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# Amateur Radio

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# CQ

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**THE RADIO AMATEUR'S JOURNAL**

**NEW**

# "DX-traordinary."



**Superior dynamic range, auto. antenna tuner, QSK, dual NB, 2 VFO's, general coverage receiver.**

## TS-930S

The TS-930S is a superlative, high performance, all-solid state, HF transceiver keyed to the exacting requirements of the DX and contest operator. It covers all Amateur bands from 160 through 10 meters, and incorporates a 150 kHz to 30 MHz general coverage receiver having an excellent dynamic range. Among its other important features are, SSB slope tuning, CW VBT, IF notch filter, CW pitch control, dual digital VFO's, CW full break-in, automatic antenna tuner, and a higher voltage operated solid state final amplifier. It is available with or without the AT-930 automatic antenna tuner built-in.

### TS-930S FEATURES:

- **160-10 Meters, with 150 kHz-30 MHz general coverage receiver.**  
Covers all Amateur frequencies from 160-10 meters, including new WARC bands, on SSB, CW, FSK, and AM. Features 150 kHz-30 MHz general coverage receiver. Separate Amateur band access keys allow speedy band selection. UP/DOWN bandswitch in 1-MHz steps. A new, innovative, quadruple "UP" conversion, digital PLL synthesized circuit provides superior frequency accuracy and stability, plus greatly enhanced selectivity.
- **Excellent receiver dynamic range.**  
Receiver two-tone dynamic range, 100 dB typical (20 meters, 50-kHz spacing, 500 Hz CW bandwidth, at sensitivity of 0.25  $\mu$ v, S/N 10 dB), provides the ultimate in rejection of IM distortion.
- **All solid state, 28 volt operated final amplifier.**  
The final amplifier operates on 28 VDC for lowest IM distortion. Power input rated at 250 W on SSB, CW, and FSK, and at 80 W on AM. Final amplifier protection circuits with cooling fan, SWR/Power meter built-in.
- **CW full break-in.**  
CW full break-in circuit uses CMOS logic IC plus reed relay for smooth, quiet operation. Switchable to semi-break-in.

- **Automatic antenna tuner, built-in.**  
Covers Amateur bands 80-10 meters, including the new WARC bands. Tuning range automatically pre-selected with band selection to minimize tuning time. "AUTO-THRU" switch on front panel.
- **Dual digital VFO's.**  
10-Hz step dual digital VFO's include band information. Each VFO tunes continuously from band to band. A large, heavy, flywheel type knob is used for improved tuning ease. T.F. Set switch allows fast transmit frequency setting for split-frequency operations. A=B switch for equalizing one VFO frequency to the other. VFO "Lock" switch provided. RIT control for  $\pm$ 9.9 kHz.
- **Eight memory channels.**  
Stores both frequency and band information. VFO-MEMO switch allows use of each memory as an independent VFO, (the original memory frequency can be recalled at will), or as a fixed frequency. Internal Battery memory back-up, estimated 1 year life. (Batteries not Kenwood supplied).
- **Dual mode noise blanker ("pulse" or "woodpecker").**  
NB-1, with threshold control, for pulse-type noise. NB-2 for longer duration "woodpecker" type noise.
- **SSB IF slope tuning.**  
Allows independent adjustment of the low and/or high frequency slope of the IF passband, for best interference rejection. HIGH/LOW cut control rotation not affected by selecting USB or LSB modes.
- **CW VBT and pitch controls.**  
CW Variable Bandwidth Tuning control tunes out interfering signals. CW pitch controls shifts IF passband and simultaneously changes the pitch of the beat frequency. A "Narrow/Wide" filter selector switch is provided.
- **IF notch filter.**  
100 kHz IF notch circuit gives deep, sharp, notch, better than -40 dB.
- **Audio filter built-in.**  
Tuneable, peak-type audio filter for CW.
- **AC power supply built-in.**  
120, 220, or 240 VAC, switch selected (operates on AC only).

- **Fluorescent tube digital display.**  
Six digit readout to 100 Hz (10 Hz modifiable), plus digitalized sub-scale with 20-kHz steps. Separate two digit indication of RIT frequency shift. In CW mode, display indicates the actual carrier frequency of received as well as transmitted signals.
- **RF speech processor.**  
RF clipper type processor provides higher average "talk-power," improved intelligibility.
- **One year limited warranty on parts and labor.**
- **Other features:**
  - SSB monitor circuit, 3 step RF attenuator, VOX, and 100-kHz marker.
- **Optional accessories:**
  - AT-930 automatic antenna tuner.
  - SP-930 external speaker with selectable audio filters.
  - YG-455C-1 (500 Hz) or YG-455CN-1 (250 Hz) plug-in CW filters for 455-kHz IF.
  - YK-88C-1 (500 Hz) CW plug-in filter for 8.83-MHz IF.
  - YK-88A-1 (6 kHz) AM plug-in filter for 8.83-MHz IF.
  - SO-1 commercial stability TCXO (temperature compensated crystal oscillator). Requires modifications.
  - MC-60A deluxe desk microphone with UP/DOWN switch, pre-amplifier, 8-pin plug.
  - TL-922A linear amplifier (not for CW QSK).
  - SM-220 station monitor (not for pan-adaptor).
  - HS-6, HS-5, HS-4, headphones.

More information on the TS-930S is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

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Specifications and prices are subject to change without notice or obligation.

# Scan the World.

# NEW



## SSB, CW, AM, FM, digital VFO's, 10 memories, memory and band scan, dual 24-hour clocks...

## R-2000

The R-2000 is an all mode SSB, CW, AM, FM receiver that covers 150 kHz–30 MHz in 30 bands. New microprocessor controlled operating features and an UP conversion PLL circuit provide maximum flexibility and ease of operation to enhance the excitement of listening to stations around the world. Key features include digital VFO's, ten memories that store frequency, band, and mode information, memory scan, programmable band scan, fluorescent tube digital display, and dual 24-hour clock with timer.

### R-2000 FEATURES:

- **Covers 150 kHz–30 MHz in 30 bands.** Uses innovative UP-conversion digitally controlled PLL circuit. UP/DOWN band switches (1-MHz step). VFO's continuously tuneable across 150 kHz–30 MHz.
- **All mode: USB, LSB, CW, AM, FM.** Provides expanded flexibility in receiving various signal types. Front panel mode selector keys, with LED indicators.
- **Digital VFO's for best stability.** 50-Hz step, switchable to 500-Hz or 5-kHz, using front panel pushbutton switches. F. LOCK switch provided.
- **Ten memories store frequency, band, and mode data.** Complete information on frequency, band, and mode is stored in memory, assuring maximum ease of operation. Each memory may be tuned as a VFO. Original memory frequency may be recalled. AUTO. M switch for automatic storage of current operating data, or, when off, selective storage of data using M. IN switch.

