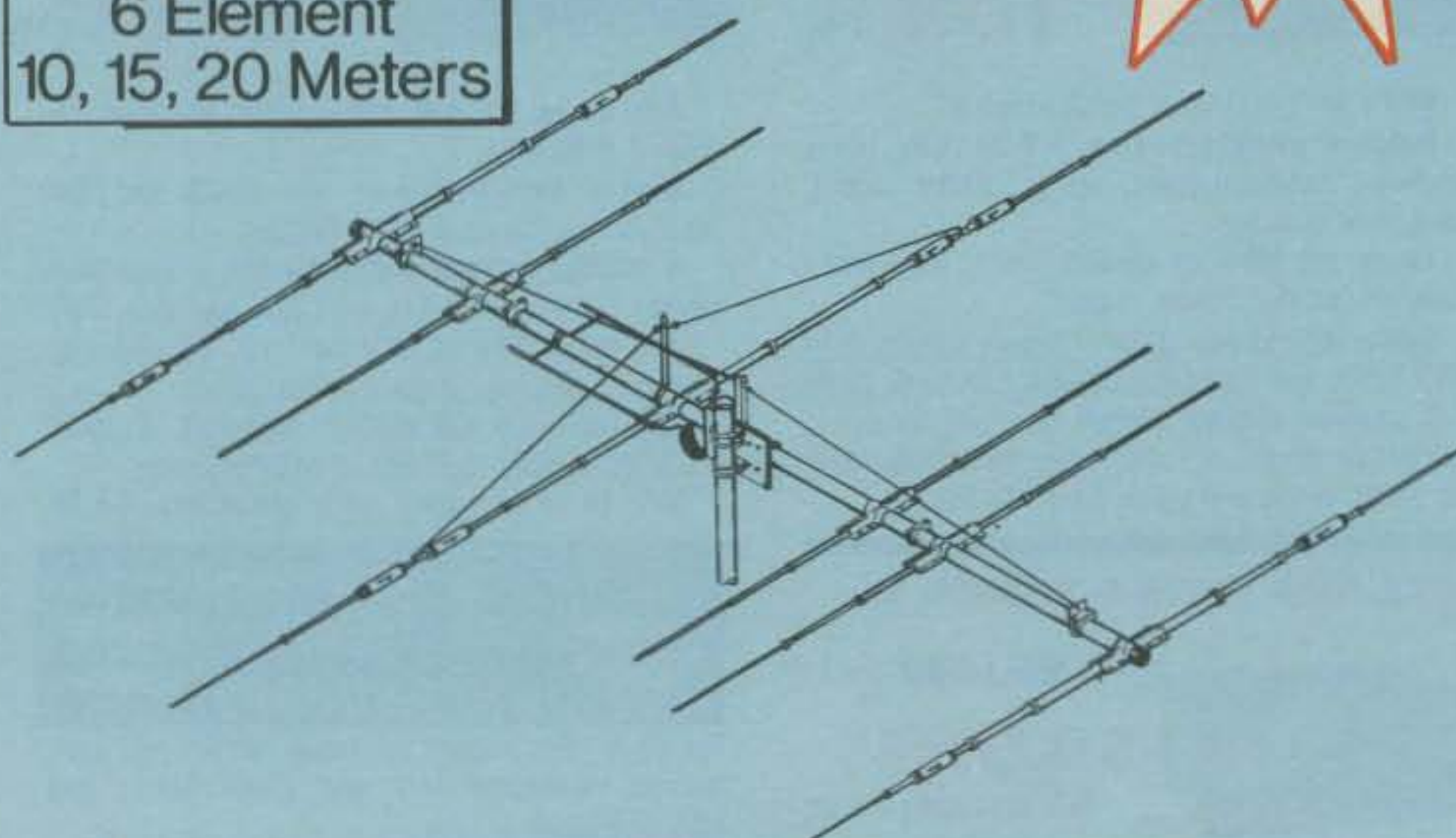


Band MHz:	14-21-28	Longest element:	27'4"
Maximum power input:	legal limit	Turning radius:	15'9"
Gain (dBd):	up to 8 dB	Maximum mast diameter:	2" O.D.
VSWR at resonance:	1.3:1	Surface area:	5.7 sq. ft.
Impedance:	50 ohms	Wind loading at 80 mph:	114 lbs.
F/B ratio:	up to 20 dB	Assembled weight (approx.):	37 lbs.
Boom (O.D. x length):	2" x 14'4"	Shipping weight (approx.):	42 lbs.
No. elements:	3	Direct 52 ohm feed no balun required	
		Maximum wind survival:	100 mph

**SPECIAL REPEAT
BY POPULAR DEMAND!**

AMATEUR NET
~~\$282.00~~ **\$239.70**
**4TH OF JULY
SPECIAL!!!**
Charge Card
or Cashiers Check
with orders
earn free freight
Continental U.S.A.
AMATEUR NET
~~\$387.00~~
\$328.95

SY36
6 Element
10, 15, 20 Meters



Band MHz:	14-21-28	Longest Element:	29'6 1/2"
Maximum power input:	legal limit	Turning radius:	19'1"
Gain (dBd):	up to 9 dB	Maximum mast diameter:	2" O.D.
VSWR at resonance:	1.1:1	Surface area:	8.6 sq. ft.
Impedance:	50 ohms	Wind loading at 80 mph:	215 lbs.
F/B ratio:	up to 20 dB	Assembled weight (approx.):	53 lbs.
Boom (O.D. x length):	2" x 24'2 1/2"	Shipping weight (approx.):	62 lbs.
No. elements:	6	Maximum wind survival:	100 mph

ADD 30 AND 40 METERS TO YOUR TRI-BAND WITH THE NEW 33-6 MK AMATEUR NET ~~\$99.00~~ \$84.15

Now you can have the capabilities of 30 meter and 40 meter operation on the System 36 and System 33. Using the same type high quality traps, the new addition will offer 200 kHz of bandwidth at less than 2:1 SWR. The new 33-6 MK will fit your present SY36 or SY33, and using the same single feed line.

WV-1A
4 BAND TRAP VERTICAL
(10 - 40 METERS)
AMATEUR NET
~~\$99.00~~ \$84.15

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured are large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a base mount bracket to attach to vent pipe or to a mast driven in the ground.

SPECIFICATIONS

- 19' total height
- Self supporting—no guys required
- Weight—14 lbs.
- Input impedance: 50Ω
- Power-handling capability: Legal Limit
- Two High-Q traps with large diameter coils
- Low angle radiation
- Omnidirectional performance
- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

CALL US FOR THE DEALER CLOSEST TO YOU

4091 Viscount, Memphis, Tennessee 38118

Order From Your Dealer or Call:

(901) 794-9494

Maco Manufacturing Co.
Division of Majestic Communications, Inc.

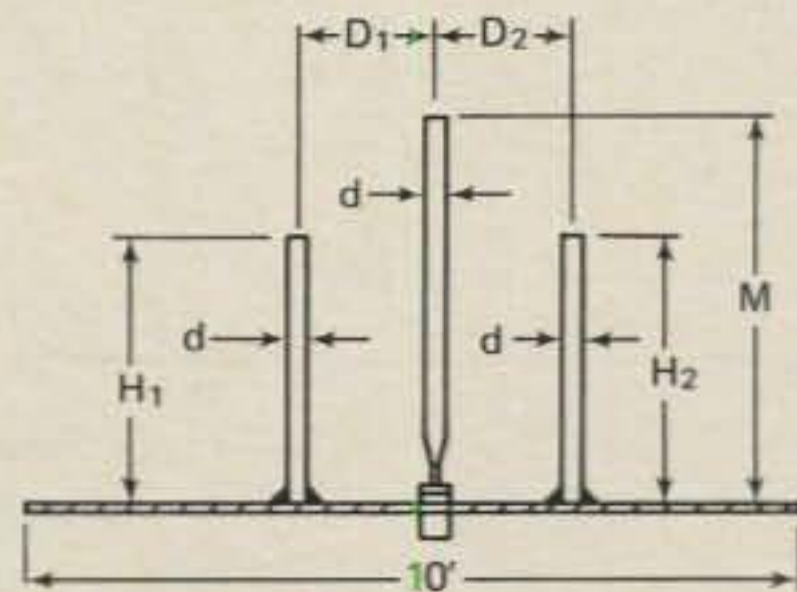
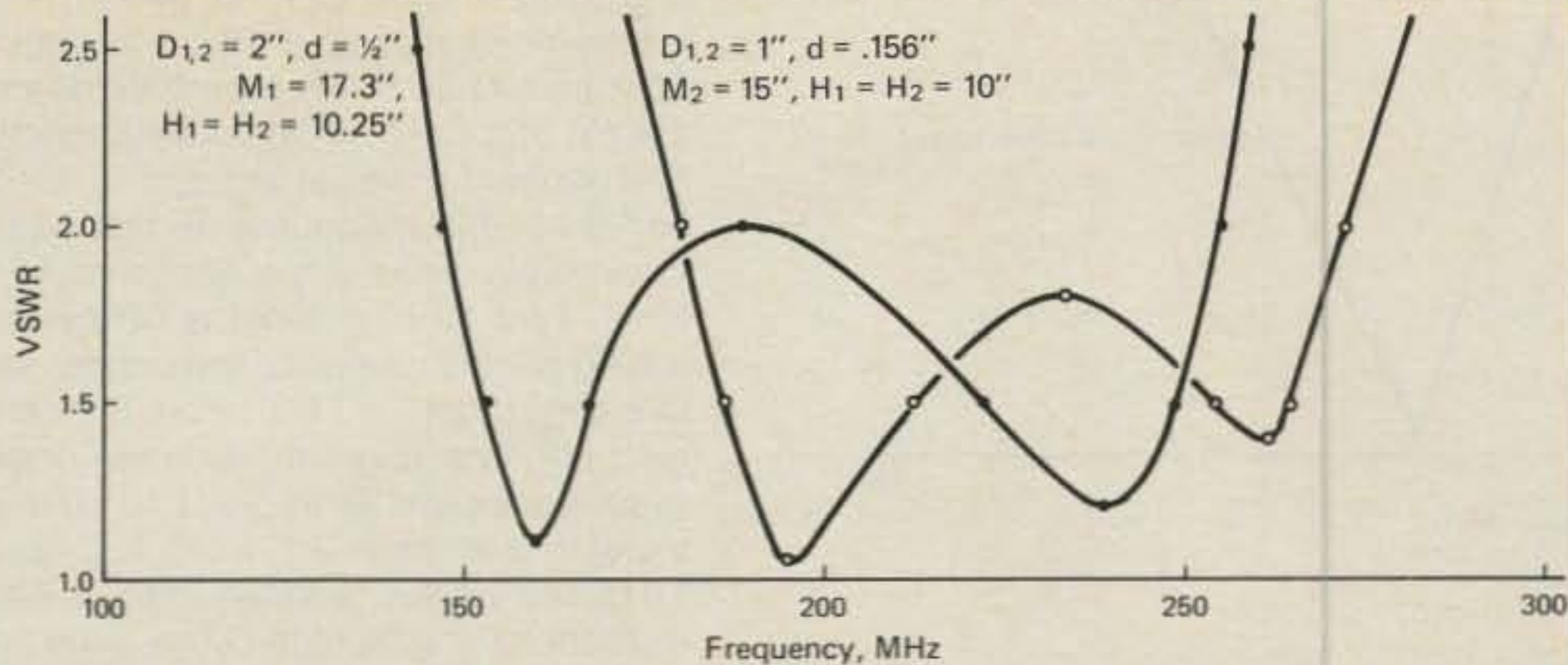


Fig. 8- V.s.w.r. curve of the 195 and 260 MHz modeled antenna. A variation in construction using 1/2 inch O.D. tubing and 2 inch separation is also shown.

tenna structure by 1.6 so that the lowest frequency is 140 MHz gives overall dimensions of 8.2 inches wide, 1.8 inches thick, and 32.6 inches long. This would permit coverage from 140 MHz to 249 MHz under 2.5:1 v.s.w.r.

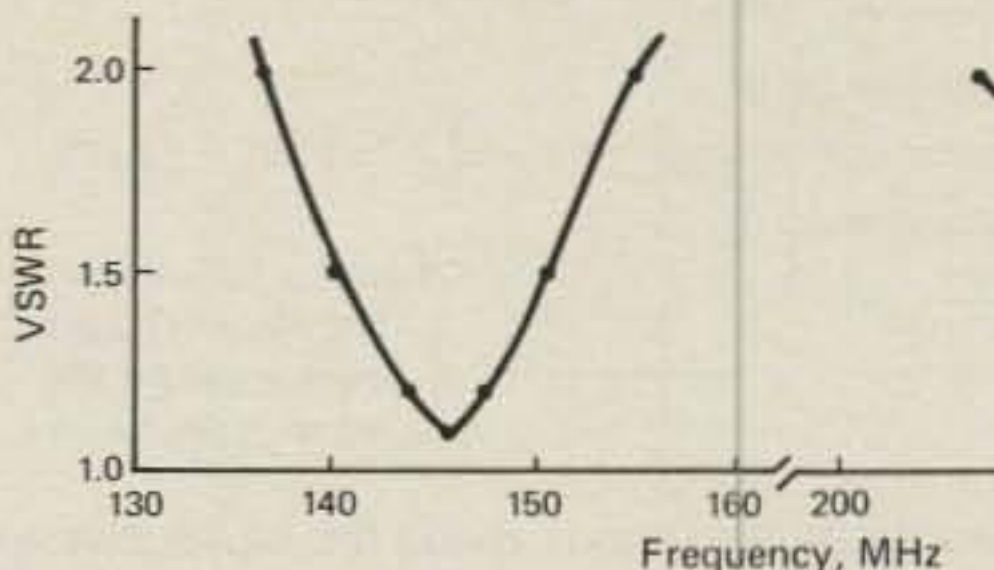
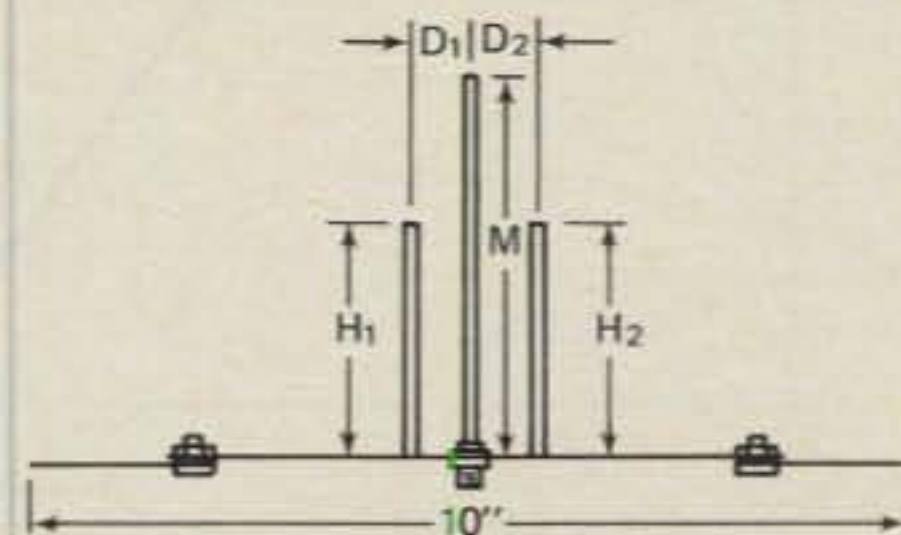
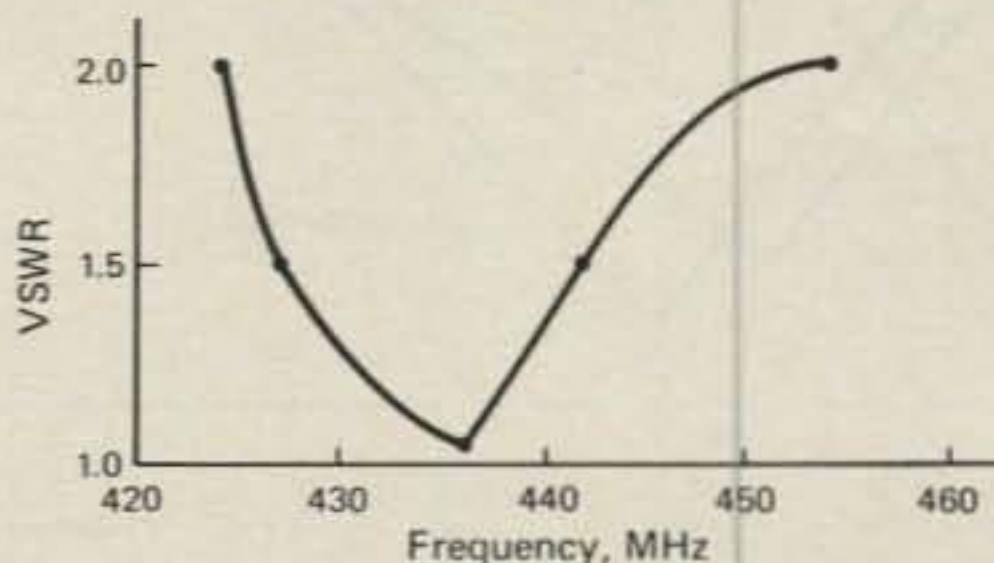
A broadband antenna presented by Dave Geiser, WA2ANU, in December 1978 *QST* and the *ARRL Antenna Book*⁵ is the discone for 144, 220, and 420 MHz. Although it has a higher cutoff frequency, the lowest frequency, which determines the maximum dimensions, is 140 MHz. For comparison, its overall dimensions are 22.563 inches in diameter by 20 inches tall. Although the discone covers a much broader frequency range, the open-sleeve dipole, because of its long, slender geometry, should lend itself more readily as a driven element in more complex antenna structures such as Yagis and corner reflectors. In fact, Telex Communications, Inc. has applied for a patent on the use of open-sleeve dipole elements in Yagi-Uda arrays. They also have a product called the Explorer 14, which utilizes this application in a tri-band Yagi beam.

The Open-Sleeve Monopole

Although the studies of the open-sleeve antenna by King and Wong concentrated on applications of the open-sleeve dipole at v.h.f. and u.h.f., the earliest studies of the open sleeve by H.B. Barkley in June 1955 dealt with the open-sleeve monopole.⁶ Barkley's MSEE thesis for the U.S. Naval Postgraduate School contains the results of an investigation into the properties of the open-sleeve monopole.

The open-sleeve monopole had previously been patented by Dr. J.T. Bolljahn of Stanford Research Institute and was issued patent no. 2,505,751 in May of 1950. During the fall of 1954 it was suggested to Mr. Barkley that the open-sleeve antenna would be a possible subject of investigation for an 11-week industrial tour with Stanford Research Institute from January through March 1955. Barkley's paper contains the results of this investigation.

The basic principles of the open-sleeve monopole are the same as those of the



M = 19.875"
H₁ = H₂ = 12.000"
D₁ = D₂ = 1.25"
Element O.D. = d₁ = d₂ = 0.156"

Fig. 9- A third variation of the test antenna. This version tunes 2, 1 1/4, and 3/4 meters.

open-sleeve dipole. The form of the open-sleeve monopole is shown in fig. 7.

The longer central driven element controls the low-frequency resonance, and the shorter sleeve elements control the high-frequency resonance. The diameter of the elements controls the maximum

v.s.w.r. between the two resonances. In all cases sleeve elements are grounded.

Tests on the V.H.F. Open-Sleeve Monopole

I constructed three v.h.f. models of the



JAL Radio Communications

210 51ST STREET SW · CANTON, OHIO 44706 · (216) 484-3353

- B&W Coax Switches #595 \$29.95
- B&W Dipoles and Coils
- Kantronics Code Tapes, Interfaces, Software
- Mosley Antennas
- Telex Hy-Gain Antennas TH7DXX S \$369.95
- Telex CDE Ham IV Rotor \$193.50
- Close-Out Stock Cushcraft Antennas 214FB \$67.50, 214B \$67.50







MFJ Products

1224 Computer Interface NEW	959 RCVR Tuner \$76.95
1212 CW Computer Interface . . . \$84.90	941C XCVR Tuner \$77.35
1200 CW Interface \$59.95	1020 Indoor Active Antenna . . . \$67.95

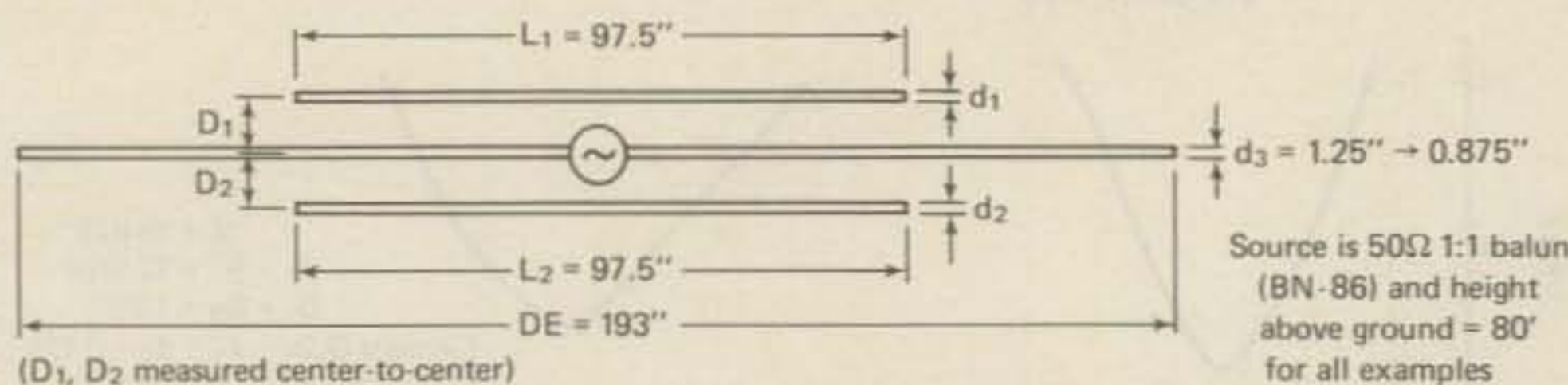
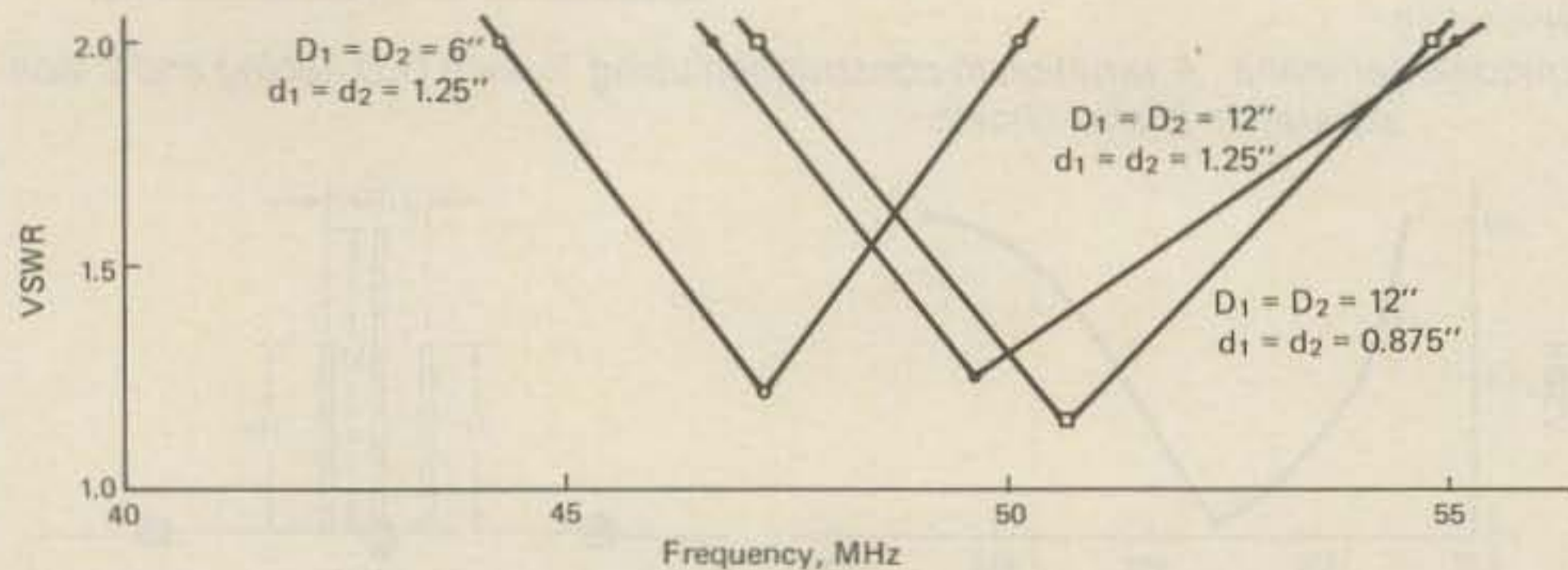
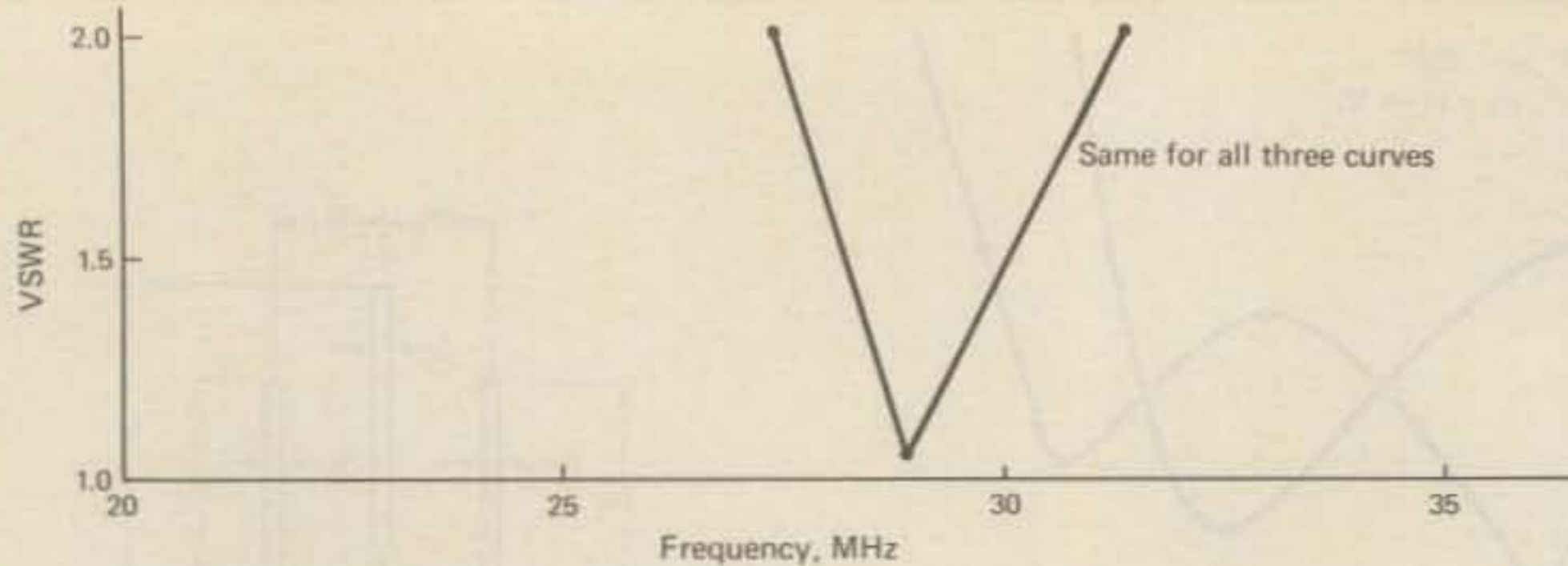
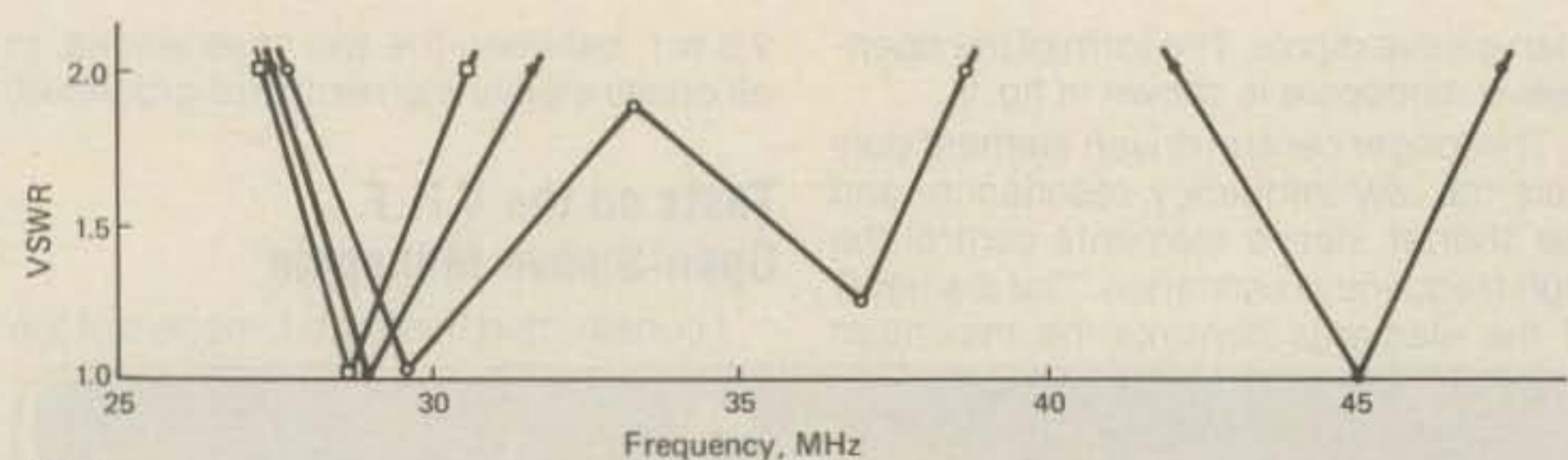
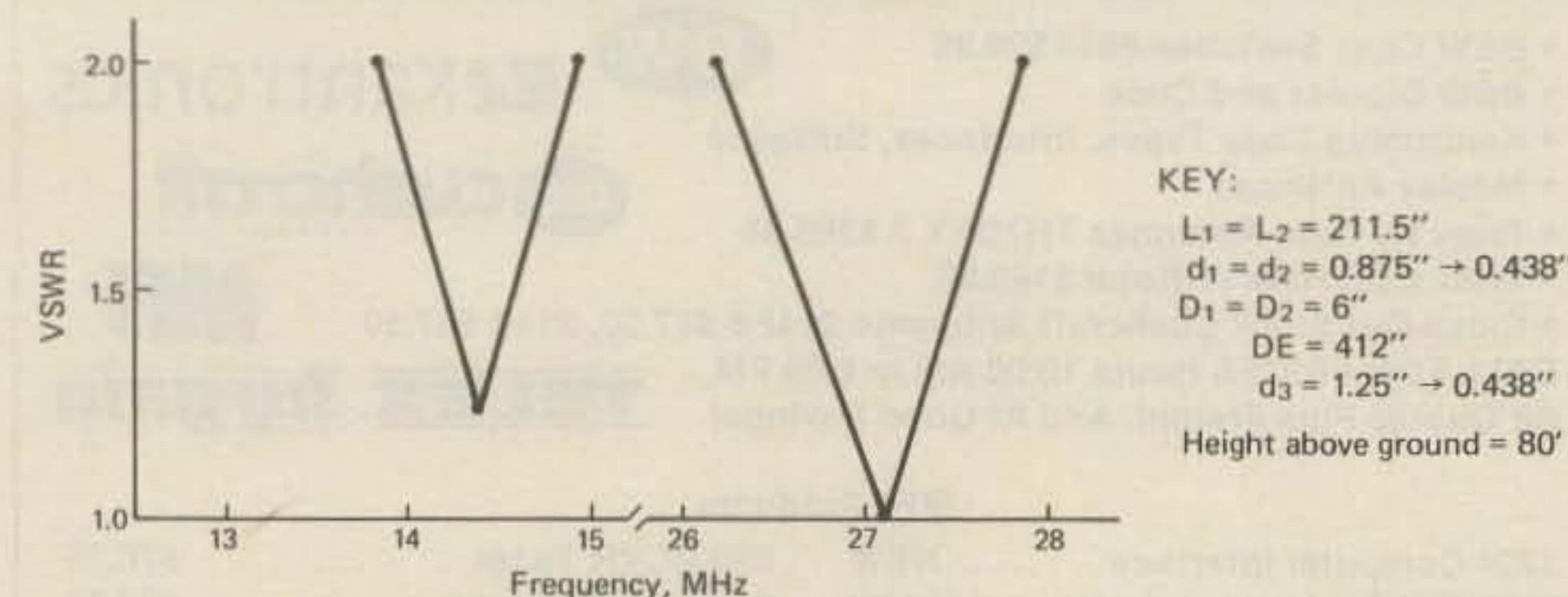


Fig. 10- The v.s.w.r. curves for three different configurations using the same sleeve length of 97.5 inches.



KEY:
 □ DE alone DE = 193"
 ● L₁ = L₂ = 109.5" D₁ = D₂ = 6"
 ○ L₁ = L₂ = 139.5" d₁ = d₂ = 0.875" → 0.625"
 d₃ = 1.25" → 0.875"

Fig. 11- The effect of lengthening the sleeve elements while maintaining a constant spacing and relatively constant element diameter.



KEY:
 L₁ = L₂ = 211.5"
 d₁ = d₂ = 0.875" → 0.438"
 D₁ = D₂ = 6"
 DE = 412"
 d₃ = 1.25" → 0.438"
 Height above ground = 80'

Fig. 12- The results of a model using a central dipole resonant near 14.3 MHz.

open-sleeve monopole to test. The first model consisted of a 15 inch length of 5/32 inch O.D. brass tubing soldered to the pin of a type "N" chassis connector. The connector was attached to a flat copper sheet that measured 10 feet square. Its ¼-wave resonance occurred at 195 MHz. Two 10 inch lengths of the same tubing were soldered to the copper sheet at a separation of 1 inch from the central element. The resultant antenna showed resonances at 195 and at 260 MHz with v.s.w.r. less than 2:1 from 180 to 272 MHz. The v.s.w.r. is shown in fig. 8. Another model using ½ inch O.D. tubing and 2 inch separation is also shown in fig. 8. A third model tuned for the 2, 1¼, and ¾ meter amateur bands is shown in fig. 9. The antenna behaves as a quarter-wave with low-angle radiation on 2 and 1¼ meters. However, the ¾-wave resonance is used at 436 MHz with resulting high-angle radiation. If the central monopole is tuned higher in the 2 meter band, the ¾ meter v.s.w.r. will be better within the 440-450 MHz region.

H.F. Open-Sleeve Applications

The broadband potentials of the v.h.f. or u.h.f. open-sleeve antenna are obvious. Not so obvious is its potential for broadband or multiband use at h.f. (3-30 MHz).

In the investigation by King and Wong it was found that larger diameter elements enhanced the broadband characteristics of the open sleeve by lowering the maximum v.s.w.r. between the resonance of the longer driven element and the resonance of the shorter sleeve elements. With a ratio of the element diameter to the maximum length of the dipole (d/l) at 0.055, the maximum v.s.w.r. between resonances was 2.5:1. With a ratio of d/l at 0.017, the maximum v.s.w.r. between resonances was 4:1. I assumed that even smaller ratios would give even higher values of midband v.s.w.r. I also assumed that the two separate resonances would remain intact, each with a bandwidth typical of the element diameter used.

My first h.f. models of the open-sleeve antenna were open-sleeve dipoles in the transition region between h.f. and v.h.f. My central dipole was a center-fed dipole element mounted on a metallic boom, fed with a BN-86 balun, and resonant near 29 MHz. The sleeve elements were chosen so that the 2:1 frequency range would not be exceeded.

Fig. 10 shows curves of three different configurations using the same sleeve length of 97.5 inches. The sleeve elements were of a constant diameter, whereas the driven central element used tubing which tapered from 1.25 inches at the center to 0.875 inches at the tips. The different configurations of the sleeves did not have a noticeable effect on the v.s.w.r. at 29 MHz.

Fig. 11 shows the effect of lengthening

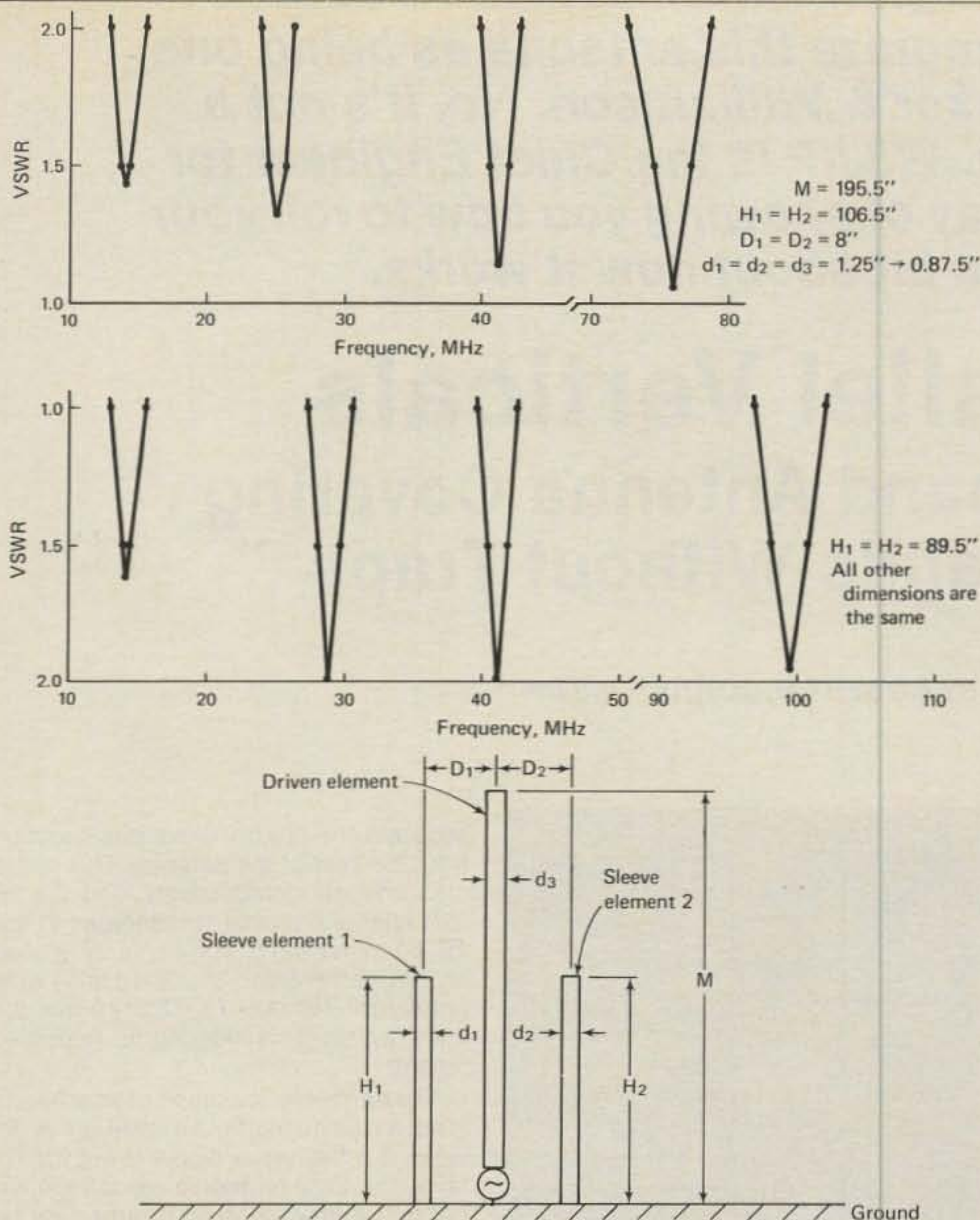


Fig. 13- Diagram of an open-sleeve monopole. The plot shows the v.s.w.r. of two configurations using a central monopole resonant near 14 MHz.

the sleeve elements while maintaining a constant spacing and relatively constant sleeve-element diameter. As one can easily see, the v.s.w.r. curves merge together as the sleeve lengths approach that of the central element. This could allow multibanding of frequencies too closely spaced for conventional traps. This could also be used to broadband h.f. antennas where low v.s.w.r. is required over a frequency range too broad for conventional dipole elements.

Fig. 12 shows the results of a model using a central dipole resonant near 14.3 MHz. The sleeve lengths were chosen at random using the 2:1 criteria established earlier. A slightly shorter sleeve length should make a perfect 20 and 10 meter antenna, whereas longer sleeve elements could make 20/12, 20/15, or 20/17 meter multiband antennas.

Although I have not tried lower frequencies, it should be possible to make open-sleeve antennas for the 40/20, 40/30, 30/20, 30/15, 30/17, 80/40, and 160/80 meter bands. Unique triband configurations should work on 40/30/15,

40/20/15, or 40/17/15 using the central dipole as 3 half waves on 15 meters.

The open-sleeve monopole was also modeled on h.f. Fig. 13 shows the v.s.w.r. of 2 configurations using a central monopole resonant near 14 MHz. One configuration used sleeve elements resonant at 25 MHz (12 meters). It also had $\frac{1}{4}$ -wave resonances near 41 and 76 MHz. The other model used sleeve elements resonant at 29 MHz, with corresponding $\frac{1}{4}$ -wave resonances near 41 and 100 MHz. The h.f. open-sleeve monopoles were ground mounted with 8 radials, each 12 feet long, buried slightly below ground level.

Summary

Even though the open-sleeve antenna has been in existence since the early 50s, I feel as though I have discovered an entirely new and exciting antenna. In a way it is new to the amateur community. Why, in over 30 years of existence, no amateur has put its simplicity and broadband capabilities to work, I do not know. But I do know that with the current popularity of broadband no-tune transceivers, a new

broadband antenna will not be overlooked for long.

References

1. H.E. King, "Experimental Antenna Development at the Aerospace Corporation," *IEEE Antennas and Propagation Newsletter*, Vol. 24 No. 2, April 1982, pp. 5-8.
2. E.L. Bock, J.A. Nelson, and A. Dorne, "Sleeve Antennas," in *Very High Frequency Techniques*, H.J. Reich, ed., New York: McGraw-Hill, 1947, Chapter 5.
3. H.E. King and J.L. Wong, "Design Variations and Performance Characteristics of the Open-Sleeve Dipole," Aerospace Corp., El Segundo, CA, Tech. Rep. TR-0073 (3404-2), Jan. 15, 1973.
4. H.E. King and J.L. Wong, "An Experimental Study of a Balun-Fed Open-Sleeve Dipole in Front of a Metallic Reflector," *IEEE Trans. on Antennas and Propagation* Ap-20, March 1972, pp. 201-204.
5. The ARRL *Antenna Book*, 14th ed., American Radio Relay League, Newington, CT, 1982, Chapter 11, pp. 11-24, 25.
6. H.B. Barkley, "The open-sleeve as a broadband antenna," U.S. Naval Postgraduate School, Monterey, CA.
7. H.E. King and J.L. Wong, "A Cavity-Backed Dipole Antenna with Wide-Bandwidth Characteristics," *IEEE Trans. on Antennas and Propagation* Ap-21, Sept. 1973, pp. 725-727.

RF Porta-Tenna

VHF/UHF Telescopic 1/4 & 5/8 Wavelength Antennas for Hand-Held Transceivers & Test Equipment

1/4 WAVELENGTH

Model No.	Freq. MHz	Description	Price
196-200	144-148	5/16-32 stud w/spring	\$5.95
196-204	"	BNC connector w/spring	7.95
196-214	"	BNC connector	6.95
196-224	144-UP	BNC conn. adj. angle	7.95
196-814	220-225	BNC connector	6.95

5/8 WAVELENGTH

191-200	144-148	5/16-32 for HT-220	\$22.95
191-201	"	1/4-32 stud	22.95
191-210	"	5/16-32 for old TEMPO	22.95
191-214	"	BNC connector	19.95
191-219	"	PL-259 w/M-359 adpt.	22.95
191-810	220-225	5/16-32 for old TEMPO	22.95
191-814	"	BNC connector	19.95
191-940	440-450	5/16-32 for HT-220	22.95
191-941	"	1/4-32 stud	22.95
191-944	"	BNC connector	19.95

Largest Selection of Telescopic Antennas. Write for info. Price are postpaid via UPS to 48 States. For air delivery via UPS Blue add \$1.50. Florida add 5% sales tax. Payment by M.O. or Cashiers Check only.

RF PRODUCTS
 P.O. Box 33, Rockledge, FL 32955, U.S.A.
 (305) 631-0775

CIRCLE 44 ON READER SERVICE CARD

Some of you may recognize this antenna as being one manufactured by Barker & Williamson. No, it's not a rip-off of their design. W3JIP is the Chief Engineer for B&W, and it's their way of showing you how to roll your own, plus teach you a bit about how it works.

Parallel Verticals

A Broadband Antenna Covering Six Bands Without Traps

BY ROBERT H. JOHNS*, W3JIP

In fig. 1, a 25 foot vertical made up of three separate elements is shown. The antenna is resonant on 80, 40, 30, 20, 15, and 10 meters with low s.w.r., and does not have any traps in it, only one loading coil. The bandwidth is unusually broad on all bands from 7 MHz on up.

Parallel dipoles have been successfully used in the past to get multiband operation without traps, but parallel verticals have not been widely used by amateurs. They make a very effective antenna. By clustering three vertical elements into a triangle, a sturdy, tower-like structure is produced. The antenna in fig. 1 is built from 1/2 inch steel electrical tubing, EMT, held in place by insulator rings cut from PVC pipe. Both of these are readily available and not expensive. The absence of any traps in the antenna makes it easy to build and tune.

Operation

Each of the three elements is resonant on two bands. The 40 meter quarter wave is top-loaded by three capacity loops which shorten its length down to 25 feet. It is also a 3/4-wavelength radiator on 15 meters. The 30 meter element also works on its third harmonic, 10 meters. The 80 meter element has a large loading coil located at the top of a quarter wave for 20 meters. This coil acts as a high-impedance choke on 14 MHz, cutting it off from the rest of the antenna on 20 meters. This gives the same result that a trap would do, but no capacitor is used with the coil, and the inductive reactance of the coil, 3000 ohms, is high enough to effectively

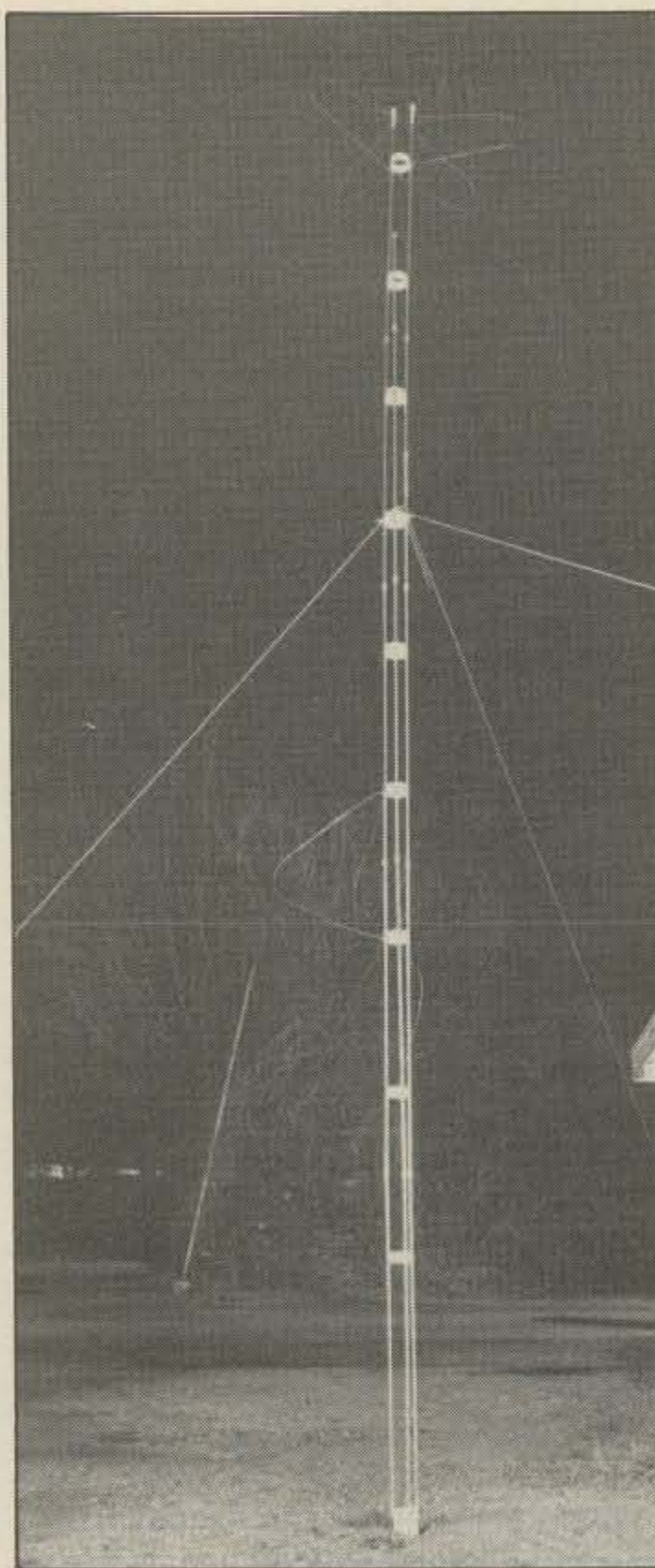


Fig. 1—The six-band vertical uses no traps. Instead there are three separate elements, each resonant on two bands. The capacity "hats" keep the height to 25 feet.

separate the quarter-wave base section from the rest of the antenna. This coil is also enough to inductively load the 25 foot element so that it resonates in the 75–80 meter band. Top capacity is used on this element also, giving it a fairly wide bandwidth—about 75 kHz at the 2:1 s.w.r. points—considering its restricted height.

The harmonic operation of an antenna is not a routine matter if a low s.w.r. is desired. If a half-wave dipole is cut for 7.1 MHz, the third harmonic resonance will *not* occur at 21.3 MHz; it rather will be well above the 15 meter band. This is because the end of the antenna has capacity-to-free space, which makes the antenna electrically longer than its physical length. The antenna is really shorter than a half wavelength. On its third harmonic, the end quarter waves are shortened by the end capacity, but the inner wavelength is not. You have to raise the frequency to get three shorter half waves to resonate on this antenna.

In order to get 15 meters to resonate on this vertical, where the end capacity effect is greater, some extra side capacity is added one third of the way up the antenna. This lengthens the part of the antenna where the inner two quarter waves have a voltage loop, and lowers the resonant frequency down into the 15 meter band. Two side capacity loops are used on the 40 and 15 meter elements and only one on the 30 and 10 meter elements.

Capacity loading to shorten an antenna has a big advantage over inductive loading: it doesn't reduce the bandwidth. In this antenna, the three parallel elements together with the loops at the sides and top make a very thick effective radiator, and the resulting bandwidths are very broad.

*3379 Papermill Rd., Huntingdon Valley, PA 19006

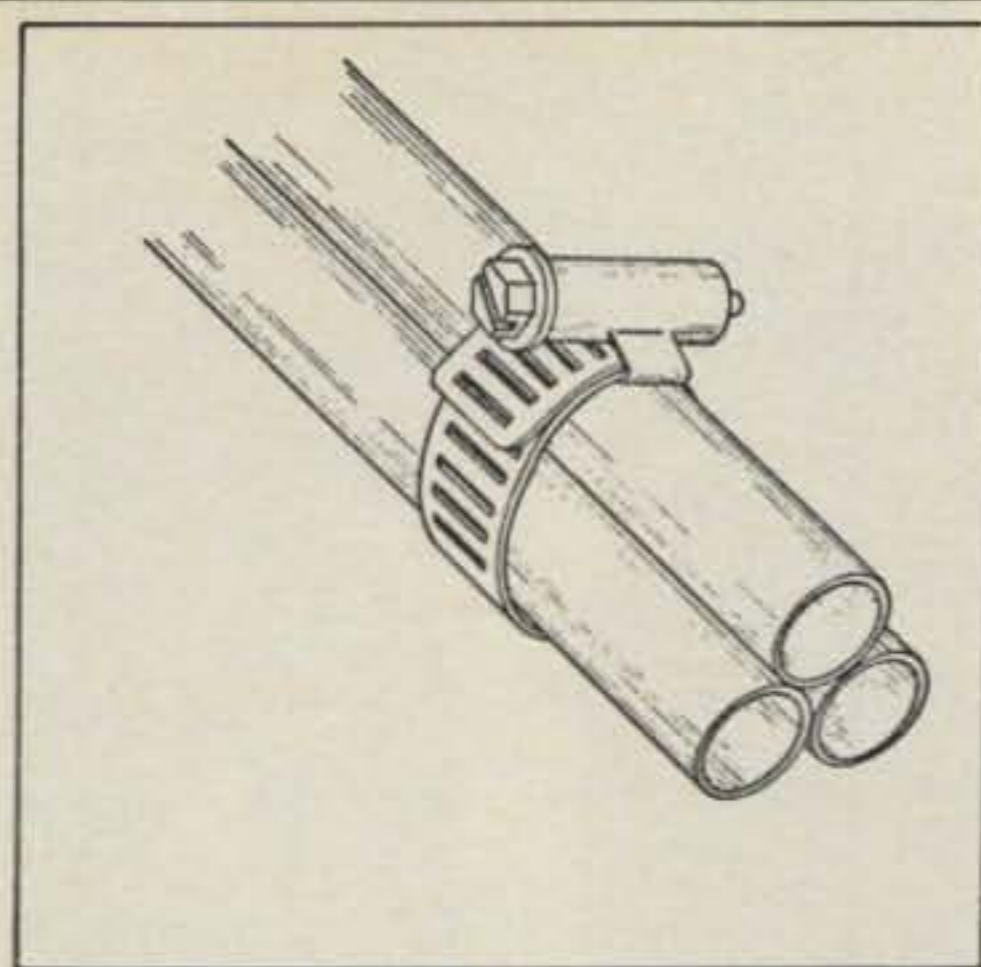


Fig. 2— Hose clamps are used to hold three lengths of steel EMT tubing together so that holes for attaching them to the insulating rings can be drilled in the proper places. The holes need to be in the same plane in a single tube and at the same height on all three tubes.

Tuning

The 75 meter antenna can be tuned by spreading the two capacity loops at the top. With the two together, resonance is near 4 MHz, and when they are spread apart, the antenna tunes just below 3.8 MHz. For 80 meter operation, add some wire straight up. With two more feet to the height of the element it tunes to about 3.6 MHz.

With the dimensions given in fig. 8, the 20 meter element is tuned to the top of the band. It can be lowered in frequency by adding a few inches to the wire between the coax connector and the element, or with a small capacity rod about a foot long attached to the top of the 20 meter section at the insulating ring just below the coil. This is visible in fig. 1. Bending this rod outward lowers the frequency on 20. Thirty meters can be tuned similarly.

Forty, fifteen, and ten meters are so broad that you won't need to adjust for different ground conditions or your favorite part of a band. The side loops can be pushed together on 15 meters or the single one folded in on 10, if you do want a tuning adjustment.

Construction

The 1/2 inch EMT is available from hardware and discount stores, but an electrical distributor will have it at a better price. Nine 10 foot lengths are needed. With some care match up three lengths that will be side-by-side in the antenna so that the antenna will be straight when assembled. If the differences in length are more than an eighth of an inch, equalize them with a hacksaw. The lengths needed are shown in fig. 8, as well as the location of the holes to be drilled in the tubing. All the holes are 3/16 inch in diameter. The insulating rings are 30 inches apart and

Fig. 3— The lengths of EMT are bolted to the insulating rings with 3/16 inch (#10-24) bolts. The loading coil for 80 meters is wound on a thick-walled PVC pipe which is a good fit over the 1/2 inch EMT. Notice that the coil connections are not made to the antenna by the through bolts that bolt the form to the tubing, but rather are made by separate self-tapping screws into the steel for a positive electrical contact.

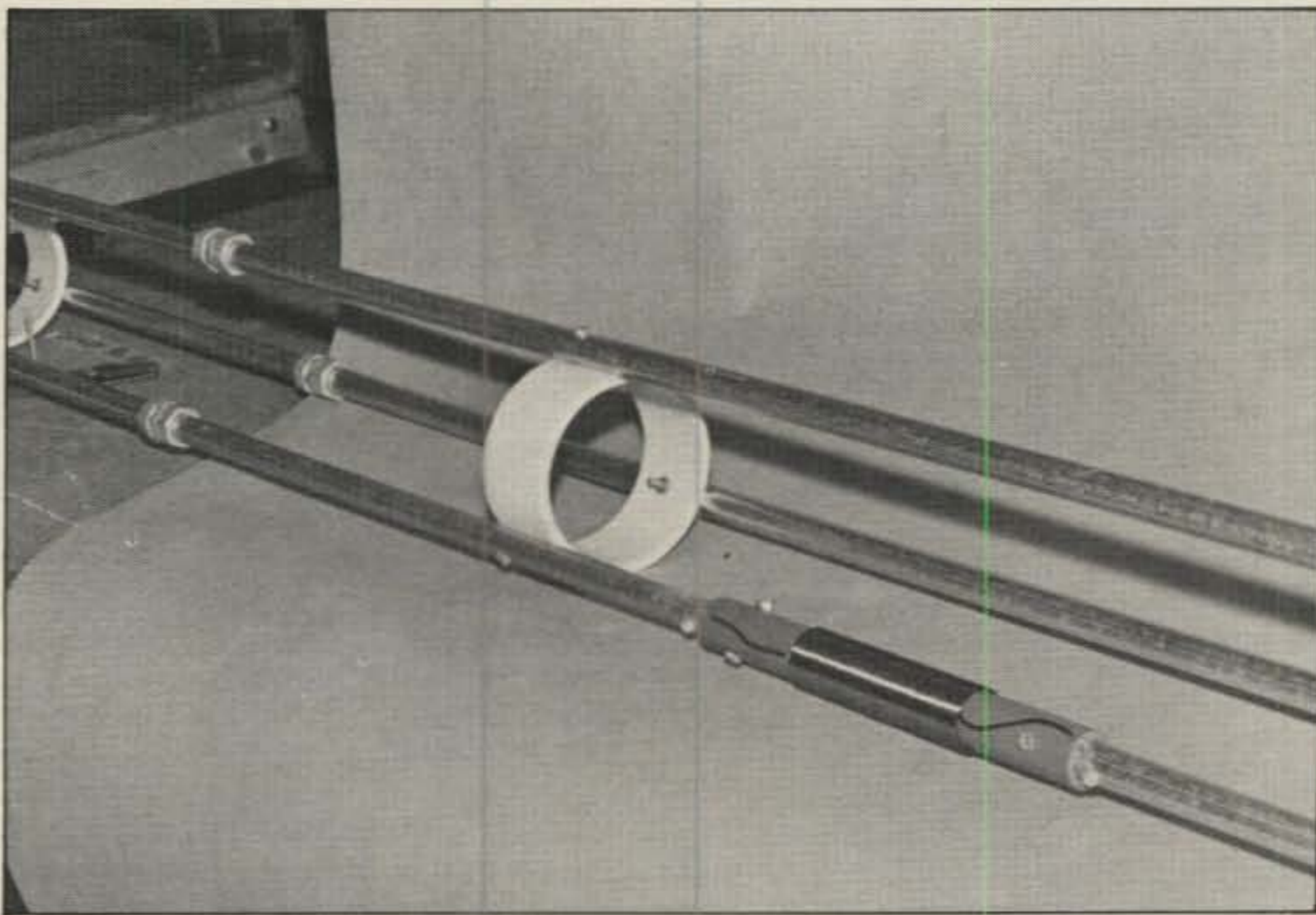


Fig. 4— The base insulator with the SO-239 coax connector mounted on it and wires connecting to the elements. The bolt below is for a ground connection and the radials. A shallow hole can be dug for the base to sit in, or the base can sit on level ground.

15 inches from the ends of the EMT tubes, except at the base.

The holes in the EMT must be parallel to one another in each length of tubing. To help in laying them out correctly, strap three lengths together with two 1 1/2 inch hose clamps, as shown in fig. 2. This will hold them in place and prevent them from rotating while you measure, mark, and center punch for the holes to be drilled. A rubber band wrapped around the tubes

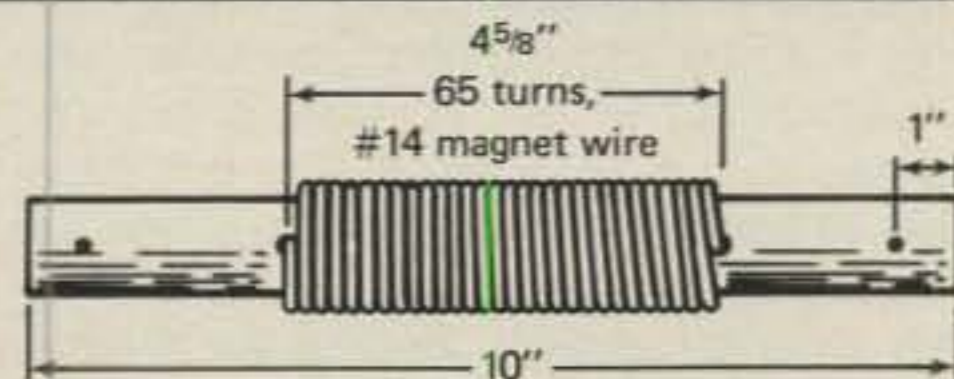


Fig. 5— Dimensions and hole locations for the 80 meter coil and form. The coil is 3/4 inch PVC pipe, schedule 80.

will help locate holes in the same place on all three tubes.

The insulating rings, 2 inches long, are cut from 4 inch PVC pipe, schedule 40. This is available from plumbing and swimming-pool suppliers. The base insulator is 4 inches long. Three 3/16 inch holes are spaced equally around each ring. Measure and lay out these with some care so that the elements will be straight after they are bolted to the rings. See figs. 3 and 4.

Details of the coil for the 20 and 80 meter element are given in fig. 5. The thick-walled schedule 80 PVC pipe for the coil form is harder to find than schedule 40 pipe, but it is worth phoning around for since it is a good fit around 1/2 inch EMT. The 3/4 inch schedule 40 pipe can be used if necessary.

The base insulator in fig. 4 has a 5/8 inch hole drilled in it for the SO-239 coax connector. File a flat on the outside of the insulator so that the connector will lie flat against it. Solder three wires to the inside of the connector to run to the base of the elements. The connector will also need weatherproofing.

The 10 foot lengths of antenna can be built anywhere, but the final joining of the sections will need a smooth, level surface. I suggest assembling everything

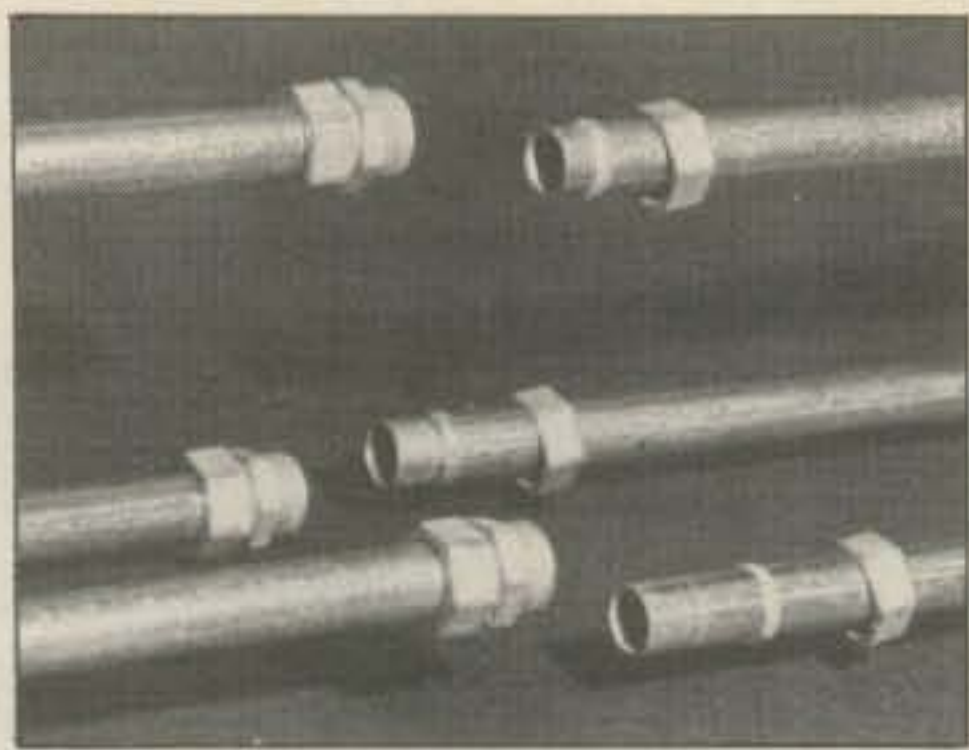


Fig. 6— The EMT compression couplings in place ready to join two sections of the antenna together. A split ring will be trapped between the sleeve and the large nut and forced into the EMT, actually cutting grooves into it. A very strong joint results.

loosely at first, both the couplings and the nuts and bolts. This will permit some twisting and adjusting of the elements to get them straight.

The compression couplings are easy to use if they are disassembled and the nuts and split inner rings put onto the two EMT pipes to be joined, as in fig. 6. The pipe ends then slide easily into the coupling sleeve. Remove any cutting burr first. For final tightening of the joints, use large wrenches or arc joint pliers and tighten with a lot of force. The compression couplings are very strong. They are subject to compression and tension in the antenna and do not have to resist

much bending. Such short sleeves could not provide much stiffness.

With the top of the assembled antenna on a chair or stepladder, the top loops can be installed (see fig. 7). The top insulators are made from a 1/2 inch PVC slip-cap and a 4 inch length of 1/2 inch PVC SDR pipe. This type (SDR) has thinner walls than the schedule 40 pipe and is used because it makes a good fit over 1/2 inch EMT. Place the cap over the pipe and drill a 3/16 inch hole near the edge of the cap. When the bolt that holds the top loops in place is tightened, the cap and pipe flatten to make a tight grip on the element. Make sure the bolt isn't touching the element; it should be an inch or so above it.

The capacity loops are all the same size, each made from a 6 foot length of #9 galvanized steel wire. This is a hardware item that is sold in 50 foot rolls for clothesline and dog runs. It is difficult to cut. If your pliers won't cut through, make as deep a notch as you can and then bend the wire sharply at the notch and it will break there. The loops are held to the antenna elements by the 3/16 inch bolts that hold the EMT to the insulator rings. Bend eyes (small rings) into the ends of the loops that will fit around the 3/16 inch bolts. The longer 2 inch bolts and washers are used where the loops attach.

The EMT and the #9 wire have a good galvanized coating and should last for many years. Places where that coating

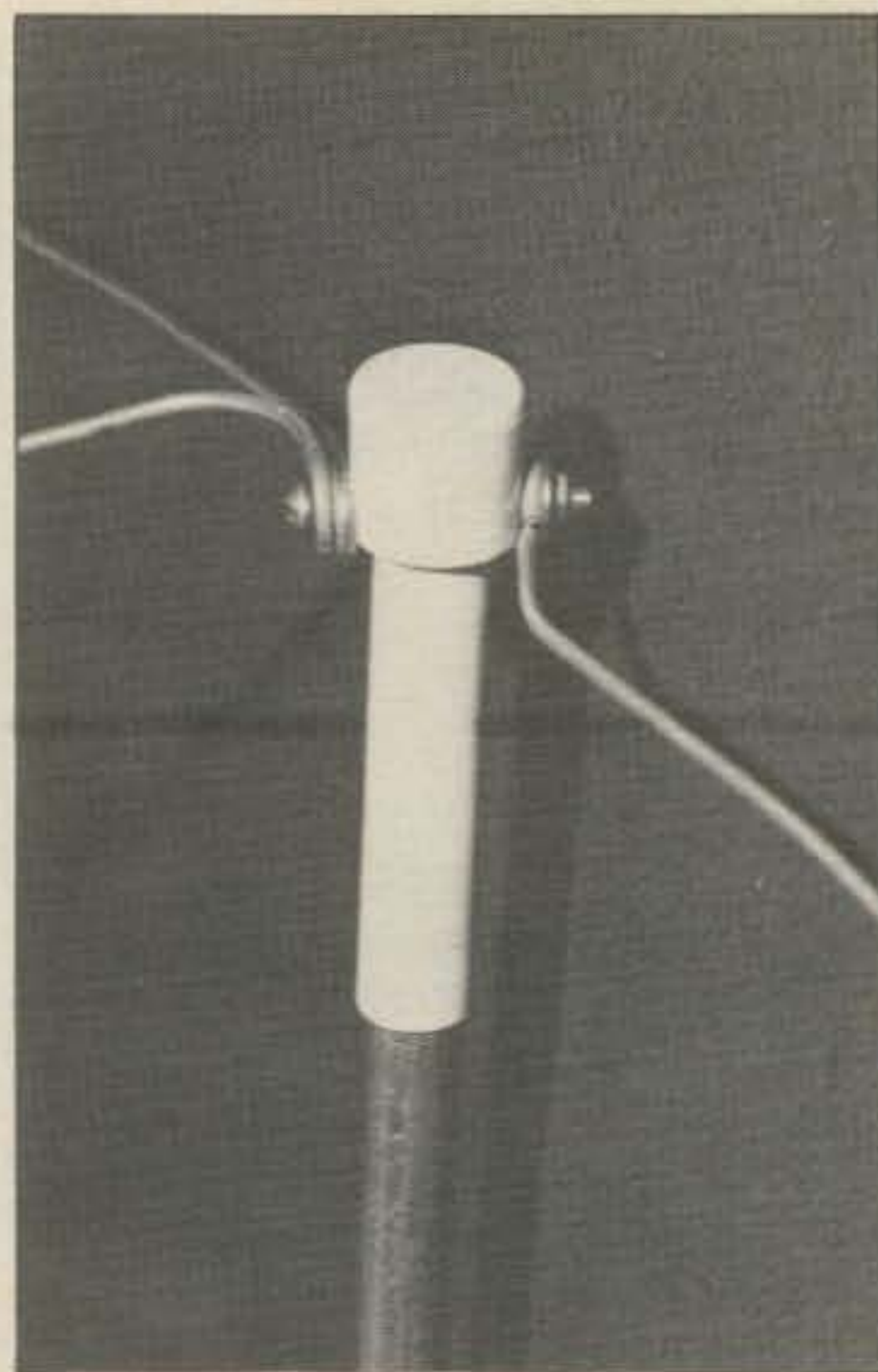
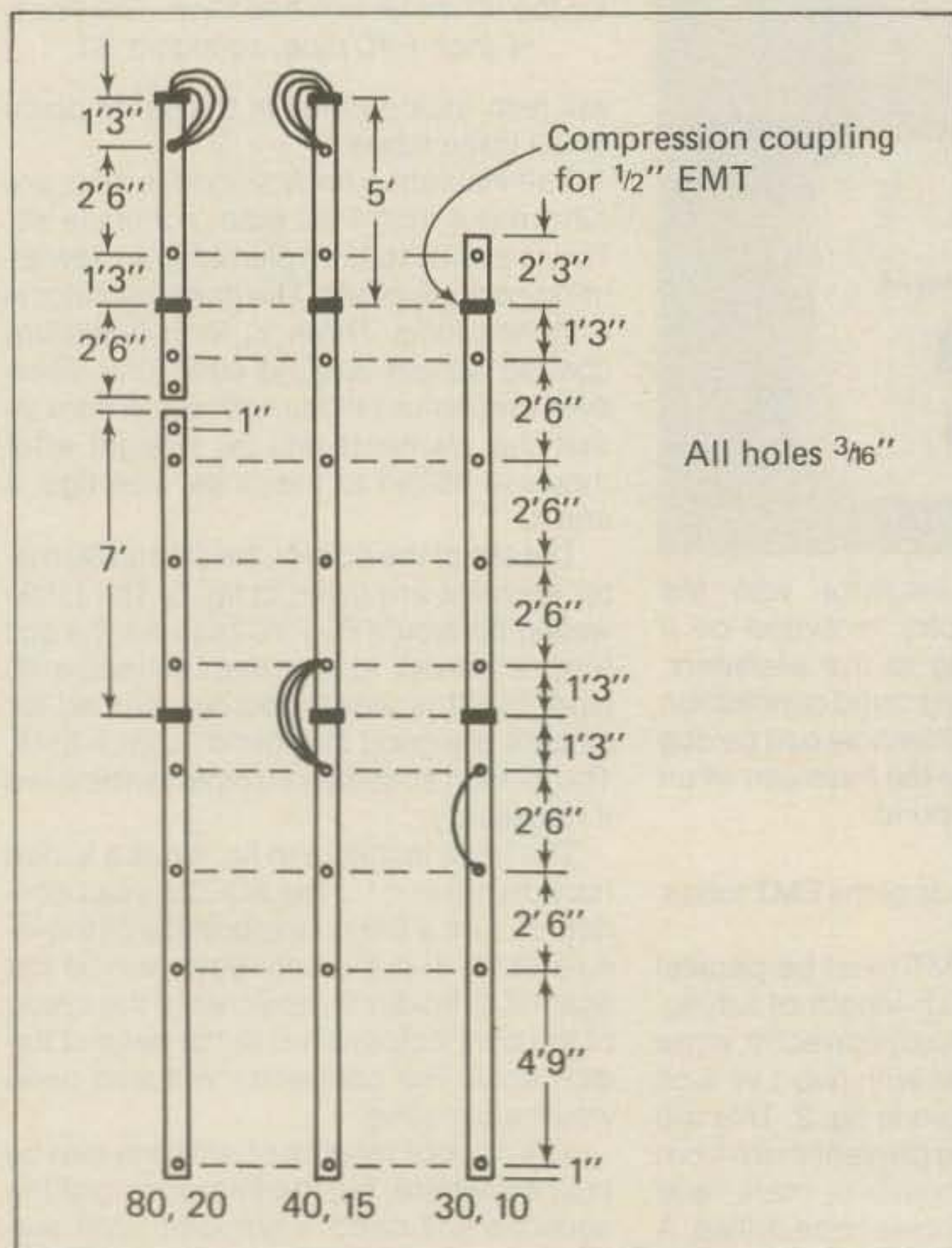


Fig. 7— An insulator cap that supports the capacity loops at the top of the antenna. This one, with three loops bolted to it, is on the 40 meter element. The 1/2 inch PVC pipe is a good fit over the EMT, provided it is the thin-walled type, SDR. The ends of the #9 wire loops have been bent into small circles to fit over the 3/16 inch bolts, and washers have been used under the bolt head and the nut.



Quantity Material

90 ft.	1/2" EMT, electrical tubing in 10 ft. lengths
6	Compression couplings for 1/2" EMT
26	1 1/2" long, #10-24 bolts, with nuts and lockwashers
8	2" long, #10-24 bolts, with nuts and lockwashers
2 ft.	4" PVC pipe, Schedule 40
10 in.	3/4" PVC pipe, Schedule 80
10 in.	1/2" PVC pipe, SDR
2	1/2" PVC slip caps
1	SO-239 coaxial cable connector
40 ft.	#14 copper magnet wire
560 ft.	wire for radials, any
16	washers, 3/16"
2	1 1/2" hose clamps
5	solder lugs, for #14 wire, 3/16" hole
50 ft.	#9 galvanized steel wire
1 qt.	plastic roof coating

Table 1— Parts for the six-band vertical.

Fig. 8— Location of the holes to be drilled in the EMT. All of the holes are 3/16 inch and pass through both walls of the tubing. The drilling will go better if you have a new, sharp, good-quality, high-speed drill bit.

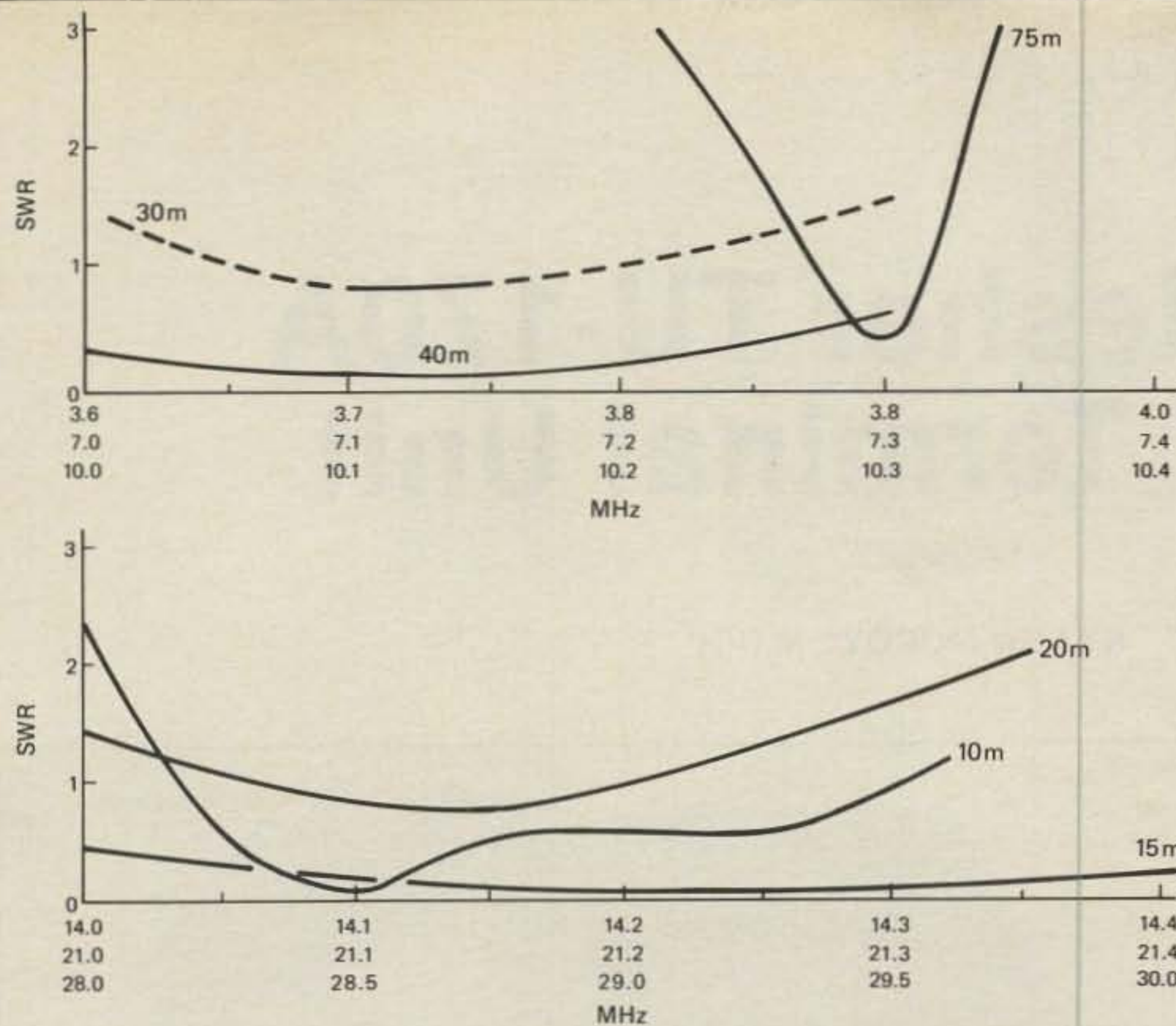


Fig. 9— S.w.r. curves for the six-band vertical.

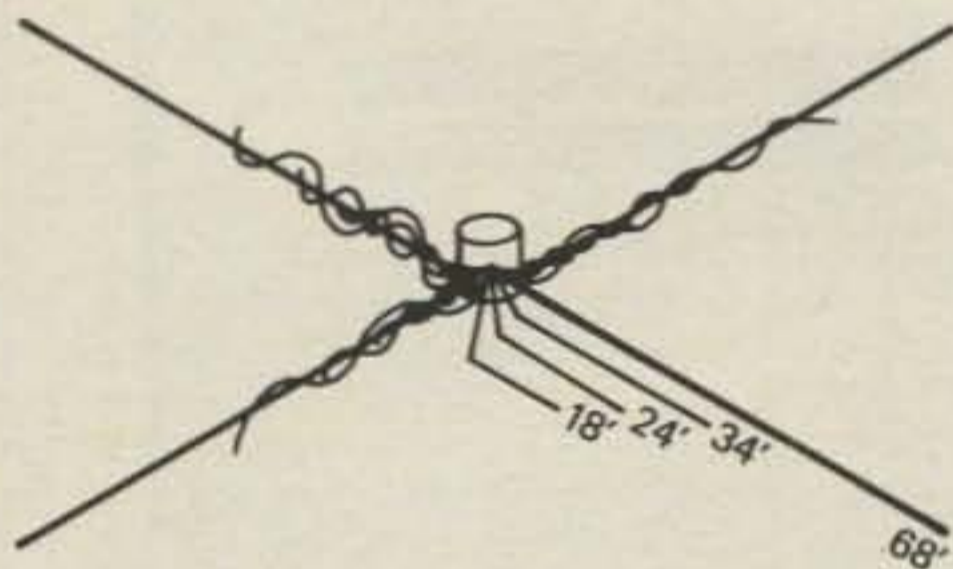


Fig. 10— A set of radials for the six-band vertical. The radials for 30 and 40 meters are also resonant on 10 and 15, so only four wires are needed in each "leg" of the radials. If you don't have the room to run them out straight, bend them and wind them around your property. Any type of wire may be used for the radials, and they can be buried or laid on top of the ground. If insulated wire is used, the four-in-one leg can be twisted together as shown above. The ones shown straight are just to indicate the lengths to use.

low-angle signal that will work DX. Consult an antenna handbook for a discussion of radials. Fig. 9 shows the s.w.r. curves for the six-band vertical when used with a proper radial system.

has been lost, such as holes or cuts, will need protection. I recommend coating each nut and bolt and coupling with an undercoating or a roof-patching compound. These adhere to metal and stay somewhat flexible and waterproof. Coax-Seal® is also a good choice for a sealant.

Radials

A vertical antenna fed at a current loop must have a good ground system to work against. Four radials, each with four wires, as shown in fig. 10, will do an adequate job, but a larger radial system will do even better. Aim for a good system, with 50 to 100 wires, and put out a good

Guys

The antenna may be supported by a tree or the side of a house with good results. The best installation, however, will be in the clear away from interfering objects. It will need guying, just below the coil, as shown in fig. 1. Quarter inch or larger nylon or polypropylene rope is good and will not require insulators. Watch out for nylon stretching, especially in wet weather. Phillystran guy cable, of course, would be ideal. If you must use wire guys, install insulators every few feet, especially near the antenna.

The complete antenna weighs about 40 pounds and can readily be put up by a large person. By butting the base against a tree or building, you can simply walk it up to a vertical position and carry it upright to the installation point. If a helper isn't available to tie the guys, you can secure two guys and raise it against them by lifting and pulling the base in under the rest of the antenna. Once all the guys are tied, the vertical can be raised and lowered for adjustments quite easily this way without loosening the guy ropes.

Several of the features shown in this antenna are the subject of a patent application. Amateurs are welcome to build the vertical for their own use, but manufacturers are cautioned that all rights under the Patent Code will be strictly enforced. A complete antenna is available from Barker & Williamson, 10 Canal St., Bristol, PA 19007. See their ad in this issue.

We stock:

RADIOS

- Azden
- Icom
- KDK
- Kenwood
- Santec
- Ten-Tec
- Yaesu

ANTENNAS

- AEA Isopoles
- Antenna Specialists
- Avanti
- Butternut
- Cushcraft
- Hustler
- Hy-Gain
- KLM
- Larsen
- Mini-Products
- Mosley
- VoCom

ACCESSORIES

- AEA Keyers, Code Readers
- Alliance Rotors
- Ameritron Amplifiers
- ARRL Publications
- Astron Power Supplies
- B & W
- Bencher Paddles
- Callbooks
- CDE (Telex) Rotors
- Daiwa/MCM/J.W. Miller
- Kantronics
- MFJ
- Benjamin Michael Clocks
- Microlog
- Mirage Amplifiers & Meters
- Saxon Cable
- Telex Headsets
- Tokyo Hy-Power Amplifiers
- VoCom Amplifiers

ege, inc.

13646 Jefferson Davis Highway
Woodbridge, Virginia 22191
Store Hours: M-W-F 12 noon—8 p.m.
T-Th-S 10 a.m.—4 p.m.
Information and Virginia Orders:
(703) 643-1063
Call for Quotes
Dealer Inquiries Invited

**Your Discount Dealer for Amateur, SWL,
and Marine Communications Equipment**

ORDER TOLL FREE 1-800-336-4799 (Orders Only, Please)

Order Hours: M-F 11 a.m. to 7 p.m.;
Saturday 10 a.m. to 4 p.m.
Bonus: 2% Discount
for Prepaid Mail Orders
(Cashiers Check or Money Order)

Send stamp for a flyer.
Terms: Prices do not include
shipping. VISA and Master Charge
accepted. 2% discount for prepaid
orders (cashier's check or money
order). COD fee \$2.00 per order.
Prices subject to change without
notice or obligation. Returns
checks accepted. Returns
subject to 10% restocking fee.

The Flesher TU-170A RTTY Terminal Unit

BY LEW MCCOY*, W1ICP

Many years ago when I was working at the ARRL, I was assigned the job of building a terminal for transmitting and receiving RTTY. The unit I built was a tube job, and it was very cumbersome to say the least. What with computers and solid-state devices, amateur radio RTTY has come a long way since then. The Flesher TU-170A RTTY terminal unit described in this review is an outstanding example of these advances. Compared to that early tube version of mine, the TU-170A is about one-quarter the size and does about ten times as much. The TU-170A is available in either kit or wired form. I elected to wire the kit version.

Among the amateurs who use computers in conjunction with their amateur stations, particularly for RTTY work, the Flesher name is quite popular and their units are in wide use. This is not to imply that the unit described here cannot be used with any TTY unit. It can. It is just that this reviewer became familiar with the Flesher products through other amateurs using computers—particularly TRS-80's®. (And, incidentally, my testing of the TU-170A involved the use of a TRS-80® Model I.)

Constructing the Kit

The TU-170A kit that I wired consisted of the main board and chassis, two plug-in filter units, a plug-in demodulator board, and an AFSK board. There are separate manuals for the different boards, five in all. That may sound like a lot, but it isn't. There is a manual for the main board and cabinet, another for each of the filters, one for the demodulator, and the other for the AFSK board. All the construction books are extremely clear and use the conventional, step-by-step, check-off wiring procedure. Nothing is left to guesswork, and a neophyte can easily wire the project correctly. I must



This is a front-panel view of the TU-170A. At bottom left is the power switch, followed by the standby/operate, the send/receive, the reverse send, and reverse receive switches. At the upper right are the LED indicators described in the text.

admit that as clear as the manual is, I goofed. I wired in one diode backwards, and it took about an hour of troubleshooting to find it!

Wiring time for the complete unit, main board and others, was about five or six hours. Board and component quality is excellent and I have nothing but praise for the kit—with the possible exception of the circuit diagram. It takes a little studying to follow the diagram simply because the unit is in sections (main board and plug-in units). It would be nice to have one complete diagram rather than to trace the multi-terminal connectors. However, I suppose this is a technical writer's criticism more than anything else. As I said, it is an excellent kit, and the construction manuals are very clear.

Circuit Description

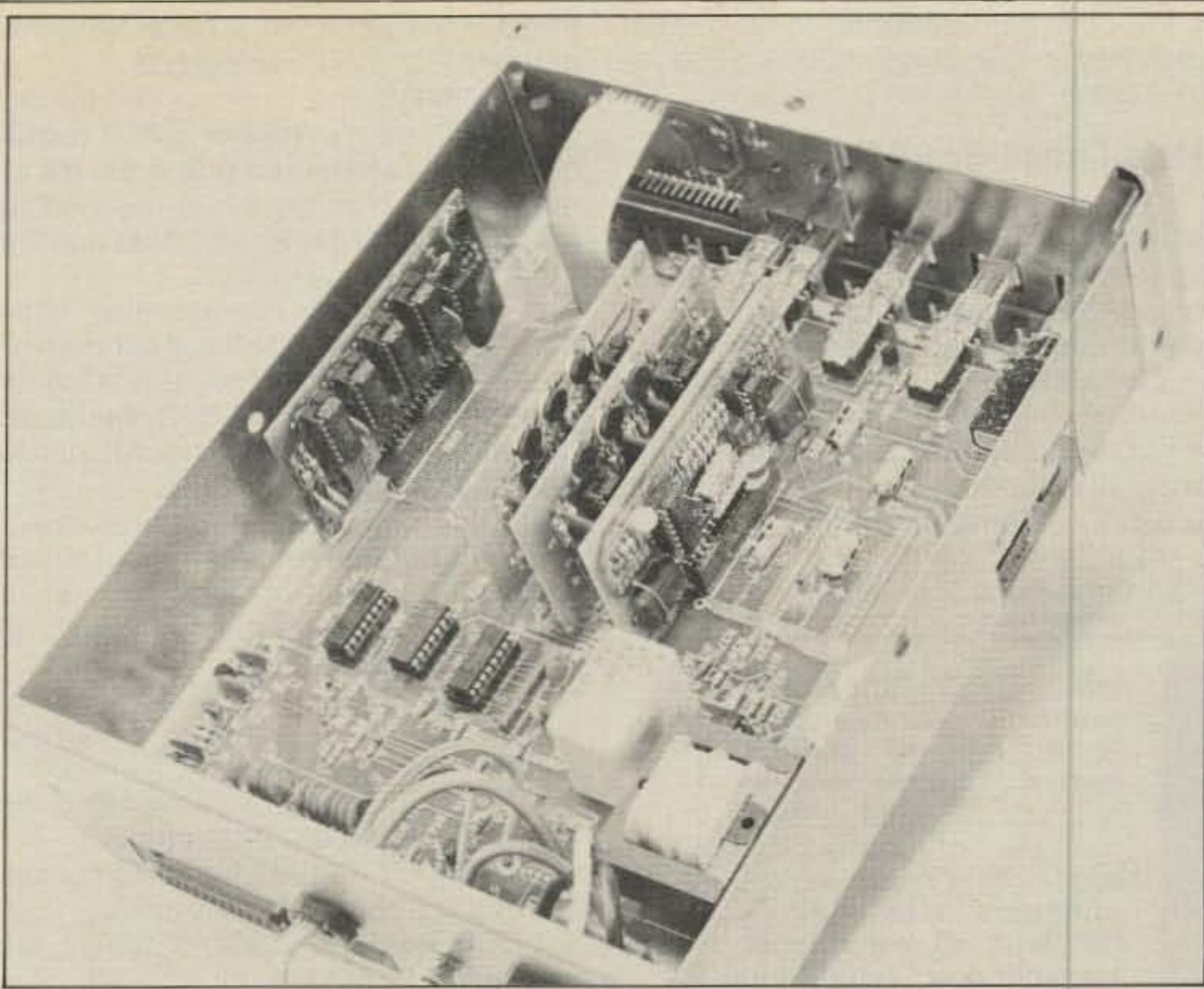
The TU-170A is set up so that several active filters can be used, depending on the keying shift desired. This kit was pro-

vided with two filters: one was wired for 2125 Hz and the other for 2295 Hz, which are the commonly used amateur mark/space frequencies. However, the filter boards can be set up when wired for other frequency shifts. The frequencies include 2125, 2295, 2550, and 2975 Hz. Each of the active filters consists of three stages of two-pole, active bandpass filters. Each stage is a low-gain low-Q stage, which when cascaded with the other two stages results in a very highly stable, high-Q filter.