- **Lithium battery memory back-up.** (Est. 5 yr. life.)
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- **Dual 24-hour quartz clocks, with timer.** Permits programming two different time zones. Timer for ON and OFF programming. Timer REMOTE output on rear panel (not for AC power).
- **Three built-in IF filters with NARROW/WIDE selector switch. (CW filter optional.)** 6 kHz wide or 2.7 kHz narrow on AM. 2.7 kHz automatic on SSB. 2.7 kHz wide on CW, or, with optional YG-455C filter installed, 500 Hz narrow. 15 kHz automatic on FM.
- **Squelch circuit, all mode, built-in, with BUSY indicator.**
- **Noise blanker built-in.** Eliminates pulse-type noise on SSB, CW, and AM.
- **Large front mounted speaker.**
- **Tone control.**
- **RF step attenuator. (0-10-20-30 dB.)** Four step attenuator, plus antenna fuse.
- **AGC switch. (Slow-Fast.)**
- **"S" meter, with SINPO "S" scale.**
- **High and low impedance antenna terminals.** A high impedance (500 ohm) terminal, and a low impedance (50 ohm) co-axial connector are provided.
- **100/120/220/240 VAC, or 13.8 VDC operation.** (Optional DCK-1 cable kit required for 13.8 VDC.)
- **Other features.**
  - RECORD output jack.
  - Audible "beeper" (through speaker).
  - Carrying handle.
  - Headphone jack.
  - External speaker jack.
- **Optional accessories:**
  - HS-4, HS-5, HS-6 headphones.
  - DCK-1 DC cable kit.
  - YG-455C 500-Hz CW filter.
  - HC-10 World digital quartz clock.

More information on the R-2000 is available from all authorized dealers of Trio-Kenwood Communications  
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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.



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- Base Charger & Power Supply (ST-5BC)
- Remote Speaker (MS-505)
- Mobile Charger (ST-MC)
- Speaker Microphone (SM-3)

The ST-144  $\mu$ P is approved under FCC Part 15.



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# The Radio Amateur's Journal



**ON THE COVER:** Joe Marshall, K2AU, digs into the pile-up to snare another rare one on c.w. Joe has been a top contender in the ARRL Sweepstakes each year and we've been working on him to try his "fist" on our WPX Contest this year. Photo by Larry Mulvehill, WB2ZPI.

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# Zero Bias

## AN EDITORIAL

**M**aybe we just don't come off as fun people. When the CB boom was really big, there were several songs (better left unnamed) on the pop charts extolling CB. There were big-name Hollywood stars in movies focused around the use of CB. The movies and the records are history now, although the movies show up on TV now and then. Things seem to have settled down, or have they? I recently received a promotion for a record which is riding on the computer fad. It's a 45 r.p.m. called "BASIC Ain't the Language of Love" which purportedly chronicles the highs and lows of a romance beset by bits, bytes, and bugs. Next I guess we can expect Burt Reynolds to star in "Smokey Bytes the Apple."

I think we as amateurs may be facing a problem in how we are perceived. We don't have songs, movies, or TV shows which feature amateur radio. We do have a few very good TV spot "commercials" for amateur radio put out by the ARRL, but they're serious and about serious subjects. We missed the clear shot between CB and computers, and now I hope that robots don't beat us out next time.

I know that we are all serious about amateur radio, but I also know that we derive enjoyment and a lot of fun out of what we do. The problem seems to be in how to convey that feeling of fun, excitement, and accomplishment. If we could find and take that mythical young person that Wayne is always looking for (everyone else is looking, too, Wayne) and tell him/her about the most exciting thing conceivable (to us) about amateur radio, would that young person reply, "Why would I want to do that?" "Because it's fun, that's why," we would reply.

It may be a fact that tomorrow's scientists, engineers, and technicians should come from the ranks of amateur radio, and therefore we should encourage youngsters to get involved for that reason. That's a benefit derived from the other side of maturity and has nothing to do with having a good time while you get there. The price tag on our equipment is not a turn-on, but it shouldn't be a turn-off either. These very same young people found the money for CB gear, TV games, and computer hardware and software simply because these pastimes were fun. Fun is the sizzle, not the proverbial steak. Amateur radio is certainly Grade A, Prime Cut, super-quality steak to be sure, but until we can sell the sound of that sizzle and the smell of that cooking, then we haven't attracted anyone. Young people, middle-aged people, and senior citizens all respond pretty much the same—if it's fun and enjoyable, then it's worth the effort to learn and study.

A code-free license might be the key that's needed to unlock the barriers that some people put up to avoid taking the test. It is perfectly obvious that a great many amateurs want the c.w. requirements maintained and oppose the code-free license proposal completely.

While the philosophical elements of the dichotomy are interesting and produce strong emotional argument, reality and the facts are that the situation is not up for a vote. Reality is that the FCC wants a code-free license, a volunteer examiner program, and anything else that will deregulate the amateur radio service to the point where they can afford it. We are not being asked to vote on whether or not we want it; we are only being asked to facilitate the implementation. That is the prime issue to keep in mind.

As has been brought out by many others, to implement a code-free license program that will work we will need a strong and vigorous volunteer program. By now you should know my feelings on that one. If not, I'll repeat myself. I don't see how the present structure of amateur radio can support such a program either financially or with enough able amateurs to come even close to what's being offered now. It has got to spiral inward. If that happens, it really becomes academic to the discussion to keep on harping on a code-free license. It will be hard enough trying to get a regular license.

If you want to have a philosophical discussion, though, consider the real meaning of the word *license*. Perhaps real isn't the exact word either; consider the implied meaning. A license, especially an amateur radio license, is a GOVERNMENT recognition and approval of our activity. We have the weight of the Federal Government behind us. I'm sure that perhaps three guys in Pomona who give a test are legal too, but it's not really the same thing. Maybe the day could come when a test by Tom, Dick, and Harry would carry the same weight and status as a test by Fred, Bill, and Chuck. No matter which three you wind up with, none would have the import or meaning of an FCC Examiner, FCC Office, and a real honest-to-goodness FCC-earned license. If they or you think so, consider the possibility of home-grown doctor licenses, pilot licenses, driver licenses, and any other skill-required government-regulated activity licenses.

To return to reality once again, it is a fact that the present administration has had to cut spending and funding of all sorts of government activities—not just amateur radio. The FCC has had a hiring freeze for some time now, and attrition has taken its toll of workers. If attrition doesn't work fast enough, workers probably will be let go to bring the work force within current spending limits. Those which are left probably will be shifted to other jobs as needed or do double duty in some areas. It is a real problem. To take a hard-ball approach would be to say that although it is a problem, it's not our problem. Up to now there has been the mandate for the government to set standards, do testing, and issue a license certifying the competence level of the applicant. There's quite a bit implied in that statement.

That is what is needed and what should be continued. I don't know how the government can pay for continued amateur radio licensing, but then again, it's their problem. I do know that we can't pay for it.

A license guaranteed by Fred, Bill, and Chuck is not now nor will it ever be the same thing. If it is the same thing in people's minds, then a code-free license will not be that important. What we have to keep paramount in our minds is just what that license means and what it says.

A code-free license is definitely needed in amateur radio. It does not carry with it the denial or removal of c.w. privileges for anyone. I can specifically say that because we sponsor the biggest c.w. contests in amateur radio, and we look forward to bigger and better ones each year. It has nothing at all to do with infringing on the traditional h.f. bands, since it concerns itself with operations above 30 MHz. It is in a proposed area where there is little or no c.w. activity at all. Why the fear and outcry?

One reason for the fear and opposition is that perhaps this license class might become very popular, and thousands of new "operators" will pounce on the u.h.f. and v.h.f. bands. That's what happened when Technician class amateurs descended on 2 meters. Of course one of the penalties was that we had to give up our Motorola tube gear and make do with the synthesized HT's this new market demanded. This new group had the audacity to actually have fun and tell others about what a good time they were having, thereby getting others to join in. A fair number even went as far as getting a higher class license to sample the fun on the h.f. bands. It's still a good way to have fun and enjoy amateur radio.

We are not by design a closed society. We have evolved to five classes of licenses, each denoting an interest level and ability. There is certainly room for a sixth. That sixth class will bring with it (as the others have) a market for new equipment and technology. Left to our own devices, we'd be back with the Motorola tube gear on 2 meters. We also tend to forget that those nifty little transceivers we take for granted came from the development of technology required for the CB industry during that boom. There is the potential for more good than bad with a code-free license. Morse code is not our only reason for being, just as Fred, Bill, and Chuck are not the FCC.

Look at what you do as amateurs and listen to yourself explain amateur radio to a newcomer. Do the two concur? How do you explain the code requirement? As a wonderful opportunity or as a drudge you have to get through? Can you sell the sizzle of amateur radio to that newcomer and answer him with "because it's fun, that's why I do it, and you can have just as much fun, too"? After all, isn't that the truth?

73, Alan, K2EEK

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# Announcing

● **KABHXU from Grandview, MO** - On May 7, the Southside ARC will operate KA0HXU on 21.355, 14.290, and 7.230 from 1500Z to 2400Z in commemoration of Harry Truman's 99th birthday. Commemorative QSL's will be sent via the bureau unless otherwise requested. For information, write to Southside ARC, P.O. Box 412, Grandview, MO 64030.

● **N2BMN from the USS Ling** - On May 14, the Meadowlands ARA will operate from the *USS Ling*, docked on the Hackensack River, New Jersey, using the call N2BMN. They will be on the air from 1500-2100Z on c.w., s.s.b., and f.m. For frequencies to be used write to Meadowlands ARA, P.O. Box 324, Little Ferry, NJ 07643. A certificate will be issued for an 8 1/2" x 11" envelope and 37c postage for confirmation of a QSO.

● **Indiana, PA, Celebration** - The Indiana, PA, County ARC will celebrate Jimmy Stewart's 75th birthday (he is a native of the county) the week of May 16-21. Club members will be on the air all week on the General and Novice frequencies. Send s.a.s.e. and QSL to W3FVU for commemorative QSL.

● **Tennessee Special Olympics** - This event will be held on May 20-21 at Vanderbilt University, Nashville, TN. There is a critical need for amateurs to receive messages from the participants as they arrive for the games, and to relay the results of the games, particularly in the smaller communities of Tennessee. The call signs in use will be K4CPO and W4VSV. For additional information, contact NZ4W at 615-292-2153, or W4CJY at 615-298-5892.

● **Mt. St. Helens QSO Party** - This third annual event will take place on May 21-22 from 0001-2359 UTC. Look for W7AIA on s.s.b. 3.895, 7.230, 14.280, 21.360, 28.505; c.w. 3.705, 7.105, 21.105, 28.105; and v.h.f. area repeaters. To apply for the award send log info or QSL and \$2.00 (or 8 IRC's) to Award Manager, W7AIA, P.O. Box 1424, Vancouver, WA 98668.

● **Algonquin ARC from Nantucket** - This operation will take place on May 21-22 on c.w. up 60 from the low end of the bands, and s.s.b. up 60 from the low ends of the General phone bands, 80-10, using the call W1BK. QSL with s.a.s.e. to P.O. Box 258, Marlboro, MA 01752.

● **W9LM, 50 Years in Amateur Radio** - The Northwest ARC will operate W9LM from 1700-1700Z May 28-29 on s.s.b. 10 kHz from the lower General 40, 20, 15, 10 meter bands; c.w. 25 kHz from lower edge of Novice bands; and 2 meter simplex on 146.52 MHz. QSL with s.a.s.e. for certificate to NARC, P.O. Box 121, Arlington Heights, IL 60006.

● **Apple Owners** - Apple Computer owners may now borrow from the club's electric library of computer programs. For a free catalog and information, write to the Electric Bookshelf, P.O. Box 1409, Norcross, Georgia 30071.

● **Connecticut DX Association** - The newly formed Connecticut DX Association (WB1EAZ, Ron, President; KB1BE, Paul, Vice Pres., and WB1CBY, Tom, Secy-Treas.) will be holding monthly meetings the third Wednesday of the month at 7:30 p.m., at ARRL Headquarters, Main Street, Newington, Connecticut. July and August meetings will be omitted. A DX net is held by CDXA every Monday at 7:30 p.m. on the Coventry, CT, repeater 147.375. Those interested are invited to attend the meetings or net operation. Write for further information to: Connecticut DX Association, P.O. Box 181, Columbia, CT 06237.

\*The following hamfests, etc., are slated for May:

May 1, **Suffolk County Radio Club Flea Market**, Melville, LI, NY. Contact Richard Tygar, AC2P, 516-643-5956.

May 1, **Lynchburg ARC Swapfest**, Lynchburg, VA. Contact Lynchburg ARC, P.O. Box 4242, Lynchburg, VA 24501.

May 1, **Eastern Connecticut ARA Radio and Computer Flea Market**, Putnam, CT. Contact Don Amirault, K1APE, 66 Labonte Rd., Box 310, RR #1, Thompson, CT 06277, or call 203-923-2727.

May 1, **11th Annual Sacramento Valley Amateur Radio Ham-swap**, Roseville, CA. Contact Doug Long, KB6ZR,

8810 Swallow Way, Fair Oaks, CA 95628 (916-961-0728).

May 2-3, **Anniston Hamfest**, Anniston, AL. Contact Dale Boothe, 3430 Greenwood Ave., Anniston, AL 36201.

May 7, **Arrowhead Radio Amateur Club Swapfest**, Duluth, MN. Contact Jerry Frederick, N0BNG, 1127 104th Ave. West, Duluth, MN 55808 (s.a.s.e.)

May 7, **3F ARC Swapfest**, Menasha, WI. Contact Mark Michel, W9OP, 339 Naymut St., Menasha, WI 54952.

May 7, **Ozaukee Radio Club 5th Annual Swapfest**, Cedarburg, WI. Contact Ozaukee Radio Club, P.O. Box 13, Port Washington, WI 53074 (s.a.s.e.)

May 7, **Southern Tier ARCs Hamfest**, Owego, NY. Contact C. England, KF2X, RD #1, Box 144, Vestal, NY 13850 (s.a.s.e.)

May 7-8, **Baton Rouge ARC Hamfest**, Baton Rouge, LA. Contact BRARC, P.O. Box 4004, Baton Rouge, LA 70821.

May 14, **Wexauke ARA 23rd Annual Swap Shop**, Cadillac, MI. Contact Wexauke ARA, P.O. Box 163, Cadillac, MI 49601.

May 14-15, **Central Washington State Hamfest**, Yakima, WA. Contact Dan Haughton, P.O. Box 9211, Yakima, WA 98909.

May 15, **Warminster ARC Hamfest**, Wrightstown, PA. Contact WARC, Box 113, Warminster, PA 18974, or call AK3O at 215-968-3133 after 2300 UTC.

May 15, **Southern Ontario Repeater Team Flea Market**, Arva, Ontario, Canada. Contact SORT, Inc., P.O. Box 73, Hyde Park, Ontario N0M 1Z0, Canada, or call VE3GYQ at 519-473-1643.

May 15, **9th Annual Easton Amateur Radio Hamfest**, Easton, MD. Contact Van Herridge, WB3HGQ, Box J, St. Michaels, MD 21663.

May 15, **Tristate ARS Hamfest**, Evansville, IN. Contact Hal Wilson, WB9FNN, RR #8, Box 427B, Evansville, IN 47711.

May 15, **Athens County ARA Hamfest**, Athens, OH. Contact ACARA, P.O. Box 72, Athens, OH 45701, or call WB8DOD at 614-797-4874.

May 15, **Knox County ARC Hamfest**, Knoxville, IL. Contact Timothy S. Smith, KA9LXB, 229 South Main St., Monmouth, IL 61462.