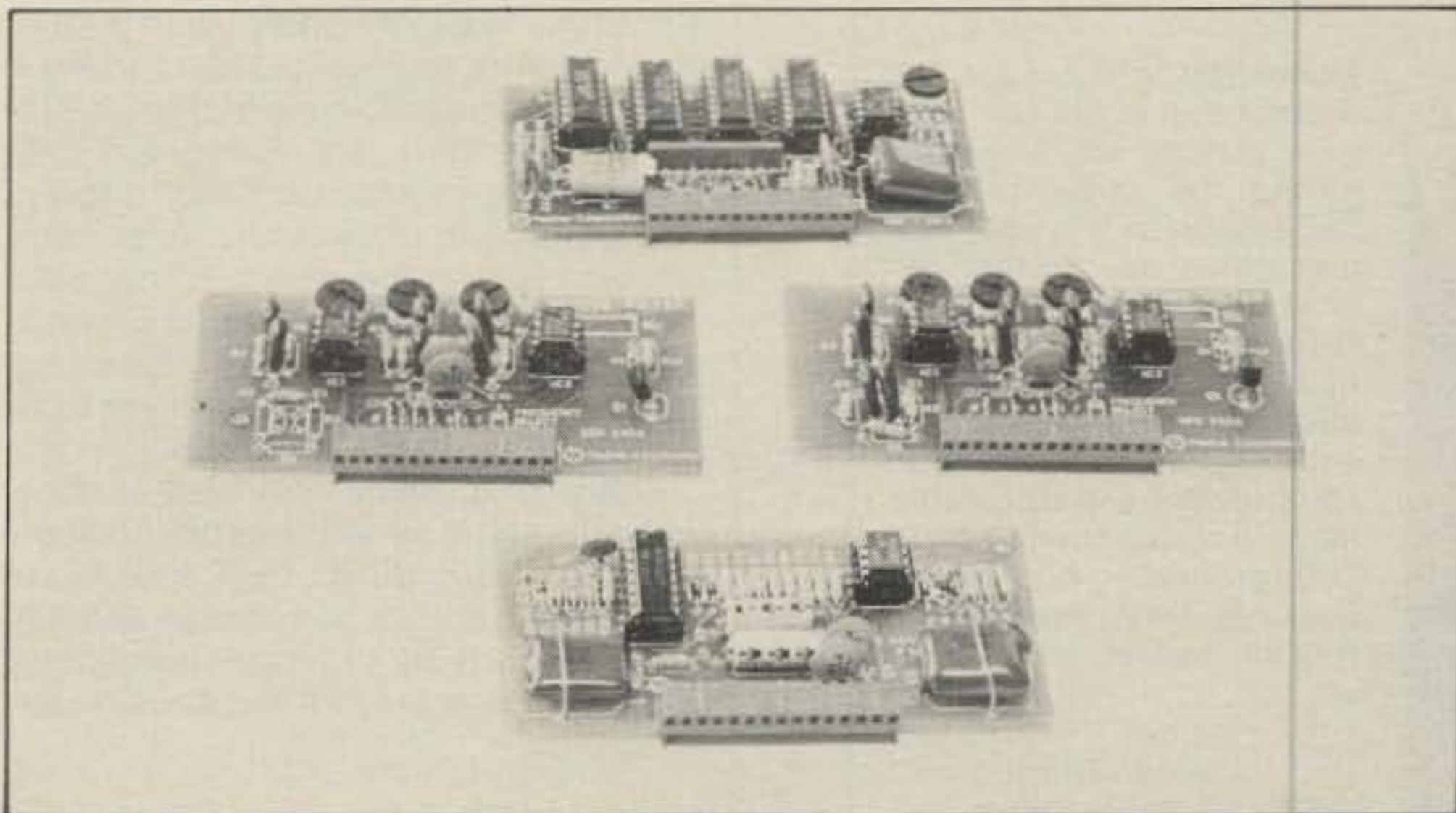
The first filter stage consists of one half a dual op amp, the second filter using the second half of the op amp. Another half of a dual op amp is used for the third filter stage. Each filter stage is peaked independently by a potentiometer.

On the filter board tuned to 2295 or 1445 Hz, an additional phase shift network is formed by an RC network. This network provides additional delay of the signal passing through the filter to pro-

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



The interior view of the TU unit clearly shows the plug-in boards. At right is the demodulator board, next at the left are the filter boards, and near the far wall is the AFSK board. At the lower right is the power transformer; next to it is the auto-start relay.



Shown here at the bottom is the demodulator board, above it are the two filter boards, and at the top are the AFSK boards.

vide proper phase relationship between the mark and space signals to give a proper plus-shaped oscilloscope pattern which may be used for tuning.

The Demodulator Board

The TU-170A Demodulator consists of a discriminator stage, low-pass filter section, signal-balance restorer circuit, slicer and mark hold circuit. The output of the discriminator circuit is a pulsating d.c. voltage of a polarity determined by the dominant filter signals (mark or space). Output from the discriminator is fed to an active low-pass filter, one using an op amp. Filter output is then fed to the signal

balance restorer. This circuit essentially corrects for any signal level differences between the mark and space filter outputs. The output of the signal balance restorer provides a bias voltage which will center the output levels of the low-pass filter at the input of the slicer. The slicer stage, utilizing an op amp, is a positive feedback- or hysteresis-type slicer. As such, it has a dead band which is determined by the ratio of two resistors and will only change state when the input voltage exceeds the hysteresis level. This circuit prevents low-level signal fluctuation from generating erroneous output signals. Also, a mark/hold circuit returns the TU output to the mark state any time a space

WHY COMPROMISE

Others claim more gain for their antennas than the IsoPole™ antennas, but none can beat the IsoPole for HONEST on-the-horizon omni-directional gain unless you are willing to spend at least THREE TIMES AS MUCH!!! The IsoPole is easiest of ALL competitive models to assemble, has a weather protected, factory-tuned matching network, (no more aggravating SWR variations with weather changes), uses all stainless steel hardware, and is designed to withstand severe icing and wind conditions. The IsoPole antenna is UPS shippable without the standard 10 foot 1¼ inch TV mast. You can buy the mast from your local ham dealer, hardware store, or Radio Shack™ store for less than the shipping costs of a single mast. When good strong, low cost 10 foot sections of mast are so easily available, why compromise by using several shorter pieces that have to be joined together?

Prices and Specifications subject to change without notice or obligation.

TEXAS TOWERS



A DIVISION OF TEXAS RF DISTRIBUTORS, INC.

1108 SUMMIT AVE., SUITE 4
PLANO, TEXAS 75074

Mon.-Fri.: 8:30 a.m.-5:30 p.m.

Saturday: 9:00 a.m.-1:00 p.m.

TELEPHONE: (214) 422-7306

AEA Brings you the Breakthrough!

signal is longer than the normal space pulse width should be.

Audio Frequency Shift Keyer Board (AFSK)

The TU-170A AFSK board utilizes a crystal-controlled oscillator, a programmable frequency divider, and a band-pass filter which provides a sinusoidal audio frequency output in the range from 2000-3000 Hz (Hi-Tones). For a time base, a 5.508 MHz crystal oscillator is used. The oscillator is connected to the input of programmable dividers—three 40193's. The output of the last divider is a symmetrical square wave which is connected to

a low-pass filter designed to have a flat response in the range of 2000-3000 Hz (Hi-Tones).

Main Circuit-Board Details

The main circuit-board logic consists of the input and output circuits necessary to interface the various plug-in circuit boards just described to the front-panel controls and peripheral equipment.

There are various inputs to the main board. The KEY-IN input switches the AFSK to the downshift CW ID frequency when the TU is in the transmit mode. This is a TTL compatible input.

AFSKIN-TTL input signal causes the AFSK to switch between mark and space

frequencies when the TU is in transmit. AFSKIN-TTL is TTL compatible.

AFSKIN-RS input also provides the determination of the mark or space output frequencies when the TU is in the transmit mode. This signal is connected through an IC and is wired OR'ed with the AFSKIN-TTL signal.

SEND-N controls the operating mode of the TU. The SEND-N line is left open or held at +5 volts when the TU is in the receive mode. When SEND-N is pulled down or at a low TTL level, the TU is switched to the send mode.

RECEIVE AUDIO input signal is the signal from the receiver audio output circuit which contains the audio-frequency-shifted TTY signal. Minimum audio input level must be 100 millivolts.

RDA (Receive Data Available) output indicates the presence of an output signal from the mark filter.

DMOUT-TTL output is derived from the demodulator circuit-board output.

DMODOUT—RS is a demodulator output that is a bi-polar signal.

SCOPE MARK and SCOPE SPACE are also available outputs.

Front-Panel Displays

As with any TU, one of the primary concerns of the RTTY operator is "How easy is it to tune-in a TTY signal?" With the tuning indicators on the TU-170A I found it extremely simple to tune-in signals correctly. First, there is a 10-segment LED bar-graph signal indicator which displays the output level of the filters. Also, there are two LEDs for the mark and space signal. (In the SEND mode, these LEDs indicate the presence of mark and space signals on the AFSK input.) It is easy to tune-in signals with these indicators.

There is a power indicator to show when the unit is turned on or off. Additionally, there is a SEND LED that shows when the TU is in the send mode, and last, there is an RDA LED which indicates when a signal is present and the autostart relay is on.

Additional Details

The TU-170A is packaged in a gray metal case 7½" x 3" x 10". It has its own a.c. supply, 120 v.a.c. at 5 watts. The main connector on the back of the case is a chassis-mount DB25 (female). And (I consider it a nice touch) Flesher includes a DB25 male connector in the kit so one doesn't have to go berserk trying to find the suitable connector.

In my setup I used the TU-170A in conjunction with the Crown ROM-116 and the TRS-80®. My exciter (transceiver) is a Drake TR4CW. The Drake drives a 1 kw amplifier. The combination worked very well and the TU-170A was faultless. Used in conjunction with the ROM-116, the system was everything I could ask for.

The TU-170A is made by Flesher Corp., 507 Jackson, Topeka, Kansas 66603. The price is \$189.95 kit, \$289.95 wired.

BUTTERNUT ELECTRONICS COMPANY

Model 2MCV "Trombone" Model HF6V Model 2MCV-5 "Super Trombone"

THE WINNERS

BUTTERNUT ELECTRONICS

405 EAST MARKET ST. LOCKHART, TX 78644

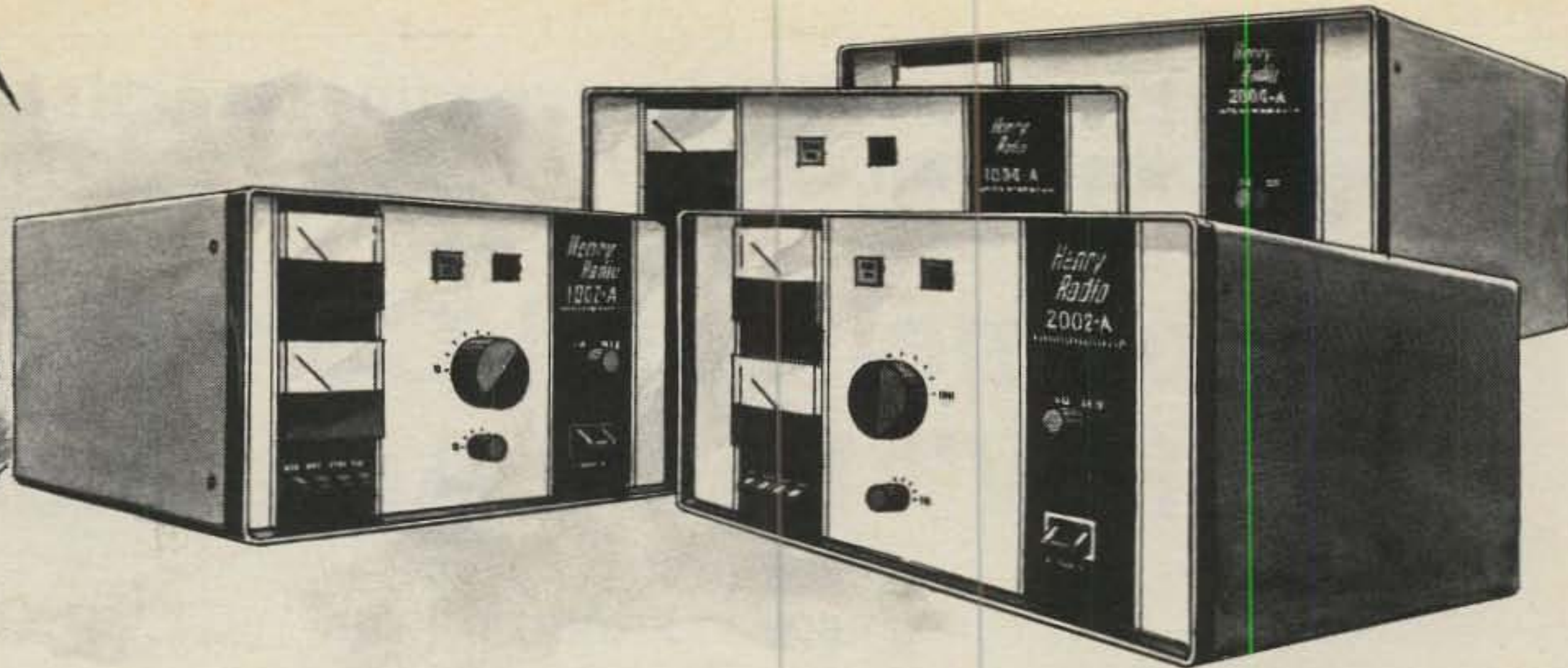
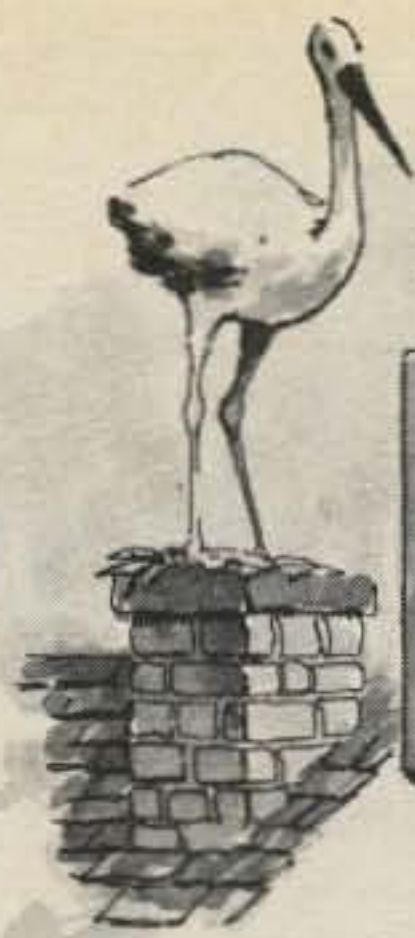
Model HF6V - Completely automatic bandswitching 80 through 10 plus 30 meters. Outperforms all 4- and 5-band "trap" verticals of comparable size. Thousands in use worldwide since December '81! 160 meter option available now; retrofit kits for remaining WARC bands coming soon. Height: 26 ft/7.8 meters; guying not required in most installations.

Model 2MCV "Trombone"™ — omnidirectional collinear gain vertical for 2 meters having the same gain as "double-5/8-λ" types, but the patented "trombone" phasing section allows the radiator to remain unbroken by insulators for maximum strength in high winds. No coils "plumber's delight" construction and adjustable gamma match for complete D.C. grounding and lowest possible SWR. Height: 9.8 ft/2.98 meters.

NEW
Model 2MCV-5 "Super-Trombone"™ — Same advanced features as the basic 2MCV but a full wavelength taller with additional "Trombone"™ phasing section for additional gain. Height: 15.75 ft/4.8 meters.

All BUTTERNUT ANTENNAS use stainless steel hardware and are guaranteed for a full year. For further information on these and other BUTTERNUT products write for our FREE CATALOG!

Please send all reader inquiries directly.



We're proud to announce the birth of FOUR fabulous new VHF and UHF amplifiers

Henry Radio has taken a giant step forward, combining the most advanced technology (including Eimac's new 3CX800A7 power triode) with Henry's traditional quality.

1. the 2002-A . . . a bright new rework of our popular 2002 2 meter amplifier. It uses the new Eimac 3CX800A7. The RF chassis uses a ¼ wave length strip line design for an extremely reliable approach. It provides 2000 watts input for SSB and 1000 watts input for CW. Because this tube is rated at an unheard of 15dB gain, only about 25 watts drive is required for full output. The 2002-A . . . \$1095.00

2. the 2004-A is identical to the 2002A except that it is set up for the 430 to 450 MHz band. This amplifier will use a ½ wave strip line and offer all of the same specifications as the 2002A. This will replace our limited production 2004. The 2004-A . . . \$1295.00

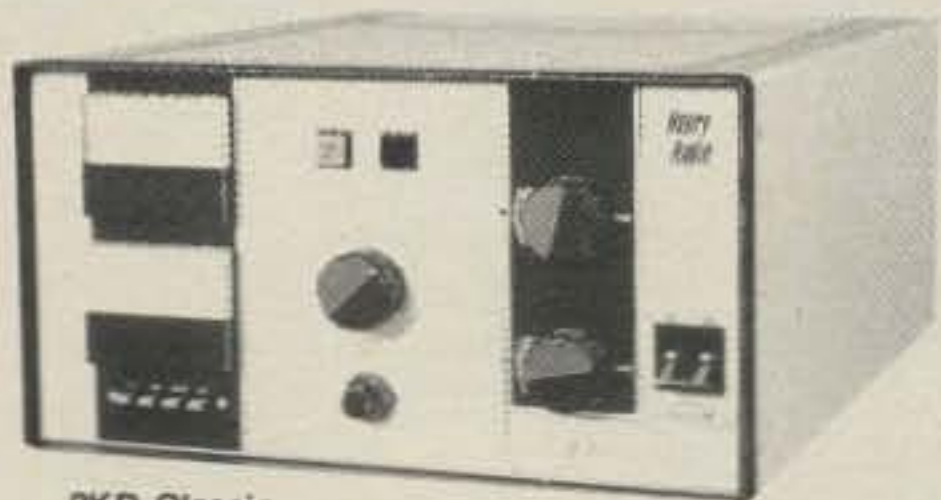
3. the 1002-A is a 2 meter amplifier with the same design as the 2002A, except using one 8874 tube for ½ power specifications. The 1002A is rated at 600 watts PEP output and 300 watts continuous carrier output. It employs

the same strip line design as the 2002A. The 1002-A . . . \$795.00

4. the 1004-A . . . a half power version of the 2004A - using again the 8874. The 1004A will cover the 430 to 450 MHz band using a ½ wave strip line design. The 1004-A . . . \$895.00.

The Henry 2002-A (Special) and the 1002-A (Special) for any frequency between 50 and 500 MHz, full and half power respectively, are available for non-amateur laboratory, scientific or communications use.

These exciting new Henry amplifiers will also be available in FCC type accepted models for commercial two-way FM communications. These amplifiers join a unique line of high power commercial, industrial and scientific amplifiers and transmitters for communications, plasma-generation; nuclear magnetic resonance, heating and other special applications. Let us know what your requirements are. We're here to help both in the U.S.A. and throughout the world.



2KD Classic

IKD-5 . . . 1200 watt desk model \$695

2KD CLASSIC . 2000 watt desk model. We challenge you to find a better desk model for even a thousand dollars more. \$980

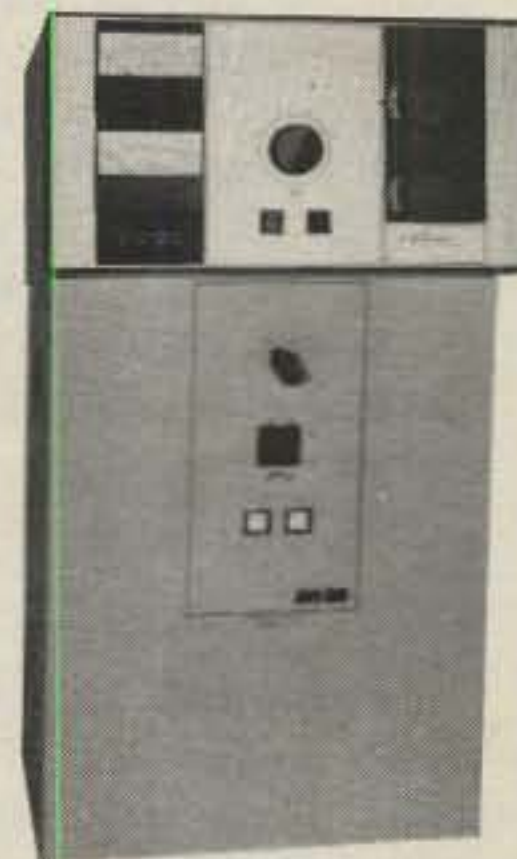
The 2K CLASSIC The latest and best version of the console \$1295.

that made the name "2-K" famous around the world. **The 2K CLASSIC "X"** We can't think of any way to make this magnificent 2000 watt amplifier better. Rugged . . . durable . . . the last amplifier you may ever need to buy. \$1795.

The 3K CLASSIC uses the superb Eimac 8877 tube. More than 13 db gain. We believe the 3K to be the finest amateur linear available anywhere. \$2695

The 3K CLASSIC "X" version available for export and military customers only. \$2895.

The 4K ULTRA A general coverage, general purpose amplifier for commercial, military, scientific and export customers. Not for sale to amateurs in the U.S.A. \$4500



2K Classic



Henry Radio

Prices subject to change without notice

CIRCLE 31 ON READER SERVICE CARD

2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820-1234
931 N. Euclid, Anaheim, CA 92801 (714) 772-9200
Butler, Missouri 64730 (816) 679-3127

TOLL FREE ORDER NUMBER: (800) 421-6631

For all states except California.
Calif. residents please call on our regular numbers.

K4JZB reports on his "V" beam experiments and shows us how to roll our own.

Development and Construction of "V" Beam Antennas

BY ROBERT F. ZIMMER*, K4JZB

The antennas to be described here are often mistaken to be log-periodic antennas. They are not. They are "V" antennas, $\frac{1}{2}$ -wavelength "V's" both parasitic and driven. I have been using them for over 10 years. I also have a three-element tribander, plus four-element monobanders for 14 and 21 MHz.

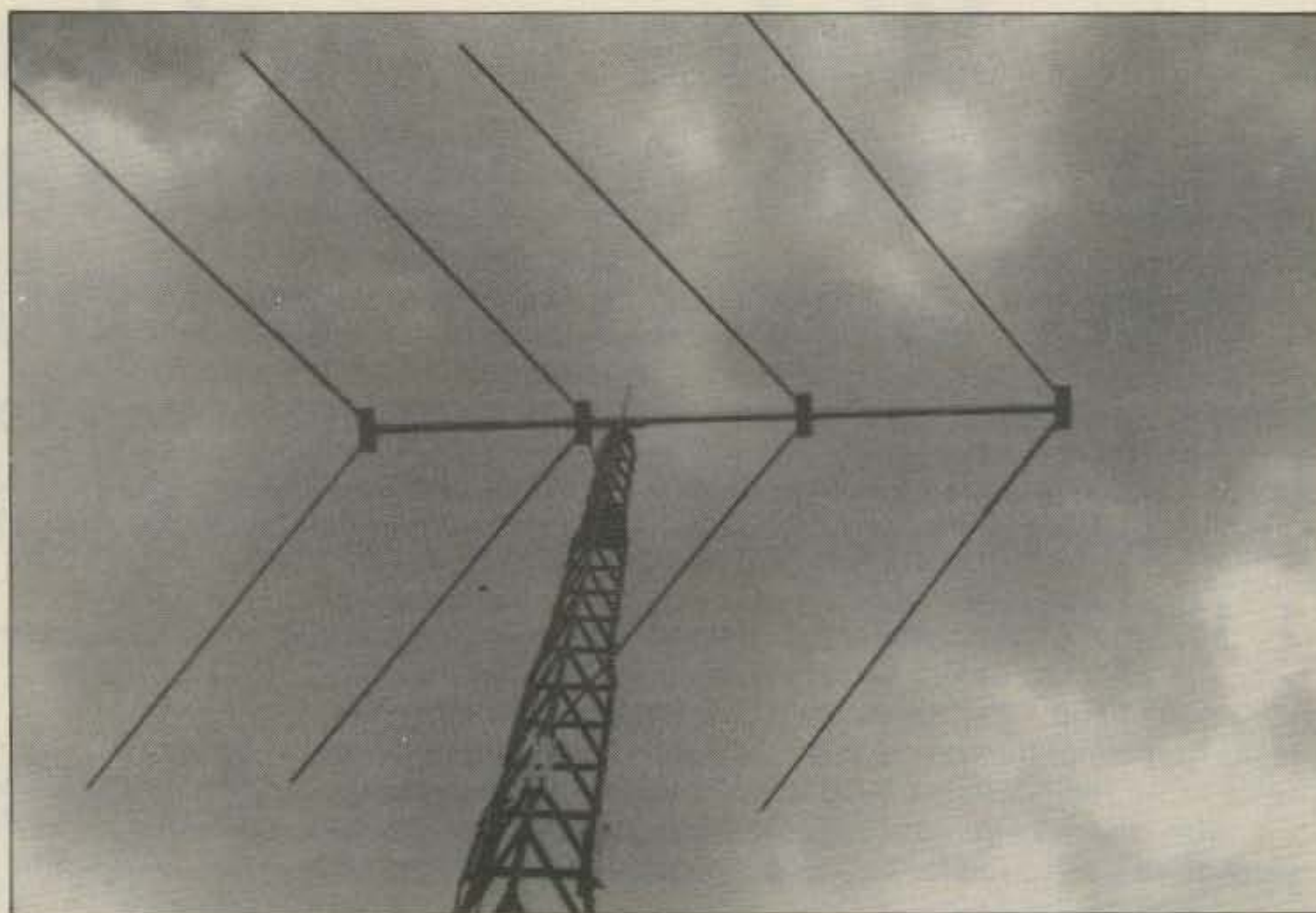
I started off first by bending the antenna elements forward 40° to determine if the reported 3 to 5 dB additional gain actually could be realized. The first antenna was a two-element antenna with both elements of equal length (fig. 1). This proved two things: (1) that front-to-back ratio could be obtained, and (2) that good forward gain could be achieved. They both were justified in this design.

Next I lengthened one element by 5% (fig. 2). This proved to be very beneficial and will out-perform three-element Yagi beams. These antennas were used on 21 MHz s.s.b. and were evaluated on short haul (1,000 miles), medium haul (3,000 miles), and long haul (10,000 miles plus). They were tested at heights from 5 to 50 feet and with output powers from 60 to 600 watts p.e.p.

I then built a three-element broadband antenna for 28 MHz (fig. 3). It was installed 24 feet up and aimed due west. With only 60 watts p.e.p. output, I was able to work VK's when they were only hearing west coast stations.

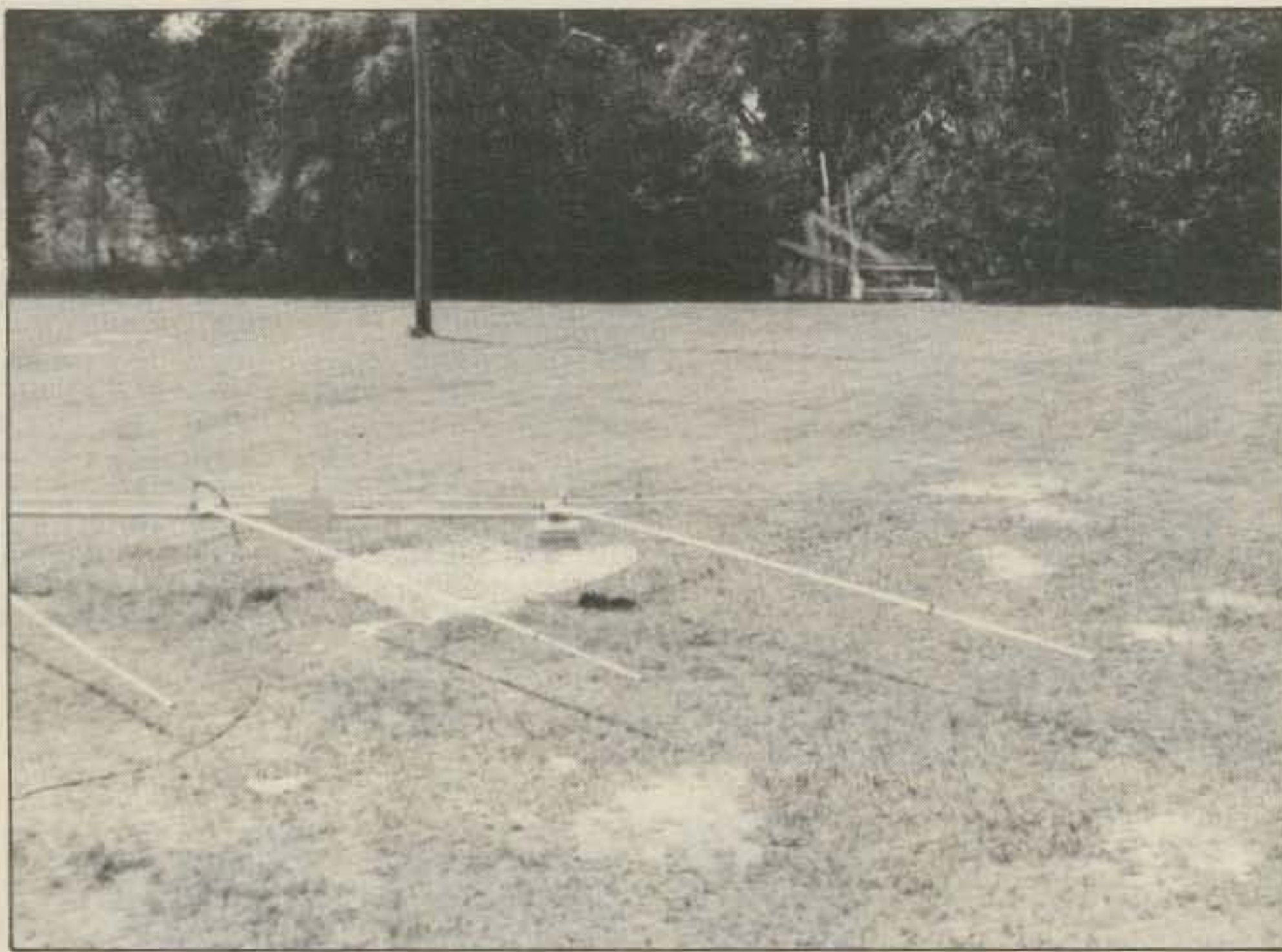
On January 27, 1982 I got caught with my antennas down when Martha, 3C0AC, came on. With the aid of my wife, the antenna shown in fig. 2 was hauled up on the roof and installed on the tower 24 feet up. I pointed it toward Africa and got 3C0AC on the first call through a terrific pile-up. This all took place in a half-hour period.

The next antenna to be described in this series is a four-element one. It has three driven elements plus a reflector on 21 MHz. It has been up since February at a height of 50 feet and has done a terrific job. I have had many inquiries about it from stations I've worked all over the

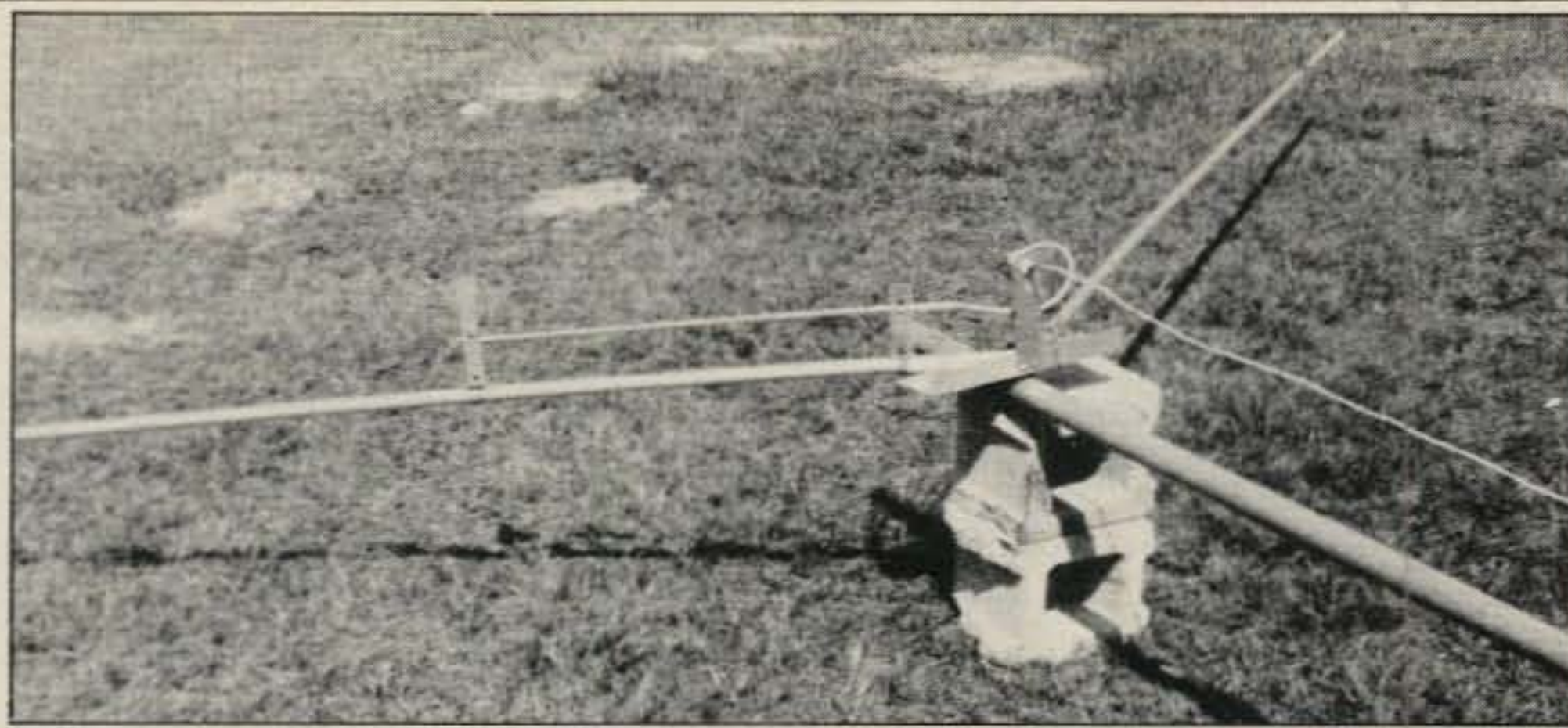


The 4-element version with 4 foot spacing between DE1, DE2, and DE3, 12 dB gain.

The 10 meter antenna ready to be put up on the tower.



P.O. Box 232, Land O'Lakes, FL 33539



Note that the inner part of RG-8U is slid into the $\frac{3}{8}$ inch Gamma rod to adjust s.w.r.

BAND	REFL	DE ₃	DE ₂	DE ₁	DIR
20	424"	404"	400"	346"	376"
15	284"	270"	267"	264"	252"
10	210"	200"	196"	192"	182"

Table I- Element lengths.

ELEMENT SPACING	REFL TO DE ₃	DE ₃ TO DE ₂	DE ₂ TO DE ₁	DE ₁ TO DIR
20	8'	2'	2'	8'
15	5½'	2'	2'	5½'
10	4'	2'	2'	4'

Table II- Element spacing.

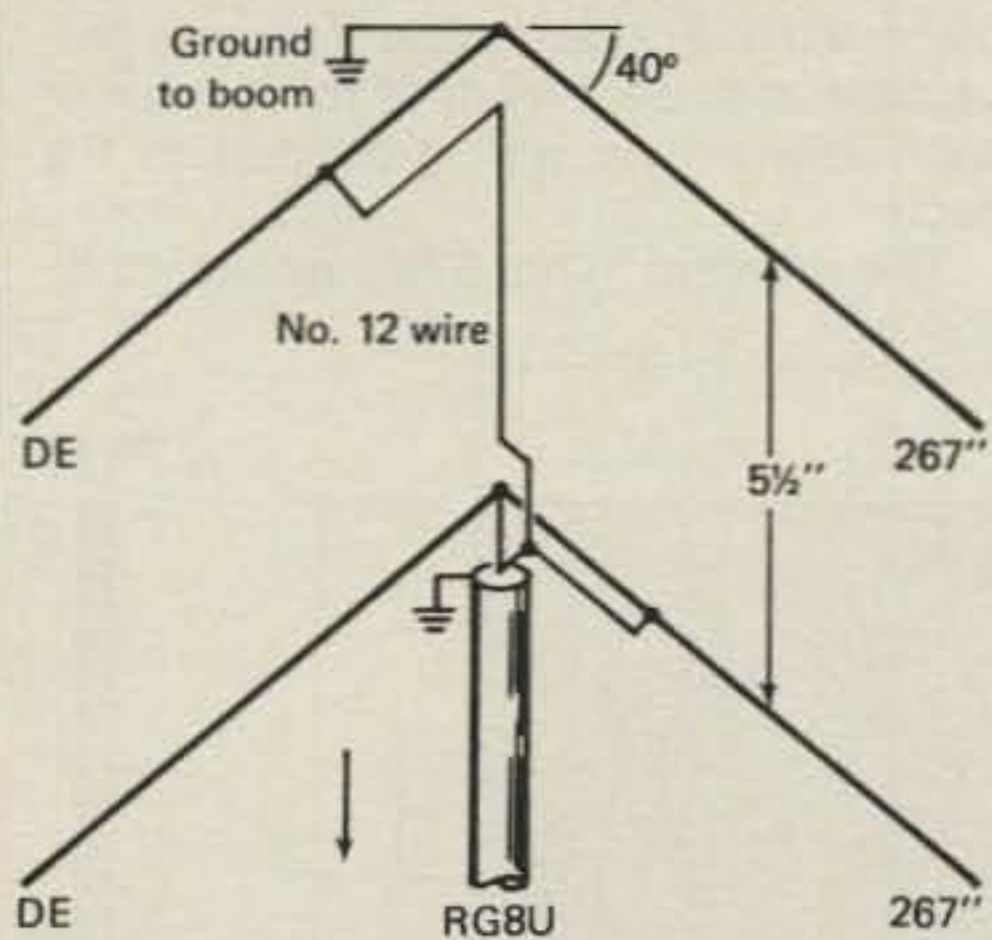


Fig. 1- This was constructed to test the theory of "V" beam operation. It proved forward gain and front-to-back ratio.

world. I get reports of S-9 plus 10-20, to even pegging the "S" meter, to being the only "W" coming through.

When the elements are formed into a "V" there are two problems to be solved: the element mounting plates and the joining of the two halves of the tubing. The photographs show the method used to mount the elements to the boom. The automotive muffler clamps used to mount the plates to the boom are painted to retard rust, so it is necessary to use an aluminum strap to ground the plates to the boom.

I have never been able to bend tubing with ordinary tools found in a home workshop, so I just put the tubing in a vise and flatten the center. This also makes it very easy to drill and fasten at the center to the bracket. The elements can be made from almost any size aluminum tubing available at a local hardware store. They all seem to stock from ½ to 1 ¼ inch sizes in lengths of 6 and 8 feet and are of the thickness necessary for telescoping.

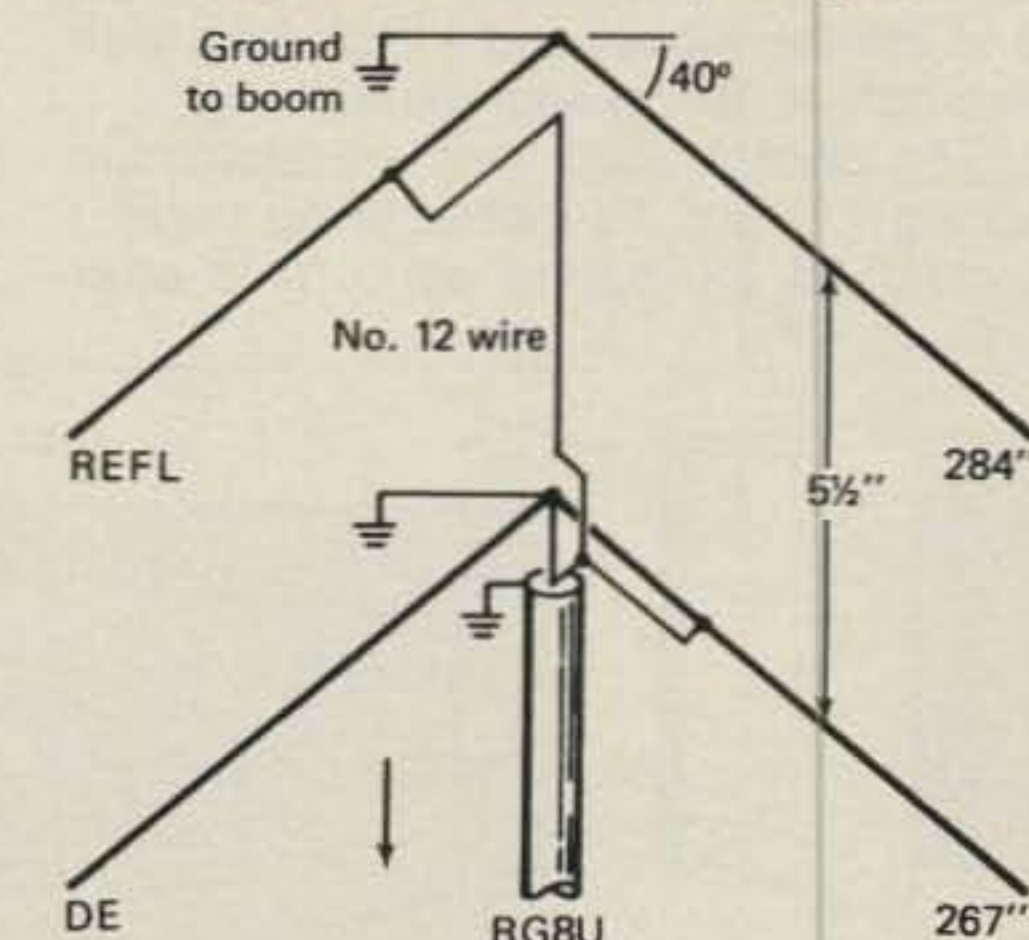


Fig. 2- This is a very good beam with 6.64 dBi gain. The front-to-back ratio is about 25 dB on 21 MHz.

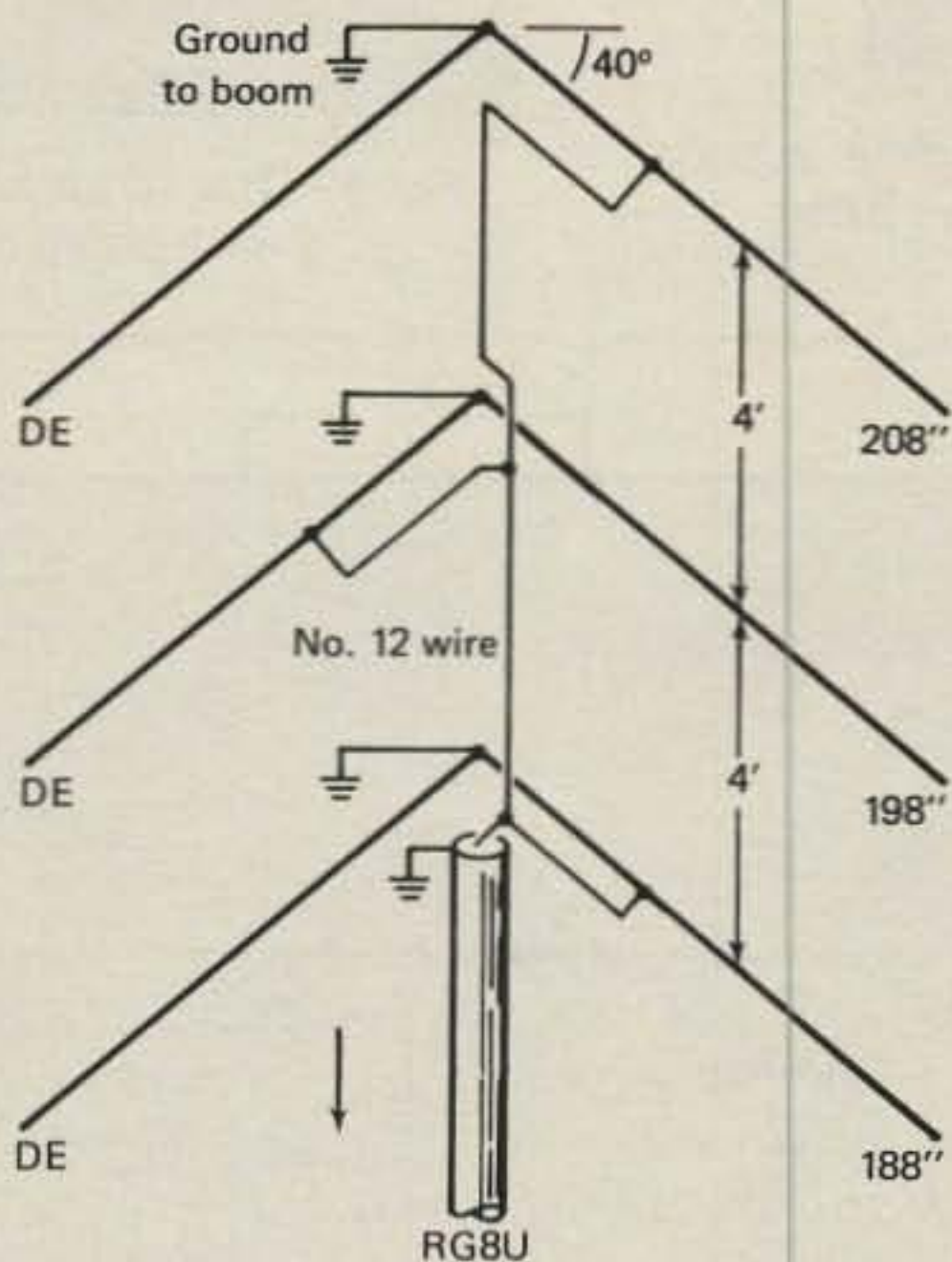


Fig. 3- The design shown in this diagram was used on 10 meters with 7.92 dB over the entire phone band.

BAND	GAMMA LENGTH	SPACING TO ELEMENT	CAPACITY
20	40-48"	6"	140pF
15	30-36"	4"	70pF
10	20-24"	4"	45pF

Table III- Dimensions of Gamma matches.

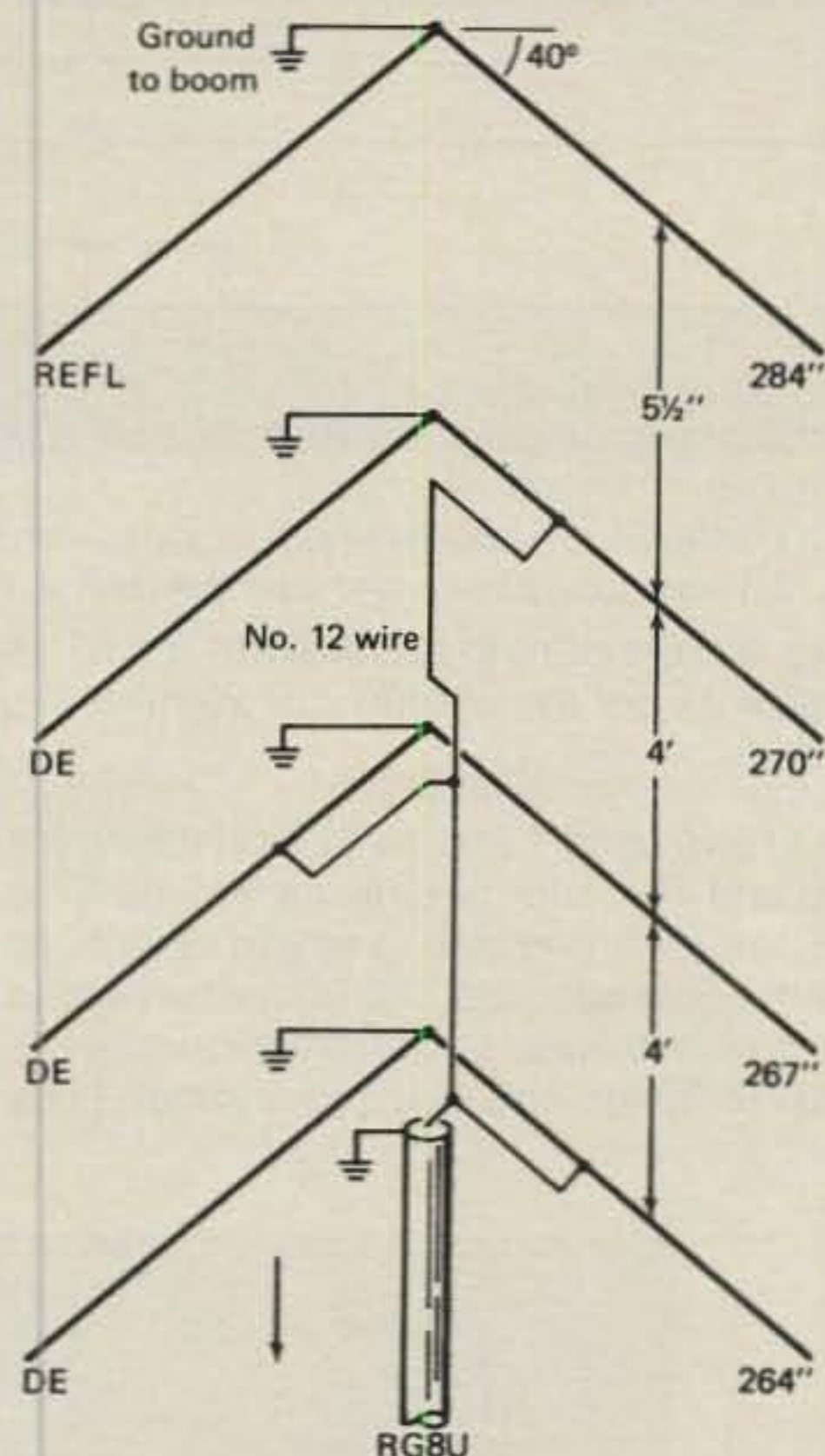


Fig. 4- This configuration is in use at present at K4JZB. It has a gain of 12 dB.

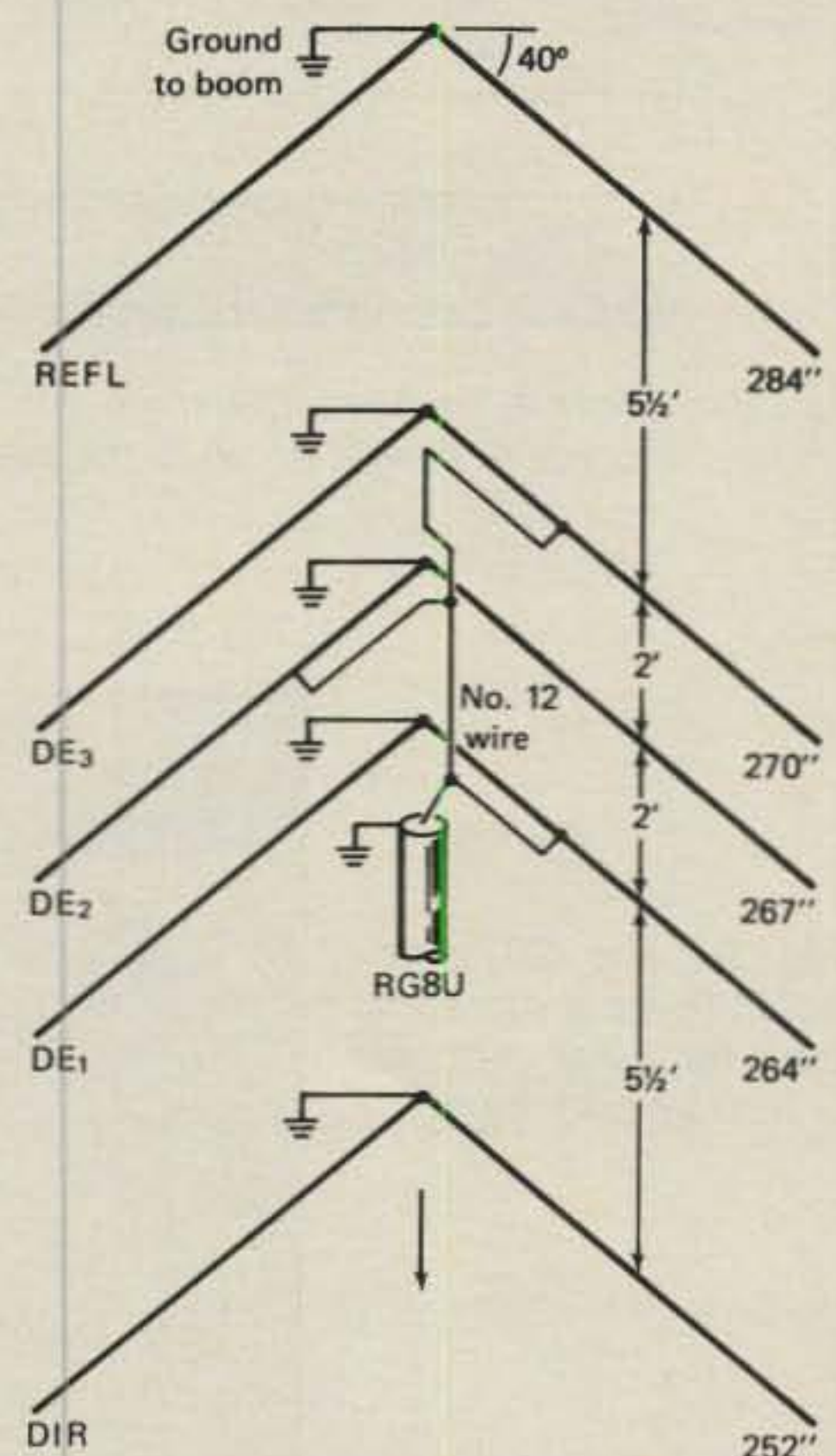
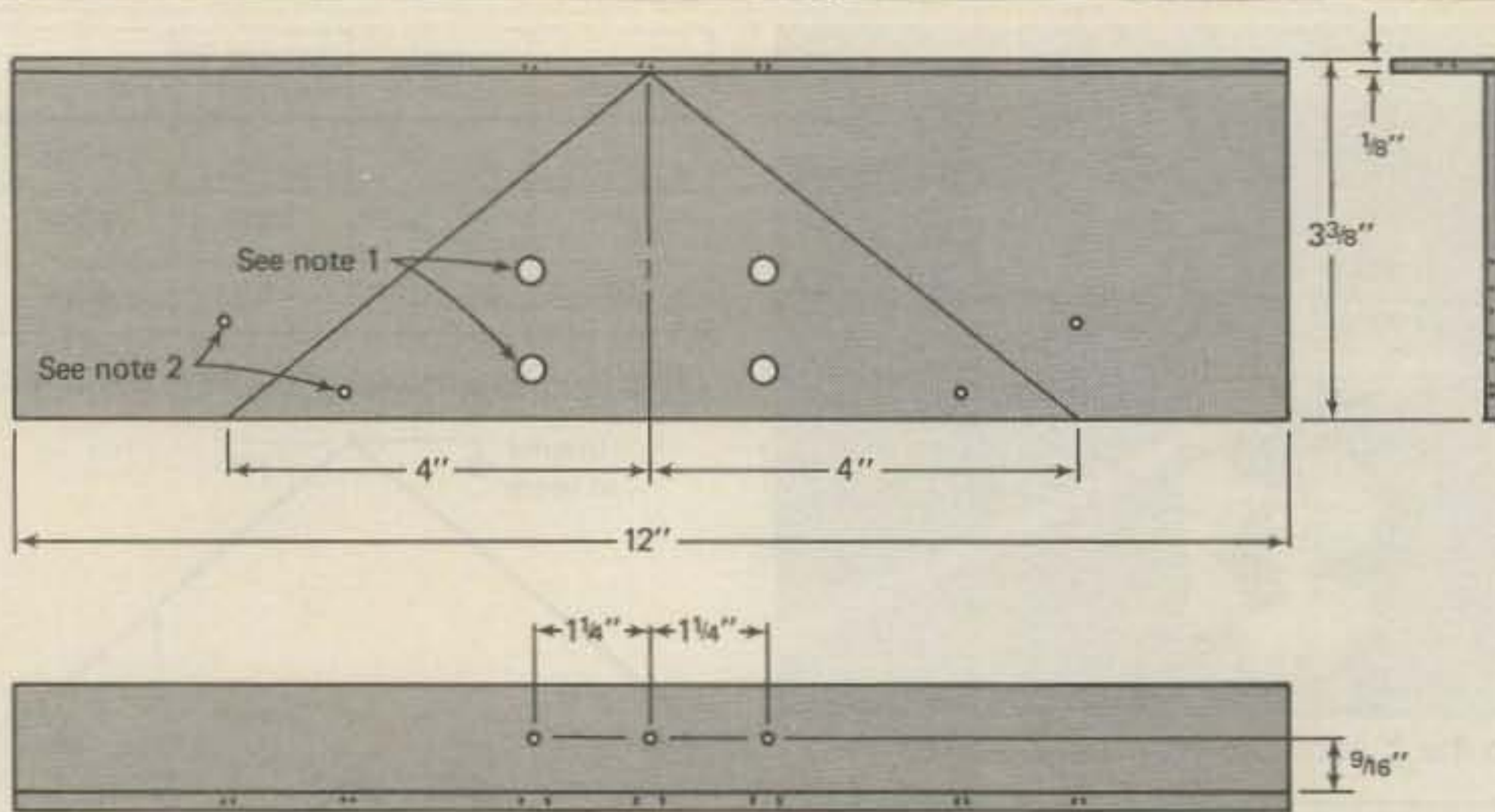


Fig. 5- Revised spacing results in 16 dB gain and sharper horizontal beam width.



NOTES:

1. These holes depend on boom size and size of clamps.
2. These holes, diameter and spacing depend on element size and clamps.

Fig. 6- Element-to-boom plate for 10 and 15 meters. Use two angle plates back to back as per the photos. For 20 meters use the stronger method as per the photos.

I have used 1 to 7/8 to 3/4 inch tubing for 10 and 15 meter booms, as well as 7/8 to 3/4 to 5/8 inch, and also 3/4 to 5/8 to 1/2 inch, all with equal success. For 20 meter booms one or two sizes larger are recommended. To fasten one size into another, I use

stainless steel automotive hose clamps and slit the tubing end 1 inch long with two cuts at 90° to each other.

The booms used here are aluminum tubing 1 1/2 and 1 5/8 inches in diameter. I picked up the tubing as surplus after

World War II, and they have been used and reused since that time. For the shorter booms TV masting can be used very effectively.

One nice thing about these antennas is that they take a shorter boom. The antennas shown in figs. 3 and 4 were also used with spacing between driven elements (DE) of 2 feet as shown in fig. 5. These would have a boom length in fig. 3 of 4 feet and in fig. 4 of 9 1/2 feet. This would make a very compact beam for 10 and 15 meters.

I could not ascertain any great difference between the 2 foot or 4 foot spacing. The main thing to watch for is to have each adjoining element out of phase to the other. This is necessary to have the gain additive. I recommend the 4 foot reflector spacing for 10 meters, 5 1/2 foot spacing for 15 meters, and 8 foot spacing for 20 meters.

The element mounting plates (use two together) are used and inverted as per the photographs. The feedline between elements is No. 12 copper wire. This is preferred over coax cable. The only precaution is to be sure that the center of each element is well grounded to the boom.

The antenna in fig. 6 has an added di-

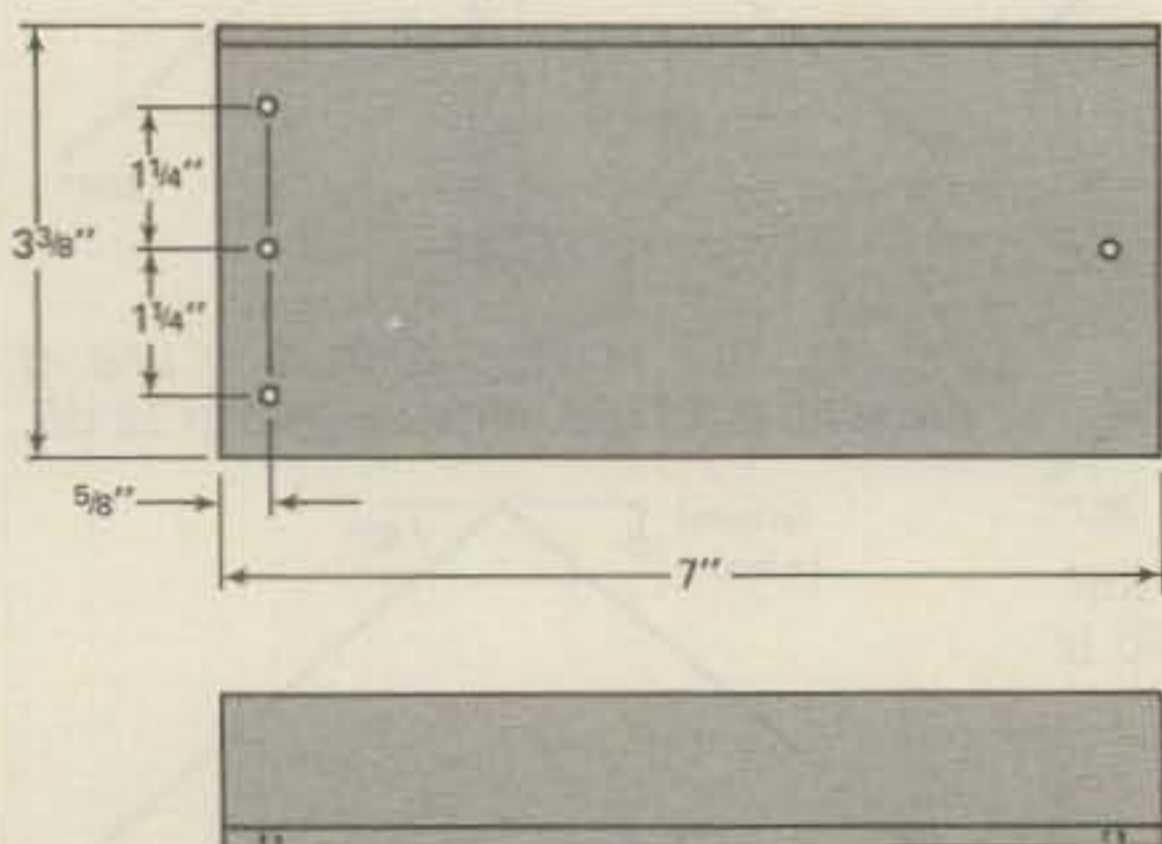


Fig. 7- Use the same angle plate for feedline support. It mounts at a right angle to the element plate.

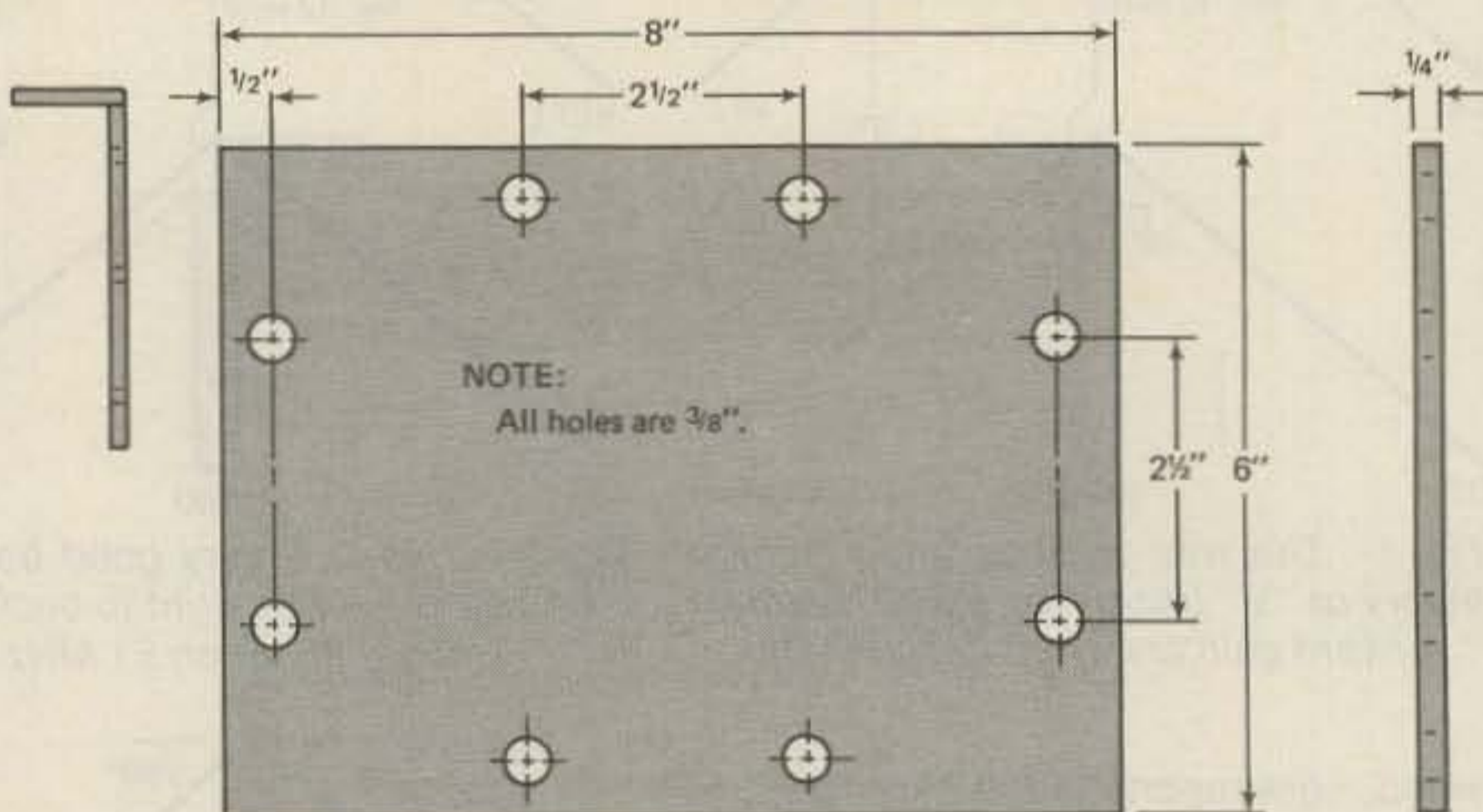


Fig. 8- The 10 and 15 meter boom-to-mast mounting plate for 2 inch boom diameter and 2 inch mast diameter.

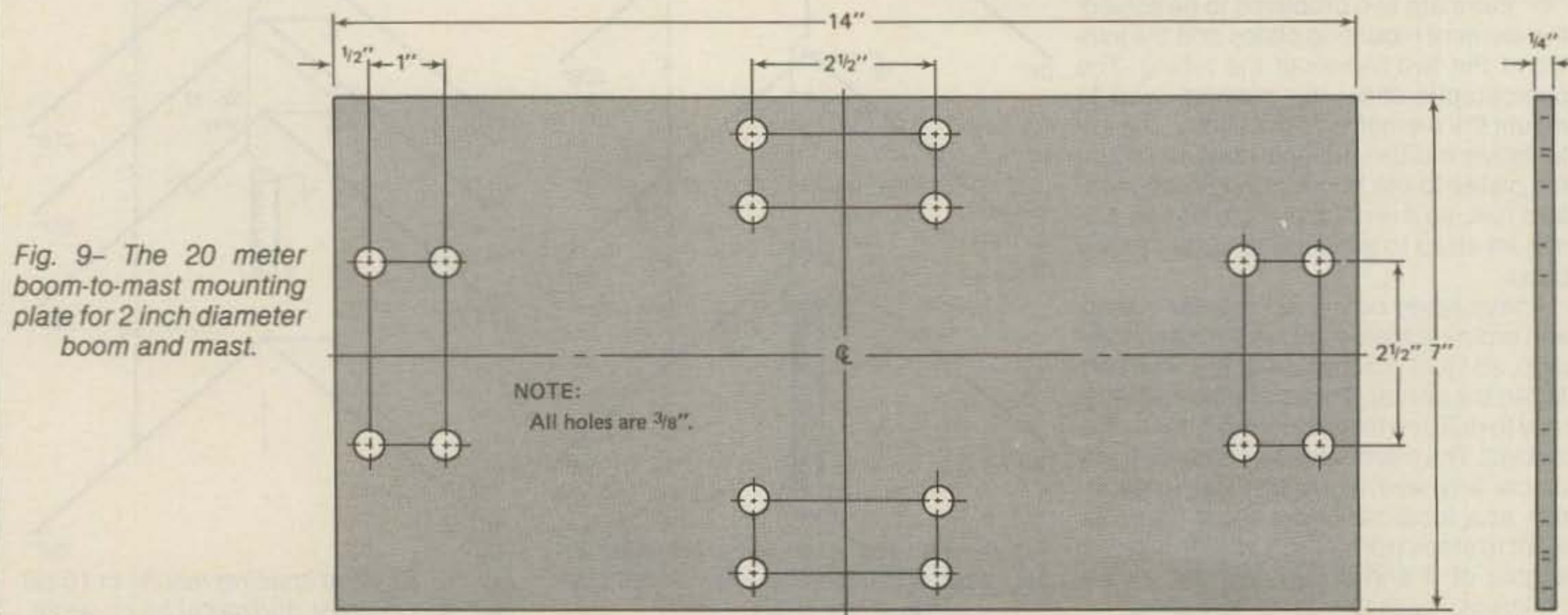
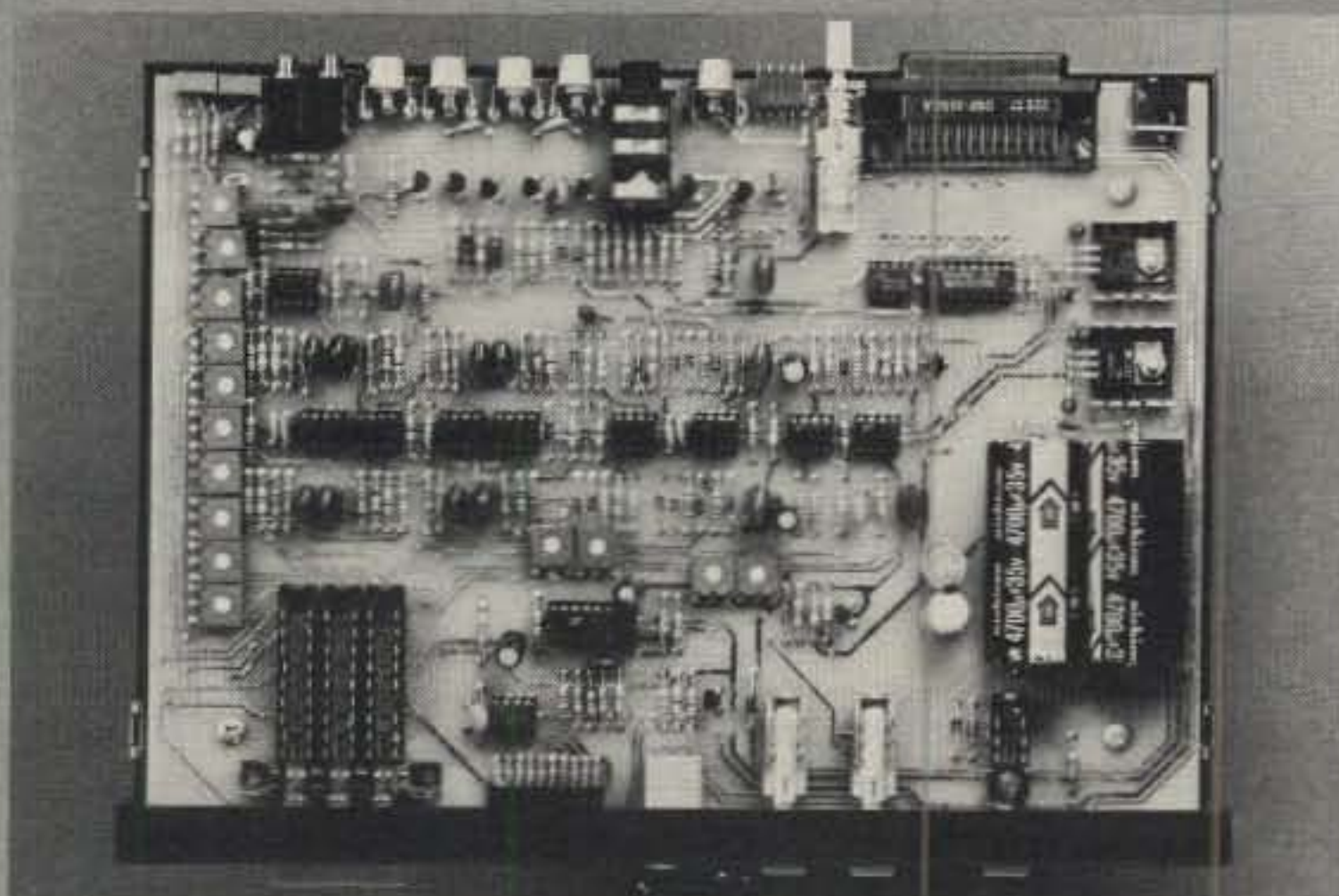


Fig. 9- The 20 meter boom-to-mast mounting plate for 2 inch diameter boom and mast.

**MISSOURI
RADIO CENTER**

**"CALL TOLL FREE"
1-800-821-7323**

CHAMPAGNE RTTY/CW on a Beer Budget



AEA

**Brings you the
Breakthrough!**

CP-1 Computer Patch™ Interface

The AEA Model CP-1 Computer Patch™ interface will let you discover the fastest growing segment of Amateur Radio: computerized RTTY and CW operation.

When used with the appropriate software package (see your dealer), the CP-1 will patch most of the popular personal computers to your transceiver for a complete full-feature RTTY/CW station. No computer programming skills are necessary. The CP-1 was designed with the RTTY neophyte in mind, but its sophisticated circuitry and features will appeal to the most experienced RTTY operator.

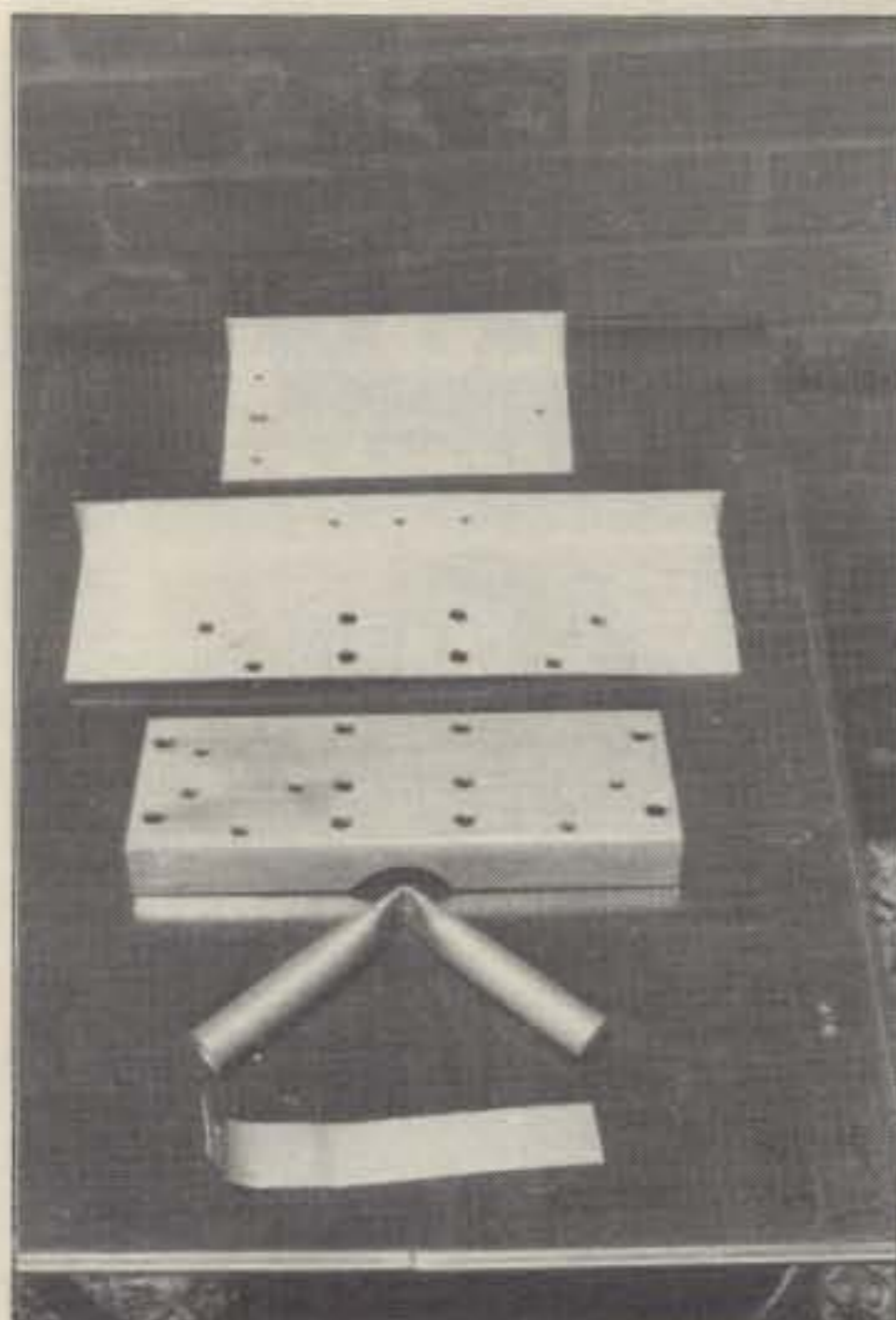
The CP-1 offers variable shift capability in addition to fixed 170 Hz dual channel filtering. Auto threshold plus pre and post limiter filters allow for good copy under fading and weak signal conditions.

Transmitter AFSK tones are generated by a clean, stable function generator. Plus (+) and minus (-) output jacks are also provided for CW keying of your transmitter. An optional low cost RS-232 port is also available. The CP-1 is powered with 16 VAC which is supplied by a 117 VAC wall adaptor included with the CP-1.

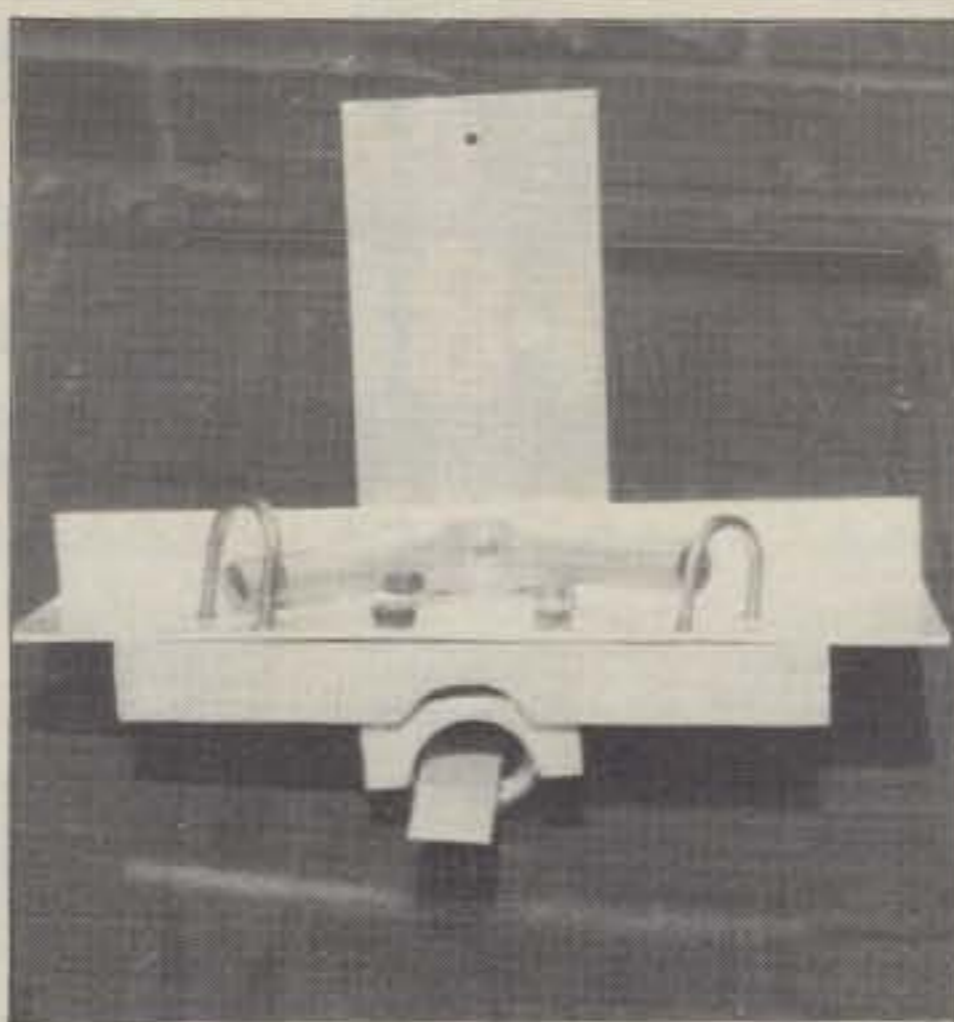


CIRCLE 133 ON READER SERVICE CARD

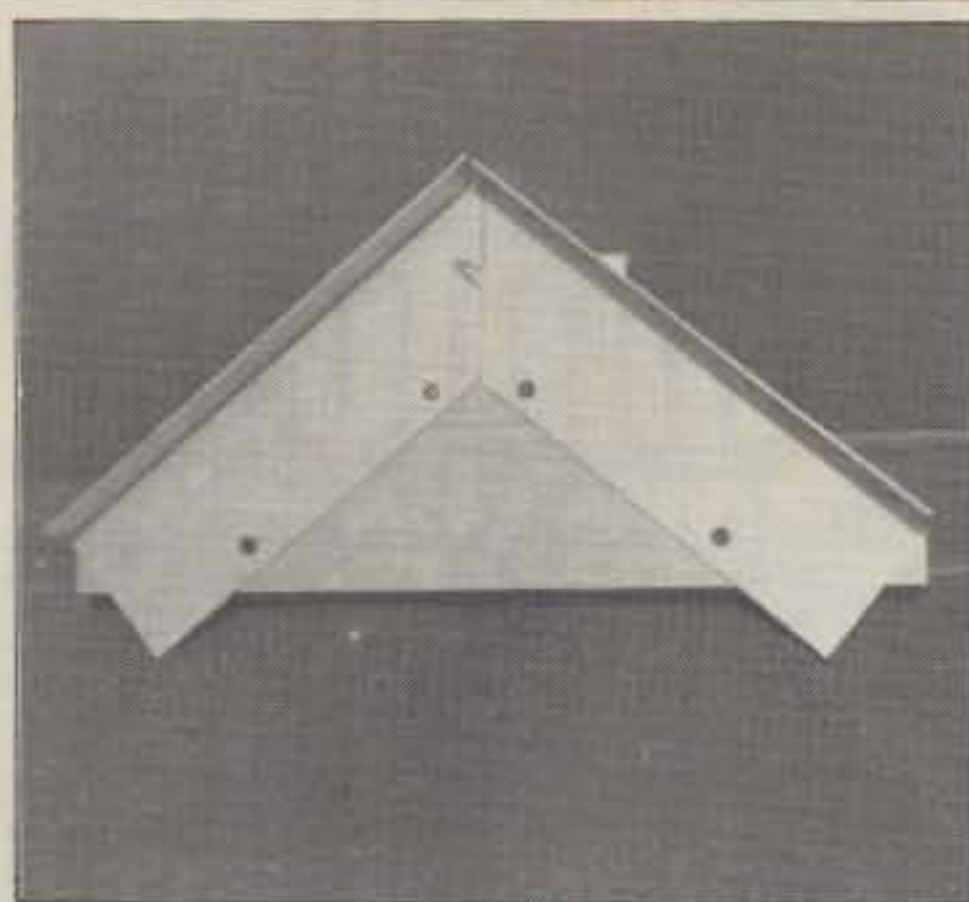
2900 N.W. VIVION RD. / KANSAS CITY, MISSOURI 64150 / 816-741-8118



Element mounting brackets used on 10 and 15 meter beams.



Here the bracket is assembled and ready to go on a boom.

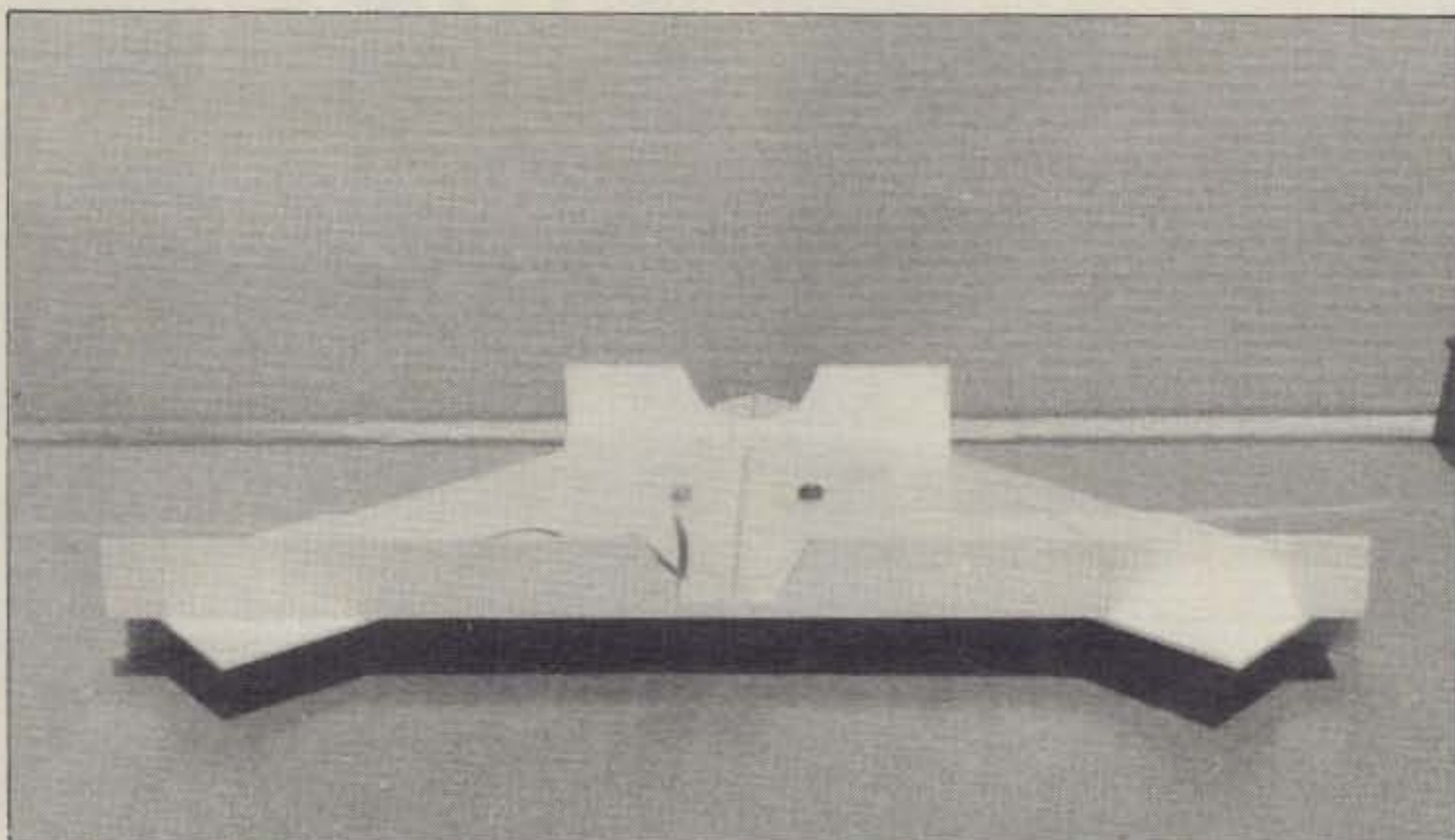


Brackets used on 20 meters are much heavier due to larger and longer elements. They are each 12 inches long.

rector which sharpens the beam width and greatly increases the gain. With the antenna pointed at VK land, the ZL stations cannot be heard. The direction must be changed 8° south of west to bring them in, and the VK's are lost at that time.

The mail I received from my first article in the January 1983 issue of *CQ* indicates that more information is needed about the construction and adjustment of Gamma matches. I trust the following information will be helpful.

I have used many different Gamma matches over the years. The one used now is made from 3/8 inch aluminum tubing, spaced 4 inches from element, shorted at far end to the driven element. Into the center is slid RG-8U coax which has the outer covering and shield braid removed. This makes a fine capacitor which seems to hold up very well in all climates.



Note the double construction. This is the bottom view.

To adjust the Gamma, I vary the shorting bar first to get the lowest s.w.r., and then vary the coax capacitor to lower the s.w.r. even further. When it has reached 1.5 to 1 or lower, I stop, as more time spent here does not seem to pay. When multiple driven elements are used, Gam-

ma matches must be adjusted as a group—i.e., each one must be the same.

Each antenna has a critical angle of radiation, and at that angle the gain is maximum. At other angles the antenna will not exhibit its full gain.

I have found from use that multiple driven elements have a lower angle of radiation than parasitic beams. This is evident in the "W8JK" and "ZL Special" beams. The driven beams show their higher gain over longer paths. Also, the driven beams work more effectively at low heights. I have never found a Yagi that would work very well at heights of less than 40 feet, while the driven "V" antennas have proved to work well at 12 and 14 feet above ground. This is a bonus for those who do not have a 50 to 70 foot tower, as a lower-priced structure will work.

From on-the-air use I have concluded that tilting the elements forward 40° results in a 1 db additional gain per element. Adding more driven elements adds 2.64 db per element. I have figured the gain of each antenna many times over a long period of time and at various distances, and I have included this information in the drawings.

Radio equipment not included

Also Available . . .
Floor Space: 51" Wide by 30" Deep
\$199.50

... at last ...

your shack organized!

A beautiful piece of furniture — your XYL will love it!

\$184.50 S-F RADIO DESK

Deluxe - Ready to Assemble

Designed with **angled** rear shelf for your viewing comfort and ease of operation.

FINISHES: Walnut or Teak Stain.

Floor Space: 39" Wide by 30" Deep

Additional Information on Request.

Checks, Money Orders, BankAmericard and Master Charge Accepted.

F.O.B. Culver City. (In Calif. Add 6% Sales Tax.)

DEALER INQUIRIES INVITED

S-f Amateur Radio Services

4384 KEYSTONE AVENUE • CULVER CITY, CALIF. 90230 — PHONE (213) 837-4870

CIRCLE 70 ON READER SERVICE CARD

TS430S FILTER DEAL

For superior performance at lower cost, use top-rated 8-pole Fox Tango crystal filters to fill the optional spots in your rig. For example, our 1800 Hz FT2808 equivalent of the YK88SN has a 60/6 dB shape factor of 1.7 compared with 2.0, a price of \$55 vs \$63, and squarer shoulders at the top with steeper skirts all the way down to more than -80 dB!

For more pleasant SSB audio use our 2100Hz bandwidth FT2809. For CW, the FT2802 400Hz unit is better than the YK88C, while the 250Hz FT2801 is sharper than the YK88CN. The more you buy, the more you save! But don't buy an AM filter, not even ours.

BIGGER IS BETTER!

Fox Tango filters are better because of this discrete crystal (not monolithic) construction. This makes them slightly larger than YK filters so they are patched into the circuit with short lengths of coax. Installation is easy—no drilling or circuit changes. Order with confidence.

INTRODUCTORY PRICES—Complete Kit

Any ONE filter.....\$55
Any TWO filters.....\$100 (Save \$10)
Any THREE filters....\$145 (Save \$20)

Includes all needed cables, parts, detailed instructions. Specify the type(s) desired:

SSB—FT2808 (1800Hz); FT2809 (2100Hz)
CW—FT2801 (250Hz); FT2802 (400Hz)

Shipping \$3 per order; (\$5 air). FL Sales Tax 5%.