May 15, **Wabash County ARC Hamfest**, Wabash, IN. Contact Dave Spangler, N9ADO, 45 Grant St., Wabash, IN 46992.

May 20-21, **Rochester Hamfest-ARRL NYS and Atlantic Divisions Conventions**, Rochester, NY. Contact Rochester Hamfest, 300 White Spruce Blvd., Rochester, NY 14623.

May 21, **Columbia Hamfest**, Columbia, MO. Contact Columbia Hamfest '83, P.O. Box 283, Columbia, MO 65205.

May 21, **Northwest Arkansas ARC Hamfest/Swapmeet**, Rogers, AR. Contact KA5HEV, P.O. Box 338, Prairie Grove, AR 72753.

May 21-22, **Tri-City Hamfest**, Kennewick, WA. Contact Tri-City Hamfest Council, P.O. Box 1181, Richland, WA 99352.

May 22, **Fremont and Ottawa Counties Radio Clubs Hamfest**, Fremont, OH. Contact John Dickey, W8CDR, 545 N. Jackson St., Fremont, OH 43420, or call 1-419-332-8066.

May 22, **MAARC Hamfest**, Delaware County Fairgrounds, Muncie, IN. Contact Craig Graham, WD9EHF, RR 12, Box 86, Muncie, IN 47302.

May 22, **Denison Repeater Assoc. Flea Market**, Deloit, IA. Contact Gene Mitchell, N0DQS, Hwy 39, Deloit, IA 51441.

May 22, **Breeze Shooters Hamfest**, Pittsburgh, PA. Contact Don Myslewski, K3CHD, 359 McMahan Rd., North Huntingdon, PA 15642, or call 412-863-0570.

May 28-29, **Radio Amateur Club of Knox County Hamfest**, Knoxville, TN. Contact Mark Nelson, AJ2X, 4317 Foley Drive, Knoxville, TN 37918, or call 615-687-9656.

May 29, **Maryland FM Assoc. Hamfest**, Friendship, MD. Contact MFMA Hamfest Committee, c/o John Elgin, WA3MNN, 5495 Harpers Farm Rd., Apt. 2, Columbia, MD 21044, or call 301-596-3741.



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- By-pass switching is included for straight through, low power operation without having to turn off amplifier.
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- Amplifier is comprised of two units — rf deck for desk top, and separate power supply.
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- Manufactured in U.S.A.

\*Export model includes coverage of the 10-meter Ham Band.



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- By-pass switching is included for straight through, low power operation without having to turn off amplifier.
- Bandpass tuned input circuitry for low distortion and 50 ohm input impedance.
- Built-in power supply.
- Operates from 120/240 V-ac, 50/60 Hz primary line voltage.
- Manufactured in U.S.A.

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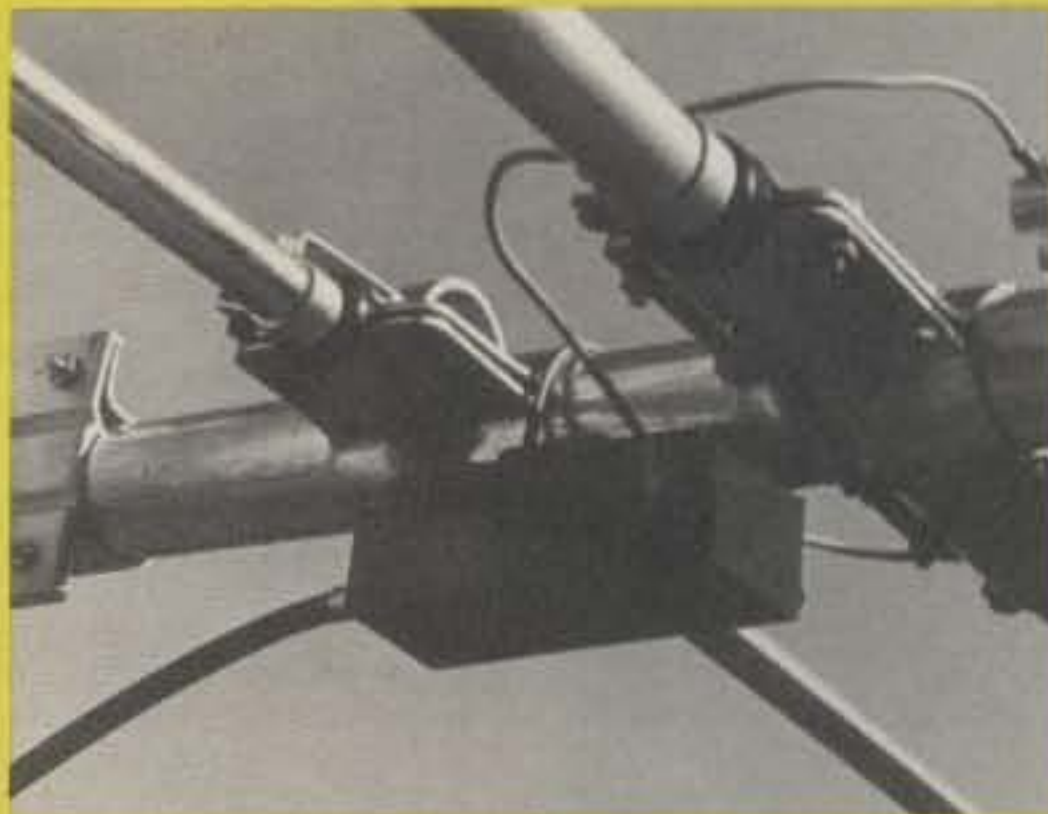
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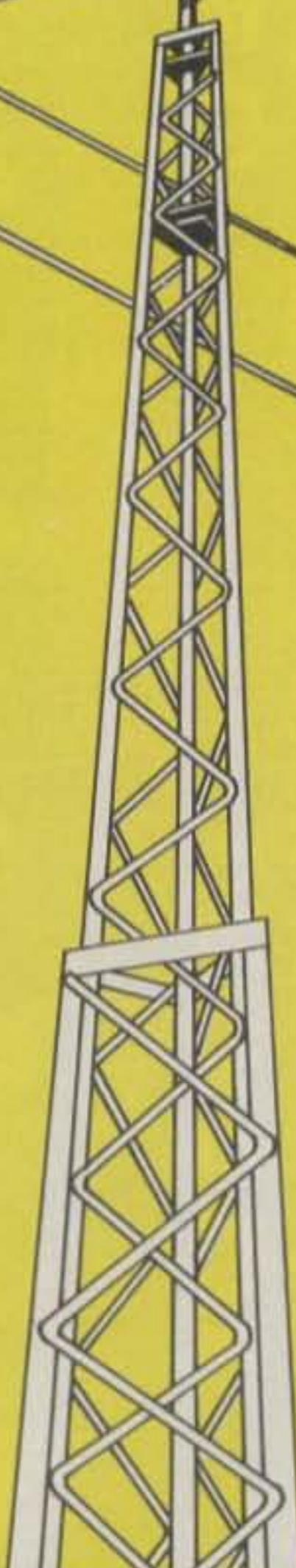
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## Remarkably Compact, High Performance Broadband Tribander with Quad-Band Option

### 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 on 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 or 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.