ONE YEAR WARRANTY

GO FOX-TANGO—TO BE SURE!
Order by Mail or Telephone.

AUTHORIZED EUROPEAN AGENTS
Scandinavia: MICROTEC, Makedien 26,
3200 Sandefjord, NORWAY
Other: INGOIMPEX, Postfach 24 49,
D-8070, Ingolstadt, W. GERMANY



FOX TANGO CORPORATION

Box 15944 C, W. Palm Beach, FL 33416
(305) 683-9587

CIRCLE 16 ON READER SERVICE CARD



C-1000-DW
\$337.59

Organize your shack with a CLUTTERFREE MODULAR CONSOLES

Prices start at \$169.92

- 9 Models to choose from
- Large, 42" H X 57" W X 30" D
- Strong grove-construction
- Mar-resistant wood grain finish
- Options, drawers & face plate
- For ham or home computer
- Visa and Master Charge

CLUTTERFREE MODULAR CONSOLES

P.O. Box 5103 Tacoma, WA. 98405
(206) 272 0713

CIRCLE 59 ON READER SERVICE CARD

Say You Saw It In CQ

The Antenna Bank

6460 H General Green Way
Alexandria, VA 22312
703-569-1200

Hy-Gain

TH7DXS	7 element triband	---	376.00
TH5MK2S	5 element triband	---	309.00
TH3MK3S	3 element triband	---	215.00
TH3JrS	3 element triband	---	156.00
18AVT	5 band trap vertical	-	87.50
14AVQ	4 band trap vertical	-	51.00
V2S	2 meter colinear	-----	38.00

Hy-Gain Crank-up Towers

HG-50MT2	50' side supported	-	754.00
HG-52SS	52' self-supporting	-	923.00

Hustler

58TV	5 band trap vertical	--	100.00
67-144	2 meter colinear	-----	99.00
MO-1, MO-2	HF mobile masts	---	18.50
RM-10, RM-15	HF resonators	---	9.00
RM-20	HF resonator	-----	12.00
RM-40	HF resonator	-----	13.00
RM-75, 80	HF resonators	-----	14.75

Rohn Towers

25G	10' stacking section	---	41.00
25AG2, 3, 4	top sections	-----	53.50
45G	10' stacking sections	---	93.75
45AG2, 3, 4	top sections	-----	104.75
HDBX48	48' self-supporting	-	316.00
FK2548	48' foldover	-----	794.00

Diawa

CS-201	2 way coax switch	---	20.00
CS-401	4 way coax switch	---	62.00
CN-520	HF SWR/Power meter	---	59.00
CN-620B	HF/VHF SWR/Power	---	107.00
CN-720B	HF/VHF SWR/Power	---	150.00

Mini-Products

HQ-1	Mini-Quad 6, 10, 15, 20 m	-	129.95
------	---------------------------	---	--------

Cushcraft

A4	4 element triband beam	---	224.50
A3	3 element triband beam	---	172.50
R3	Gain triband vertical	---	224.50
AV5	5 band trap vertical	-----	88.50
AV4	4 band trap vertical	-----	81.50
214B, FB	14 element 2m beam	---	68.00
A147-11	11 element 2m beam	---	37.50

Rotors

T2X "Tailtwister"	20 sq ft	---	244.00
HAM-IV	15/7.5 sq ft	-----	195.00
CD-45II	8.5/5 sq ft	-----	102.75
HD-73	Dual speed 10.7 sq ft	-	89.00
U-100	Approx. 3 sq ft	-----	42.00

MFJ

MFJ-900	200 W Versa Tuner	---	41.95
MFJ-941C	300 W Versa Tuner	---	77.55
MFJ-949B	300 W Versa Tuner	---	117.55

Coax

RG-213/u	Milspec 95% shield	-	.28/ft
RG-8/u	95% shield	-----	.24/ft
RG-8/X	"Mini-8" 95% shield	-	.12/ft

ORDERS ONLY: 800-336-8473

ALL others call: 703-938-1400

NO COD - We ship UPS

Allow two weeks for delivery

Shipping cost NOT included

We reserve the right to limit quantities - We accept VISA & MC

CIRCLE 84 ON READER SERVICE CARD

CQ FOR THE 80's

What do you want from a Ham magazine? News. Entertainment. Interviews. Projects. Reviews. Information. Great Reading.

Is that all?

Well, how about a WAZ Award Program, a Five Band WAZ Program, the two greatest World Wide DX Contests in the world, a DX Awards Program, two 160 Meter DX Contests, a USA-CA County Awards Program, a DX Hall of Fame. Twelve of the greatest achievement and operating programs in the Amateur Radio world today. All from CQ.

CQ. MORE THAN JUST ANOTHER MAGAZINE. IT'S AN INSTITUTION.

The Radio Amateur's Journal 76 N. Broadway, Hicksville, NY 11801

Please send me CQ for Life 3 Years 2 Years 1 Year. Start with _____ issue.

NEW RENEWAL

Name _____ Call _____
Street _____ State _____ Zip _____
Rates (check one)
3 Years (36 issues).....42.00
2 Years (24 issues).....29.00
1 Year (12 issues).....16.00

My account number is

Charge My Order To: Payment Enclosed \$ _____

Master Charge

VISA

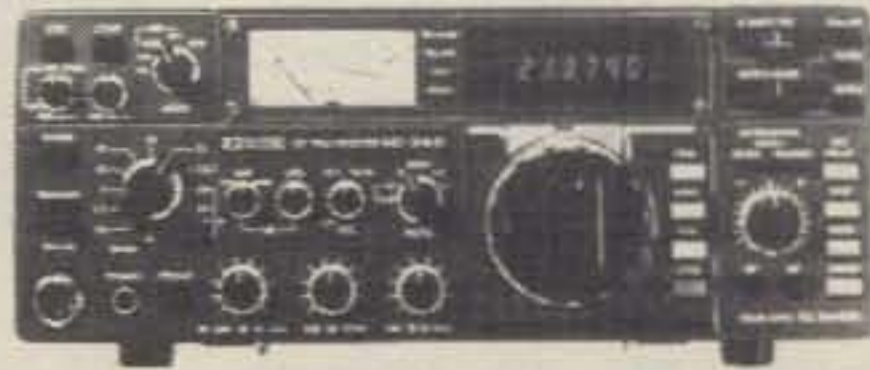


KENWOOD TS-430S



- All Bands
- General Coverage
- 200 Watts
- Dual VFO's
- 8 Memories

ICOM IC-740



- 1.8 to 30 MHz
- Super Receiver
- 200 Watts
- Selectable IF/PBT Tuning

YAESU -NEW FT-77



- Extremely Compact
- 200 Watts
- 3.5 to 30 MHz
- Inexpensive

ANTENNA SALE

CUSHCRAFT

A-3	\$175
A-4	\$226
R-3	\$226
AV-5	\$ 90
214-FB	\$ 69
32-19	\$ 82
40-2CD	\$260

HY-GAIN TOWERS

HG37SS	\$ 649
HG52SS	\$ 919
HG54HD	\$1429
HG70HD	\$2339
HG50MTS	\$ 749

BUTTERNUT

HF6V	\$109
KT34A	\$299
KT34XA	\$449
144-148LBA	\$ 69

HY-GAIN

TH5MK2S	\$318
TH7DXS	\$378
TH3MK3S	\$218
TH3JRS	\$158
TH2MKS	\$138
18AVT/WS	\$ 94
18HTS	\$335
V2S	\$ 37

LARSEN

CALL

AEA

CALL

2900 N.W. VIVION RD. / KANSAS CITY, MISSOURI 64150 / 816-741-8118

CIRCLE 74 ON READER SERVICE CARD

RF TRANSISTORS

FRESH STOCK - NOT SURPLUS

P/N	Net/ea.	Matched Pr.	Net/Pr.
MRF412	\$18.00	MRF412-2	\$39.00
MRF421	27.00	MRF421-2	58.00
MRF450	12.50	MRF450-2	28.00
MRF453	15.00	MRF453-2	33.00
MRF453A	15.00	MRF453A-2	33.00
MRF454	16.50	MRF454-2	36.00
MRF454A	17.00	MRF454A-2	37.00
MRF455	14.00	MRF455-2	31.00
MRF455A	13.50	MRF455A-2	30.00
MRF458	18.00	MRF458-2	39.00
MRF492	20.00	MRF492-2	43.00

PREMIUM MATCHED QUADS AVAILABLE

VHF & UHF TRANSISTORS

Type	Mount	Rating	MHz	Net/ea.
MRF238	(s)	30W	145-175	13.00
MRF240	(s)	40W	145-175	15.00
MRF245	(F)	80W	130-175	27.00
MRF247	(F)	80W	130-175	27.00
MRF492	(F)	70W	27-50	20.00
SD1416	(F)	80W	130-175	30.00
SD1477	(F)	125W	130-175	37.00
SD1441	(F)	150W	130-175	83.50
2N6081	(s)	15W	130-175	7.75
2N6082	(s)	25W	130-175	9.75
2N6083	(s)	30W	130-175	9.75
2N6084	(s)	40W	130-175	13.50
MRF644	(F)	25W	430-470	21.50
MRF646	(F)	45W	430-470	24.50
MRF648	(F)	60W	430-470	33.50

Technical Assistance and cross-reference information on CD, PT, RF, SRF & SD P/N's; Call our Engineering Dept. (619) 744-0728

WE SHIP SAME DAY C.O.D. or VISA/MC/Am. Ex. Minimum Order \$25.00 Add \$3.50 Shipping RF Parts Catalog Avail. OEM & Quantity Discounts

ORDERS ONLY: 800-854-1927



WESTCOM

1320 Grand Ave. San Marcos California 92069 (619) 744-0728

1983 CQ WW WPX S.S.B. Contest High-Claimed Scores

The following are early-bird high-claimed scores as of mid May 1983. These are raw scores subject to verification.

7 MHz	7 MHz
K9MWM/0	296,468
KR2Q	292,608
K7UR	237,896
AG9S	221,844
K8NA	212,544

U.S.A. SINGLE OPERATOR ALL BAND	DX SINGLE OPERATOR ALL BAND
K2VV	3,255,826
K6NHZ	1,903,995
A16V	1,863,708
NE6I	1,851,184
KQ8M	1,807,542
K4CG	1,420,826
KQ9L	1,190,624
W14R	1,029,216
WA0TKJ	1,001,784
KF2O	938,950

3.8 MHz	3.8 MHz
KJ9D	158,098
KU8E	97,500
N4OH	97,364
KB5FU	92,448
KE9U	60,048

1.8 MHz	1.8 MHz
WA2SPL	29,524
AA4MM	11,800
K1KNQ	6,466
WA9EYY	5,238
KG7D	928

28 MHz	28 MHz
K6SVL	308,460
NN6U	303,739
N3DAY	287,946
WD0ASM	166,413
W0GOR	163,030

21 MHz	21 MHz
NO4J	866,866
KU8V	690,897
WB6FCR	653,184
KV0K	535,952
K1KJT	491,904

14 MHz	14 MHz
A17B	1,162,458
W8LU	1,039,280
KC0MB	325,254
WB7WQE	302,510
K3ND	126,800

7 MHz	7 MHz
W9PNE	AB 60,006
AD2Y	AB 41,416

3.8 MHz	3.8 MHz
4M3AZC	5,549,634
H44R	4,303,760
I6FLD	4,052,862
SV1JG	3,627,615
9Y4VU	3,264,338
IO6NOA	2,794,469
XO7IN	2,543,550
WL7E	2,318,189
PP2ZDD	2,275,280
PY8ZWM	2,156,875

28 MHz	28 MHz
P42J	1,575,712
PY5BAB	1,291,209
EABZI	1,241,080
LU1ABT	1,117,611
CP6EL	1,115,604

21 MHz	21 MHz
OH0BH	3,983,972
SM2EKM	2,721,114
KP4EQF	2,635,512
LU2X	921,690
F6BEE	637,518

14 MHz	14 MHz
JH3DPB	1,053,812
PP8ZAT	550,020
EA3DFA	304,722
4C5AZ	242,592
GM4RFE	137,088

7 MHz	7 MHz
FM7CD	2,361,240
CQ4NH	1,207,338
EA7EL	853,512
VE5DX	814,657
H18GB/6	489,984

3.8 MHz	3.8 MHz
HC1HC	504,678
NP4CC	406,386
CT4KQ	147,223
OH3WS	145,920
DF2IS	81,900

1.8 MHz	1.8 MHz
T32AF	16,872
VP2MO	8,190

MULTI-SINGLE	MULTI-SINGLE
VE1DXA	7,417,257
VE6OU	6,267,891
JG1ZUY	6,226,493
XF0MDX	4,660,802
SL0ZG	3,370,200

MULTI-MULTI	MULTI-MULTI
VK2WU	7,058,808
VE2UN	1,987,980

QRPP	QRPP
JK1QLH	21 101,703
JA9XBW	AB 67,727
JA9CRI	21 33,966
EA2SN	AB 30,240
JF6GAS	AB 18,486

Note: Queries pertaining to the WPX Contest should be sent to Steve Bolia, N8BJQ.

CIRCLE 75 ON READER SERVICE CARD

STEP UP TO *telrex*

Professionally Engineered Antenna Systems

**NOW
FACTORY
DIRECT!!!**

TB5EM



MIVD/2 frequencies
\$84.50 Post Paid (U.S.)

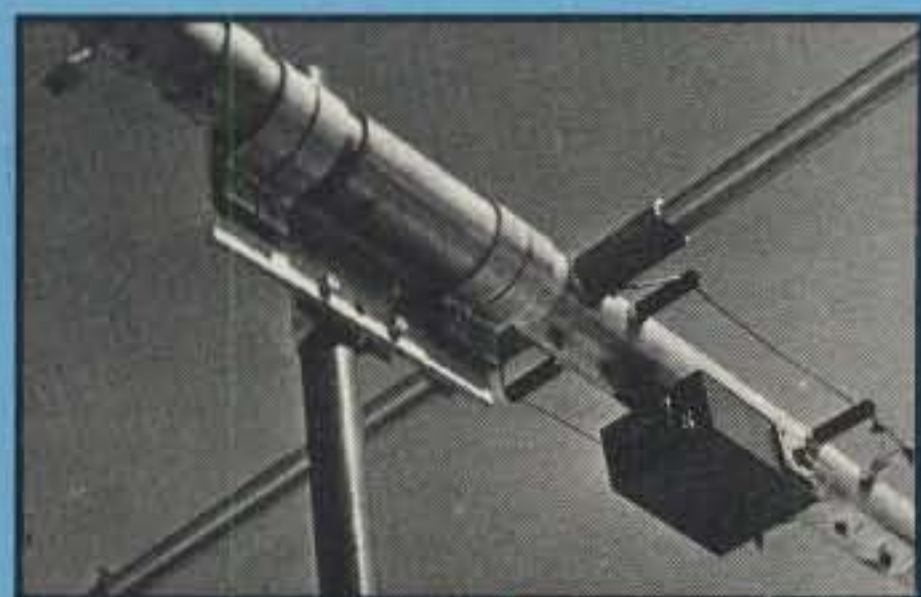
Only Telrex provides!

- Easy assembly (within 2 hrs)
- 100 mph wind rating.
- Heavy wall tubing.
- Stainless Steel electrical hardware.
- Exceptional Gain and F/B ratio.

**YOUR PRICE
\$445.00
Value \$535.00**

By the only test that means anything . . . on the air comparison . . . Telrex Tri-Bands continue to support the fact that they are designed to out-perform all competition . . . as they have for over 3 decades. Here's why . . . Telrex uses a unique trap design employing HI-Q 7500 V ceramic condensers, 3 optimum-tuned reflectors to provide maximum gain and true F/B Tri-Band performance.

**40M346
\$1650.00
Value \$1975.00**



**2MVS814 kit
\$201.00**

Special N-type coaxial connectors, solid rod elements (driven thru the boom), tinned connecting lugs, and s/s electrical hardware provide you with peace of mind for many years!

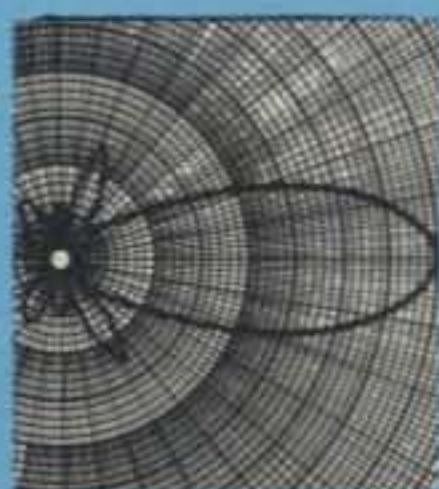
If top 2 Meter performance is your requirement, the 2MVS814 kit consisting of 2 ea. phased 2 Meter "Balun" fed precision tuned 8 element Arrays outperform even quad stacked antennas of other makes.

A FEW OF THE WORLD'S FINEST!

MODEL	Description	GAIN	Value	PRICE
2M1528C	2 Meter 15 element	(17 DBD)	160.00	131.00
10M523	10 Meter 5 element	(13 DBD)	342.00	285.00
10M636	10 Meter 6 element	(14.6 DBD)	745.00	625.00
15M532	15 Meter 5 element	(13 DBD)	545.00	455.00
15M845	15 Meter 8 element	(15 DBD)	1120.00	925.00
20M536	20 Meter 5 element	(12 DBD)	645.00	535.00
20M646	20 Meter 6 element	(14 DBD)	1130.00	945.00
40M214	40 Meter 2 element	(5.6 DBD)	740.00	615.00
40M329	40 Meter 3 element	(8.3 DBD)	1139.00	950.00
40M346	40 Meter 3 element	(9 DBD)	1975.00	1650.00
TB4EC	10, 15, 20M Tri-Band	(5.5 DBD)	252.00	205.00
TB5ES	10, 15, 20M Tri-Band	(8.5 DBD)	398.00	330.00
TB6EM	10, 15, 20M Tri-Band	(10 DBD)	735.00	565.00

Phone . . . 201-775-7252 (nights, weekends, holidays and leave your address) or write Telrex - P.O. Box 879, Asbury Park, N.J. 07712, for your free copy of the latest Telrex UHF, VHF, HF Antenna, and Rotator Catalog.

**T
L
I**



ANTENNAS DESIGNED TO LAST!

Communications Antennas Since 1921

telrex LABORATORIES

P.O. Box 879 - Asbury Park, N.J. 07712

Phone 201-775-7252

CIRCLE 117 ON READER SERVICE CARD

Ingenuity and economical necessity make design engineers of us all. KA0MSI shows us how to make a gain antenna for 2 meters for under \$4.00. It's also a good practical exercise for making simple plumbing repairs around the house.

Build A 2 Meter J-Pole Antenna For \$3.98

BY JEROME T. MAGEE*, KA0MSI

I recently found myself in the position of being laid off and newly upgraded, so I had to watch my pennies. I have only one 2 meter rig—an old rock-bound Standard HT. From the shack I could hit the Denver area repeaters nicely, but on simplex I was limited to the immediate area.

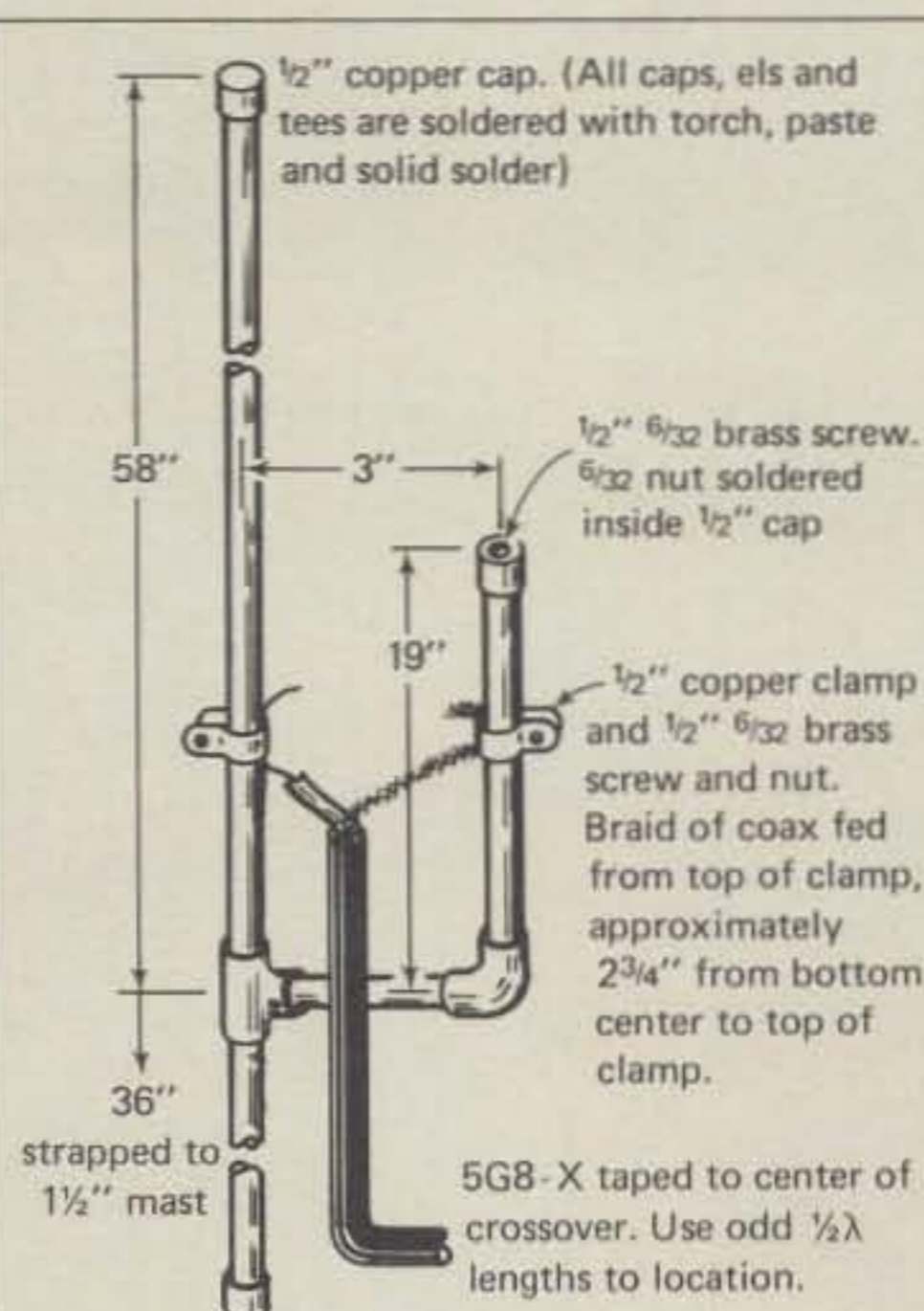
Some of the locals had built 300 ohm twin-lead J-pole antennas which worked out fairly well in portable use, and that gave me the idea for building a sturdier version. An ideal (cheap) and widely available material for v.h.f. antenna construction can be found in your local hardware store—copper do-it-yourself plumbing hardware. A quick exercise with my calculator gave me the dimensions for this antenna using 1/2 inch ID (5/8 inch OD) copper tubing.

Copper tubing and all of the assorted fittings can be joined together simply by using a small torch. A few tips are in order before we proceed to the actual construction. Clean all surfaces to be soldered (both inside and out) to a high shine with emery cloth prior to any soldering. Use a dab of soldering paste on the surfaces to be joined, again both inside and out. Use solid solder, not acid or resin core. Heat the tubing and fitting with the torch until the solder flows into the joint, and then wipe the joint with a dry cloth (or fine steel wool). This makes a clean, nice, shiny connection, just like the pros.

Construction

Fig. 1 shows how the antenna should look upon completion. Measure the driven element from the center of the Tee fitting to the top, including the cap. This dimension should be 58 inches. Tuning and adjusting of the antenna will be done with the 19 inch 1/4λ section. Again, this dimension includes the cap.

The matching section is constructed of both brass and copper hardware. Partially this is done to keep down electrolysis and for the practical reason of availability.



Parts List	Price
1 Elbow	\$0.18
1 Tee	.35
3 Caps	.60
1 Pipe 10 feet	2.19
2 Hangers	.18
2 Brass screws 1/2 6-32	.24
3 Brass nuts 6-32	.24
Total	\$3.98

All hardware is copper-plumbing fixtures. The pipe is 1/2" ID stock (5/8" OD).

Fig. 1—The plumbing-school delight. This is a simple one-evening project that you can build for a few bucks and will put more punch in your signal.

ty. Drill a hole in the cap used for the 1/4λ matching section large enough to pass a 6-32 screw. Solder one of the 6-32 nuts to the inside of the cap. The 6-32 screw then will "fine tune" the element.

First solder all of the caps on, followed by the Tee and Elbow fittings as separate units. Use a long table or planks with C-clamps to align the tubing. Make sure the elements are parallel and exactly 3 inches apart (center of one tubing to

center of the other) before soldering the connecting nipple into the Tee.

The remaining 3 feet of tubing is then soldered into the bottom of the Tee as a mount. This bottom section can be hose-clamped to a standard 1 1/4 inch mast.

Strip one end of the coax. Leave about 1 inch of the foam insulation on the center conductor. Tin the ends of the braid and center conductor. Assemble the clamps (made from hangers). The coax is connected to the elements by the clamps in a pressure fit. The center conductor goes to the driven element and the braid to the matching section. From a center line at the midpoint of the Tee and Elbow, the top of the clamp measures 2 3/4 inches up. Tape the coax to the nipple (the small connecting piece of tubing) for support.

Tuning

The antenna is tuned with a field-strength meter and an s.w.r. meter. Slide the clamps slightly up and down until the lowest s.w.r. and highest field-strength reading is achieved. This may take several tries. The 6-32 adjusting screw should be sticking up about 1/8 inch at this point. After you've reached a happy balance, adjust the tuning screw for minimum s.w.r. If this is done at ground level, you may have to adjust the antenna again once it is at operating height.

How Does It Work?

In actual practice, the s.w.r. over a 1.75 MHz range was essentially flat. The "action test" took place in my dining room where I compared a reference 1/4λ antenna on my HT to the J pole. I called a station on the other side of town on simplex first with the little whip. He reported my signal as S-6. Switching to the indoor J pole, his aural S meter registered a 40 dB over S-9. My field-strength meter also confirmed a stronger signal with the J pole.

If I can abstract the apparent investment of \$.88 per dB increase, it did make quite a difference and was certainly well worth the effort.

*1391 South Holly St., Denver, CO 80222



MICROLOG AIR-1

Connect your computer to the air!

The "AIRWAVES" that is, thru the Microlog AIR-1, a single board terminal unit AND operating program that needs no external power supply or dangling extras to put your VIC-20 computer on CW & RTTY. And what a program! The famous Microlog CW decoding algorithms, superior computer enhanced RTTY detection, all the features that have made Microlog terminals the standard by which others are compared. Convenient plug-in jacks make connection to your radio a snap. On screen tuning indicator and audio reference tone make it easy to use. The simple, one board design makes it inexpensive. And Microlog know-how makes it best!

There's nothing left out with the AIR-1. Your VIC-20, America's most popular computer, can team-up with Microlog, America's most successful HAM terminal, to give you an unbeatable price and performance combination for RTTY & CW. If you've been waiting for the right system at the right price, or you've been disappointed with previous operating programs, your time is now. At \$199, the complete AIR-1 is your answer. Join the silent revolution in RTTY/CW and put your VIC-20 ON-THE-AIR! See it at your local dealer or give us a call at Microlog Corporation, 18713 Mooney Drive, Gaithersburg, Maryland. TEL (301) 258 8400. TELEX 908153.

Note: VIC-20 is a trademark of Commodore Electronics, Ltd.

MICROLOG
INNOVATORS IN DIGITAL COMMUNICATION

Here's another neat little idea that will help you out with those building projects. It's a simple piece of test equipment for finding the resonance of tuned circuits and quarter-wave stubs.

Build A Resonance Detector

BY RUDOLPH E. SIX*, KA8OBL

Finding resonance with a grid-dip oscillator has always been complicated due to the limitations of the instrument. The dials tend to be small, and a wide frequency range is packed on a small scale. There are usually several dips; the confusing part is trying to find out which is the right one. I started looking around for something simple and accurate to measure tuned circuits and quarter-wave stubs. My Hewlett-Packard TS-510 r.f. generator covered 10–400 MHz and had just enough output to drive a diode detector with a 50 microamp meter as the indicator (fig. 1).

This simple arrangement worked rather well, but something was needed for resonances below 10 MHz. The Heath IG-102 r.f. signal generator on the bench had a large dial and covered fundamentals up to 100 MHz. This unit is typical of these signal generators, but their output is limited to approximately 100 mv, not enough to drive a microamp meter directly. Since the detected signal is d.c., a simple op-amp arrangement was used to boost the signal enough to drive a meter. The diode works in the square-law region. In other words, twice the r.f. voltage across the diode results in a four-times increase across the meter; this makes resonance-dips nicely sharp.

The calibration on these signal generators is close enough for most purposes—tuned circuits with variable caps or tuning slugs—but for accurate work a frequency counter is needed.

Quarter-wave stubs presented a different problem. An open twin-lead stub picked up enough low-frequency noise to prevent sharp dips at resonance. The r.f. coupling cap was moved to the diode side to block the noise, and the low ends of the stubs were grounded. With coax the shield is connected to the r.f. source and the center wire to the detector, a self-shielding arrangement. This works extremely well even with large lengths of coax. Twin-lead does not have the self-shielding feature of coax, and large lengths (50 inches or longer) pick up increasingly more noise. Resonance is

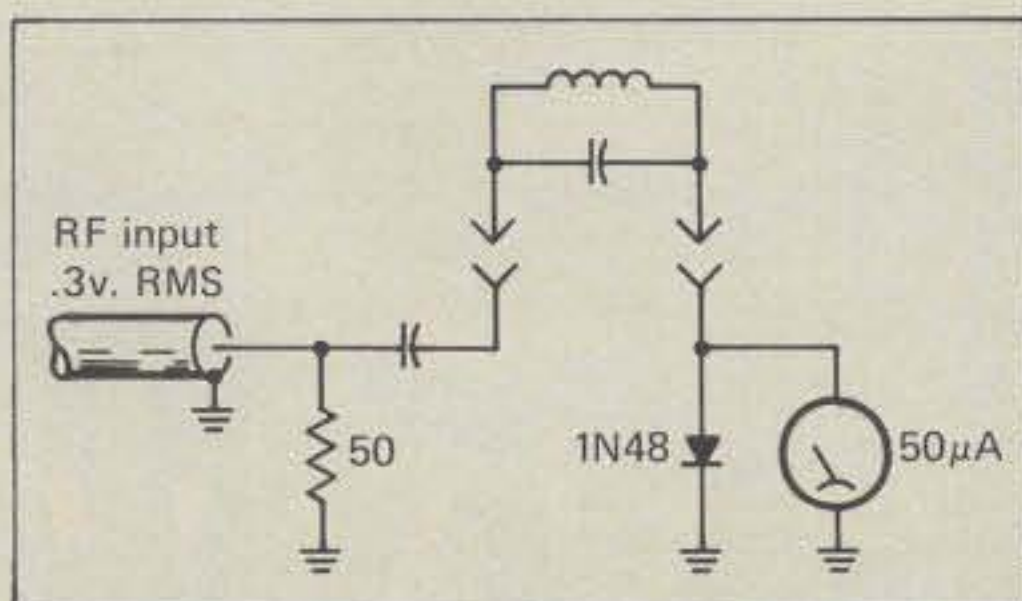


Fig. 1—A simple diode detector using a 50 microamp meter as the detector.

also influenced by nearby objects, thus making measurements on open-wire stubs more difficult and not as accurate as on coax.

Construction

Fig. 2 shows the circuit assembled in a shielded enclosure made from a piece of copper-clad board and a bathtub capacitor shell. The existing capacitor holes, plus 2 extra holes that were drilled, were enlarged to fit three 500 pF feed-through caps which were soldered in. The coax r.f. feed comes through the fourth. Vector spring clips (Vector T-32A-1dp) were installed on the copper-clad board. The copper shield was removed from around

the clips with a sheet-metal drill and an Exacto® blade. The op-amp was built on a small vector board with spacers. The whole assembly was mounted in a plastic case with two 9 volt batteries and power switch. A lot of unnecessary plugs were avoided by direct r.f. feed, and the output is a twisted pair of wires with banana plugs. Rather than mount an individual meter, I used my Simpson v.o.m. on the 2.5 volt scale. For accurate dipping plenty of hash marks are needed, and a v.o.m. has a lot; not only that, but it saves the expense of an extra meter. Tuning up is simple; with no signal applied, turn the 5K null pot for zero volts. Assemble the shield and you are ready to go.

Tuned circuits are dipped in the conventional manner. The value of the capacitor has to be known to calculate the inductance of the coil. Tuned tank circuits up to 2 meters are easily measured. Above 2 meters, quarter-wave stubs should be used. Coax stubs below 250 MHz present no problems; accurate length above 250 MHz does. With the vector spring-clip arrangement, approximately 0.2 inches should be added to the coax-length calculation. For u.h.f. work, a coax connector should be mounted in place of the spring clips. Quarter-wave antenna stubs

The resonance detector. It detects resonance of tuned circuits and transmission lines from 1–250 MHz.



*30725 Tennessee, Roseville, MI 48066

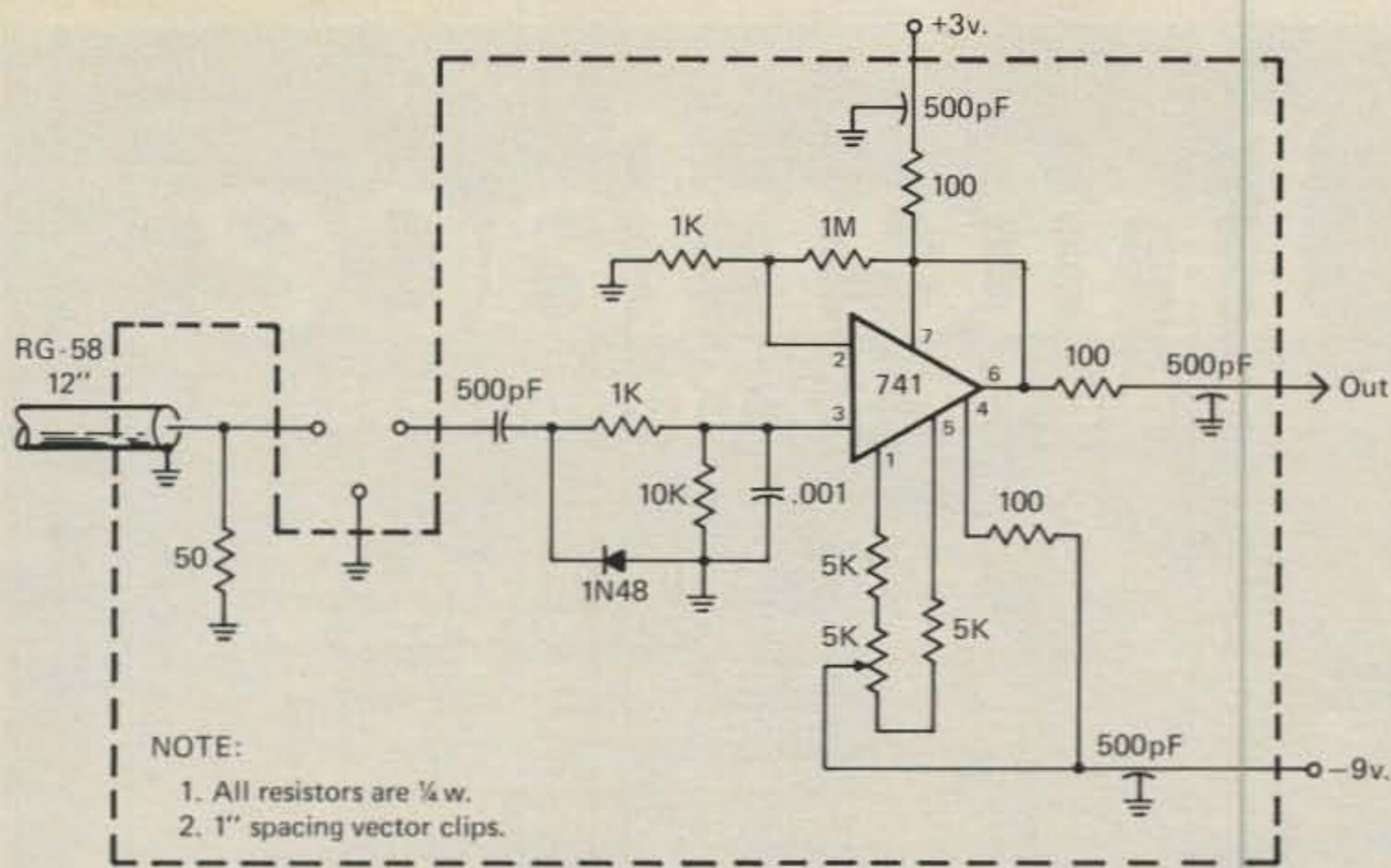
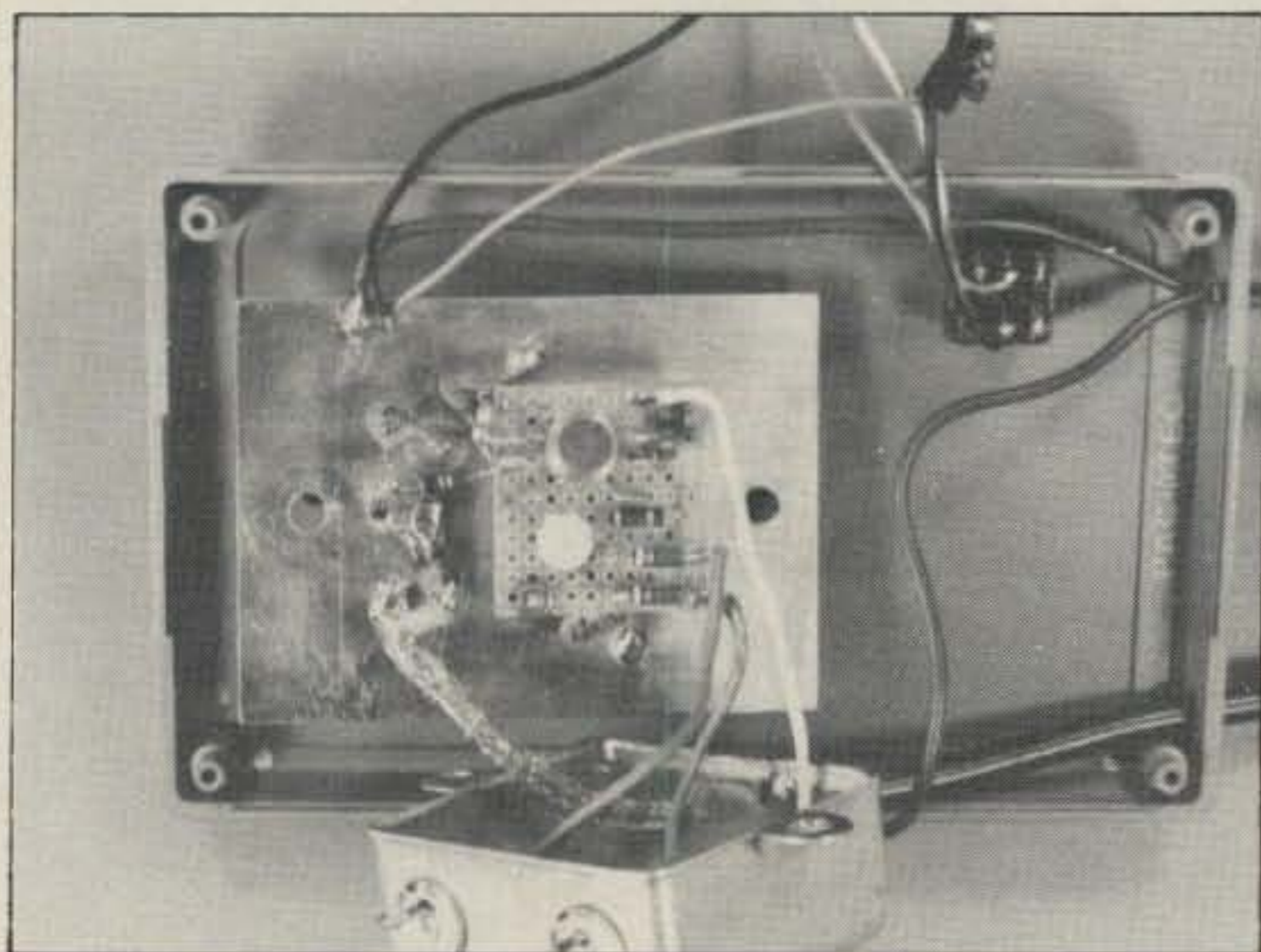


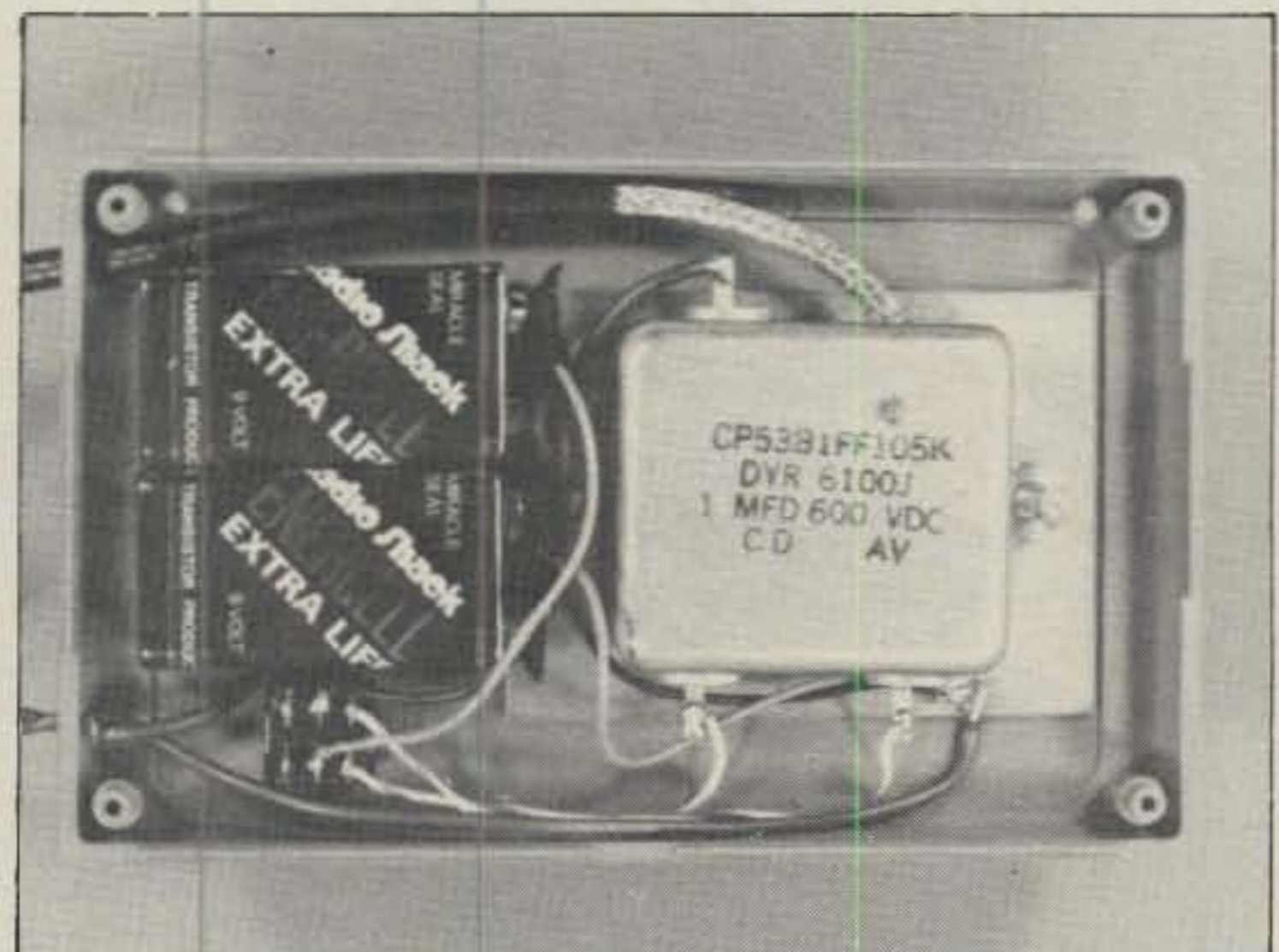
Fig. 2— Schematic diagram of the resonance detector described in the text.

could then be checked more accurately with their connector. An alternative method for finding the length of a stub at the higher frequencies is to measure the resonant frequency at a longer length. For instance, a coax stub for 220 MHz can be made by cutting one-quarter of the length of a stub adjusted for 55 MHz. A more accurate method would be to plot several lengths and find the resonant frequency and velocity factor. The velocity of a magnetic wave is slower through a transmission line with a dielectric other than air. The wavelength of coax or twin-lead is always shorter than in free space. The ratio of the wavelength in air versus wavelength in the transmission line is the velocity factor. This velocity factor is different for various types of lines, and the measured value can be substantially different from the published value. A plot of different lengths versus frequency can give an accurate correlation at any frequency.

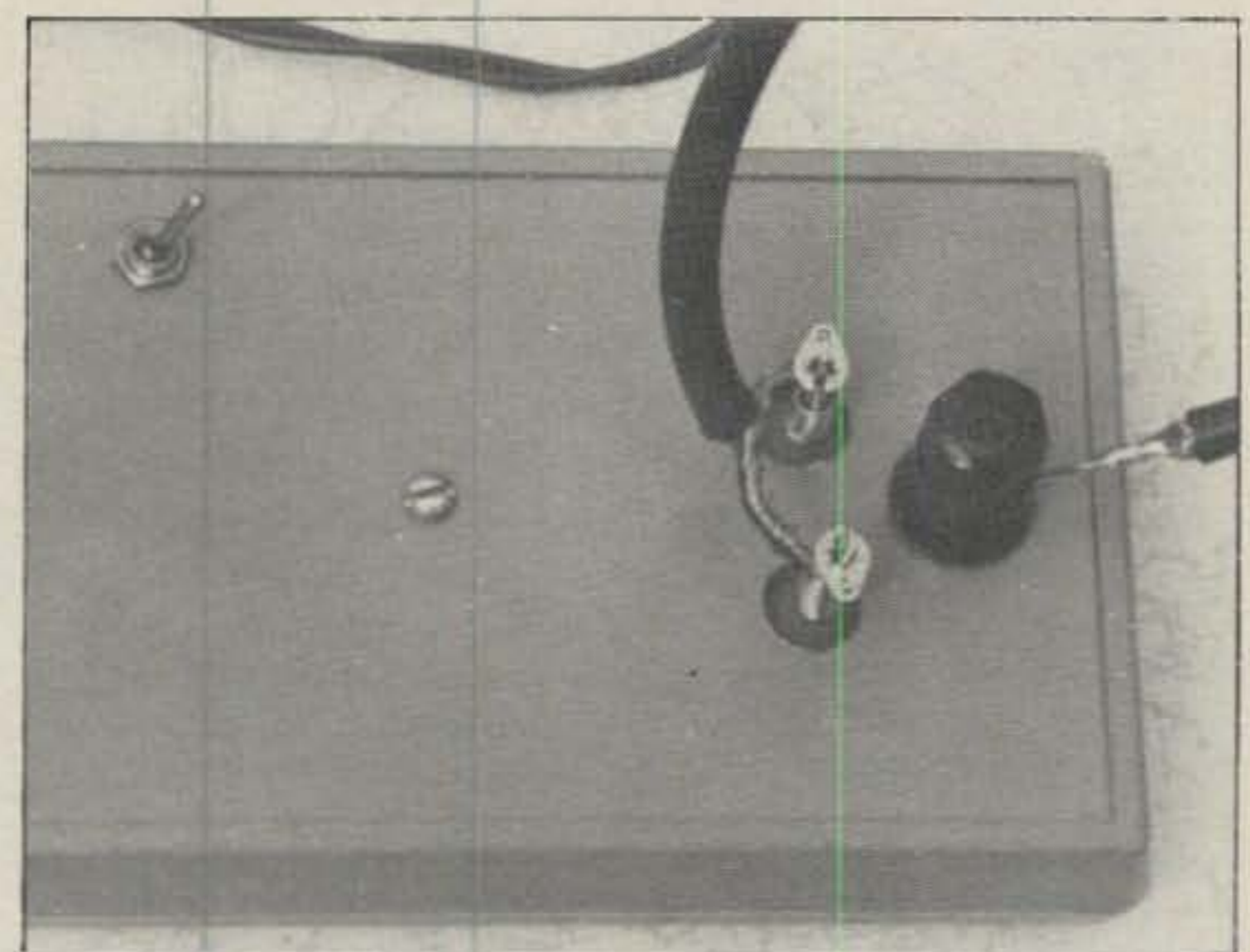
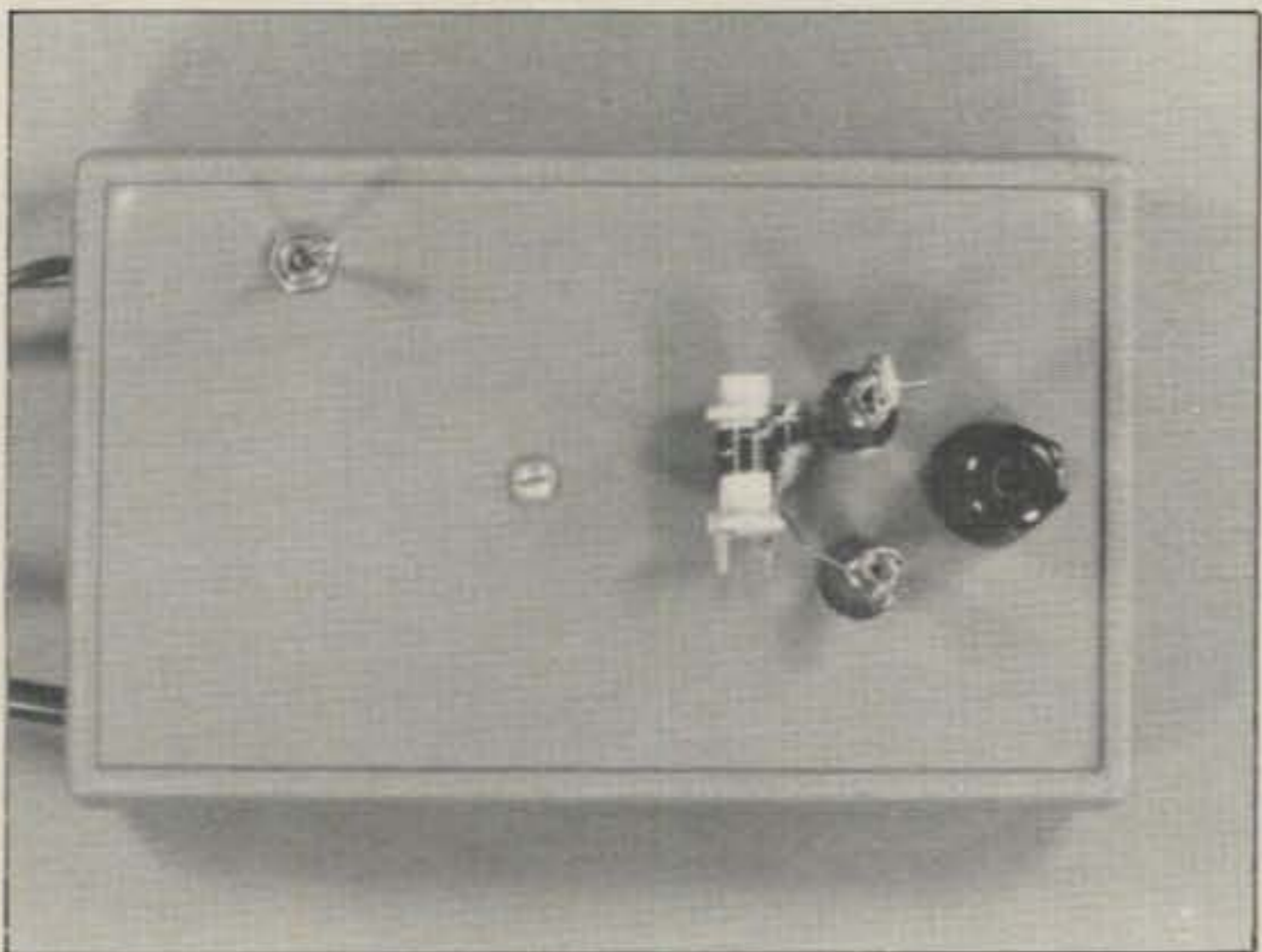
Construction details. The detector diode and coupling cap are mounted as close as possible to the Vector pins. The enclosure is a bathtub capacitor shell.



Mounting tuned circuits for testing.



The batteries are held in place with a dab of silicone rubber. All the parts are available from Radio Shack.



Quarter-wave stubs. One-half inch is peeled back, the center wire and shield are abruptly turned 90° and inserted. The low end is peeled back, the center soldered to the shield and grounded. The line length is the part in the vinyl sheet plus 0.2 inch added for the instrument.

The Interface

Software Available for Six Computers

The versatility of the personal computer gives you a whole new world with the Kantronics Interface™ and Hamsoft™ or Hamtext™. The Interface™ connects to any of six popular computers with Hamsoft™ or Hamtext™ giving you the ability to send and receive CW/RTTY/ASCII. An active filter and ten segment LED bargraph make tuning fast and easy. All programs, except Apple, are on program boards that plug directly into the computer.

Hamtext™, our new program, is available for the VIC-20 and Commodore 64, with all the features of Hamsoft™ plus the ability to save received information to disc or tape, variable buffer sizes, VIC printer compatibility, and much more. Our combination of hardware and software gives you the system you want, with computer versatility, at a reasonable price.

Hamsoft™ Features

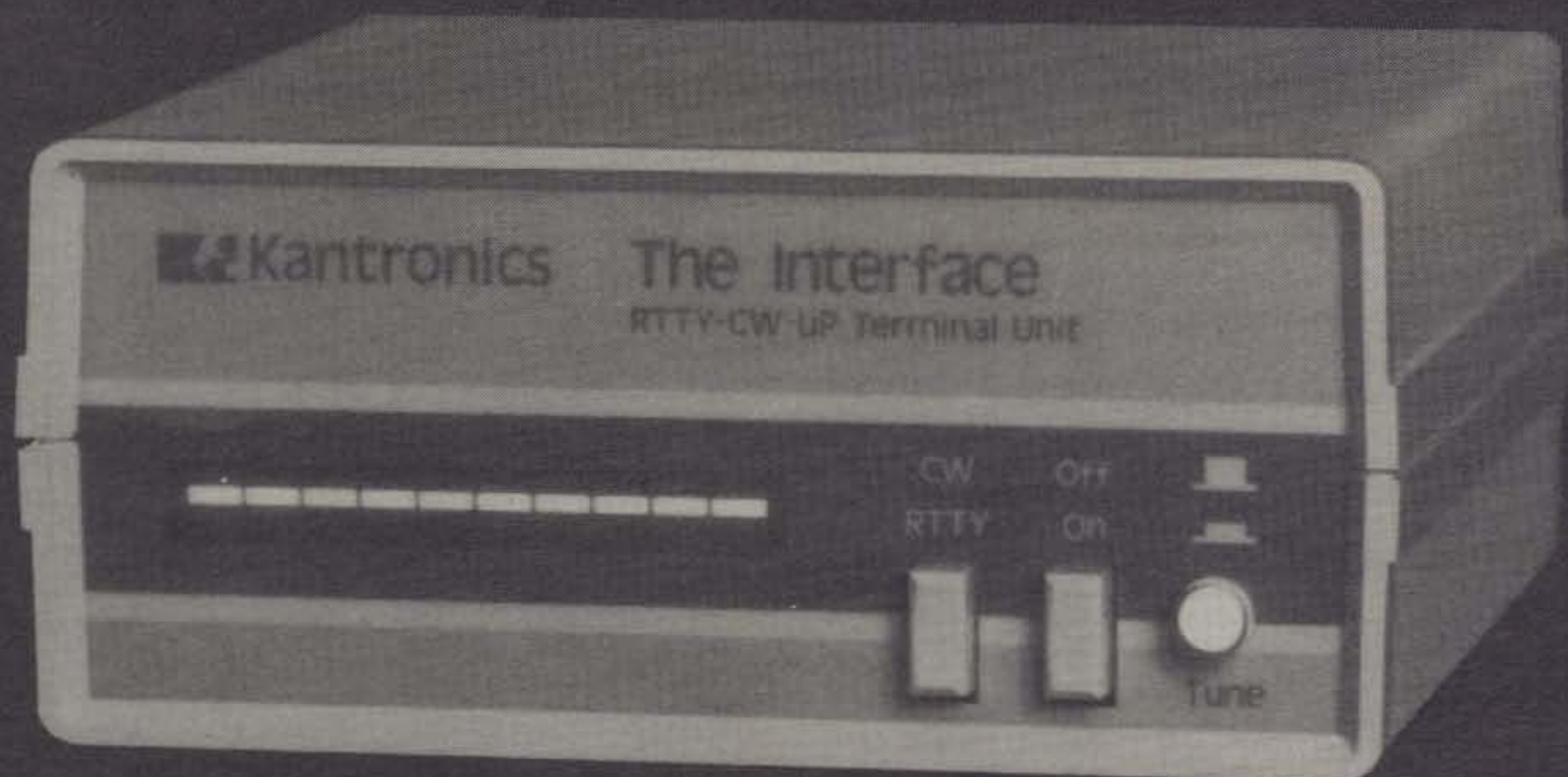
Split Screen Display
1026 Character Type Ahead Buffer
10 Message Ports-255 Characters each
Status Display
CW-ID from Keyboard
Centronics Type Printer Compatibility
CW send/receive 5-99 WPM
RTTY send/receive 60, 67, 75, 100 WPM
ASCII send/receive 110, 300 Baud

Hamsoft™ Prices

Apple Diskette	\$29.00
Atari Board	\$49.95
VIC-20 Board	\$49.95
TRS-80C Board	\$59.95
TI-99 Board	\$99.95

Hamtext™ Prices

VIC-20 Board	\$99.95
Commodore 64 Board	\$99.95



Suggested Retail \$169.95

For more information contact your local Kantronics Dealer or:
Kantronics 1202 E. 23rd Street Lawrence, KS 66044

Proven Success

Our best salesmen don't even work for Kantronics

Dear Sirs:

I am writing first of all to say how much I enjoy my Kantronics Interface and the software that I bought for my VIC-20 micro-computer. For a very reasonable price I have had a whole new world of amateur radio--not to mention some commercial transmissions I have been able to copy--opened to me.

P.S.
Am #tickled pink"with this setup and having a ball. Thanks for a nice product !

Dear Phil:

I recently purchased a VIC 20 computer and your companies "Interface" and software for RTTY and CW and I must say it does a magnificent job. I have worked over twenty countries on RTTY on 15 and 20 meters in one month. The copy on CW is unbelievably excellent.. adding a new dimension to amateur radio for me. "you done good,"as we say here in Tennessee.

I must tell you, I have the equipment in operation and it works super good! I think it is an outstanding piece of electronics.

Your directions f
CW state the

Gentlemen:

It's nice to find someone like you that responds to user suggestions - keep up the good work.

The Interface is available with software for six popular computers. Hamsoft is our original program for the Apple II, II+, or IIe; Atari 400 or 800; Radio Shack Color Computer, VIC-20, or Texas Instruments TI-99/4A. Hamtext, our advanced program, works with the Apple II, II+, or IIe; VIC-20, or Commodore 64.

The Interface and Hamsoft or Hamtext combination has put computerized communications at a reasonable price. Contact your local Kantronics dealer or write us for more information.

 **Kantronics**

(913) 842-7745
1202 E. 23rd Street
Lawrence, Kansas 66044

Here's another little task—besides beam headings, logging, latitude, and longitude—that your PC can do. You can actually use it to design an antenna.

Writing Antenna Design Programs For Your Personal Computer

BY PHILIP S. RAND*, W1DBM

Many amateurs have purchased a computer, if not for themselves then for their children. So why not put it to work in the hamshack? Besides sending and receiving c.w. and RTTY, they are well suited to doing mathematics. As a matter of fact, they take all the drudgery out of calculating the lengths of all kinds of antennas. I use my TRS-80 Color Computer® to design those antennas I told you about in CQ last August.

If you are a novice at computing, you probably would try to buy an antenna program on tape. However, save your money; it's really very easy to write your own program just the way you want it. All home computers use a program language called BASIC, which was developed at Dartmouth College in the 1960s. BASIC stands for "Beginners All-purpose Symbolic Instruction Code," and it approximates the English language. It varies slightly from one brand of computer to another, but it is generally very easy to use.

A program written in BASIC consists of a bunch of numbered lines each containing a command or statement telling the computer what you want it to do. These go into the computer's memory to be used when you "run" the program, and may be saved on a cassette tape recorder for future use. You could start the program with line 1, continuing with consecutive line numbers to the end of the program. However, it is better to start at, say, line 10 and then go to lines 20, 30, 40, etc., so that you can go back later and add some commands that you forgot earlier.

Writing an Antenna Program in BASIC

The keyboard on the computer works just like that of a typewriter except that it only prints in capital letters. At the end of each line you must hit the carriage

RETURN or **ENTER** key, the same as on a typewriter. There are, however, several special keys such as **CLEAR**, which clears the TV screen, **BREAK**, which breaks the running of the program, and an arrow pointing to the left, ←, which is used as a back-space and eraser.

Your computer has been programmed at the factory to recognize certain English words as commands and statements such as: **NEW**, **RUN**, **LIST**, **PRINT**, **INPUT**, **GOTO**, **IF THEN**, **FOR NEXT**, **LOAD**, **SAVE**, and **END** to name a few that we will use in our antenna program. In general they mean the same thing to the computer as they do to you. Punctuation marks also have special meaning to the computer as you will see.

Let's write a program in BASIC to design a dipole antenna. We will keep it very simple using only six program lines. All programs are written using numbered program lines so that the computer can store them in memory in numerical order and find them when needed. We will write this program with widely spaced line numbers so that we can go back later and add some sophistication to the program.

The first thing to do is to give the program a name. Therefore, type the following into your computer keyboard:

```
30 PRINT " DESIGNING DIPOLE ANTENNAS"
```

Don't forget to press the enter key after each program line.

Next enter the frequency for which you are designing the antenna like this:

```
50 INPUT " PLEASE ENTER THE  
FREQUENCY IN MHZ. ";F
```

Note the quotation marks following **PRINT** and **INPUT**. These tell the computer to print everything on the TV screen that is between them. The semicolon in line 50 tells the computer to assign to the letter **F** the value that you input for the frequency. The two spaces between the quote and the first word tell the computer to print that word starting two spaces from the left side of the screen.

Antenna Formula

Since the computer only knows what you tell it, you must now tell it how to design a dipole. To do this, look up the formula for designing a half-wave dipole:

$$L = \frac{492 \times .95}{F}$$

where **L** = feet, and **F** = MHz. This formula must be changed slightly so your computer will know what you want it to do. The multiplication sign in BASIC is the asterisk (*) and the division sign is the fraction bar (/). So enter the following line into your program:

```
130 L = 492*.95/F
```

The computer now recalls the value that you entered for **F** and solves the formula for **L** and stores the length in feet until you request it. The next program line will do just that. Type:

```
160 PRINT F,L
```

Because there is a comma between **F** and **L**, the computer will print the **F** on the left side and the **L** on the right side of the TV screen. This all will happen so fast that you will not be able to see it unless you stop the program for a moment. We will do this with an **INPUT** statement. Type the following:

```
190 INPUT " PRESS THE ENTER KEY  
TO CONTINUE";C
```

Again, all between the quotation marks is printed on the TV screen, and the computer waits for you to enter something. After you have read the dipole dimensions, hit the **ENTER** key. The computer will enter a zero as the value for **C**, but this does no harm to the program, since we do not use the letter **C** in the program.

The next and last line in our simplified program is to tell the computer to go back to the beginning and run the program again. Therefore, type:

```
200 GOTO 30
```

After entering line 200, "list" the pro-

*P.O. Box 8, Haverhill, NH 03765

gram on the TV screen to see if you have made any typing mistakes. To do this simply type:

LIST

and everything you have typed so far will appear on the TV in numerical order. If you find any errors, just retype that line over again and the computer will replace the old line with the new line when you press the **ENTER** key. Now try "running" the program. Type:

RUN

and instantly your TV screen should look like fig. 1. Next comply with the request and enter a frequency such as 3.900. This will appear following the "?" as you type it. Upon hitting the **ENTER** key, fig. 2 will appear on the TV giving you the dimensions for a 75 meter dipole.

That's all there is to writing a program in BASIC to design a dipole antenna. To design other types of antennas, simply put the correct formula into line 130 and change the title in line 30.

Improving the Appearance of the Print-Out

Let's dress up the TV display a little by using some of the unused program lines. Press the "**BREAK**" key to interrupt the program so we can use the keyboard.

BREAK

Type in the following lines:

```
10 CLS
20 PRINT:PRINT:PRINT
40 PRINT:PRINT
```

Line 10 **CL**ears the **S**creen at the start of the program, and lines 20 and 40 add line spaces at the top of the screen and between the program name and the frequency request. Let's put a title over the frequency and length printout, like this:

```
70 CLS:PRINT
80 PRINT" THE LENGTH OF A DIPOLE FOR
THIS FREQUENCY IS:"
90 PRINT" MHZ"," FEET"
```

Note the comma between the **MHZ** and **FEET**. This will place these titles directly over the figures. Now try running the program again and it will look like fig. 3.

Errors

You will find the computer is very exacting and will not tolerate misspelled commands or statements in program lines or the incorrect use of punctuation marks. The program will halt and "**? SN ERROR IN LINE 200**" will appear on the TV. In case this happens, you type:

LIST 200

Line 200 will now be printed on the screen so that you can compare it with what was supposed to be there. Perhaps you find you forgot to type what line to go to. All you do is retype the line correctly

```
DESIGNING DIPOLE ANTENNAS
PLEASE ENTER THE FREQUENCY IN MHZ, ?
```

Fig. 1- TV display of the six-line antenna design program waiting for the frequency to be entered.

```
DESIGNING DIPOLE ANTENNAS
PLEASE ENTER THE FREQUENCY IN MHZ. ? 3.9
3.9          119.846154
PRESS THE ENTER KEY TO CONTINUE ?
```

Fig. 2- TV display after entering the requested frequency. Note that the printing is all crowded at the top of the screen.

```
THE LENGTH OF A DIPOLE ANTENNA FOR
THIS FREQUENCY IS:
MHZ.          FEET

3.9           119.846154
PRESS THE ENTER KEY TO CONTINUE ?
```

Fig. 3- The display after lines 20 and 40 have been added to the program.

and press **ENTER**. At this point line 200 should be retyped to read:

```
200 GOTO 10
```

If you want to completely erase an entire line in the program, simply type the line number and press the **ENTER** key. Now **LIST** the program and you will find that the line has been eliminated.

Decimal Places

Who needs a frequency or antenna length to 6 or more decimal places? Our computer is only trying to be as accurate as possible, so let's tell it to print the frequency to only two decimal places and the feet to only one decimal place. There are several ways to do this, but the following way is simple. We will use the "integer" function, **INT(X)**. This changes our decimal number into a "whole" number by eliminating everything to the right of the decimal point. Type in the following new program lines:

```
110 F=INT(F*100)
120 F=F/100
140 L=INT(L*10)
150 L=L/10
```

Run the program now and you will see that the frequencies and feet have been reduced to two and one decimals respectively. You can now compare antenna lengths for several frequencies within an amateur band just by entering a series of frequencies, say, 50 kHz apart. But why go to all this bother? Let the computer do it. Tell your computer to go through the

length calculation 11 times adding 50 kHz to the frequency each time and to print the results in two columns on your TV screen. Type the following program lines:

```
100 FOR I = 1 TO 11
170 F = F + .05
180 NEXT I
```

Back in line 50, if you fail to enter a fre-

```
TO DESIGN A DIPOLE ANTENNA
WITH LENGTHS EVERY 50 KHZ.
WITHIN A BAND OF 500 KHZ.
```

```
ENTER A FREQUENCY AT THE
LOW END OR 50 TO 100 KHZ.
OUTSIDE THE LOW END OF THE
BAND?
```

```
LIST-70
10 CLS
20 PRINT:PRINT:PRINT
30 PRINT" TO DESIGN A DIPOLE A
NTENNA WITH LENGTHS EVERY 5
0 KHZ. WITHIN A BAND OF 500
KHZ. "
40 PRINT:PRINT
50 INPUT" ENTER A FREQUENCY AT
THE LOW END OR 50 TO 100
KHZ. OUTSIDE THE LOW END
OF THE BAND";F
60 IF F=0 THEN GOTO 50
70 CLS:PRINT
OK
```

```
80 PRINT" THE DIPOLE LENGTHS A
RE: "
90 PRINT" MHZ. "," FEET"
100 FOR I=1 TO 11
110 F=INT(F*100)
120 F=F/100
130 L=492+.95/F
140 L=INT(L*10)
150 L=L/10
160 PRINT F,L
170 F=F+.05
180 NEXT I
190 INPUT"ENTER";C
200 GOTO 10
OK
```

```
THE DIPOLE LENGTHS ARE:
MHZ.          FEET
3.5           133.5
3.55          131.6
3.6           129.8
3.65          128
3.7           126.3
3.75          124.6
3.8           123
3.85          121.4
3.9           119.8
3.95          118.3
4             116.8
ENTER?
```

The final printout of the complete program is shown in these photos.

quency before hitting the **ENTER** key, you will be entering a "zero" for the frequency. Since you cannot divide by a zero, the program will abort with a "**?/0 ERROR IN LINE 50**" appearing on the TV screen. To prevent this enter the following line:

60 IF F=0 THEN GOTO 50

Run the program now and see how you like designing dipoles for every 50 kHz in an amateur band. Great, isn't it! Obviously the program name needs to be changed, so try this one:

30 PRINT " TO DESIGN A DIPOLE ANTENNA WITH LENGTHS EVERY 50 KHZ. WITHIN A BAND OF 500 KHZ. "

Also let's change line 50 to read:

50 INPUT " ENTER A FREQUENCY AT THE LOW END OR 50 TO 100 KHZ. OUTSIDE OF THE LOW END OF THE BAND ";F

Now run the completed program (see Table I), only entering a frequency at the low end of the band, such as 3.5, 6.9, 13.9, etc. Note how easy it is now to compare antenna lengths for different parts of a band. Your TV displays should now look like those in the photos.

If you own a computer that will do trigonometry, such as the TRS-80-C®, with Extended Color BASIC®, you can also write

your own program to calculate great circle bearings and distances. Have fun! The first thing you know, your computer will be running your whole station.

In Conclusion

If you own a computer other than a TRS-80 Color, a TRS-80 Model III, or an IBM Personal Computer, you may have to make a few changes in the above program, since all computers do not speak the same "dialect" of BASIC.

Table II is a modified program listing that runs successfully on the Apple II, VIC-20, TI-99/4A, Sinclair/Timex, and other similar computers, including the three mentioned above.

Note that "commands" and "statements" such as "CLS", "HOME", "STAY CLEAR", and "SHIFT"-"HOME/CLR" that are only acceptable to certain makes of computers have been left out of the program. Some computers will reject an input statement such as this: **50 INPUT " ENTER THE FREQ. IN MHZ. ";F** but almost all will accept the following:

50 PRINT " ENTER THE FREQ. IN MHZ. "
55 INPUT F

A few computers require the use of the word "LET" when assigning a value to a

```

10 CLS
20 PRINT: PRINT
30 PRINT " TO DESIGN A DIPOLE ANTENNA
  WITH LENGTHS EVERY 50 KHZ.
  WITHIN A BAND OF 500 KHZ. "

40 PRINT: PRINT
50 INPUT " ENTER A FREQUENCY AT THE
  LOW END OR 50 TO 100 KHZ.
  OUTSIDE OF THE LOW END OF THE
  BAND ";F

60 IF F=0 THEN GOTO 50
70 CLS: PRINT
80 PRINT " THE DIPOLE LENGTHS ARE "
90 PRINT " MHZ. ", " FEET "
100 FOR I=1 TO 11
110 F=INT(F*100)
120 F=F/100
130 L=492*.95/F
140 L=INT(L*10)
150 L=L/10
160 PRINT F,L
170 F=F+.05
180 NEXT I
190 INPUT " ENTER ";C
200 GOTO 10
  
```

Table I- Listing of the complete program.

```

10 PRINT
20 PRINT
30 PRINT " TO DESIGN A DIPOLE ANTENNA
  WITH LENGTHS EVERY 50 KHZ.
  WITHIN A BAND OF 500 KHZ. "

40 PRINT
50 PRINT " ENTER A FREQUENCY IN MHZ.
  AT THE LOW END OR 50 TO
  100 KHZ. OUTSIDE THE LOW
  END OF THE BAND. "

55 INPUT F
60 IF F=0 THEN 55
70 PRINT
80 PRINT " THE DIPOLE LENGTHS ARE "
90 PRINT " MHZ. ", " FEET "
100 FOR I=1 TO 22
110 LET F=INT(F*100)
120 LET F=F/100
130 LET L=492*.95/F
140 LET L=INT(L*10)
150 LET L=L/10
160 PRINT F,L
170 LET F=F-.05
180 NEXT I
185 PRINT " TO REPEAT, ENTER 'C' "
190 INPUT C$
200 GOTO 10
  
```

Table II- This is a modified program listing that will run on almost any make of home computer.

variable in the program. Others will simply ignore the word. Note that we have added "LET" to several program lines; for example: **110 LET F=INT(F*100)**.

Some computers will only accept a single statement per line. Therefore, a line such as **10 PRINT: PRINT** must be put into two lines:

10 PRINT
15 PRINT

When writing your programs for your particular make of computer, keep the above in mind and you should have no problems.

A PROVEN TOP-PERFORMER

AR-22 DIGITALLY SYNTHESIZED VHF FM RECEIVER

FEATURES

- The smallest pocket-size receiver with full band coverage.
- Easy control and operation
- Super-Sensitivity . . . 0.2uV 12dB SINAD
- Super-Selectivity . . . 2 monolithic crystal filters and ceramic filter
- 450mW of clean and low audio distortion
- Low-stand-by current . . . 18mA
- Rechargeable NiCd battery pack

SPECIFICATIONS

RECEIVER SYSTEM:

PLL frequency synthesized dual conversion superheterodyne

INTERMEDIATE FREQUENCY:

10.7MHz (1st. IF) and 455kHz (2nd. IF)

SENSITIVITY:

0.2uV across 50-Ohm at 12dB SINAD
0.35uV at 20dB NQ

SELECTIVITY:

Better than 60dB EIA SINAD

INTERMODULATION RESPONSE:

Better than 65dB

SQUELCH SENSITIVITY:

0.2uV at threshold squelch, adjustable

FREQUENCY STABILITY:

±10ppm over -10°C to +60°C

* Complete specifications available on request

STANDARD FREQUENCIES

141,000-149,995 MHz (AR-22 Type-A)
146,000-154,995 MHz (AR-22 Type-B)
151,000-159,995 MHz (AR-22 Type-C)
156,000-164,995 MHz (AR-22 Type-D)
161,000-169,995 MHz (AR-22 Type-E)

All types of accessories included, \$170.00

To order direct include \$2.50 shipping and handling.
From California add sales tax. Visa/MasterCard orders are
welcomed. We will pay shipping and handling charge for
all prepaid orders. No C.O.D. please.



ACE communications, inc. 2832-D WALNUT AVENUE, TUSTIN, CALIFORNIA 92680 (714) 544-6281

TELE X: 655-306

CIRCLE 66 ON READER SERVICE CARD



TRI-EX TOWER — THE TOWER OF YOUR FUTURE

Tri-Ex is the tower of your future. If you want quality and experience Tri-Ex is the name you want. People from all over the world recognize Tri-Ex, and that is why Tri-Ex is located on every continent of the globe.

Tri-Ex towers are manufactured in the United States and licensed for manufacture in Europe.

Tri-Ex puts the same quality in each and every tower. Ask those who own them. Features include high strength low wind resistant W bracing, formed guides, galvanizing inside and out, high strength aircraft cabling, hand and motor driven winch systems, bearing rollers, and electronic welding in precision jigs.

Tri-Ex manufactures a complete line of towers, crank up towers from 25 feet to 150 feet, and stacked towers from 10 feet up.

For additional information write to:

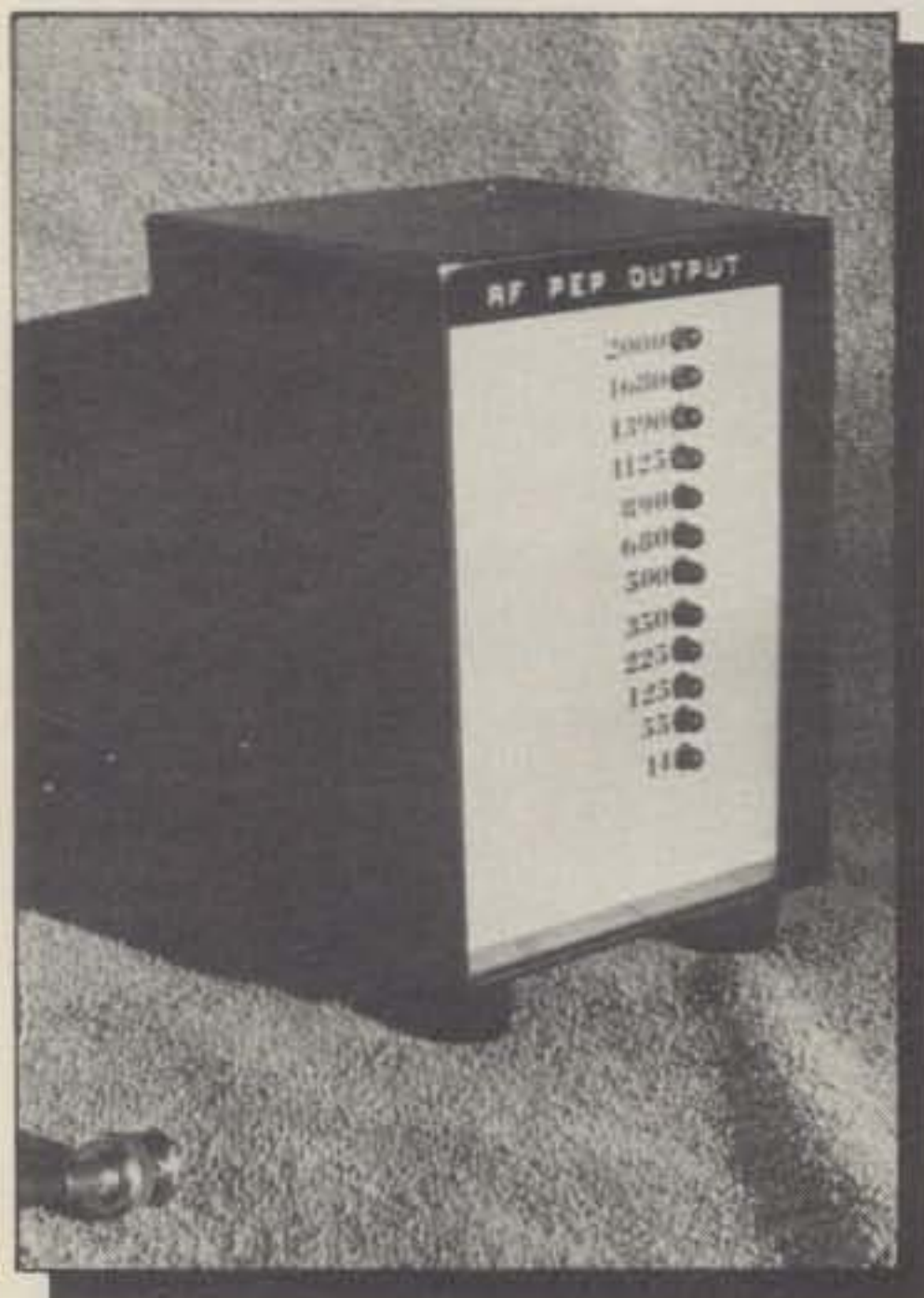
**TRI-EX TOWER
CORPORATION**
P.O. Box 5009
Visalia, CA 93278
(209) 651-2171

Ask for a copy of
our dealer list.

Here's a great little weekend project that will light up your operating. This practical piece of test gear will make a good addition to your shack.

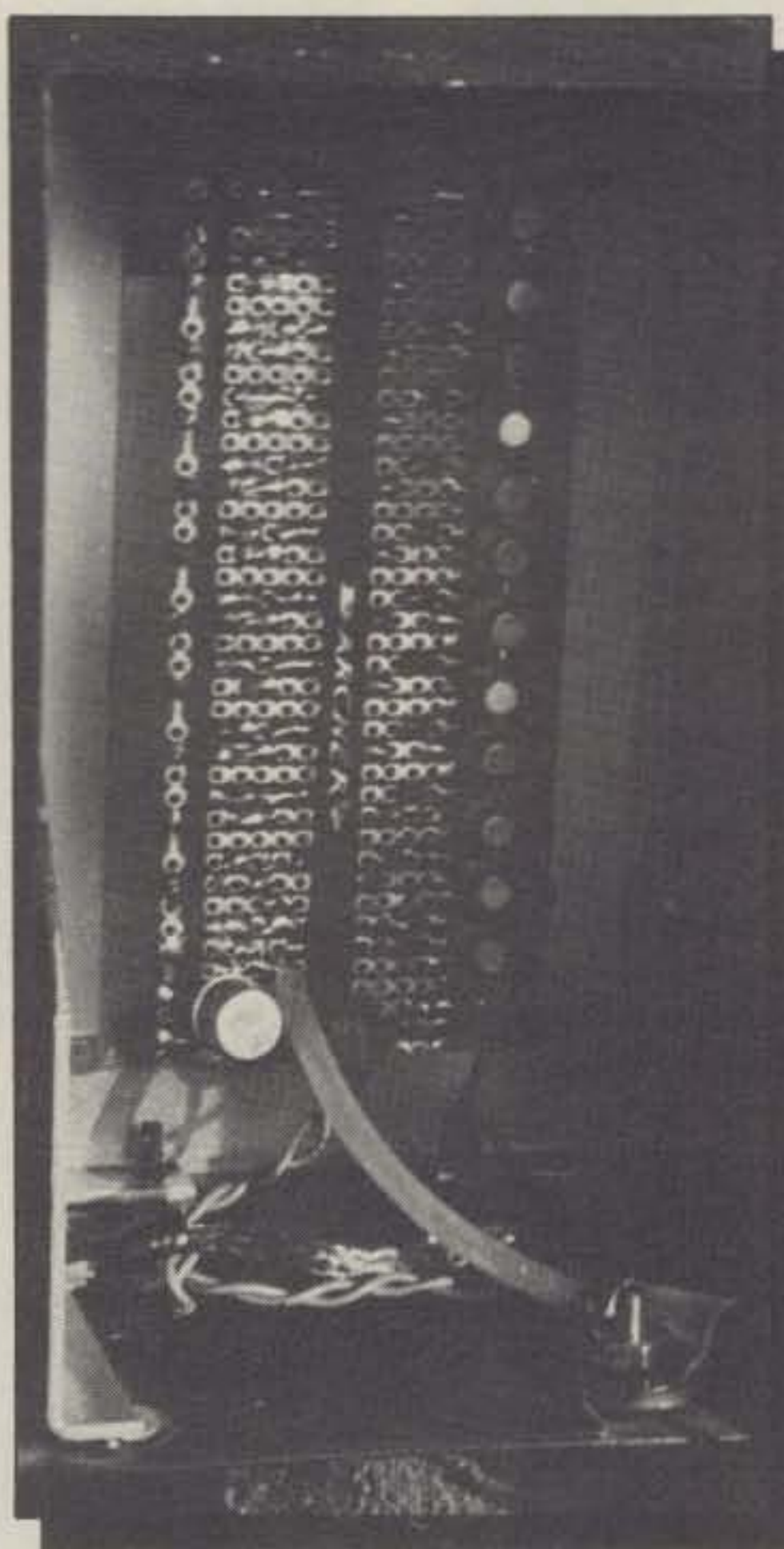
CONSTRUCT A PEAK-READING LED R.F. WATTMETER

BY R. DAVID BEARD*, WA4QGA



Front view of the wattmeter. You can dress up the completed project to suit your own taste.

Interior view. The coax at the bottom goes to the sampler unit, and the twisted pair of wires goes to the d.c. source.



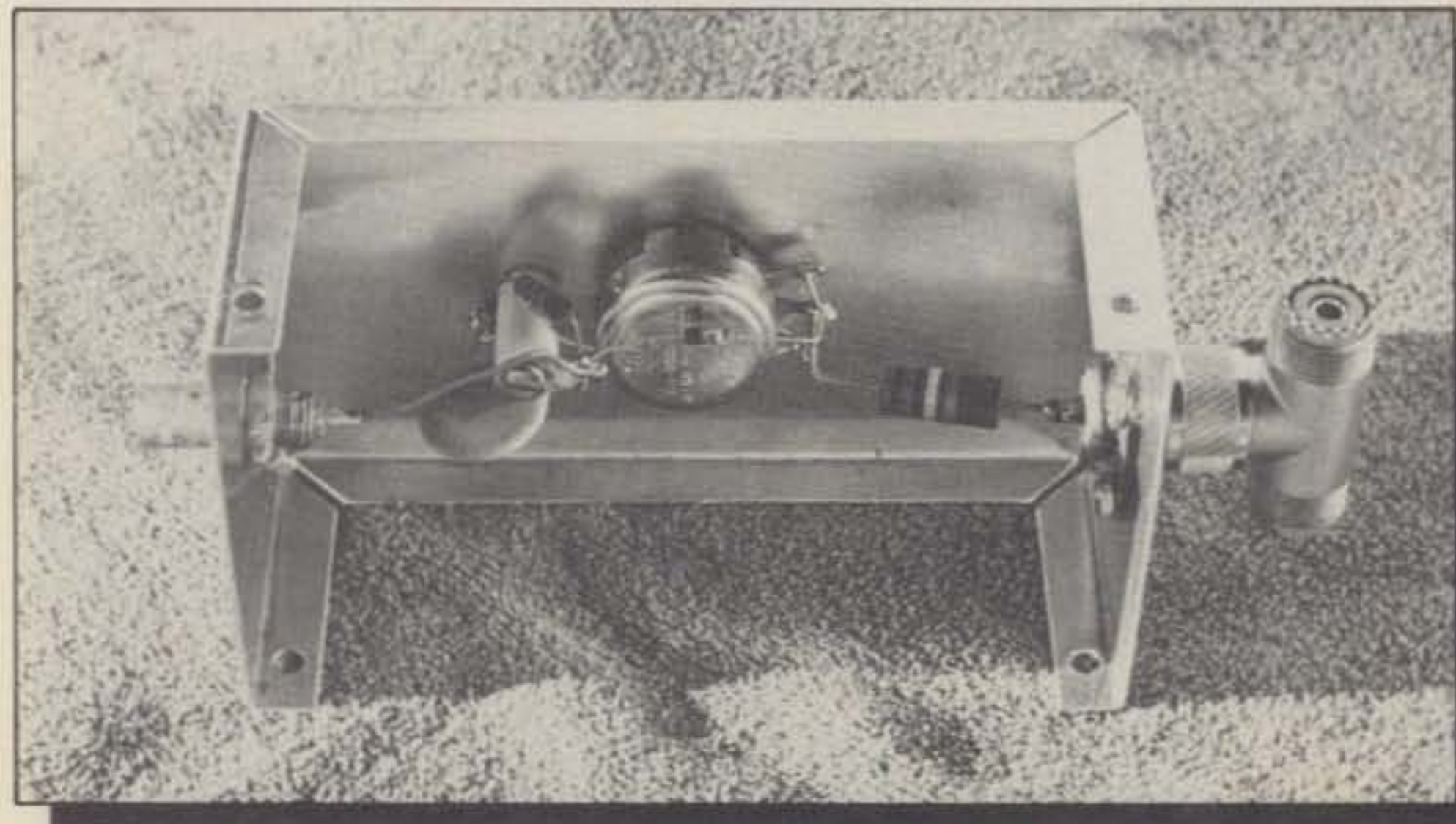
Interior and exterior views of the sampler. Sampling is done via the T connector. Construction is straightforward and uses normally available components.

Have you ever wondered just how much power is actually traveling up the coax? The following schematic and circuit description will give you a device that is (1) easy to build, (2) inexpensive to build, (3) simple to calibrate, and (4) will actually tell you how much power you're running. The project should cost between \$25 and \$30 to build and will satisfy the FCC proposal recently published regarding power output levels.

Circuit Description

The schematic, fig. 1, consists of 12 LEDs. Each LED is driven by a 2N2222 transistor. Practically any small-signal NPN transistor will do. For turning on each LED at a discrete power level 1N914 diodes are used. As the diodes are in series, the LEDs are turned on in sequence as each diode starts to conduct. Resistors R2 and R3 form a simple voltage divider, and resistor R1 limits collector current. Resistor values are not extremely critical as long as all segments contain equal values. The values may be changed somewhat to accommodate on-

*2913 Gaston, El Paso, TX 79935



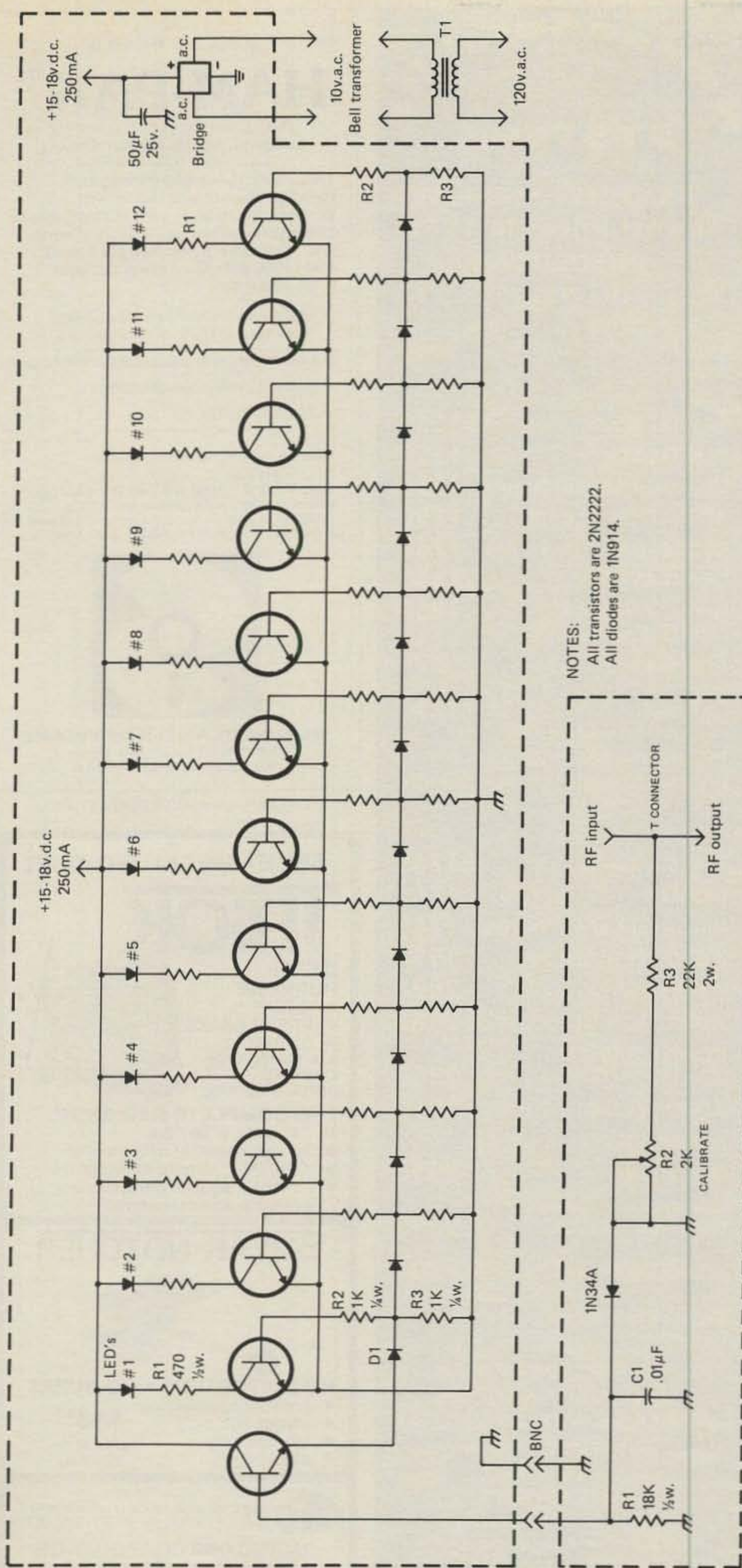


Fig. 1—Schematic of the peak-reading LED r.f. wattmeter.

LED No. *	Power Output
1	14
2	55
3	125
4	225
5	350
6	500
7	680
8	890
9	1125
10	1390
11	1680
12	2000

*LED No. 1 is at the bottom of the display. LED No. 12 is at the top of the display.

Table I—Relationship between LED numbers in fig. 1 and the peak power output they reflect.

hand junk-box values. Transistor types are also noncritical as long as all transistors are the same number.

The complete power meter is built on two separate chassis. One is the LED pc board and the other is the rectifier unit. Transmission-line voltage is sampled via a "T" connector connected to an SO-239 on a small chassis. The lower schematic enclosed in dotted lines is the unit being described. The time constant of R1C1 is only critical in that if C1 is too large, the true peaks will not be indicated. If R1 is too large, the low-order LEDs will have a tendency to stay lit after the r.f. output has ceased, or the LEDs will have a tendency to glow upward as power increases instead of indicating discrete power levels.

As the unit is actually a voltmeter and we wish to read the output in watts, I have included the approximate power level each LED will indicate (see Table I).

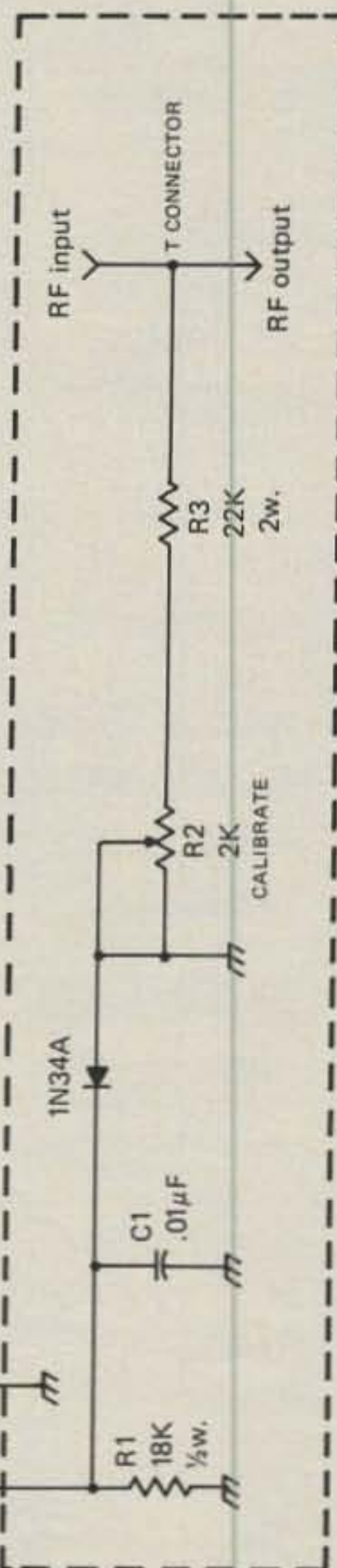
After the unit was built and calibrated, the LED display was compared to an oscilloscope (Tektronix 535) voice display on 20 meters, and true peak values of power were displayed by the meter. For ranges of 0-20 and 0-200 watts, the values of R2 and R3 in the rectifier unit will have to be scaled to provide full-scale readings on the 20 and 200 watt levels.

To calibrate the unit you will need an accurately calibrated r.f. voltmeter or an in-line wattmeter. The single-tone (or two-tone) output level will be the same value displayed by the LEDs as by the RMS value indicated by the two above methods. Calibrate at the highest power level available if a full-scale value cannot be reached.

With no speech "processing" or "compression," the highest order LED should flash only on occasion when the peaks of your voice reach the peak limits of your transmitter. Never should an LED flash indicate higher power output than that reached during carrier condition tune-up.

To test the completed display unit to see that all LEDs light, temporarily connect the input lead, through a 1K resistor, to the positive side of the power supply. All LEDs should light to their maximum brightness. Good DX!

NOTES:
All transistors are 2N2222.
All diodes are 1N914.



HT-Power!

Super Stick II & III

+9db 5/8 wave + 3 db 1/4 wave

Plus a 2 Meter or 220 mhz Duck
For Under A Buck

\$19⁹⁹ + 1¢
FOR THE DUCK

THE WORD IS OUT!

The SSII 2 meter & SSIII 220 mhz 5/8 wave ants. exhibit 9db gain over a short rubber duck when fully extended and 3db when collapsed to a quarter wave. The SSII or SSIII is the solution to many of those fringe area problems that plague every repeater system. With the Tuned Antenna's exclusive modular construction you can replace or exchange any of the 15 types of base connectors, plus the telescopic section may be replaced for only \$5.00. The tuned loading coil/spring is soldered to the machined end caps not swagged...And there are no ticky tacked capacitors or leads in the SSII or SSIII's loading coil to break.

There are no short cuts in designing and building quality ants. The Super Stick ants. are the only 5/8 wave ants. that spec gain in db at a 1/4 wave and 5/8 wave over a rubber duck. These gain figures were obtained from extensive field testing on HT's. Now you know why the word is out. The SSII & SSIII ants. give your HT more effective power. Call one of our 112 dealers today.

RD2S
Stubby

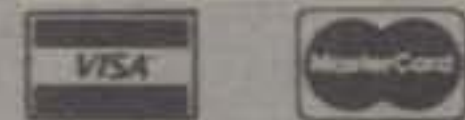
MODULAR
CONSTRUCTION
FEATURES

REPLACEABLE
TELESCOPIC
SECTION

TUNED
COIL/SPRING

This Multi-Based System
available for any HT
BNC, TNC, "F" Type
PL-259, or Motorola/Tempo

For Dealer Location or
To Order Call
(619) 268-0720



Terms: C.O.D., check or money order. Please add \$2.00 for first antenna and \$1.00 for each additional antenna to cover shipping and handling.

THE TUNED ANTENNA CO.
9520 Chesapeake Dr., #606
San Diego, CA 92123

CIRCLE 64 ON READER SERVICE CARD

Nampa Satellite SYSTEMS

IDAHO'S LARGEST DEALER

"HAMS SERVING HAMS"
Lowest Prices in TVRO

INTRODUCING
The NSS 75F

.3 F/D .1 piece fiberglass,
weighs only 80#. True polar-
mount, buttonhook feed.

SYSTEM PRICES

SAT-TEC R5000	\$1550
KLM Sky Eye IV	1550
Universal Comm. DL2000	1550
AUTO-TECH GLR 500	1650
DEXCEL DXP1100-stereo	1750
DRAKE ESR 24	1850
Luxor-Stereo-	1850
Infra-Red Remote	

All packages include: 7.5' dish,
Polarmount, Polarotor II
Polarizer, 100° K LNA,
modulator and cables.

PRODELIN 10' Dish - .3 F/D 8
panels, fiberglass. The ultimate
in 4 GHZ dishes.

SYSTEM PRICES

KLM Sky Eye IV	\$1765
SAT-TEC	1765
Universal Comm. DL2000	1765
AUTO-TECH GLR 500	1994
DRAKE ESR 24	2094
AUTO-TECH GLR 520	2165
DEXCEL DXR 1100	
with LNC - stereo	2350
AUTO-TECH GLR 560	2360
LUXOR STEREO, Infra-Red	
remote control	2395
General Instruments	
Infra-Red Remote	2395

All packages include 100° K LNA
or LNC, Cables, Modulator,
Dish, Polarmount, Polatron II
Polarizer.

DEALERSHIPS AVAILABLE
NATIONAL FINANCING
AVAILABLE WITH AS LITTLE AS
10% DOWN (O.A.C.)
CALL TOLL FREE

1-800-654-0795
for info or ordering
312 12th Avenue South
Nampa, Idaho 83651
WB6TOC (208) 466-6727 KI7D

CIRCLE 77 ON READER SERVICE CARD

ANNOUNCING

HAM-PAK™

The Multi-Purpose Program for
Computer-Equipped Ham Shacks

Throw away your dog-eared beam
heading chart (if you can find it.)
Stop tearing through your old logbooks to
see if you verified that VU7. And what
was that coil-winding formula again?
HAM-PAK puts the answers at your
fingertips with:

- Instant, accurate beam headings
from your QTH to 300 countries
- Instant retrieval of past DX confirmations
- Instant prefix identification
- Math formulas for radio use

Minimum System: TRS-80 III, 32K, 1 disk

ONLY \$29⁹⁵ and we pay the postage!
(Check or money order, please. No C.O.D.'s)
HAM-PAK is a trademark of Sunderland Software
Inquire about HAM-PAK for Apple, Atari, & VIC!



SUNDERLAND SOFTWARE
39256 Sunderland Drive
Mt. Clemens, MI 48044

CIRCLE 99 ON READER SERVICE CARD

SHEET METAL WORKER

TRIOK

MULTI- PURPOSE

- SHEAR
 - PRESS BRAKE
 - SLIP ROLL
- ALL FUNCTIONS
OPERATE
SIMULTANEOUSLY



THE COMPLETE R&D SHOP

- 24" wide • 257 lbs.
- 20" ga. capacity mild steel or
- .050/.060" 1/2 hard aluminum
- punches, special dies, stand
available as accessories

SHEAR-NOTCHER



NO DISTORTION • NO BURRS

- continuous shearing
 - corner notching
 - tab notching
 - nibbling
- \$58⁵⁰**
plus \$4.00
shipping



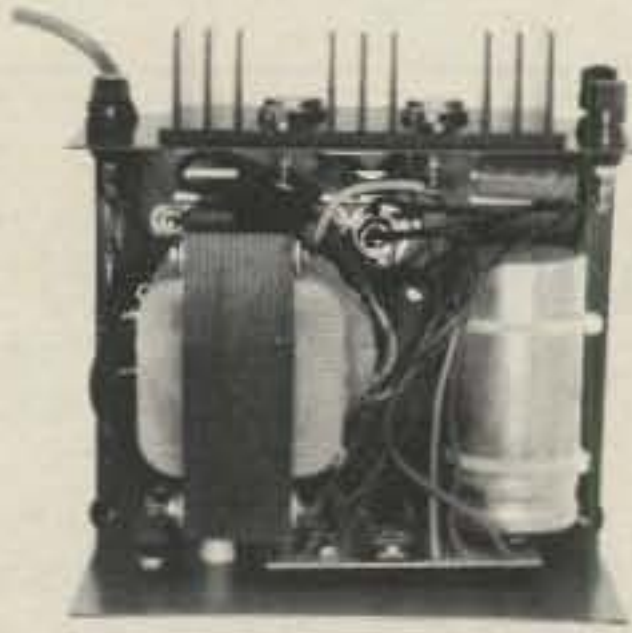
Send for your FREE literature and
SHEET METAL WORKER BULLETIN

PACIFIC ONE CORPORATION
513 Superior Avenue, Suite K303
Newport Beach, CA 92663 (714) 645-5962

CIRCLE 24 ON READER SERVICE CARD

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •



INSIDE VIEW - RS-12A

RS and VS SERIES 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-4A.
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage.
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD
- 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)



MODEL RS-50A



MODEL RS-50M



MODEL VS-50M

RS-A SERIES



MODEL RS-7A

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

RS-M SERIES



MODEL RS-35M

- Switchable volt and Amp meter

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt (lbs)
RS-12M	9	12	4 1/2 x 8 x 9	13
RS-20M	16	20	5 x 9 x 10 1/2	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13 3/4 x 11	46

VS-M SERIES



MODEL VS-20M

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

MODEL	Continuous Duty (Amps)			ICS* (Amps)	Size (IN) H x W x D	Shipping Wt (lbs)
	@13.8VDC	@10VDC	@5VDC			
VS-20M	16	9	4	20	5 x 9 x 10 1/2	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13 3/4 x 11	46

RS-S SERIES



MODEL RS-12S

- Built in speaker

MODEL	Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt (lbs)
RS-12S	9	12	4 1/2 x 8 x 9	13
RS-20S	16	20	5 x 9 x 10 1/2	18



MODEL RS-7B

- Matches EF Johnson PPL Radios Available as models.

MODEL	Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt (lbs)
RS-7B	5	7	4 x 7 1/2 x 10 3/4	9
RS-10A	7.5	10	4 x 7 1/2 x 10 3/4	11

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

CIRCLE 80 ON READER SERVICE CARD

THE INS AND OUTS OF THE WASHINGTON SCENE

RFI Complaints To Commission Continue At High Level

According to Jeffrey Young, Enforcement Division, Field Operations Bureau (FOB), FCC, RFI complaints to the Commission in the second quarter of FY83 (January, February, and March 1983) totaled 17,860, down from the 20,943 complaints reported in the same period a year earlier. The drop is attributed to the fact that the public finds it more difficult to file complaints today because of the FCC's closing last year of field offices around the country. Regardless, the number of complaints received in the last quarter suggests that on an annualized basis, reported cases of RFI are still running in excess of 71,000 per year!

Of the 17,860 complaints received, 14,060 (79%) involved a television receiver as the victim device. Of these, CB operations were alleged to be involved in 9,784 cases of TVI, while amateurs were cited in 795 cases. The continued high level of TVI complaints, most of which are linked to front-end overload of the TV set, indicates that TV manufacturers still have not corrected the design deficiencies responsible for the alleged "interference."

In all, CBers were alleged to be involved in 10,889 complaints, while amateurs accounted for 1,218. Complaints by amateurs against other amateurs totaled 389, up from the 314 complaints reported during the last quarter.

Finally, one area that the Commission is watching with concern is that involving complaints about Part 15 devices (i.e., devices that are not intended to radiate, but do). Radiation from things such as lamps that can be turned on and off by touch were among the devices cited.

Readers experiencing RFI problems are urged to file complaints with the FCC.

FCC Reinstates Survey of Part 15 Devices

As noted above, RFI caused by Part 15 devices is of increasing concern to the Commission. Because of this, the Commission's Field Operations Bureau is now surveying the retail marketplace to determine the level of compliance by manufacturers of these devices with the FCC's labeling requirements.

According to Joe Casey, Enforcement

Division, FOB, a similar survey last year found that 30% of the devices examined did not contain the required label indicating that they were FCC approved. Specifically, of 317 items examined by Commission engineers, 114 were not properly labeled. As a result, 38 citations were issued to the appropriate parties.

In the current survey, engineers from four FCC field offices will visit retail stores in their local areas and will sample devices that generate an RF signal for compliance with the labeling law. Emphasis will be placed on devices such as computers, coin-operated games, security transmitters, TV interfaces for games and computers, and cordless telephones. The four geographical areas in which this activity is scheduled to take place will change each month, and the survey will continue for at least a year.

Readers experiencing RFI problems with Part 15 devices are encouraged to file a complaint with the nearest FCC district engineer. Alternatively, complaints may be sent to the FCC in Washington, D.C., for forwarding to the appropriate field office; write to: Federal Communications Commission, Field Operations Bureau, 1919 M St., NW, Washington, D.C. 20554.

Electronic Organ Manufacturer Tells Complainant to Stick Pin in Amateur's Cable

A well-known manufacturer of electronic organs recently advised an organ owner who complained of interference from a nearby amateur station to "put a pin in the ham's coax." The "advice" was brought to the attention of the ARRL, which sent the following comments to the president of the company:

"Had the organ owner taken the advice of your man seriously and damaged the amateur radio station's transmission line, he would have become criminally liable under Federal law for causing damage to a federally-licensed radio station. He could also have caused the radio transmitter to malfunction and possibly injure the operator.

"Not only would your employee be criminally liable as an accessory should someone actually follow such advice, (but) it is very possible that (name of company deleted) could be held liable for personal and property damages under the

doctrine of respondeat superior. This doctrine establishes that an employer is responsible for the tortious acts of his employee which occur in the course of the tortfeasor's employment."

It is cases such as this which suggest the time is ripe for the FCC to consider susceptibility standards for electronic home-entertainment equipment... standards provided for under Public Law 97-259. The Federal imposition of standards is the only solution to the RFI problem, since the electronics industry has done little, if anything, to ensure that its equipment will operate properly in the presence of strong RF fields.

FCC Issues NPRM on Expansion of 10 Meter Repeater Band

On 12 May 1983, the Commission released an NPRM which seeks the public's comments on a proposed expansion of the 10 meter repeater band. Currently confined to the band 29.5-29.7 MHz, the NPRM proposes opening the band 29.0-29.7 to repeaters.

According to John Johnston, Chief, Personal Radio Branch, Private Radio Bureau, the reasons for the proposed expansion are many. For example, amateurs are exhibiting an ever-increasing interest in the use of 10 meter f.m. and of repeaters in this band. Then, too, the increasing availability of commercial equipment and so-called "10 meter convertibles" (i.e., CB transceivers that have been converted to 10 meter f.m. operation) suggests that it won't be long before the current 200 kHz repeater band is overcrowded.

CATVI Prevents Amateur From Establishing Emergency Communications

A report has reached your Washington Editor of a case in which harmful radiation from a cable television system (so-called cable television interference, or CATVI) prevented an amateur from using his f.m. 2 meter transceiver to report an accident. The incident, which involved an automobile accident in an urban area, was not life threatening, and the amateur was able to call for help by driving away from the scene and using the telephone.

The cable operator in question has frequently been notified that his emissions on cable channel "E" interfere with ama-

Media-Tech®, 8603 Conover Place, Alexandria, VA 22308

teur communications on the 2 meter band. And while some attempts have been made to clear up the problem, radiation from overhead cables is still responsible for high levels of interference in some areas. In the case noted above, the CATVI was so great that the mobile operator was unable to signal through the repeater in a location where the repeater is normally full quieting.

It is situations such as this which make urgent the early consideration of FCC Docket RM-4040, which if approved would require the CATV industry to vacate channels "E" (144 MHz band) and "K" (220 MHz band). These frequency bands, after all, are assigned to the Amateur Service by the FCC; their use by the CATV industry is only to be on a "closed circuit" basis.

Astronaut Owen Garriott to Operate on Amateur Band From Space

As should now be known, Shuttle astronaut Owen Garriott, W5LFL, will operate an amateur station aboard an upcoming mission. Specifically, *Amateur Satellite Report* (AMSAT's newsletter for the amateur space program) announced that "NASA's Associate Administrator for Manned Space Flight, Gen. James Abrahamson, has designated the STS-9/Space-lab flight, to be flown this fall, as the mission on which the amateur radio equipment will be carried."

The amateur operations, of course, will be carried out on a non-interference basis during Garriott's free time, with the equipment used to be furnished by the ARRL. Operations are planned for the low end of the 2 meter band, and efforts are now underway to establish the communication protocols to be used.

Congratulations to the ARRL and AMSAT for helping Dr. Garriott obtain the necessary permission for this operation, an operation that will place amateur radio in the spotlight worldwide!

For more information on W5LFL's operation from space, contact: Radio Amateur Satellite Corporation (AMSAT), 850 Sligo Avenue, Silver Spring, MD 20910; or American Radio Relay League (ARRL), 225 Main Street, Newington, CT 06111.

Amateur's Station License Revoked Because of Malicious Interference

The Chief of the Private Radio Bureau, Mr. James McKinney, has ordered that the license for amateur radio station N6BII be revoked immediately. Further, the order suspended the General Class amateur operator license of Harold R. Claypoole, operator of N6BBI.

The order resulted from observations by Commission engineers from the San Diego office of Claypoole's malicious interference to communications of other operators. The interference consisted of

making transmissions, including unmodulated carriers, directly on top of ongoing transmissions by other operators; of broadcasting recorded material, including music; and of identifying with a false call sign, WB6AAT. Claypoole, in a telephone call to the Federal Bureau of Investigation, also threatened to shoot Commission engineer Grigsby to death if the engineer came to Claypoole's house.

The Commission, according to Ray A. Kowalski, Chief, Special Services Division, PRB, views malicious interference in any radio service as a very serious matter, and will take whatever measures are necessary to enforce the Rules on the books.

Other Issues of Interest Considered by Commission

As we go to press, the Commission is reviewing a number of matters of interest to the Amateur Service. In addition to several minor changes to the Rules and Regulations, the FCC is expected to release a Report and Order on the elimination of logging requirements. Instead of preserving mandatory logging of international third-party traffic, as was requested by the ARRL, the Commission is expected to authorize its district Engineers-in-Charge to order an amateur to maintain a comprehensive log when questionable operations or rule violations are observed.

It is also expected that the FCC will consider the allocation of additional frequencies to the Radio Amateur Civil Emergency Service (RACES).

ARRL Honors Delegates to Communications Technology and Policy Seminar

In May the ARRL sponsored a reception and buffet to honor delegates attending the Seminar on Communications Technology and Policy. The seminar, sponsored by the U.S. Information Agency and the U.S. Telecommunications Training Institute, is for top-level telecommunication managers from countries around the world, and is intended to familiarize these people with communications equipment, operating procedures, and telecommunications policies.

The ARRL reception, which took place in the Dirksen Senate Office Building, provided for one-on-one contact between the visitors and amateurs from the Washington, D.C. area. Members of the Capitol Hill Amateur Radio Society, the Department of State Amateur Radio Club, and the Capital City Amateur Radio Society all took part, as did representatives of the League.

Planning for the reception and buffet was under the able direction of the League's Washington Area Coordinator, Mr. Perry Williams, W1UED. Perry was assisted by Ellen Thrasher, who, among other things, handles appointments for Senator Barry Goldwater.

Commission Invites Amateurs to Submit Exam Questions

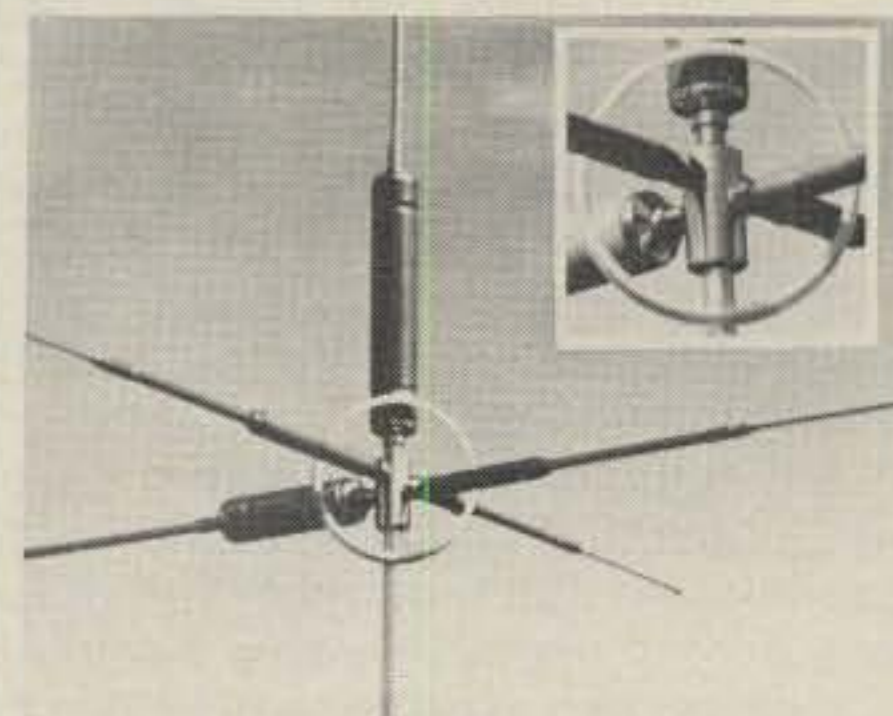
If you are a licensed amateur, the FCC invites you to submit questions for use in its amateur radio operator examinations. These examinations determine whether an individual is qualified for the privileges conveyed by an amateur radio license, and as such, the subjects covered are many and diverse. Included is material on the FCC's Rules and Regulations, operating procedures, radio-wave propagation, amateur radio practice, electrical principles, circuit components, practical circuits, signals and emissions, and antennas and feedlines.

For more information, write to the Private Radio Bureau, FCC, 1919 M St., NW, Washington, D.C. 20554, and request PR Bulletin 1035.

FCC Staff Members Win Awards

Richard Smith, Chief, Field Operations Bureau, and Robert Foosaner, Deputy Chief, Private Radio Bureau, recently won awards as outstanding members of the Government's Senior Executive Service. These annual awards, made annually, reward senior executives for their performance during the previous year. Congratulations, Dick and Bob, from everyone at CQ!

Your Washington Editor thanks Mr. Richard I. Vaughan, Regional Director, FCC, San Francisco, CA, for his contributions to this month's column.



X-PANDA-FIVE \$15.00

(Plus \$1.50 Shipping & Handling. Florida Residents Add 5%.)

- X-PANDA-FIVE converts your Hustler or Hy-Gain mobile antenna from one to five bands. Add as many resonators for the bands you wish to operate. Adjust resonators for minimum SWR, no stopping to change bands any more.
- X-PANDA-FIVE with proper resonators and good ground plane makes an ideal system for apartments and condominiums.
- X-PANDA-FIVE can be used to make a multi-band antenna system for vans, campers, motor homes and travel trailers.
- X-PANDA-FIVE will accept either regular or super size resonators

Dealer inquiries invited.

J.L. Industries
P.O. Box 547
Hallandale, FL 33009

NEWS OF CERTIFICATE AND AWARD COLLECTING

The story of the month for August as told by Dave is:

David S. Short, W5PWG All Counties #393 8-7-82

"Thanks for the memories and the opportunity to ride along with each one of you during my 19 year odyssey which took me through every county in the 50 states of America. I can still recall the faint 40 meter signals of a small, but determined group who had a notion that they would attempt to contact an amateur radio station in every county, and then someone did do just that. Remember? As it turned out, Cliff, K9EAB, was the first, and as I write these very words, the 400th person to have worked them all has long since passed.

"Well, it was rare indeed, back in the early 60's, to find a mobile station who would name each new county as they drove along. The chase was on; fixed stations, mobiles, and portables were searched out as if they were rare DX. Looking back through some of the old log books it still amazes me that the monthly county total back then roughly compares to what is now worked in one day. No complaints from this end. The excitement of being in the initial chase, along with several others, was compensation enough. The chase continued until in 1969 we finally made it over the 3000 mark (#33), and then—Europe. I had mixed emotions about leaving, but then this is a hobby, you know!

"As it turned out, the stay in Europe was longer than I had first expected. You can imagine that the 'whole ball of wax' was mighty big by the time I returned. Something had to be done to whittle that ball back down to size. So, armed with a TS-530S and a vertical, we melded back into the chase with all that could be mustered. At times it seemed to me that the task would be all but impossible, what with being in the fringe area running not quite QRP power.

"For the record, if you were listening on the 30th of June 1982 (my birthday) at 0152Z when I contacted Pete, KC4IF, in Monroe County, Kentucky, you knew that the chase which started many years ago finally came to an end. What a thrill that contact was for me. I'll never forget it. Thanks, Pete!

"That 'ball of wax' is now on the back burner, soon to be melted down into small squares, packaged, and made ready for the next generation. Best wishes to all

333 South Lincoln Avenue, Mundelein, IL 60060



David Short, W5PWG, All Counties #393.

who are starting! I hope that it won't take you quite as long as it took me. And in memory of Cliff Corne, K9EAB, and a small group of County Hunters who gathered in Jackson, Mississippi, March 1969, I tender my thanks to you one and all."

(Dave, W5PWG, is ex-W4SKI/W2GRH/DL5DA—ed.)

Special Honor Roll All Counties

- #419 John Hawkins, W5EHY 4-19-83.
- #420 Karel Tettelaar, VE7ATH 4-27-83.
- #421 Thomas Sundstrom, W2XQ 5-2-83.
- #422 James Blackwood, N8AIL 5-3-83.

Awards Issued

John Hawkins, W5EHY, contacted his last county and completed all records to claim All Counties #419, Mixed, dated 4-19-83.

Karel Tettelaar, VE7ATH, in British Columbia, heard and was heard from all counties and has been awarded All Counties #420, all 2 x S.S.B., 4-28-83. Margaret Tettelaar, VE7ATI, holds All Counties #133. The story of Karel and Margaret appeared in the May 1980 issue of *CQ*.

With a little help from his computer, Thomas Sundstrom, W2XQ, finished all the paperwork to qualify for All Counties #421, Mixed, 5-2-83.

Busy as he was helping prepare all the details for the 1983 County Hunters Convention, James Blackwood, N8AIL, completed every county to win All Counties #422, Mixed, 5-3-83.

Lew Mulligan, WA4OIB, added USA-CA 2500, all 2 x S.S.B., to his collection.

Tom Van Ettiger, WC4K, collected USA-CA 500 through 1000, Mixed.

Lorraine Bachmann, WDX9DCJ, did a lot of listening and sent for USA-CA 500 through 1000, endorsed Mixed. This is the first USA-CA Certificate issue to an s.w.l. in Wisconsin.

USA-CA 500 certificates this time were issued to:

Masao Nakamura, JA1AJA, endorsed Mixed.

Hiroyuki Takeuchi, JA8AYN, endorsed Mixed.

Vladimer Naumenko, UA3GEA, endorsed Mixed.

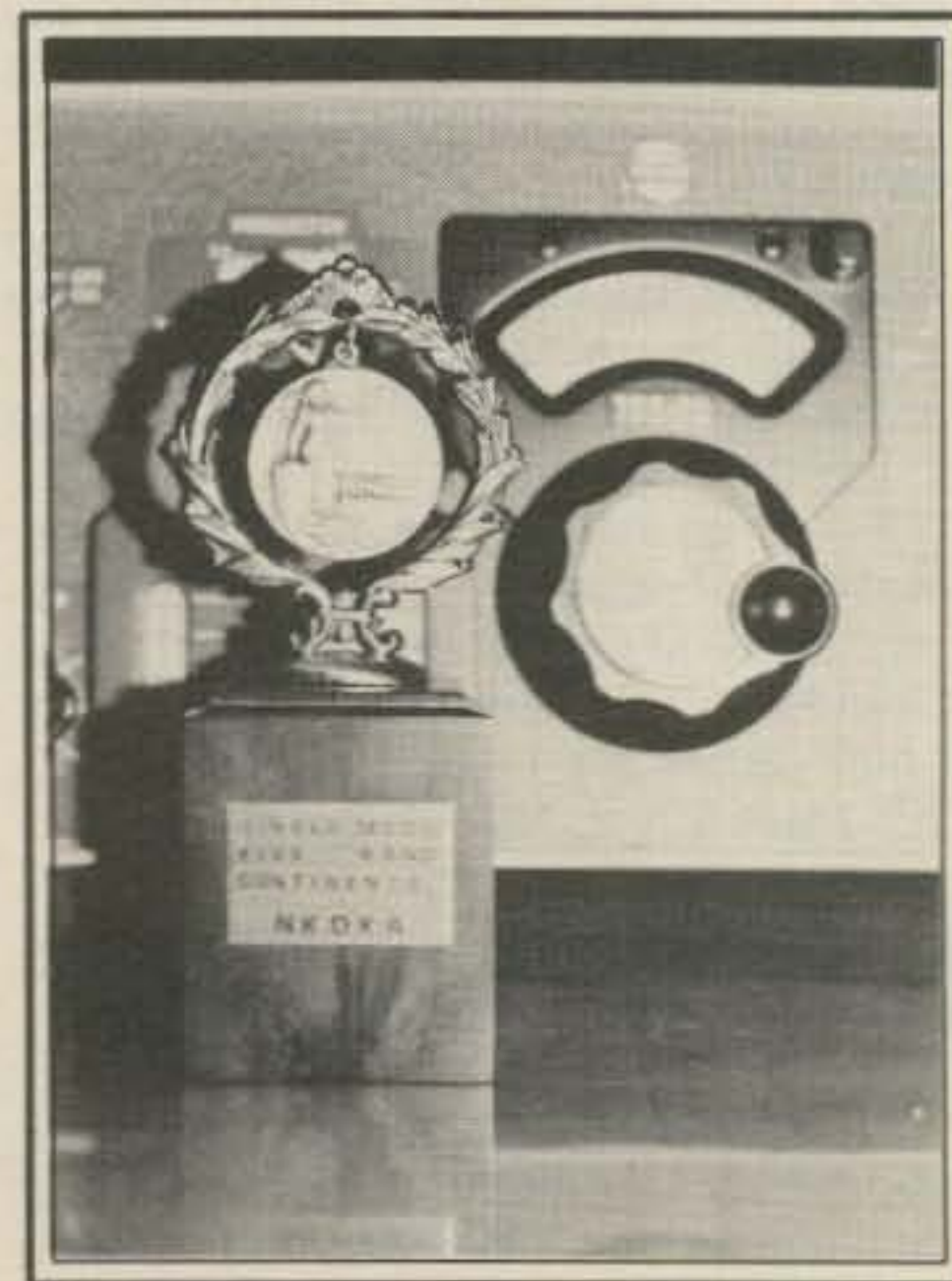
Fumioki Sato, JH8MXH, endorsed all 2 x S.S.B.

Kazuo Kumanaka, JA8JL, endorsed Mixed.

Awards

Jamaica Amateur Radio Association Award 1983. This award is in commemoration of Jamaica's 21st year of independence, 6th August 1983. It is available to all licensed radio amateurs, and is issued for c.w., phone, or mixed modes. The award will be issued for contacts during the period August to December 1983. Applications should be sent to: Awards Chairman, Gerald Burton, 6Y5AG, Box 214, Kingston 20, Jamaica W.I.

Rules are as follows. Contact must be made with 5 different 6Y5 stations on any band during the period August to December 1983. QSL cards or written proof with time, date, band, mode, and 6Y5 stations worked is required. The fee for this award is U.S. \$3.00 or 10 IRCs and an 8" x 10" self-addressed envelope.



Northern Kanagawa DX Assoc. Trophy.

Northern Kanagawa DX Association Single Mode 5 Band All Continents Award. Applicants must submit proof of QSOs with stations in six continents on a single mode and five bands. This award is issued to any licensed radio amateur and s.w.l. who submits proof of 2-way radio

contacts with the above stations. The mode and amateur bands used and the date of contact are not limited at all. The serial number of the award is given separately to each mode. The award may be issued for six or more bands with the special endorsement if all supporting information is included in the application. QSL cards of the same station for different bands and different modes may be used in one application. Cross-band and cross-mode QSOs cannot be counted. This award is given in the form of a trophy with a medal.

Send the log data certified by two licensed radio amateurs with 25 IRCs to: Award Chairman, Northern Kanagawa DX Association, Jeitti, Michinori Jimbo, 2653, Saurashi, Sagamiko-Machi, Tsukui-Gun, Kanagawa-Ken, 199-01, Japan.

Worked All Counties West Virginia Award. The Mountaineer Amateur Radio Association of Fairmont, WV, is sponsoring the WACWV. The award is open to any licensed amateur radio operator. Only contacts made after July 1, 1946 will count toward this award. Attractive certificates will be issued to each amateur who works all 55 West Virginia counties. Contacts may be made on any of the amateur bands and on any mode. *Repeater contacts are not allowed.* Stations working the WV counties may be portable or mobile during the operation. All contacts do not have to be made from one fixed location. Qualification will be determined by presenting a log with the 55 county contacts, in alphabetical order, and should include the following: date, time, WV county, station worked, band, mode, RS(T), and name of county worked.

This log must be signed by two amateurs, other than the applicant, confirming the fact that they have viewed the original QSL cards and find them accurate. Submit the application, along with \$2.00 to cover handling and postage, to Mountaineer Amateur Radio Association, c/o Steve Wilson, 1332 Overhill Rd., Fairmont, WV 26554.



Worked All West Virginia Counties Certificate.

Diploma Taba Poty—PS7 Award. DTP (PS7) is an international diploma granted through the Sectional Directory of LABRE of the State of Rio Grande do Norte, Brazil. It is intended to develop amateur radio activities and give everyone

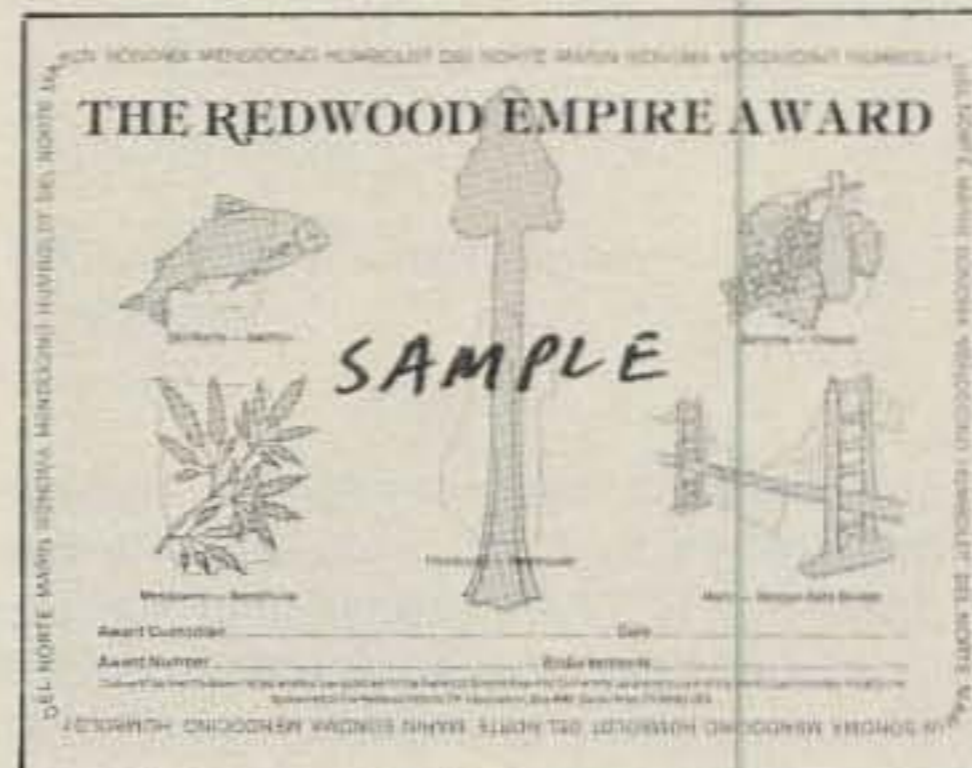
the opportunity to work the PS7 prefix. The award will be granted to any Brazilian, except PS7 stations, and to foreign amateurs contacting different PS7 radio stations as follows.

Foreign radio amateurs—Work 10 different PS7 stations which have different call suffixes (for example, PS7AB, BS, CAM, DFA, EET, FCA, XA, etc.). Stations may be worked in any mode or band, including via v.h.f. repeater.

In both cases, contacts must be made after January 1, 1976. Brazilian stations send 10 single units of postage along with the log sheets; foreign stations send 6 IRCs with log sheets. Enclose your QSL card and address application to Diploma Taba Poty—PS7 Award, LABRE, P.O. Box 251, ZC 59.000, Natal (RN) Brazil.

USA-CA Honor Roll

3000	W2XQ	509	500
W5EHY 448			JA1AJA 1827
VE7ATH 449	2000		JABAYN 1828
W2XQ 450	WA4OIB 564		WC4K 1829
NBAIL 451			UA3GEA 1830
	1000		JH8MXH 1831
2500	WC4K 775		JABJL 1832
WA4OIB 507	WDX9DCJ 776		WDX9DCJ 1833
W5EHY 508			



The Redwood Empire Award.

The Redwood Empire Award. The Redwood Empire DX Association proudly announces the Redwood Empire Award. REDXA will award the unique, handsome certificate for working amateurs in each of the five coastal counties of Northern California: Marin, Sonoma, Mendocino, Humboldt, and Del Norte. Contacts must be made after Jan. 1, 1981, on any h.f. band 10–160 meters. The award is endorsable by band or mode. Send certified log data with U.S. \$2.00 or 7 IRCs to: The Redwood Empire DX Association, Box 4881, Santa Rosa, CA 95402.

The certificate is professionally designed and features the best-known symbols of California's north coast. Marin County is represented by the Golden Gate Bridge, Sonoma County by its excellent grapes and wine, Humboldt County by the towering redwood trees, Del Norte County by the Pacific salmon, and Mendocino County by its major cash crop. Behind each drawing is an outline map of each county. The award is printed on heavy, light-blue stock with navy blue and black inks. It is shipped flat and will make a welcome addition to any radio shack.



Worked All Scottish Districts Award. (Details of this award are in the March 1983 Awards column.)

Notes

Well, we have made some mistakes! In the March column All Counties #401, John Sebastian, was listed as W8BGF. John's correct call is N8BGF. Sorry, John. Incorrect USA-CA numbers were listed in the June column. Instead of All Counties #116 and #117, they should be as follows: #416 Burwyn W. Thurman, N9TN 2-8-83; and #417 John A. Devoldere, ON4UN 2-17-83. If you are keeping your own records of USA-CA numbers, please make these corrections.

Only one more month left of the summer holidays! I hope everyone is enjoying the outdoors and sunshine.

73, Dorothy, WB9RCY

RELIABLE MICROWAVE TV ANTENNAS

2.1 to 2.6 GHz Frequency Range
34db System Gain (or Greater)

Complete System (as pictured)	\$119.95
Down Converter Probe Style (Assembled and Tested)	\$ 49.95
Power Supply (12V to 16V DC+) (Assembled and Tested)	\$ 39.95



1 YEAR WARRANTY
PARTS & LABOR

PETERSON ELECTRONICS

4558 Auburn Blvd.
Sacramento, CA 95841
(916) 486-9071

C.O.D.'s
SPECIAL QUANTITY
PRICING
Dealers Wanted



CIRCLE 72 ON READER SERVICE CARD

You say you need an extra few hands to tune up the rig in a couple of nanoseconds before the rig shuts itself down? KB8ZO has come up with a quick way to tune your rig, especially your antenna tuner.

CONFIDENTIAL

For Antenna Tuner Users Only

BY JERRY VOLPE*, KB8ZO

Today is literally the "age of the antenna tuner." In fact, there are more antenna tuners advertised in amateur radio magazines or built from construction articles in these magazines than any other station accessory. The intention of this article is not to present another rendition of the perfect antenna tuner. Instead, I hope to show you a better way to use your present antenna tuner no matter what its design.

Adjusting Your Tuner: A Real Ordeal

Like many of you, I have never liked using an antenna tuner. Oh, I appreciate the results (a proper impedance match for the transmitter and low-pass filter). I'm just not sure that the "means" is justified by the "end." There are already so many steps involved in the station tune-up process! However, I honestly believe that there are enough honest-to-goodness benefits derived from antenna tuners that they are here to stay.

If we take a moment to think about it, there are at least three major drawbacks to using an antenna tuner. First of all, we will need to transmit through our tuner to the antenna while adjustments are being made! This on-the-air tuning is undoubtedly responsible for many of the interfering signals present on our crowded amateur bands. Secondly, our transmitters, low-pass filters, and some types of automatic T/R circuits are susceptible to damage or instability problems during the tune-up process. This, of course, is due to the tremendous mismatches presented to the equipment by the antenna tuner. In fact, many solid state transmitters are so affected by the initial inductive or capacitive reactances presented by a mistuned

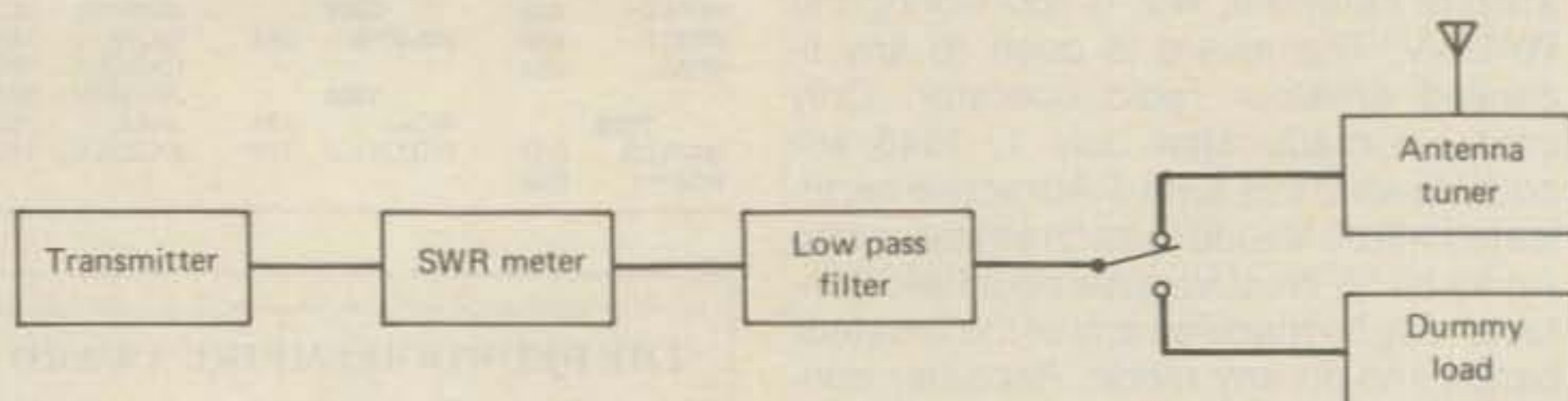


Fig. 1—Block diagram of a typical station showing the various elements which must be adjusted, usually quickly.

antenna tuner that they literally oscillate themselves to a quick death! The third drawback involves complexity. Here we must consider the equipment required (an s.w.r. meter, coax switch, and a dummy load) and the number of actual steps involved in the tune-up process.

Let's examine the basic steps involved in tuning a typical station, such as the one illustrated in fig. 1, before I present an alternative approach to antenna tuning. Normally we:

1. Attach an appropriate 50 ohm non-reactive load to the transmitter (omitted for solid state output transmitters).

2. Tune the transmitters for normal output to the dummy load (also omitted for solid state output transmitters).

3. Replace the dummy load with the antenna tuner (and the antenna!).

4. Locate an unused frequency near the proposed frequency of operation.

5. Set the s.w.r. meter for maximum sensitivity.

6. Key the transmitter, identify your station, and increase the power output until the s.w.r. meter deflects sufficiently.

CAUTION: At this time the transmitters and low-pass filters are not operating into their designed loads. A transmitter's output will be reduced significantly, even though relative power meters may state otherwise. You might be tempted to adjust your transmitter's load and tune controls to compensate. *DON'T do it!* Simply limit the length of your test transmissions.

Unfortunately, it is possible to permanently damage both your transmitter and filter at this time, even though you may be using a low-pass filter normally designed for 1 kw operation.

7. Adjust the antenna tuner's controls to obtain an acceptable s.w.r. indication. This probably will take two or more transmissions.

8. Increase the transmitter's output power (which somewhat changes the impedance transformations in the transmitter, tuner, and antenna system), reduce the sensitivity of the s.w.r. meter, and then readjust the tuner controls for the best s.w.r.

9. Identify the last transmission, and then move to the frequency of operation. Hopefully, this will not be far enough from the tune-up frequency to require readjustments.

As you can see, we do an awful lot in this tune-up process, although it can be shortened somewhat by keeping a log of tuner control settings for future starting points.

An Alternative That Works

It is often said that "adversity is the mother of invention." Well, I am not really much of an inventor, although I seem to flourish in the art of re-inventing others' ideas. Unfortunately, I must give the major credit for this idea to those hundreds of electronic marvels who came before me. In fact, it was by reading various dis-

*3620 Lakeshore Drive, Apt. F-10, St. Joseph, MI 49085

MOBILE TOWERS by ALUMA

FOR MOBILE VAN,
TRUCK OR TRAILERS.
USE FOR COMMUNICATION OR
CHECK YOUR SIGNALS.

HIGHEST QUALITY
ALUMINUM & STEEL

- TELESCOPING Crank-Ups to 100 ft.
 - TILT-OVER MODELS
- Easy to install. Low Prices.

EXCELLENT FOR
HAM COMMUNICATIONS



Mobile Trailer Type



Mobile Truck Type

Mobile Van Type

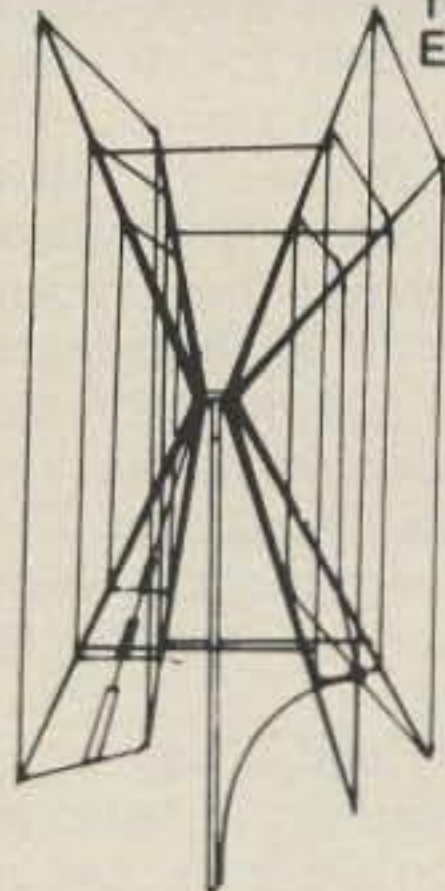
Over 36 types
aluminum and
steel towers made—
specials designed
and made—write
for details.

ALUMA TOWER COMPANY
BOX 2806CQ
VERO BEACH, FLA. 32960
(305) 567-3423 TELEX 80-3405

CIRCLE 51 ON READER SERVICE CARD

GEM-QUAD FIBRE-GLASS ANTENNA FOR 10, 15, and 20 METERS

Two Elements \$215.00
Extra Elements \$154.00



Price is
F.O.B. Transcona

INCLUDES U.S.
Customs Duty

KIT COMPLETE
WITH

- SPIDER
- ARMS
- WIRE
- BALUN KIT
- BOOM WHERE NEEDED

2 element 2-meter Quad N/C on re-
quest, offer with purchase of quad.

WINNER OF MANITOBA DESIGN
INSTITUTE AWARD
OF EXCELLENCE

Buy two elements now — a third
and fourth may be added later with
little effort.

Get a maximum structural strength
with low weight, using our "Tride-
tic" arms.

GEM QUAD PRODUCTS

Transcona, Manitoba, Canada R2C 2Z5
Box 53 Telephone (204) 866-3338

N.C.G. CO.



WORLD COMMUNICATIONS

ALL NEW 10 / 160 METER



HF—10 thru 160 Meters
Solid State, 200 W. PEP, 3 Step
Tuning (1 kHz, 100 Hz, 25 Hz), 4
Memories, Auto Scan, Automatic
Up/Down Tuning, Dual VFO, IF
Tuning Offset, Noise Blanker, Mic
Compressor, VOX, CW Side
Tone, Built-in 120 VAC and 13.8
VDC supplies, RTTY-ASCII,
FAX operation, USB-LSB,
CW-W, CW-N (CW Narrow Filter
optional)

Special Price \$949.50

15 METER



15 Meter Mobile DX'ers
USB-CW, 10W high, 2W low,
VFO Tuning, Noise Blanker, Fine
Tune \pm 4 kHz, Digital Frequency
Readout, 13.8 VDC, Neg.
ground, 9.5"L x 9"W x 2.5"H

Special New Price \$279.50

Export Sales Information
Cable: NATCOLGLZ

Order Direct or from your
local dealer (714) 630-4541

COMING SOON

New Triband Transceiver
40, 15 & 6 Meter



1275 N. Grove St.
Anaheim, CA 92806

Prices and specifications are subject
to change without notice or obligation.

CIRCLE 86 ON READER SERVICE CARD

WIRE & CABLE

RG-213 mil. spec.	27c/ft
RG-214 mil. spec.	1.25/ft
RG-8U foam, 95% braid	23.5c/ft
RG-8X foam, 95% braid	11.5c/ft
RG-58AU mil. spec.	10.5c/ft
RG-114 micro. mil. spec.	8.5c/ft
RG-11AU mil. spec.	19c/ft
RG-59U foam, 95% braid	24c/ft
RG-59U mil. spec.	11.5c/ft
300 ohm ladder line poly ins.	6c/ft
450 ohm ladder line poly ins.	8c/ft
450 ohm ladder line bare, 100 ft.	\$11.00
8 conductor rotor cable (2 #18/6 #22)	15c/ft
8 conductor rotor cable, heavy duty	34c/ft
4 conductor rotor cable, 100 ft.	\$5.50
14 Ga. Stranded Copperweld, 70 ft roll	\$4.95
14 Ga. Stranded Copperweld, 140 ft roll	\$9.00
12 Ga. Solid Copperweld 50 ft multiples	6c/ft
14 Ga. Solid Copperweld 50 ft multiples	4c/ft
18 Ga. Solid Copperweld 50 ft multiples	4c/ft
14 Ga. Stranded Copper	8c/ft
8 Ga. Solid Aluminum 50 ft multiples	8c/ft

ANTENNA ACCESSORIES

Amphenol PL-259	75c/ea
Ceramic insulators dogbone/strain	65c/40c
Coaxial lightning arresters	\$3.75
Coax seal, roll	\$1.95
W2AU balun 1:1 or 4:1	\$14.25
W2AU END-sulator	\$1.35
W2AU traps 10, 15, 20 or 40 mtr.	\$18.95/pr
W2AU new 30 mtr traps	\$24.00/pr
W2AU traps 75 or 80 mtr.	\$26.25/pr
VAN GORDEN HI-Q 1:1 balun	\$8.95
VAN GORDEN Center insulator	\$5.75
B&W Traps 40/80-10mtrs.	\$26.75/pr
B&W 375 or 376 coax switch	\$21.15
B&W 593/595 coax switch	\$23.00/\$27.35
B&W 5KW balun 1:1 or 12-1	\$36.00
B&W 5KW balun 4:1 or 6-1	\$45.00
DAIWA coax switch CS 201/401	\$19.95/\$61.95

TOWERS

HY-GAIN CRANK UP AND UNIVERSAL ALUMINUM
TOWERS AT BIG DISCOUNT
10 ft heavy duty tripod tower.....\$39.95
15 ft heavy duty tripod tower.....\$54.60
FREE FREIGHT ON HY-GAIN TOWERS. CALL OR WRITE
FOR PACKAGE QUOTE ON HY-GAIN TOWER, ANTENNA
AND ROTOR, FREIGHT FREE.

ANTENNAS AND ROTORS

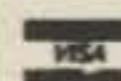
HY-GAIN New Explorer Triband	\$267.95
HY-GAIN AR-22XL/CD-45II	\$58.95/\$102.75
HY-GAIN HAM IV/Tailtwister	\$194.95/\$241.50
HY-GAIN TH3MK3S/TH3JRS	\$213.20/\$154.50
HY-GAIN TH5MK2S/TH7DXS	\$306.00/\$375.00
HUSTLER 3TBA/4BTV/5BTV	\$193.11/\$77.99/\$98.50
HUSTLER 6BTV new 6 band vertical	\$123.25
HUSTLER 30 meter modification kits for older HUSTLER'S	\$36.95
HUSTLER G6144B/G7144	\$67.99/\$98.99
BUTTERNUT HF6V	\$108.29
BUTTERNUT TBR-160HD	\$47.50
BUTTERNUT RMK-11/STR-11	\$37.90/25.50
BUTTERNUT 2MCV/2MVCV-5	\$25.00/\$31.00
MINI-PRODUCTS HQ-1 Mini Quad	\$127.95
B&W 370-15 All Band folded dipole	\$127.67
B&W AT-80 10, 15, 40, 80 mtr trap dipole	\$43.50
LARSEN LM-150-MM 5/8 2mtr mag mnt	\$35.25
ALL OTHER HY-GAIN, HUSTLER, LARSEN AND B&W ANTENNAS IN STOCK AT BIG DISCOUNT. CALL OR WRITE FOR QUOTE.	

STATION ACCESSORIES

Bracher Paddles, black/chrome	\$35.00/\$42.75
DRAKE TV-3300 1kw low pass filter	\$30.60
BMI Clocks 173B digital, 973A analog	\$31.99/\$37.15
SHURE 444D dual imp. mic.	\$47.95
DAIWA Meters 520/540/550	\$59.75/\$68.95/\$76.00
DAIWA Meters 620B/630/720B	\$105.00/\$124.95/\$148.95
DAIWA Tuners 418/518	\$165.99/\$272.95
DAIWA Keyers DK200/210	\$66.98/\$79.20
DAIWA LA2035 30w 2mtr fm, ssb linear	\$69.50
NYE VIKING MBIV-01/02 Tuners	\$297.50/\$330.40
NYE VIKING 3kw low pass filter	\$23.50
TELEX HEADPHONES C1210/1320	\$27.50/\$39.25
TELEX HEADSETS Procom 200/300	\$79.89/72.00
MFJ PRODUCTS	ALL AT BIG DISCOUNT
VOCOM 5/8 2mtr collapsible ant.	\$14.50
VOCOM 2w in 25w out 2mtr amp	\$66.75
VOCOM 2w in 50w out 2mtr amp	\$98.95
KDK-FM 2030 2mtr transceiver	\$269.00
ALPHA DELTA products in stock	call

FAST SERVICE—SAME DAY SHIPPING
SHIPPING CHARGES ADDITIONAL, PA RES. ADD 6%
SALES TAX. PREPAY BY CERT. CHECK OR MO AND
TAKE A 2% DISCOUNT OFF THE ABOVE PRICES.
PRICES SUBJECT TO CHANGE.

PLEASE SEND FOR FREE FLYER.



We Export Anywhere.



LA CUE COMMUNICATIONS
ELECTRONICS

132 Village St. • Johnstown, PA 15902
(814) 536-5500

HOURS M-F 8:30 till 6:00 • SAT 8:30 till 4:00

CIRCLE 23 ON READER SERVICE CARD

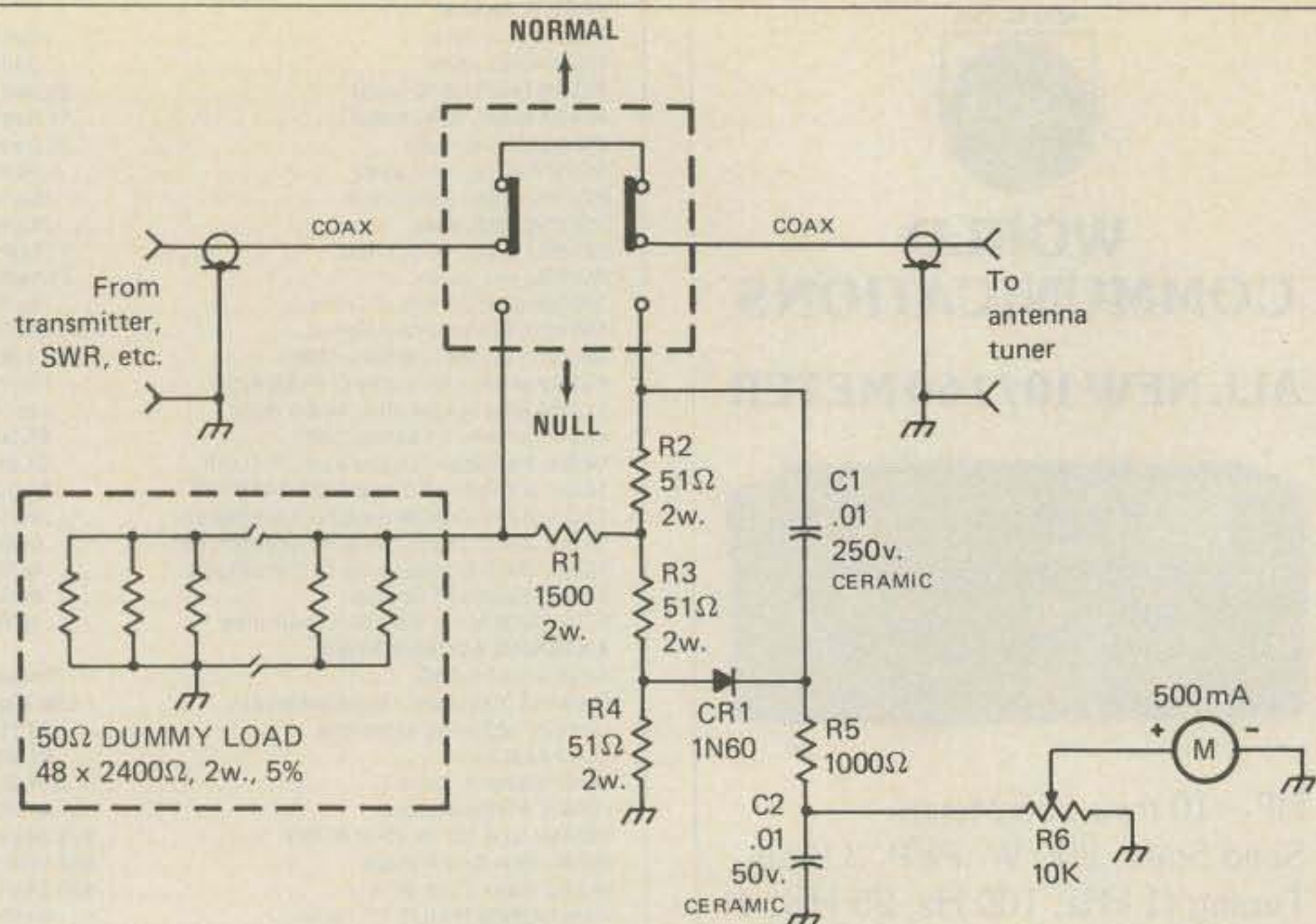


Fig. 2—Schematic diagram of an antenna null meter.

cussions in the *ARRL Solid State Design* book that I came across this idea for "improved" antenna-tuner tuning! I call this little device an Antenna Null Meter.

Fig. 2 shows the diagram for this little wonder box. The heart of the device is a 50 ohm resistive bridge, although it needs a coax switch and a dummy load for our purposes. For convenience sake, I have included the coax switch (a hefty d.p.d.t. toggle switch), the "null bridge," and a 100 watt dummy load in the same enclosure. As I live in an apartment, with the station neatly packed into a drop-front desk, I chose to compact my station as much as possible by combining all these items together. I saved a lot of money, too. However, you may wish to use an external dummy load and coax switch (d.p.d.t. variety) to build your own Antenna Null Meter.

The Antenna Null Meter

The Antenna Null Meter is a simple, highly effective, yet inexpensive device to build. In fact, the entire construction price is only a fraction of the cost of the s.w.r. bridge, coax switch, and dummy load that it replaces. All you need is a simple d.c. meter and a handful of easily obtained parts, which can be scrounged from your junk box or a local radio parts dealer.

The basic purpose of this device is to furnish you with an alternate means of adjusting an antenna tuner—a means that dramatically reduces on-the-air interference problems, protects transmitters and transmitting accessories from mismatch tuner conditions, and reduces the complexity of the tune-up process.

How It Works

Through the Antenna Null Meter's design, the transmitter's output is connected directly to a 50 ohm non-reactive load.

Then a very small portion of this r.f. energy is coupled through a 1500 ohm resistor to a resistive bridge circuit made up of three 51 ohm resistors and the antenna tuner's input impedance. When the antenna tuner is adjusted so that it transforms the antenna's feedline impedance to a pure 50 ohm resistance, the bridge circuit becomes "balanced."

The balance of r.f. currents is monitored on a simple volt meter. The action of balancing the bridge eliminates any potential r.f. voltage differences between the two sides of the meter circuit, in which case the meter will read 0 volts (a perfect null). Obviously, as the antenna tuner is adjusted away from the perfect match condition, the bridge's r.f. currents become unbalanced, which results in a forward-scale deflection of the meter. The more unbalanced the bridge, the higher the meter's deflection. In this manner, the bridge portion of this device indicates when an antenna tuner is properly adjusted.

Construction

You can use any meter movement ranging from 50 microamps to 10 milliamps in this circuit, with the larger current meters giving only a slight decrease in bridge sensitivity. Regardless of your final choice of meter, you should include a sensitivity control to protect its movement from damage during the tune-up process.

R1 through R5, C1, C2, and CR1 should be mounted physically close to the d.p.d.t. switch and with the shortest leads possible. This can be accomplished by mounting them on a 5 lug terminal strip at the switch as shown in fig. 3. The coax connectors and the dummy load are connected to the switch through lengths of RG-8X coax. The d.p.d.t. toggle switch can be any type able to hold approximately 10 amps at 110 v.a.c. The dummy load can be internal or external to the unit.

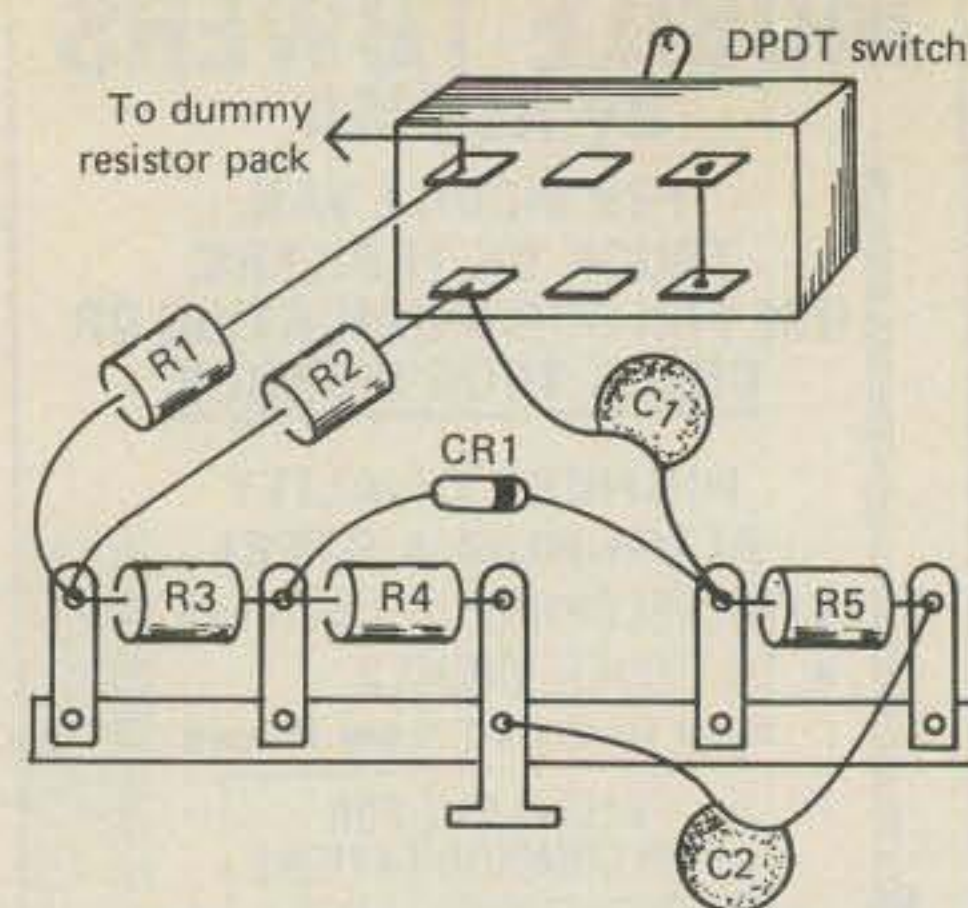


Fig. 3—Partial parts placement detailing the short lead connections of the r.f. bridge components.

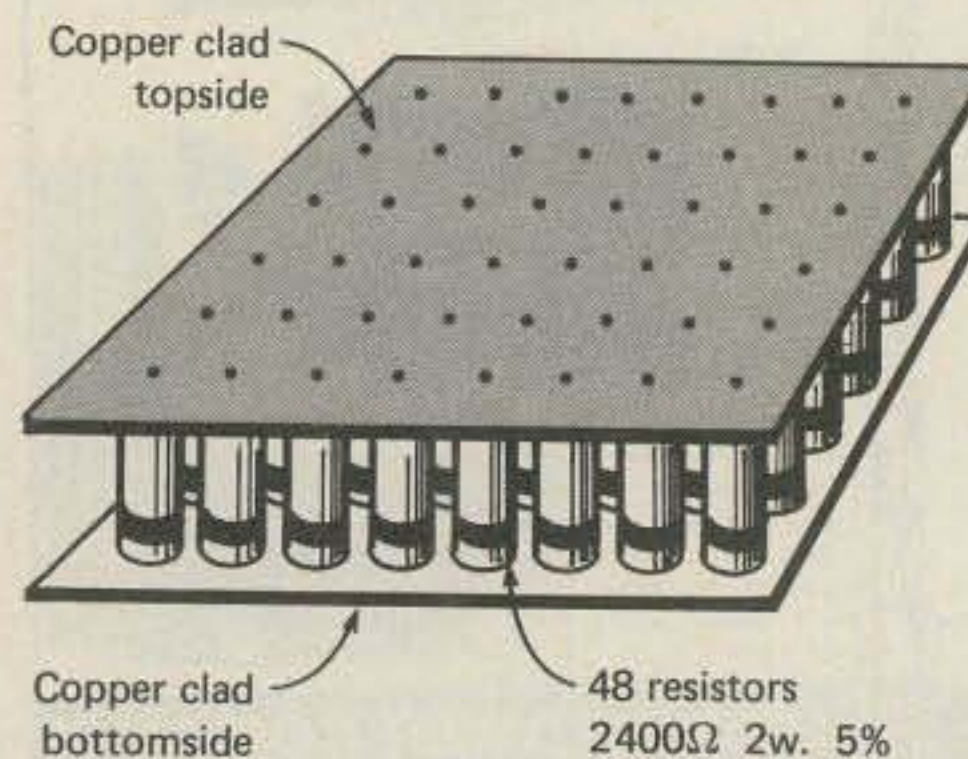


Fig. 4—Construction technique used for the inboard dummy load.

However, building one inside the unit eliminates one more coax from the jumble of cables in your shack.

The dummy load for this unit is made up of forty-eight 2400 ohm 2 watt resistors that are sandwiched together, with air spacing of 1/4 inch, between two identically drilled circuit boards. The resistor ends are mounted flush with the non-clad side of each circuit board. Then the leads are soldered to the foil side and cut. Finally, the finished "sandwich" is mounted to the bottom panel of the cabinet. This keeps the ground connection short, which eliminates stray reactances at the higher r.f. frequencies.

The finished dummy load, shown in fig. 4, is capable of dissipating at least 98 watts of r.f. power. In practice, one of these dummy loads has worked for a year on my TS-520SE, and has never shown any tendency to heat-up. Of course, other combinations of 2 watt resistors could be used. However, this particular choice seemed best for both cost and performance. In fact, the total cost of the resistors and circuit boards was under \$9.00!

Installation and Operation

The Antenna Null Meter (A.N.M.) should be installed directly ahead of the antenna tuner. This particular unit should not be used at power inputs much above 100 watts, although this restriction is primarily a function of the dummy load's size. Once your A.N.M. is installed, you:

1. Select the band and frequency of operation.

2. Turn the A.N.M. switch to the **TUNE** position.

3. Tune the exciter for normal operating power. Remember that even though 99 percent of your r.f. is going to a dummy load, you still must identify your transmissions!

4. Adjust the antenna-tuner controls for a total "null" on the A.N.M.'s meter. You may need to change the sensitivity control while making these adjustments.

5. Switch the A.N.M.'s switch to **NORMAL** and transmit away!

Final Notes

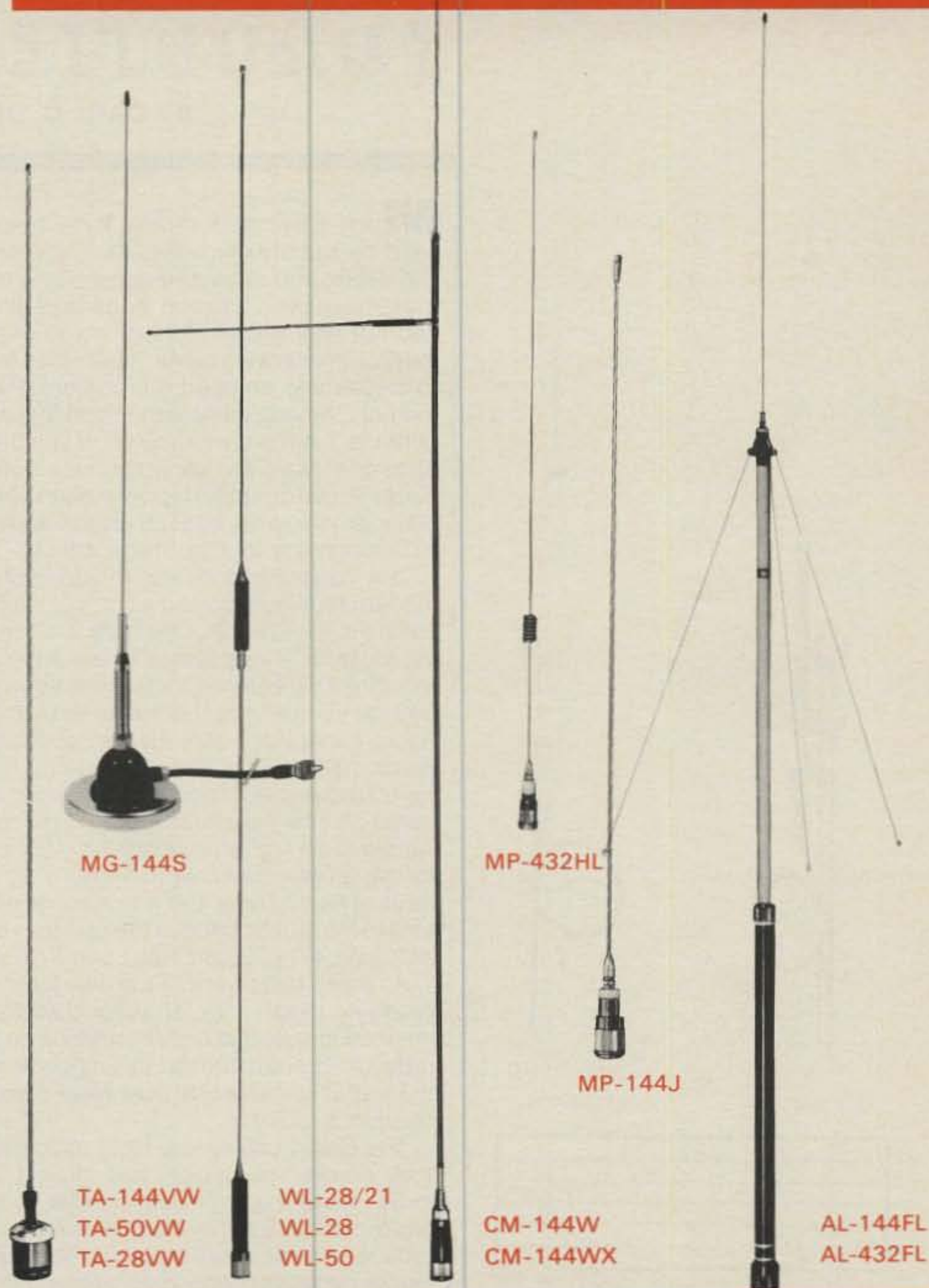
I don't believe that antenna tuners are cure-alls when it comes to antenna/transmitter matching. To the contrary, I believe, like many of you, that the antenna should be matched to the feedline when at all possible, thus presenting a matched 1.0 to 1 condition to the transmitter. However, even in the best of conditions a perfect antenna/feedline match is a function of frequency. Therefore, as you tune above or below the design frequency of your antenna, there is an increasing mismatch between the antenna system and the transmitter. As long as an antenna system to transmitter mismatch is 2.0 to 1 or less, you will have very little trouble loading a tube-type transmitter for maximum output, although the effectiveness of internal and external low-pass filters (TVI fighters) is reduced. However, this is not true with solid state transmitters.

Antenna to transmitter matching is extremely critical for most solid state transmitters, as they are very s.w.r. sensitive, even to the point of cutting their output power by 25 or more percent with a 2.0 to 1 s.w.r. Add to this the fact that many solid state transmitters either break into immediate high-power oscillations or shut-off altogether when operated into a badly mistuned antenna circuit. Therefore, it is important that the antenna/feedline combination show a good match to this type of transmitter, regardless of how far you have tuned from the antenna's design frequency. Unfortunately, this is a job that can only be accomplished with an antenna tuner.

So, you see, whether you have a tube-type or solid state transmitter, antenna tuners can be extremely useful devices. I've used many different types of tuners over the years, although I had never found them to be particularly convenient—at least not until I built my first Antenna Null Meter. Since then antenna tuning has become a cinch. The null meter makes using the tuner easy, and the tuner keeps my transmitter and low-pass filter happy, in which case they last a long, long time, delivering all that communicating power to the ether. And that, my friends, is the name of the game! So use your antenna tuner in good health, and perhaps the next time you are tuning up, we won't hear you.

MAXIMIZERS

NEW



MG-144S

MP-432HL

MP-144J

TA-144VW
TA-50VW
TA-28VW

WL-28/21
WL-28
WL-50

CM-144W
CM-144WX

AL-144FL
AL-432FL

Get the most out of going mobile with KLM's hot new **MAXIMIZER** base/mobile and handi antenna series. Single and multiband models from 21 to 440 MHz deliver **MAXIMUM** coverage and performance without frills or compromise.

MAXIMIZER mobile sampler: TA-series: $1/2\lambda$ whips for 144, 220, and 440 MHz voltage protection.

MG-144S: $1/4\lambda$ monopole with powerful magnet mount.

WL-series: center loaded whips for 28/21, 28 and 50 MHz

MP-432HL: $5/8\lambda + 3/8\lambda$ whip for 432 MHz

CM-series: multiband whips for 15/10/6/2 meters or 10/6/2 meters.

AL-series: high gain $1/4\lambda$ for mobile/handle applications.

There's more! See your KLM dealer or write for a catalog.

KLM Electronics, Inc. P.O. Box 816, Morgan Hill, CA 95037 (408) 779-7363

KLM

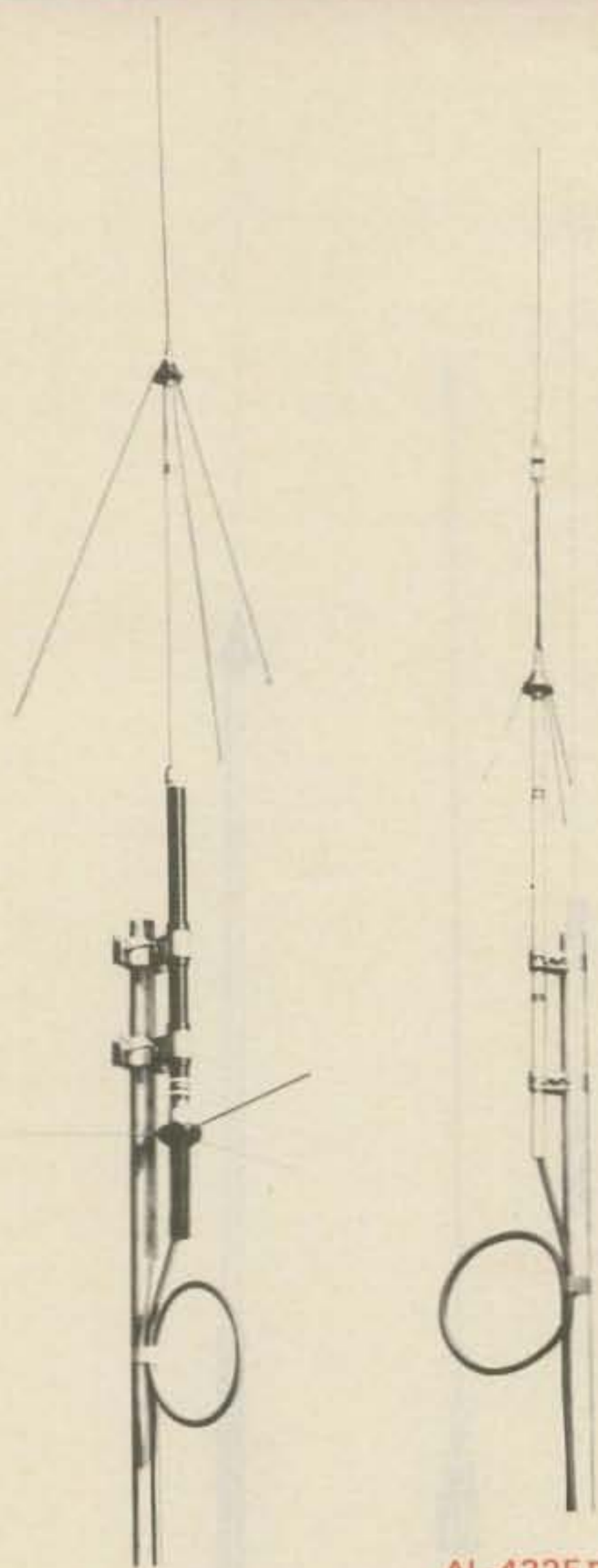
Electronics Inc.

MAXIMIZER**NEW**

W5JJ comes up with a nostalgic morsel that just might be food for a hungry (and inquisitive) mind.

THE FORGOTTEN ANTENNA

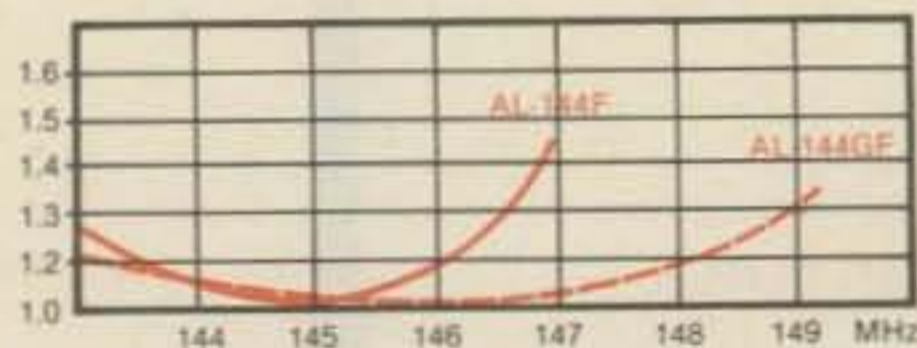
BY CARL C. DRUMELLER*, W5JJ



AL-144GF

AL-432F II

AL-460F II



AL-144GF - $1/2\lambda + 1/4\lambda$ collinear for 2 meters. Supplied with ground plane radial kit to deliver superior performance and full band coverage.

AL-432FL - $5/8\lambda + 5/8\lambda$ collinear base station antenna for 430-440 MHz. Built-in ground plane. Excellent gain, ideal for reaching fringe areas.

KLM

Electronics Inc.

See your KLM Dealer or write for our complete catalog
P.O. Box 816,
Morgan Hill,
California 94035

Many types of antennas have been used by radio experimenters, commercial users, and radio amateurs. Some of these have been adopted for general use and are well known. Others, some with merit, some lacking same, have fallen into disuse and dropped out of sight and memory. Among these is the "condenser antenna." As its name implies, it has the form of a two-plate capacitor with both plates above ground. The lower plate normally is somewhat larger than the upper to compensate for the "fringe effect."

The capacitor antenna, to use more modern terminology, had a flurry of interest in the early 1920s, chiefly as a receiving antenna. It was touted as a competitor of the loop antenna for replacement of outside aerials. A test conducted by the Radio Laboratory, U.S. Bureau of Standards, revealed the loop to be better for lower frequencies (below about one megahertz) and the capacitor type to have advantages on higher frequencies. This information was published in the April 1923 issue of *Radio News* and was made available to the author through the courtesy of Ken Bale, W7VCB, and Ray Long, W5TY.

As these tests were made only for the receiving mode, they left untouched the interesting question of performance as a radiator. There is reason to suspect that the capacitor antenna may have some merit as a radiator.

The Radio Laboratory tests indicated that ohmic resistance and dielectric losses were major limiting factors in its performance. Each of these was easy to reduce to quite small amounts. By making the plates of copper mesh, resistance was dropped to a very low figure. Dielectric losses were kept low by two means. One was to keep material out from between the two plates by supporting the plates from their corners with insulating material (rope, etc.) running out to the supporting posts. The other was to keep the entire structure well above ground to minimize ground losses. It was important, too, to keep the edges of the antenna well removed from buildings, trees, etc.

One description of such an antenna in another magazine (*Popular Radio*) of the

same vintage revealed square plates with a lead-in coming down from the middle of the upper plate and through the center of the bottom plate to the radio equipment immediately below. Although polarization was not mentioned, it is probable that it was vertical, with the actual radiation in the transmitting mode taking place from the vertical lead-in. (This premise is suggested by the functioning of the DDRR antenna.)

The Radio Laboratory version, as illustrated in *Radio News*, showed rectangular plates with leads from both the upper and the lower plates coming off an edge and running to radio equipment sitting alongside the antenna. The rectangular plates, which were 310 cm by 90 cm for the upper and 400 cm by 180 cm for the lower, with 80 cm spacing initially and 120 cm later, did not introduce any directional effects, according to the Bureau of Standards report. There was no mention of how radiation would take place when used as a transmitting antenna and no mention of polarization.

As a general rule, the more interface there is between the conducting surface of a radiator and the surrounding space, the more effective is the radiator. Accepting this premise leads one to believe the capacitor antenna might be an effective radiator. On the other hand, recalling the action of strip-type wave guides would suggest that little energy would extend (be radiated) beyond the dimensions of the (larger) lower plate unless there was great distance between the two plates. Reception experiments indicate that separation of plates has a major bearing on strength of received signals, and it is reasonable to believe that the reciprocal relationship would hold for the transmitting mode.

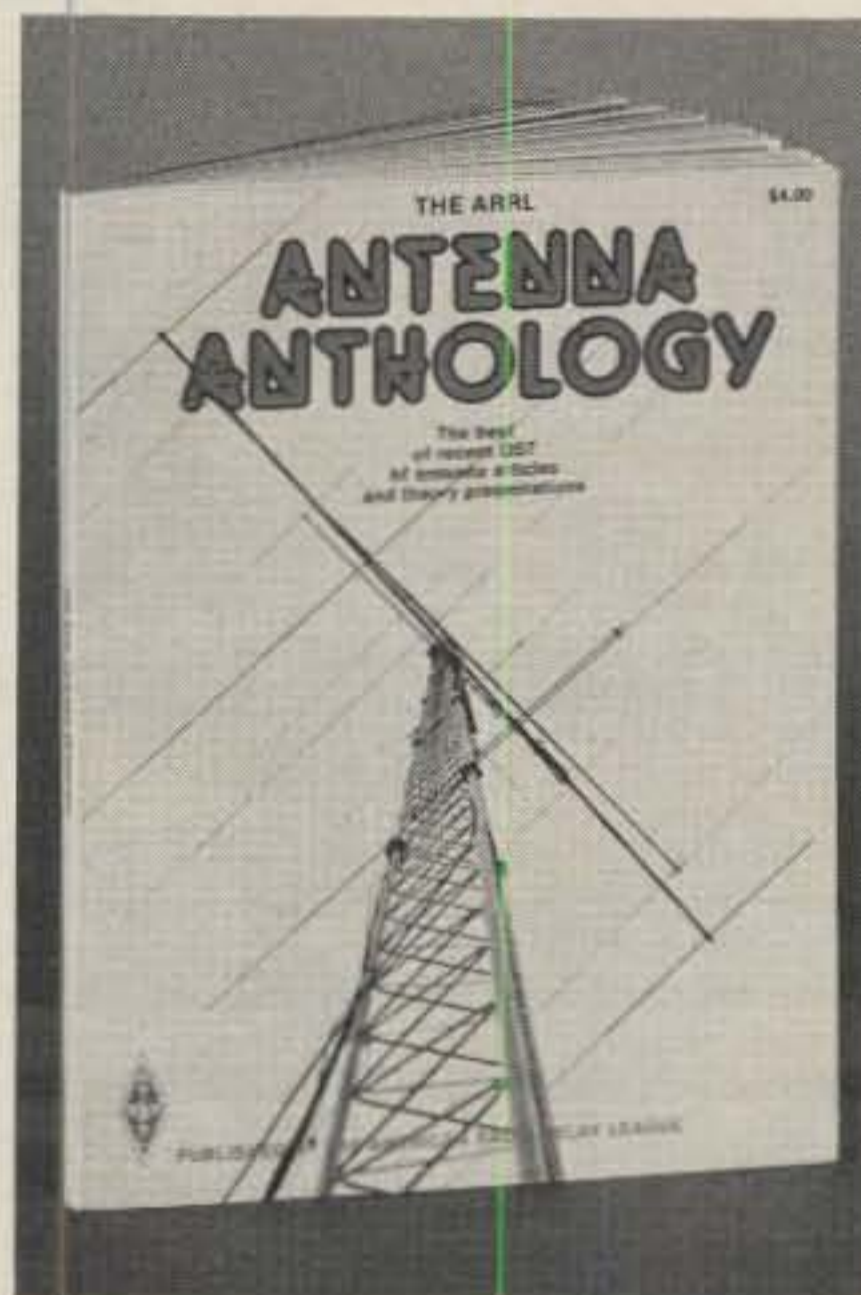
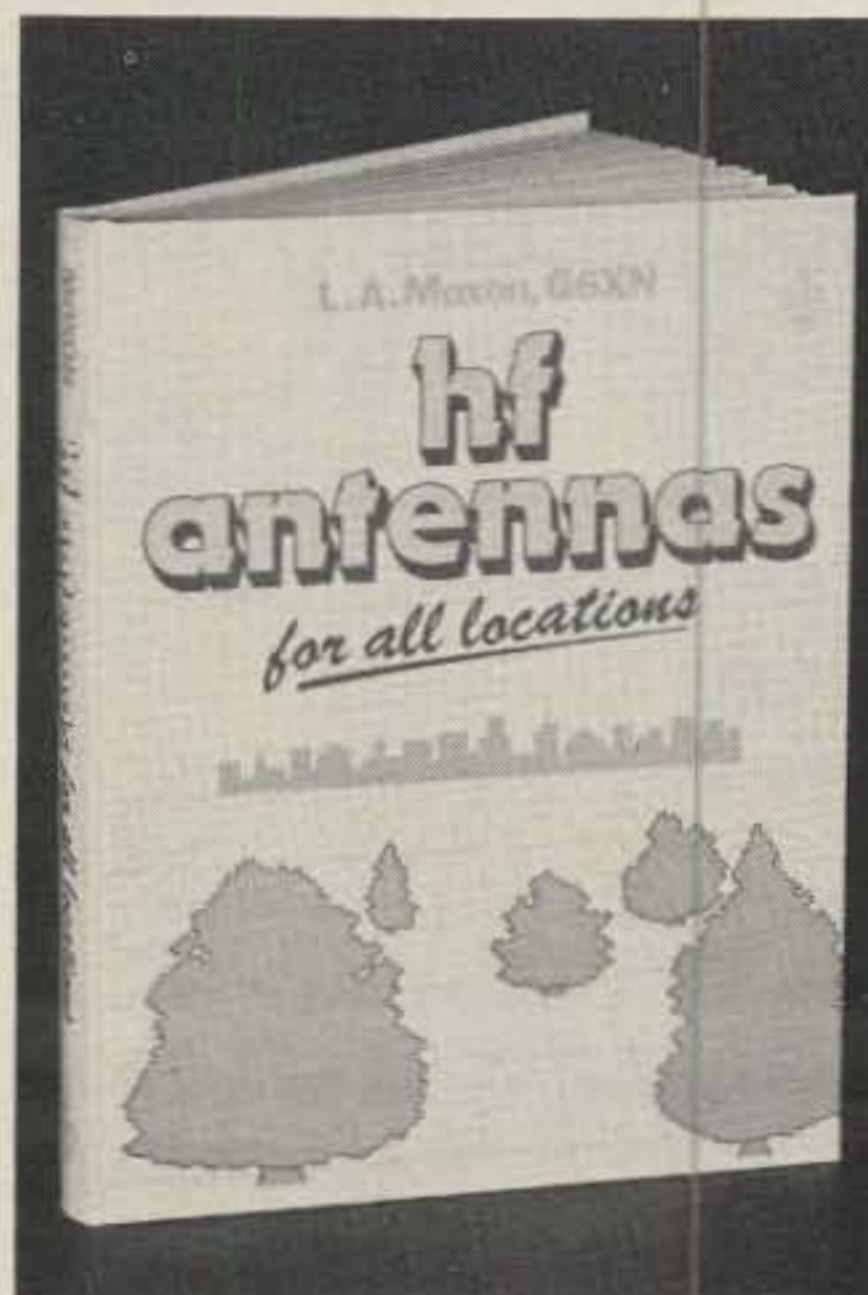
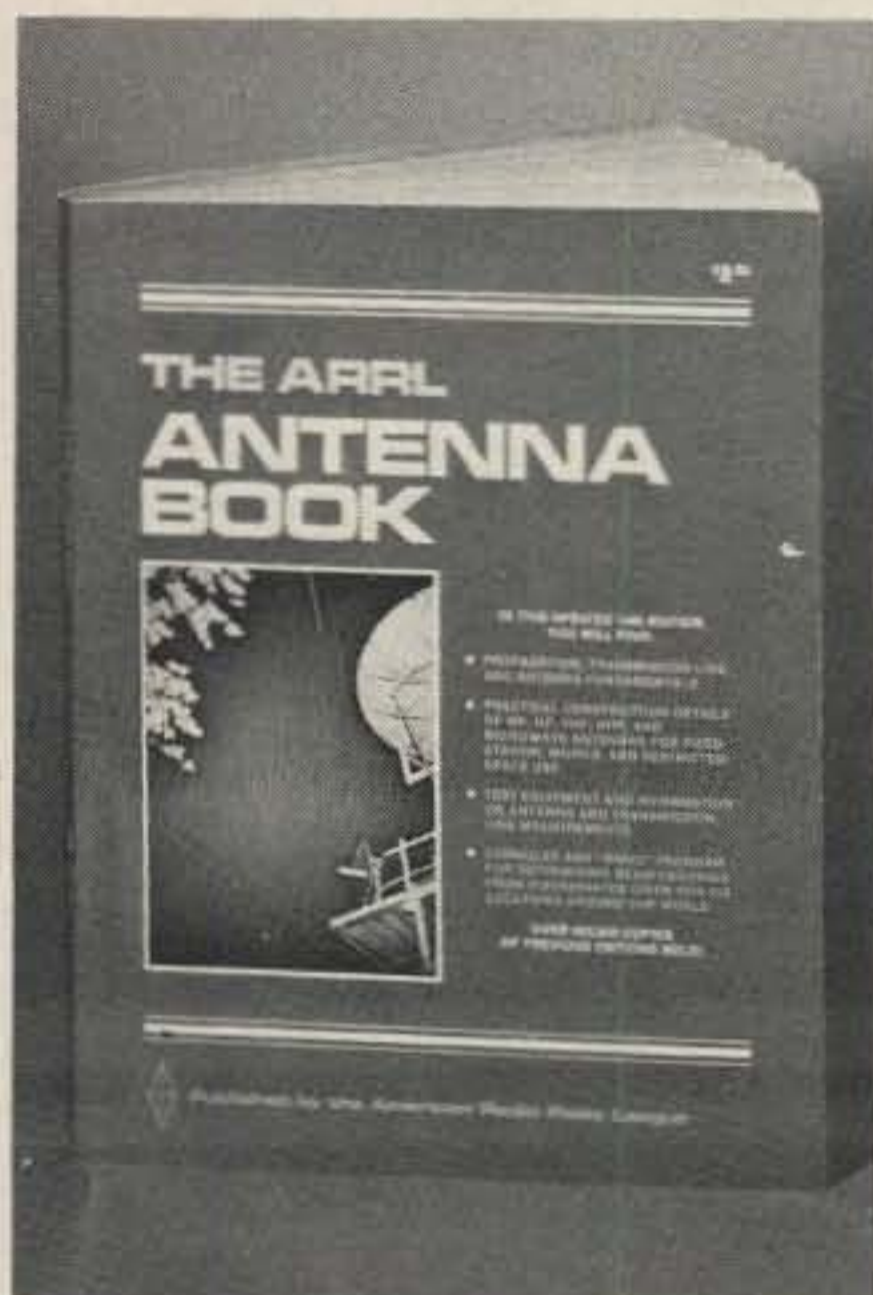
Although the Bureau of Standards report gave numerical values to matters such as resistance (ohmic plus loss) and capacitance, it did not touch on the matter of feed-point impedance. This, of course, would be of prime interest to the modern radio amateur. It remains for some ambitious amateur, one equipped with the time, the space, and the required apparatus, to investigate and to explore not only feed-point impedance but use capabilities. Who knows? Possibly here may be a limited-space antenna worthy of wide acceptance!