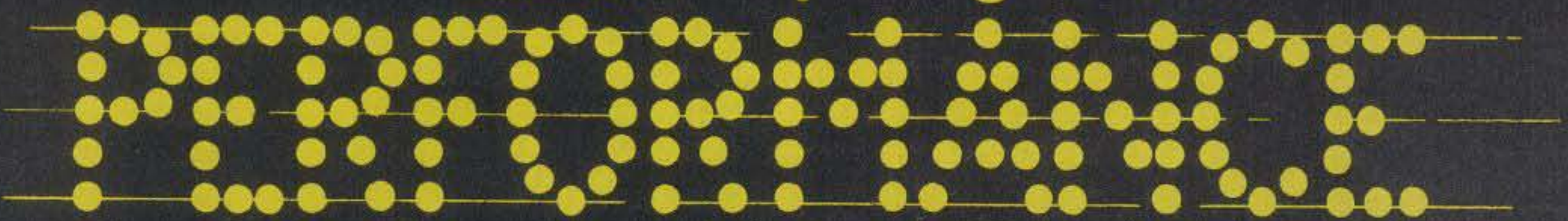
Lew McCoy, W1ICP is among the most authoritative writers in amateur radio. For over 30 years he served on the ARRL technical staff with his last position as assistant senior technical editor. Presently he is the technical editor for CQ magazine. Here is what he had to say about the Explorer 14:

"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		
Lightning Protection .....	DC Ground		
<b>Mechanical</b>			
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. (.69 m <sup>2</sup> )		

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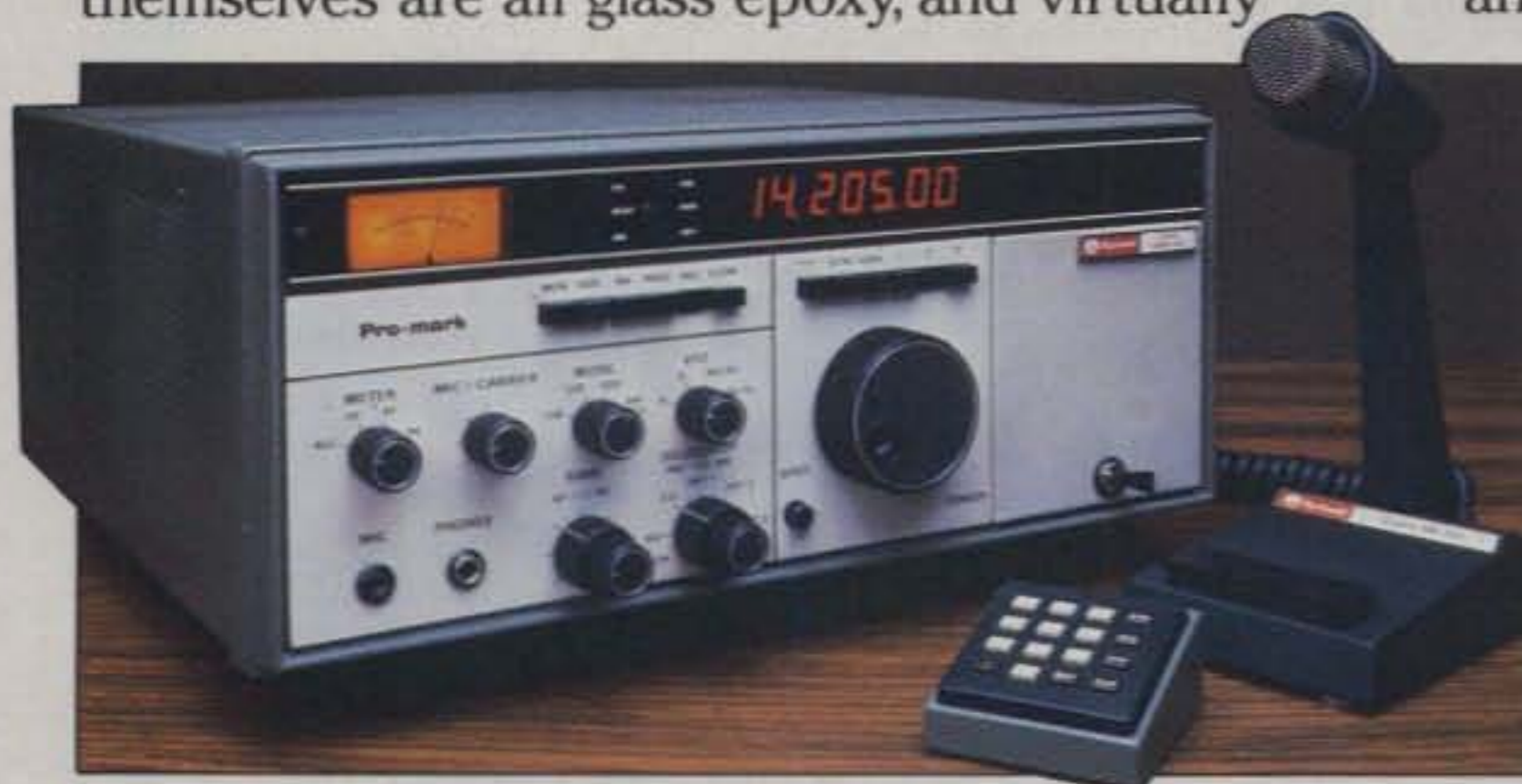


At Collins, we know serious amateurs won't settle for less than professional performance. So we build every KWM-380 to commercial rather than amateur standards. For example, our PC boards are connected by ribbon cables with gold-plated pinfield connectors. The boards themselves are all glass epoxy, and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

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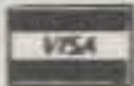
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Old and "new": At lower left is the hand-built prototype HT-36 transmitter, constructed in 1956-57; immediately to its right is the S-29, a general-coverage receiver and one of the first portables Hallicrafters built; overhead both is the SX-9, an early 1936-vintage general-coverage receiver.



**Scheduled to talk at Dayton this year on his very unique accomplishment, WD5EOG is a man to be reckoned with as we read about his particular interest in amateur radio.**



Charles Dachis, WD5EOG, flanked by some of the scores of restored Hallicrafters receivers and transmitters in his extensive collection.

## Wall-To-Wall, Floor-To-Ceiling Nothing But Hallicrafters

BY FRED BONAVIDA\*, W5QJM

Shortly after dawn not long ago, Charles Dachis, WD5EOG, was roused from his sleep at his Austin, Texas, home by a telephone call from a U.S. Customs officer at the San Antonio airport some 75 miles away. "He told me he had an air-freight package for me from Canada, and that I had to come down there in person and clear it through customs," Dachis recalled. Within an hour, Dachis was on the highway to San Antonio to pick up the package and put an end to one of the strangest interludes in his five years of collecting radio gear.

Dachis has one of the most extensive collections known of Hallicrafters equipment: receivers, transmitters, accessories, and even one round-screen television set dating from 1947—many of them older than he, and most emblazoned with the familiar "h" that marked a leader in communications equipment for generations of amateur operators.

One room in his home is lined with sets he has collected and restored to the same electrical, mechanical, and physical condition they had when new. That room—his ham shack—literally is wall-to-wall and floor-to-ceiling with Hallicrafters. Some of his prized possessions date back to the 1930s and bear magical names such as Sky Challenger, Super Skyrider, Skyrider

Defiant, Sky Buddy, and the like. Some are thought to be very rare—the only known examples of their kind.

In a drawer of his desk is a well-thumbed catalogue of Hallicrafters equipment; it is a list Dachis compiled over the years through acquisition of equipment and with the help of former Hallicrafters employees and what few company records he could find. He thought in the past that he had completed the list, only to receive a letter or a phone call with an offer to sell an unheard-of receiver or unit from the once-prolific manufacturer.