*5824 N.W. 58th St., Warr Acres, OK 73122

Please send all reader inquiries directly.

Y BOOKS

"A STATION IS ONLY AS EFFECTIVE AS ITS ANTENNA SYSTEM"



THE ARRL ANTENNA BOOK The best and most up-to-date antenna information around. The just revised 14th Edition contains in its 328 pages propagation, transmission line and antenna fundamentals. You can update your present antenna system with practical construction details of antennas for all amateur bands - 160 meters through microwaves. There are also antennas described for mobile and restricted space use. Tells how to use the Smith chart for making antenna calculations and covers test equipment for antenna and transmission line measurements. Over 600,000 copies of previous editions sold. Paperbound. Copyright 1982. \$8.00 in the U.S., \$8.50 elsewhere.

HF ANTENNAS FOR ALL LOCATIONS by L.A. Moxon, G6XN. An RSGB publication. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, although construction information is also given on a small number of aluminum antennas. Chapters include: Taking a New Look at hf Antennas; Waves and Fields; Gains and Losses; Feeding the Antenna; Close-spaced beams; Arrays, Long Wires, and Ground Reflections; Multiband Antennas, Bandwidth; Antenna Design for Reception; The Antenna and Its Environment; Single-element Antennas; Horizontal Beams; Vertical Beams; Large Arrays; Invisible Antennas; Mobile and Portable Antennas; What Kind of Antenna: Making the Antenna Work; Antenna Construction and Erection. Copyright 1982, 1st Edition, Hardbound \$12.00.

ANTENNA ANTHOLOGY The best QST hf antenna articles and theory presentations. Verticals: 2 and 4 band verticals for the novice, Cheapie GP, High Performance system for 20, 40 and 80, other loaded systems. Yagis: Short antennas, and The Log-Yag Array. Quads: Wire quads for 80 and 40, 2-Element Quad for the Novice, Miscellaneous Antennas: Loops, Delta-loops, Antennas for travel trailers and campers, plus matching devices and antenna test accessories. Copyright 1978, 148 pages. \$4.00 U.S., \$4.50 elsewhere.

Enclosed in U.S. funds drawn on a U.S. bank or an international money order is \$ _____ for the books marked below:

() ARRL Antenna Book
\$8 U.S. \$8.50 elsewhere

() HF Antennas
\$12.00

() Antenna Anthology
\$4 U.S. \$4.50 elsewhere

NAME _____

ADDRESS _____

CITY, STATE OR PROVINCE, ZIP OR POSTAL CODE _____

Charge to my Master Charge Visa _____

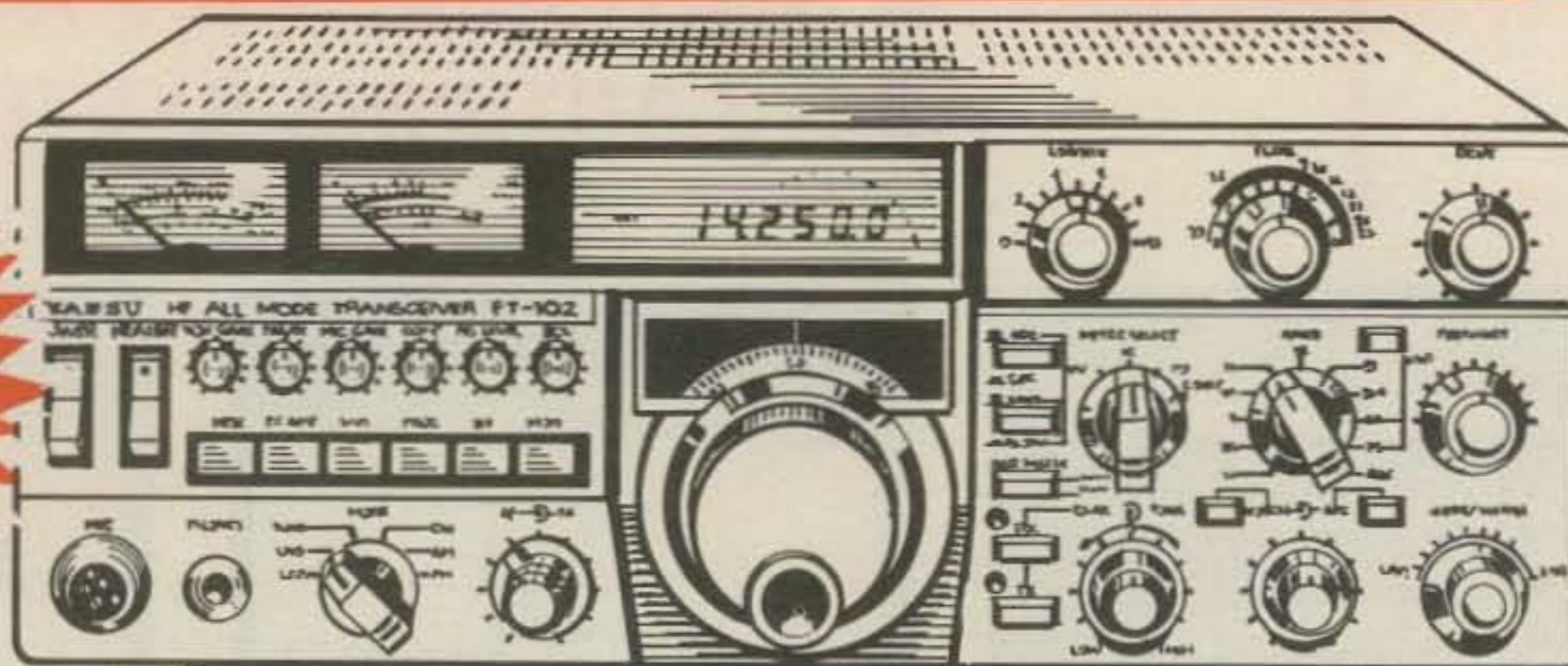
Account number _____ expires _____

A.R.R.L.
225 Main Street
Newington, CT 06111

Bank number (MC) _____ **CQ**

Fantastic buys from Long's!

**\$260
OFF!**



YAESU FT-102 high performance all mode HF transceiver

Top-of-the-line rig at a great price! The FT-102 covers 160-10 meters, including the WARC bands in SSB or CW modes. Also capable of AM/FM operation with optional AM/FM module. Its commercial quality transmitter uses three 6146B tubes for an exceptionally clear signal and the extra-sensitive receiver boasts an extremely wide dynamic range. Other features include variable IF shift/width tuning, adjustable noise blanker level, audio tailoring and built-in speech processor. RF output on SSB/CW: 240W DC. Built-in power supply: 110/117/200/230V AC @ 50/60 Hz.

\$889

List Price 1149.00 Item No. YAEFT102
Add 9.00 shipping & handling

Complete 10 foot satellite TV system **\$1595**

List Price \$4015 Item No. SAT4472
Shipped Motor Freight Collect

What the system does:

Provides your home receiver with up to 60 channels of satellite TV. Movies, news, sports and much more!

What the system includes:

1. Model 43 dish antenna. Constructed of reflective metal bonded with fiberglass. Comes in 4 sections.
2. Polar mount complete with azimuth and elevation adjustments for precise satellite-to-satellite tracking.
3. LNA mount with rotor and remote console for polarity adjustment. Extension tubes not included.
4. KLM SS-22 receiver and downconverter. Downconverter mounts near the LNA. Receiver features LED signal strength indicator, scan and video invert. RF modulator, extra.
5. Amplica ACD-305305 low noise amplifier. Rated at 120° K, uncooled. Uses GaAs FET transistors for maximum performance. Weatherproof, cast aluminum housing.
6. Scalar feed horn. Provides 0.5 dB gain improvement over conventional types. Virtually eliminates system noise.

Note: Interconnecting cables between components not included. Your VCR's RF modulator can be used with this system. Otherwise an RF modulator will be needed (approx. cost, \$59).

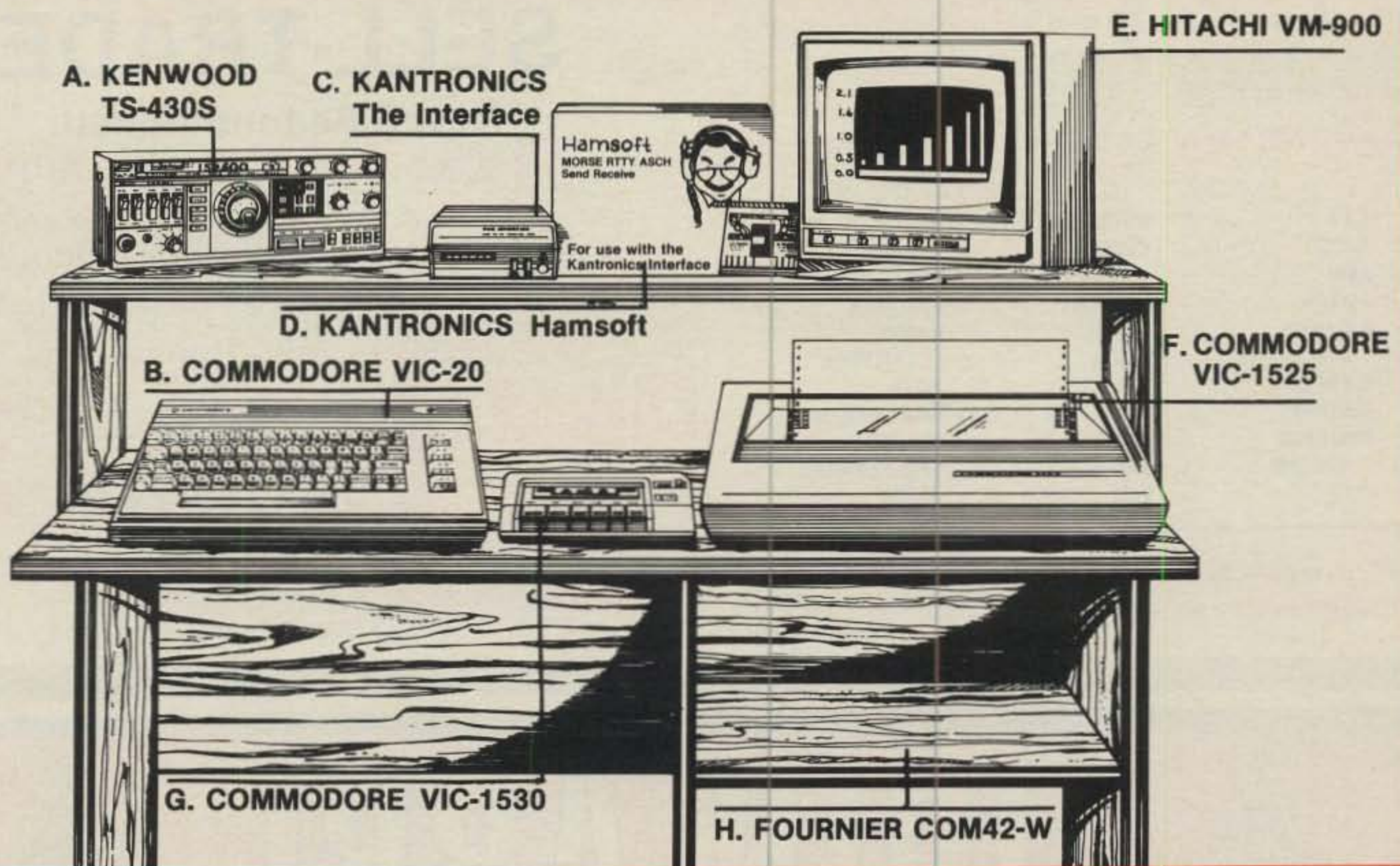


Call
Toll Free **1-800-633-3410**

IN ALABAMA CALL 1-800-292-8668 9 AM TIL 5:30 PM CST, MONDAY THRU FRIDAY

CIRCLE 143 ON READER SERVICE CARD

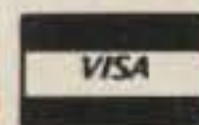
Your complete computer center



Long's has everything you need to set up or complete your personal computer system!

- A. KENWOOD TS-430S** all mode HF transceiver Covers 160-10 meters plus general coverage receive. I.N. KENTS430S. List 899.95 **809.95**
- B. COMMODORE VIC-20** personal computer Full-size typewriter keyboard, built-in BASIC, 5K memory. I.N. COMVIC20. List 299.95 **75.00**
- C. KANTRONICS The Interface** Transceiver-to-computer modem/terminal for RTTY, ASCII and CW. I.N. KANINTERFACE. List 189.95 **170.95**
- D. KANTRONICS Hamsoft** package Hardware/software package for use with The Interface, computer and transceiver. I.N. KANVIC20 **49.95**
- E. HITACHI VM-900** 9" black and white video monitor High resolution picture. High/75 ohm impedance. I.N. HATVM900. List 155.00 **129.95**
- F. COMMODORE VIC-1525** graphic printer Makes paper copies of programs from your Commodore 64/VIC-20. I.N. COMVIC1525. List 399.00 **355.50**
- G. COMMODORE VIC-1530** program recorder Stores programs from Commodore 64/VIC-20 on standard cassettes. I.N. COMVIC1530. List 75.00 **67.50**
- H. FOURNIER COM42-W** deluxe computer console desk Monitor shelf plus storage. Six caster rollers for easy mobility. Dimensions 42"x 21"x 27". I.N. FCFCOM42W. List 89.00 **59.00**

Long's Electronics



MAIL ORDERS: P.O. BOX 11347 B'HAM AL 35202 • ADDRESS: 3131 4TH AVE SO. B'HAM AL 35233

CIRCLE 144 ON READER SERVICE CARD



NEWS BULLETIN

For more than 40 years we have been serving the amateur community with QUALITY PRODUCTS and DEPENDABLE "S-E-R-V-I-C-E" and, we fully intend to carry on this proud tradition with even MORE new product lines plus the same "fair" treatment you've come to rely on. Our reconditioned equipment is of the finest quality with 30, 60 and even 90-day parts and labor warranties on selected pieces. And, remember . . .

"WE SERVICE WHAT WE SELL!"

- | | | |
|-------------|------------|--------------|
| A E A | BUTTERNUT | MFJ |
| AMECO | CUBIC | MIRAGE |
| ARRL | CUSHCRAFT | NYE |
| ASTRON | DENTRON | PALOMAR |
| ANTENNA | DIAWA | RADIO |
| SPECIALISTS | DRAKE | CALLBOOK |
| B & W | HUSTLER | ROHN |
| BENCHER | ICOM | TELEX-HYGAIN |
| BENJAMIN | JANEL | TEN-TEC |
| MICHAEL | KANTRONICS | TRIO-KENWOOD |
| | KLM | YAESU |

Call or write today for free copy of our latest catalog/used equipment list.

CIRCLE 38 ON READER SERVICE CARD

YOUR HAM DOLLAR GOES FURTHER AT . . .



"America's Most Reliable Amateur Radio Dealer"

SELL-TRADE New & Reconditioned HAM EQUIPMENT

Call or Write Us Today For a Quote!
You'll Find Us to be Courteous, Knowledgeable
and Honest



— Phone —
605-886-7314

P.O. Box 73
208 East Kemp
Watertown, SD 57201



JOIN ARRL



BENEFITS FOR YOU: QST, QSL Bureau, Awards (DXCC, WAS, etc.), Low Cost Insurance, Operating Aids, Government Liaison and more—Much more! For You!

USE THIS COUPON OR A FACSIMILE AND MAIL TODAY.

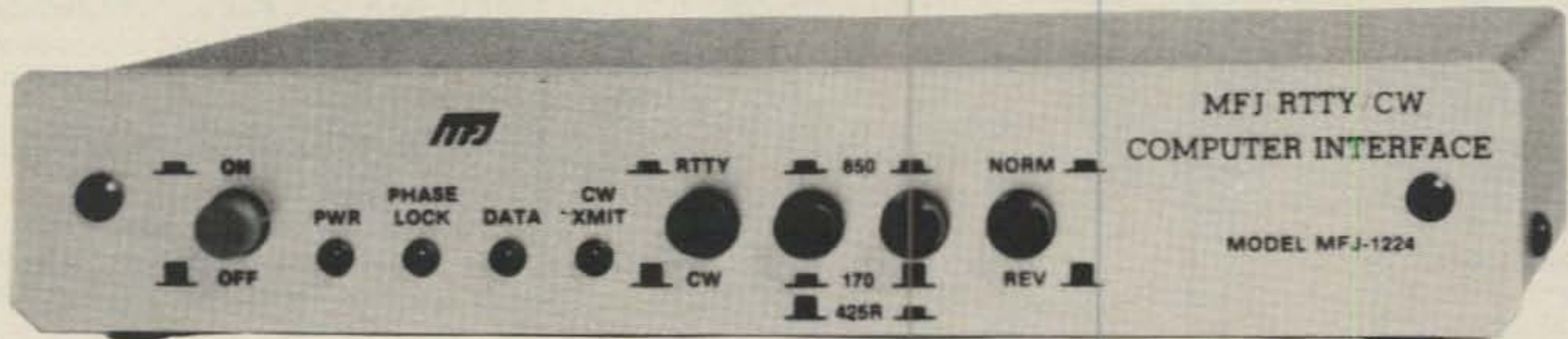
MEMBERSHIP APPLICATION

**The American Radio
Relay League, Inc.
Desk 15
225 Main Street
Newington, CT 06111**

Name _____ Call _____
Street _____
City _____ Prov./State _____ PC/Zip _____
\$25 in U.S./\$30 in Canada/\$33 elsewhere (U.S. funds)
Licensed amateurs, age 17 or under or age 65 or over, upon submitting proof of age, may request the special dues rate of \$20 in the U.S. (\$25 in Canada, \$28 elsewhere, in U.S. funds)
For postal purposes, fifty percent of dues is allocated to QST, the balance for membership.
VISA or Chargex No. _____ Expires _____
Master Card No. _____ Bank No. _____ Expires _____

MFJ RTTY / ASCII / CW COMPUTER INTERFACE

Lets you send and receive computerized RTTY/ASCII/CW. Copies all shifts and all speeds. Copies on both mark and space. Sharp 8 Pole active filter for 170 Hz shift and CW. Plugs between your rig and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 or most other personal computers. Uses Kantronics software and most other RTTY/CW software.



- Copies on both mark and space tones.
- Plugs between rig and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 and most other personal computers.
- Uses Kantronics software and most other RTTY/CW software.

\$ 99⁹⁵
MFJ-1224

This new MFJ-1224 RTTY/ASCII/CW Computer Interface lets you use your personal computer as a computerized full featured RTTY/ASCII/CW station for sending and receiving.

It plugs between your rig and your VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64, and most other personal computers.

It uses the Kantronics software which features split screen display, 1024 character type ahead buffer, 10 message ports (255 characters each), status display, CW-ID from keyboard, Centronic type printer compatibility, CW send/receive 5-99 WPM, RTTY send/receive 60, 67, 75, 100 WPM, ASCII send/receive 110, 300 baud plus more.

You can also use most other RTTY/CW software with nearly any personal computer.

A 2 LED tuning indicator system makes tuning fast, easy and positive. You can distinguish between RTTY/CW without even hearing it.

Once tuned in, the interface allows you to copy any shift (170, 425, 850 Hz and all shifts between and beyond) and any speed (5 to 100 WPM on RTTY/CW and up to 300 baud on ASCII).

Copies on both mark and space, not mark only or space only. If either the mark or space is lost the MFJ-1224 maintains copy on the remaining tone. This greatly improves copy under adverse conditions.

A sharp 8 pole active filter for 170 Hz shift and CW allows good copy under crowded, fading and weak signal conditions. Uses FET input op-amps.

An automatic noise limiter helps suppress static

crashes for better copy.

A Normal/Reverse switch eliminates retuning while stepping thru various RTTY speeds and shifts.

The demodulator will even maintain copy on a slightly drifting signal.

A +250 VDC loop output is available to drive your RTTY machine. Has convenient speaker output jack.

Phase continuous AFSK transmitter tones are generated by a clean, stable Exar 2206 function generator. Standard space tones of 2125 Hz and mark tones of 2295 and 2975 Hz are generated. A set of microphone lines is provided for AFSK out, AFSK ground, PTT out and PTT ground.

FSK keying is provided for transceivers with FSK.

High voltage grid block and direct outputs are provided for CW keying of your transmitter. A CW transmit LED provides visual indication of CW transmission. There is also an external hand key or electronic keyer input jack.

In addition to the Kantronics compatible socket, an exclusive general purpose socket allows interfacing to nearly any personal computer with most appropriate software. The following TTL compatible lines are available: RTTY demod out, CW demod out, CW-ID input, +5 VDC, ground. All signal lines are buffered and can be inverted using an internal DIP switch.

For example, you can use Galfo software with Apple computers, or RAK software with VIC-20's. Some computers with some software may require some external components.

DC voltages are IC regulated to provide stable

AFSK tones and RTTY/ASCII/CW reception.

Aluminum cabinet. Brushed aluminum front panel. 8x1 1/4x6 inches. Uses 12-15 VDC or 110 VAC with optional adapter, MFJ-1312, \$9.95.

RTTY/ASCII/CW Receive Only SWL Computer Interface



\$ 69⁹⁵
MFJ-1225

Use your personal computer to receive commercial, military and amateur RTTY/ASCII/CW traffic.

The MFJ-1225 automatically copies all shifts (850, 425, 170 Hz shift and all others) and all speeds.

It plugs between your receiver and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 and most other personal computers.

It uses Kantronics software which features CW receive 5-99 WPM, RTTY receive 60, 67, 75, 100 WPM, and ASCII receive 110, 300 baud, plus more.

An automatic noise limiter helps suppress static crashes for better copy, while a simple 2 LED tuning indicator system makes tuning fast, easy and positive.

In addition to the Kantronics compatible socket, a general purpose socket provides RTTY out, RTTY inverted out, CW out, CW inverted out, ground and +5VDC for interfacing to nearly any personal computer with most appropriate software.

Audio in, speaker out jacks. 4 1/2x1 1/4x4 1/4 in. 12-15 VDC or 110 VAC with adapter, MFJ-1312, \$9.95.

ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT DELIGHTED, RETURN WITHIN 30 DAYS FOR PROMPT REFUND (LESS SHIPPING).

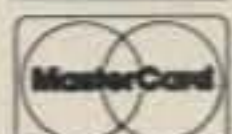
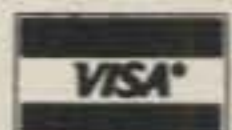
- One year unconditional guarantee • Made in USA.
- Add \$4.00 each shipping/handling • Call or write for free catalog, over 100 products.

MFJ

MFJ ENTERPRISES, INC.
Box 494, Mississippi State, MS 39762

TO ORDER OR FOR YOUR NEAREST DEALER, CALL TOLL-FREE

800-647-1800. Call
601-323-5869 in Mississippi and out-
side continental U.S.A. Telex 53-4590.



CIRCLE 126 ON READER SERVICE CARD

ALL ITEMS ARE
GUARANTEED OR SALES
PRICE REFUNDED.
PRICES F.O.B.
HOUSTON
PRICES SUBJECT TO
CHANGE WITHOUT
NOTICE.
ITEMS SUBJECT TO
PRIOR SALE.

MADISON Electronics Supply



Houston COM-VENTION '83
The 1983 ARRL
National
Oct. 7-9, 1983
Astro Village Hotel

- KDK 2030 25W 2M FM**
Super reliable! \$259.00
- BOOKS, BOOKS, BOOKS -**
Bash, Radio Pub., TAB,
Callbooks, Gilfer, RTTY, SAMS,
Rider, ARRL, AMECO - Our
shelves are full!
- CUSHCRAFT R3/A4** 229.00
- MFJ 1224 Interface** 79.95
- JSC 450 Ohm ladderline** . .20/ft.
RG8x Silver14/ft.
- KANTRONICS Software** . 10% off
- AEA CP1** 199.95
- JERSEY SPECIALTY**
- RG21329/ft.
- ALLIANCE HD73** 99.95
- ICOM 25H**
- 45W, 2M FM 349.00
- YAESU FT77** 539.00
- FV101DM (limited) 150.00
- SP101 (limited) 20.00
- FT208RA Call
- ALPHA DELTA &
SHERWOOD** 10% off list
- ANTECO 5/8 2M**
- Mag Mnt Ant-Complete .. 25.00
- SOLAR POWER**
- Corp. Modules Call
- MFJ 496 Keyboard** 269.00
- HAL CT2200** 829.00
- MPT3100** 2449.00
- 12' screen 189.00

See you at the
ARRL Delta Division Con.
at the Civic Center
August 13 & 14

- BENCHER** Single lever
paddles New Item
- Black 39.95
- Chrome 49.95
- TOKYO HYPOWER**
- HL160V 3-10
- in/160-180 out 299.00
- HC2000 Tuner 299.00
- FOXTANGO** Filters 10% off. Call
- KANTRONICS** Interface .. 139.95
- PRO-AM** Mobile
- whips 75M to 10M .. 20.00 ea.
- SIGNAL ONE** One
- Mil Spec (good trades) 4995.00
- HAL MPT3100/**
- Message unit 2449.00
- ST5000 219.00
- ST6000 649.00
- ETO** Alpha 77DX 3775.00
- 77SX Export Call
- WELZ** Meters 10% off
- DRAKE** TR7A/RV75 ... 1700.00
- ICOM** IC 751 and IC271 Call

We will open and inspect
all equipment at your
request. Accessories
purchased will be installed
and tested without charge.

**IF IT'S
NOT LISTED,
CALL ME!!**

ROBOT

- 1200C SSTV \$1139.00
- 450C 789.00
- 800C/800CH 789.00
- 400C Conversion Kit 469.00
- 800C Conversion Kit 155.00

Big LCD Clock

GMT/Local twin display, black frame with
large, easy-to-read display (.6" high)
Batteries included. \$29.95 + \$1.50 shipping.

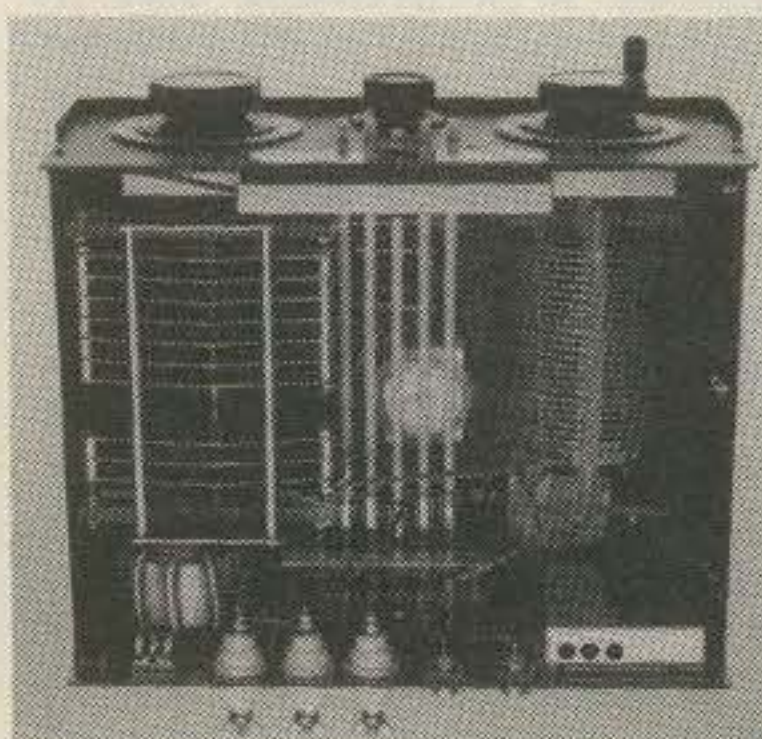


HAM TAGS

\$12.95 + \$1.50 shipping



NYE MB-V Deluxe Tuner



List \$485.00 **Madison \$435.00**

COMPUTERS + RADIO = RTTY/MORSE

- #1 **AEA** CP1, Kantronics Interface,
VIC 20 Hamsoft and computer with
cables to fit your VIC 20 radio
\$325.00
- #2 Above package with **HAMTEXT**
\$375.00
- #3 **MFJ 1224**, Kantronics Hamsoft,
VIC 20 and the cables for your
radio. \$225.00

DON'S CORNER: We will do warranty work, no
matter where it was bought. That might not be
real bright, but it's friendly, and where would we
be without friends. Speaking of which . . . Do
you get any calls or remarks about TVI/RFI?
We have several good books on the subject
from ARRL, Orr. First, DON'T PANIC!!
Ground systems are the most frequent
culprit. Be sure you're not running parallel to
the tx line. No? Check for inductance coupling
with fences, rain gutters, etc. Go step by step.
Need help? Call our regular number for advice.
YOU ARE NOT UNIQUE, and we might help.

New HAL MPT 3100 ASR



The MPT3100 software may be added to any
DS3100 ASR with MSO3100 hardware package.
There are three new operating modes:

STORE: Up to 32,000 characters. All rec'd text is
stored. Each message has seq. number ID. Time-
Date data automatically.

EDIT: Edit any or all in storage. ID's altered to
fit tx sequence. Custom code insertion (i.e. ID).
Subdivide files.

RELAY: All changes and edits can be stored. TX
can have quick-break feature for direct ASR TX.
Non-destructive.

PLUS A LOT MORE . . . Call us!

**1508 McKINNEY
HOUSTON, TEXAS 77010**

***CALL FOR QUOTES
713-658-0268**

**We stock what we advertise, and much more.
TOLL FREE - ORDERS ONLY
1-800-231-3057**

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Military Radio Frequency Transmission Lines

The transmission line between the station equipment and antenna is very important. This feedline carries the transmitter's radio frequency (r.f.) output to the antenna; it also brings signals from the antenna to the receiver portion of the station. Attenuation (loss) in the feedline causes a reduction in the signal transmitted from the antenna. Of more importance, feedline loss can make it difficult (or impossible) to have a contact with a very weak station. Use good feedline to have optimum results. Using a high-loss feedline at one's station is like running your car on kerosene and mothballs.

The list accompanying this column provides basic technical information on all existing transmission lines identified by RG/U and the newer M17 designations. Most of these cables are coaxial, but there are other types such as triaxial and waveguide. Most of the information in this list is extracted from Military Specification MIL-C-17E (dated 12 July 1974), updated through Amendment 3 of 12 February 1982, General Specification for Flexible and Semirigid Radio Frequency Cables. The explanations in the following paragraphs can help you select proper transmission lines for your applications.

Transmission-line cables are presently being manufactured with 13 types of outer protective jackets, although 3 types are no longer used in new cable designs. They are also made using 24 types of dielectrics, with 6 types no longer used in new cable designs. Type I and IIA jackets are most common to our applications.

Type I low-temperature plasticized polyvinylchloride (PVC) jackets are used on cables of older design. Some Type I jackets are vinyl-acetate copolymer. Type I jackets have a plastisizer (extender) incorporated during their manufacture to improve cable flexibility. Cable flexibility is satisfactorily maintained by this method, but the extender migrates through the shield braid and attacks the insulation surrounding the center conductor. The insulation deteriorates and the radio frequency losses increase. The lifespan of this kind of coax, before losses become high, is only about two years from the date of manufacture, and old coax of this type is no bargain at any price.

Type IIA non-contaminating medium / low-temperature plasticized synthetic resin protective (black) jackets are used



The 1982-83 Radio Club members. Four of the six are Novices in this new club and are working on their General tickets. Sponsor L.K. Woods is at right.



This shows a typical noontime scene in the classroom. While these students listen in to a c.w. contact, others are practicing code using tape recorders.



Here are Gerry Fink, KA7NQX; Tracey Mader, KA7NQW; Joe Kalus, KA7NRG; and Scott Madsen, KA7NRH. All four are in the 11 to 13 year age bracket, and they are members of the Clear Creek Middle School Amateur Radio Club in Buffalo, Wyoming. Larry Woods, KC7HL, provides a hands-on introduction to amateur radio for his sixth and seventh grade students. The classroom station includes a Kenwood TS-530S transceiver with an automatic keyer; their antenna is a 5-band vertical. They hope to expand their station to include SSTV (Slow-Scan TV) and RTTY (radioteletype) next year. The students paid for all station equipment and accessories by conducting fund raisers. They have contacted 65 countries and most states. They operate before and after school, plus lunch times. Several new Novices are in process in this club, and the four current Novices are hoping to upgrade to General soon. FCC examinations are just conducted two times per year in their area, and the test site is not in Wyoming. It appears that Larry is doing an excellent job of using amateur radio to increase learning interest on the part of his students; at the same time, he is making it easier for other amateurs to contact Wyoming.

on newer cables such as RG-213/U (RG-8/U replacement). This jacketing has a long service life, is abrasion resistant, and is not damaged by sunlight. These Type IIA jackets do not contain an extender which would contaminate the insulation surrounding the center conductor. Cables with Type IIA jackets can be buried for underground use. These cables have a minimum service life of about 20 years, and they usually cost no more than those with Type I jacketing. Type II jackets were also made from a non-contaminating synthetic resin. Type II jack-

ets are similar to Type IIA jackets but they are gray, not black.

RG-8/U has not been manufactured to military specifications since November of 1969, and individual cable manufacturers now produce their own versions of RG-8/U, which are sometimes not a good value. The braided shield on cheapened cables is usually reduced to the point where any bend in the cable causes an undesirable gap to open in the sparse shielding. Inadequate shielding results in unacceptable r.f. leakage, even at relatively low frequencies and power levels.

2814 Empire Ave., Burbank, CA 91504

This leakage is worse when one of these cables is used at higher frequencies and power levels. It is not advisable to use cables which are not manufactured to current military specifications, *unless* you specifically know that they meet your requirements. These commercial equivalent cables are sometimes less efficient, but they are just as expensive as their superior counterparts. It has recently become common to see cheap coax with aluminum shielding in lieu of the usual copper braid. This aluminum shielding is usually found on cables sold with connectors already attached. There is no satisfactory way to solder to aluminum, and users of this kind of cable are forced to use crimp-type connectors when these cables are cut.

Manufacturers' specifications would seem to indicate that coax with foamed insulation is better than coax with the usual solid insulation. Foamed coax has a higher velocity of propagation and less loss when comparing specifications. However, these foamed coaxial cables may not be as good as they appear to be at first glance. Many of these foam insulations are not gas impregnated and moisture accumulates in the air bubbles. This moisture accumulation changes the velocity of propagation, alters the characteristic impedance, and increases r.f. attenuation in foamed cables. There is another practical disadvantage to foamed cables: they are physically more susceptible to damage at bend points. When using a cable with foam insulation, one must exercise extreme care to avoid mechanical bending stress.

In summary, use coaxial cables which are manufactured to current military

specifications and which have Type II or Type IIA jackets. Do not use coax with (non-gas) foamed insulation and Type I jackets. The better coaxial cables usually cost no more than their less useful counterparts. It is often easier to use RG-58C/U in lieu of RG-213/U for the various short interconnections required in the station. RG-58C/U is smaller, cheaper, and more flexible than RG-213/U. However, RG-58C/U has about twice as much loss as RG-213/U, so it should not be used for long transmission lines, such as between the station and an outside antenna.

The better known "RG" cable designations are listed first in this list followed by the newer "M17" cables. The part number of every "RG" cable has been changed to an "M17" number, and most have been superseded by a new "M17" number following the initial change. The first change resulted in a coaxial cable such as RG-213/U being re-identified as M17/74-RG213. The second change resulted in M17/74-RG213 being superseded by M17/163-00001, and this latter number is the new correct identification of this cable. However, it is realized that the older numbers will be seen and used for several years. In this example (M17/163-00001), M17 refers to the basic specification (MIL-C-17), /163 is the sheet number in that specification (163), and the 00001 is the number of the cable in that group (issued in sequence).

If you need additional information, you can request it from coaxial cable manufacturers such as:

Amphenol Cable Division
2122-T South York Road
Oak Brook, IL 60521

Belden Corporation, Electronic Div.
2000 South Batavia Avenue
Geneva, IL 60134

Cablewave Systems, Inc.
60 Dodge Avenue
North Haven, CT 06473

Champlain Cable Corporation
West Canal Street
Winooski, VT 05404

Columbia Electronic Cables
New Bedford, MA 02744

Dearborn Wire and Cable Company
9299 Evenhouse Avenue
Rosemont, IL 60018

Essex, Telecommunications Products Div.
1601 Wall, Department 2-R
Fort Wayne, IN 46804

ITT Suprenant
172 Sterling Street
Clinton, MA 01510

National Wire and Cable Corporation
136 San Fernando Road
Los Angeles, CA 90031

Phalo Corporation
530 Boston Turnpike
Shrewsbury, MA 01545

Pirelli Cable Corporation
2 Tower Drive
Wallingford, CT 06492

Plastoid Corporation
Gingerbread Castle Road
Hamburg, NJ 07419

Precision Tube Company, Inc.
Wissahickon and Church
North Wales, PA 19454

Standard Wire and Cable Company
2345 Alaska Avenue
El Segundo, CA 90245

Teledyne Thermatics
P.O. Drawer 505
Elm City, NC 27822

Tensolite Division, Carlisle Corporation
Old Post Road, Route 9A
Buchanan, NY 10511

Thermax Wire Corporation
32-02 Linden Place
Flushing, NY 11354

Thermofil, Limited
Industrial Zone
Maalot, Israel

Times Fiber Communications, Inc.
358 Hall Avenue, P.O. Box 384
Wallingford, CT 06492

Uniform Tubes, Incorporated
200 West 7th Avenue
Collegeville, PA 19426

The purpose of each column of the cable list is as follows:

An asterisk (*) preceding a cable designation (RG/U) indicates that the cable is known to have the preferred Type II or Type IIA outer protective jacket.

The **RG/U** column shows just the basic transmission-line numbers in sequence. As an example, RG-58C/U is listed as 58C. R, G, and U represent Radio Frequency Transmission Line (R), Government Designation (G), and Universal Application (U).

The **Ohms** column lists the characteristic impedance (if applicable) shown in the associated military specification. Cable

RTTY RADIOTELETYPE FREQUENCY LISTS

2000 WORLDWIDE RADIOTELETYPE STATIONS by FREQUENCY... press, air, military, government, diplomatic, all utilities with calls, times, plus other information 3 to 30 MHZ. \$12 POSTPAID

World Press Services Frequencies & Manual. All press services, frequencies and transmission times. BOOK with 3 LISTS...\$8 ppd.

UNIVERSAL ELECTRONICS
1280 AIDA DR. • REYNOLDSBURG, OH 43068

CIRCLE 149 ON READER SERVICE CARD

"Bare Power Supply Boards"

(FOR ALL TO-220 3 TERMINAL REGULATORS)

"Four Styles In Stock"

- 7800 Positive Fixed
- 7900 Negative Fixed
- 317T Positive Adjustable
- 337T Negative Adjustable

All Boards 2"x3" - 610
Silk Screened - Soldermasked
Make Projects A Snap!
Includes: Detailed Instructions
Parts Lists-Schematics-Design Tips

\$2.50 ea. - 4 for \$9.00 add \$1.00 postage & handling

MIDWEST TECHNICAL
P.O. BOX 272, AURORA, IL 60507

CIRCLE 19 ON READER SERVICE CARD

APPLE] [™
VIC 20™
BAUDOT - ASCII - MORSE



TU II. Complete computer interface. Sends and receives RTTY and CW. Assembled and tested (less cables) **\$124.95**

VIC 20 adapter cable **\$9.95**

VIC 20 RTTY/CW cassette (requires 8K memory expansion) **\$29.95**

APPLE "Ham Radio Communications Package" by C.H. Galfo **\$29.95**

APPLE "Super-Ratt" with Radio Bulletin Board System, Verified File Transfer, Selcall, etc. **\$59.95**

Write for kit information and prices.

Add 5% for shipping. Washington residents add sales tax. VISA/MC include expiration date.

HRA ELECTRONICS, Dept. C, P.O. Box 571, Hoodspport, WA 98548

CIRCLE 68 ON READER SERVICE CARD

manufacturers often show a different value and this is okay as long as their stated impedance falls within the specified allowable tolerance. As an example, RG-213/U is listed as 50 ohms with a tolerance of 2 ohms; consequently, a manufacturer can list their RG-213/U as being any characteristic impedance between 48 and 52 ohms.

The **Tol.** column lists the characteristic impedance tolerance allowed, whenever it is known. Unless otherwise stated, each tolerance can be assumed to be plus or minus.

The **Cap./ft.** column lists the typical capacitance between the inner conductor and the outer shield.

The **Velocity Factor** column gives the relationship between a full wavelength in free space and a full wavelength of coaxial cable. For example, in free space a full wavelength at 7.15 MHz is 137.66 feet. A full wavelength of RG-8/U would be 137.66 times the velocity factor (.659), or 90.72 feet. This information is useful in certain applications for phasing antennas.

The **10 MHz** column lists the typical attenuation (in decibels) at 10 megahertz per every 100 feet of transmission line. The number to the right is the power-handling capability (in watts) at 10 MHz. Cable manufacturers may rate their cables at better values than the specification requires.

The **400 MHz** column lists the typical attenuation (in decibels) at 400 megahertz per every 100 feet of transmission line. The number to the right is the rated minimum power-handling capability at 400 MHz. Cable manufacturers may rate their cables at lower loss levels and higher power-handling capabilities than the specification requires. Remember that power is approximately doubled or halved by each 3 dB change; this means that a 100 foot length of cable with an attenuation of 6 dB at 400 MHz cannot be expected to deliver more than 25 watts to the load (antenna) when 100 watts of 400 MHz power is supplied to its input from the transmitter.

The **Comment** column contains amplifying information. *Inactive* in the comment column means the cable is inactive for new design use.

Notes

Since the r.f. currents flowing through coaxial cable flow along the outer surface of the inner conductor (the GO line) and the inner surface of the outer conductor (the RETURN line), each coax acts like a waveguide above some critical frequency.

Regardless of which cable you select, remember to avoid sharp bends and to minimize mechanical stress on your cables. Sharp bends can displace the center conductor closer to the shield, and this lowers the characteristic impedance of the cable.

RG/U	Ohms	Tol.	Cap./ft. (in pF)	Velocity Factor	10 MHz dB	10 MHz Watts	400 MHz dB	400 MHz Watts	Comment
1	—	—	—	—	—	—	—	—	Waveguide
2	—	—	—	—	—	—	—	—	Waveguide
3	—	—	—	—	—	—	—	—	Waveguide
4	50	2	—	—	1.40	650	—	—	Superseded by 58B
5	52.5	2	—	—	0.83	1500	6.5	200	Superseded by 5A
*5A	50	2	—	—	0.83	1500	6.5	200	Superseded by 5B
*5B	50	2	29.5	.659	0.83	1500	6.5	200	Superseded by M17/73-RG212
*6	75	3	—	—	0.83	1500	6.5	200	Superseded by 6A
*6A	75	3	20.0	.659	0.83	1500	6.5	200	Superseded by 6B
6B	75	3	—	—	0.83	1500	6.5	200	Superseded by M17/2-RG006
7	97	3	—	—	0.66	3500	6.0	300	—
8	52	2	29.5	.659	0.66	3500	6.0	300	Superseded by 8A
*8A	52	2	29.5	.659	0.66	3500	6.0	300	Superseded by 213
*9	51	2	—	—	0.66	2700	6.1	300	Superseded by 9A
*9A	51	2	29.5	.659	0.66	2700	6.1	300	Superseded by 9B
*9B	50	2	30.0	.659	0.66	2700	6.1	300	Superseded by 214
*10	52	2	—	—	0.66	3500	6.0	300	Superseded by 10A
*10A	52	2	29.5	.659	0.66	3500	6.0	300	Superseded by 215
11	75	3	20.5	.659	0.66	2500	5.2	250	Superseded by 11A
*11A	75	3	20.5	.659	0.66	2500	5.2	250	Superseded by M17/6-RG011
*12	75	3	—	—	0.66	2500	5.2	250	Superseded by 12A
*12A	75	3	20.5	.659	0.66	2500	5.2	250	Superseded by M17/6-RG012
13	74	3	—	—	0.66	2500	5.7	250	Superseded by 13A
*13A	74	3	20.5	.659	0.66	2500	5.7	250	Superseded by 216
*14	52	2.5	—	—	0.41	6000	3.1	480	Superseded by 14A
*14A	52	2.5	29.5	.659	0.41	6000	4.3	480	Superseded by 217
15	75	3	—	—	0.66	2500	—	—	Superseded by 12A/11A
16	52	2	—	—	—	—	—	—	Good to 1 GHz
*17	52	2	—	—	0.24	14000	2.8	1100	Superseded by 17A
*17A	52	2	29.5	—	0.24	14000	2.8	1100	Superseded by 17B
*17B	50	2	—	—	0.24	14000	2.8	1100	Superseded by 177
*18	52	2	—	—	0.24	14000	2.8	1100	Superseded by 18A
*18A	52	2	29.5	.659	0.24	14000	2.8	1100	Superseded by 219
*19	52	2	—	—	0.17	25000	2.3	1500	Superseded by 19A
*19A	52	2	29.5	.659	0.17	25000	2.3	1500	Superseded by 220
*20	52	2	—	—	0.17	25000	2.3	1500	Superseded by 20A
*20A	52	2	29.5	.659	0.17	25000	2.3	1500	Superseded by 221
*21	53	2	—	—	4.40	340	33.0	60	Superseded by 21A
*21A	53	2	—	—	4.40	340	33.0	60	Superseded by 222
22	95	5	—	—	1.20	1700	9.5	150	Superseded by 22A
*22A	95	5	—	—	1.20	1700	9.5	150	Superseded by 22B
*22B	95	5	—	—	1.20	1700	6.8	150	Superseded by M17/15-RG022
23	125	5	—	—	0.40	—	5.2	—	Superseded by 23A
*23A	125	5	—	—	0.40	—	5.2	—	Superseded by M17/16-RG023
24	125	5	—	—	0.40	—	5.2	—	Superseded by 24A
*24A	125	5	—	—	0.40	—	5.2	—	Superseded by M17/16-RG024
25	48	4	—	—	—	—	—	—	Superseded by 25A
25A	48	4	—	—	—	—	—	—	HV Pulse Cable
26	48	4	—	—	—	—	—	—	Superseded by 26A
26A	48	4	—	—	—	—	—	—	Armored Pulse Cable
27	48	4	—	—	—	—	—	—	Superseded by 27A
27A	48	4	—	—	—	—	—	—	HV Pulse Cable
28	48	4	—	—	—	—	—	—	Superseded by 28A
28A	50	4	—	—	—	—	—	—	Superseded by 28B
28B	48	4	—	—	—	—	—	—	Pulse Cable
29	53.5	2	—	—	1.35	1150	8.8	160	Superseded by 58C
30	58	2	—	—	1.35	1150	8.8	160	Superseded by 58C
31	51	2	—	—	0.66	3500	5.5	300	Superseded by 213
32	51	2	—	—	0.66	3500	5.5	300	Superseded by 215
33	51	2	—	—	0.66	3500	—	—	—
34	71	3	—	—	0.32	7200	3.8	650	Superseded by 34A
*34A	75	3	—	—	0.32	7200	3.8	650	Superseded by 34B
*34B	75	3	20.0	.659	0.32	7200	3.8	650	Good to 1 GHz
*35	71	3	—	—	0.24	13500	2.8	1500	Superseded by 35A
*35A	75	3	—	—	0.24	13500	2.8	1500	Superseded by 35B
*35B	75	3	20.5	.659	0.24	13500	2.8	1500	Armored 164
36	69	3	—	—	—	—	—	—	Good to 1 GHz
37	52.5	2	—	—	1.25	730	—	—	Superseded by 58C
38	52.5	2	—	—	0.83	1500	—	—	Superseded by 212
39	72.5	3	—	—	0.83	1500	—	—	Superseded by 6B/59B
40	72.5	3	—	—	0.83	1500	—	—	Superseded by 6B
41	67.5	—	—	—	—	—	—	—	—
*42	78	—	—	—	—	—	—	—	Superseded by 222
43	95	—	—	—	—	—	—	—	Superseded by 130
44-47	—	—	—	—	—	—	—	—	Stud-Supported
48-53	—	—	—	—	—	—	—	—	Waveguide
54	58	—	—	—	0.92	1580	7.0	200	Superseded by 54A
54A	58	—	—	—	0.92	1580	7.0	200	Good to 1 GHz
55	53.5	2.5	28.5	.659	1.35	800	11.7	90	Superseded by 55A
*55A	50	2	29.5	.659	1.35	800	11.7	90	Superseded by 55B
*55B	53.5	2.5	28.5	.659	1.35	800	11.7	90	Superseded by 223
56	48	—	—	—	—	—	—	—	Pulse Cable
57	95	5	—	—	0.65	3000	8.8	350	Superseded by 57A
*57A	95	5	—	—	0.65	3000	8.8	350	Superseded by 130
58	53.5	—	28.5	.659	1.25	730	10.0	85	Superseded by 58A
58A	50	2	29.5	.659	1.40	650	14.0	75	Superseded by 58B
*58B	53.5	—	—	—	1.25	730	10.0	85	Superseded by 58C
*58C	50	2	29.5	.659	1.40	650	14.0	75	Superseded by M17/28-RG058
59	73	3	21.0	.659	1.10	1200	9.0	135	Superseded by 59A
*59A	75	3	—	—	1.10	1200	9.0	135	Superseded by 59B

RG/U	Ohms	Tol.	Cap./ft. (ln pF)	Velocity Factor	10 MHz		400 MHz		Comment
					dB	Watts	dB	Watts	
131	95	5	—	—	0.65	3000	8.8	350	Armored 130
132	—	—	—	—	—	—	—	—	Waveguide
133	95	5	—	—	—	—	5.7	64	Superseded by 133A
*133A	95	5	—	—	—	—	5.7	64	Superseded by M17/100-RG133
134	185	—	—	—	—	—	—	—	Bead-Supported
135-139	—	—	—	—	—	—	—	—	Waveguide
140	75	3	—	—	1.2	5700	8.0	1100	Superseded by 302
141	50	2	—	—	1.20	5700	9.0	1100	Superseded by 141A
141A	50	2	—	—	1.20	5700	9.0	1100	Superseded by 303
142	50	2	—	—	1.20	5700	11.7	1100	Like 55
142A	50	2	—	—	1.20	5700	11.7	1100	High Temp 55A
142B	50	2	—	—	1.20	5700	11.7	1100	Superseded by M17/60-RG142
143	50	2	—	—	0.85	8700	6.0	2000	Like 5
143A	50	2	—	—	0.85	8700	6.0	2000	Superseded by 304
144	75	3	—	—	0.60	17000	4.5	2800	Hi Temp 11A
145	75	—	—	—	—	—	—	—	—
146	190	10	—	—	—	—	—	—	Cancelled
147	52	—	—	—	0.17	25000	2.3	1500	Cancelled
148	52	—	—	—	—	—	—	—	Armored 8
*149	75	3	—	—	0.88	1900	10.0	—	Superseded by 391
*150	75	—	—	—	0.88	1900	10.0	—	Superseded by 392
151	50	—	—	—	—	—	—	—	Bead-Supported
152	50	—	—	—	—	—	—	—	Bead-Supported
153	50	—	—	—	—	—	—	—	Bead-Supported
154	50	—	—	—	—	—	—	—	Bead-Supported
155	50	—	—	—	—	—	—	—	Bead-Supported
*156	50	4	—	—	—	—	—	—	Cancelled
*157	50	4	—	—	—	—	—	—	Cancelled
*158	25	2.5	—	—	—	—	—	—	Cancelled
159	50	2	—	—	1.20	5700	9.0	1100	Superseded by 142
160	125	5	—	—	—	—	—	—	Superseded by 160A
160A	125	5	—	—	—	—	—	—	Superseded by 264
161	70	2	—	—	5.30	350	21.0	150	Miniature
162	175	—	—	—	—	—	—	—	Bead-Supported
163	—	—	—	—	—	—	—	—	Waveguide
*164	75	3	20.5	.659	0.24	13500	2.8	1500	Unarmored 35B
165	50	2	—	—	0.60	15000	5.0	2500	Superseded by M17/65-RG165
166	50	2	—	—	0.60	15000	5.0	2500	Armored 165
167-173	—	—	—	—	—	—	—	—	Waveguide
174	50	2	30.0	.659	3.90	170	20.0	25	Miniature
*174A	50	2	—	—	3.90	350	20.0	25	Superseded by M17/119-RG174
175	—	—	—	—	—	—	—	—	Bead-Supported
176	2400	240	—	—	—	—	—	—	Cancelled
*177	50	2	30.0	.659	0.24	14000	2.8	1100	Superseded by M17/160-00001
178	50	2	—	—	5.60	640	29.0	100	Superseded by 178A
178A	50	2	—	—	5.60	640	29.0	100	Superseded by 178B
178B	50	2	—	—	5.60	640	29.0	100	Superseded by M17/93-RG178
179	75	3	—	—	5.30	350	21.0	150	Superseded by 179A
179A	75	3	—	—	5.30	350	21.0	150	Superseded by 179B
179B	75	3	—	—	5.30	350	21.0	150	Superseded by M17/94-RG179
180	93	5	—	—	3.30	2000	17.0	400	Superseded by 180A
180A	95	5	—	—	3.30	2000	17.0	400	Superseded by 180B
180B	95	5	—	—	3.30	2000	17.0	400	Superseded by M17/95-RG180
*181	125	5	—	—	—	—	6.0	—	Cancelled
*182	125	5	—	—	—	—	—	—	Superseded by 160
183	50	—	—	—	0.18	14000	1.2	2100	—
184	—	—	—	—	—	—	—	—	Waveguide
*185	2000	—	—	—	—	—	—	—	Time Delay Cable
*186	1000	—	—	—	—	—	—	—	Time Delay Cable
187	75	3	—	—	5.30	350	21.0	150	Superseded by 187A
187A	75	3	—	—	5.30	350	21.0	150	Superseded by 179B
188	50	2	—	—	6.00	770	20.0	240	Superseded by 188A
188A	50	2	—	—	6.00	770	20.0	240	Superseded by 316
189	50	—	—	—	0.20	20000	1.5	1500	Superseded by 389
190	50	4	—	—	—	—	—	—	Cancelled
191	25	2.5	—	—	—	—	—	—	Cancelled
192	12.5	—	—	—	2.00	—	—	—	Pulse Cable
193	12.5	—	—	—	2.00	—	—	—	Pulse Cable
194	12.5	—	—	—	2.00	—	—	—	Pulse Cable
195	95	3	—	—	3.30	2000	17.0	400	Superseded by 195A
195A	95	3	—	—	3.30	2000	17.0	400	Superseded by 180B
196	50	2	—	—	5.60	640	29.0	100	Superseded by 196A
196A	50	2	—	—	5.60	640	29.0	100	Superseded by 178B
197	50	—	—	—	0.14	18000	0.93	2800	Semi-Rigid
198	70	—	—	—	0.23	6800	1.7	1100	—
199	70	—	—	—	0.17	15000	0.87	2400	—
200	70	—	—	—	0.07	42000	0.51	5800	—
201-208	—	—	—	—	—	—	—	—	Waveguide
209	50	+2/-3	—	—	0.32	47000	2.85	10000	Cancelled
210	93	5	—	—	0.90	1300	8.0	125	—
211	50	2	—	—	0.25	66000	2.3	10000	Superseded by 211A
211A	50	2	—	—	0.25	66000	2.3	10000	Superseded by M17/72-RG211
*212	50	2	29.5	.659	0.83	1500	6.5	—	Superseded by M17/73-RG212
*213	50	2	30.5	.659	0.66	3500	5.5	300	Superseded by M17/74-RG213
*214	50	2	30.5	.659	0.66	2700	5.5	300	Superseded by M17/75-RG214
*215	59	2	30.5	.659	0.66	3500	5.5	300	Superseded by M17/74-RG215
*216	75	3	20.5	.659	0.66	2500	5.2	250	Superseded by M17/77-RG216
*217	50	2	30.0	.659	0.41	6000	4.3	480	Superseded by M17/165-00001
*218	50	2	30.0	.659	0.24	14000	2.75	1200	Superseded by M17/166-00001
*219	50	2	30.0	.659	0.24	14000	2.75	1200	Armored 218

LISTEN UP!

Here's what you've been looking for — an all new hard-hitting monthly magazine which gives a unique insider's view of what's really going on in the world of communications. POP'COMM is your primary source of information — bigger and better than any communications magazine, with exciting coverage of scanners, shortwave broadcast & utility stations, spy stations, pirate and clandestine broadcasters, RTTY monitoring, survivalist communications systems, FCC news, wiretapping and bugging, scrambling/unscrambling, surveillance/undercover communications, satellite & cable TV, sophisticated telephones, & more. What you've been looking for all along! Take advantage of substantial savings over the newsstand price by subscribing now. Don't miss out on even one single issue of POPULAR COMMUNICATIONS — order your subscription now.

Twelve Issues \$12

POPULAR COMMUNICATIONS

76 N. Broadway, Hicksville, NY 11801

Yes! The NEW POPULAR COMMUNICATIONS is just the magazine I've been looking for. Start sending it to me now! I understand that I may cancel at any time for any reason, and receive a full refund on my unused subscription.

1 Year (12 issues) \$12.00
 Newsstand price \$21.00

2 Years (24 issues) \$22.00
 Newsstand price \$42.00

3 Years (36 issues) \$32.00
 Newsstand price \$63.00

Paid by: Check Money Order MasterCard Visa
 My account number is:

Name _____
 Street _____
 City _____ State _____ Zip _____

Canada/Mexico — one year \$14.00, two years \$26.00, three years \$38.00; Foreign — one year \$16.00, two years \$30.00, three years \$44.00; Foreign Air Mail — one year \$69.00, two years \$136.00, three years \$203.00.

RG/U	Ohms	Tol.	Cap./ft. (in pF)	Velocity Factor	10 MHz		400 MHz		Comment
					dB	Watts	dB	Watts	
*305	75	—	—	—	—	—	—	—	Like 298
*306	75	2	—	—	0.15	15000	1.3	1700	Superseded by 306A
*306A	75	2	—	—	0.15	15000	1.3	1700	Cancelled
*307	75	4	—	—	1.20	1300	7.5	130	Superseded by 307A
*307A	75	4	—	—	1.20	1300	7.5	130	Superseded by M17/116-RG307
*308-315	—	—	—	—	—	—	—	—	Unassigned
*316	50	2	—	—	6.00	770	20.0	240	Superseded by M17/113-RG316
*317	95	5	—	—	—	—	8.0	—	—
*318	50	—	—	—	0.12	22000	0.8	4300	—
*319	50	—	—	—	0.12	48000	0.44	7000	Superseded by 319A
*319A	50	—	—	—	0.12	48000	0.44	7000	—
*320	—	—	—	—	—	—	—	—	Waveguide
*321	50	—	—	—	0.04	90000	0.3	13000	—
*322	50	—	—	—	0.04	90000	0.3	13000	—
*323	50	—	—	—	0.15	17000	1.2	2100	—
*324	50	—	—	—	0.15	17000	1.2	2100	—
*325	50	—	—	—	0.36	3800	3.0	340	Flexible
*326	50	—	—	—	0.24	11000	1.8	720	Flexible
*327	50	—	—	—	0.16	23500	1.4	1400	Flexible
*328	25	2.5	—	—	—	—	0.4	—	Good to 3 GHz
*329	50	4	—	—	—	—	0.4	—	Good to 3 GHz/Inactive
*330	50	—	—	—	—	—	—	—	—
*331	50	1	—	—	0.23	8500	2.3	1000	—
*332	50	1	—	—	0.15	17000	1.2	2100	—
*333	50	1	—	—	0.15	17000	1.2	2100	—
*334	75	2	—	—	0.25	6600	1.9	860	—
*335	75	2	—	—	0.25	6600	1.9	860	—
*336	75	2	—	—	0.15	15000	1.3	1700	—
*337-359	—	—	—	—	—	—	—	—	Waveguide
*360	50	1	—	—	0.19	12000	1.5	1600	—
*361	—	—	—	—	—	—	—	—	—
*362	—	—	—	—	—	—	—	—	—
*363	—	—	—	—	—	—	—	—	—
*364	—	—	—	—	—	—	—	—	—
*365	50	2	—	—	0.66	2700	5.5	300	Superseded by M17/164-00002
*366	50	—	—	—	0.27	7800	1.8	1000	—
*367	50	—	—	—	0.35	250000	2.3	35000	—
*368	—	—	—	—	—	—	—	—	—
*369	50	—	—	—	0.34	4300	2.4	35000	—
*370	50	—	—	—	0.34	4300	2.4	35000	—
*371	—	—	—	—	—	—	—	—	Buoyant Cable
*372	—	—	—	—	—	—	—	—	Buoyant Cable
*373	—	—	—	—	—	—	—	—	Buoyant Cable
*374	—	—	—	—	—	—	—	—	Buoyant Antenna
*375	—	—	—	—	—	—	—	—	Waveguide
*376	50	—	—	—	0.15	17000	1.2	2100	—
*377	50	—	—	—	0.28	16000	1.9	2300	—
*378	50	1	—	—	0.07	1800	0.17	—	Semi-Rigid
*379	—	—	—	—	—	—	—	—	Waveguide
*380	—	—	—	—	—	—	—	—	Waveguide
*381	—	—	—	—	—	—	—	—	Waveguide
*382	50	—	—	—	—	—	—	—	Rigid
*383	100	—	—	—	—	—	—	—	Buoyant Twisted Pair
*384	50	—	—	—	—	—	—	—	Buoyant Antenna
*385	50	—	—	—	0.26	70000	21.0	7000	—
*386	—	—	—	—	—	—	—	—	Buoyant Antenna
*387	—	—	—	—	—	—	—	—	—
*388	50	—	—	—	0.41	6000	4.3	480	Moistureproof
*389	50	—	—	—	0.20	20000	1.5	1500	Flexible
*390	—	—	—	—	—	—	—	—	—
*391	72	3	—	—	0.88	1900	15.0	—	Superseded by M17/126-RG391
*392	72	3	—	—	0.88	1900	15.0	—	Superseded by M17/126-RG392
*393	50	2	—	—	0.60	15000	5.0	2500	Superseded by M17/127-RG393
*394	—	—	—	—	—	—	—	—	—
*395	—	—	—	—	—	—	—	—	—
*396	—	—	—	—	—	—	—	—	—
*397	50	—	—	—	0.60	15000	5.0	2500	—
*398	—	—	—	—	—	—	—	—	—
*399	—	—	—	—	—	—	—	—	—
*400	50	2	—	—	1.20	5700	9.6	1100	Superseded by M17/128-RG400
*401	50	0.5	—	—	0.85	8600	6.0	2000	Superseded by M17/129-RG401
*402	50	1	—	—	1.20	5700	8.0	1100	Superseded by M17/130-RG402
*403	50	1	—	—	5.60	640	29.0	100	Superseded by M17/131-RG403
*404	50	2	—	—	5.60	640	29.0	100	Superseded by M17/132-RG404
*405	50	1.5	—	—	5.60	640	14.0	300	Superseded by M17/133-RG405
*M17/2-RG006	75	3	—	—	0.83	1500	6.5	200	Video
*M17/6-RG011	75	3	—	—	0.66	2500	5.2	250	Good to 1 GHz
*M17/6-RG012	75	3	—	—	0.66	2500	5.2	250	Armored
*M17/15-RG022	95	5	—	—	1.2	1700	6.8	150	Twin Axial
*M17/15-RG111	95	5	—	—	1.2	1700	6.8	150	Armored 22B
*M17/16-RG023	125	5	—	—	0.40	—	5.2	—	Twin Axial
*M17/16-RG024	125	5	—	—	0.40	—	5.2	—	Armored 23A
*M17/19-RG025	48	4	—	—	—	—	—	—	HV Pulse Cable
*M17/21-RG026	48	4	—	—	—	—	—	—	Armored Pulse Cable
*M17/22-RG027	48	4	—	—	—	—	—	—	HV Pulse Cable
*M17/22-00001	48	4	—	—	—	—	—	—	Unarmored 27A
*M17/23-RG028	48	4	—	—	—	—	—	—	Pulse Cable

LEARNING THE MORSE CODE?

Try the All New
AEA BT-1
Basic Trainer For
Morse Code



AEA, in conjunction with ETS (Educational Technology and Services)*, has developed the BT-1 Code Trainer. ETS methodology, based upon research by a prominent mid-west university, has demonstrated that a typical student using this system and the BT-1 can learn Morse code to speeds of 20 WPM in four weeks based upon two 20 minute daily training sessions.

The pre-programmed BT-1 computerized trainer will allow you to achieve proficiency in Morse code faster than any other known method.

No prior knowledge of Morse code is required to use the BT-1. There are no tapes to purchase or wear out. The BT-1 operates from a 12 VDC source or from the AEA 117 Vac wall adapter unit, AC-2. For portable use the BT-1P is available with Nicad batteries and comes with a charger that operates from 117 Vac. The unit can also be used in mobile settings via the 12 VDC system.

*Education Technology & Services, see page 81, October 1981 issue of Ham Radio Magazine.

Prices and Specifications Subject To Change Without Notice or Obligation.

G.I.S.M.O.
800-845-6183

**1039 LATHAM STREET
ROCK HILL, S.C. 29730**

**Service Department
Call 803-366-7158**

**AEA Brings you the
Breakthrough!**

CIRCLE 78 ON READER SERVICE CARD

ENJOY COMFORTABLE LISTENING



PSK-1 POWER SPEAKER

Now you can enjoy plenty of transceiver audio without having to turn your hand-held volume control up so far it goes into distortion. The PSK-1 features a powerful 2 1/2 watt (output) 20 db audio amplifier that will interface with virtually any communication receiver speaker output jack. Experience the luxury of distortion-free room filling audio from your hand-held transceiver even in a noisy mobile environment.

The PSK-1 is housed in an attractive case that would also decorate any base station. Power can be obtained from any 12 VDC source capable of 500 mA.

Prices and Specifications subject to change without notice or obligation.

ADVANCED ELECTRONIC APPLICATIONS, INC.

P.O. Box C-2160,
Lynnwood, WA 98036
(206) 775-7373
Telex: 152571 AEA INTL

AEA Brings you the Breakthrough!

CIRCLE 30 ON READER SERVICE CARD

TET ANTENNA SYSTEMS

"THE PERFECT MATE FOR YOUR SOLID-STATE"

FEATURES

- Dual-Drive For Total Broadband
- Machined Aluminum Boom-To-Mast And Element Mounts
- Lightweight Yet Rugged
- Excellent Gain & F/B Balun (Non Ferrite) Included
- All Elements Active
- Stainless Steel Electrical Hardware Included
- Air Dielectric Coaxial Trap Capacitors
- Precision Machined Aluminum Alloy
- Easy One Afternoon Assembly
- Lower Wind Load
- U.P.S. Shippable

TRIBAND YAGIS

HB33SP	3 El.-13'2" Boom-27 Lb.	\$189.95
	3KW Max. Pwr. - Compact	+ship.
HB43SP	4 El.-19'8" Boom-38 Lb.	\$249.95
	3KW Big Signal Performance	+ship.
HB34D	4 El.-16'5" Boom-34 Lb.	\$219.95
	3KW Slightly Larger Than 33SP	+ship.
HB35T	5 El.-24'7" Boom-50 Lb.	\$349.95
	3KW "THE ULTIMATE"	+ship.

ALSO AVAILABLE

HB40NL3	3 El. 40M Monoband	\$379.95
HB40NL2	2 El. 40M Monoband	\$254.95
AX210NW	2 X 20 El. 2M Array	\$209.95
	Twin "Cross Yagi" Cir. Polar.	+ship.
KR-400	Med. Duty Rotor	\$119.95
KR-500	Elevation Rotor	\$189.95
GDX-2	4 Band Discone Ant.	\$ 69.95
	6M Thru 70CM	+ship.

CASH, CHECK, M.O., VISA & MASTERCARD

"Swiss Quads" - Thrust Bearings - Rotors
Many Other Models Available
Call Or Write For Complete Catalog.

SULTRONICS

(513)376-2700

15 Sexton Dr., Xenia, Ohio 45385

CIRCLE 18 ON READER SERVICE CARD

RG/U	Ohms	Tol.	Cap./ft. (in pF)	Velocity Factor	10 MHz dB	10 MHz Watts	400 MHz dB	400 MHz Watts	Comment
*M17/24-RG034	75	3	—	—	0.32	7200	3.8	650	Good to 1 GHz
*M17/28-RG058	50	2	—	—	1.4	650	14.0	75	Superseded by M17/155-00001
*M17/29-RG059	75	3	—	—	1.10	1200	9.0	135	Good to 1 GHz
*M17/30-RG062	93	5	—	—	0.90	1300	8.0	100	Extra Flexible
*M17/31-RG063	125	6	—	—	0.52	3000	5.5	340	Air Spacing
*M17/31-RG079	125	6	—	—	0.52	3000	5.5	340	Armored 63B
*M17/33-RG064	48	4	—	—	—	—	—	—	Pulse Cable
*M17/34-RG065	950	50	—	—	21.20	—	—	—	Video Delay
*M17/45-RG108	78	7	—	—	2.30	340	16.0	50	Twin Axial
*M17/47-RG114	185	10	—	—	1.34	1150	6.7	160	—
*M17/52-RG119	50	2	—	—	0.50	31000	3.8	4000	Hi Temp
*M17/52-RG120	50	2	—	—	0.50	31000	3.8	4000	Armored 119
*M17/54-RG122	50	2	—	—	1.70	240	18.0	60	Superseded by M17/157-00001
*M17/56-RG130	95	5	—	—	0.65	3000	8.8	350	Twin Axial
*M17/56-RG131	95	5	—	—	0.65	3000	8.8	350	Armored 130
*M17/60-RG142	50	2	—	—	1.2	5700	11.7	1100	Superseded by M17/158-00001
*M17/62-RG144	75	3	—	—	0.60	17000	4.5	2800	Hi Temp 11A
*M17/64-RG035	75	3	—	—	0.24	13500	2.8	1500	Armored 164
*M17/64-RG164	75	3	—	—	0.24	13500	2.8	1500	—
*M17/65-RG165	50	2	—	—	0.60	15000	5.0	2500	Superseded by M17/159-00001
*M17/65-RG166	50	2	—	—	0.60	15000	5.0	2500	Armored 165A
*M17/67-RG177	50	2	—	—	0.24	14000	2.8	1100	Good to 12.4 GHz
*M17/72-RG211	50	2	—	—	0.25	66000	2.3	10000	Superseded by M17/161-00001
*M17/73-RG212	50	2	—	—	0.83	1500	6.5	100	Superseded by M17/162-00001
*M17/74-RG213	50	2	—	—	0.66	3500	5.5	300	Superseded by M17/163-0001
*M17/74-RG215	50	2	—	—	0.66	3500	5.5	300	Armored 213
*M17/75-RG214	50	2	—	—	0.66	2700	5.5	300	Superseded by M17/164-00001
*M17/75-RG365	50	2	—	—	0.66	2700	5.5	300	—
*M17/77-RG216	75	3	—	—	0.66	2500	5.2	250	Good to 1 GHz/Inactive
*M17/78-RG217	50	2	—	—	0.41	6000	4.3	480	Good to 3 GHz
*M17/79-RG218	50	2	—	—	0.24	14000	2.5	1100	Good to 1 GHz
*M17/79-RG219	50	2	—	—	0.24	14000	2.5	1100	Armored 218
*M17/81-RG220	50	2	—	—	0.17	25000	2.3	1500	Good to 2 GHz/Inactive
*M17/82-RG221	50	2	—	—	0.17	25000	2.3	1500	Good to 1 GHz/Inactive
*M17/83-RG222	50	2	—	—	4.40	340	33.0	60	—
*M17/84-RG187	75	3	—	—	5.30	350	21.0	150	Superseded by 179B
*M17/84-RG223	50	2	—	—	1.35	800	11.7	90	Superseded by M17/167-00001
*M17/85-RG224	50	2	—	—	0.41	6000	4.3	480	Good to 3 GHz/Inactive
*M17/86-RG225	50	2	—	—	0.60	15000	5.0	2500	Hi Temp
*M17/87-RG226	50	6	—	—	0.55	18000	3.8	3500	Hi Temp
*M17/88-RG227	50	2	—	—	0.60	15000	5.0	2500	Armored 87A/Inactive
*M17/89-RG228	50	2	—	—	0.25	66000	2.3	10000	Armored 211A/Inactive
*M17/90-RG071	93	5	—	—	0.90	1300	8.0	125	Double Braid
*M17/92-RG115	50	2	—	—	0.60	15000	5.2	2500	Hi Temp
*M17/93-RG178	50	2	—	—	5.60	640	29.0	100	Superseded by M17/169-00001
*M17/93-00001	50	2	—	—	5.60	640	29.0	100	Good to 3 GHz
*M17/94-RG179	75	3	—	—	5.30	350	21.0	150	—
*M17/95-RG180	95	5	—	—	3.30	2000	17.0	400	—
*M17/97-RG210	93	5	—	—	0.90	1300	8.0	125	—
*M17/100-RG133	95	5	—	—	—	—	5.7	64	—
*M17/101B	50	2	—	—	5.60	640	29.0	100	Superseded by M17/93-00001
*M17/102B	—	—	—	—	—	—	—	—	Cancelled
*M17/109-RG301	50	2	—	—	—	—	70.0	—	Hi Attenuation
*M17/110-RG302	75	3	—	—	1.20	5700	8.0	1100	Hi Temp
*M17/111-RG303	50	2	—	—	1.20	5700	9.0	1100	Superseded by M17/170-00001
*M17/112-RG304	50	2	—	—	0.85	8700	6.0	2000	Hi Temp
*M17/113-RG316	50	2	—	—	6.00	720	20.0	240	Superseded by M17/172-00001
*M17/116-RG307	75	4	—	—	1.20	1300	7.5	130	Triax

1983 CQ World Wide DX S.S.B. Contest October 29-30

Larsen, Avanti, Anixter-Mark PROFESSIONAL Antennas for the Amateur Operator

Larsen—for 2 meters, we recommend Larsen's best, the NMO-150-MM, featuring Kulrod 5/8-wave stainless-steel chrome-plated whip, air-wound coil, and heavy magnet with Motorola threads. Aluminum capacitance pad and rubber gasket on edges. **\$50.95**

Avanti—for a more permanent installation on 2 meters, we recommend the ON-GLASS AP151.3G, featuring the new flexible mounting system, easy tuning, and no loss through the glass. 31 1/2" whip equals 48" 5/8 wave in performance. **\$38.50**

Anixter-Mark—we recommend the HW-3 10, 15, 20 meter with 40 meter option at **\$58.75**. Individual Heliwhips for all amateur bands including 160 meters. Or 10, 15, 20, 40 meter HV4 at **\$69.75**.

Add \$3.00 for shipping in 48 states. Send \$1.00 for 1983 Antenna Catalog.

H.C. Van Valzah Co.

1140 Hickory Trail, Downers Grove, IL 60515
(312) 852-0472 We Stock Antenna Parts

CIRCLE 57 ON READER SERVICE CARD

Say You Saw It In CQ

RG/U	Ohms	Tol.	Cap./ft. (In pF)	Velocity Factor	10 MHz dB	Watts	400 MHz dB	Watts	Comment
*M17/119-RG174	50	2	—	—	3.90	350	20.0	25	Superseded by M17/173-00001
*M17/120B	—	—	—	—	—	—	—	—	Cancelled
*M17/124-RG328	25	2.5	—	—	—	—	0.4	—	—
*M17/125-RG329	50	4	—	—	—	—	0.4	—	—
*M17/126-RG391	72	3	—	—	0.88	1900	15.0	—	Low Noise
*M17/126-RG392	72	3	—	—	0.88	1900	15.0	—	Armored 391
*M17/127-RG393	50	2	—	—	0.60	15000	5.0	2500	Superseded by M17/174-00001
*M17/128-RG400	50	2	—	—	1.20	5700	9.6	1100	Superseded by M17/175-00001
*M17/129-RG401	50	0.5	—	—	0.85	8700	6.0	2000	Semi-Rigid
*M17/129-00001	50	0.5	—	—	0.85	8700	6.0	2000	Semi-Rigid
*M17/130-RG402	50	1	—	—	1.20	5700	8.0	1100	Semi-Rigid
*M17/130-00001	50	1	—	—	1.20	5700	8.0	1100	Semi-Rigid
*M17/131-RG403	50	2	—	—	5.60	640	29.0	100	Triax
*M17/132-RG404	50	2	—	—	5.60	640	29.0	100	Low Noise
*M17/133-RG405	50	1.5	—	—	5.60	640	14.0	300	—
*M17/133-00001	50	1.5	—	—	5.60	640	14.0	300	—
*M17/133-00002	50	1.5	—	—	5.60	640	14.0	300	—
*M17/133-00003	50	1.5	—	—	5.60	640	14.0	300	—
*M17/134-00001	50	2	—	—	1.2	700	6.0	60	Triax
*M17/134-00002	50	2	—	—	0.8	4000	6.0	330	Triax
*M17/135-00001	50	2	—	—	0.8	4000	6.0	330	Triax
*M17/135-00002	50	2	—	—	0.8	4000	6.0	330	Triax
*M17/136-00001	75	3	—	—	—	—	21.0	1400	Good to 3 GHz
*M17/137-00001	95	5	—	—	—	2500	17.0	370	Good to 3 GHz
*M17/138-00001	50	2	—	—	3.3	1300	21.0	220	Good to 3 GHz
*M17/139-00001	95	5	—	—	—	2400	18.0	370	Good to 3 GHz
*M17/140-00001	95	5	—	—	—	2400	18.0	370	Cancelled
*M17/151-00001	50	2.5	—	—	13.0	110	25.0	50	Semi-Rigid
*M17/151-00002	50	2.5	—	—	13.0	110	25.0	50	Semi-Rigid
*M17/152-00001	50	2	—	—	3.3	1400	20.0	220	Good to 12.4 GHz
*M17/153-00001	50	2	—	—	3.3	1400	24.0	210	Good to 12.4 GHz
*M17/154-00001	50	3	—	—	—	—	38.0	22	Semi-Rigid
*M17/154-00002	50	3	—	—	—	—	38.0	22	Semi-Rigid
*M17/155-00001	50	2	—	—	1.4	650	14.0	75	Good to 1 GHz
*M17/156-00001	50	2	—	—	0.5	31000	3.8	4000	Hi Temp
*M17/156-00002	50	2	—	—	0.5	31000	3.8	4000	Armored M17/156-00001
*M17/157-00001	50	2	—	—	1.7	240	18.0	60	Smaller 58
*M17/158-00001	50	2	—	—	1.2	5700	11.7	1100	Good to 12.4 GHz
*M17/159-00001	50	2	—	—	0.6	15000	5.0	2500	Hi Temp
*M17/160-00001	50	2	—	—	0.24	14000	2.8	1100	HF 218
*M17/161-00001	50	2	—	—	0.25	66000	2.3	10000	Hi Temp
*M17/162-00001	50	2	—	—	0.83	1500	6.5	100	Good to 10 GHz
*M17/163-00001	50	2	—	—	0.66	3500	5.5	300	Good to 10 GHz
*M17/164-00001	50	2	—	—	0.66	3500	5.5	300	Good to 10 GHz
*M17/164-00002	50	2	—	—	0.66	2700	5.5	300	—
*M17/165-00001	50	2	—	—	0.41	6000	4.3	480	Good to 1 GHz
*M17/166-00001	50	2	—	—	0.24	14000	2.5	1100	Good to 1 GHz
*M17/167-00001	50	2	—	—	1.35	800	11.7	90	Good to 12.4 GHz/Inactive
*M17/168-00001	50	2	—	—	0.60	15000	5.2	2500	Hi Temp
*M17/169-00001	50	2	—	—	5.60	640	29.0	100	Good to 3 GHz
*M17/170-00001	50	2	—	—	1.20	5700	9.0	1100	Hi Temp
*M17/171-00001	50	2	—	—	0.85	8700	6.0	2000	Hi Temp
*M17/172-00001	50	2	—	—	6.00	770	20.0	240	Hi Temp
*M17/173-00001	50	2	—	—	3.90	350	20.0	25	Miniature
*M17/174-00001	50	2	—	—	0.60	15000	5.0	2500	Moistureproof
*M17/175-00001	50	2	—	—	1.20	5700	9.6	1100	Flexible
*M17/176-00001	77	7	—	—	—	—	—	—	Flexible Twin

RTTY



TU-470

- Full featured RTTY to 300 baud plus CW terminal unit.
 - 3 Shifts, active filters, remote control, xtal AFSK, FSK, plus much more.
- Suggested retail price...\$499.95
Introductory offer.....**\$429.95**
Offer Expires 9-1-83



TU-300

- RTTY terminal unit to 300 baud.
 - 3 Shifts, active-filters, xtal AFSK, FSK, plus more.
- kit **\$289.95**
wired \$399.95



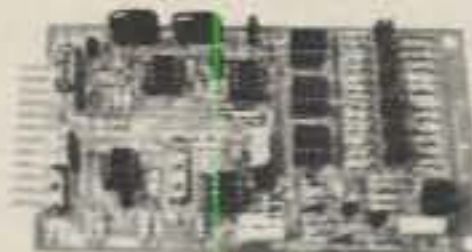
TU-170A

- Single shift RTTY terminal unit.
 - Xtal AFSK, FSK, active-filters and more.
- Kit **\$189.95**
wired \$289.95



TU-170

- Single shift RTTY terminal unit.
 - Low cost, AFSK, active-filters.
- \$149.95**
(Kit only)



DM-170

- Single shift RTTY demodulator.
 - Low cost, active-filters, autostart.
- \$47.95**
(Kit only)

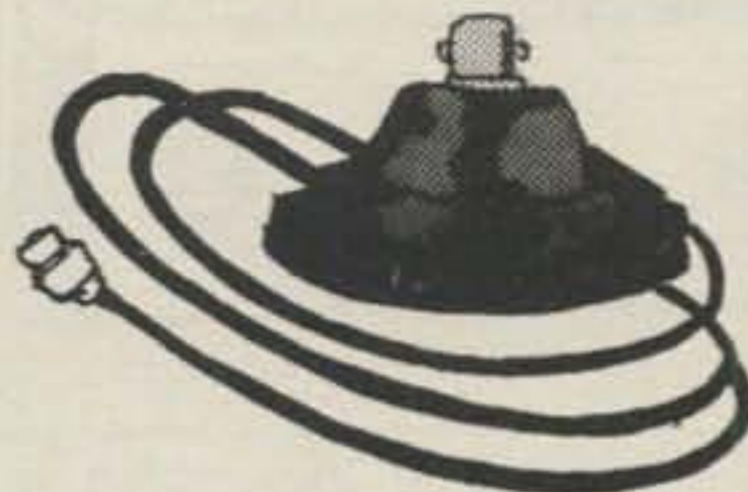
SALES ONLY

1-800-HAM-RTTY



Flesher Corporation
P.O. BOX 976
TOPEKA, KS. 66601

UP YOUR ERP



For HT owners operating inside a vehicle and wanting increased T/R range, RF PRODUCTS has the low cost solution.

Remove your BNC antenna from the HT and mount on the RF PRODUCTS BNC magnet mount, install the magnet mount on the roof top and connect the BNC co-ax connector.

The magnet mount (part no. 199-445) has 10 feet of small (5/32") co-ax with BNC connector attached and is priced at \$15.95 (including shipping by UPS to 48 states).

TO ORDER - send \$15.95 money order or cashiers check only
Florida residents add 5% sales tax
For air shipment add \$1.50

PART NO.	LOW COST ACCESSORY ANTENNAS DESCRIPTION	PRICE
194-214	2M helical full length BNC connector	\$7.95
194-254	2M helical stubby type BNC connector	8.95
194-814	1 1/4 M helical full length BNC connector	7.95
194-854	1 1/4 M helical stubby type BNC connector	8.95
194-944	3/4 M helical stubby type BNC connector	8.95
195-914	3/4 M flexible 1/4 wave BNC connector	7.95
196-214	2M telescopic 1/4 wave BNC connector	6.95

RF PRODUCTS

P.O. Box 33, Rockledge, FL 32955, U.S.A. (305) 631-0775

CIRCLE 21 ON READER SERVICE CARD

Say You Saw It In CQ

CIRCLE 34 ON READER SERVICE CARD

August 1983 • CQ • 75

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

More Random Headings: Part IV

Last month CQ carried Part III of columnist Thurber's current series which reviewed several new antenna products and which also highlighted the author's plunge into computers. This month it's back to some mainline antenna topics.

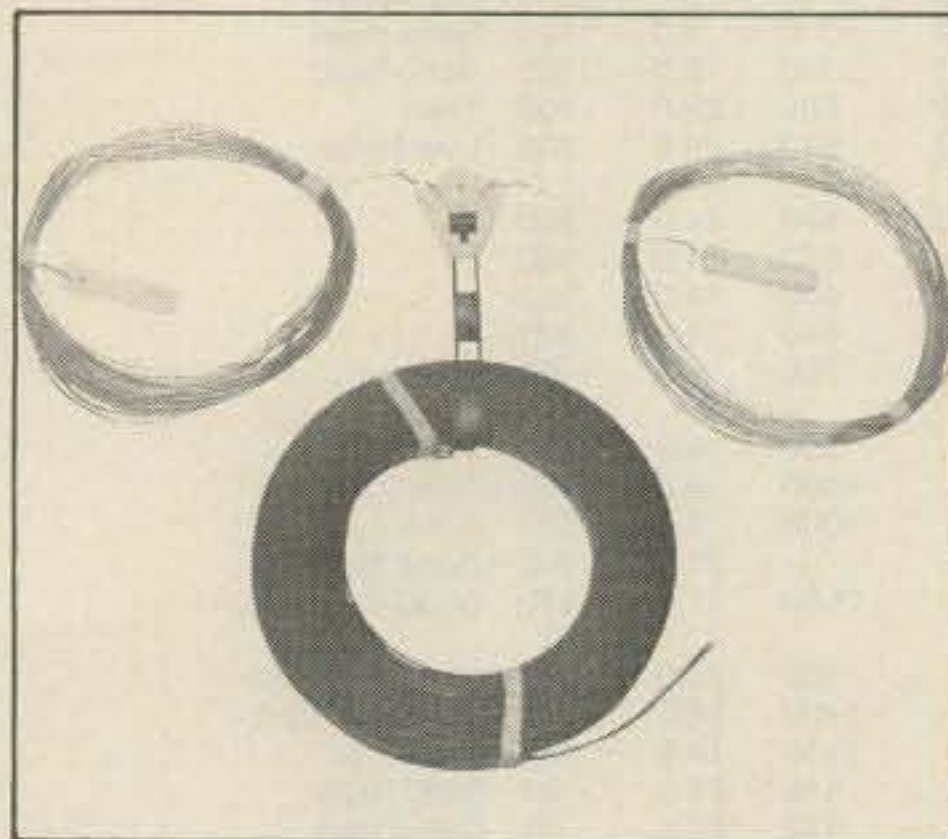
Last month's Antennas column saw your columnist digress from the usual format of the Antennas column to sidetrack into some observations on experiences with a new personal computer. Last month's column, in fact, was the first one which was 100% completed by electronic word-processing means, rather than by using the trusty Smith Corona electric. In that column, we publicly answered some reader mail, focusing primarily on reflected/forward power measurement and standing-wave ratio (s.w.r.), and also discussed the new Palomar Engineers M-827 light-bar s.w.r. meter.

This time it's back to antennas, but we'll cover three items of quite dissimilar nature. First, we'll get into the problem of obtaining acceptable reception between the amateur bands (such as for s.w.l.'ing or RTTY monitoring); discuss specialized antennas for cordless telephones; and take a look at the "big signal" arrays at N7AM. First, some considerations for monitoring.

Monitoring Between the Bands

Most amateur systems are designed with the primary objective of first obtaining good transmitting performance on a given band or bands, and second, securing good reception characteristics on the same band(s). For the most part amateur antennas are designed for discrete frequency performance on the 160, 80/75, 40, 20, 15, and 10 meter bands, or some combination thereof, with some recent expansion to cover the 12, 17, and 30 meter WARC assignments. Although the new WARC bands have caused some readjustment in antenna designs to recognize the fact that transmitting antennas should also cover these frequencies, at least for future use, even multiband antennas will offer but "discrete" performance across the h.f. spectrum, albeit expanded to cover up to nine h.f. bands.

Even nine-band amateur antennas are relatively poor performers on the in-be-



The conventional multiband dipole generally lends itself well to reception anywhere in the h.f. spectrum. This Drake AK75 dipole is designed for 160-10 meters when used with an antenna tuner (and balun, for transmitting). The Drake antenna, as shown here, consists of 100 feet of 470 ohm balanced feedline ("ladderline") connected to a 135 foot dipole with a strain-relief center insulator. (Photo courtesy R.L. Drake Company)

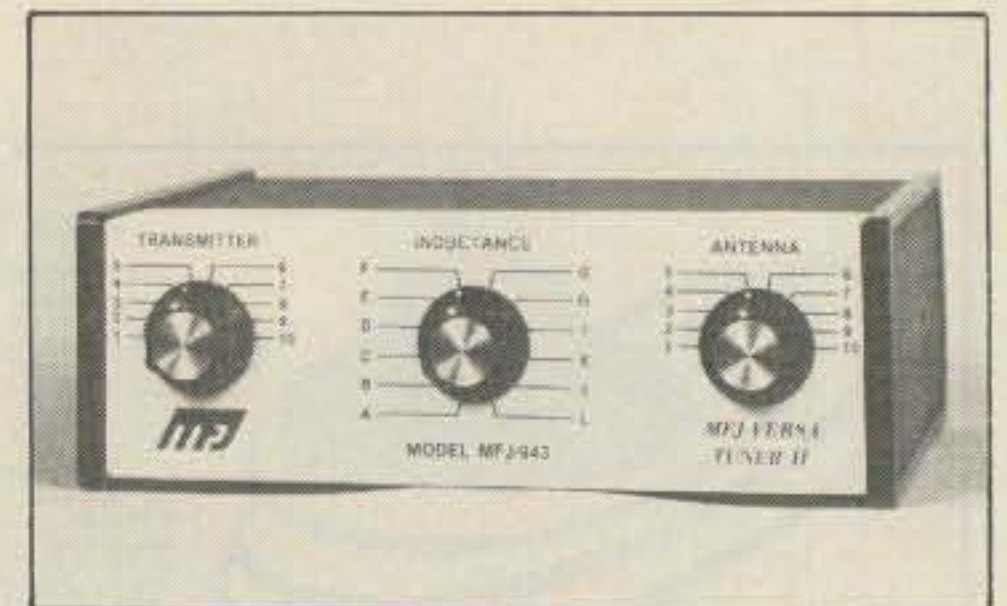
tween frequencies. Generally, the narrow bandwidth of quads and Yagis results in significant gain only in the bands(s) for which the antennas were designed; dipoles and verticals offer a similar though less-pronounced drop-off in performance as the operating frequency is removed from the design frequency. In fact, sharply tuned antennas will often perform worse than, say, a simple, casually installed randomwire when used for reception on frequencies far removed from an amateur band, due to the high selectivity of the antenna.

It's possible to adapt most amateur antenna designs to any h.f. frequency, tailoring the antenna for the in-between frequencies of interest. In many cases, however, doing so isn't practical or cost-effective; most amateurs have little interest in replicating an antenna system for off-ham-band operation. If cost is not a limitation, the log periodic antenna represents a good choice for consistent performance and directivity across a wide range of frequencies. The log periodic offers very good forward gain (7-8 dB or more) and a high front-to-back ratio, characteristics akin to standard Yagis. However, the physical size, mechanical complexity, and cost generally restrict these antennas to a lower limit of 7 to 14 MHz, and heavy-duty rotators are a "must" for them. The log periodic designs are covered in the standard antenna texts, and

several manufacturers, such as KLM and Hy-Gain, offer log periodics that will do a good job over a very broad frequency range, both for transmitting and receiving purposes.

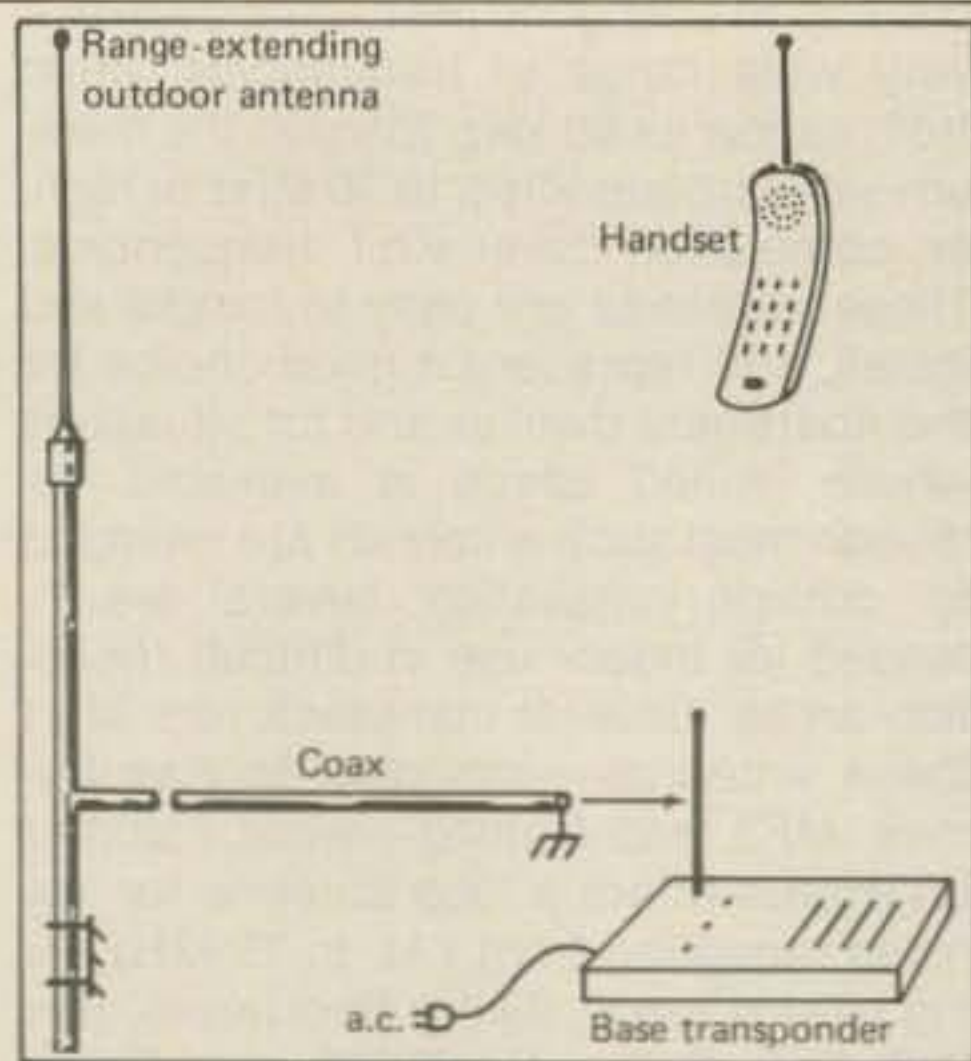
A more conventional broadband transmitting antenna offers another alternative to the between-the-bands reception problem. If you have the space for a full-size dipole for regular transmitting purposes, you may wish to consider one of the antenna designs that boast fairly "flat" performance over a wide range. Naturally, such an antenna will also provide good reception in the popular short-wave bands. One new commercial design having promise is the Barker and Williamson Model 370-15 broadband folded dipole that covers the full 3.5-30 MHz range continuously and with a low s.w.r.; the 90 foot, coax-fed antenna can be used as a flattop dipole or a "sloper." Of course, you should not overlook various single and multi-band amateur antennas that can be adapted to odd-frequency use. For example, the well-known 7/21 MHz odd-harmonic dipole relationship could be used to produce a 6/18 MHz antenna, while there appears to be no reason why the popular Windom antenna design could not be "slipped" to favor non-ham bands, although I haven't tried this approach. Have any of you?

A "no-cost" approach to in-between-bands monitoring is simply to tie the transmitting antenna wires together, whether they lead to a Yagi, quad, dipole, or vertical, in order to operate the entire system as a randomwire. Often this pro-



A simple, wide-range transmatch is a useful accessory in matching a variety of receiving antennas. This inexpensive MFJ unit is designed to match any feedline from 1.8-30 MHz—coaxial cable, balanced line, or singlewire. It includes a 4:1 balun; an SO-239 coax connector is provided, as are binding posts for singlewire or balanced transmission lines. For transmitting, the unit handles 300 watts r.f. output. (Photo courtesy MFJ Enterprises, Inc.)

317 Poplar Drive, Millbrook, AL 36054



Shown above is a typical cordless telephone system consisting of the base-station transponder and the portable handset. Most range-extending techniques are applied to the base-station unit, usually taking the form of an outdoor 49 MHz receiving antenna substituting for the small telescopic whip found on most units. A long, elevated a.c. extension cord may help extend the range of the transponder's 1.7 MHz carrier-current-style transmitter.

Fig. 1—Diagram of a typical cordless telephone system.

base-station transponder transmits on one of several frequencies in the 1.7 MHz range by feeding r.f. to the a.c. power line, much in the fashion of carrier current radio systems operated by colleges and universities for their dormitories. The portable handset receives the medium-wave signal through a Ferrite loop or bar antenna which is built into the handset. The handset usually transmits to the base-station transponder on the 49 MHz band using a telescoping whip or "rubber ducky" type antenna. The modulation used both ways is f.m., which provides fairly noise-free reception over the typical 300–600 foot system range. Operation is in the duplex mode; that is, reception and transmission on both units are carried out simultaneously, as on regular wired telephone circuits. The cordless units are becoming increasingly popular for a variety of purposes, such as working in the yard, visiting with a neighbor, dipping in the family swimming pool, etc., when it's desirable to remain in telephone contact. The hamshack applications are many, especially if the shack is in a garage or shed detached from the home. Recent telephone company deregulation will probably further increase cordless telephone sales.

Both units in the system use low power, 100 milliwatts or less, and fall under Part 15 FCC regulations for limited radiation devices. Range is necessarily limited as a result, and most manufacturers guarantee only 300 feet, although some-

times range is stated as being as high as 700 feet. There are a few steps that may be taken to increase range, however.

First, there is little that can be done with the handset to boost range. Most of the telescoping whips are designed to be resonant on 49 MHz (precisely, 49.83 to 49.89 MHz, where five channels are used) and should not be modified. However, if the handset uses a rubber ducky type antenna, additional range may be secured by substituting a telescoping whip for a slight improvement in transmitting and receiving efficiency. Manufacturers are quick to point out, however, that antenna modifications that affect the transmitted signal may be illegal, although this point is not a crystal-clear one. Little can be done to improve the 1.7 MHz reception range, which to some extent depends on the size of the Ferrite antenna, which, of course, must fit within the confines of the handset case.

The base-station transponder's transmitting efficiency in the 1.7 MHz range is fairly low, and it depends largely on the type and layout of house wiring. Metal-shielded house wiring will quickly attenuate the low-power r.f. carried in the electric mains. Also, signals are quickly dissipated by transformers, power meters, and other devices in the a.c. lines. Two things that may be tried to increase transponder transmission range include: (1) simply plugging the unit into a different a.c. outlet to see which yields greater transmitting range; and (2) using a long, well-elevated extension cord between the base station transponder and the wall plug; the extension cord helps get the signal across for greater transmit range. It is also possible to feed the 1.7 MHz r.f. into a randomwire antenna, although to do so almost certainly would be in violation of the FCC requirements for Part 15 device radiation.

The most practical and effective way of increasing cordless telephone range is to install an elevated, outdoor, 49 MHz receiving antenna for the base-station transponder. This antenna would be of the same approximate dimensions as a 6 meter amateur-band antenna, and may be either cut-down slightly from the 6 meter length, fabricated from scratch, or purchased commercially. Most such antennas are mast mounted, vertically polarized, and use coaxial cable to feed the transponder. The only tricky part comes into play in connecting the coax to the base-station unit. A "cheap and dirty" method is simply to clip the coax onto the telescopic whip; a better method is to remove the whip and open up the transponder, connecting the coax center conductor to the same circuit-board point at which the whip was originally attached. The coax braid is attached to the circuit board ground connection or circuit foil at a point as near to the antenna connection point as possible.

There are several other frequency

combinations in use on domestic and export models, including 35/49 MHz, 49/70 MHz, and 49/49 MHz. The latter frequency combination is becoming increasingly popular among the more expensive systems, and range is more easily enhanced on this band than with the 1.7/49 MHz band units. The outdoor antenna will, of course, be effective for both transmission and reception on the 49 MHz transponder. However, modifying the transmitting antenna may be of questionable legality, as suggested earlier.

Several manufacturers make antennas specifically designed for cordless telephones; these include Firestick, Valor, and Winn-Tenna. The latter, for example, makes a number of models for both domestic and export (nonstandard frequency) use. These include vertical dipole, vertical ground plane, and vertical center-fed coaxial types. A horizontally polarized model is also available.

A typical "range-extended" system example is shown in fig. 1. Those interested in keeping up with developments in cordless and other telephone technologies may be interested in following the "On the Line" column which appears on a monthly basis in CQ's sister publication, *Popular Communications*. This column reviews new telephone technology and is authored by Gordon West, WB6NOA.

Big Signal from Bremerton

Not long ago Jack Riggs, N7AM, sent us some photos and a description of his 5-element, 80 meter vertical array and his 3-element 40 meter quad which have served to put N7AM and Bremerton, Washington, on the DX map. Both antennas are impressive, to say the least, and the 80 meter one is especially so. We'll share with you some of the details on the latter, thanks to Jack.

Jack used a 3-element, quarter-wavelength vertical parasitic array for 3 years, and was quite pleased with the 80 meter DX performance of the antenna. The quarter-wave, 3-element vertical provided a gain of about 7 dB and a front-to-back (F/B) ratio of about 25 dB. Experiments were later conducted with three elements in a half-wave version, which yielded DX signal reports up to two "S" units better than with the quarter-wave version.

To provide southwest and northeast coverage, Jack erected two additional verticals in a half-wave configuration to provide three reflectors and one director, for a total of five elements with switchable directivity in the four quadrants. The five-element vertical array was first placed on the air in July 1981; field-strength measurements showed that the desired results were attained: a narrowing of the beamwidth using the side reflectors, and an increased forward gain that approached a husky 12.5 dB.

The resultant antenna consists of 5 telescoping elements made of 40 foot alu-

UNADILLA

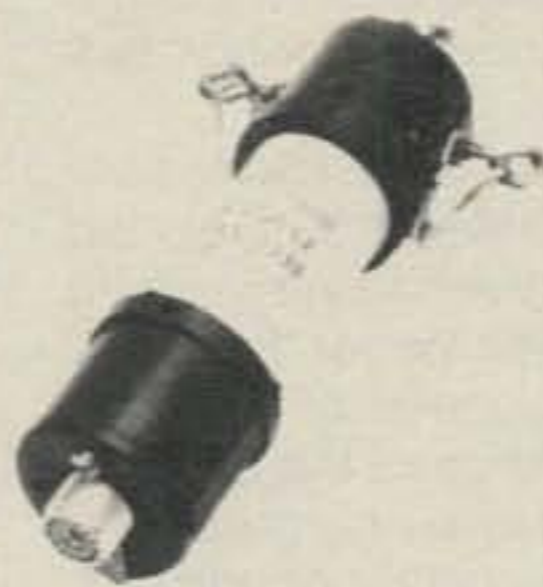


DEALERS!

Handle Unadilla/Reyco's line of full power antenna accessories. Famous around the world. Preferred by amateurs, armed forces and industry for 20 years. Call Bonnie toll-free and get started!

Just a few of our 400 dealers around the world.

- Argentina
Multiradio
- Australia
Scalar
- Canada
Ham Traders
Atlantic Ham Radio
- Chile
Soffersons CIA Ltd.
- England
AmComm Services
- Holland
Nipshagen BV
- Mexico
La Casa del Radioaficionado
- Republic of South Africa
J. Lieberman Electronics Ltd
- Spain
North Africa Electronics
- United States
Amateur Electronic Supply
N & G Distributing



World Famous
W2AU Balun



Antenna
Kits



"Old Reliable"
Reyco Trap

WE ALSO MAKE:

- Lo-Pass Filter 2000 W
- Quad Parts
- Baluns/Traps
- Insulators
- Antenna Wire

HAMFEST MANAGERS—

Unadilla cooperates!
Call us.
HAMS—call for our
free catalog PC-81 with
worldwide dealer list.

6743 Kinne St., East Syracuse, NY 13057
Toll Free 1-800-448-1666 TWX 710-541-0493
NY/HI/AK/Canada (collect) 1-315-437-3953



UNADILLA/REYCO

A Division of Microwave Filter Company, Inc.

CIRCLE 93 ON READER SERVICE CARD

YOU'LL NEVER GET A BETTER DEAL

HUSTLER ANTENNAS

SF2 - "Buck Buster" 5/8" Wave
2 Meter Antenna w/3/8 x 24"
Threaded Base -
3dB gain **\$8⁹⁵**

**HOT - EASY ON/OFF
TRUNK MOUNT**
with 3/8 x 24" Swivel Ball
for CG144 & SF-2

\$14⁹⁵

CG144 **\$23⁹⁵**
5.2dB gain
Collinear
w/3/8 x 24"
Threaded Base

G6144 - 6dB
Base
Antenna **\$68⁵⁰**

G7144 - 7dB
Commercial
Grade Base
Antenna **\$98⁰⁰**

And many other Hustler Antennas & Mounts

BBL144	25 ⁹⁵	MRK-1	13 ⁷⁵
BBLT144	35 ⁰⁰	SFM	24 ²⁵
BBLT440	24 ⁷⁵	THF	13 ⁹⁵
HLM	13 ⁹⁵	UHT-1	8 ⁹⁵

**CECO STOCKS THE ENTIRE HUSTLER
HF/VHF/UHF & COMMERCIAL PRODUCT LINE
PLEASE CALL FOR CECO'S LOW, LOW PRICE
DEALER INQUIRIES INVITED**



COMMUNICATIONS, INC.

2115 AVENUE X
BROOKLYN, N.Y. 11235
(212) 646-6300
(800) 221-0860
TELEX: 235125

CIRCLE 138 ON READER SERVICE CARD

Say You Saw It In CQ

CALL LETTER

HATS — T SHIRTS

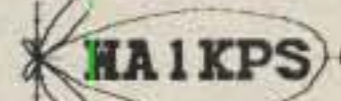
101 & Elm Street, Suite 4C Peterborough, NH 03458



HATS

Only \$6
HAT COLORS
Royal Blue Navy Blue
Red Gold Green

Hats Are One Size Fits All - Nylon Mesh Back



LINE 1 CIRCLE ONE OF THE DESIGNS ABOVE

LINE 2

OR

LINE 3

OR

LINE 4

OR

NOTE: Hats Maximum 8 Large or 16 Small Letters Per Line



T SHIRTS

Only \$8
SHIRT SIZES
Adult: Sm Med Large X-Large
Child: 2-4 6-8 10-12 14-16

SHIRT COLORS
Lgt Blue Lgt Green Tan
Wht/Red Trim Wht/Blue Trim

CALL LETTER HATS 101 & Elm Street Suite 4C Peterborough, NH 03458

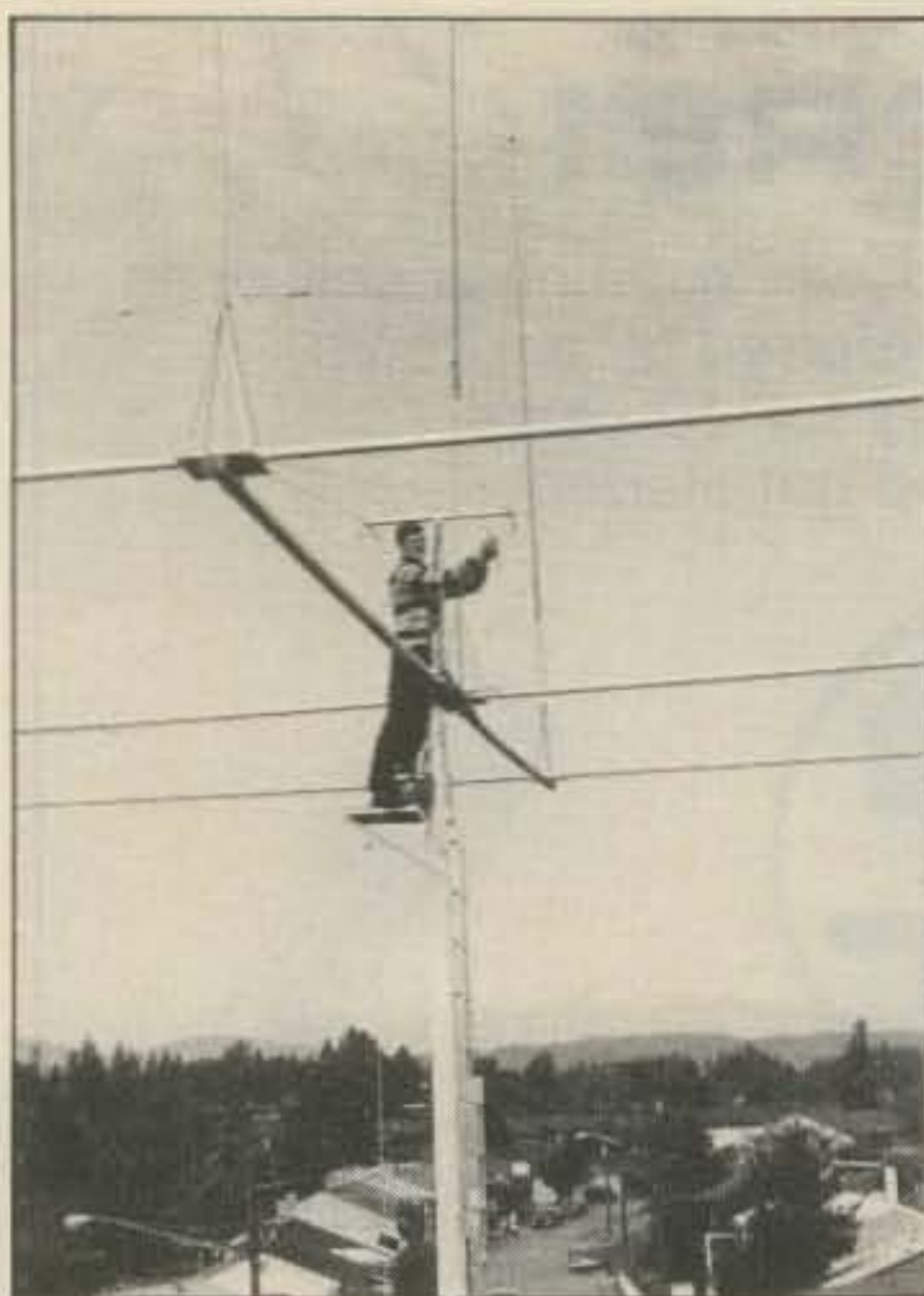
Attractive and Durable, just the thing for field days, contests, conventions or any other activity. Ideal personalized gifts for special occasions and they carry your own personal message. Imprints are permanent and guaranteed not to fade, peel or shrink. Order 12 or more and we will reproduce your own business or club logo FREE. Remember, every item can have a Different name or message in addition to your logo. Imprints are generated by computer for total flexibility and FAST service.

Name _____ Phone _____
Address _____
City _____ State _____ Zip _____
Ck Money Order Charge Card # _____
Signature To Validate Order _____ Exp. Date _____

ORDER BLANK

Add \$2 To Total For Shipping Charges

CQ



A complement to N7AM's 80 meter colossus is his equally impressive 40 meter, 3-element, wide-spaced quad. The antenna, shown perched atop a sky-needle-design tilt-over tower, consists of three loops approximately 109 feet around. (Photo courtesy N7AM)

minum irrigation pipe in sizes ranging from 2 to 4 inches in diameter. The driven element has a 14 foot fiberglass pole at the top for a design frequency of 3.7 MHz; guying is done at the 40, 80, and 108 foot levels, using $\frac{5}{32}$ inch polyester line, while $\frac{1}{8}$ inch aircraft cable is used for winching. Vacuum relays at the base of each outer element allow the array to be changed in direction and tuned by switching wire lengths to make the individual elements act either as a director or as a re-

flector (the close 0.1 wavelength spacing causes the tuning to be critical). As with any ground-mounted h.f. antenna, the ground system is important. In fact, Jack points out that he put in two summers on his hands and knees installing ground radials covering two city lots. The radials were necessary for the quarter-wave array, but for the half-wave array the radials are still useful to help hold down the angle of radiation and to provide a good "balance" to the system.

Jack's conclusions from his experiences with the half-wave array included the observation that the half-wavelength vertical is about 5 dB better than any 3-element array (horizontal or vertical). The superb performance of the antenna has also enabled him to learn a great deal about 80 meter propagation conditions, especially regarding European "long-path" propagation that would not be readily discernible when using a lesser-performing antenna.

The accompanying photos show Jack's 5-element vertical array and also his 40 meter quad. Hopefully, it will only take a little extra encouragement for Jack to write up his antenna as a construction article for CQ!

Wrapping It

In this month's "Random Headings" Antennas column series we have returned to some more conventional antenna subjects and issues to discuss between-the-bands signal monitoring and specialized antennas for cordless telephones. We have also looked at the interesting antennas making up N7AM's "big signal from Bremerton." Next month we'll continue with several other topics of timely interest. See you then.

73, Karl, W8FX

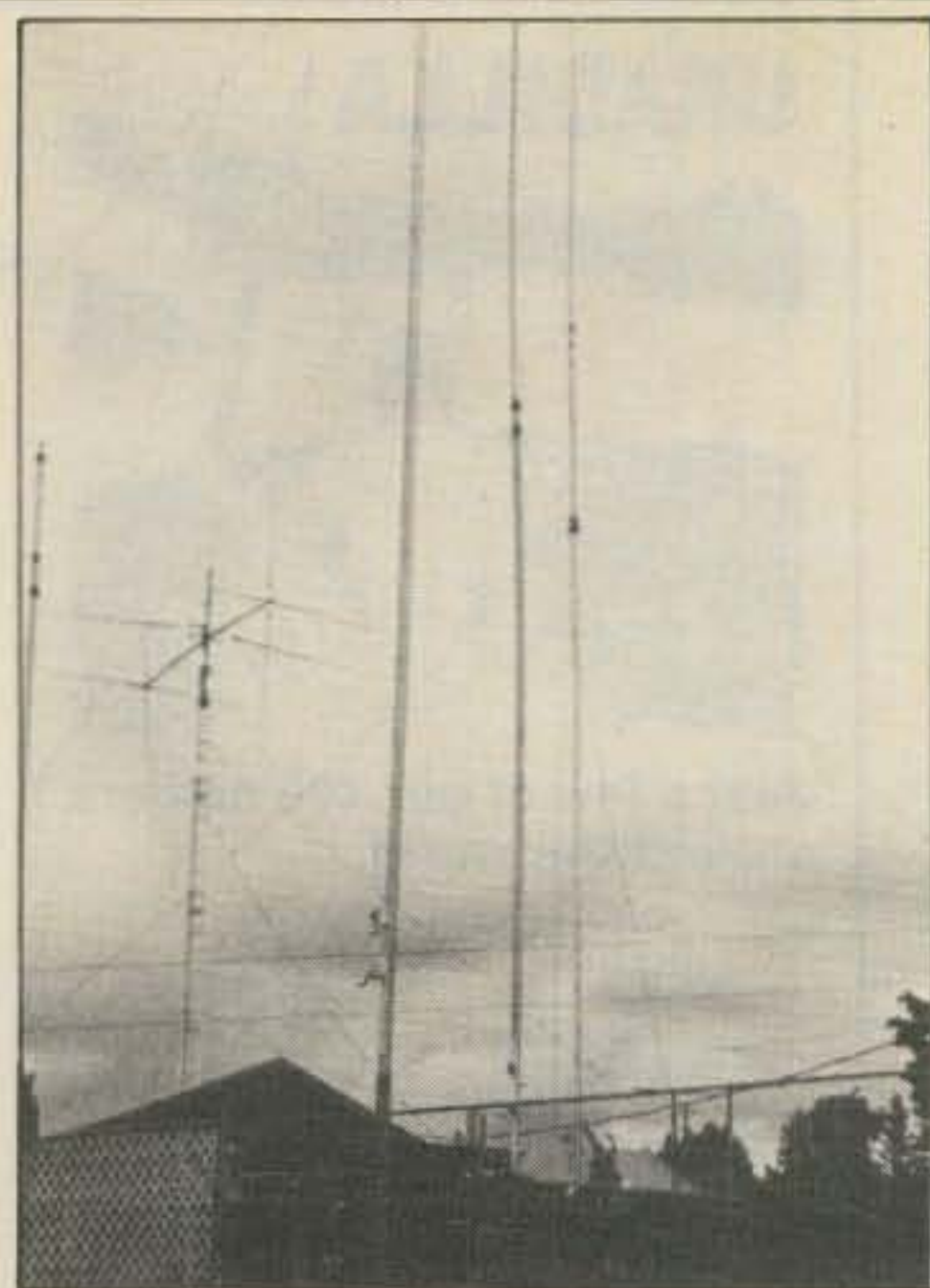


Photo looks to the northeast; the left side of the picture shows the NW element cranked down to the 40 foot level. Vacuum relays are used to switch directivity patterns and between phone and c.w. segments of the 80 meter band. (Photo courtesy N7AM)

Bibliography

Friedman, Herb. "Cordless Telephones—How They Work," in the Communications Corner column, *Radio-Electronics*, April 1981.

Friedman, Herb. "More About Cordless Phones," in the Communications Corner column, *Radio-Electronics*, June 1981.

Jesson, Joseph E. RTTY column in *Popular Communications*, January 1983.

McComb, Gordon. "Buyer's Guide to Cordless Telephones," *Radio-Electronics*, November 1982.

Scott, Robert F. "Cordless Telephones," *Radio-Electronics*, July 1981.

Thurber, Karl T., Jr., W8FX. "A Look at the Longwire," in two parts, *CQ*, May and June 1981.

Thurber, Karl T., Jr., W8FX. "Antennas for the Listener," in three parts, *CQ*, June–August 1981.

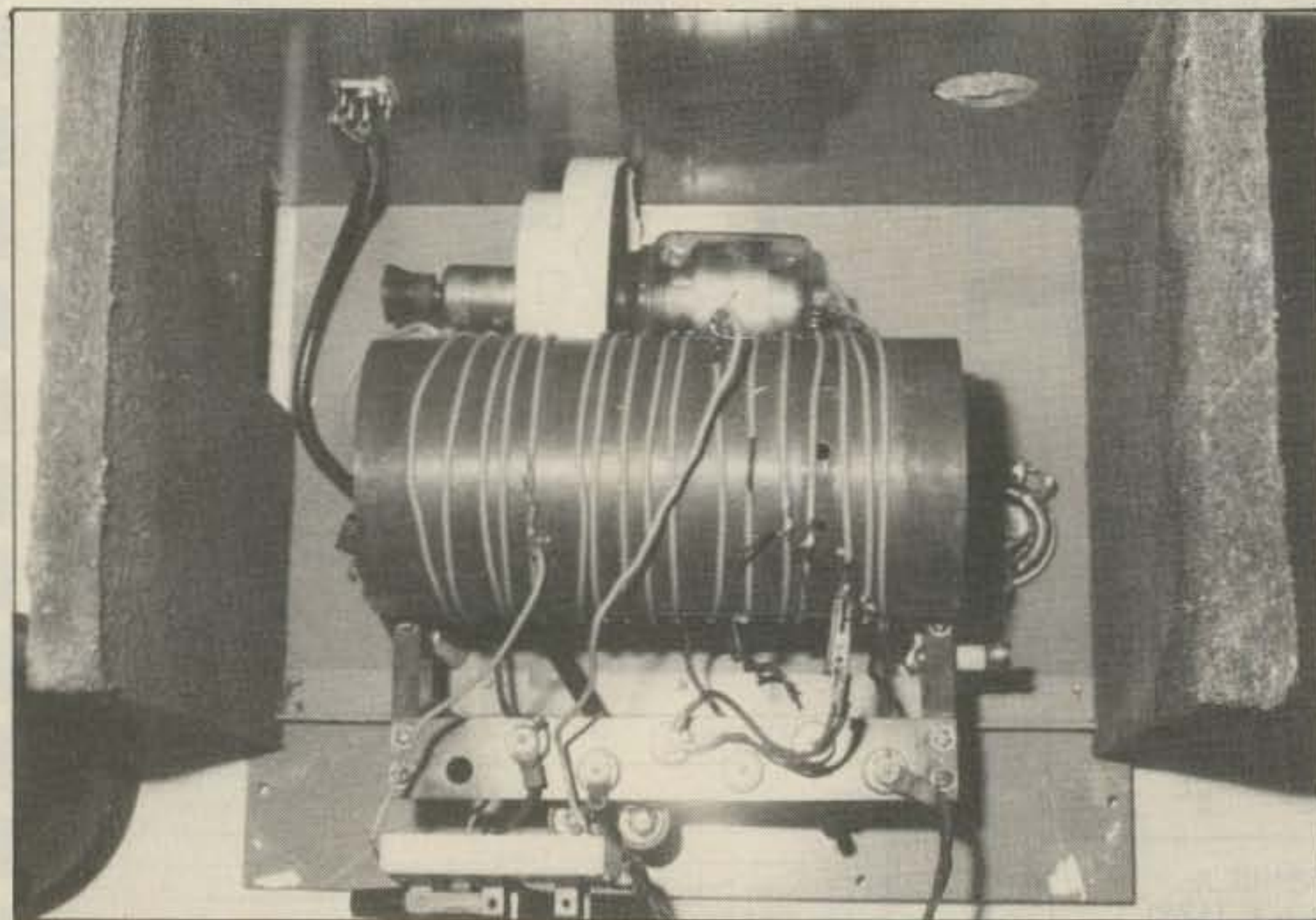
Thurber, Karl T., Jr., W8FX. "Improved Receiver Performance," *CQ*, September 1981.

Thurber, Karl T., Jr., W8FX. "More on Dipoles: Multiband Antennas With Tuned Feeders," *CQ*, December 1980.

Thurber, Karl T., Jr., W8FX. "The Transmatch Revisited," in three parts, *CQ*, July–September 1982.

West, Gordon, WB6NOA. "Can You Turn Cordless Insecurity Into Security?" in the On the Line column, *Popular Communications*, February 1983.

West, Gordon, WB6NOA. "Cordless Telephone Range: Here are the Facts!" in the On the Line column, *Popular Communications*, January 1983.



Parallel-tuned coil and condenser, mounted at the base of the driven element, with taps for best s.w.r. Additional taps are provided for operation on 40 meters. (Photo courtesy N7AM)

Ducks are getting smaller!
and...



better!



Because you and the leading radio manufacturers want the best-performing, the best looking antenna; Centurion has grown to be the Duck leader. We've developed many smaller antennas to make the hand-held radio perform better, and now the newest duck...the Tuf Duck "mini". It's shorter (about 3") yet it's a full 1/4 wave radiator on VHF.

Actual Size

CENTURION
TUF DUCK
ANTENNAS

CENTURION

Phone 402/467-4491
Telex 48-4377 CENTURION LCN
P.O. Box 82846 Lincoln, NE 68501 2846

CIRCLE 40 ON READER SERVICE CARD

Say You Saw It In CQ

brings the top to you...

ROHN®

ROHN brings the top to you with its patented design. For the ultimate "on the ground" service and antenna installation, a ROHN "Fold-Over" Tower is your best buy. Your safety comes first with "Fold-Over". For complete details write:

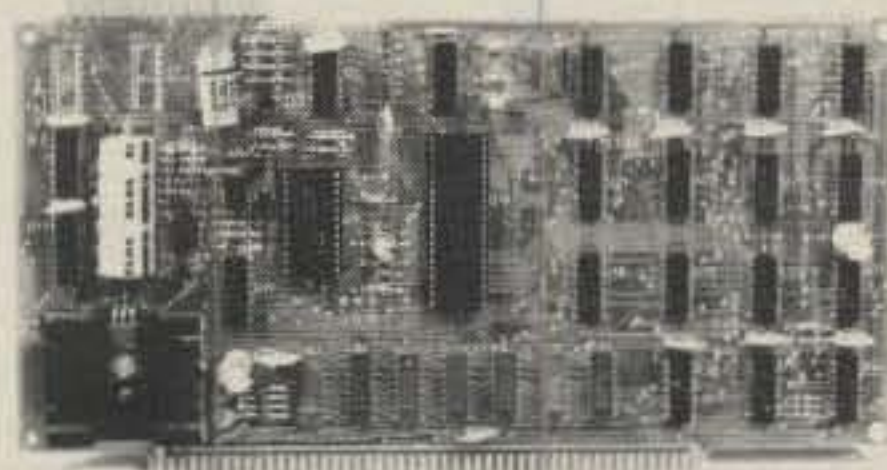
ROHN® "FOLD-OVER" TOWERS

Box 2000 · Peoria, Illinois 61656
U.S.A.

CIRCLE 42 ON READER SERVICE CARD

**\$129⁰⁰ STAND ALONE VIDEO TERMINAL
GETS YOU STARTED IN RTTY.**

ASCII
→
BAUDOT



COMPOSITE
→
VIDEO

SCT-100 FEATURES:

- Serial ASCII/BAUDOT with multiple baud rates
- 64 x 16 line format with 128 characters
- Full cursor control with scrolling
- On board power supply
- Microprocessor controlled
- \$229⁰⁰ assembled and tested, \$189⁰⁰ full kit, \$129⁰⁰ partial kit

Call or write today. MC/VISA accepted.

CIRCLE 84 ON READER SERVICE CARD

XITEK

214 - 840-2072

P.O. Box 2952 / Garland, TX. 75041

CIRCLE 85 ON READER SERVICE CARD

Once you have your beam up, the next stage is finding out exactly where you want to point it. Here's where your personal computer comes in handy.

LATITUDE AND LONGITUDE CALCULATIONS

BY THOMAS R. SUNDSTROM*, W2XQ

Among the variety of tasks the micro-computer has taken on in the home and in the amateur radio shack are calculations involving latitude and longitude. There has been a proliferation of beam-heading charts. Some include return bearings and some include both long- and short-path headings. Still other reports include distances expressed in statute miles, nautical miles, or kilometers. Great-circle and direction-finding programs should be of interest to the amateur who operates the h.f. bands and the v.h.f.-u.h.f. bands. For example, the ARRL has announced VHF/UHF Century Club awards based upon the grid locator system, a system that has been used in Europe for a number of years. Further, direction finding on the repeater sub-bands has become increasingly more important. Some amateurs compile a reference table of compass bearings to known transmitter locations, compare that to their antenna rotor control readout, and use all of that data to triangulate on an unknown jamming source.

For the shortwave listener, great-circle path and propagation prediction programs are interesting to compare broadcasting schedules to band conditions. Billboard Publication's annual *World Radio TV Handbook*, in addition to broadcast schedule information, lists many transmitter locations with latitude and longitude expressed in decimal degrees.

Over the past few years print media have published a number of computer programs using latitude and longitude values. Most of them work well but require the user to enter latitude and longitude as decimal values. In addition, given the design of the program, some values must be entered as positive values and some as negative values, depending upon

positional relationships to the Greenwich meridian and the equator. With a micro-computer available for use, there is no reason to do these calculations by hand.

A set of subroutines were developed and used to replace the front end of a number of programs of interest to me. A subroutine is not a complete program unto itself, but may be incorporated into a larger program by using a **GOSUB** statement to enter the subroutine and a **RETURN** statement to get back to the main program.

Although these subroutines have been written for an Apple II Plus™ (trademark of Apple Computer Inc.), it should be relatively easy to convert them for other microcomputers.

How It Works

The subroutines in the listing with this article have been documented with **REM** (remark) statements. The main loop, beginning at line 1000, offers an option to insert your home location values (beginning at line 1600) or two locations (beginning at line 1100). You have the option of entering degrees, minutes and seconds, or decimal degrees, or combinations thereof by looping through the subroutine beginning at line 1300. Format reminders prompt for the input data separated by commas.

The subroutine starting at line 1300 calculates decimal degrees and then runs each calculation through the subroutine beginning at 1500. This subroutine assigns plus or minus values to each latitude and longitude calculated. You may have to adjust the "if-then" (lines 1520-1550) statements to route the calculation through the correct value (line 1560 or line 1570). The output of this subroutine drives your program. In your main program, write one additional line using the information in line 1580 to convert C(1) through C(4) to the variables in your main

program. The added line should precede the main program and follow the format:

```
xxxx C(1)= :C(2)= :C(3)= :C(4)= :REM CONVERSION
```

Where "xxxx" is the line number. Insert values as needed.

The subroutine beginning at line 1600 inserts the standard home location values based on the data in lines 1630 and 1650. You can calculate your decimal values for your location by answering "no" to the question in line 1010 when you run your program for the first time. Use a **PRINT** statement to write the values of C(1) and C(2) to the screen, copy them down, and then change lines 1630 and 1650 for your location.

For your use, two additional subroutines may be called with a **GOSUB** statement whenever you need them. The first is an option to run the program again (beginning at line 1900), and the second is an "enter C to continue." The latter is useful to control the flow of output to the screen, to enable you to look at one screen at a time, rather than have it whiz by at an unreadable speed.

Where practical, all key responses test for an acceptable response to minimize keyboard errors. "if-then" statements do the work here.

Conclusion

You can use these subroutines by writing your main program and get the input data (location names and four coordinates) from the subroutines by using a **GOTO 1000** or **GOSUB 1000** statement early on in your program. Get back to your main program by inserting the appropriate **GOSUB** statements into lines 1180, 1190, and 1200 as needed.

In conclusion, if you find these line numbers duplicate those of another program, I recommend you type these in as listed and save them on disc or tape.

*Box 175, Vincentown, NJ 08088-0175

```

1000 REM *** MAIN LOOP ***
1010 HOME : VTAB 10: PRINT "ARE YOU AT YOUR NORMAL HOME LOCATION?"
1020 PRINT : HTAB 25: PRINT "(Y/N) "; GET Z#: PRINT Z#
1030 IF Z# = "Y" GOTO 1600
1040 IF Z# = "N" GOTO 1710
1050 IF Z# < > "Y" OR Z# < > "N" GOTO 1020
1060 FOR X = N TO 4: PRINT
1070 IF X = 1 THEN 1110
1080 IF X = 2 THEN 1120
1090 IF X = 3 THEN 1130
1100 IF X = 4 THEN 1140
1110 HOME : PRINT "ENTER LATITUDE OF HOME LOCATION": GOTO 1150
1120 PRINT "ENTER LONGITUDE OF HOME LOCATION": GOTO 1150
1130 GOSUB 1800: HOME : PRINT "ENTER LATITUDE OF OTHER LOCATION": GOTO 11
50
1140 PRINT "ENTER LONGITUDE OF OTHER LOCATION": GOTO 1150
1150 GOSUB 1300: REM DEG-MIN-SEC TO DECIMAL DEGREES
1160 GOSUB 1500: REM STANDARD VALUES +/-
1170 NEXT X
1180 REM *** PUT YOUR MAIN PROGRAM STATEMENTS,
1190 REM *** GOSUB STATEMENTS, OR RETURN
1200 REM *** STATEMENTS IN THIS SECTION OF THE PROGRAM.
1210 GOSUB 1900: REM REPEAT JOB?
1220 END
1300 REM *** CONVERT DEG-MIN-SEC TO DECIMAL DEGREES ***
1310 PRINT : PRINT "DO YOU WANT TO ENTER:": HTAB 5: PRINT "(1) DEGREES-MI
NUTES-SECONDS: OR": HTAB 5: PRINT "(2) DECIMAL DEGREES?" SPC( 15):: GET
Q: PRINT Q
1320 IF Q < 1 OR Q > 2 GOTO 1310
1330 ON Q GOTO 1340,1410
1340 PRINT : HTAB 5: PRINT "DEGREES, MINUTES, SECONDS, LAT/LONG"
1350 HTAB 5: PRINT "FORMAT: D,M,S,L"
1360 PRINT : HTAB 6: PRINT "ENTER: "; INPUT D,M,S,Y#
1370 IF Y# = "N" OR Y# = "S" OR Y# = "E" OR Y# = "W" THEN 1390
1380 IF Y# < > "N" OR Y# < > "S" OR Y# < > "E" OR Y# < > "W" THEN 134
0
1390 C(X) = D + (M / 60) + ((S / 60) * .001)
1400 GOTO 1450
1410 HTAB 3: PRINT "FORMAT: D.D,L": PRINT
1420 M = 0: S = 0
1430 HTAB 4: PRINT "ENTER: "; INPUT D,Y#
1440 GOTO 1370
1450 RETURN
1500 REM *** ASSIGN +/- ***
1510 REM ** CHANGE LINE NUMBERS IN THE FOLLOWING FOUR STATEMENTS TO ADJU
ST PLUS AND MINUS VALUES FOR N, S, E AND W TO YOUR PROGRAM
1520 IF Y# = "N" THEN 1560
1530 IF Y# = "S" THEN 1570
1540 IF Y# = "E" THEN 1560
1550 IF Y# = "W" THEN 1570
1560 C(X) = C(X) * ( + 1): RETURN
1570 C(X) = C(X) * ( - 1): RETURN
1580 REM *** C(1)=HOME LAT.: C(2)=HOME LONG.: C(3)=OTHER LOCATION LAT.:
C(4)=OTHER LOCATION LONG.
1600 REM *** INPUT STANDARD DATA ***
1610 N = 3
1620 REM *** INSERT YOUR COORDINATES BELOW ***
1630 C(1) = 39.9005: C(2) = - 74.7175
1640 REM *** INSERT YOUR NAME AND LOCATION BELOW ***
1650 N# = "TOM--W2XD": W# = "VINCENTOWN, NJ"
1660 GOTO 1060
1700 REM *** INPUT NON-STANDARD DATA ***
1710 N = 1
1720 HOME : VTAB 8
1730 PRINT : PRINT "WHAT IS YOUR NAME?": PRINT
1740 INPUT N#
1750 PRINT : PRINT "WHAT IS YOUR HOME LOCATION?"
1760 PRINT
1770 INPUT W#
1780 GOTO 1060
1800 REM *** IDENTIFY OTHER LOCATION ***
1810 HOME : VTAB 10: PRINT "WHAT IS THE OTHER LOCATION?": PRINT : INPUT O
#: RETURN
1900 REM *** DO THE JOB AGAIN? ***
1910 HOME : VTAB 12
1920 PRINT : PRINT "DO YOU WANT TO RUN THIS JOB AGAIN?": PRINT : HTAB 25:
PRINT "(Y/N) "; GET Z#: PRINT Z#
1930 IF Z# = "Y" THEN 1010
1940 IF Z# = "N" THEN 1960
1950 IF Z# < > "Y" OR Z# < > "N" THEN 1920
1960 TEXT : HOME : PRINT "BYE!": RETURN
2000 REM *** 'C' TO CONTINUE ***
2010 VTAB 22: HTAB 5: PRINT "ENTER 'C' TO CONTINUE...": GET C#: PRINT C#
: IF C# < > "C" GOTO 2010

```

Once saved, reload the subroutines and renumber them, so as not to conflict with the main program, using a utility program such as Applesoft's "RENUMBER." Then type the other program into the computer and save the whole program under a different name. The subroutines presented here and saved as is can be reloaded and used again in other programs, again renumbering and resaving under a new name as necessary.

I hope you find these subroutines as useful as I have. Questions? I'll help if I can, but an s.a.s.e. is a must.

Key Perfect

KEY PERFECT 4.0
RUN ON
LAT/LONG CONVERSION

CODE	LINE# - LINE#
571F	1000 - 1090
9F6A	1100 - 1190
9FC1	1200 - 1360
580C	1370 - 1500
9968	1510 - 1610
6CAF	1620 - 1740
6BB6	1750 - 1930
3E74	1940 - 2010

TOTAL PROGRAM CHECK IS : 07E3

Key Perfect is a utility program that generates a "check code" for each 10 lines of BASIC or 80 bytes of machine language for an Apple II or Apple II Plus with DOS 3.2, 3.2.1, or 3.3 with a minimum of 24K. Key Perfect is available from Micro-Sparc, Inc., P.O. Box 325, Lincoln, MA 01773 (telephone 617-259-9710). MSI publishes *Nibble* magazine for Apple users.

First type these subroutines exactly as they appear, with all REM statements, character strings, and line numbers as presented. Save the subroutines, and then boot the Key Perfect disk and follow its instructions. Your table should exactly match the table published here. If it doesn't, check the line numbers where the code differs for typing errors.

References

Heise, Jan A., WA4VQD, and Ed Mehnert, N3NN. "DX Delight," 73, Peterborough, NH, December 1978, p. 174.

Lindholm, John F., W1XX. "VHF/UHF Century Club Awards," *QST*, American Radio Relay League, Newington, CT, January 1983, p. 49.

Rose, Robert B., K6GKU. "MINIMUF: A Simplified MUF-Prediction Program for Microcomputers," *QST*, American Radio Relay League, Newington, CT, December 1982, p. 36. □

The army used to call it a "field expedient," using what you have at hand. KB2MF uses a bit of theory and a field expedient to get some r.f. out on 160 from a city lot.

The Unconventional Sloping "L" Antenna For 160 Meters

BY WALT S. GRADZKI*, KB2MF

Living in a ranch-style home on a 70' x 110' lot in a residential neighborhood presented me with a challenge to build a 160 meter antenna.

As a broadcast engineer familiar with antenna operating between 550 and 1600 kHz, I was very concerned with the match between the transmitter and the antenna. Broadcast transmitters are designed to work into a 50 ohm load with zero reactance (expressed $50 \pm j0$ ohms). The j is used to identify reactance, + for inductive and - for capacitive. If the reactive component is not 0, the power output and transmitter efficiency will suffer. In addition, the bandwidth will be affected and consequently the sound will suffer.

The more I thought about the perfect antenna for 160, the more discouraged I became. There was just no way to erect a halfwave or quarterwave antenna on my limited property. Or was there? The question that kept popping up was is it necessary to achieve $50 \pm j0$ ohms? The answer was not really. What would suffer and what problems could I expect to see? Bandwidth and efficiency were not major issues, and since an amateur transmitter operates either in the c.w. or s.s.b. mode, the key-down duration period wouldn't put any excessive strain on my finals.

With theory now out of the way, I proceeded to string up a quarterwave antenna any way I could. The result was an antenna wire attached to my tower, end-fed at 30 feet, sloping down to the far corner of my backyard, and attaching to a 6 foot high stockade fence. From that point the wire makes a 45-degree turn to the right and travels 1 foot above the fence for 50 feet. The only ground used is the 30 foot tower and an 8 foot ground rod attached to it. The total length of wire used was about 136 feet.

To make the antenna work, I installed a Bird model 43 Thru-line wattmeter in the line at the transmitter end and trimmed

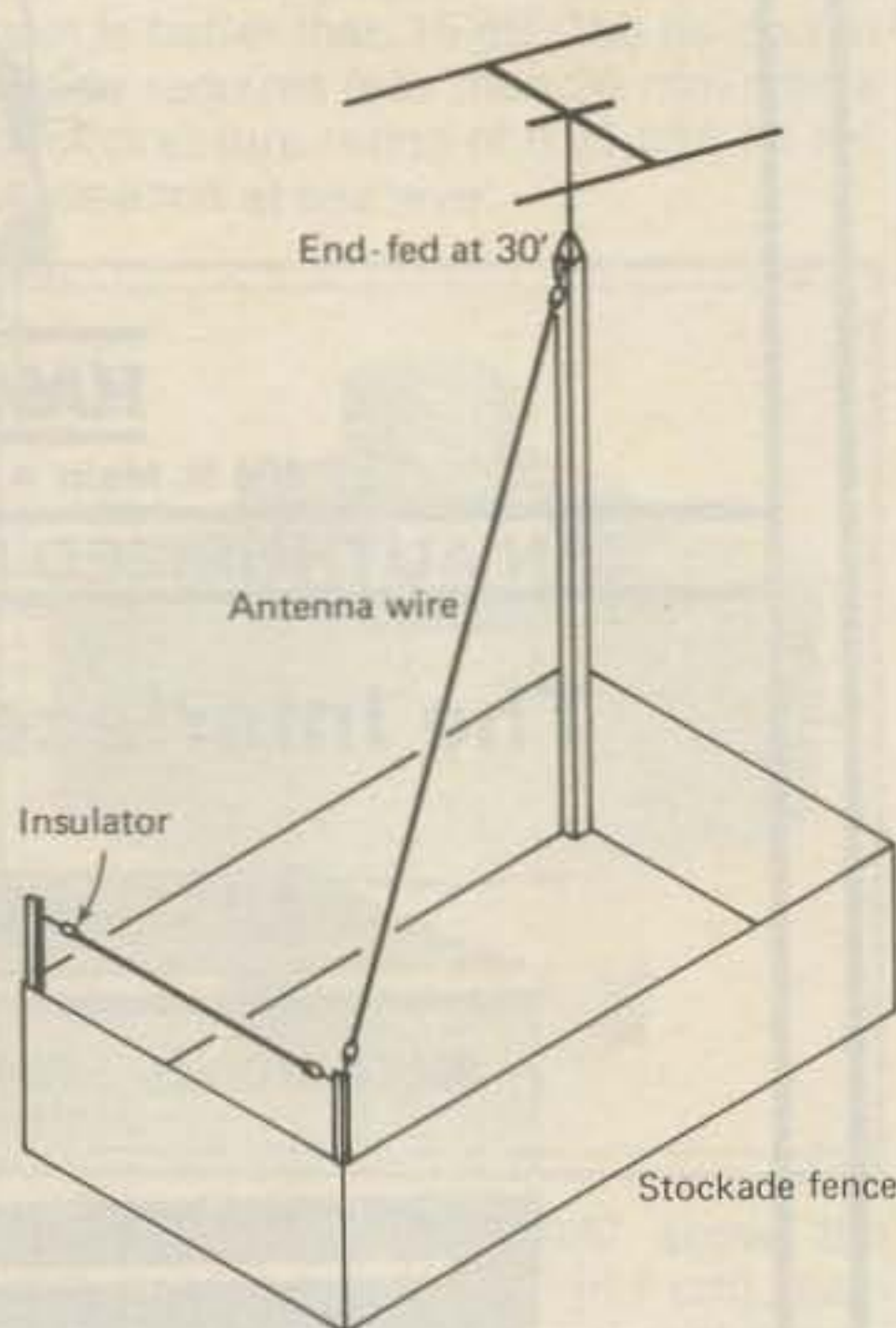


Fig. 1- Diagram showing antenna layout, an unconventional sloping "L."

1800	2.5:1
1825	2.1:1
1850	1.5:1
1875	1.25:1
1900	1.1:1
1925	1.35:1
1950	1.8:1
1975	2.3:1
2000	2.5:1

Table I- S.w.r. measured with the Bird 43 Thru-line wattmeter.

the antenna length for a 1:1 s.w.r. at the center of the band. Using this technique I got an s.w.r. of 2.5:1 at the band ends and an s.w.r. of 1:1 at the center.

Just out of curiosity, and since I had the equipment handy, I measured the whole band with a stable URM-25F signal generator and a General Radio 916-AL R.F. Bridge. At 1900 kHz the antenna system read $48 + j0$ ohms. However, at

1800	$12 + j3.3$ ohm
1825	$15 + j10$ ohm
1850	$22 + j13$ ohm
1875	$34 + j16.3$ ohm
1900	$58 + j8$ ohm
1925	$51 - j37$ ohm
1950	$28 - j37$ ohm
1975	$15 - j26$ ohm
2000	$10 - j19$ ohm

Table II- Resistance and reactance.

1800 kHz it read $12 + j3.3$ ohms, and at 1975 kHz it read $15 - j26$ ohms. As you can see, the resistance and reactance varied all over the place.

The end result is that the antenna works great throughout the band. It was cheap and easy to build. The items used were 136 feet of No. 14 copperweld wire, 2 plastic insulators, 1 hose clamp, and a length of RG-8 about 50 feet long with a PL-259 connector on the end.

Will it work DX? Perhaps. Will it work WAZ? Maybe. Can I operate on 160 meters and have fun? You bet! The moral to this story is don't be concerned about a proper antenna. Improvise and trim until you get a good, low s.w.r. and operate.

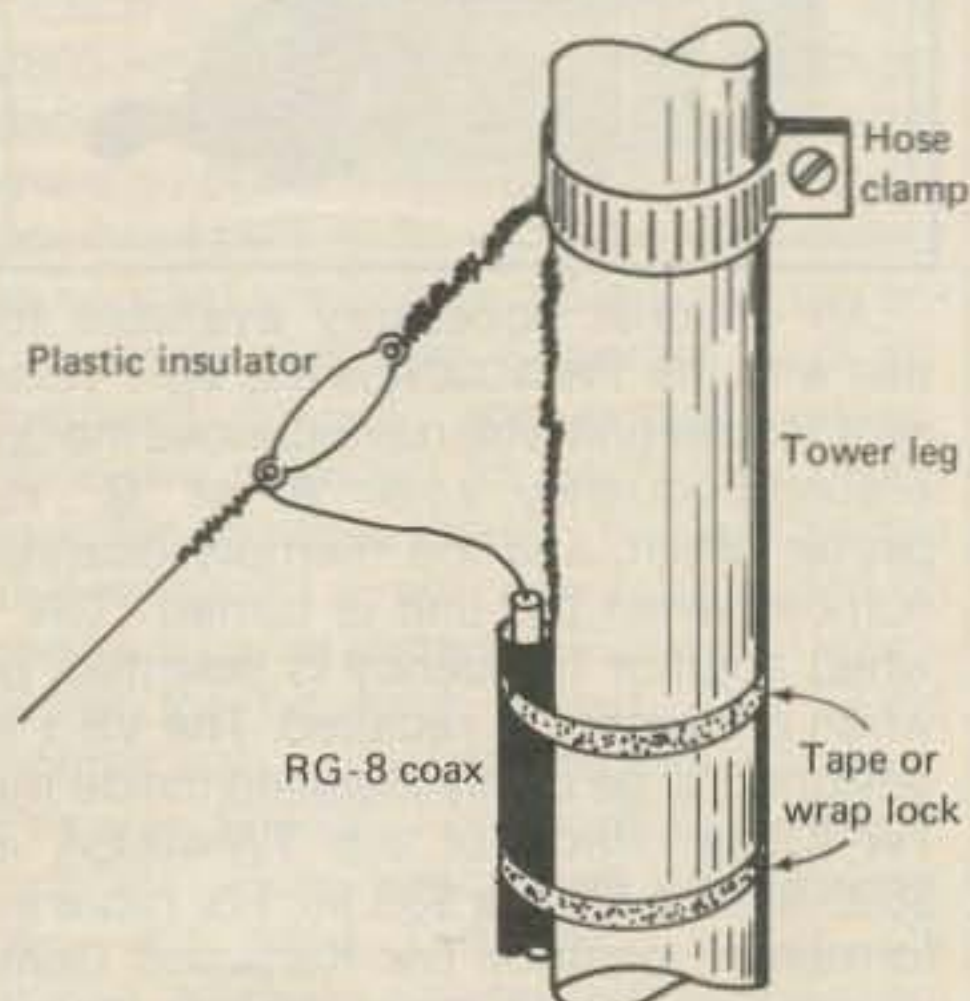


Fig. 2- Typical end-fed installation of the unconventional sloping "L."

*22 Sutton Place, Toms River, NJ 08753

IN THE GOOD OLD SUMMERTIME

The publishers of *The Final Exam* offer you books to while away those lazy summer days!

- ★ Teaching Novice classes? Your students will thank you for using the **Novice Class edition of *The Final Exam***. Not a Q & A manual, but a straightforward book that tells your students what you want them to know while keeping them amused. Your students will finally *enjoy learning!* Used in classes all over the country. Only \$4.95 plus \$2.25 Shipping & Handling (S & H) for a single copy. Quantity discounts usually available through your local dealer.
- ★ Want to keep up with changes in the FCC rules? For only \$9.95 per year we offer you a *subscription to Part 97 of the FCC Rules & Regs* with verbatim updates mailed 1st Class every 2 months. There's no better service anywhere!
- ★ ***The Complete Idiot's Guide to DX*** by Stu Gregg is just what beginning DXer's need. With a sense of humor, Stu teaches the basic ins and outs of DX. Only \$9.95 (plus \$2.50 S & H).
- ★ Got an Apple II, II+, or Ile and like DX? ***The DX-Pediter*** will help you tremendously with your record keeping while you work on DXCC! On 5 1/4" floppy with good documentation for \$29.95 (plus \$2.00 S & H).
- ★ Can't remember where you saw an important formula or table with ham data? Look in ***Band-Aids!*** This is an encyclopedia of miscellaneous info for hams for just \$9.95 (plus \$2.25 S & H).
- ★ Here's the newest book by Bob Shrader - W6BNB - ***Amateur Radio Theory & Practice***. If you really want to *understand* ham radio theory, then this book is a must! Available for \$19.95 (plus \$3.50 S & H).
- ★ Antenna enthusiasts! You need ***Antennas*** by John Kraus - W8JK. This is loaded with calculus and trig but is the "Bible" of antenna books. Only \$44.95 (plus \$4.00 S & H).
- ★ Do you want antenna applications? Order ***Antenna Engineering Handbook***. This 1,013 page book by H. Jasik has more info than you'll use in three lifetimes. Just \$74.95 plus (\$4.00 S & H).
- ★ Want a good theory book on electronics? Get ***Electronic Communication*** by Bob Shrader. Need to pass the FCC's General Radiotelephone exam? Used in classrooms throughout the country, this theory book does the trick. Order one today for \$26.95 (plus \$4.00 S & H).
- ★ Ready to learn solid state? Get ***Electronic Principles*** by Malvino. This is the book to read after *Electronic Communication*. Put it on your bookshelf for \$26.95 (plus \$4.00 S & H).
- ★ California orders must include 6 1/2% sales tax (no tax on S & H). Visa & MasterCard accepted. All of the above items are in stock at this time. Prices valid until September 1, 1983. Free shipping via UPS or Parcel Post on orders over \$75.

In The Works

The Ham Radio Instructor's Guide (Vol. I) will instruct you how to teach ham classes. The first volume discusses the psychology of learning, lesson plans, course development, etc. What's more, an organization is being developed to certify ham radio instructors. Dick Bash - KL7IHP is almost finished with the book and plans to have it available in September. Price will be \$14.95 (tentative) plus \$2.50 S & H.

- Attention Authors -

We are seeking authors for books on RTTY, satellites (Phase III-B or later), antennas, and VHF/UHF theory. Please send for our information sheet and get your book published *now!*

Orders should be mailed to:

Bash Educational Services, Inc.

P.O. Box 2115 • San Leandro, CA 94577 • 415-352-5420
Telephone orders accepted Monday - Friday, 10 AM - 6 PM (California time)

CIRCLE 79 ON READER SERVICE CARD



TEN-TEC Corsair



TRIO-KENWOOD 830



TRIO-KENWOOD 7950



TRIO-KENWOOD 930



ICOM 740



TRIO-KENWOOD R-2000



TRIO-KENWOOD TS-430S

For your super special price

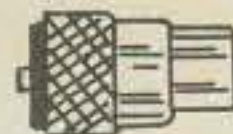
Call Toll Free:

800-638-4486

Laurel Plaza - Rte 198
Laurel, MD 20810
in MD. Call: 792-7373

CIRCLE 38 ON READER SERVICE CARD

NEMAL ELECTRONICS COAXIAL CABLE SALE



CABLE LOSS CHART — IN WINTER '82/'83 NEMAL CATALOG — FREE
WITH ORDER OR SEND SASE

** SATELLITE TV—TYPE "N" **

UG-21D/U Male for RG-3, 213	..... \$3.00
UG-21D/U Silver Plate	..... \$3.35
UG-23B/U Female for RG-8	..... \$3.75
UG-27C/U Elbow, Silver	..... \$5.25
UG-29B/U Barrel, Silver	..... \$4.25
UG-57B/U Double Male, Silver	..... \$5.25

Same Day Shipment!

* FRANCHISED DISTRIBUTOR, KING'S CONNECTORS

POLYETHYLENE DIELECTRIC

RG6A/U double shield 75 ohm	..... 25¢/ft.
RG59/U 100% foil shield TV type	..... \$7/100 ft or .10¢/ft.
RG8U 96% shield mil spec	..... \$27.95/per 100 ft or .31¢/ft.
RG11U 96% shield 75 ohm mil spec	..... 25¢/ft.
RG58AU Stranded Mil Spec 96% Shield	..... 12¢/ft.
RG58U mil spec 96% shield	..... 11¢/ft.
RG62AU 96% shield 93 ohm mil spec	..... 12¢/ft.
RG174/U-mil spec 96% shield	..... *8./per 100 ft or .10¢/ft.
RG213 noncontaminating 96% shield mil spec	..... 36¢/ft.

LOW LOSS FOAM DIELECTRIC

RG8X 95% shield	..... \$14.95/100 ft or .17¢/ft.
RG8U 80% shield	..... 16.95/100 ft. or 19¢/ft.
RG58U 95% shield	..... 10¢/ft.
RG59/6/U 100% foil shield 18 Ga. 75 ohm	..... 12¢/ft.

Cable—shipping \$3.00 1st 100 ft., \$2.50 each add'l 100 ft.

COD (cash only) add \$1.50—FLA. Res. add 5% Sales Tax

1325 NE 119th Street, Dept. 4X, North Miami, FL 33161

100 ft. RG8U with PL-259 on each end	..... \$19.95
RG8U 97% shield 11 Ga (Equiv. Belden 8214)	..... \$29.95/100ft.
RG214/U (Double Silver Shield- 50 ohms)	..... \$1.55/ft.
3/8" tinned copper ground strap	..... 30¢/ft.
RG-217/U mil spec, double shielded, non-contaminating, 1/3 less loss than RG-8, 5000 watt rating	..... 85¢/ft.

ROTOR Cable 8 Conductor (2-18GA/6-22GA) . . . 19¢/ft.
HEAVY DUTY ROTOR cable (2-16GA/6-18GA) . . . 36¢/ft.

CONNECTORS MADE IN USA

PL-259 Teflon/Silver	..... \$1.59
Amphenol PL-259	..... 79¢
Amphenol BNC UG88C/U Male for RG-58	..... \$1.25
PL-259 push-on adapter shell	..... 10/\$3.89
PL-259 and/or SO-239	..... 10/\$5.89
Double Male Connector	..... \$1.79
PL-258 Double Female Connector	..... 98¢
Reducer UG-175 or 176	..... 10/\$1.99
UG-255 (PL-259 to BNC)	..... \$3.50
Elbow (M359)	..... \$1.79
F59A (TV type) built on crimp ring	..... 10/\$1.99
UG 21D/U Amphenol Type N Male for RG8	..... \$3.00
UG-273 (BNC to PL)	..... \$3.00

Connectors—shipping 10% add'l. \$3.00 minimum

ORDERS UNDER \$20.00 ADD \$2.00 ADD'L. HANDLING

Call (305) 893-3924

CIRCLE 112 ON READER SERVICE CARD

SUMMER TIME IS ANTENNA TIME

TELEX®

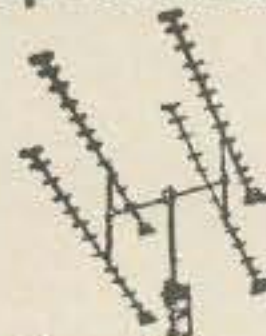
hy-gain®

TH7DX	..... \$379.00
TH5MK2	..... \$319.00
TH3MK3	..... \$219.00
TH2MK2	..... \$139.00
18HTS	..... \$349.00
18AVT	..... \$ 95.00
V2S	..... \$ 44.95
214BS	..... \$ 35.00
HC144MAG	..... \$ 29.95
HB144MAG	..... \$ 20.95

Call for prices on KLM
and Antenna Specialists

ZUBER'S AMATEUR RADIO

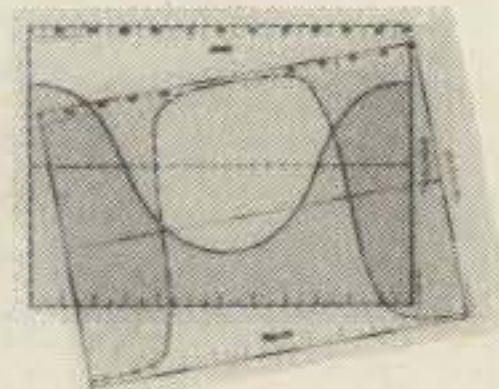
a division of Zuber's Sound Around
421 First Avenue S.E.
Cedar Rapids, Iowa 52401
Phone 319/362-4434



We Want To Be Your Ham Dealer!
Money Order, Cashiers Check — F.O.B.

CIRCLE 37 ON READER SERVICE CARD

Fight Poor Conditions with . . . The DX EDGE



The DX operating aid used around the world. Increase your country totals on all bands by knowing: Where and when to look for long haul QSOs on the long path and Gray Line; When the sun rises and sets at any QTH in the world at any time of year. See it all: no tables to use or calculations to make. Slide rule format.

Large size: map, with zones and prefixes, 12" x 4 3/4"; 12 slides, one for each month, 6 1/4" x 4 3/4". All plastic.
Price: \$14.95 ppd. in U.S., Canada, Mexico; \$16.00 in N.Y.; \$18.95 in all other countries,
air mail. U.S. funds only. Please make check or m.o. payable to The DX EDGE and mail to:

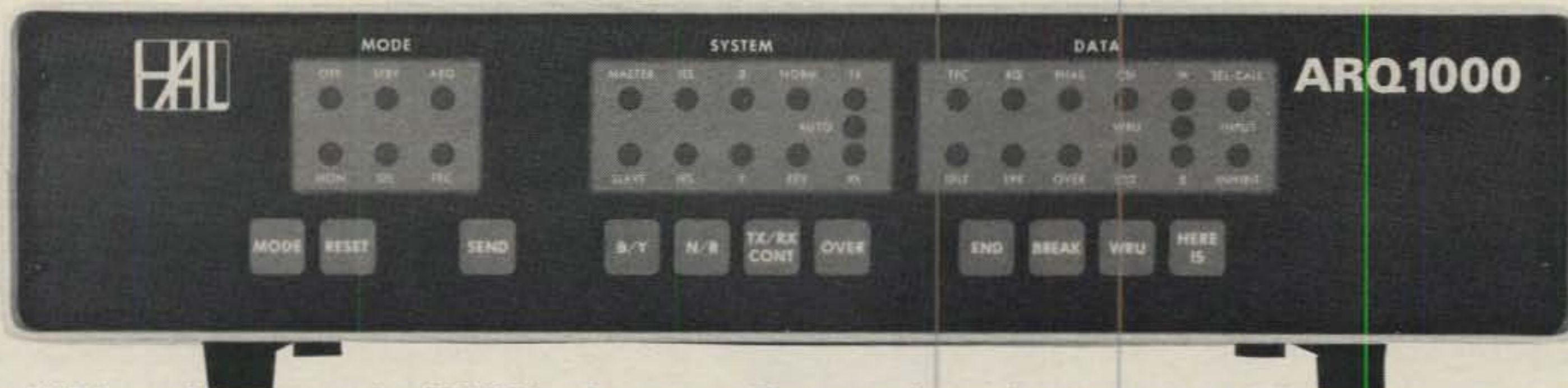
The DX EDGE, P.O. Box 834, Madison Square Stn., New York, N.Y. 10159

An information flyer is available free of charge.

A product of Xantek, Inc. © Xantek, Inc. 1982

Please send all reader inquiries directly.

AMTOR RTTY

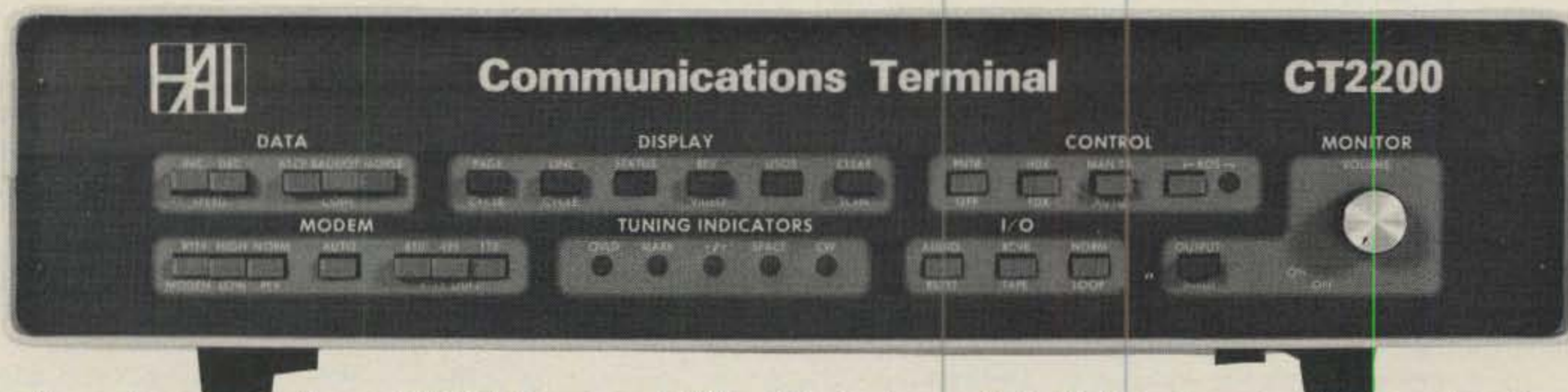


HAL is proud to announce the ARQ1000 code converter. This terminal not only supports the AMTOR amateur codes, but meets ALL of the commercial requirements of CCIR Recommendation 476-2. The ARQ1000 can be used with present and previous generation HAL RTTY products. In fact, any Baudot or ASCII full duplex terminal at data rates from 45 to 300 baud may be used with the ARQ1000. Some of the outstanding features of the ARQ1000 are:

- Send/receive error-free ARQ, FEC, and SEL-FEC modes
- Automatic listen mode for ARQ, FEC, and SEL-FEC
- Meets commercial requirements of CCIR 476-2
- By-pass mode for normal RTTY without changing cables
- Programmable ARQ access code, SEL-CAL code and WRU
- Programmable codes stored in non-volatile EEPROM
- Keyboard control of normal send/receive functions
- 30 Front panel indicators and 11 control switches
- Interfacing for loop, RS232, or TTL I/O
- "Handshaking" control for printer and keyboard or tape
- Self-contained with 120/240V, 50/60 Hz power supply
- Cabinet matches style and size of CT2200 and CT2100
- Table or rack mounting
- Built-in DM170 modem option available
- Encryption option available for commercial users
- 8 1/2" x 17" x 10 1/2"

The ARQ1000 is commercial-quality equipment that will give you the outstanding performance you expect from a HAL product. Write for full details and specifications of the ARQ1000.

BY POPULAR REQUEST



By popular request — the new CT2200. Our slogan is "When Our Customers Talk, We Listen" — and we have been listening. The CT2200 includes these often requested features:

- New AMTOR connections for use with ARQ1000
- Keyboard programming of all 8 "brag-tape" messages
- Programmable selective call code
- Expanded HERE IS storage for a total of 88 characters
- Non-volatile storage of HERE IS, "brag-tape," and SEL-CAL code
- 3 1/8" x 17" x 10 1/2"

All of the proven CT2100 features are retained. Some of these features are:

- Tuning scope outputs (a MUST for AMTOR)
- Built-in demodulator for high tones, low tones, "103", or "202" modem tones
- 36 or 72 character display lines
- 2 pages of 72 character lines or 4 pages of 36 character lines
- Split screen or full screen display
- Baudot or ASCII, 45 to 1200 baud
- Full or half duplex
- Morse code send/receive at 5 to 99 wpm
- Send/receive loop connection
- Automatic transmit/receive control (KOS)
- Audio, RS232C, or Loop I/O
- On-screen tuning and status indicators
- Clearly labeled front panel switches, not obscure keyboard key combinations
- Separate convenient lap-size keyboard
- Internal 120/240, 50/60 Hz power supply
- Attractive shielded metal cabinet

In addition, an update kit is available so that all CT2100 owners can update their CT2100's to include CT2200 features. The kit even includes a new CT2200 front panel! Rather than making a proven product obsolete, HAL put even more behind the buttons. Pick up a CT2200 at your favorite HAL dealer and join the RTTY fun. Write for our full RTTY catalog.



HAL COMMUNICATIONS CORP.
Box 365
Urbana, IL 61801 (217) 367-7373

NEWS OF COMMUNICATIONS AROUND THE WORLD

*Sound, sound the clarion, fill the fife!
Throughout the DX world proclaim
One crowded hour of DX life
Is worth an age without a name . . .*

Though August brings the warm, slow days of summer, it is also a sign that the great days of Fall DXing are near. As DXers turn from the rites of summer to prepare for the great CQ World-Wide DX Test in October, it is also the time to burnish some of the never-ending worries. Last week one of the burnishers was up the hill to alert us to some of the problems that worriers face.

"It's these contests that are getting to me," he glumly advised us. "Once I would be all fired up when Fall was near, ready to go day and night and not particularly caring what contest was on. If there was a contest, I was there. I would work 'em all. But somehow it doesn't seem to be fun anymore. Sometimes I hardly get excited at all."

As one eventually comes to suspect, there is a reason for most everything; hardly anything ever happens without a reason. The initial suspicion was that the local QRP type had been trampled on in a pile-up, possibly not only having been beaten, but maybe even not getting through with the end of the bunch—those with low towers and lower power. Certainly this one would have been out of place in that crowd.

"Remember the DX Tests this Spring?" he asked, his eyes filled with a question that we suspected we would hear more about. "The bands were opening to various parts of the world. That was good, but the more I'd tune, the more I'd find stations just sitting on a frequency and calling 'CQ DX.' On some bands it seemed as though they were lined up like pickets on a fence." The QRPer leaned closer. "And would you believe? They were mostly W's and K's! What do you think of that?"

"What I want to know," continued the QRPer, quickly getting to the nub of his worries, "is why anyone in a world-wide DX test needs to work or go looking for a 'W' or 'K' station? That's what I'd like to know. Are those prefixes suddenly so rare that all you have to do is announce your availability and you'll be fighting off a pile-up? What's going on anyhow?"

"That all?" we slipped in, and the QRPer was off again. "And what about all these ideas that you read about every time you pick up a magazine? Things like



This is Heitor Vianna Posada Filho who operates from Niteroi across the bay from Rio de Janeiro. Interested in DXing, he signs PY1EQR and works as a flight-control radar operator at the Rio de Janeiro airport.

a codeless license, no DXCC credits on the new bands, no license at all for CBers, more phones on the old bands, no phone on the new bands. And what do you think of that idea I saw in one magazine that full-blown pile-ups on a rare station should be confined to 10 kHz of the band?" Again the QRPer was leaning close to nail down our attention. "Can you imagine a true-blue ZA-Albanian showing on the bands and trying to hold things to 10 kHz? I don't think that DX has ever before been in such a precarious state, and I fear for the future." This was a worried DXer for sure, standing there using his hands to shape his words. But what could one say?

Most DXers live with the premise of the fairness of men and the goodness of the world. But this one was feeling the edge of something that he could not scratch. "That's just what they were doing," he said, pounding a fist into the palm of the other hand for emphasis, "and some of them were running everything wide open and maybe even a bit more. Why some were buckshotting 5 kHz either side of their frequency, and you know what it takes to do that these days. That isn't the way it is supposed to be, is it?" He said all of this as though there was no room for argument. It was then that we decided to haul him even further up the hill to the Old Timer who has been around so long that he knows personally everything that irritates DXers and possibly even a few more that the newer DX types have not yet thought of. Sometimes a second opinion helps.

The QRPer was quick into his woes. "Sometimes I think," he said, "that the good old days are all gone and there are

no good ones left." Then he again told the Old Timer of his fears and troubles. He got an attentive ear. Finally the Old Timer spoke and we listened.

"You've probably heard me say it before, but almost every DXer comes on the scene thinking he's found perfection in an imperfect world. Usually he is so convinced that he wants no change except for possibly adding some new countries. But one learns; one always does." The Old Timer looked at the QRPer. "You following me?" he asked, and the QRPer nodded his head.

"Years ago," the Old Timer continued, "I had moderate power and a beam. In a contest I'd hear someone with a strong signal calling a station that I needed and the strength of the signal discouraged me from even getting in. Then after awhile I continued to listen, and although the signal might have been strong, the results were not. Finally I came to the conclusion that what I was hearing was a signal off a vertical or possibly a dipole, but a signal that was being radiated in more than one direction—sometimes a signal that was stronger at my place than at the DX stations. Understand?"

"I'm going to speculate," the Old Timer continued, "that while you hear them calling 'CQ DX,' you also hear sparse results. Maybe once in awhile you'll come across a station with a superb location, high towers, and big antennas. Throw in the adequate power, and they'll work everything. But you'll also find them scanning the bands in a DX Test, hearing what they need for multipliers, working them quickly, and then on to another. When they can't work multipliers, they work counters, and many West Coast stations have done just that by working JA's as long as their endurance lasts when the bands are out to other areas. Certainly you've noticed all of this?"

The Old Timer had the QRPer's attention. "You mean that maybe I'd ignore those camped on a frequency and everlastingly calling 'CQ DX' and search for countries and counters that I might hear and which they probably are not. Is that what you mean?"

The Old Timer was looking off into the distance. "You might try it," was all he would say. The QRPer stood waiting for more advice, but none came. We weren't going to say anything at this point, for it was evident that this QRPer respected words that came from a source of wisdom he thought was denied him. But we knew he'd learn, for DXers always do.

"How many licensed amateurs are there in the U.S. these days?" we asked, already knowing the answer, but trying to divert this QRPer's thinking. The answer

77 Coleman Dr., San Rafael, CA 94901

The WPX Program

Mixed

1051 NU4N 1053 KI2G
 1052 DF1SD 1054 YU7DX

S.S.B.

1584 KA0IQR 1587 KI2G
 1585 G4KHF 1588 W0CON
 1586 JF2IGP 1589 EA7AVU

C.W.

2204 EA7CJM 2207 W9CBE
 2205 VE3DAP 2208 W2YVQ
 2206 W9VEN

Endorsements

Mixed: 450 DF1SD, KI2G, KU4N, WA3ZMY, VE3KZE, YU7DX, 500 DF1SD, KI2G, WA3ZMY, YU7DX, 550 DF1SD, KI2G, WA3ZMY, 600 VE5AE, DF1SD, KI2G, VE2PD, WA3ZMY, 650 DF1SD, KI2G, WA3ZMY, 700 NN4Q, DF1SD, 750 NN4Q, JA1VDJ, 800 NN4Q, JA1VDJ, 850 WD9IC, NN4Q, JA1VDJ, 1000 NN4Q, JA1VDJ, JE1JKL, 1050 JE1JKL, 1150 KL7AF, 1300 N7TT, I2PHN, 1350 IN3ANE, I2PHN, K9BG, 1400 I2PHN, 1450 I2PHN.

S.S.B.: 350 K2POF, KA0IQR, DL3OK, KI2G, KU9C, 400 KA0IQR, KI2G, DL3DK, WD5HEG, EA3BOX, 450 KA0IQR, KI2G, DL3DK, EA3BOX, 500 KI2G, DL3DK, EA3BOX, 550 WD9FOE, KF4EO, KI2G, DL3DK, 600 WD9HAW, KI2G, YB0ACL, VE2PD, DL3DK, 650 JH4PRU, DL3DK, 700 LU3YL/W4, KZ2P, 750 LU3YL/W4, KZ2P, 800 LU3YL/W4, 850 LU3YL/W4, 900 LU3YL/W4, 950 LU3YL/W4, I3ZKD, 1000 LU3YL/W4, I3ZKD, 1050 LU3YL/W4, I3ZKD, 1100 I3ZKD, I2PHN, I6SF, 1150 I3ZKD, I2PHN, 1450 W0YDB, 1600 I4ZSQ, 350 EA7CJM, W9VEN, KN7K, 400 W9VEN, 450 K2POF, W9VEN, 500 OZ5EDR, 600 W6YMH, 900 OK1DKR, 1000 N4YB, 1100 N4YB, 1500 N2AC.

C.W.: 350 EA7CJM, W9VEN, KN7K, 400 W9VEN, 450 K2POF, W9VEN, 500 OZ5EDR, 600 W6YMH, 900 OK1DKR, 1000 N4YB, 1100 N4YB, 1500 N2AC.

10 meters: LU3YL/W4.
 15 meters: LU3YL/W4.
 20 meters: DF1SD, KI2G.
 40 meters: LU3YL/W4.
 160 meters: LU3YL/W4, KC8JH.

Asia: LU3YL/W4, DF1SD.
 Africa: WD9IC, DL1AM, LU3YL/W4.
 Europe: G4KHF, K3IXD, DF1SD, KI2G.
 No. America: K7DBV, KI2G.
 Oceania: LU3YL/W4, N4YB, W4ZYQ.

VPX 229: 13-72249.

WPNX 215: KA8ISF.

Award of Excellence: LU3YL/W4 with 160 meter endorsement.

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

was right there. This QRPer could think on his own. Come to think of it, most DXers can. We pressed on.

"With some 400,000 or so licenses out, is it really possible that there is spectrum for all of these to be on the air at the same time? Or even half of them? Some who have been close to the action have figured that not more than 25% of amateur licensees are active; the others are holding their licenses, but show little or no activity. Years back when the FCC charged fees for a while, the number of licenses held dropped significantly, as those inactive amateurs apparently felt it was not worth the price to hold on to something they were not using or had no intention of using. Then the FCC fees were rescinded, other factors moved in, and the totals soared." We were moving close to hold the QRPer's attention. "Does any of this have significance for you?" we asked, and the QRPer was lost in thought. After a bit a light started to show in his eyes.

"You mean . . .?" he said, and we nod-



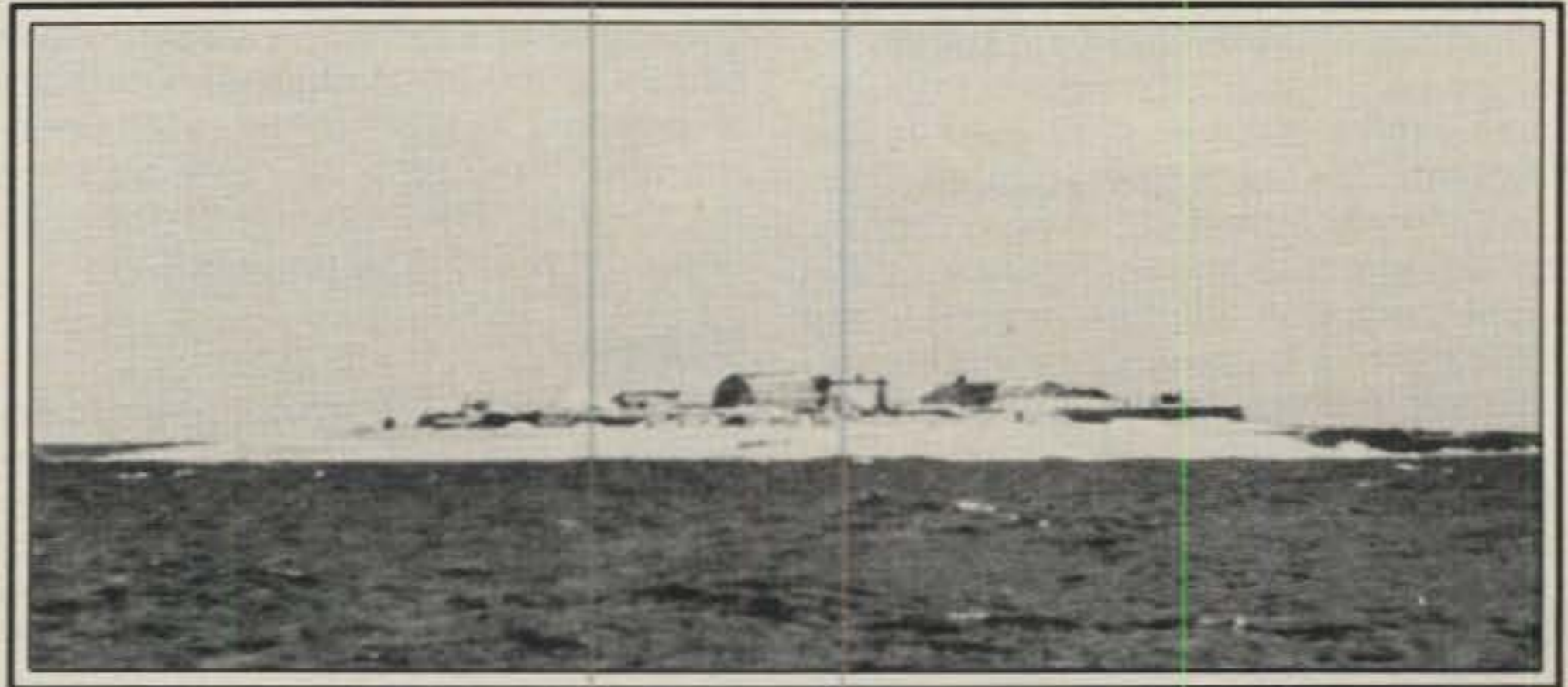
This photo was taken during a visit to Japan by OZ5DX. Left to right are JH1WIX, OZ5DX, and JP1BJR, ex-J2JJ, of the 1930s. Anyone ever operating on 21 c.w. has heard the loud signal of JH1WIX. (Photo via W2GT)

ded. He smiled and again was showing animation. "All these years," he continued, "when you were telling me about listening, I just got to thinking that you were trying to clear the frequency. But I listen and a lot of other DXers I know also listen. Sometimes when you think that no one's around, a call on the 2 meter box will bring a dozen or more of the locals out into the open. Right?"

He was right, and almost any casual DXer will recognize the scenario. "But what is it like when a really rare piece of DX shows up, possibly even one that you need. Then all the listeners become callers and the bands get a bit tight, right!"

If nothing else, this was taking the QRPer where he wanted to go. "You know," he rushed on briskly, "one of those articles in a magazine said that DX pile-ups interfere with important things like ragchewing. But thinking things over, any increase in activity is always going to crowd the bands for a period. But then again, a DXpedition usually only has a limited run, so the problem is self-correcting.

"You know something," the QRPer finally said. "You were right about politicians learning early to listen. DXers would possibly be in the same category, but listening is not going to be enough. I'm going to do something about it. That's for sure!"



Amboina Cay in the Spratlys, this taken by the 1979 IDXF effort. They were fired on at that time by troops on the island. This Spring DJ3NG and DJ4EI died as the result of mortar fire which sunk their boat in the vicinity.

And away he went. But the next time I saw him down in the village, there on his rear bumper was the slogan: "Free the DX Bands." Down in the Oklahoma country some may think he's thinking of gasoline, but most DXers understand.