The package from Canada, for instance, contained an HT-11D marine-band radiotelephone, an item needed for that portion of his collection devoted to commercially-oriented gear. Dachis purchased it from a man in Canada who responded to one of his many ads for Hallicrafters gear. But after a year of waiting and repeated telephone calls and unanswered letters to the seller, Dachis had nothing; he had all but written off the hope of getting the unit or his money refunded. Then came the surprise telephone call from the customs officer in San Antonio, and the HT-11D went on the shelf with the others in Austin. That was the closest Dachis has come to getting "burned" in his years of shopping the world for Hallicrafters equipment. So far, he says, he has had only good luck in dealing with fellow amateurs and is thankful for their help in expanding his collection.

Most of the collection was found through advertisements in various publications. He first tried newspapers in Central

\*P.O. Box 12072, Capitol Station, Austin, TX 78711

Texas, but got only limited response. Efforts in amateur-oriented magazines and advertising sheets did much better; the response there has been "overwhelming," he says. Just the mention of his pursuit on the air had brought a response of "Oh, you're the Hallicrafters man!" from more than one amateur operator. That often has led to another piece for the collection.

At last count, Dachis says, he had 104 different receivers in working order with another "eight or ten" awaiting restoration; about two dozen transmitters, a lesser number of transceivers, the T-54 TV set, and so forth. There is even a promotional paper airplane with the traditional "h" on its wings. He is still looking.

Dachis's introduction to Hallicrafters gear came in 1960 when he was living in the Washington, D.C. area and acquired an SX-28, the first of what he later classified as "super radios." It was made in 1942, the year in which he was born, and he kept it until 1964 when he moved to Minneapolis, Minnesota, and traded it for an SX-42 with expanded frequency coverage and f.m. reception capability.

It was not until 1975, after moving to Austin, that Dachis decided he wanted another SX-28 and began advertising for one in the local newspaper. Several months and \$200 in advertising bills later, he got a call. "This guy said, 'I've got a Super Skyrid-er. It's a big, heavy thing, and I don't know what model number it is,'" Dachis recalled. "But it turned out to be an SX-28, and it was an ungodly mess. It had been in a flood; it was caked with mud on the bottom; it was full of mud daubers' and pillbugs' nests; the glass was knocked out of the dial; the front panel was completely stripped of paint. 'It was a real mess. I have since then scrapped radios that were in better shape than that one,'" he continued. "But it was an SX-28. It had taken me six months to find it, and I figured they were awfully rare. So I paid him \$10 for it, but believe me, it wasn't worth even that. I put in over a hundred hours restoring that thing . . . and it's one of the ones that's in there now."

The ads finally produced other calls from persons with radios to sell. Occasionally there were offers to sell a "whole garage full of radio gear" for \$50. One caller sold Dachis an S-38 and an S-77 for \$5 each. The die was cast; the collecting of Hallicrafters equipment was begun in earnest.

But Dachis says he discovered Hallicrafters was a "very prolific company" when he began researching what he had gotten himself into. "There was no limit to the amount of equipment they made," he said. "They were into TV, the military, amateur, . . . CBs, commercial radios, everything."

Pin-pointing what Hallicrafters had produced proved as difficult as acquiring some of the early equipment. The company, once headquartered in Chicago, has been sold several times and moved over the years, and its focus in the industry was changed.<sup>1</sup> In the process, many records were lost, destroyed, or discarded, Dachis said.

Crucial help came from ex-Hallicrafters engineers and employees, whom Dachis met on the air or whose names were given him by others. Through them he obtained what little documentation was available on the early days. One precious item was a list, compiled in the early 1960s by a Hallicrafters employee, of amateur receivers and transmitters manufactured beginning in the 1930s. That list was an important starting point for his catalogue and collecting, but it was not complete.

"I am still finding equipment that nobody seemed to know about," he said. "For instance, someone said he had an HT-36, and I checked my master list and the (service) manuals but I couldn't find an HT-36 anywhere. So I sent him the money, and here came this HT-36. So I added it to my list."

The HT-36 turned out to be a prototype sideband transmitter for the 2-30 MHz range built in 1956 or 1957 apparently to sell to the Department of Defense for military use. Dachis' hand-wired version is thought to be the only surviving example of that unit, which never was marketed commercially. "I am still finding things like this all the time," he said. "You know, they don't even know what they built, there was so much."

Dachis drew the line at 1968 and collects no Hallicrafters equipment made after then.



Charles Dachis, WD5EOG, at the operating position in his shack. At his elbow, from left, are the HT-32A transmitter and HT-33B linear amplifier. Over his shoulder is an SX-101 receiver, while on the shelf above are an SX-17 receiver and an HT-44 transmitter.

The pride of his collection is the DD-1 Dual-Diversity Receiver.<sup>2,3</sup> Built in 1937, it cost \$500 new. It has 25 tubes and two complete receivers in the handsome, wood-console cabinet. As near as can be determined, only about 500 DD-1 receivers were built, and only a handful survive today.

The oldest in his collection are the 1930s-vintage S-5, Super-7, and S-8A receivers, none of which resembles the Hallicrafters line that followed them. He recently added a key prize to his hoard: a rare S-10 receiver.<sup>4</sup>

Dachis also has a "want list," topped by the S-1, a four-tube TRF receiver in a wooden case introduced in 1931. In a typical month of hunting for it and others on the list, Dachis will run up a long-distance telephone bill of \$50 and will spend another \$30 to \$40 on postage. He frequently hears from amateurs trying to restore or repair a Hallicrafters receiver or transmitter. Letters have come from all over the world, and some of them have had to be translated. His files include two desk drawers full of service manuals, many of them original copies.

Occasionally the unexpected drops in his lap. One man sent Dachis four original instruction manuals with no advance notice, while a man in Kodiak Island, Alaska, sent him an SX-122, boxes of metal tubes, and several cans of shrimp—all for the cost of the postage.

Dachis is negotiating with a publisher to produce a history of the Hallicrafters Company, complete with photographs of the equipment being described. He is anxious to hear from those who might have memorabilia, letters, or other historical information to add to it, or who might have a rare item of equipment that could be photographed and catalogued with his collection.

If there is an uncertainty about a piece of Hallicrafters gear, Dachis probably has the answer. Name a model of almost anything the company made between 1931 and 1968, and he unblinkingly can rattle off mechanical, electrical, and physical specifications from memory.

"From the S-1 through the SX-God-knows-what, I've got it all right up here," he says, tapping the side of his head with a finger. "Well, almost all . . ."

## Footnotes

<sup>1</sup>William Orr, W6SAI, "The Hallicrafters Story," *ham radio*, November 1979, page 20.

<sup>2</sup>John Nagle, K4KJ, "Diversity Reception: An Answer to HF Signal Fading," *ham radio*, November 1979, page 48.

<sup>3</sup>Nagle, "High Frequency Diversity Receiver from the 30s," *ham radio*, April 1980, page 34.