Spratly

Back in April many Dxers were waiting for a projected Spratly operation by West German amateurs to show on the air. The waiting turned to shock when the group approaching one of the islands reported that they were under fire and went off the air after hurriedly reporting that the vessel was on fire.

For some days there was growing concern over what had happened. Ships in the vicinity reported no sighting of survivors. Then after eight days a report came that survivors had been found floating in an open dinghy by a Panamanian registry vessel and were taken to Hong Kong. The report was that Diethelm Mueller, DJ4EI, was killed in the initial attack, being caught by an artillery blast and blown overboard. Gero Band, DJ3NG, died but hours before the rescue vessel *Linden* sighted the survivors. The leader of the effort, Baldur Dronica, DJ6SI, and Norbert Willand, DF6FK, were hospitalized in Hong Kong, dehydration and exposure being severe. The owner of the vessel, Peter Marx, and another crew member, Jenny, were also receiving medical attention. Apparently the 51 foot vessel was a total loss along with all the equipment.

The vessel had approached Amboina Cay, and deciding that the portents were not friendly, they changed course to head away from Amboina and towards another island in the Spratly group. This was when they were fired on, set afire, and destroyed. The vessel was hurriedly abandoned without time to provide for survival supplies. A sea and air search was made although in some instances this covered the wrong areas. It was reported that the hostile fire came from Vietnamese troops on the island. Several of the countries whose nationals were involved were looking into the matter.

In these DX columns last month there

The WAZ Program

10 Meter Phone

243 WD5DBV 245 F6FHO
244 F6FFA

15 Meter Phone

161 N4PB 162 JI1VVB

20 Meter Phone

448 N6CYL 452 W2IJB
449 K4RIG 453 N1ALR
450 KB6YC 454 W4JFE7
451 KM6B

10 Meter C.W.

46 JH3JJS

15 Meter C.W.

91 JA1BN

20 Meter C.W.

192 W4WJ 194 W4JFE7
193 N4KE 195 N5CID

40 Meter C.W.

41 JH7BDS

All Band WAZ

S.S.B.

2660	KD6BV	2672	WD0DMN
2661	JA1UTQ	2673	KB5EK
2662	WA2GEA	2674	F6FWW
2663	KA0FPK	2675	W5UFI
2664	WD4PQF	2676	JA7HMZ
2665	HK8BVN	2677	WN5MBS
2666	KK0L	2678	W3ICM
2667	WD8PKF	2679	PT2LS
2668	WD8KLC	2680	EA7BLU
2669	ON8HF	2681	EA6OB
2670	WB3DWH	2682	EA7AZJ
2671	WB7VHA		

C.W. and Phone

5563	KA2DIV	5572	DK8SV
5564	N6DW	5573	DF3ZK
5565	W4EJH	5574	ON8HF
5566	KJ9O	5575	W7LYO
5567	K9AYK	5576	W9LCQ
5568	JA7UFZ	5577	WA8WMC
5569	KB6EP	5578	DL2NAP
5570	DL9WW	5579	W3CIM
5571	DF9TD	5580	JF3AIE

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. 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 C.Q. awards is \$4.00 for subscribers and \$10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application.

was a report from San Hutson, K5YY, on the question of continuing the Spratlys as a DXCC country. Several factors were noted, these including the possible danger to any operation aimed at putting the islands on the air. Although the column was written back in April prior to the events in the South China Sea, San Hutson's words turned out to be prophetic, much more than anticipated. At Visalia in April there was also discussion on the possibility of deleting Spratly, although this ended on an inconclusive note.

Back in the 1960s two other DXers, Chuck Swain and Ted Thorpe, were lost at sea in a small boat when returning to the Samoa area after a DXpedition in the South Pacific. They were caught in a tropical storm. Chuck Swain, then XW8AU, was one who founded the SEANET back in 1963; his home call was K7LMU. Ted Thorpe was out of New Zealand. Chuck



Two choice DXers (left to right) are Ken Cohen, VS6IC, and Arsen Innocenty, JT1AN. Note that Arsen is holding on to a copy of his favorite magazine. For those who may have the opportunity of visiting Hong Kong, Ken has the only kosher delicatessen in all of Hong Kong. (Photo via W7PHO and W2LZX)

Swain was also with Don Miller when they first put Spratly on the air back in 1965 signing 1S9WNV.

More than once there have been DX-peditions where some long chances were taken and where some personal peril was always at hand. More often than might be expected, these efforts came off successfully. But inevitably something happens, something goes wrong, and the results are tragic. No DXer will ever consider that working some of these countries is worth the price.

Spratly Islands are disputed territory with a number of countries laying claim to the reefs. China, Vietnam, and the Philippines are among those who consider the reefs as sacred ancestral soil. It is also an area where seismic exploration has indicated the possibility of oil deposits. Under the proposed Law of the Sea treaty, sovereignty over an island also includes the sea floor for 200 miles around. Although this has not been ratified by a number of nations, including the United States, there has been no hesitancy on the part of many nations to declare a claim for sea bed up to 200 miles offshore. For years no one paid much attention to the Spratlys; now there may be more attention than justified. The loss of the two German amateurs will long be remembered.

Malpelo

Fred Laun, K3ZO, now assigned to Colombia, was the first to confirm that a Malpelo effort by the HK amateurs is on for this Fall (probably in October).

The call sign will be HK0TU, and the effort will be sponsored by the Liga Colombiana de Radioaficionados (LCRA). Early on, those listed for the effort were HK1QQ, HK3RQ, HK3BAU, HK3TF, and HK0BKX. Initial plans called for three, possibly four,

5 Band WAZ

Standings as of May 1, 1983

All 200 zones worked:

1. ON4UN, John Devoldere (Belgium)
2. K4MQG, Gary Dixon (U.S.A.)
3. SM4CAN, Kent Svensson (Sweden)
4. AA6AA, Steve Orland (U.S.A.)
5. W8AH, Albert Hix (U.S.A.)
6. W6KUT, E. A. Andress (U.S.A.)
7. EA8AK, Fernando Fernandez (Spain)
8. LA7JO, Stig Lindblom (Norway)
9. EA3SF, Fernando Blenert (Spain)
10. OH1XX, Hannu Nieminen (Finland)
11. EA8OZ, Julio Rosello (Spain)
12. W0SD, Edward Gray (U.S.A.)
13. K0ZZ, Gary Knutson (U.S.A.)
14. ON6OS, P. Michiels (Belgium)
15. OK3TCA, E. Melcer (Czech.)
16. K6SSS, Fred Capossela (U.S.A.)
17. ZL3GQ, Peter W. Watson (New Zealand)
18. OK3CGP, Stefan Melcer (Czech.)
19. SM0AJU, Leif Lundin (Sweden)
20. OZ3PZ, Preben Thomsen (Denmark)
21. I3MAU, Reno Mauri (Italy)
22. I2ZGC, Gianni Zillio (Italy)
23. 4Z4DX, Dov Gavish (Israel)
24. N4KE, Ron Blake (U.S.A.)
25. K5UR, Rick Roderick (U.S.A.)
26. K9AJ, Michael McGirr (U.S.A.)
27. SM3EVR, Tord E. Julander (Sweden)
28. LA5YJ, Bjorn Hugo Ark (Norway)
29. DL3RK, Walter Geyrhalter (W. Germany)
30. N4WJ, Frank McCormick (U.S.A.)
31. G3MCS, W.R. Hawthorne (England)
32. SM5AQD, Hakan "Hawk" Eriksson (Sweden)
33. W0MLY, George Mc Kercher (U.S.A.)
34. I0RIZ, Gianni Rizzi (Italy)
35. ON5NT, Ghislain Penny (Belgium)
36. OH6JW, Antti Kiviuoma (Finland)
37. OK1AWZ, Milan Dlabac (Czech.)
38. IV3PRK, Pierluigi "Luis" Mansutti (Italy)
39. DJ6RX, Klaus Heintzenberg (W. Germany)
40. OH3YI, Ossi Lehvas (Finland)
41. I4RYC, Relli Claudio (Italy)
42. ZL1BIL, Mike Edwards (New Zealand)
43. I4EAT, Fausto Minardi (Italy)
44. ZL1BQD, R.J. Runciman (New Zealand)
45. TG9NX, Francisco Capuano (Guatemala)
46. XE1J, Joe Levy (Mexico)
47. F5VU, Jean Brunner (France)
48. W3AP, Norwood Lowry (U.S.A.)
49. YO3AC, Andrei Giurgea (Romania)
50. K3TW, Tom Warren (U.S.A.)
51. XE1OX, Elicio Munoz (Mexico)
52. VE7IG, Reg Beck (Canada)
53. OK1ADM, Vaclav Vsetecka (Czech.)
54. CT1FL, Carlos Viana (Portugal)
55. WA1AER, Raymond Sylvester (U.S.A.)
56. N4RR, Roger Hoffman (U.S.A.)
57. UW0MF, Mike Filippov (USSR)
58. W4DR, J. Robert Eshlemann (U.S.A.)

The top 10 contenders for 5 Band WAZ:

1. JA3EMU, 199
2. N4WW, 199
3. W1NG, 199
4. W8UVZ, 198
5. LA9GV, 198
6. EA8QL, 197
7. K1MEM, 197
8. K4CEB, 197
9. K7UR, 196
10. F6DZU, 196

200 Stations have attained the 150 zone level

FREE CATALOG

QSL CARDS

MAIL ORDER EXPRESS
BOX 703-C
LEXINGTON, N.C. 27293

CIRCLE 50 ON READER SERVICE CARD

COMPUTER OWNERS AT LAST!

- Send/Receive CW with your VIC 20, PET, Commodore 64, Atari 800/400!
- RTTY for your VIC 20!
- Package includes program cassette, I/O Connector, Hardware Schematics. • SASE for Details.

CW - \$17.95
RTTY - \$19.95
Both For \$34.95 SAVE!

WIRED/TESTED TU \$124.95
COMPLETE KIT TU \$60.00
TU CIRCUIT BOARD \$10.00

ADD \$2.00 SHIPPING EACH ORDER
Many other Programs also in stock.
Amateur Accessories
6 Harvest Ct., RD7, Flemington, N.J. 08822
(201) 782-1551

CIRCLE 63 ON READER SERVICE CARD

S-LINE OWNERS ENHANCE YOUR INVESTMENT

with **TUBESTERS™**

Plug-in, solid state tube replacements

- S-line performance—solid state!
- Heat dissipation reduced 60%
- Goodbye hard-to-find tubes
- Unlimited equipment life

TUBESTERS cost less than two tubes, and are guaranteed for so long as you own your S-line.

SKYTEC Write or phone for
Box 535 specs and prices.
Talmage, CA 95481 (707) 462-6882

CIRCLE 145 ON READER SERVICE CARD

Novices / Technicians

- Don't let Morse code requirement keep you from upgrading!
- General Class course takes you from 5 - 16 w.p.m.
- Simple, effective method helps you progress quickly.
- Deluxe album with two 1-hour cassettes and instruction booklet.

only **\$19.00** (incl. or M.O.)
postage paid

DATALOG P.O. Box 7010, Dept. CO4
Bismarck, ND 58502

Please send _____ @ \$19.00 each
(ND add 4%)

Name _____
Address _____
City _____ State _____ Zip _____

FILTER CASCADING

The most cost-effective way to improve the selectivity of any receiver - old or new - is to improve its IF filtering. A Fox-Tango Cascading Kit puts a high-quality steep-sided 8-pole filter in series with your present filter(s), both SSB and CW. The result is narrower Bandwidth and better Shape Factor, both of which dramatically reduce adjacent channel QRM - a necessity in today's crowded bands.

CONSIDER THESE KIT FEATURES

- Easy installation - 30 minute average.
- No drilling, switching, alignment.
- 16 poles of filtering yield:
Filter Shape Factor as high as 1.19.
Ultimate Rejection better than 100dB.
Works wonders on SSB; improves CW.
- Compensates for Filter insertion loss.
- Complete instructions, clear diagrams.
- No RX audio impairment, TX unaffected.
- Includes Filter and all needed parts.
- Fits all models of Series - any letter.
- All Filters 8-pole - Guaranteed One Year.

SPECIFY KIT WANTED WHEN ORDERING

YAESU FT101 \$75; FT101ZD \$70; FT107 \$75;
FT901/2 \$65; FR101 \$55 (filter only). KENWOOD
TS520/R599 \$70; TS820 \$70; TS830/RB20 \$150
(Two Filters). HEATH SB104A \$60.

Shipping \$3 (Air \$5). FL Sales Tax 5%

In addition to the above, FOX-TANGO stocks a wide line of \$55 SSB, CW, and AM 8-pole filters for Yaesu, Kenwood, Drake R4C and 7-line, and Heathkit. Also, special filters made to order. Send specs for quote.

GO FOX-TANGO - TO BE SURE!
Order by Mail or Telephone.
AUTHORIZED EUROPEAN AGENTS
Scandinavia: MICROTEC (Norway)
Other: INGOIMPEX (West Germany)

FOX TANGO CORPORATION
Box 15944C W Palm Beach, FL 33406
Phone (305) 683-9587

CIRCLE 26 ON READER SERVICE CARD

ENJOY COMFORTABLE LISTENING



PSK-1 POWER SPEAKER

Now you can enjoy plenty of transceiver audio without having to turn your hand-held volume control up so far it goes into distortion. The PSK-1 features a powerful 2 1/2 watt (output) 20 db audio amplifier that will interface with virtually any communication receiver speaker output jack. Experience the luxury of distortion-free room filling audio from your hand-held transceiver even in a noisy mobile environment.

The PSK-1 is housed in an attractive case that would also decorate any base station. Power can be obtained from any 12 VDC source capable of 500 mA.

Prices and Specifications subject to change without notice or obligation.

ADVANCED ELECTRONIC APPLICATIONS, INC.
P.O. Box C-2160,
Lynnwood, WA 98036
(206) 775-7373
Telex: 152571 AEA INTL

AEA Brings you the Breakthrough!

CIRCLE 47 ON READER SERVICE CARD

TUBES, SEMICONDUCTORS, IC'S DIODES AT SUPER LOW PRICES IN DEPTH INVENTORY

EIMAC, SYLVANIA, GE, CETRON

OA2	\$2.75
3-400Z	115.00
3-500Z	99.00
4CX250B/7203	58.00
4CX1000A/B168	430.00
4PR60C/8252W	295.00
4X150A/7034	58.00
5AR4	4.73
5C22	165.00
5R4GB	3.85
6AK5	4.26
6AL5	2.93
6AQ5	2.85
6CA7	5.61
6DJ8	2.75
6JG6A	6.56
6JS6C	6.05
6KD6	6.90
6L6GC	5.25
6KV6A	6.02
6LF6	7.19
6LQ6	6.83
6MJ6	7.28
12AT7	2.93
12AU7	2.63
12AX7A	2.64
572B/T160L	46.00
705A	10.00
811A	13.50
813	40.00
829B	40.00
832A	38.00
833A	185.00
866A	9.50
872A	24.00
M-2057	15.00
5670	4.40
5684	33.00
5687	4.00
5751	4.00
5814A	3.70
5879	5.75
5894	65.00
6005	5.25
6146B	7.50
6360	6.50
6528A	75.00
6550A	7.50
6883B	9.00
7360	12.25
7558	7.00
7591A	4.70
7868	3.75
8072	95.00
8417	6.87
8874	195.00
8875	210.00
8877/3CX1500A7	475.00
8908	12.95
8950	11.50
MRF-453	18.50
MRF-454/A	18.50
MRF-455/A	18.50
2N6084	15.00

Full line of Sylvania ECG Replacement Semiconductors Always in Stock. All Major Manufacturers Factory Boxed. Hard To Get Receiving Tubes At Discount Prices.

Minimum Order \$25.00. Allow \$3.00 For UPS Charges. Out of Town, Please Call Toll Free: 800-221-5802 and Ask For "ABE"

TRANSLETERONIC INC.
1365 39th STREET, BROOKLYN, N.Y. 11218
Tel. 212-633-2800/Wats Line 800-221-5802
TWX710-585-2460 ALPHA NYK.

CIRCLE 94 ON READER SERVICE CARD

stations with plans to lift gear to the top of the rocky pinnacle, which would benefit the western reaches and the deserving W6's and W7's as well as the JA's.

Every Malpelo DXpedition is a major effort with the Colombian Navy giving logistic support to the efforts. This always is an LCRA effort, and over the years there has been little else there other than LCRA operators. HK3DDD was named as the QSL manager for the effort, and by the time you read this, things should be well along in the planning.

Mallorca

The Radio Club of Mallorca has plans to be heard in every major contest coming down the pike and wants DXers to listen for them. The club callsign is EA6RCM, and QSLs go to: EA6RCM, Apartado Postal 1000, Palma Mallorca (Balearic Islands) ESPANA. They promise to be heard on both c.w. and s.s.b.

AMSAT QSL Bureau

This bureau was moved in the Spring and is now located in downtown Obetz in Ohio. With Phase 3 of AMSAT not too far in the future, the bureau is seeking to clean up the accumulations before more come in. Currently the bureau has cards for over 640 stations. An s.a.s.e. sent to: AMSAT QSL Bureau, 1850 Lisle Avenue, Obetz, Ohio 43207, will help. Eventually the dead stuff will be cleaned out, but the bureau would rather ship it to where it belongs. Send #10 envelope (long business type) or 5¢ per card for overseas stations. Cards are sent at the end of each month. Phase IIIB of AMSAT was due to be launched aboard the French *Ariane* in June, although the launch dates were slippery. In efforts to meet launch dates, plans were to ship the third stage of the rocket by airlift to the launch site in French Guiana even though final review had not been completed. It might be recalled that on *Ariane V* the third stage failed, dumping everything into the Atlantic. *Ariane VI* was due to be launched the first week in June, and by now you should know how things have gone.

CQ DX Awards Program

S.S.B.

1245	KP4AAQ	1249	W4JFE/7
1246	EA7AZJ	1250	K5MZG
1247	VO1CW	1251	EA2MC
1248	EA7CZE	1252	EA2AIG

C.W.

582	AC6H	583	W9RY
-----	------	-----	------

S.S.B. Endorsements

310	K4CEB/311	275	W0ULU/276
300	W9SS/309	275	WA6DTG/276
300	W2CC/305	250	K4JLD/261
275	W2FGY/298	200	VO1CW/230
275	AI5I/294	200	EA7AZJ/220
275	KB5FU/291	200	WD0DMN/202
275	W4BQY/287	200	KP4AAQ/200
275	WB4KTG/281	200	EA2MC/200
275	W6NLG/279	150	EA2AIG/162
275	W4JFE/7/279		

C.W. Endorsements

310	W3GRS/314	200	K4JLD/221
300	W4BQY/308	28 MHz	KA3R
275	W9RY/283		

Total number of active countries is 315. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

Columbia/Shuttle Flight #9

The *Columbia* will be back in service after the completion of the refurbishing and up-dating of the original space shuttle. It is due to be launched in September, and when it takes off next month, Owen Garriott, W5LFL, should have permission to take along a 2 meter rig.

The ARRL and AMSAT are working on a rig that can handle the pile-ups. In late Spring it was strongly anticipated that NASA would be issuing a letter of authorization, and the whole plan seemed to be solid. Keep listening for the frequencies; they should be available.

QSL Bureaus and Stuff

If one works in a QSL Bureau, one knows trouble first hand. The problem of-

ten is to determine what might be merited criticism and what might be premature expectations. Or, as in some instances, the good work in certain portions of a bureau is often forgotten in complaining about a section that is not performing satisfactorily. While a bureau seldom gets much praise for an efficient job, it catches more than it wants when there is a dissatisfied DXer in the woods.

Jay O'Brien, W6GO, and Jan O'Brien, K6HHD, were in charge of the program at Visalia and tried to bring everything out in the open so there could be discussion and some understanding. It was not a completely successful program. However, to get any valid questions out in the open, a questionnaire was distributed at Visalia, to be forwarded to the ARRL.

Keeping in mind that QSL Bureaus are mostly volunteer operations, they are not the easiest things to direct, drive, or maintain a consistent level of operation. However, gnashing one's teeth and muttering in the outer darkness does little good. The approach of the O'Brien's will, if nothing else, bring out and substantiate enduring problems. If you are working at the club level and would like a bit more information, an s.a.s.e. with 54¢ postage might bring you a copy of the file on the matter. Throw in another 17¢ and ask for a copy of the QSL list if you are not already acquainted with it. The address is Box 700, Rio Linda, CA 95673.

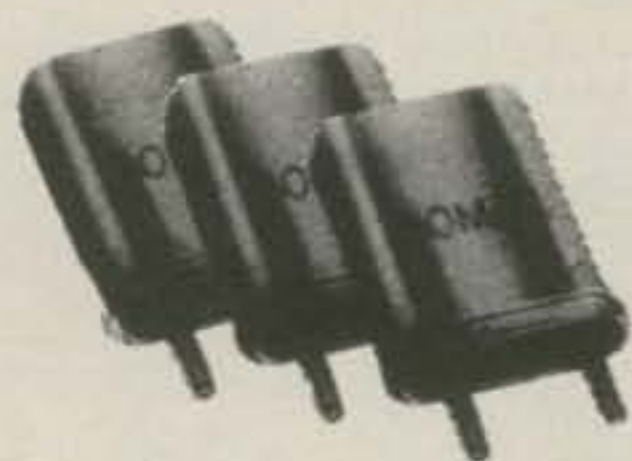
Some Quick DX Notes

Sometimes when feeling in an ebullient mood, we are tempted to be expansive in replying to questions such as "Where do you find DXers?" Our reply is short and quick: "Everywhere!" Sometimes even in your advertising mail you'll find them. Recently reading a solicitation of "Pacific Woodworker," we found Charles Harris listed as the publisher. Then we read further, and it was! "Chod Harris" is sometimes known as VP2ML, and sometimes remembered for staff work at ARRL Headquarters. But then again, we have always said that the woods are filled with DXers, most of them listening on the morning long path.

Bill Early, WA9AEA, has compiled a list of QSL managers for stations on the YL International Single Sideband System. The list is extensive, a bit more than we can fit in, but if you are interested, an s.a.s.e. to Bill at Box 10026, Chicago, IL 60610 might get one into your hand. For a newly minted DXer all QSL information is valuable.

There has also been word from the FCC that there is no intention in the foreseeable future to re-issue unassigned callsigns. Also, the period for renewal of an expired license has been extended to two years, and KP5 has been designated the prefix for Desecheo.

The DXAC has been reported as recommending that Peter I island in the ant-



WE'RE ROLIN IN CRYSTALS!

2 METER CRYSTALS - \$3.95 EACH
(10 OR MORE - \$3.50 EACH)

QUICK DELIVERY

ROLIN DISTRIBUTORS
P.O. BOX 436
DEPARTMENT CQ
DUNELLEN, N.J. 08812

(201) 469-1219

CIRCLE 33 ON READER SERVICE CARD

WE STOCK CRYSTALS FOR:

CLEGG	DRAKE	ICOM
KENWOOD	MIDLAND	REGENCY
STANDARD	WILSON	YAESU

Custom crystal orders accepted

Now available: precision-cut, landmobile crystals

CIRCLE 33 ON READER SERVICE CARD

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee \$2.00, with no fees required for up-dates.

MIXED

2400	YU2DX	1686	K5UR	1228	K6ZDL	987	EA9IE	800	YU2CO
2311	F9RM	1619	N2AC	1210	4Z4DX	975	KC8CC	783	JA9FAI
2308	YU4HA	1604	N9AF	1204	DA2DC	958	YU2CBK	768	EA1JO
2169	K6JG	1538	YU7AW	1204	K8LJG	952	WB8ZRL	757	A18M
2141	W2NC	1520	I6SF	1204	JH1VRQ	937	N4IB	747	VE2FOU
2100	K2VV	1488	SM7TV	1189	W8RSW	892	KA3A	732	N2AIF
2075	VE3GCO	1481	W8CNL	1180	W7CB	859	WD9IIC	722	K7CU
2071	N4MM	1393	I2PHN	1164	N6JM	848	KO8T	718	W6OUL
1924	K6XP	1379	N6FX	1108	DJ2UU	846	YU1DZ	697	KC8JH
1866	YU7BCD	1364	K9BG	1100	KL7AF	825	W6YMH	695	KJ7N
1844	W4BQY	1347	W0SFU	1027	N3ED	822	G3ZRH	658	K8HF
1726	N4NO	1349	KF2O	1014	NN4Q	817	N8BJQ	656	K9TI
1703	W7LLC	1312	IN3ANE	1013	W8ILC	814	G4FAM	635	VE2PD
1690	PA0SNG	1287	SM3EVR	1011	I2MQP	808	W0JIE	621	OE1KJW
1690	N6JV	1263	N6AW	995	LA7JO				

S.S.B.

2227	F9RM	1510	YU7BCD	1239	I2PHN	1005	G4CHP	764	N3ED
2024	I0ZV	1506	OZ5EV	1107	KF2O	997	ZP5RS	750	N4IB
1970	I0AMU	1458	W0YDB	1101	PY3BXW	971	W6YMV	732	VK6YL
1871	K6JG	1446	PA0SNG	1101	W4BQY	935	N2AC	702	I0SGF
1838	K6XP	1426	K5UR	1099	I6NOA	933	KC8CC	698	W3GXF
1815	K2POA	1399	I0MBX	1098	F2MO	922	TG4NX	670	JH5FD
1770	K2VV	1391	W9DWQ	1091	VE1YX	874	WB6GFJ	665	DK4AP
1721	N4MM	1322	CT1UA	1070	CT1FL	849	KL7AF	649	OE8MOK
1706	ZL3NS	1300	WD8MGQ	1034	JH1VRQ	842	WA2FKF	646	KB2DE
1687	N6CW	1294	YU7AW	1033	KC4OV	832	K8LJG	638	I1POR
1642	I4ZSQ	1289	N2SW	1032	N6FX	829	WB8ZRL	615	VE2PD
1568	I8YRK	1271	I6ZJC	1029	WA4OIB	805	W8ILC	607	KC8YM
1557	I8KDB	1253	WA4QMO	1028	W2NC	796	AC2J	604	W8RSW
1530	HB9AA	1247	N4NO	1009	I2MQP	768	W6LQC	603	K80C

C.W.

1959	W8RSW	1516	K6XP	1342	N4MM	1101	YU3NP	743	DJ1YH
1919	W2NC	1509	N4NO	1316	VK4SS	1065	K6ZDL	719	KA3A
1763	W8KPL	1508	YU7BCD	1314	K5UR	1045	JE1JKL	695	AG5C
1674	WA2HZR	1486	W9DWQ	1295	W9FD	925	N4YB	656	VE2FOU
1656	ON4QX	1452	N2AC	1281	I6SF	876	K8LJG	644	EA1JO
1652	N6JV	1432	W3ARK	1245	VO1AW	861	YU7JF	616	W8ILC
1609	K6JG	1428	G2GM	1195	VE7CNE	801	N3ED	612	G4FAM
1587	K2VV	1401	W4BQY	1182	YU7AW	799	KL7AF	605	N2AIF
1575	DL1QT	1344	WA1JMP	1105	N6FX	798	KF2O		

arctic be accepted for DXCC country status should anyone ever get there and operate. The island is 68°S and 90°W. Norway has claimed the island, although by international treaty anything south of 60°S is for the time being supposed to be international territory. There have been reports that the Turkish authorities are moving to again allow legitimate amateur radio stations in TA-land. The FCC is looking at the idea of allowing amateurs in the Hawaiian Islands and nearby areas to use A3 and F3 in the 7075-7100 kHz area because of the closeness of the islands to ITU Region III. Possibly something similar may come from KL7 land, some parts of which are only a few miles from Zone 19 in UA0-land, actually much closer than Hawaii.

Efforts have failed to bring Mt. Athos to the deserving DXers during this Spring, with SV1JG not being successful in getting permission to operate from the monastery. W6LAS/SV/A was reported as being on the air by some European stations, this one operating low-power mobile.

LA5NM has returned to Svalbard and expects to be there until late Spring of 1985. There is a report that a good number (some estimates run as high as 20%) of the Heard Island VK0HI/VK0CW contacts were duplicates in the same band and mode. This is a cheerful bit of information if you tried and did not get even a

single contact that you needed. But, as some of the duplicators themselves have noted, they are helping the DX station by showing him that he is getting out, and it also gives them a chance to tell the DX station of the great job they are doing. A side benefit is that everyone listening knows who has the really big signal.

Some Kenya licenses are showing still fresh from the printers. Station 5Z4DJ has been heard in recent months, and 5Z4DP should be on the air late this month or early next month.

Martti Laine, who knows what it is to

operate from Albania, says that there still is hope and that in late Spring some of the Albanian types were going to Finland for some training in radio and might be able to take some gear back to downtown Tirana. Never give up hope that the true-blue ZA type will show in your log one of these days.

The JAs who were hoping for a Bangladesh operation a few months back could not get their gear past the customs. But S2BTF was being reported a couple of months back on the SEANET, although he may have gone QRT by now.

1Z5A is rumored to be used by the state of Karen in Burma and is supposedly applying to the ITU for recognition. Memory comes back to remind us that in other days we would have started thinking of a half-wave rectifier tube or even a transistor when we would hear such a designation. But the days when Slim could fool a DXer with a contrived call like that are long gone. Heck, the station said that they were even applying for ITU recognition, and that should prove something. Right?

VR6TC still schedules W6HS, his QSL Manager, at 21350 kHz at 0000Z on Tuesdays. We recall from other years that this was at this place and time on Wednesdays, so you might check the other if you don't find him where expected. VR6KY is also being reported around 21300 kHz from 1900Z.

There is a 28 MHz beacon in lower Connecticut, this signing KA1YE/B at 28284 kHz with 4 watts, a 30 second carrier, then KA1YE/B SE CT, and it goes 24 hours a day.

WA1IOB/B is also on from near Boston and W3VD/B from the Laurel, Maryland, area. All these beacons are in the 28175 kHz to 28284 kHz area. These beacons have been heard in Europe. HB9AVE maintains a list of beacons, and if you are interested, drop Willi a note. There is only a limited spectrum for 10 meter beacons in the U.S., and if you need help or advice, drop a note to W. Keith Hibbert, KA1YE, 25 Hillcrest Road, Niantic, CT 06357.

Slim has been noted in the Netherland

IRON POWDER and FERRITE PRODUCTS

AMIDON
Associates

Fast, Reliable Service Since 1963

Small Orders Welcome

Free 'Tech-Data' Flyer

Toroidal Cores, Shielding Beads, Shielded Coil Forms
Ferrite Rods, Pot Cores, Baluns, Etc.

12033 OTSEGO STREET, NORTH HOLLYWOOD, CALIFORNIA 91607

CIRCLE 32 ON READER SERVICE CARD

new SIX BAND VERTICAL ANTENNA

**Model AV-25
NO TRAP VERTICAL**
for 80, 40, 30, 20, 15, 10 meters.

\$99.50

UPS SHIPPING
& HANDLING
ADD \$11



- Only 25 ft. high.
- Three parallel vertical elements.
- Rugged steel tubing.
- Direct feed with 52 ohm coax, low SWR.
- Broad band.
- Capacity loaded, top and sides.
- Only one coil, high in 80 M element.
- Also available for commercial frequencies.



4 1/2" DIA.
SPACERS

AR-25 Radial System for AV-25 antenna. Four multiwire radials that are resonant on each of the six bands. \$49.50

PATENT PENDING



ALL OUR PRODUCTS MADE IN USA

BARKER & WILLIAMSON

Quality Communication Products Since 1932

At your Distributor write or call

10 Canal Street, Bristol PA 19007

(215) 788-5581



Antilles signing PJ8II and PJ0II. Cross-checks indicate that the station is not in the Netherland Antilles, nor is it properly licensed, if at all. PJ8UQ and PJ8YL are reported to be the only active PJ8 stations at present. Visiting DX types must sign their home call plus /PJ. If you hear N8II given as the QSL route, you can be wary. Jeff, N8II, says he is QSL manager for none of these.

Following is some information on the Western Pennsylvania DX Association. Alan Lefcort, WB3GPR, is the current president of this active group; Bill Futrowsky, WB3JWJ, is the vice-president. Wayne Albert, KB3KV, is the secretary, and you can reach him at 1508 Ligonier Street, Latrobe, PA 15650 should you need more information.

Don't let it slip your mind that the First International DX and Contest Symposium will be held at the ARRL National Convention in Houston the first weekend in October. The convention is October 7-9, and Bob Evans, N5DU, is the coordinator for the Symposium.

If you can't wait until October, the big Northwest DX Convention will be held in Seattle the end of July, running from July 29-31 at the Doubletree Plaza Hotel. Jim Hadlock, K7WA, can give you a fast fill-in with details. When CQ shows up early in your mailbox, as it always does, and the humidity is at the saturation point, think Seattle!

DX Ten Years Back—August 1973

CR8AM was on from Timor; K4DAO and KS6ES were the visiting operators. VK3JW was still jumping up and down trying to get accreditation for the first Melish Reef effort and was headed for Melbourne to do some shaking. K4IIF was beating the woods trying to raise more action for the coming CQ WW DX Contest, especially on 40 and 80. The FCC was calling in Conditional Class licensees for review, the Southwest Division Director noting that about 60% failed to respond to the notice and of the 40% who showed only 10% successfully passed the test. ZD3D was leaving Gambia and working hard to use up all the QSL cards on hand. WK4AH was looking for a November Lord Howe visit. San Hutson, K5QHS, was aiming for Juan Fernandez in September; he now signs K5YY.

73, Cass, WA6AUD

5B WAZ No. 23

If it takes a good suffix, Dov Gavish, 4Z4DX, in Ramat-Hasharon, has what gets the attention. The call also got him 5B WAZ #23, the first from an Asian QTH, and a check of W4KA's list will show that the second 5B WAZ in Asia did not show until #57.

As DXers go, Dov has not been a licensed DXer for long, first being licensed in 1968. He is 31 years old, married, and has two children. He holds 5BDXCC, VE-



Dov Gavish, 4Z4DX, got his start in amateur radio by going to the local radio club meetings in Kibbutz Ramat-David in northern Israel back when he was 13 years old. His father, Israel, 4X4VB, was trying to get Dov headed right—right to DXing, that is. Dov won 5B WAZ #23 to prove that he never stopped heading in the right direction. Here he waits at his operating position for more of the right stuff.

YL DXCC #20, and a handful of other awards. Dov works both c.w. and s.s.b. using a TS-180 to a KT3YXA beam with another beam on 40 and a vertical on 80. If you wonder about that KT3YXA, Dov says that some of his antennas are homebrew.

Dov comes from an amateur radio family; his father is 4X4VB, Israel. Dov belongs to the IARC DX Club and tends to keep an eye on the local v.h.f. DX net. There are about 20 members in the local network. Though he has gained 5B WAZ, he still needs some states on 80 to fill out a 5B WAS. You will often find Dov in the WPX and CQ DX tests working mostly 80 and 40 c.w. in the WPX.

QSL Information

A35EL to OE2DYL
A6XJC to PE0MGM
AP2KD to JJ1TBB
C53CJ to KB8KS
CE8AE to WA3HUP
CN8AD to FBJL
CN8CO to WB3KGY
C07AM to WB6QPG
CP5EL to WB1DQC
CQ3BX to CT3BX
CR9EL to OE2DYL
CR8UA to W3HNK
CX5RV to G5RV
HK8COP to W9UCW
G4CPA/OY to VE2FGS
DU4RLC to VE2FGS
J87LTA to K4LTA
JY8JP to K1JPQ
KC4AAA to K9AUB
KC4AAC to W6MAB
LA2EX/3X1 to LA2EX
N6YK/V2A to N0DH
VK9YC to Only direct
VP2KBD to K1IJV
VP2KBE to K1IJV
V55YY to K5YY
4K1F to UQ2GDW
4N9WC to YU4GYZ
4S7TZ6 to ON6TZ
4X4MS/5NB to DL8ME
5K8LR to HK3SO
5N8GM to IBXIU
5W100 to OE2DYL
5Z4CL to W5DCB

6W8HL to WA4VDE
5N6PDC to K6EDV
7X2HM to I8YCP
962XX to AK3F
9L1EX to LA2EX
A92Z to Box 26855, Bahrain
J28DM to BP 2417, Djibouti
HZ1AT to Box 1208, Riyadh, Saudi Arabia
LA5NM/JW5NM to Matt Bjerrang, Longyear Airport, N-9170, Svalbard, Norway
TABBE to P.O. Box 252, Gaziantep, Turkey
TI5TP to P.O. Box 125, Grecia, Costa Rica
VP8ML to Charles McKenzie, Port Stanley, Falkland Islands
XT2BM to P.O. Box 140, Ouagadougou, Voltaic Republic
5V7WI to P.B. 1499, Lome, Togo
7Z2AP to Box 2537, Riyadh, Saudi Arabia
9L10R to PMB 502, Freetown, Sierra Leone
9L1YL to P.B. 992, Freetown, Sierra Leone
G4ABI/ST2 to P.B. 974, Khartoum, Sudan
WA4IKZ/CR9T to D. Tanis, CC906, Box 167, Saudi Arabian Airlines, Jeddah, Saudi Arabia

LARSEN ANTENNAS TRAVEL IN THE FAST LANE.



Race car communications demand the best from an antenna under some of the worst conditions. Split second decisions require reliable signals at exceptionally high speeds.

That's why Larsen Antennas are used on race cars at the Indy 500. Because Larsen Antennas are designed to take high speed with minimal signal distortion. Proving they can travel in the fast lane without putting a drag on their performance.

Larsen's precision tapered stainless steel whip provides maximum flexibility while minimizing radiation pattern distortion, giving you a clear consistent signal. And Larsen's

exclusive Kūlrod® plating, gives your antenna high conductivity to assure that maximum power goes into communicating — not heat.

That full measure of performance goes into our product integrity too. With a no nonsense warranty that won't slow you down.

So, whether you're following the racing circuit or a local rescue effort, you'll find Larsen Antennas will keep you ahead of the situation with dependable performance. Ask your favorite Amateur dealer to demonstrate how you can hear the difference with Larsen Antennas. Write for our free Amateur catalog.

CIRCLE 13 ON READER SERVICE CARD



Larsen Antennas

IN USA: Larsen Electronics, Inc.
11611 N.E. 50th Avenue P.O. Box 1799 Vancouver, WA 98668 Phone: 206-573-2722

IN CANADA: Canadian Larsen Electronics, Ltd.
283 E. 11th Avenue, Unit 101
Vancouver, B.C. V5T 2C4 Phone 604-872-8517

Kūlrod® is a registered trademark of Larsen Electronics, Inc. in U.S.A. and Canada.

Kūlrod® is a registered trademark of Larsen Electronics, Inc. in U.S.A. and Canada.



CQ BOOK SHOP

The Shortwave Propagation Handbook, 2nd ed.
by George Jacobs, W3ASK, and Theodore J. Cohen, N4XX
A new, revised edition of the popular guide to all your propagation needs. Contains up-to-the-minute information and charts, and guides you through producing your own propagation data. 154 pages, paperback, \$8.95. Order #C137.

Setting Up and Using Your Own Ham Shack
by L.B. Cebik, W4RNL
Practical pointers on setting up an amateur station layout in almost any available space. Includes basic info on space and safety requirements, plus equipment specs and features, what you should buy and what you can build, station accessories, and even logs and checklists. 308 pages, paperback, \$10.95. Order #T184.

World Press Services Frequencies
by Thomas Harrington
A comprehensive manual covering the field of radioteletype news monitoring—antennas, receivers, terminal units, monitors, and more. Contains 3 master lists of times of transmission, frequencies, plus ITU list of over 50 news services worldwide. 72 pages, paperback, \$7.95. Order #U173.

Ameco Amateur Radio Question & Answer Study Guides
Easy-to-understand questions and answers based on the latest FCC study guides, plus sample exams, will help you make sure you're ready to sit for the license tests.
Ameco Amateur Radio General Class Q&A Study Guide, 64 pages, paperback, \$1.95. Order #A034.
Ameco Amateur Radio Advanced Q&A Study Guide, 64 pages, paperback, \$1.95. Order #A035.
Ameco Amateur Extra Class Q&A Study Guide, 64 pages, paperback, \$1.95. Order #A036.

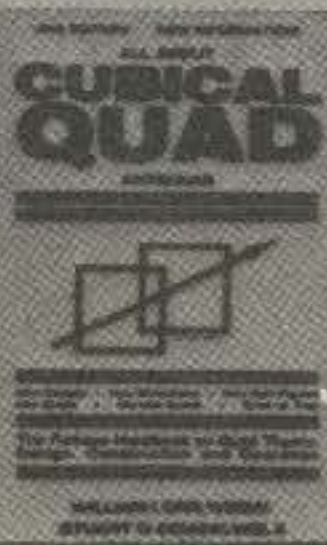
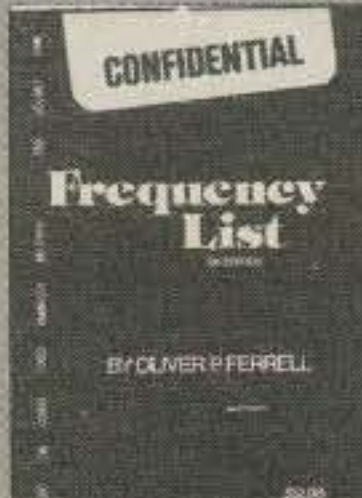
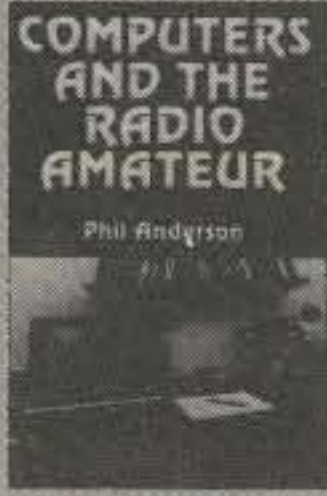
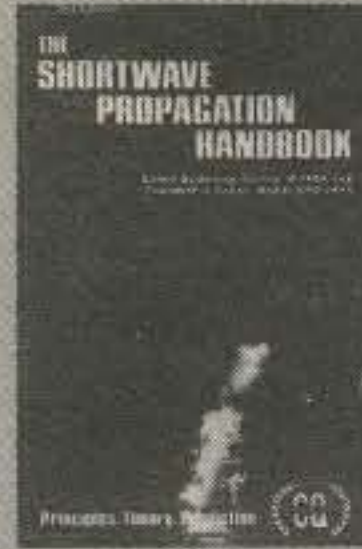
Computers and the Radio Amateur
by Phil Anderson
For the radio amateur who wants to know how computers function and how they can be used with other equipment, this book is an easy-to-understand introduction to the current and future uses of computers in amateur radio. 207 pages, hardcover, \$18.95. Order #P178.

The RTTY Handbook
by Byron H. Kretzman, W2JTP
An old classic and a must for those interested in RTTY machine technology. Covers history, general practice, basic principles, equipment, and operation. No RTTY enthusiast's library is complete without this book. 191 pages, paperback, \$3.95. Order #C198.

The 10 Meter FM Handbook
by Bob Hell, K9EID
Gives all of the simple details for converting many CB rigs, h.f. transceivers, and commercial gear to operate on 10 meter FM, complete with VHF transverters for use on 6, 2, or 1 1/4 meters. Also explains the unique systems and propagation characteristics that occur on 10 meter FM. 80 pages, paperback, \$4.95. Order #M150.

The Forrest Mims Circuit Scrapbook
by Forrest Mims
Emphasizing a practical and applications-oriented approach to solid state electronics, this book provides useful device and circuit info, plus an overview of contemporary electronic devices. A compilation of columns by Mims which appeared in *Popular Electronics*. 141 pages, paperback, \$14.95. Order #M202.

Ameco Novice Code and Theory Package
A complete training package containing the 128-page Novice theory course and a 60-minute code cassette, which teaches how to send and receive code up to 8 words per minute, and a 32-page book. Also included are FCC-type code and theory examinations to help even a rank beginner get a ticket fast! \$7.50. Order #A024.



CRB Research Series
by Tom Kneitel, K2AES
Directories of scanner frequencies for the VHF aero band (108 to 136 MHz), energy industries and environmental agencies, plus the "top secret" registry of U.S. government radio frequencies. Up-to-date, comprehensive listings of frequencies that would otherwise be hidden from your scanner use.
Energy-Scan, 26 pages, paperback, \$5.95. Order #C151.
Air Scan, 3rd ed., 80 pages, paperback, \$7.95. Order #C152B.

The Final Exam
by Dick Bash, KL7IHP
Amateur radio license exam manuals proven highly successful in helping hams pass the FCC tests. Material for the books was obtained by interviewing actual applicants for the exams and collecting and researching the questions they had on the exams.
General Class, 123 pages, paperback, \$9.95. Order #B153.
Advanced Class, 108 pages, paperback, \$9.95. Order #B154.
Extra Class, 108 pages, paperback, \$9.95. Order #B155.
Novice Class, 104 pages, paperback, \$4.95. Order #B163.

Confidential Frequency List, 5th ed.
by Perry Ferrell
Bigger than the 4th edition, this new book has 30% more stations listed, more than 7500 operating between 4-28 MHz. Listings by frequency and callsign. Complete list of Coastal CW stations plus Embassy, Aeronautical, Military, Time Sigs, Feeders, and more. Details on schedules, emergency channels, alternates, and never-before-published IDs. 224 pages, paperback, \$9.95. Order #G196.

The Radio Publications Group—The "Bill Orr Series"
These easy reading classics belong in the library of any active ham. Loaded with practical how-to information, with tables, charts, and formulas arranged for handy reference.
Beam Antenna Handbook, 200 pages, paperback, \$7.95. Order #R143.
Wire Antennas, 192 pages, paperback, \$7.95. Order #R144.
Antenna Handbook, 192 pages, paperback, \$7.95. Order #R145.
Cubical Quad Antennas, 112 pages, paperback, \$6.95. Order #R146.
VHF Handbook, 336 pages, paperback, \$11.95. Order #R147.
Interference Handbook, by W.R. Nelson, 247 pages, paperback, \$9.95. Order #R172.

World Radio TV Handbook 1983
The world's only complete directory of international broadcasting and TV stations—the established, authoritative guide endorsed by the world's leading broadcasting organizations. A comprehensive listing of short-, medium-, and long-wave stations revised and updated to reflect actual conditions. Also includes special features on listening gear, and DX club activities. 600 pages, paperback, \$17.50. Order #B097.

The SWL's Manual of Non-Broadcast Stations
by Harry L. Helms
From the basics of propagation to logging and verification, this book shows what to expect from monitoring utility stations and other point-to-point types of radio communications. Includes appendices of call sign allocations, addresses, modes, and much more. 272 pages, paperback, \$12.95. Order #T187.

Radio Handbook, 22nd ed.
by Bill Orr, W6SAI
A state-of-the-art, single-source reference on radio communications and theory for hams, professional ops, techs, and engineers. New coverage includes solid-state devices, Yagis and quads, and h.f. amplifier designs. A hands-on instruction manual, as well. 1168 pages, hardcover, \$39.95. Order #S197.

CQ BOOK SHOP

76 North Broadway
Hicksville, NY 11801

Order Date: _____

Name _____

Address _____

City _____

State _____ Zip _____

Check Master Charge Visa

Card No. _____ Expires _____

X _____

Signature required on all charge orders:

QTY.	ORDER #	TITLE	PRICE	TOTAL

Shipping charges \$2.00 per order. Shipping charges waived on orders of \$50.00 or more. Books shipped best way. All orders are processed the day they are received, but please allow 30 days for delivery within North America.

Book Total	_____
Shipping Charge	_____
Grand Total	_____

" MAXCOM "

AUTOMATIC ANTENNA MATCHER

TUNES

ONE ANTENNA .3 MHZ. TO 70 MHZ.

VSWR LESS THAN 1.5:1

WITH NO ANTENNA TUNING

- * NO MOVING PARTS !
- * 5 YEAR WARRANTY !
- * INSTANT SWITCHING !
- * 50 OHM INPUT !
- * LOW NOISE !
- * DIPOLE !
- * MARINE !
- * AMATEUR !
- * 100% SOLID STATE !
- * NO CONTROL LEADS !
- * LIGHT WEIGHT !
- * HIGH EFFICIENCY !
- * 200 TO 2KW. P.E.P. !
- * LONG WIRE !
- * MILITARY !
- * AVIONICS !

AT LAST ! A RADIO STATION INSTALLATION THAT IS JUST THAT !
"INSTALLATION ONLY"

NO MORE TIME CONSUMING, FRUSTRATING AND COSTLY ANTENNA TUNING.

ONE ANTENNA FOR ALL FREQUENCIES AND ALL BANDS FROM:
.3 MHZ. TO 70 MHZ.

SEE YOUR LOCAL DEALER FOR MORE INFORMATION, IF HE CAN'T HELP YOU
ASK WHY ?
AND CONTACT:

MAGNUM DISTRIBUTORS INC. 1000 S. DIXIE HWY. POMPANO BEACH, FLORIDA. 33060
305-785-2002

WE WILL GLADLY FURNISH INFORMATION AND YOUR CLOSEST STOCKING DEALER !

THE SCIENCE OF PREDICTING RADIO CONDITIONS

The present sunspot cycle continues to decline steadily. The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a monthly mean number of 79.7 for April 1983. This results in a smoothed sunspot number of 95.2 centered on October 1982. The intensity of a solar cycle is measured by the smoothed sunspot numbers. A smoothed sunspot number of approximately 75 is forecast for August 1983.

August DX Conditions

Typical summertime h.f. propagation conditions are expected during August. During the hours of daylight look for fairly good DX openings on 10 meters towards southern and tropical areas, with peak conditions expected during the afternoon hours. Conditions should be considerably better on 15 meters, with this band opening to more areas of the world, and with generally stronger and more stable signals than observed on 10 meters. Expect 15 meter signals to peak during the afternoon hours with openings best towards the south and to tropical areas, although some east-west openings should also be possible. World-wide DX should be possible on 20 meters for a window of several hours following local sunrise and again during the late afternoon hours. Intense ionospheric absorption will severely limit DX openings during mid-day.

During the hours of darkness expect good DX openings to most parts of the world on 20 and 40 meters. Some 15 meter DX openings are likely towards southern and tropical areas to about midnight. Look for 80 meter DX openings to many areas of the world during the hours of darkness, but expect seasonally high static levels. Seasonally high solar absorption and static levels will make DX possibilities on 160 meters extremely difficult during August, but some openings may be possible towards the Caribbean area during the hours of darkness.

For more specific information concerning DX band openings for the period August 15 to September 15, 1983, see the DX Propagation Charts, which appear on the following pages.

Short-Skip Conditions

For openings over distances ranging between 50 and 250 miles 80 meters should be optimum during the day and 160 meters at night. Between 250 and

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for August 1983

Propagation Index	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 17-18, 22	A	A	B	C
High Normal: 11-12, 16, 19, 26	A	B	C	C-D
Low Normal: 2-3, 5-6, 8, 10, 15, 20-21, 23-25, 27, 29-30	A-B	B-C	C-D	D-E
Below Normal: 1, 4, 7, 9, 13-14, 28, 31	B-C	C-D	D-E	E
Disturbed: None	C-E	D-E	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 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 day of the month. For example, an opening shown in the charts with a propagation index of 3 will be fair-to-poor (C-D) on Aug. 1st, good-to-fair (B-C) on the 2nd and 3rd, fair-to-poor (C-D) on the 4th, good-to-fair (B-C) on the 5th and 6th, etc.

750 miles try 40 meters during the day and 80 meters at night. For openings between 750 and 1300 miles 20 meters should be best during the day, with 15 meters also a possibility. From sundown to midnight try 40 meters, and from midnight to sunrise conditions should be best on 80 meters, with 40 meters also a possibility. For openings between 1300 and the one-hop limit of 2300 miles the best daytime band should be 20 meters, with some possibilities also on 15 meters. Try 40 meters during the hours of darkness, with 20 meters also a possibility. For more specific times for openings, refer to the Short-Skip Charts which appeared in last month's column.

Seasonally high static levels are expected to continue through August and should be most noticeable on the 40, 80, and 160 meter bands.

V.H.F. Ionospheric Openings

Sporadic-E propagation usually tapers off during August, but it should continue to occur fairly frequently. Some 6 meter sporadic-E openings are expected during the month over distances of approximately 750 to 1300 miles. During periods

of intense and widespread sporadic-E ionization, two-hop openings may be possible considerably beyond this range. Also check the 2 meter band for an occasional sporadic-E type opening between approximately 1200 to 1400 miles. While sporadic-E short-skip openings may occur at any time, there is a tendency for them to peak between 8 a.m. and noon and again between 6 p.m. and 9 p.m. local daylight time.

The Perseids, which is expected to be one of this year's major meteor showers, should take place between August 9th and the 14th. Up to 50 meteors an hour are expected to enter the earth's atmosphere during the shower's peak intensity. Ionization produced by this meteor shower, particularly during the period of maximum intensity, is expected to make possible frequent meteor-scatter-type openings on the 6 and 2 meter bands over distances of several hundred miles. The Perseids shower is expected to reach peak intensity on August 10th and 11th.

Although auroral activity is usually at a seasonal low during August, some is likely to occur during periods of radio stormi-

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.
2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts.
3. The propagation index is the number that appears in () after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:
 - (4) Opening should occur on more than 22 days
 - (3) Opening should occur between 14 and 22 days
 - (2) Opening should occur between 7 and 13 days
 - (1) Opening should occur on less than 7 daysRefer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual dates on which an opening with specific propagation index is likely to occur, and the signal quality that can be expected.
4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate daylight time is used not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.
5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-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.
6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

August 15-September 15, 1983
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	09-15 (1)	08-10 (1) 10-12 (2) 12-15 (3) 15-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-10 (3) 10-11 (2) 11-13 (1) 13-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	19-21 (1) 21-23 (2) 23-02 (3) 01-02 (2) 02-03 (1) 20-21 (1)* 21-00 (2)* 00-02 (1)*
Northern Europe & USSR	09-13 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-14 (2) 14-15 (1)	05-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-22 (1) 22-00 (2) 00-01 (1)	19-21 (1) 21-00 (2) 00-02 (1) 20-21 (1)* 21-00 (2)* 00-01 (1)*
Eastern Mediterranean & Middle East	11-14 (1)	06-09 (1) 09-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	07-09 (2) 09-14 (1) 14-16 (2) 16-20 (3) 20-22 (2) 01-03 (2) 03-07 (1)	19-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Western Africa	11-14 (1) 14-16 (2) 16-17 (1)	07-09 (1) 09-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-23 (4) 23-02 (3) 02-06 (2) 06-09 (1)	20-23 (1) 23-02 (2) 02-03 (1) 21-02 (1)*
Eastern & Central Africa	13-16 (1)	10-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-01 (2) 01-03 (1)	20-02 (1) 21-01 (1)*
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	09-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	08-15 (1) 15-17 (2) 17-21 (3) 21-22 (2) 22-00 (1) 00-02 (2)	20-22 (1) 22-01 (2) 01-03 (1) 21-02 (1)*
Central & South Asia	Nil	09-12 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-20 (1) 20-22 (2) 22-00 (1)	05-07 (1) 19-21 (1)
Southeast Asia	Nil	08-10 (1) 10-12 (2) 12-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 08-10 (2) 10-11 (1) 19-22 (1) 22-00 (2) 00-01 (1)	Nil
Far East	Nil	09-11 (1) 18-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-13 (1) 18-20 (1) 20-22 (2) 22-00 (1)	05-06 (1) 06-07 (2) 07-08 (1) 06-07 (1)*
South Pacific & New Zealand	11-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	09-15 (1) 15-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	12-20 (1) 20-22 (2) 22-00 (3) 00-01 (4) 01-03 (3) 03-05 (2) 05-07 (1) 07-08 (2) 08-10 (3) 10-12 (2)	01-02 (1) 02-03 (2) 03-06 (3) 06-07 (2) 07-09 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	16-17 (1) 17-19 (2) 19-21 (1)	09-11 (1) 16-18 (1) 18-21 (2) 21-23 (1)	06-08 (2) 08-10 (3) 10-11 (2) 11-16 (1) 16-18 (2) 18-22 (1) 22-01 (2) 01-03 (1)	03-04 (1) 04-07 (2) 07-08 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*

Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (3) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	07-08 (3) 08-10 (4) 10-12 (3) 12-15 (3) 15-18 (2) 18-21 (4) 21-23 (3) 23-01 (4) 01-03 (3) 03-04 (2) 04-06 (1) 06-07 (2)	19-20 (1) 20-21 (2) 21-03 (4) 03-05 (3) 05-06 (2) 06-08 (1) 20-00 (1)* 00-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-11 (2) 11-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	13-16 (1) 16-18 (2) 18-19 (3) 19-23 (4) 23-03 (3) 03-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1)	20-23 (1) 23-05 (2) 05-07 (1)* 03-06 (1)*
McMurdo Sound, Antarctica	Nil	14-16 (1) 16-18 (1) 18-19 (1)	18-20 (1) 20-21 (2) 21-01 (3) 01-03 (2) 03-07 (1) 07-09 (2) 09-10 (1)	01-05 (1)

Time Zones: CDT & MDT (24-Hour Time)
CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	09-14 (1)	09-11 (1) 11-12 (2) 12-13 (3) 13-15 (2) 15-17 (1)	05-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-21 (2) 21-00 (1)	19-22 (1) 22-01 (2) 01-02 (1) 20-01 (1)*
Northern & Central Europe USSR	08-12 (1)	11-16 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-21 (1) 21-00 (2) 00-01 (1)	19-20 (1) 20-00 (2) 00-01 (1) 20-00 (1)*
Eastern Mediterranean & Middle East	Nil	10-11 (1) 11-13 (2) 13-15 (1)	06-08 (1) 08-10 (2) 10-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-22 (1) 22-00 (2) 00-02 (1)	19-00 (1) 20-23 (1)*
Western Africa	10-12 (1) 12-16 (2) 16-17 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-19 (3) 19-21 (2) 21-22 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-22 (4) 22-01 (3) 01-02 (2) 02-09 (1)	20-23 (1) 23-01 (2) 01-02 (1) 21-00 (1)*
Eastern & Central Africa	13-15 (1)	11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	13-15 (1) 15-17 (2) 17-22 (3) 22-00 (2) 00-02 (1)	20-00 (1) 21-23 (1)*
Southern Africa	11-13 (1)	08-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	06-09 (1) 13-15 (1) 15-18 (3) 18-20 (2) 20-22 (1) 22-00 (2) 00-01 (1)	19-21 (1) 21-00 (2) 00-01 (1) 21-00 (1)*
Central & South Asia	Nil	09-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1) 19-21 (1)
Southeast Asia	Nil	10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-13 (1) 19-21 (1) 21-23 (2) 23-01 (1)	06-08 (1)
Far East	Nil	09-11 (1) 15-16 (1) 16-19 (2) 19-21 (1)	19-22 (1) 22-00 (2) 00-02 (1) 07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (1)	03-06 (1) 06-07 (2) 07-08 (1) 05-07 (1)*

South Pacific & New Zealand	09-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	09-13 (1) 13-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	08-10 (3) 10-13 (2) 13-18 (1) 18-20 (2) 20-23 (3) 23-03 (4) 03-05 (3) 05-08 (2)	00-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 01-03 (1)* 03-06 (2)* 06-07 (1)*
Australasia	09-11 (1) 14-16 (1) 16-19 (2) 19-20 (1)	09-11 (1) 15-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	08-10 (3) 10-13 (2) 13-20 (1) 20-22 (2) 22-23 (3) 23-02 (4) 02-03 (3) 03-08 (2)	02-04 (1) 04-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-23 (4) 23-02 (3) 02-05 (2) 05-07 (3)	19-20 (1) 20-21 (2) 21-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 20-23 (1)* 23-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	08-11 (1) 11-14 (2) 14-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	12-16 (1) 16-17 (2) 17-19 (3) 19-22 (4) 22-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-10 (1)	20-22 (1) 22-05 (2) 05-07 (1) 02-05 (1)*
McMurdo Sound, Antarctica	Nil	13-15 (1) 15-17 (2) 17-20 (1)	17-19 (1) 19-21 (2) 21-01 (3) 01-04 (2) 04-07 (1) 07-09 (2) 09-10 (1)	01-06 (1)

Time Zone: PDT (24-Hour Time)
WESTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	Nil	09-11 (1) 11-13 (2) 13-15 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-15 (3) 15-16 (2) 16-18 (1) 22-23 (1) 23-01 (2) 01-02 (1)	20-21 (1) 21-23 (2) 23-00 (1) 22-23 (1)*
Central Europe & USSR	Nil	09-11 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-17 (1) 22-00 (1)	18-20 (1) 20-22 (2) 22-23 (1) 21-22 (1)*
Eastern Mediterranean & Middle East	Nil	08-09 (1) 09-11 (2) 11-12 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (1) 19-20 (1) 20-22 (2) 22-23 (1)	20-22 (1)
Western & Central Africa	13-16 (1)	08-11 (1) 11-13 (2) 13-16 (3) 16-18 (2) 18-19 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-01 (2) 01-07 (1) 07-09 (2) 09-10 (1)	21-00 (1)
Eastern Africa	Nil	09-13 (1) 13-16 (2) 16-18 (1)	13-15 (1) 15-18 (2) 18-20 (3) 20-22 (2) 22-23 (1)	20-22 (1)
Southern Africa	10-13 (1)	07-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-22 (1) 22-23 (1) 23-00 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	Nil	09-11 (1) 17-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-20 (1) 20-22 (1)	06-08 (1)

KIRK

HIGH STRENGTH FIBERGLASS



AVAILABLE IN A COMPLETE RANGE OF KITS

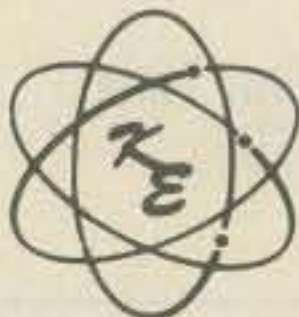
Special Instruction Manual on Kirk's "Super Quads" \$2.75

SUPER-QUAD KITS

- 2 3 4 ELEMENT TRI BAND
10 15 20 METER AMATEUR NET FROM \$256.68
- 2 3 4 ELEMENT DUAL BAND
10 15 OR 10 6 METER AMATEUR NET FROM \$150.42
- 2 ELEMENT 40 METER AMATEUR NET \$523.50
- VHF 4 ELEMENT 2 OR 6 METER AMATEUR NET FROM \$96.75

2-3-4
ELEMENTS
OR MORE

WRITE FOR FULL INFORMATION. PRICES DO NOT INCLUDE POSTAGE.
PRICES ARE SUBJECT TO CHANGE.



KIRK ELECTRONICS DIVISION
VIKING INSTRUMENTS, INC.

73 Ferry Rd., Chester, CT 06412 ● Telephone: (203) 526-5324
CIRCLE 150 ON READER SERVICE CARD

Southeast Asia	16-19 (1)	09-11 (1) 15-17 (1) 17-20 (2) 20-21 (1)	21-01 (1) 01-03 (2) 03-04 (3) 04-07 (2) 07-09 (3) 09-10 (2) 10-12 (1) 19-21 (1)	03-07 (1)
Far East	15-18 (1)	09-11 (1) 14-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	21-23 (2) 23-01 (3) 01-04 (2) 04-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-12 (2) 12-14 (1)	02-03 (1) 03-05 (2) 05-07 (3) 07-08 (1) 02-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	09-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-21 (1)	09-13 (1) 13-17 (2) 17-18 (3) 18-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	05-09 (2) 09-11 (3) 11-13 (2) 13-17 (1) 17-19 (2) 19-22 (3) 22-02 (4) 02-05 (3)	22-23 (1) 23-04 (3) 04-06 (4) 06-07 (3) 07-08 (1) 23-01 (1)* 01-03 (2)* 03-05 (3)* 05-06 (2)* 06-07 (1)*
Australasia	09-14 (1) 14-18 (2) 18-20 (1)	09-11 (1) 14-18 (1) 18-19 (2) 19-21 (4) 21-22 (2) 22-00 (1)	13-20 (1) 20-22 (2) 22-23 (3) 23-03 (4) 03-05 (3) 05-08 (2) 08-10 (3) 10-13 (2)	01-02 (1) 02-03 (2) 03-06 (3) 06-07 (2) 07-08 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-13 (2) 13-15 (3) 15-17 (2) 17-18 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-21 (4) 21-01 (3) 01-05 (2) 05-06 (3)	19-20 (1) 20-21 (3) 21-04 (4) 04-05 (2) 05-06 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	08-11 (1) 11-14 (2) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-21 (4) 21-23 (3) 23-01 (2) 01-07 (1) 07-09 (2) 09-11 (1)	20-23 (1) 23-04 (2) 04-05 (1) 00-04 (1)*
McMurdo Sound, Antarctica	Nil	13-17 (1) 17-19 (2) 19-21 (1)	09-11 (1) 17-19 (1) 19-21 (2) 21-01 (3) 01-03 (2) 03-04 (1)	23-03 (1) 03-05 (2) 05-07 (1)

* Indicates best time for eighty meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.

TOLL FREE ORDERS • 1-800-826-5432

AK, HI, CA OR INFORMATION • (213) 380-8000

5 KEY ASSEMBLY

\$1.00 EACH

CONTAINS 5 SINGLE-POLE NORMALLY OPEN SWITCHES. MEASURES 3 3/4" LONG

6 KEY ASSEMBLY

\$1.25 EACH

CONTAINS 6 SINGLE-POLE NORMALLY OPEN SWITCHES. MEASURES 4 1/4" LONG

120V INDICATOR

NEON INDICATOR. RATED 120 V 1/3 W. MOUNTS IN 5/16" HOLE... RED LENS.
75¢ EACH
10 FOR \$7.00
100 FOR \$65.00

MINIATURE 6 VDC RELAY



SUPER SMALL SPDT RELAY. GOLD COBALT CONTACTS.

RATED 1 AMP AT 30 VDC. HIGHLY SENSITIVE. TTL DIRECT DRIVE POSSIBLE. OPERATES FROM 4.3 TO 6 V. COIL RES. 220 OHM.

1 3/16" x 13/32" x 7/16"
AROMAT # RSD-6V
\$1.50 EACH
10 FOR \$13.50

13 VDC RELAY



CONTACT: S.P.N.C. 10 AMP @ 120 VAC ENERGIZE COIL TO OPEN CONTACT...

COIL: 13 VDC 650 OHMS
SPECIAL PRICE \$1.00 EACH

SEND FOR FREE 40 PAGE CATALOG!

MINIATURE TOGGLE SWITCHES

ALL ARE RATED 5 AMPS @ 125 VAC

- | | | |
|--|--|---|
| <p>S.P.D.T. (on-on)</p> <p>P.C. STYLE. NON-THREADED BUSHING. 75¢ EACH
10 FOR \$7.00</p> | <p>S.P.D.T. (on-on)</p> <p>SOLDER LUG TERMINALS. \$1.00 EACH
10 FOR \$9.00
100 FOR \$80.00</p> | <p>S.P.D.T. (on-off-on)</p> <p>SOLDER LUG TERMINALS. \$1.00 EACH
10 FOR \$9.00
100 FOR \$80.00</p> |
| <p>S.P.D.T. (on-off-on)</p> <p>NON-THREADED BUSHING. P.C. STYLE. 75¢ EACH
10 FOR \$7.00</p> | <p>S.P.D.T. (on-on)</p> <p>P.C. LUGS, THREADED BUSHING. \$1.00 EACH
10 FOR \$9.00
100 FOR \$80.00</p> | <p>D.P.D.T. (on-on)</p> <p>SOLDER LUG TERMINALS. \$2.00 EACH
10 FOR \$19.00
100 FOR \$180.00</p> |

ALL ELECTRONICS CORP.

905 S. VERMONT • P.O. BOX 20406 • LOS ANGELES, CA 90006

- QUANTITIES LIMITED
- MINIMUM ORDER \$10.00
- USA \$2.50 SHIPPING
- NO C.O.D.
- FOREIGN ORDERS INCLUDE SUFFICIENT SHIPPING
- CALIF. RES. ADD 6%

CIRCLE 121 ON READER SERVICE CARD

Channel Guard XL-1000



Adjustable Transmitter Low-pass filters & antenna tuner for CB & Ham use.

Eliminates TV interference. Functions as an effective antenna tuner; 100 db rejection of spurious RF above 40 MHz; Has VARIABLE input impedance-50-70Ω. Handles up to 1 KW (SSB); Negligible insertion loss; Compact; Instructions \$35

XL-500 - 500 watts-non tunable \$25
XL-150 - 150 watts-non tunable \$15 MC & VISA

TELCO PRODUCTS CORP.
44 Sea Cliff Ave., Glen Cove, NY 11542

CIRCLE 136 ON READER SERVICE CARD

ALUMINUM ANTENNA TUBING

- | | |
|----------------------------|--------|
| 1/2" x .049" x 72" | \$3.50 |
| 5/8" x .058" x 72" | 4.50 |
| 3/4" x .058" x 72" | 5.50 |
| 7/8" x .058" x 72" | 6.30 |
| 1" x .058" x 72" | 7.00 |
| 1 1/8" x .058" x 72" | 8.00 |
| 1 1/4" x .058" x 72" | 8.60 |
| 1 3/8" x .058" x 72" | 10.25 |
| 1 1/2" x .058" x 72" | 15.00 |
| 2" x .058" x 72" | 15.00 |
| 2" x .104" x 72" | 19.00 |
| 3/4" x 1 1/2" x 1/8" x 36" | 6.00 |

(longer lengths available)
Telescoping 6063-T832 Aluminum
\$3.50 Freight & Handling

MASTERCARD VISA

WINDEVOR ALUMINUM

4610 N. LINDBERGH
ST. LOUIS, MO 63044
(314) 731-3037

CIRCLE 90 ON READER SERVICE CARD

ness on the h.f. bands. Check the Last-Minute Forecast which appears at the beginning of this column for those days during August that are expected to be Below Normal or Disturbed. These are the days on which auroral activity is most likely to occur. Auroral-scatter-type openings, on both 6 and 2 meters, can range from a few hundred up to about a thousand miles, and they are usually characterized by very rapid flutter fading and Doppler shift on s.s.b. signals.

For the very patient, check the 6 meter band for possible Trans-equatorial (TE) openings between 8 and 11 p.m. local daylight time. This type of propagation favors openings from the southern tier states into deep South America, with the signal path crossing the magnetic equator at a right angle. TE openings during August are rare, but they can occur. They are usually characterized by very weak signals and severe flutter fading.

73, George, W3ASK

812-422-0231



The HAM SHACK

808 N. Main
Evansville, IN 47711



ICOM-2AT



ENCOMM/SANTEC
ST-144/uP



YAESU-FT77



TEN-TEC CORSAIR



ICOM-751

- AEA**
CP-1 New Computer Interface call
CK-2 Contest Memory Keyer \$139.00
144 Isopole Antenna 40.00
- ALLIANCE**
HD73 (10.7 sq ft) Rotator \$99.00
U-110 Small Rotator 49.00
- ASTRON**
RS7A 5-7 Amp Power Supply \$49.00
RS12A 9-12 Amp Power Supply 69.00
RS20A 16-20 Amp Power Supply 89.00
RS20M 16-20 Amp w/meter 109.00
RS35A 25-35 Amp 135.00
RS35M 25-35 Amp w/meter 149.00
RS50A 37-50 Amp 199.00
RS50M 37-50 Amp w/meter 225.00
VS-20M Variable w/meter 125.00
VS-35M Variable w/meter 175.00
VS-50M Variable w/meter 249.00
RS-12S w/speaker 74.00
RS-20S w/speaker 104.00
- B&W**
Folded Dipole 80-10 Meter, Only 90' Long,
No Tuner Necessary \$135.00
- BASH**
Books and Tapes \$9.95
- BENCHER**
BY-1 Paddle/BY-2 Chrome \$36.00/45.00

- BUTTERNUT**
HF6V 80-10 Meter Vertical \$119.00
ZA-1A Balun 16.50
- CUSHCRAFT**
A3 Tribander 3 EL \$179.00
A4 Tribander 4EL 229.00
R3 Motor Tuned Vertical 229.00
214B Boomer 14EL 2M 69.00
214FB Boomer 14EL FM 69.00
228FB Power Pack 28EL 2M FM 189.00
32-19 Super Boomer 19 EL 2M 83.00
220B Boomer 17 EL 220 MHz 75.00
ARX-2B Ringo Ranger II 2M 39.00
Rotatable Dipoles call
- DAIWA**
CN-520 1.8-60 MHz SWR/Pwr Mtr \$63.00
CN-620B 1.8-150 MHz SWR/Pwr Mtr 110.00
CN-630 140-450 MHz SWR/Pwr Mtr 129.00
CS-201 2-position switch 22.00
- DRAKE**
TR7A Xcvr w/PS7 \$1,435.00
R7A Receiver 1,225.00
TR5 Xcvr w/PS75 675.00
- ENCOMM (SANTEC)**
ST-144/uP, 220/uP, 440/uP
The Handhelds Offering the Most Features
Call for Your Discount Price
- HAL**
DS3100/MPT/ST6000 \$2,825.00
CT2200/KB2200 945.00
- HY-GAIN**
TH7 DXS 7EL Tribander \$375.00
TH5 MK2S 5EL Tribander 319.00
402BAS 2EL 40 Meter Beam 199.00
66BS 6EL 6 Meter Beam 109.00
18HTS 80-10 Meter Beam 339.00
V2S 2 Meter Vertical 39.00
5/8 Wave 2M Mag Mt 20.00
CD45 8.5 sq ft Rotator 105.00
Ham IV 15 sq ft Rotator 195.00
T2X 20 sq ft Rotator 249.00
HDR300 25 sq ft Rotator 435.00
Free Shipping on all crank-up towers
- ICOM**
We Have All the Great ICOM Transceivers in Stock
Call About the New Ones Now Available
IC-2AT Now Only \$215.00
3AT/4AT Handhelds 235.00
25A new display & mic 305.00
290H 2M All Mode 479.00
45A 440 MHz 349.00
R70 Superb Receiver 629.00

- KLM**
KT34A 4EL Triband Beam \$299.00
KT34XA 6EL Triband Beam 459.00
144-148-13LBA 2M Long Boomer 79.00
143-150-14C 2M Satellite Ant 79.00
420-470-18C Satellite Ant 59.00
Maximizer Antennas Call
- KANTRONICS**
The Fantastic Interface for CW, RTTY, ASCII
Software Available for VIC20, VIC64, APPLE,
ATARI, TR80C, T199
Call for a Package Price
- LARSEN**
NLA-150-MM 5/8 Wave 2M Mag Mt \$39.00
- MFJ**
989 3KW Roller Inductor Tuner \$289.00
941C Tuner/Meter/Ant. Switch/Balun 81.00
940B Tuner/Meter/Ant. Switch 72.00
900 Tuner 45.00
401 Econokeyer 45.00
422 Keyer/BENCHER Paddle combo 89.00
722 Filter w/notch 63.00
812 VHF Meter 29.00
816 HF Meter 29.00
104 Deluxe Preselector 89.00
103 New 24hr Clock 33.00
313 VHF Conv for HT 36.00
- MIRAGE**
B108 10/80 Preamp \$155.00
B1016 10/160 Preamp 245.00
B3016 30/160 Preamp 199.00
D1010N 10/160 440 MHz 275.00
MP1/MP2 Watt Meters 100.00
- ROHN**
25G \$42.00
- SHURE**
444D Desk Mic/414A Hand Mic \$50.00/36.00
- TEN-TEC**
New 2M Handheld \$285.00
Argosy II Digital 535.00
2KW Tuner Kit 185.00
The Fantastic Corsair Call
- TOKYO HY-POWER**
HL30V 2/30W Amp \$63.00
HL160V 3 or 10/160W Preamp 295.00
HC2000 2KW Tuner 295.00
HL82V 10/80W Preamp 145.00
HL20U 2/20W UHF Amp 99.00
HL45U 10/45W Preamp 175.00
HL90U 10/80W Preamp 299.00
- YAESU**
FT77 Call for Prices

Prices and Availability Subject to Change

Send SASE for our new & used equipment list.
MON-FRI 9AM-6PM • SAT 9AM-3PM

CIRCLE 109 ON READER SERVICE CARD

BUTTERNUT ELECTRONICS COMPANY



Model 2MCV
"Trombone"

Model HF6V

Model 2MCV-5
"Super Trombone"

Model 2MCV "Trombone"® —omnidirectional collinear gain vertical for 2 meters having the same gain as "double-5/8λ" types, but the patented "trombone" phasing section allows the radiator to remain unbroken by insulators for maximum strength in high winds. No coils "plumber's delight" construction and adjustable gamma match for complete D.C. grounding and lowest possible SWR. Height: 9.8 ft/2.98 meters.

Model HF6V—Completely automatic bandswitching 80 through 10 plus 30 meters. Outperforms all 4- and 5-band "trap" verticals of comparable size. Thousands in use worldwide since December '81! 160 meter option available now; retrofit kits for remaining WARC bands coming soon. Height: 26 ft/7.8 meters; guying not required in most installations.

NEW! Model 2MCV-5 "Super-Trombone"® —Same advanced features as the basic 2MCV but a full wavelength taller with additional "Trombone"® phasing section for additional gain. Height: 15.75 ft/4.8 meters.

All BUTTERNUT ANTENNAS use stainless steel hardware and are guaranteed for a full year. For further information on these and other BUTTERNUT products write for our FREE CATALOG!



**BUTTERNUT
ELECTRONICS CO.**

405 EAST MARKET ST. LOCKHART, TX 78644

Please send all reader inquiries directly.

HAL-TRONIX, INC.

HAL 2304 MHz DOWN CONVERTERS (FREQ. RANGE 2000/2500 MHz)
2304 MODEL #1 KIT BASIC UNIT W/PREAMP LESS HOUSING & FITTINGS... \$19.95
2304 MODEL #2 KIT (with preamp)..... \$29.95
2304 MODEL #3 KIT (with High Gain preamp)..... \$39.95

MODELS 2 & 3 WITH COAX FITTINGS IN & OUT AND WITH WEATHER-PROOFED DIE CAST HOUSINGS

BASIC POWER SUPPLY..... \$19.95
POWER SUPPLY KIT FOR ABOVE WITH CASE..... \$24.95

ANTENNAS & OTHER ACCESSORIES AVAILABLE. SEND FOR MORE INFO.



2100-2500 MHZ

*HMR-II COMPLETE UNIT
COMPLETE SYSTEM AS SHOWN. NOT A KIT. INCLUDES A PC BOARD, POWER SUPPLY, CABLES & CONNECTORS—PRE-ASSEMBLED AND TESTED. 24dB GAIN OR GREATER.

1 UNIT..... \$149.95
2 UNITS..... \$139.95 ea.
3 OR MORE UNITS..... \$129.95 ea.

*HAM MICROWAVE RECEIVER

PRE-SCALER KITS

HAL 300 PRE..... (Pre-drilled G-10 board and all components)..... \$14.95
HAL 300 A/PRE..... (Same as above but with preamp)..... \$24.95
HAL 600 PRE..... (Pre-drilled G-10 board and all components)..... \$29.95
HAL 600 A/PRE..... (same as above but with preamp)..... \$39.95

PRE-AMPLIFIER

HAL-PA-19 WIDE BAND PRE-AMPLIFIER, 2-200 MHz BANDWIDTH (- 3dB POINTS), 19dB GAIN
FULLY ASSEMBLED AND TESTED \$8.95

HAL-PA-1.4 WIDE BAND PRE-AMPLIFIER, 10 MHz TO 1.4 GHz. 12dB GAIN
FULLY ASSEMBLED \$12.95

HAL-PA-2.1 GHz 2 STAGE PRE-AMPLIFIER, DESIGNED FOR 2304 DOWN CONVERTER. MADE TO PIGGIE-BACK ON THE 2304 BOARD. OFFERS 20 dB GAIN. ALSO HAS AN IMAGE REJECTION FILTER.

SHIPPING INFORMATION: ORDERS OVER \$25 WILL BE SHIPPED POST-PAID EXCEPT ON ITEMS WHERE ADDITIONAL CHARGES ARE REQUESTED. ON ORDERS LESS THAN \$25, PLEASE INCLUDE ADDITIONAL \$2.60 FOR HANDLING AND MAILING CHARGES. SEND 20¢ STAMP FOR FREE FLYER.

HAL-TRONIX INC.

P.O. BOX 1101

SOUTHGATE, MICH. 48195

PHONE (313) 285-1782



"HAL" HAROLD C. NOWLAND
WBZXH

CIRCLE 139 ON READER SERVICE CARD

HOW CAN I INTERCEPT
SMUGGLERS? SECRET
SATELLITES? RESCUE
MISSIONS? SIGNALS
FROM SPACE?

WHAT IS THE TRUTH
ABOUT ANTENNAS?
TUNERS? PREAMPLIFIERS?

HOW CAN I CHOOSE THE BEST
RECEIVER? ANTENNA?

WHAT ARE THE LAWS REGARD-
ING LISTENING IN?

UNCOVER LISTENING
EXCITEMENT YOU
NEVER THOUGHT
POSSIBLE!

For your **FREE COPY** of
MONITORING TIMES--

CALL NOW! Toll-free
1-800/438-8155

(cont. US except NC).

Others dial 1-704/837-2216

or write to

Grove Enterprises, Dept. K, 140 Dog Branch Road
Brasstown, NC 28902

CIRCLE 92 ON READER SERVICE CARD



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

KITTY SAYS: WE ARE NOW OPEN 7 DAYS A WEEK.
Saturday & Sunday 10 to 5 PM

Monday-Friday 9 to 6:30 PM

Come to Barry's for the best buys in town. For
Orders Only Please Call: 1-800-221-2683.



"We're raising a racket with
our Super Summer Prices."



ICOM

IC-R70, IC-720A, IC-730, IC-740, IC-25A/H, IC-35A
IC-45A, IC-251A, IC-2KL, IC-471A, IC-290H, IC-751



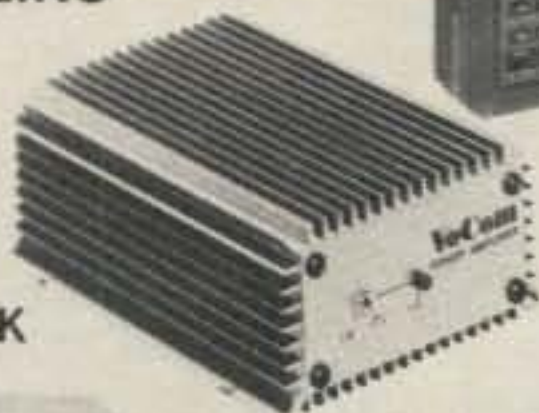
YAESU

FT-ONE, FT-980, FT-102, FT-77, FT-707, FT-230R
FT-726R, FT-480R, FT-720RU, FT-290R, FRG-7700, FT-625RD



ROCKWELL/COLLINS
KWM-380

VoCom/Mirage
Tokyo Hy-Power
Amplifiers &
5/8λ HT Gain
Antennas IN STOCK



YAESU
FT-208R
FT-708R

ICOM
IC2AT
IC3AT
IC4AT

Land-Mobile H/T
Wilson Mini-Com II
Yaesu FTC-2203, FT-4703
Icom IC-M12 (Marine)
Tempo M-1

DRAKE TR-5, TR-7A, R-7A, L-7, L-15, Earth
Satellite Receiver ESR-24, THETA 9000E & 500,
EARTH SATELLITE STATION ESS-2250



SMART PATCH

CES-Simplex Autopatch 510-SA Will Patch FM
Transceiver To Your Telephone. Great For
Telephone Calls From Mobile To Base. Simple
To Use - \$319.95.



SANTEC
ST-220/UP
ST-144/UP
ST-440/UP

NEW IMPROVED

MURCH Model
UT2000B

MFJ Models
900, 940B, 941C & 982.

DENTRON AMPLIFIERS
GLA-1000C



SPECTRUM COMMUNICATIONS REPEATERS
SCR-1000, 4000 & 77
Commercial & Amateur In Stock



KANTRONICS
Field Day 2, Mini-Reader,
Interface, Software &
Code Tapes

AEA CP-1 Computer Patch

**Complete Butternut Antenna
Inventory In Stock!**

**Communications Specialists
Encoders In Stock!**

Smallest Wireless
Telephone Available
600 ft. range w/encoder \$135.00

**BENCHER PADDLES &
Vibroplex Keys In Stock!!**

New TEN-TEC
Corsair In Stock

**DIGITAL
FREQUENCY
COUNTER**

Trionyx-
Model TR-1000
0-600 MHz
Digimax Model
D-510 50 Hz-1GHz



Tri-Ex Towers
Hy-Gain Towers
& Antennas,
and Rotors
will be shipped direct
to you FREE of shipping cost.

AEA 144 MHz
AEA 440 MHz
ANTENNAS



BIRD
Wattmeters &
Elements
In Stock

EIMAC
3-500Z
572B, 6JS6C
12BY7A &
4-400A

MAIL ALL ORDERS TO BARRY ELECTRONICS CORP., 512 BROADWAY, NEW YORK CITY, NY 10012.

New York City's LARGEST STOCKING HAM DEALER
COMPLETE REPAIR LAB ON PREMISES

"Aquí Se Habla Español"

BARRY INTERNATIONAL TELEX 12-7670
TOP TRADES GIVEN ON USED EQUIPMENT
STORE HOURS: Monday-Friday 9 to 6:30 PM
(\$1.50 parking across the street)
Saturday & Sunday 10 to 4 PM (Free Parking)
AUTHORIZED DIST. MCKAY DYMEK FOR
SHORTWAVE ANTENNAS & RECEIVERS.

**NEEDED:
SERVICE
DEPARTMENT
TECHNICIANS!!**

We Stock: AEA, ARRL, Alpha, Ameco, Antenna Specialists, Astatic, Astron, B & K, B & W, Bash, Bencher, Bird, Butternut, CDE, CES, Collins, Communications Spec. Connectors, Covercraft, Cubic (Swan), Cushcraft, Daiwa, Dentron, Digimax, Drake, ETO (Alpha), Eimac, Encomm, Henry, Hustler (Newtronics), Hy-Gain, Icom, KLM, Kantronics, Larsen, MCM (Daiwa), MFJ, J.W. Miller, Mini-Products, Mirage, Newtronics, Nye Viking, Palomar, RF Products, Radio Amateur Callbook, Robot, Rockwell Collins, Saxton, Shure, Swan, Telxon, Tempo, Ten-Tec, Tokyo Hi Power, Trionyx TUBES, W2AU, Waber, Wilson, Yaesu Ham and Commercial Radios, Voccom, Vibroplex, Curtis, Tri-Ex, Wacom Duplexers, Repeater, Phelps Dodge, Fanon Intercoms, Scanners, Crystals.

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS
DEALER INQUIRIES INVITED. PHONE IN YOUR ORDER & BE REIMBURSED.

COMMERCIAL RADIOS stocked & serviced on premises.

**Amateur Radio & Computer Courses Given On Our Premises, Call
Export Orders Shipped Immediately. TELEX 12-7670**

IRT/LEX-"Spring St. Station"
Subways: BMT-"Prince St. Station"
IND-"F" Train-Bwy. Station"
Bus: Broadway #6 to Spring St.

A LOOK AT THE WORLD AROUND US

Selection and Use of Today's "Dream Rigs"

The continuing introduction of new and exciting commercial h.f. transceivers often creates a perplexing situation for today's radio amateurs. While on one hand we may be unsure if all of a rig's "bells and whistles" would be useful, we also don't want to be shortchanged in communications capabilities. As a result of this dilemma, we may purchase a unit and later (or sooner!) trade it without ever realizing its full benefits. The "do everything rig of our dreams" may thus have slipped through our fingers without our even knowing it. There are also many times (such as for mobile or portable operations) when a simple and straightforward transceiver is noticeably more useful than a multi-knob unit.

The keynote to selecting and enjoying an h.f. rig thus involves analyzing what is desired and what capabilities various rig designs offer. Confusing? Not really. We're merely saying, for example, that it wouldn't be quite logical to purchase an FT-102 or TS-830 if your primary style of operating involves brief on-the-air stints with a fair amount of band hopping and "fast operating." Likewise, a serious DXer probably wouldn't be fully satisfied with a TS-430, FT-77, or KWM-380 as his only h.f. transceiver. There are a number of additional aspects worth considering in the h.f. equipment game, and although any rig can be made to perform in an outstanding manner, a unit equally suited to one's own style gives the greatest returns, regardless of its age or popularity.

Some of the ideas I'm going to present this month may not appeal to all of you, but that's necessarily part of the concept—to present a variety of ideas and ideals which you can separate as desired and from which you can then draw your own conclusions on selecting and using a modern h.f. rig. This will not be a technical discussion, but rather an operational and user-oriented overview of rig capabilities. Technical and circuit-design information on modern rigs was covered very well by Doug DeMaw in the January 1983 issue of QST.

Tubes Versus Transistors

As you are aware, all modern transceivers use fully solid-state receivers. Considered in terms of r.f. energy generation, though, we are presently amidst a



The ICOM 740 transceiver features dual independent v.f.o.'s, one tunable memory per band, both RIT and XIT, an i.f. notch filter, plus continuously adjustable AGC and noise blanker. These features allow you to both chase several DX stations simultaneously and survive numerous environmental noises. If the optional internal supply is used, this is today's most compact "single box" rig.

period of transition between tubes and transistors. Transceivers with tube finals are still being manufactured, but high-power transistors are pushing this era. This same situation will soon hold true for linear amplifiers (several solid-state 1 kw broadcast transmitters have been available for 5 or 6 years). Some amateurs feel tubes are exceptionally rugged devices with output unequalled by transistors. That's a misconception. A TS-830 and a KWM-380, for example, both produce a stout and beautiful sounding transmitted signal. Likewise, an ICOM 740 or a Yaesu FT-102 are equally suited for SSTV or RTTY use. Naturally, the output power of these (or any other) rigs must be reduced for long-duty-cycle modes. Frankly, there

are so many warnings and tuning limits with modern tube finals (plus a number of tuning adjustments) that one may realize more use and pleasurable returns from a fully solid-state transceiver. The "switch on and operate immediately" plus "instant bandswitching without tuning" ability is like a totally new ball game of enjoyment. S.w.r. cutbacks? If you're wasting time with a high s.w.r., you deserve the consequences. Both tubes and transistors suffer from impedance mismatches.

Having a tube-type linear amplifier attached to an all solid-state exciter is a downer. The transceiver is ready for action on a moment's notice, but tubes can't continuously survive that kind of "waking." Sure, some operators switch on an amplifier and immediately drive it wide open, just as some folks jump in a car and hit 90 m.p.h. before they get to the end of the block, but continuous repairs soon curtail those shenanigans. Solid-state linears may run slightly less output power, but their overall agility gives greater on-the-air returns for multi-band operators. Think about that. Super power isn't mandatory if you're onto DX before the wolf pack and battle cruisers arrive. Start pileups; don't join them!

Casual Versus Serious DXing

As we all know, one of the oldest and most popular activities in amateur radio is DXing. While each of us has his own thoughts in this area, we must agree that there is a special feeling of achievement in such long-distance communications. Whether you'll go to almost any ends to land those rare DX contacts (multiple antennas, 20 hours a day monitoring, numerous DX newsheets, etc.) or whether



Kenwood's TS-930 includes dual v.f.o.'s and eight memories which store both band and frequency information. One may thus operate 30 c.w., 20 s.s.b., 15 c.w., and 10 s.s.b. with a single switch throw. Separate controls are used for setting c.w. and s.s.b. bandwidths, and XIT is not included. Rig draws approximately 500 watts on transmit and delivers approximately 110 watts r.f. output.

*Eastwood Village No 1201 So., Rt. 11, Box 499, Birmingham, AL 35210

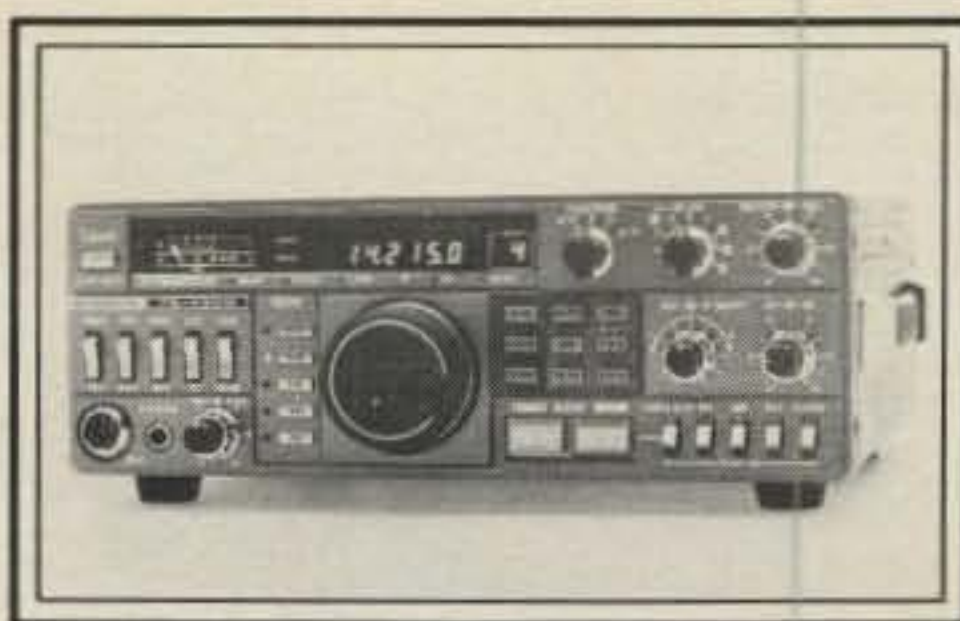
you're equally satisfied working more common DX (and/or being content without a heavy QSL chase) generally describes whether you're a casual or a serious DXer.

The serious DXer places special importance not only on his abilities, but also on all h.f. equipment. His main transceiver usually includes a super speech processor, variable selectivity, switchable steep skirted filters, and at least two v.f.o.'s with a number of programmable memories. These measures are necessary if maximum operating time returns are to be realized. Before the days of dual v.f.o. transceivers many of these DXers used two or more rigs for frequency agility. One setup (usually that with the highest output and most rugged final amplifier) was left operational on 20 meters while another rig (usually with the "hottest" receiver) clamored from band to band, dragging a nerve-wracking tuning process with it. Once these "battle cruisers" were swung into action, they could plow through any band and easily reach their target. Meanwhile, the less-equipped but frequency-agile boys may have quickly hopped in, worked the DX, and headed for higher ground. Properly used, today's instant-on and no tune-up solid-state rigs have a decided advantage! Times are now changing, and many of today's "Big Guns" are also obtaining gear capable of instantly jumping on the air and popping onto any frequency with a respectable (although somewhat less powerful) signal.

The casual DXer is noticeably more flexible in both operating habits and equipment selection. Unrestrained from the needs of "special artillery," these amateurs comprise the major market for new "bells and whistles" rigs (a general category in which most of us fall). Quite surprisingly, however, such fancy transceivers are seldom put through their paces and used to their maximum benefit. Otherwise there would be substantially more top DXers and high-scoring contesters. Want to gain a leading edge on DXing and contesting tactics? Learn how to *really use* that new h.f. transceiver!



Leading the pack of present "bells and whistles" rigs, Yaesu's new FT-980 may include more features than most operators will ever need or use. The independent and continuously adjustable i.f. bandwidth and i.f. shift are great. Not a lightweight, but one heck of a rig! Home troubleshooting and repairs could be difficult on this complex unit.



A super "bells and whistles" version of the popular TS-130, Kenwood's TS-430 features eight band-and-frequency memories, i.f. notch, and selectable s.s.b. or c.w. filters. Noise blanker is not adjustable. Processor is fair, and i.f. shift is relatively good. This rig has unlimited capabilities for amateurs in good locations. Unit delivers approximately 110 watts output; mating a.c. supply draws approximately 390 watts.

Using Bells and Whistles Effectively

This is an area that's difficult to describe in a brief magazine column, so try to read between the lines and ponder these ideas as we go.

How useful are those memories and dual v.f.o.'s in many rigs? Not a bit unless they are put into action. Let's take an example of an IC-730 outrunning a TS-830. Let's say we're up early and hit 20 meters right before it opens. Tuning 14.000 to 14.030, only one very weak signal is heard on 14.010. Leaving v.f.o. "A"

there, we punch up v.f.o. "B" and tune 14.200 to 14.240. A VK7 is heard on 14.222. Switching back to v.f.o. "A," the c.w. signal is now readable—a 3B8—in QSO. The frequency is quickly stored in memory and v.f.o. "A" is then synced with v.f.o. "B" (merely punch "write"). The VK7 is signing, but there's time to scan 14.200 to 14.230 again and spot a DU. The 3B8 now signs; you call him and check the VK7. A DX station caught the 3B8, but the VK7 signs clear. You call and he returns. The DU is about to sign. You now return to the VK7 while using fast VOX and split v.f.o.'s to monitor the DU. Upon turnover, the VK7 begins to "wrap up" with you while the 3B8 again signs. You call the 3B8 (his frequency is in memory) and get him, return a final to the VK7, then copy the 3B8's info and quickly check 14.000 to 14.020 during his call sign over (merely release memory and re-punch it to return to 3B8). A ZL was spotted on 14011.3. Unless your rig has multiple memories, you'll need to write down this frequency until a v.f.o. can be moved. Next, it's on to the DU, more tuning, etc.

Approximately 10 minutes soon will have passed, and you'll notice others are beginning to pile up over your previously worked DX. It's time to increase pace! Between band scans on 20 meters, start lining up similar tactics for 15, 30, or 40 meters. Remember that it's more important to be there first than to run high power. Remember also to scan the second

AVANTI. The on-glass, halfwave, mobile antenna that installs in 15 minutes.



- **Co-inductive coupling** establishes highly tuned circuit through glass with no measurable signal loss.
- **No ground plane:** Full halfwave design—performance equal to practical 5/8 wave installations.
- **DUO-BOND mounting** for firm, fast, waterproof bonding. Removable without damaging car or antenna.
- **No holes:** No vehicle damage; fast, easy cable routing.
- **Four models** for 2 meter, 220 MHz and UHF amateur bands.

the antenna specialists co.



a member of The Allen Group Inc.
12435 Euclid Avenue, Cleveland, Ohio 44106
Export 55 Main St., Freeport, N.Y. 11520
Canada: A. C. Simmonds & Sons, Ltd.

we design solutions.

CIRCLE 142 ON READER SERVICE CARD

band with v.f.o. "A" (freed after the VK7 QSO) so a desirable station can be snapped into memory. If you've played your cards smoothly, you can now work DX on two (or three!) bands almost simultaneously. Using the separate memories for each band permits controlling everything with a single throw of the bandswitch. If you have ICOM's mating IC2KL linear amplifier, it will automatically follow the transceiver's band hopping. Ole'!

Now we reach the point of either needing more memories, having to write down frequencies spotted from memory tuning, or taking time to move v.f.o.'s. Almost 20 minutes of operating time has elapsed; the bands are coming to life, and we'll need to move a little quicker to snag the good ones. At this point, however, we're doing more button pushing than knob turning. If a pileup becomes ridiculous, we simply move to another, or jump to another band or two and snap back later.

Now don't tell me these operating tactics don't work. I've successfully done this for some time. In fact, I've occasionally used two rigs (both with memories) on two separate desks feeding separate antennas simultaneously. On one occasion a curious VK called to ask why he heard me working two DX stations almost simultaneously on different frequencies. I asked the fellow to stand by. You guessed it. I was signing with a UAØ on another band at that time. Heck, with today's rigs one



Aggravated with the "bells and whistles" game? Tired of super complex rigs? Yae-su's FT-77 is a "plain Jane" unit with a super smooth, rubberized tuning knob and (hopefully) very reliable circuitry. No VOX, no processor, just a very nice, easy-to-use unit.

can work OSCAR, 30 meters, and listen to underworld communications all at once. Why miss any of the action!

During the previous discussion it may seem that we overlooked frills such as bandpass or i.f. shifts, variable bandwidths, notch filters, etc. Not necessarily. When you hit the bands at the right times and move at a smooth clip, wasting moves with those frills isn't logical. True, they're nice to have available (especially a good speech processor and noise blanker), but many operators merely set and forget these controls. How about you? If you live

in a city, an adjustable or dual-mode noise blanker will be a blessing ("wide," or "full" blanking reduces man-made noises with the sacrifice of minor distortion). A tunable notch filter at the i.f. level (not a.f.) also lowers noise levels. A signal quality sacrifice is again necessary, but the alternative is lost communications. Variable bandwidth and i.f. shift are useful for weekenders facing crowded bands (what are your main operating times?). One very useful frill is the recent inclusion of XIT to mate with RIT (assuming that control covers ± 5 kHz the dial's frequency). In addition to use for easy net QSY's, it's also good for "leap frog" contacts or working adjacent frequency DX when memories are tied up.

In Conclusion

As previously mentioned, this collection of ideas was presented for your sorting and knowledge when contemplating a new h.f. rig. If you liked the DXing examples of supreme knob twiddling, remember that DX bulletins, magazines, etc., help decide game plans *before* switching on any rig. Remember also that rigs and trends are continually changing and improving. As we said, a new rig well may be your best bargain. If you would like us to delve further into this area (maybe previewing new gear?), drop us a note or catch us on the air . . . if you can.

73, Dave, K4TWJ

The Big New Plus in Business Mobile Radio

Digital technology makes the **Wilson Citi-Com Plus** the most versatile radio

ever produced. Ten simplex or semi-duplex frequencies with independent CTCSS tones can be programmed via a jumper enabled keyboard. Advanced microprocessor design provides crystal-less operation. A built-in priority scanner can be programmed to scan any or ten channels in the transceive mode for monitoring.

The **Wilson Citi-Com Plus** is the most versatile business mobile radio ever designed. It's everything you'll ever need in a 10 channel UHF transceiver for less than you might imagine.

For more information, pricing, ordering or a product brochure contact:



UNIVERSAL COMMUNICATIONS

A DIVISION OF INNOVATIVE LABS, INC.

P.O. Box 339 • ARLINGTON, TEXAS 76010-0339 • (817) 860-1641 Metro (817) 265-6638



NEWS/VIEWS OF ON-THE-AIR COMPETITION

Rules for the 1983 WW DX Contest will appear in next month's issue. At this writing no changes are anticipated, and the list of Trophies and Plaques should remain the same with a few possible additions. We have received several inquiries from potential donors, and they will be included if the necessary requirements are fulfilled in time. Anyone wishing to be included in the upcoming 1983 contest must make the necessary arrangements before August 15th. This will give us time to get the info out before contest time.

As I have often suggested, a Memorial Plaque is an excellent way to perpetuate the call of a departed club member. There are several single-band areas that are still available. (Check the Sept. '82 issue for last year's rules.) Write to me as soon as possible and I will give you all the details.

Practically all the plaques that are processed via CQ have been awarded. A good portion of them were presented at Visalia and Dayton. If you have not received yours, especially those provided by the donors, contact me and I'll try to track it down for you. We are holding two for lack of mailing instructions: KG6JIA in the 1979 WW Phone Contest and S83T also on phone in the 1980 contest. Anyone knowing the whereabouts of the above please drop me a line.

The Abruzzo region of the A.R.I. is having a "Gabriele D'Annunzio Trophy" activity scheduled for September 3rd to the 11th. It appears that stations in the above regions may be worked each day on all modes, both on v.h.f. and u.h.f., making it oriented more toward European participation. There are other requirements, so if you are interested I would suggest you write for more details. Address your inquiries to: Awards Manager, A.R.I. Section, P.O. Box 63, 65100 Pescara, Italy.

A final reminder: Deadline for material for the November issue is August 15th; September 15th for the December issue.

73 for this time, Frank, W1WY

European DX Contest

C.W.: Aug. 13-14 Phone: Sept. 10-11
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

This is the 28th annual contest sponsored by the DARC. The activity will be between European countries and the rest of the world on all bands 3.5-28 MHz.

Following are updated rules, including

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

* Aug. 6-7	Illinois QSO Party
Aug. 13-14	European C.W. Contest
† Aug. 13-14	SEANET Phone Contest
Aug. 13-14	New Jersey QSO Party
Aug. 20-21	SARTG RTTY Contest
Aug. 20-21	New Mexico QSO Party
Aug. 20-21	Alaska QSO Party
** Aug. 27-28	All Asian C.W. Contest
Aug. 27-28	Alabama QSO Party
Aug. 27-28	Occabama QSO Party
Aug. 28	GARTG RTTY Contest
Sep. 3-4	"Corona" 10 Meter RTTY
† Sep. 4	Bulgarian C.W. Contest
Sep. 3-5	FOUR Land QSO Party
Sep. 3-11	"G. D'Annunzio" Contest
Sep. 10-11	G-QRP Club Activity
Sep. 10-11	Cray Valley SWL Contest
Sep. 10-11	European Phone Contest
Sep. 10-11	YLRL "Howdy Days"
Sep. 10-11	ARRL VHF QSO Party
Sep. 17-19	Wash. State QSO Party
Sep. 17-18	SAC C.W. Contest
Sep. 24-25	SAC Phone Contest
Sep. 24-25	Delta QSO Party
Sep. 24-25	Maine QSO Party
Oct. 1-2	Oregon QSO Party
Oct. 8-9	GARTG SSTV Contest
Oct. 22-23	Pennsylvania QSO Party
Oct. 22-23	ARCI QRP QSO Party
Oct. 22-23	YLRL Anniv. C.W. Party
Oct. 22-23	CLARA AC/DC Contest
Oct. 29-30	CQ WW DX Phone Contest
Nov. 5-6	YLRL Anniv. Phone Party
Nov. 12-13	European RTTY Contest
Nov. 26-27	CQ WW DX C.W. Contest

* Covered last month.

** See June issue.

† Not official.

two new features. U.S. states will now count as a multiplier. Also, QSO dupe sheets will now be required for each band on which 200 or more contacts are made.

Only 36 hours out of the 48-hour contest period may be used by single-operator stations. The 12-hour off periods may be taken in one, but not more than three, periods anytime in the contest and must be indicated in the log.

Classes: Single operator and multi-operator single transmitter, both all bands. Multi-operator stations are allowed to change bands one time only within a 15-minute period. A quick band change and return is allowed to work a new multiplier.

Exchange: RS(T) plus a QSO number starting with 001. In addition, W/K stations will include their state (i.e., 599011 MA).

Scoring: One point per QSO and one point for each QTC reported.

Multiplier: The multiplier for non-European stations is determined by the num-

ber of European countries worked on each band (WAE list). Europeans will use the ARRL DXCC list. In addition, each call area of the following countries will be considered a multiplier: JA, PY, VE/VO, VK, ZL, ZS, UA90. Each W/K state will also be considered a multiplier.

In addition, the multiplier on 3.5 MHz may be multiplied by 4, on 7 MHz by 3, and on 14/21/28 MHz by 2.

Final Score: Total QSO points, plus QTC points, times the sum total multiplier from all bands.

QTC Traffic: Additional point credit can be realized by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and was later sent back to a European station. It can only be sent from a non-European station back to a European, the general idea being that after a number of Europeans have been worked, a list of these stations can be reported back during a QSO with another station. An additional one point credit can be claimed for each station reported.

A QTC contains the time, call, and QSO number of the station being reported (i.e., 1300/DL2DN/134). This means that at 1300Z you worked DL2DN and received #134.

A QSO can be reported only once and not back to the originating station.

There is a maximum of 10 QTC's to a station. The same station may be worked several times to complete this quota. Only the original contact, however, has QSO value.

Keep a uniform list of QTC's sent; 3/7 indicates that this is the 3rd series of QTC's sent and that 7 QSO's are being reported.

Awards: Certificates to the top scorers in each class in each country and areas listed in the multiplier. Continental leaders and stations having at least half the score of the continental leader will also be honored.

Disqualification: Violation of the rules of the contest, unsportsmanlike conduct, or taking credit for excessive duplicate contacts will be deemed sufficient cause for disqualification.

Logs: It is suggested that you use the official DARC or equivalent forms. Figure 40 contacts to the page, and use a separate sheet for each band. A large-size s.a.e. and IRC's will get you a supply.

Remember, all entrants are required to submit cross-check dupe sheets for each band with 200 or more QSO's.

A penalty of 3 contacts will be deducted for each duplicate QSO that is removed by the Committee.

Mailing deadline is Sept. 15th for c.w.

entries, Oct. 15th for the phone entries.

This year all entries go to: The WAEDC Contest Committee, P.O. Box 1328, D-895 Kaufbeuren, Fed. Rep. of Germany. (The U.S.A. address is no longer available.)

European Country List: C31, CT1, CT2, DL, EA, EA6, EI, F, FC, G, GD, GI, GJ, GM, GM Shetland, GU, GW, HA, HB9, HB0, HV, I, IS, IT, JW Bear, JW, JX, LA, LX, LZ, M1, OE, OH OH0, OJ0, OK, ON, OY, OZ, PA, SM, SP, SV, SV Crete, SV Rhodes, SV Athos, TA1, TF, UA1346, UA2, UA Franz Josef Land, UB5, UC2, UN1, UO5, UP2, UQ2, UR2, Y2, YO, YU, ZA, ZB2, 1A0, 3A, 4U1, 9H1.

New Jersey QSO Party

Two Periods UTC

2000 Sat. to 0700 Sun. Aug. 13-14

1300 Sun. to 0200 Mon. Aug. 14-15

This is the 24th annual party sponsored by the Englewood A.R.A. Phone and c.w. are part of the same contest, the same station may be worked on each band and mode, and NJ may work in-state stations for QSO and multiplier credit.

Exchange: QSO no., RS(T) and QTH. County for NJ, ARRL section or country for others.

Scoring: NJ stations score 1 point for W/K and VEVO contacts, 3 points for DX. Multiply total by ARRL sections worked



You may recall that in the Seville contest announcement last May, I casually mentioned that the Grand Prize of an all-expense-paid trip to Spain to attend the Seville April Fair Feast was for real. Here's Steve Sussman, W3BGN, the overseas winner, with a few of the local club members, who made sure that Steve and the XYL got to see the feast and other points of interest, not to mention being wined and dined and meeting dignitaries at special affairs. Left to right are Steve, EA1ABT, Steve's XYL, EA7CFW, and EB7EB.

(maximum of 74). KP4, KH6, KL7, etc., are 3 point contacts and section multipliers.

Out-of-state stations multiply total NJ QSO's by total of NJ counties worked (maximum of 21).

Frequencies: 1810, 3535, 3900, 7035, 7135, 7235, 14035, 14280, 21100, 21355,

28100, 28610, 50-50.5, and 144-146. Try phone on even hours, 15 on odd hours, and 160 at 0500 GMT.

Awards: Certificates to the top scorers in each NJ county, ARRL section, and DX country. Second-place awards if four or more logs are received from that section; also Novice and Tech. awards.

Use UTC, indicate the multiplier only the first time it is worked, include a QSO check sheet and a summary sheet showing the scoring, etc. Also include a large s.a.s.e. if you wish a copy of the results.

Stations planning activity in NJ are requested to advise the E.A.R.A. by August 1st so that coverage of all counties may be planned.

Logs must be received no later than Sept. 10th and go to: Englewood A.R.A., P.O. Box 528, Englewood, NJ 07631.

S.A.R.T.G. RTTY Contest

Three Periods GMT

0000-0800 & 1600-2400 Sat., Aug. 20

0800-1600 Sun., Aug. 21

This is the 13th annual contest sponsored by the Scandinavian Amateur Radio Teletype Group. Use all bands 3.5 through 28 MHz. The same station may be worked on each band for QSO and multiplier credit.

Classes: Single operator, multi-operator single transmitter, and s.w.l.

Exchange: QSO no., signal report.

Points: QSOs with own country, 5 points. With other countries on same continent, 10 points. With other continents, 15 points. The U.S., Canada, and Australia call areas count as separate countries for scoring.

Multiplier: Each DXCC country and each W/K, VEVO, and VK call area. A multiplier will not be considered unless the claimed station appears in at least five logs, or a log is received from that station.

Final Score: Sum of QSO points from all bands times the sum of the multiplier from each band.

S.w.l.'s use same scoring but based on sum of stations and messages copied.

Awards: Certificates to the top-scoring stations in each class in each country and each call area of the U.S., Canada, and Australia.

Use a separate sheet for each band, and include a summary sheet showing the scoring, comments, and other essential information, and your name and address in block letters.

Logs must be received by October 10th and go to: S.A.R.T.G. Contest Manager, P.O. Box 717, DK 8600 Silkeborg, Denmark.

Alaska QSO Party

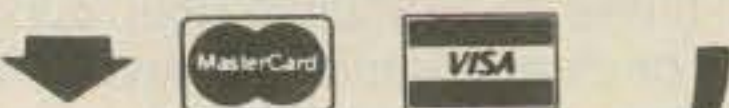
0200Z Sat. to 0200Z Sun., Aug. 20-21

This is the second time around for this one sponsored by the Alaska DX Associa-

CABLE TV

Buy Direct & Save

SUPER SPECIALS



40 CHANNEL CONVERTER
\$29⁹⁵

Advanced Solid State design and circuitry allows you to receive mid & super band channels. Restores programming to Video Recorders.

36 CHANNEL REMOTE CONTROL CABLE CONVERTER
\$69⁹⁵

JERROLD 400 THE ULTIMATE CABLE TV CONVERTER

60 CHANNEL INFRARED REMOTE CONTROL
\$129⁹⁵

Send \$5 for Complete Catalog

DIRECT VIDEO SALES

P.O. BOX 1329

JEFFERSONVILLE, INDIANA 47130

CALL

1-812-282-4766

The Spider™ Antenna

The modern multi-band mobile antenna—switch to 10, 15, 20 or 40 meters without stopping to change resonators.

Features of the Spider™ Antenna

- The Spider™ Antenna is less than six feet high and the longest resonator projects out from the mast 24 inches. This gives a slim profile, low height and light weight, offering little wind resistance and eliminating the need for a spring mount.

- Each resonator is tuned to the desired portion of the band by a tuning sleeve which slides over the outside of the resonator.

- SWR is approximately 1:1 at the selected resonant frequency.

- Base impedance approximately 50 ohms, requiring no matching network.

- Ideal for use on vans, campers, motor homes, travel trailers; also in mobile home parks, apartment houses and condominiums.

The Spider™ Adapter converts any mono-band antenna with a half-inch mast into a modern four-band antenna.

The Spider™ Maritimer™ is the ultimate for marine use. Made of non-magnetic stainless steel and nickel-chrome plated bronze, using regular Spider™ resonators and tuning sleeves.

Accessories—Bumper, ball, angle and stud mounts. Quick disconnects. RG-58A/U coaxial cable and connectors. Ground radial systems. Copper foil and copper braid ground straps.

For further information, prices write or call

MULTI-BAND ANTENNAS

7131 OWENSMOUTH AVENUE, SUITE 263C
CANOGA PARK, CALIF. 91303
TELEPHONE: (213) 341-5460

CIRCLE 20 ON READER SERVICE CARD

CIRCLE 73 ON READER SERVICE CARD

112 • CQ • August 1983

Say You Saw It In CQ

tion. Several changes have been made in this year's rules and scoring.

The same station may be worked on each band, both c.w. and s.s.b., for QSO credit, but it will only count once as a multiplier.

Exchange: RS(T) and judicial district (1, 2, etc.) for KL7's. RS(T) and QSO number (001, etc.) for non-Alaskans.

Scoring: For KL7's—2 points for each QSO on 10, 15, and 20; 5 points if on 40, 80, and 160. Multiplier—sum of states, VE provinces, and DXCC countries worked on each band.

For non-Alaskans—5 points for QSO's on 10, 15, and 20; 10 points if on 40, 80, and 160. Multiplier—sum of Alaskan judicial districts worked on each band.

Final Score: Total QSO points times the sum of the multipliers from each band.

Frequencies: C.W.—1807 and 60 kHz up from low edge of each band. S.S.B.—1813, 3895, 7270, 14285, 21360, 28660.

Awards: Certificates to the winners in each state, province, and DX country. An Alaskan Goldpanner Plaque to the Top Alaskan and non-Alaskan.

Include a summary sheet with your log, and mail no later than October 1st to: Alaska DX Association, KL7AF, P.O. Box 1614, Kodiak Island, Alaska 99615.

New Mexico QSO Party

1800Z Sat. to 2100Z Sun., Aug. 20-21

The Albuquerque DX Assoc. is again sponsoring this year's party, which is being held a month earlier than last year.

There are two categories: single and multi-operator. The same station may be worked on each band and each mode for QSO credit, and New Mexico mobiles in each county change.

Exchange: RS(T) and QTH. County for NM stations; state, province, or DX country for others.

Scoring: 2 points for phone contacts, 3 points if on c.w.

New Mexico stations multiply total QSO points by NM counties, states, VE provinces, and DX countries worked for final score. All others multiply total QSO points by number of NM counties worked (maximum of 33).

Frequencies: C.W.—1805 and 60 kHz up from low edge of each band. Phone—1835, 3985, 7230, 14280, 21370, 28570, 147,510. (No repeater.) Novice—25 kHz up from low end of Novice bands.

Awards: Certificates in each category to top-scoring NM station in each county and in each state, VE province, and DX country. A special certificate to the highest scoring NM mobile or portable. Plaques to the highest scoring NM and non-NM stations in each category, and NM Club with three or more entries.

Include a summary sheet and a dupe sheet if your log contains 200 or more QSO's, and a large s.a.s.e. for a copy of the results.

Mailing deadline is October 1st to: Ed

Graham, N5HH, 12449 Regent NE, Albuquerque, NM 87112.

Alabama QSO Party

1600Z Sat. to 2300Z Sun., Aug. 27-28

This party is again being sponsored by the Chattahoochee Valley A.R.C. The same station may be worked once on each band and each mode, mobiles on each county change, and Alabama to Alabama contacts are permitted.

Exchange: RS(T) and QTH. County for Alabama; state, province, or country for all others.

Scoring: One point per QSO. Alabama stations multiply total by sum of states, VE provinces, and countries worked. All others multiply total Alabama contacts by sum of Alabama counties worked (maximum 67).

Frequencies: C.W.—3565, 7065, 14065, 21065, 28065. Phone—3965, 7265, 14285, 21365, 28565. Novice—3725, 7125, 21125, 28125.

Awards: Certificates to top scorers in each state, VE province, and DX country. Also to anyone contacting 15 or more Alabama stations. Plaques to the overall Alabama and out-of-state winners, and to the Alabama Club with the highest aggregate score.

Mailing deadline is September 30th to: Johnny Royster, WA4VEK, P.O. Box 494, Fairfax, AL 36854. Include a large s.a.s.e. for a copy of the results.

Occupation Contest

1800Z Sat. to 2400Z Sun., Aug. 27-28

This is the third annual Occupation Contest sponsored by the Radio Association of Erie, PA. The purpose of this activity is to contact other amateurs and exchange occupations. Try to keep titles in general field—i.e., engineer, technician, machinist, salesman, etc. Note the change in the scoring this year.

Exchange: RS(T), your occupation, state, province, or DX country.

Scoring: One (1) point for each similar

1982 SAC Contest Results U.S.A. and Canada

C.W.			
W1END	10,498	AG5C	5,124
W1BL	9,063	W5ZR	4,884
KA1CY	8,050	N5BA	4,576
W1CNU	4,182	W5UNW	774
KA1CLV	3,737	W5EIJ	110
AA2Z/1	1,014	K6DDO	6,192
W1OPJ	897	W6UA	3,626
W2ZZ	7,742	N6ZZ	2,808
K2SX	5,720	AA6EE	12
WA2UDT	2,210	W7QK	5,000
W2XQ	1,566	AI9J	28,314
W3GM	31,872	K9BG	15,340
W3ARK	10,865	KO9Q	4,107
K3FN	4,104	K9IL	2,139
WA3DMH	3,800	W9YCV	4
KA3EOA	2,139	W0WP	21,896
W3ICM	132	W0RSG	2,040
N3RL	91		
K4FPF	4,500		
WA4OML	1,357		
Phone			
KA1CY	6,660	KC7V	726
K3FN	8,064	KO7G	576
W3ARK	5,445	W7QK	425
W3ICM	5,203	WD8CRY	2,052
N4MM	7,521	W8VEN	132
K4RZ	4,263	AI9J	12,300
KD4PP	2,982	W9SS	3,652
W4WIT	1,357	K19A	1,224
W5EIT	285	VE3GCO	7,965
W6EVF	1,232	VE3LKR	238
Plaque Winners			
W3GM on C.W.			
AI9J on Phone			

occupation worked. Two (2) points for each retiree worked. Three (3) points for each new occupation worked. There is no multiplier. Total QSO points is final score.

Frequencies: C.W.—40 kHz up from bottom of each band. Phone—1820, 3920, 7250, 14300, 21400, 28600.

Awards: Certificates to highest scoring stations in each state, VE province, and DX country, and a plaque to the overall winner.

Mailing deadline is October 1st to: Chris Robson, KB3A, 6950 Kreider Road, Fairview, PA 16415.



ZA-1A \$17.95
3.5-30 MHz

ZA-2A \$21.95
14-30 MHz, with hardware for 2" boom

Available from your
dealer. In U.S.A. add
\$2.00 handling

BENCHER, INC.

333 W. Lake St., Chicago, IL 60606
(312) 263-1808

CIRCLE 52 ON READER SERVICE CARD

Ham Shop

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge \$1.00. No ad (non subscriber) will be printed unless accompanied by full remittance. Non-Commercial ads free to CQ subscribers (maximum 3 lines per month). 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. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

PRE-1946 TELEVISION SETS wanted for substantial cash. Finder's fee paid for leads. Also interested in spinning disc, mirror in-the-lid, early color sets, 9AP4 picture tubes. Arnold Chase, 9 Rushleigh Road, West Hartford, Conn. 06117. Phone (203) 521-5280.

QSLs & RUBBER STAMPS—Top Quality! Card Samples and Stamp Information 50¢. Ebbert Graphics D-2, Box 70, Westerville, OH 43081.

NEW KID on block: For QSL free samples write Kings Grove Press, Box 9, Ellerslie, MD 21529. Also custom printing—instructions included. Stamp appreciated.

ATLAS RADIO REPAIR SERVICE: Specializing in the 180, 210, and 215. Ninety Day Written Guarantee—Parts and Labor. A.R.R.S., 1320 Grand, San Marcos, CA 92069. Phone (619) 744-0720.

QUADS, * dB QUADS * 2, 3 & 4 elements, complete kits, fiberglass spreaders, components, wire. 3 first class stamps for complete brochure. db + Enterprises, Box 24, Pine Valley, NY 14872.

HELP! English amateur library needs back issues of CQ magazine, no matter how old but in fair condition. Willing to pay freight. G3YMM, 9 Cloister Road, North Acton, London W3 England.

WANTED: Early Hallicrafter "Skyriders" and "Super Skyriders" with "Silver" panels. Also "Skyrider Commercial" early transmitters such as HT-1, HT-3, HT-19, and other Hallicrafter gear, parts, accessories, manuals. Chuck Dachis, WD5EOG, The Hallicrafter Collector, 4500 Russell Drive, Austin, TX 78745.

TRS-80C COLOR COMPUTER PROGRAMS and Hardware to send and receive Morse Code or RTTY, parallel I/O card, EPROM Programmer. Frank Lyman, P.O. Box 3091, Nashua, NH 03061.

STAMP COLLECTOR desires contact with radio operators with accumulation of overseas mail. All inquiries will be answered. Contact Mr. J.D. Williams, 1207 Muri St., New Orleans, LA 70114.

FOREIGN QSL CARD HANGERS: 12-18 pocket plastic holders, size 4 1/4 x 6, \$9.95. Envelopes with Call, Name, QTH, 100-\$6.95. RCO PRODUCTS, Box 7333, Kansas City, MO 64116.

VIC-20 FCC TYPE Q&A COMPUTER TAPES: Novice, Tech., Gen., Adv., Expert \$3.75. Weiss, 168 Kirch, York, PA 17402.

QUALITY TOWER ACCESSORIES TO SOLVE YOUR PROBLEMS: SO-1 standoff brackets for small 2 meter, Ringo, TV antennas, \$34.50. SO-2 Heavy-duty standoffs for large 2 meter, beams, commercial, \$59.50. MA-1 and MA-2 mast adapters put the top of your tower mast to good use, \$22.50. GP81 and GP51S Ginpole Kits provide safety for your tower work, \$129.50. BG-18 tower mast for those big beams, \$249.50. These accessories work fine on all tubing-type towers. Special accessories can be custom made to order. Request our 1983 catalog. Visa, Mastercharge. IIX Equipment Ltd., P.O. Box 9, Oak Lawn, IL 60454. Phone 312-423-0605.

IMRA-International Mission Radio Assn. helps missionaries—equipment loaned; weekday net, 14.280 MHz, 2:00-3:00 PM Eastern. 1 Pryer Manor Rd., Larchmont, NY 10538.

THE CENTRAL KENTUCKY ARRL HAMFEST, sponsored by The Bluegrass Amateur Radio Society, will be held Sunday, 8:00 AM to 5:00 PM, August 14, 1983, at Scott County High School, Longlick Road and US Route 25, Georgetown, Kentucky (Off I-75/64). Technical Forums. Awards and Exhibits in A/C facilities. Outside Flea Market space, no charge. Tickets \$3.50 advance and \$4.00 at the gate. For more information or tickets write Edward B. Bono, WA4ONE, P.O. Box 4411, Lexington, Kentucky 40504.

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! \$18.00 annually w/money-back guarantee! FREE SAMPLE for S.A.S.E. (two stamps). W5YI, Box 10101-C, Dallas, Texas 75207.

HATS WITH NAME AND CALL \$4.95 plus \$1.50 postage. SASE for hat information. Colorful QSL's Samples \$5.00. Specialty Printing, Box 361, Duquesne, PA 15110.

QRP INFO FREE. Large s.a.s.e. (2 oz. postage) to: QRP, Box 12072, Austin, Texas 78711.

RTTY/CW COMPUTER INTERFACE in easy-to-build kit, includes built-in power supply. Introductory price \$99.95. RTTY/CW software from \$34.95. Ham Log program for VIC-20 + 8K, printer option with logbook format, \$9.95 cassette. Add \$3.00 per order shipping/handling. VISA/MC/MO. SASE for complete catalog. Wes-Com, Inc., D.G. Miller, 4915 Galena Dr., Co. Springs, CO 80918. Phone 303-598-5745 7-10 PM.

ELECTRON TUBES: Current and hard to find types. Special purpose, transmitting, receiving, and cathode ray tubes. SASE for our free list. RUTAN ELECTRONIC SALES CO., 202 Miriam Parkway, Elmont, NY 11003.

SELL: Swan 500 xcvr, 410 vfo, 117xc P.S./Spkr, Autek QFI filter, VSWR meter. Orig. owner, no mods, vy good cond. All \$200. Will ship. J. S. Hubbard, KB2VK (82/83 CB). Phone 518-584-3821. No collect calls.

TEN-TEC STATION FOR SALE: Omni-D transceiver with noise blanker, Model 218, 1.8 SSB filter, 255 deluxe power supply, 243 remote VFO, 234 RF speech processor, 215 P microphone. All mint condition, \$795. Also Dentron CM-1 Tuned Input for Clipperton L, \$35. Call 915-677-3675, W5SGT.

RADIO WEST! High-quality general-coverage receivers with Collins filters, and special DX modifications installed. Catalog 50¢ (refundable). RADIO WEST, 3417 Purer Rd., Dept CQ, Escondido, CA 92025. Phone (619) 741-2891.

OUTGOING DX QSL SERVICE. No membership fee, \$.08/card. SASE for complete details. Bob Gaudio, WD8AWS, 1613 Merrill St., Kalamazoo, MI 49008.

SEND \$18.95 plus \$3.00 shipping for 2 meter, 5/8 wave magnet-mount antenna. Satisfaction guaranteed. For listing of mobile antenna bargains send SASE to WD4BUM, Rt. #7 Box 101-I, Anderson, SC 29624.

YOU'RE CORDIALLY INVITED to join the Senior Citizens Amateur Radio Society, an informative, constructive, and beneficial organization. Handicapped amateurs Free. Several awards. SASE for particulars to: SCARS, P.O. Box 6631, Ithaca, NY 14851.

HALLICRAFTERS Service Manuals, Amateur and SWL. Write for prices. Specify Model Numbers desired. Arco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

SCHEMATICS: Radio Receivers, 20's/60's. For details send namebrand, Model No., SASE. Scaramella, P.O. Box 1, Woonsocket, RI 02895-0001.

TOWERS: Galvanized steel stack/crankup. Factory direct savings. California Antenna Systems, 6020 Windy Ridge Road, Shingle Springs, CA 95682, phone (916) 677-9540.

QSL's by W4TG. Prices from \$16 per 1000. Send SASE to P.O. Drawer F, Gray, GA 31032.

83 CALLBOOKS: US \$19, DX \$18, both \$35 Ppd. W9JVF, 1147 N. Emerson, Indianapolis, IN 46219.

MUSEUM now open for radio historians and collectors. Free admission. Old-time amateur (W2AN) and commercial station exhibits, 1925 replica store and telegraph displays. 15,000 items. Write A.W.A. for details: Bruce Kelley, W2ICE, Holcomb, NY 14469.

REPLACE RUSTED ANTENNA BOLTS with Stainless Steel Bolts. Small Quantities, Free Catalog. ELWICK, Dept. 482, 230 Woods Lane, Somerdale, NJ 08083.

IBM PC/APPLE Aftermarket products; Hobbyists' Electronics Project Kits: \$50.00 complete Modem Kit, Subscription/Satellite TV Decoder Kits, Eprom Programmer/Duplicator, Popular Memory IC Testers, Data Sheets, Application Notes, and more than 6000 parts in stock: Semiconductors, Discretes, Video Products, Tools, etc. Please write for your free literature/catalog. Independent Electronics, 6415-06 Airline Rd., Dallas, TX 75205.

HAM HOLIDAY SRI LANKA: Write to Spangles Travels, 84 Templers Road, Mount Lavinia, SRI LANKA, + 5 IRCs.

WANTED: Cash paid for used SPEED RADAR EQUIPMENT. Write or call: Brian R. Esterman, P.O. Box 8141, Northfield, Illinois 60093, phone (312) 251-8901.

SINGLE PROFILE NEXUS creates a nationwide network of cultured singles. Box 7484-A Orlando, FL 32854.

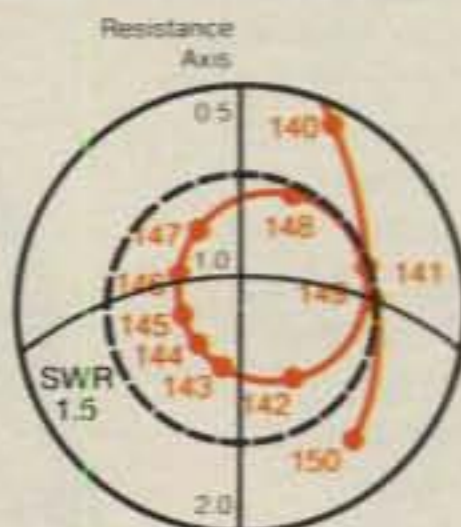
MAXIMIZER

NEW

VSWR CHART



IMPEDANCE



AP-144DII
AP-144DIII

AP-144DII - this 5/8λ + 5/8λ collinear base station vertical for 2 meters delivers significant gain over a groundplane. Built-in lightning/static arrester. Rugged construction suitable for marine applications, too.
APP-1434DIII - UHF disc radials extend gain performance to 430-440 MHz.

KLM

Electronics Inc.

See your KLM Dealer or write for our complete catalog P.O. Box 816, Morgan Hill, California 94035

Please send all reader inquiries directly.

HUSTLER

DELIVERS RELIABLE ALL BAND HF PERFORMANCE

Hustler's new 6-BTV six-band trap vertical fixed station antenna offers all band operation with unmatched convenience. The 6-BTV offers 10, 15, 20, 30, 40, and 75/80 meter coverage with excellent bandwidth and low VSWR. Its durable heavy gauge aluminum construction with fiberglass trap forms and stainless steel hardware ensures long reliability.

Thirty meter kits (30-MTK) for 4-BTV and 5-BTV are also available.



Don't miss our 30 meter excitement.
**HUSTLER -
STILL THE STANDARD OF PERFORMANCE.**

HUSTLER

3275 North "B" Avenue
Kissimmee, Florida 32741

An **AMERICAN** Company

CIRCLE 45 ON READER SERVICE CARD

BIRD Wattmeters

Authorized BIRD Distributor



Complete inventory of all Bird wattmeters, dummy loads, switches, carrying cases and accessories.

Order by phone
1-800-431-7777

Free shipping with certified check orders.

Model 4381
\$695.00

Model 43
\$162.00

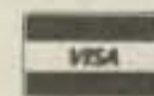


All BIRD Elements in Stock

5A through 1000E elements (5W - 1000W; 25 - 1000 MHz) \$48

50H through 1000H elements (50W - 1000W; 2 MHz - 30 MHz) \$59

2500H and 5000H elements (2500W and 5000W; 2 MHz - 30 MHz) \$75



PARAMOUNT

COMMUNICATIONS ELECTRONICS
PO Box 506, Burnett Ave., Dalton, OH 44618

CIRCLE 97 ON READER SERVICE CARD

ALL BAND TRAP ANTENNAS!



PRE-TUNED - COMPLETELY ASSEMBLED - ONLY ONE NEAT SMALL ANTENNA FOR UP TO 7 BANDS! EXCELLENT FOR CONGESTED HOUSING AREAS - APARTMENTS LIGHT - STRONG - ALMOST INVISIBLE!

FOR ALL MAKES & MODELS OF AMATEUR TRANSCEIVERS - TRANSMITTERS - GUARANTEED FOR 2000 WATTS SSB 1000 WATTS CW. INPUT FOR NOVICE AND ALL CLASS AMATEURS! IMPROVED DESIGN!

COMPLETE AS SHOWN with 90 ft. RG58U-52 ohm feedline, and PL259 connector, insulators, 30 ft. 300 lb. test dacron end supports, center connector with built in lightning arrester and static discharge - molded, sealed, weatherproof, resonant traps 1"X6" - you just switch to band desired for excellent worldwide operation - transmitting and receiving! Low SWR over all bands - Tuners usually NOT NEEDED! Can be used as inverted V's - slopers - in attics, on building tops or narrow lots. The ONLY ANTENNA YOU WILL EVER NEED FOR ALL DESIRED BANDS - WITH ANY TRANSCEIVER - NEW - EXCLUSIVE! NO BALUNS NEEDED!

80-40-20-15-10-6 meter - 2 trap --- 104 ft. with 90 ft. RG58U - connector - Model 998BUC ... \$89.95
40-20-15-10 meter --- 2 trap --- 54 ft. with 90 ft. RG58U - connector - Model 1001BUC ... \$88.95
20-15-10 meter --- 2 trap --- 26ft. with 90 ft. RG58U - connector - Model 1007BUC ... \$87.95
SEND FULL PRICE FOR POSTPAID INSURED. DEL. IN USA. (Canada is \$5.00 extra for postage - clerical-customs etc.) or order using VISA - MASTER CARD - AMER. EXPRESS. Give number and ex. date. Ph 1-308-236-5333 9AM - 6PM week days. We ship in 2-3 days. ALL PRICES MAY INCREASE... SAVE - ORDER NOW! All antennas guaranteed for 1 year. 10 day money back trial if returned in new condition! Made in USA. FREE INFO. AVAILABLE ONLY FROM
WESTERN ELECTRONICS Dept. AC-8 Kearney, Nebraska, 68847

CIRCLE 43 ON READER SERVICE CARD

Now You Can Switch 2 or 3 or 9 Antennas Over Only One Coaxial Feedline!

No Costly Control Cables

With INLINE "wireless" weatherproof coaxial relays, you simply add more antennas without costly control cables. IN-LINE also takes the guesswork out of point-to-point HF communications. By selection, you can instantly compare one antenna to another, switch monobanders, switch from horizontal to vertical, add WARC band antennas, create simple directable wire or vertical arrays, or whatever else you can dream up.

Remember - multiband trap antennas are much less efficient and have much less bandwidth than resonant dipoles. On VHF-UHF you can significantly reduce hardline usage, eliminate tower-caused directivity, change polarization, change frequency, or simply switch antennas.

Install INLINE Virtually Anywhere

And there are no expensive and unsightly multiwire control cables. They can be placed in the attic, on the roof, on a mast, on a tree, on a tower, anywhere the antennas are. They are ideal in apartment houses to overcome restrictions.

Distributed Worldwide

Literature and application data available upon request. If not in stock at your dealer, order direct. Add \$2.00 for surface UPS, \$4.00 for UPS Blue or Parcel Post. VISA, MASTER-CARD and AMERICAN EXPRESS accepted.

Wired Type Relays

101 Relay \$33.95
1013 Relay 54.95
107 Relay 44.95

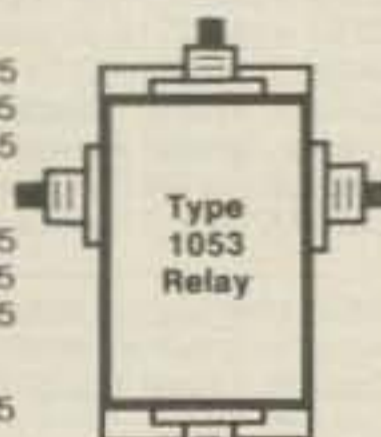
"Wireless" Type Systems

105 \$58.95
1053 76.95
108 64.95

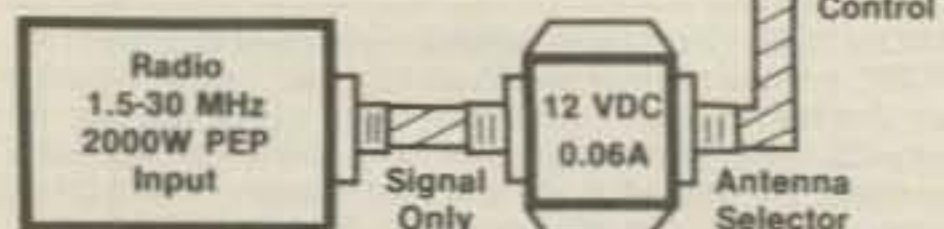
Energizer

106 \$15.95

- All relays and couplers can be equipped with "n" UG58U connectors.
- "Wireless" relays and couplers can be sold separately. Call for pricing.



Type 1053/105C Illustrated



UNADILLA/REYCO/INLINE
A Division of Microwave Filter Co., Inc.

6743 Kinne St., East Syracuse, NY 13057
US Toll Free (1-800-448-1666)
NY/AK/HI/CAN Collect (1-315-437-3953)

CIRCLE 82 ON READER SERVICE CARD

The HD-73 Rotator by Alliance

A precision instrument built to last.

The HD-73 combines Dual-Speed rotation and a single 5-position switch with the clear visibility of a backlit D'Arsonval meter. So you get precise control for fast and fine tuning.

And the advanced technology of HD-73 is backed by quality construction. Heavy duty aluminum casings and hardened steel drive gears. Lifetime factory lubrication that



withstands -20°F. to 120°F. temperatures.

The superior design of the HD-73 mast support bracket, with optional no-slip positive drive, assures perfect in-tower centering with no special tools. Automatic braking minimizes inertia stress.

Easy to install, a pleasure to use.

The HD-73 is on your wavelength. Write for performance details today.

When it comes to

QSL's...



it's the

ONLY BOOK!

US or Foreign Listings

1983 callbooks

Here they are! The latest editions of the world-famous Radio Amateur Callbook are available now. The U.S. edition features over 400,000 listings, with over 75,000 changes from last year. The Foreign edition has over 370,000 listings, over 50,000 changes. Each book lists calls and the address information you need to send QSL's. Special features include call changes, census of amateur licenses, world-wide QSL bureaus, prefixes of the world, international postal rates, and much more. Place your order for the new 1983 Radio Amateur Callbooks, available now.

	Each	Shipping	Total
<input type="checkbox"/> US Callbook	\$19.95	\$3.05	\$23.00
<input type="checkbox"/> Foreign Callbook	\$18.95	\$3.05	\$22.00

Order both books at the same time for \$41.95 including shipping.

Order from your dealer or directly from the publisher. All direct orders add shipping charge. Foreign residents add \$4.55 for shipping. Illinois residents add 5% sales tax.



SPECIAL OFFER!

Amateur Radio
Emblem Patch
only \$2.50 postpaid

Pegasus on blue field, red lettering. 3" wide x 3" high. Great on Jackets and caps.

ORDER TODAY!

RADIO AMATEUR
callbook INC.

Dept. Q
925 Sherwood Drive
Lake Bluff, IL 60044, USA

I want to tune in on HD-73.

- Send complete details
- Give me the name of my nearest dealer.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____



The Alliance Manufacturing Company, Inc.,
Alliance, Ohio 44601

Please send all reader inquiries directly.

CIRCLE 62 ON READER SERVICE CARD



NEW!

\$1295 pr.



HAM-TAGS Tough ABS custom frames. Your call on each vehicle. Available with call at top or bottom of frame, and frame/front plate (check your state). \$1.50 shipping.

BHC, Inc., 1716 Woodhead, Houston, TX 77019 (713) 522-5755

CIRCLE 140 ON READER SERVICE CARD

DIPOLE ANTENNA CONNECTOR



HYE-QUE (HQ-1) dipole connector has coax SO 239 socket molded into glass filled plastic body to accept coax PL-259 plug on feedline. Drip cap keeps coax fittings dry. Instructions included. Guaranteed. At your dealers or \$5.95 postpaid. Companion insulators \$1.25/pr.

BUDWIG MFG. Co. PO Box 829, Ramona, CA 92065
Ca. Res. add 6% Sales Tax

CIRCLE 39 ON READER SERVICE CARD

SATELLITE, MICROWAVE, VIDEO, AUDIO Components and Equipment. Send \$1 for 1983 Catalog. DSCo, Department A, 3110 Evelyn Street, Roseville, MN 55113.

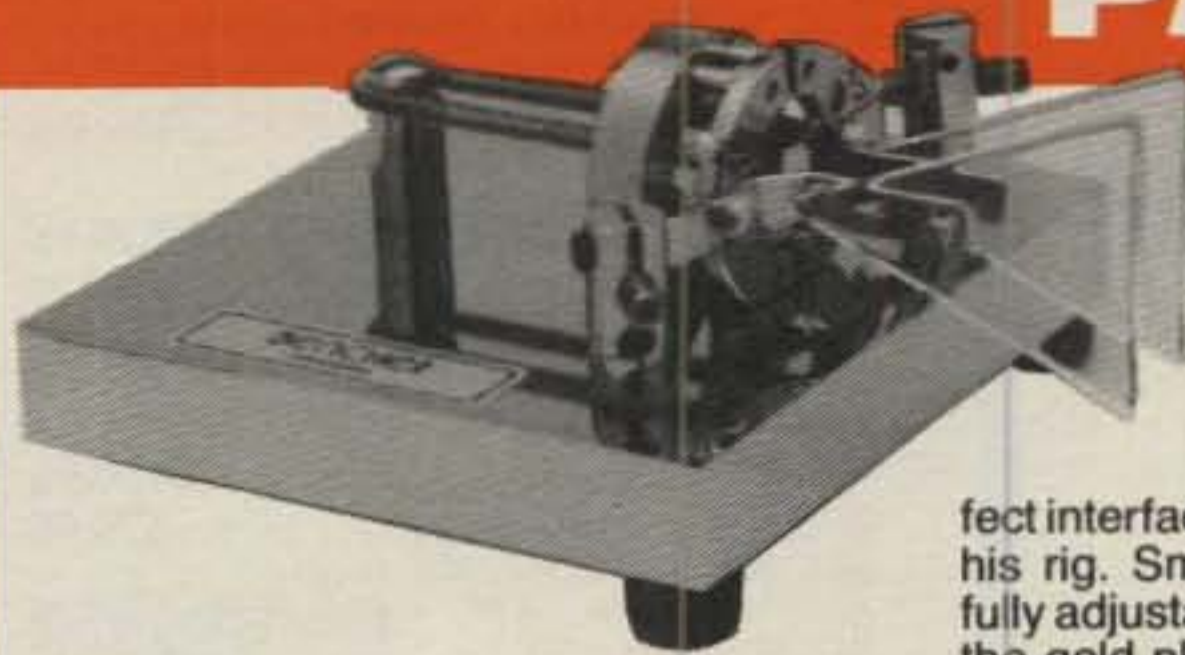
COMPLETE Novice to Extra Amateur station in mint condition consisting of Heath SB101 transceiver, HP-23 power supply, SB600 speaker, Astatic D104 microphone, all cords, and manual. Ready to go, all you need is an antenna, \$400.00. Heath HP-13B 12 volt power supply, \$40.00. Amateur 10 meter 240 channel mobile (12VDC) SSB transceiver, mint condition, \$195.00. Military BC-458A, T-21/ARC-5, BC-457A with 80 meter conversion manual, \$20.00 each. Spectronics DD-IT digital frequency counter for Tempo I, \$100.00. TRANSEL 2000 watt SWR-Watt meter with average-peak-peak hold, 1.8 to 54 MHz, new peak hold position for SSB use, new \$100.00. Paul Duncanson, 6846 Calumet Ave., Hammond, Ind. 46324. Tel. 219-932-2196.

WESTERN WIRELESS INC. (415) 372-8055. Surplus Unlimited—VRC, GRC, PRC, TRC, MRC. Surveillance—PPS, GSQ. Night Vision PVS, PAS. Phone for catalog.

MICROPHONES: Best prices in U.S. New and used professional, amateur, commercial mics. Microphone Specialists, Box 1372, Burnsville, Minn. 55337.

The New Standard...

the Ultimate IAMBIC PADDLE



Modern CW technology at its best! Carefully engineered to make optimum use of today's keyers, the Benchner Iambic Paddle is a symphony of modern materials, design and workmanship. This is the paddle that provides the perfect interface between the CW operator and his rig. Smooth, instantly responsive and fully adjustable to suit your own touch. From the gold plated solid silver contacts to the heavy leaded steel base, it truly is the ultimate.

perfect interface between the CW operator and his rig. Smooth, instantly responsive and fully adjustable to suit your own touch. From the gold plated solid silver contacts to the heavy leaded steel base, it truly is the ultimate.

At selected dealers or add \$2.00 handling.

Standard \$42.95 Chrome \$52.95 Gold Plated \$150.00

BENCHNER, INC.

333 W. Lake St., Chicago, IL 60606

CIRCLE 111 ON READER SERVICE CARD

"FREE UPS SHIPPING" To 48 States: Icom R70 \$669.95. Yaesu FRG-7700 \$439.95. Kenwood R-2000 \$509.95, R-1000 \$414.95, R-600 \$339.95. Sony-2001 \$209.95. Panasonic RF-3100 \$266.95. Bearcat-100 \$288.49. Regency-D810 \$259.95. JIL SX-200 \$324.95. Cordless Phones, Frequency Directories, Radar Detectors, Rotors, Antennas, Cable, Switches, CB's, Microphones, Phone Answering Systems, TV's, MFJ Products, Marine Transceivers, Two-Way Radio Headsets, Much, Much More. Picture Catalog \$1.00 (REFUNDABLE 1st Order). GALAXY ELECTRONICS, Box 1202, 67 Eber Ave., Akron, Ohio 44309 (216-376-2402).

VERMONT: The annual BARC International Hamfest will be held 13th and 14th August at the Old Lantern Camp Grounds in Charlotte, VT. Admission is \$4.00 for both days. Fleamarket space is \$2.00 outdoors and \$5.00 indoors. Overnight camping is available. Talk-in on 34/94, 01/61, and 52 Simplex. For more info, contact Frank, W1CTM, BARC, P.O. Box 312, Burlington, Vermont 05402.

MILITARY RADIO AND COMMUNICATIONS. Surplus Unlimited. Western Wireless Inc. (415) 372-8055. Send \$3.00 for catalog. 4840 Tahoe Circle, Martinez, California 94553.



AMATEUR RADIO CENTER, INC.

EVERYTHING FOR THE AMATEUR

2805 N.E. 2ND. AVENUE
TLX 522035 VICOR

"ESTABLISHED 1960"
MIAMI, FLORIDA 33137

MIAMI 573-8383
FT. LAUD 524-4484

The Oldest And Largest Stocking **Authorized** Dealer In Florida, Our Service Facilities Are The Finest In The South Along With Our FCC Licensed Technicians. Our Highly Qualified Sales Personnel Will Be Very Happy To Take Your Orders Or Help You Solve Your Communications Problems.

AMATEUR RADIO CENTER, INC., Your Radio Communications Department Store, Can Set You Up With: HF, VHF, UHF, RTTY, CW, Amateur, Marine And Commercial Systems To Meet Your Requirements.

KENWOOD, COLLINS, DRAKE, ICOM, MICROLOG, CUBIC, HAL, SYT, TEMPO, KLM, LUNAR, STANDARD, HY-GAIN, HUSTLER, LARSEN, J.W. MILLER, VIBROPLEX, BENCHNER, ANIXTER-MARK, CES, MIDLAND, AZDEN, MIRAGE, ZENITH DATA SYSTEMS, And Many Other Fine Products.

"We Service What We Sell" "Hablamos Espanol"

CIRCLE 61 ON READER SERVICE CARD

Order All Ham Radios & Accessories from **C-COMM**

We have the
**Products,
Prices,
and Service**
that bring you back!



720A

A high performance ham transceiver NOW AT AN UNBELIEVABLE PRICE!

This standard of the industry is also ideal for marine and portable use. Transmitter rated at 100% duty cycle for RTTY use.

Regular \$1349

**CLOSEOUT
SPECIAL!
\$899**

C-COMM

Call Toll FREE Nationwide!
800-426-6528
(Incl. Alaska & Hawaii)

Wash Residents: Add applicable sales tax. Call: 800-562-6818

International Orders:
Telex 15-2391 C-COMM

C-COMM

6115 15th Ave NW, Seattle, WA 98107
(206) 784-7337

CIRCLE 46 ON READER SERVICE CARD

AMATEUR MICROWAVE TV ANTENNA'S

1.9 to 2.5 GHz Frequency Range
50 db System Gain

Complete System (Rod Style as pictured, 25 db Gain)

PS-3 assembled, tested \$79.95

PS-3 kit form \$64.95

Complete System (Dish Style as pictured, 50 db Gain)

PS-5 assembled, tested \$109.95

PS-5 kit form \$79.95

All systems come complete with Accessory package of

- Control Box
- 60' Coax Cable
- Mounting Hardware
- Matching Transformer
- Instructions
- 90 Day Warranty



S.E.I., Inc.

912 West Touhy Ave. • Park Ridge, IL 60068

For Information or to order call:

1-312-564-0104

C.O.D.'s Accepted • Special Quantity Pricing
Dealers Wanted

5% shipping and handling, 10% for out of Continental U.S.



CIRCLE 91 ON READER SERVICE CARD

BUY! SELL! TRADE!

COMPUTER & HAM EQUIPMENT

COMPUTER

TRADER

**ANNUAL
SUBSCRIPTION**

\$15.00

Low Ad Rates — Mailed Monthly

Foreign Subscriptions - \$30.00 Year

FREE 50 Word Classified Ad with Subscription Order

COMPUTER TRADER*

Chet Lambert, W4WDR

1704 Sam Drive • Birmingham, AL 35235

(205) 854-0271

Sample Copy — \$1.00

Please send all reader inquiries directly.

WANTED: C.B.—TRAM D-42 MOBILE RADIO. Contact Ed Stevens, 23 Appleton Avenue, Pittsfield, Massachusetts 01201.

WANTED: Military Surplus Electronics, especially COLLINS. AN/ARC-102, R-1484/PRR-15, RT-1299/ARC-186, RT-715/ARC-105, ARC-114, RT-823/ARC-131, RT-857/ARC-134B, 618T, PRC-41A, F-1039A/U Filter, R-1444/UR, GRM-10, MT-1699/U, RT-662/GRC, RT-672A/ARC-97, Any R1051/URR Modules, URM-124, MK-731/ARC-51X, RT-749/ARC-109, R442/VRC, 488A-2 Inverter, USM-159, ARC-142, ARC-115, RT-1194/ARC-159, C-9815/ARC-159, ARC-123, VC-102, ARC-58 T.O. Leroy Ritta, P.O. Box 102, St. Marys 5042, South Australia.

WANTED: Old bugs for my key collection. Vibroplex, Martin, MacDonald, Emory, Dunduplex, etc. Also need Spark keys and military keys. Neal McEwen, K5RW, 1128 Midway, Richardson, TX 75081.

TIMEX/SINCLAIR: Design your own antennas. 3 element Yagi, 2 element quad, and inverted vee. All on one cassette. Only \$7.95. Kentronics, P.O. Box 586, Vernon, AL 35592.

WANTED: Military Surplus Radios. We need Collins 618T, ARC-94, ARC-102, 718F-1/2, MRC-95, MRC-108, 671U, RT-980/GRC-171, RT-712/ARC-105, RT-804A/APN-171, ARC-114, ARC-115, RT-823/ARC-131 or FM-622, RT-857/ARC-134 or Wilcox 807A, ARC-159, ARC-164, RT-859/APX-72, APN-153, Antenna Couplers 490T, CU-1658A, CU-1669A, CU-1239/ARC-105, Sperry Rand 3226A1, 3226B1, 490B-1, 690D-1. Top dollar paid or trade for new amateur gear. Write or phone Bill Slep 704-524-7519. Slep Electronics Co., Hwy. 441, Otto, NC 28763.

ROSS \$\$\$ NEW BARGAINS: BIRD 4304 RF Wattmeter \$299.90. ROBOT 450C \$789.90, 800C \$789.90. TEN-TEC 4229 Antenna Tuner Kit \$175.00, 545C \$839.90, ICOM IC-751 \$1390.00, IC-120 \$429.90, IC-271A \$689.90, IC-471A \$689.90. Every day is ICOM Day at Ross's. KENWOOD TS-430S \$779.90, TS-930S \$1349.90, TL922A \$1039.90, TR-2500 \$278.50, TS-130SE & FA-4 \$548.90, TS-830S \$804.90, TS-530S \$627.90. YAESU FT-707 \$579.90, FT-102 \$935.90, FT-980 \$1299.90, FT-77 \$569.90, FT-ONE \$1999.90. USED Kenwood TS-120S \$449.90, TS-180S/WDFC \$189.90, TS-520S \$499.90. Send SASE & call letters for list of used equipment and current specials. Limited time offer; mention this ad to receive these bargain prices. All prices cash, FOB Preston. Closed Monday at 2:00. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263. Phone (208) 852-0830.

MAGNETIC CALL SIGNS... 2 inches by 8 inches... Great gift idea. Easy transfer from one car to another. Your call letters available in the following colors (on white background): Black, Blue, Red, Green, Brown, or Orange; \$5.00, add \$.50 per order for postage. SIGN-ON, Dept. Q., 1923 Edward Lane, Merrick, New York 11566.

WESTERN WIRELESS INC. (415) 372-8055. Military Surplus specialties. Phone for catalog. Radios and accessories available. Electronic equipment of various types. Technician specializes in repair. (415) 372-8055.

NEW! ... REPAIR ANY TV ... EASY. Write Research, Box 517R, Brea, CA 92621.

HOW TO SPEAK AND UNDERSTAND SPANISH: Easy to learn. Cassette and book, only \$9.95. PRINS, P.O. Box 6012, Des Moines, Iowa 50309.

TRADE: Unused, Electronic Chess Set for good EICO (or similar) V.F.O. Samkofsky, N4ZB, 1420 Mount Vernon Drive, Holiday, Florida 33590.

JUNIOR HIGH SCHOOL 180's Amateur Radio Program needs old books, magazines, parts, and related items. Contact KE2N, G. Skloot, 2923 Mandalay Beach Road, Wantagh, NY 11793.

FREE ELECTRONIC PARTS catalog. Product lines include solar, video, audio, phones, fans, batteries, capacitors, resistors, relays, transformers, and a variety of electronic parts. Write: Horizon Sales, Inc., P.O. Box 646, Framingham, MA 01701, or call 617-875-4433.

TELEGRAPH INSTRUMENTS WANTED: Keys, sounders, relays, call boxes, meters, and related items. Larry Nutting, WD6DTC, 5957 Yerba Buena, Santa Rosa, CA 95405.

CARIBBEAN DXPEDITION! Well equipped ham shack, contest-quality antenna farm, AND secluded private villa in tropical gardens. Be a VP2M and give your family a once-in-a-lifetime vacation. For details write VP2MF, Box 2, Plymouth, Montserrat, W.I., or N5DXD, Box 7681, Houston, TX 77270.

FOR SALE: SB220 \$400, SB230 \$300. Jack Larson, Rt. 1 Box 105B, Rosamond, CA 93560.

DX HEADING MAPS centered on Baltimore, Philadelphia, NYC, Boston, LA, Detroit, Dallas, St. Louis, New Orleans, Atlanta, Chicago. \$5.95 pp. Specify city. W.A. Massey, P.O. Box 397, Hainesport, NJ 08036.

KENWOOD TS-520S, cw filter, microphone, mint, carton. I ship, \$475. WB4WRL 919-286-7927.

IBM-PC SOFTWARE. LOGGER/DUPER programmable any log format \$39.95. QSLer for automatic QSL cards \$19.95. DATA BASE DXCC bearings and records \$49.95. For information write Micro Electronic Systems, 19 Annette Park Drive, Bozeman, MT 59715.

COMPUTER SOFTWARE for VIC-20, Commodore 64, and others; Ham and educational programs. Inquire: Electronic Put-Ons, 7805 N.E. 147th Ave., Vancouver, WA 98662.

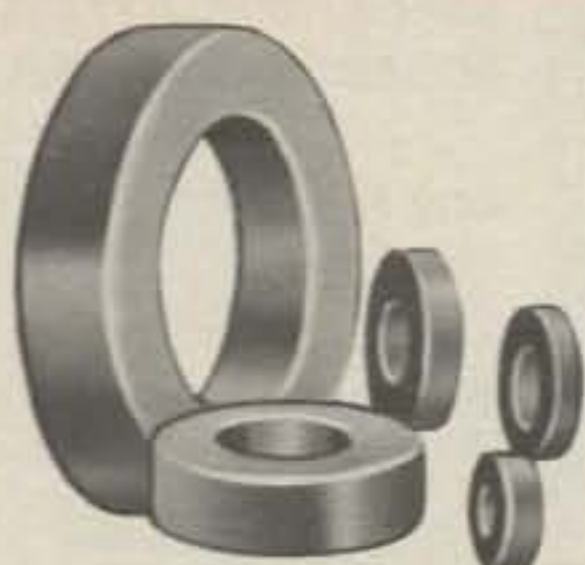
"THE SWAP LIST": Buy, sell, or SWAP your radio equipment in the nation's biggest "SWAP LIST." For a FREE copy write: SWAP LIST, Box 988, Evergreen, CO 80439.

COLLINS HAM RADIO EQUIPMENT FOR SALE: KWM-2A Transceiver, CP-1 Crystal Packet 3.4 to 30.0 MGH; 637T-2 Adjustable Dipole Antenna; SM-3 Desk Top Mic; 516-F-2 AC Power Supply; 312B-3 Speaker; Drake Watt Meter Model W-4; Heavy-Duty Rotor Complete with CDE Transmit Receiver Direction Control; Tri-Band Antenna Dummy Load; Coax Switches; Cables; Manuals. Complete package, firm \$2,500. Ken Dorkoski, 583 N. Oak St., Shamokin, PA 17872. Phone (717) 648-4193.

SACRIFICING HAM EQUIPMENT: Account Sickness. Also, week timesharing vacation time at ocean, Hilton Head Island, SC. SASE for details. William, 562-K Oak, Lexington, SC 29072-9059.

SELL: Drake TR3, mike, speaker, power supply, good condition. Make offer. Guy Carter, Route 1, Humboldt, IA 50548.

Toroid Cores



- All the popular sizes and mixes.
- Fast Service. Same day shipment via first class mail or air.

IRON POWDER TOROIDS:

CORE SIZE	MIX 2 .5-30 MHz u = 10	MIX 6 10-90 MHz u = 8.5	MIX 12 60-200 MHz u = 4	SIZE OD [in.]	PRICE USA \$
T-200	120			2.00	4.25
T-106	135			1.06	1.75
T-80	55	45		.80	1.05
T-68	57	47	21	.68	.95
T-50	51	40	18	.50	.70
T-37	42	30	15	.37	.60
T-25	34	27	12	.25	.45

RF FERRITE TOROIDS:

CORE SIZE	MIX Q1 u = 125 .1-70 MHz	MIX Q2 u = 40 10-150 MHz	MIX H u = 850 to 10MHz	SIZE OD [in.]	PRICE USA \$
F-240	1300			2.40	9.00
F-114	1500			1.14	2.50
F-87	900	300		.87	1.25
F-50	750	250	5000	.50	.80
F-37	550	200	4000	.37	.60
F-23	250	100	1500	.23	.50

Chart shows uH per 100 turns

Ferrite Beads slip over 18 ga. wire

- FB-1 for 50-200 MHz ... \$2/dozen
- FB-2 for 50 MHz & below ... \$2/dozen

Jumbo Beads slip over #12 wire

- FB-3 for 50 MHz & below ... \$3/dozen

EXPERIMENTER'S KITS

Iron Powder Toroids \$10.00

Includes:

- 1 ea. T25-12, T37-2, T80-2, T106-2.
- 2 ea. T25-6, T37-6, T50-2, T50-6.
- 3 ea. T68-2.

RF Ferrite Toroids \$10.00

Includes:

- 1 ea. F50-Q2, F114-Q1.
- 2 ea. F23-Q1, F23-Q2, F37-Q1.
- F37-Q2, F50-Q1, F87-Q1.

TO ORDER: Specify both core size and mix for toroids. Packing and shipping \$1.50 per order USA and Canada. Californians add 6% sales tax.



Minimum Credit Card
Order: \$5.00



Fast service. Free brochure and winding chart on request.

Palomar Engineers

Box 455, Escondido, CA 92025
Phone: (619) 747-3343

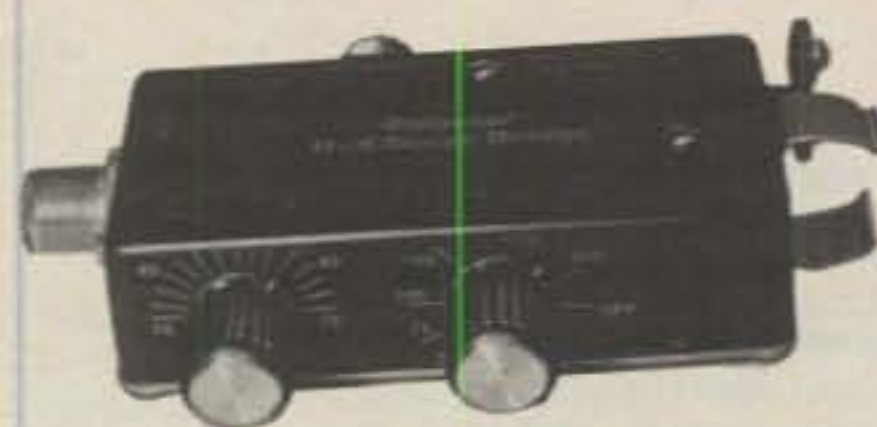
Please send all reader inquiries directly.

Advertiser's Index

AEA/Adv. Elec. Applications	74, 95
ARRL	61, 64
Ace Communications, Inc.	46
All Electronics	104
Alliance Mfg. Co.	118
Aluma Towers	57
Amateur Accessories	95
Amateur Radio Center, Inc.	119
Amidon Associates	97
Antenna Bank	35
Antenna Specialists	109
Autocode	70
BHC, Inc.	119
Barker & Williamson	98
Barry Electronics	107
Bash Educational Services	87
Bencher, Inc.	113, 119
Britt's 2-Way Radio	114
Budwig Mfg. Co.	119
Burghardt Amateur Center	64
Butternut Electronics	26, 106
CQ Book Shop	100
C Comm	120
Call Letter Hats	79
CeCo Communications Inc.	79
Centurion International	81
Clutterfree Consoles	35
Comm Center	88
Computer Trader	120
Cushcraft Corp.	6
Datalog	95
Direct Video Sales	112
EGE, Inc.	23
ENCOMM, Inc.	2
Fair Radio Sales	85
Flesher Corp.	75
Fox Tango Corp.	35, 95
G.I.S.M.O.	73
Galaxy Electronics	77
Gem Quad Products Ltd.	57
HRA Electronics	88
Hal Communications	88
Hal-Tronix	106
Ham Radio Outlet	12
Ham Shack	104
Henry Radio	27
Hustler, Inc.	116
ICOM America, Inc.	Cov. IV
JAL Radio Communications	17
JL Industries	53
Jun's Electronics	117
KLM	9, 59, 60, 115
Kantronics	42, 43, 85
Kenwood	Cov. II, 1
Kirk	104
LaCombe Distributors	72
LaCue Communications	57
Larsen Antennas	99
Lewis Construction	85
Long's Electronics	62, 63
Lunar Electronics	77
MFJ Enterprises	15, 65
Maco Manufacturing	16
Madison Electronics	66
Magnum Distributing Co.	101
Mail Order Express	95
Martin Engineering	72
Microlog Corp.	39
Microwave Filters	79, 116
Midwest Technical	68
Mirage	8
Missouri Radio Center	31, 36
Monitoring Times	106
NCG Co.	57
Nampa Satellite Systems	50
Nemal Electronics	88
Pacific One Corp.	50
Palomar Engineers	121
Paramount Communications	116
Peterson Electronics	55
Philadelphia Resins Corp.	84
RF Products	19, 75
Radio Amateur Callbook, Inc.	118
Radiokit	70
Rockwell/Collins Int'l.	7
Rolin Distributors	96
SEI, Inc.	120
S-F Amateur Radio Service	32
Sintec Co.	119
Skytec	95
Spider Antennas	112
Sultronics Amateur Radio	74
Sunderland Software	50
TET Antennas	10
Telco	104
Telex/HyGain	5
Telrex Labs	37
Ten-Tec	11
Texas Towers	25, 122, 123, 124
Translertonic, Inc.	95
Tri-Ex Tower Corp.	47
Tuned Antenna Co.	50
UNR/Rohn	81
Universal Communications	110
Universal Electronics	68
VanValzah Co.	74
Westcom Engineering	36
Western Electronics	116
Windevor Aluminum	104
Xitek	81
Yaesu Electronics	Cov. III
Zuber's	88

We'd like to see your company listed here too. Contact Jack Gutzeit, W2LZX, or Herb Pressman, at 516-681-2922 to work out an advertising program tailored to suit your needs.

R-X Noise Bridge



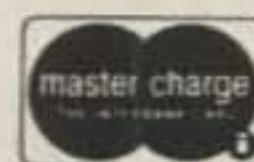
- Learn the truth about your antenna.
- Find its resonant frequency.
- Adjust it to your operating frequency quickly and easily.

If there is one place in your station where you cannot risk uncertain results it is in your antenna.

The Palomar Engineers R-X Noise Bridge tells you if your antenna is resonant or not and, if it is not, whether it is too long or too short. All this in one measurement reading. And it works just as well with ham-band-only receivers as with general coverage equipment because it gives perfect null readings even when the antenna is not resonant. It gives resistance and reactance readings on dipoles, inverted Vees, quads, beams, multiband trap dipoles and verticals. No station is complete without this up-to-date instrument.

Why work in the dark? Your SWR meter or your resistance noise bridge tells only half the story. Get the instrument that really works, the Palomar Engineers R-X Noise Bridge. Use it to check your antennas from 1 to 100 MHz. And use it in your shack to adjust resonant frequencies of both series and parallel tuned circuits. Works better than a dip meter and costs a lot less.

The price is \$59.95 in the U.S. and Canada. Add \$3.00 shipping/handling. California residents add sales tax.



Send for FREE catalog describing the R-X Noise Bridge and our complete line of SWR Meters, Preampifiers, Toroids, Baluns, Tuners, VLF Converters, Loop Antennas and Keyers.

Palomar Engineers

Box 455, Escondido, CA 92025
Phone: (619) 747-3343

Please send all reader inquiries directly.

COMMUNICATIONS EQUIPMENT SALE!

MIRAGE AMPLIFIER SALE!

B1016 2 Meter Dual Purpose \$249
H.T. 1-2W In - 35-90W Out
or Transceiver 10W In - 160W Out



Model	Band	Pre-amp	Input	Output	DC Pwr	Sale Price
B23	2M	No	2W	30W	5A	\$ 79
B108	2M	Yes	10W	80W	10A	\$159
B1016	2M	Yes	10W	160W	20A	\$249
B3016	2M	Yes	30W	160W	17A	\$199
C22	220	No	2W	20W	5A	\$ 79
C106	220	Yes	10W	60W	10A	\$179
C1012	220	Yes	10W	120W	20A	\$259
D24	440	No	2W	40W	8A	\$179
D1010N	440	No	10W	100W	20A	\$289

RC-1 Remote Control for Mirage Amplifiers..... \$24
MP-1 and MP-2 Peak-Reading Wattmeter..... \$99

ASTRON POWER SUPPLIES

Heavy Duty - High Quality - Rugged - Reliable

- Input Voltage: 105-125 VAC Output: 13.8VDC ± .05V
- Fully Electrically Regulated—5mV Maximum Ripple
- Current Limiting & Crowbar Protection Circuits
- M-Series With Meter—A-Series Without Meter

Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	\$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

MODEL RS-50A



HAL Communications Sale!

CWR6850
\$849!



CT2200
KB2100 \$959!



CWR6700 Receive Only Telereader	\$439
CWR6750 Receive Only Telereader	629
DS3100ASR Deluxe RTTY Terminal	1699
MPT3100 Message Processor Terminal	2199
RS2100 1" Scope w/Loop Supply	289
ST5000 RTTY Demodulator	219
ST6000 Deluxe Demodulator/Keyer	649
DSK3100 Disc Storage Unit	829
ARQ1000 Amtor Error Correcting Terminal	649
KG-12 12" High Resolution Monitor	169

YAESU FT-230R



List \$359
Call For Your Special Price

YAESU FT-726R



List TBA
Call For Your Special Price

KDK FM2030



SALE PRICE \$269!

YAESU FT-707



List \$699.95 Special Price \$589

R.L. DRAKE



TR-7A Transceiver On Sale \$1389!
Accessories In Stock - Call!
L7 HF Amplifier Only \$969 (Less Tubes)
Eimac 3-500Z Tubes \$199/pair



TEN-TEC SUPER SALE!



Corsair List \$1,169
Your Special Price \$1,029



Model 229...\$259.00
Model 4229 Kit...\$189.00



New Argosy
Digital Transceiver
List \$599.95 Sale \$539

ALL ACCESSORIES IN STOCK—CALL!

SANTEC

ST144µP Handie Talkie
ON SALE! Only \$279

IN STOCK FOR IMMEDIATE DELIVERY

- 142-149 995 MHz
- 24 Hour Clock
- 3.5W/1W/1W Output
- Liquid Crystal Display

OTHER SANTEC ITEMS

ST-440µP 440 MHz H.T.	\$299
SM-3 Speaker Mic	33
ST-LC Leather Case	29
ST-6BC Base Charger	29
ST-500B3 Ni-Cad Battery	29

TOKYO HY-POWER LABS

Regular \$69.95 SALE \$59!

HL-30V 2 Meters, 2W In - 30W Out

OTHER TOKYO HY-POWER ITEMS

HL-82V 2 Mtr. 2-12W In - 35-85W Out	\$139
HL-160V 2 Mtr. 1-15W In - 160W Out	299
HL-20U 440 MHz 1-3W In - 20W Out	99
HL-90U 440 MHz 10W In-80W Out w/Preamp	339
HC-200 HF Ant Tuner w/Wattmeter	89
HC-2000 Deluxe 2KW HF Antenna Tuner	299

AEA CP-1



Computer Patch Interface
List Price \$239.95
Call For Special Price
On All AEA Products.

RF POWER LABS AMPLIFIERS

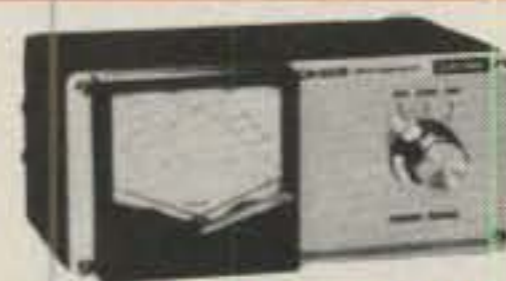
A1000 160-15 Mtr. KW w/AC Supply	\$1329
V76 6 Mtr. 8-15W In - 120W Out w/AC Supply	499
V360 6 Mtr. 5-10W In - 450W Out w/AC Supply	1189
V70 2 Mtr. 10-15W In - 90W Out w/AC Supply	499
V71 2 Mtr. 1-3W In - 90W Out w/AC Supply	519
V180 2 Mtr. 5-15W In - 200W Out w/AC Supply	599
V350 2 Mtr. 10-20W In - 400W Out w/AC Supply	1189

Fan Kits and Rack Adapters Also Available—CALL!



JANEL QSA8 PREAMP \$39!

QSA-8	\$41	432PL	\$53
PB-30	\$21	PB144	\$21
PB-50	\$21	PB220	\$21



DAIWA CN-820B 31111
100/200 mtrs
20/200/2000 wts

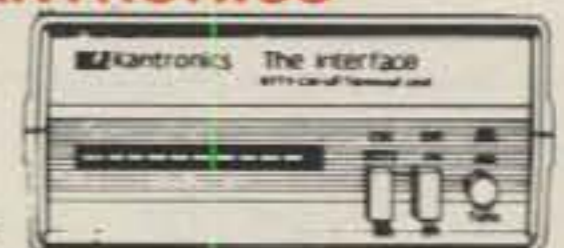


BENCHER PADDLE
BY-1 Blackbase \$39
BY-2 Chrome \$49

MFJ MODEL 104 On SALE For Only \$33!

202B Noise Bridge	\$54
250 2KW Dummy w/Oil	31
260 300W Dry Load	25
262 2KW Dry Load	59
422 Keyer w/Paddle	89
482 4 MSG Mem Keyer	89
484B 12 MSG Keyer	125
494 Keyboard	249
496 Keyboard	299
525B RF Processor	109
624 Phone Patch	59
901 300W Tuner	54
940B Tuner w/Meter	72
941C Tuner w/Meter	79
949B Deluxe Tuner	129
989 Deluxe 2KW Tuner	269

KANTRONICS



THE INTERFACE Reg. \$169.95 SALE \$149.00!

OTHER KANTRONICS ITEMS

Mini-Reader	\$239	Hamtext VIC-20	99
Mini-Terminal	259	Hamtext Model-64	99
Apple Hamsoft	29	Atan Hamsoft	49
VIC-20 Hamsoft	49	TRS-80C Hamsoft	59



TEXAS TOWERS

DIV. OF TEXAS RF DISTRIBUTORS INC.

1108 Summit Ave., Suite 4 / Plano, Texas 75074

ALL PRICES AND SPECIFICATIONS

Mon.-Fri.: 8:30 a.m. - 5:30 p.m. Sat. 9 a.m. - 1 p.m.

SUBJECT TO CHANGE WITHOUT NOTICE

TELEPHONE: (214) 422-7306





YAESU SALE!



FT-ONE

**GENERAL COVERAGE—ALL MODE
DELUXE SOLID STATE TRANSCEIVER**

Buy Now and Receive These Accessories Free:
300Hz CW Filter . \$FREE 600Hz CW Filter . \$FREE
800Hz CW Filter . \$FREE 6Khz AM Filter . \$FREE
Memory Backup . \$FREE Installation \$FREE

List Price \$3074. CALL FOR YOUR SPECIAL PRICE!
Quantities Limited — Hurry!



FT-980

CAT SYSTEM—Computer Aided Transceiver

- Wide Dynamic Range
- General Coverage
- All Mode Transceiver—CW/SSB/AM/FM/FSK!
- Full Break-in CW
- Variable Bandwidth
- AC Power Supply
- 12 Internal Digital VFO's with Memories
- Much, much more—call or write for info
- Low Noise Front End
- 10Hz Digital Readout
- RF Speech Processor
- IF Shift
- APF/Notch
- Adjustable Noise Blanker

Computer Interface now in development—
Own Tomorrow's HF Transceiver—Today!!
Manufacturer's Suggested List Price \$1499
Call For Your Special Price Today!!

ETD ALPHA



76PA \$1699



ALPHA 78



ALPHA 374A

SPECIAL SALE PRICES

Model	List	Sale
77DX	\$5450	*
78	\$3495	*
374A	\$2595	*
76A	\$1985	*
76PA	\$2395	*
76CA	\$2695	*

***Sale Prices Too Low To Print!!
Call For Your Special Prices!!**



FT-102

160-10MTR WITH WARC BANDS TRANSCEIVER

- Digital Readout
- Variable Bandwidth
- CW/SSB/AM/FM Modes
- Noise Blanker
- Built-in AC Supply
- IF Shift
- RF Speech Processor
- Much, much more—

List Price \$1149—Call for Special Low Texas
Towers Discount Price and Save \$\$\$



FT-77

New 80-10mtr Compact HF Transceiver

- Digital Readout
- CW/SSB/FM Modes
- Optional AC Supply, CW Filter, FM Unit
- External VFO, Antenna Tuner Available
- Adj Noise Blanker
- CW Wide/Narrow

List Price \$599—Call for Special Low Texas Towers
Discount Price and Save \$\$



FT-230R 2mtr FM \$359
FT-730R 440Mhz FM \$399

- 10 Memories
- LCD Readout
- Memory or Up/Down Scan
- Two VFO's
- 25W Out

Call today for Special Discount
Price & Save \$\$



**FT-726R
VHF/UHF
All Mode Tri-Band Transceiver**

- 50-54 Mhz
- 144-148 Mhz
- 10 watts output on all bands
- 430-450 Mhz
- 21, 24.5 & 28 Mhz
option available soon

Please Call For Price & Delivery
Information



VHF/UHF Multimode Portables

FT-690R 50Mhz \$379
FT-290R 144Mhz \$399
FT-790R 430Mhz \$399

Call today for Special Discount
Price & Save \$\$



FRG-7700

**All Mode Digital Communications Receiver .15 to
29.99Mhz—Receives SSB/AM/FM/CW, Built-in S
Meter, Speaker, Noise Blanker, Timer, FM Squelch,
AC Supply and More!**

Manufacturer's List \$499—Call today for Your
Special Discount Price!!

FT-208R 2mtr HT \$319
RF Out: 300mw/2.5W

FT-708R 440Mhz HT \$319
RF Out: 200mw/1.0W

- LCD Display
- 10 Memories
- Up/Down and Memory Scanning
- Complete w/Nicad Battery,
Charger and Rubber Duck Ant

Accessories Available:
LCC-8 Leather Case \$35
YM24A Spkr/Mic \$39
FNB-2 Nicad \$29
NC-8 Base Chgr \$99
Call for Special Yaesu Discount
Prices!!



METRON MA1000B AMPLIFIER

1 KW Mobile Or Portable!

- All Solid State—13.6 VDC Operation!
- No Tuning—Switch bands and Operate!
- Bandswitching can be Remotely operated
to allow Trunk installation!
- Use separate battery and existing auto
charging system for reliability!

There fine units in stock now at special
price of only \$895 delivered anywhere in
Continental U.S.A.—Call for yours!

**IMPORTANT — Prices shown are suggested by the Manufacturer.
You can Save Money with a Big Texas Towers Discount!
Call today for our Special Yaesu Sale Prices and Save \$\$\$!!**

TEXAS TOWERS

Div. of Texas RF Distributors Inc.
1108 Summit Ave., Suite 4 • Plano, Texas 75074

Telephone
(214) 422-7306



YAESU FT-726R TRIBANDER

NEW GALAXIES OF PERFORMANCE ON VHF AND UHF

FULL DUPLEX!!

SATELLITES!!

SCATTER!!

EME!!

EME!!



The New Yaesu FT-726R Tribander is the world's first multiband, multimode Amateur transceiver capable of full duplex operation. Whether you're interested in OSCAR, moonbounce, or terrestrial repeaters, you owe yourself a look at this one-of-a-kind technological wonder!

Multiband Capability

Factory equipped for 2 meter operation, the FT-726R is a three-band unit capable of operation on 10 meters, 6 meters, and/or two segments of the 70 cm band (430-440 or 440-450 MHz), using optional modules. The appropriate repeater shift is automatically programmed for each module. Other bands pending.

Advanced Microprocessor Control

Powered by an 8-bit Central Processing Unit, the ten-channel memory of the FT-726R stores both frequency and mode, with pushbutton transfer capability to either of two VFO registers. The synthesized VFO tunes in 20 Hz steps on SSB/CW, with selectable steps on FM. Scanning of the band or memories is provided.

Full Duplex Option

The optional SU-726 module provides a second, parallel IF strip, thereby allowing full duplex crossband satellite work. Either the transmit or receive frequency may be varied during transmission, for quick zero-beat on another station or for tracking Doppler shift.

High Performance Features

Borrowing heavily from Yaesu's HF transceiver experience, the FT-726R comes equipped with a speech processor, variable receiver bandwidth, IF shift, all-mode squelch, receiver audio tone control, and an IF noise blanker. When the optional XF-455MC CW filter is installed, CW Wide/Narrow selection is provided. Convenient rear panel connections allow quick interface to your station audio, linear amplifier, and control lines.

Leading the way into the space age of Ham communications, Yaesu's FT-726R is the first VHF/UHF base station built around modern-day requirements. If you're tired of piecing together converters, transmitter strips, and relays, ask your Authorized Yaesu Dealer for a demonstration of the exciting new FT-726R, the rig that will expand your DX horizons!

Price And Specifications Subject To
Change Without Notice Or Obligation

CIRCLE 48 ON READER SERVICE CARD

YAESU
The radio.



483

YAESU ELECTRONICS CORPORATION 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
YAESU CINCINNATI SERVICE CENTER 9070 Gold Park Drive, Hamilton, OH 45011 • (513) 874-3100

1.2 GHz!

NEW!

Explore the world of 1200 MHz FM
with ICOM's new IC-120 Mobile!



Now you can move out of the crowded 144 and 440 MHz bands into the wide spectrum of 1200 MHz because ICOM gives you the opportunity to explore the spectrum from 1260 to 1300 MHz . . . 40 MHz . . . with all the features found on popular 2 meter and 440 MHz rigs plus some:

Memories. Six memory channels plus 2 VFO's provide storage of most used frequencies in this wide band. Each memory allows memory of frequency, offset direction, offset frequency, and tone encoder frequency. Internal memory backup available.

Scanning. Scan the memories, scan all 40 MHz or program a segment to be scanned. All scanning has the option of scanning for a busy or open channel.

Duplex. Be able to work different repeater offsets, with ICOM's programmable offset system, as they become available.

3 Tuning Rates. Tuning increments of 10 KHz, 20 KHz or 1 MHz are available for rapid or slow tuning of the band.

RIT. RIT on FM? Yes, ± 5 KHz on either side of the transmit frequency allows you to tune signals offset from yours.

Readout. Four digit green LED readout for easy visibility day or night.

The ICOM IC-120 gives you all of this plus a very quiet PLL circuit, with excellent signal to noise ratio, high sensitivity and a stabilized power amplifier to provide full power over its temperature and voltage ranges, and the IC-120 is small, only 2"H x 5 1/2"W x 8 1/8"D.

NEW 1.2 GHz Repeater



Complete your system with the IC-RP1210 repeater.

- PLL frequency selection (198 channel, 10 KHz steps, DIP switch)
- High stability PLL (0.5PPM/-30° to +60°C)
- Repeater access via CTCSS
- DTMF control functions
- Selectable hang time
- ID'er.

CIRCLE 132 ON READER SERVICE CARD

 **ICOM**
The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 (206)454-8155 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 (214)620-2780
All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.