<sup>4</sup>Orr, "The Hallicrafters 'Ultra-Skyrider' Receiver: The 1936 'Receiver of the Year,'" *CQ*, August 1979, page 32. □



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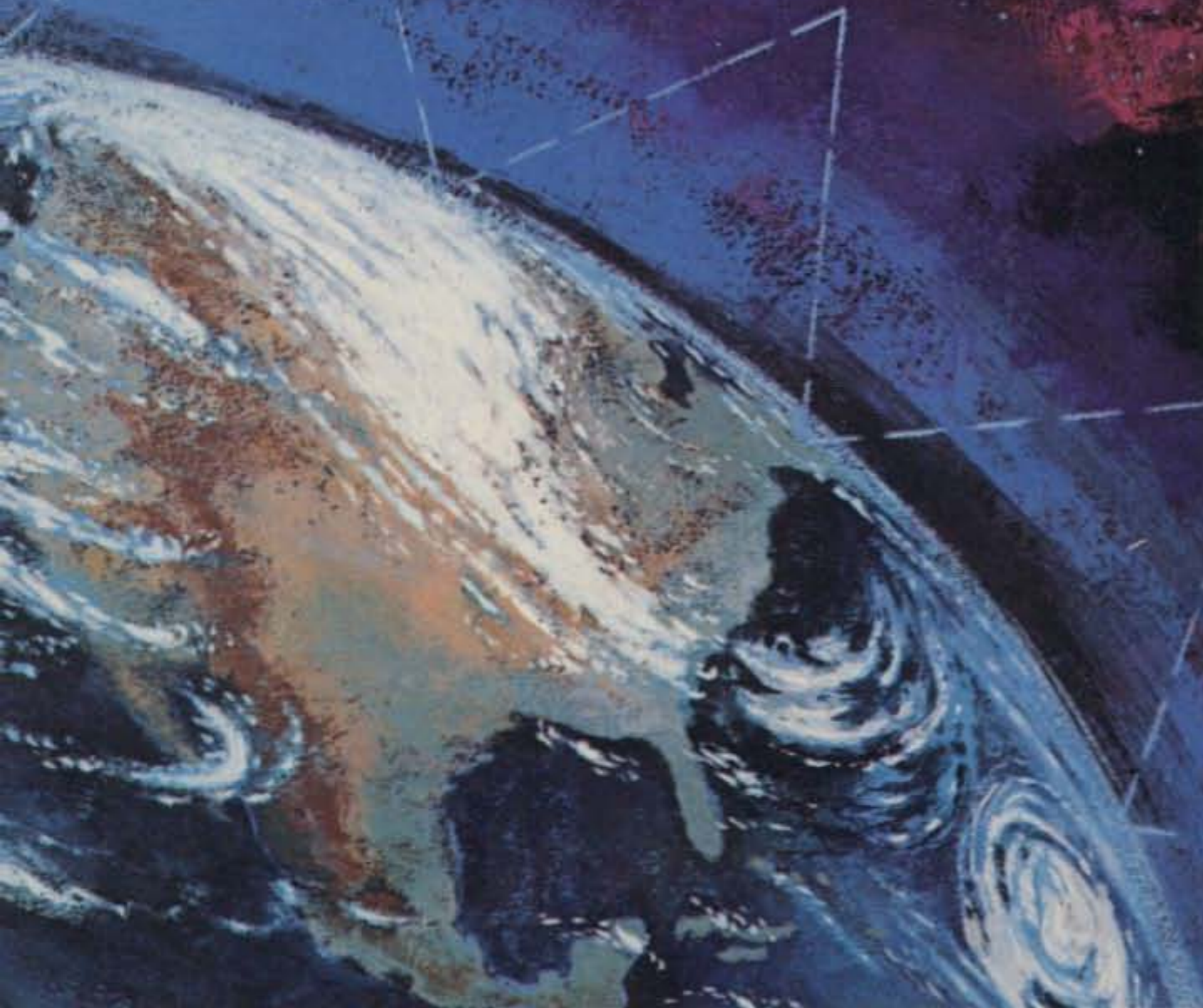
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**RCA**



**W**e took our lumps in this one. At least two solar flares and a minor storm in the geomagnetic field made for the overall poorest conditions we have ever experienced on the c.w. weekend. Unfortunately, this is a preview of oncoming propagation that will not affect just contests, but amateur radio in general. Most log comments indicated fair to poor to just plain lousy band conditions. As would be expected under the circumstances, the number of c.w. logs received was not as great as in the '81 event. However, a goodly number accepted the challenge, provided much activity, and enjoyed a fun weekend. So, even with so-called dead bands, high noise levels, heavy QSB, and a certain amount of operator frustration, I find it a pleasure to be able to report that 13 new All-Time records were established and 49 stations achieved a one-million plus score, while 20 passed the two million mark and five scored above three million.

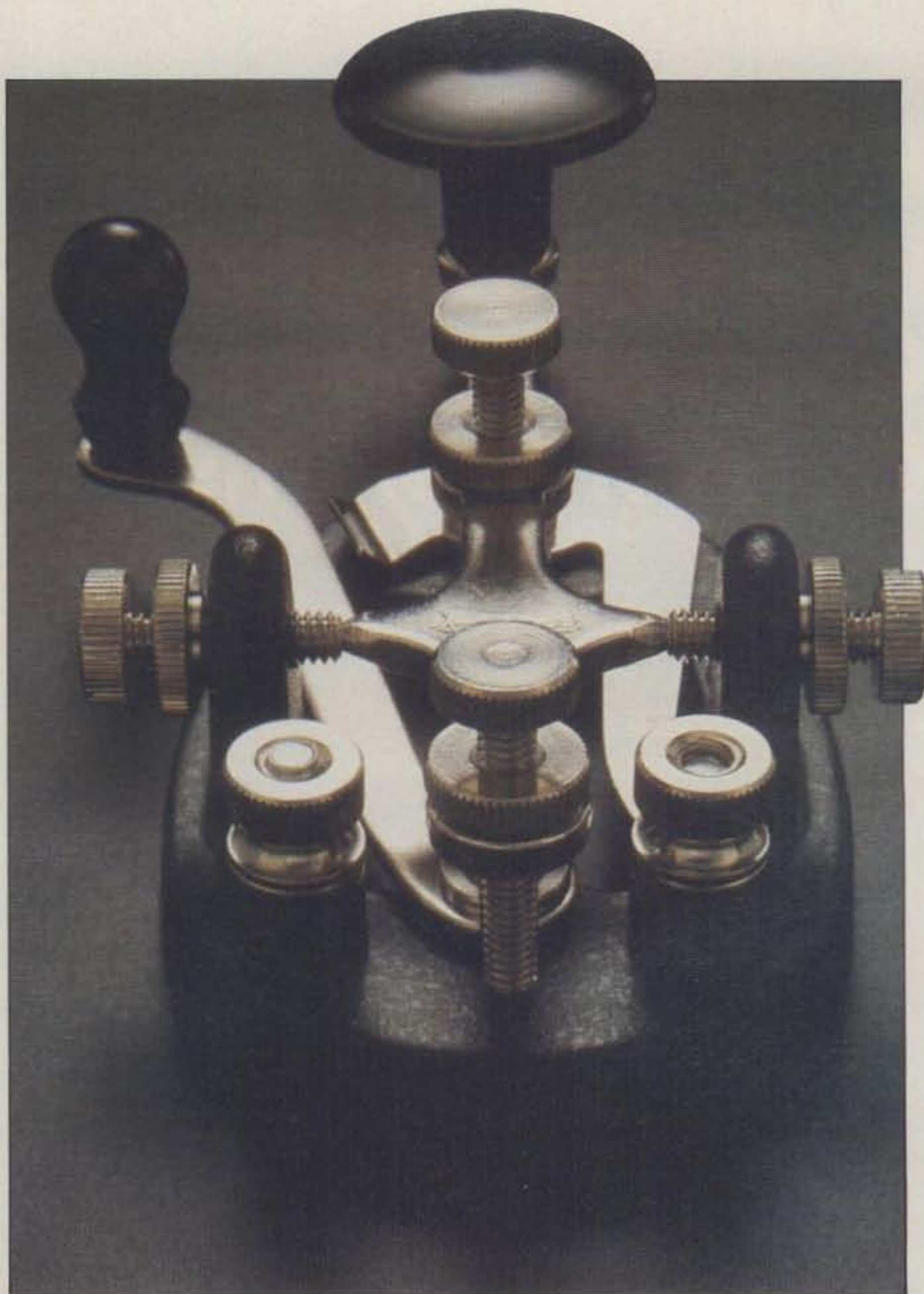
The top contest score (5,283,935) was made by the Romanian multi-multi group at station YQ0A. It was Pedro, NP4A, and his Puerto Rican op's who took the top world multi-single honor. Fred, K3ZO's S/O-A/B effort at HK3A was not only world high, but established a new world record. Also highly notable are the world records established by 4N3DX on 20 meters and OA4AWD on 40 meters. For the second time in two years, Austin, N4WW, and his crew took the top USA multi-single spot. They also hold the stateside record. The big QRPP score by David, 4X4UH, proves that it can be done with low power on c.w. This is the first time a record of over one million points was established in both the s.s.b. and c.w. parts. W8ILC did it on s.s.b. in March.

Unique prefixes were plentiful, which made it possible for station YQ0A to accumulate the top total of 607. Around the globe, 10 stations had over 500 multipliers each. K4CG was USA high with 559. It was nice to once again hear the Canadian specials. The log comment by Alan, KA2CGV, represents the feelings of many: "Enjoyed the WPX very much. The huge number of potential multipliers makes it one of the more exciting contests to work." Prefix collecting has really become popular during the last decade, and the WPX Contest is a prime source.

Per your many requests, we have published, along with these results, the first complete WPX C.W. World Record Holders' list (see page 80).

The Northern Ohio Amateur Radio Society is the first midwest USA club to win the World Club Competition Trophy. Congratulations for an outstanding accomplishment. When you consider that they are a general-interest group and that it took a large membership participation to push them to the top, you realize that the

\*7735 Redbank Lane, Dayton, OH 45424



BY BERNIE WELCH\*, W8IMZ

# RESULTS OF THE 1982 CQ WORLD WIDE WPX C.W. CONTEST



The workers, better known as the '82 WPX Contest Committee. (L to R) Bernie, W8IMZ; Steve, N8BJQ; Ray, KR8B; and Ron, W8ILC.

officers, contest managers, and membership have those ingredients so necessary for outstanding team work.

A group from the southwest, the North Texas Contest Club, is the USA Club Competition Trophy Winner. This DX contest oriented organization has been part of WPX contests for many years, and they are highly deserving of the award. Congratulations.

Did you know that over 900 different prefixes could have been worked in this event? That the WPX Awards Program is managed by Norm, K6ZDL (send him an s.a.s.e. for information)? That the 222 QSO's and 222 prefixes of OZ4RT are not a typographical error but his special effort? (The next time you want to do something different, try it for a nerve-racking WPX weekend.) That we can expect additional top-band activity now that more countries have authorized the 160 meter band for their amateurs? That 4U7ITU in Geneva was operated by a group from Barcelona, Spain? That we have had increased Novice participation each year, and that we will send an Honorable Mention Certificate Award for the single-op, high-scoring Novice? That if we had a nice log department, KØRWL would be on top of the pile?

The next WPX C.W. Contest is on 28 & 29 May '83 (GMT). The rules are published in January '83 CQ magazine. There are no rule changes from last year. However, the C.W. U.S.A. Single Operator, Single Band Trophy, donated by the Kansas City DX Club, was unintentionally deleted. This trophy is available for '83 and will again be included in the next published rules.

**DO NOT** send your logs to the old Port Washington, NY, address as it is no longer a good address for CQ. Send your WPX logs, large or small, to the new WPX Contest Director, Steve Bolia, N8BJQ, via his Call Book address, or to CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

This year's working Contest Committee did another super job (see photo). I appreciate their patience and long hours donated. The Chairman of all CQ Contests, Frank Anzalone, W1WY, continued to provide the needed support and lead-

ership. And last, but far from least, a special thank you to my XYL, Eleanor, who provided the administrative support and encouragement during my many years of managing the contest.

As I said in the S.S.B. results, I have chosen to retire as the WPX Contest Director effective as of 25 March '83. I will continue as one of the CQ magazine gang as Contest Advisor and probably in other areas later.

Thank you all for your outstanding support and please continue to do the same for the new WPX Contest Director, N8BJQ.

I finally joined the computer age. My family presented me with a VIC-20, including ham interface, and software, plus needed accessories. Better late than never. Hi!

Hope to work ya in the next one. CU in the pileups.

73, Bernie, W8IMZ

### Random Contest Comments

"Biggest thrill was working VQ9TT and 4X4UH/QRP with 5 watts. Tnx to UB5ITU for waiting 7 minutes trying to copy my call . . . WD6EWG. Did not even work a W4! Still going strong on QRPp . . . ON6NL. Hat's off to QRPp operators . . . W1IHN. 5Z4, C6A, HR5 for new ones (QRPp) . . . KH6CP. Condx were lousy. Thanks for ur efforts with the contest—was fun . . . W1BL. QRP is enough challenge with-



The new QRPp C.W. World Record Holder is David, 4X4UH. Vy FB.



World Top 21 MHz Station 5Z4CS was operated by Saty, JE1JKL.

out QRN at S-7/8 . . . N8CQA. First C.W. Contest . . . OA8CW. First contest in 1982 for me. It was great fun again . . . DJ6TK. Because of conditions I got many rest time, hi . . . JA6VZB. Band died Sunday AM for over 6 hours . . . WB4BBH. Much fun—Tnx QRP section . . . WA4FBH.

"JD1, FR0, FK8, A4X, RZ7—not bad for one watt. I think I will build a 5 watt amp for next year. I had to call the A4X and the FR0 twice . . . NN4Q. QRP operation proves that all the conscientious contesters out there have the best antennas and receivers ever built . . . W6YMH. The K4 who kept running his characters together and would not QRS 25 when asked twice? . . . VK2DXP. I enjoy my CQ subscription. You guys run the best contests and the best QRP articles . . . K19A. Went QRPp 2 months ago and finally got first QSO off this continent with my indoor dipole . . . KG1K. Tough competition in the W1 call area on 20 meters . . . KJ1N.

"I luv this contest—very easy to dupe the sheets when almost all QSO's are multipliers . . . AA1M. Best callsign, AM07CIX . . . W1RQ (Op. N1EE). Gotta get to 25 WPM—my 15 WPM is too slow . . . N2DGB. Static or lightning jumping over PL259 plugs . . . W3GM. Biggest thrill C31IU, DL2VK/ST3, DA1WA/HB0 (21 MHz) . . . W3/CM. Got my new call in mail the day the contest started . . . KE4UQ. Certainly seems slow when you have to start late and end early on 15 meters . . . AC5R. It was fun, but because I am only a Novice, not very many frequencies . . . KA5MED. KU5E and I followed each other around, and golly did that confuse some folks! . . . KU5I.

"Good to see so many Russians participate . . . WD5GX1. Unable to operate Saturday morning due to next door neighbor using very noisy power tools. He never let up the whole morning, completely blanking out all bands . . . W6BYH. My fourth WPX. More fun than ever . . . AA6EE. Novices are missing a good opportunity to improve code speed . . . N6EJG. Had more multipliers than QSO points—and a lot of fun . . . NC6Q. Now the problem is to get the stateside stations to QSL. Makes it a bit difficult to raise the totals on the WPX award filings . . . K6ZDL. Where was 4U7ITU located? . . . KD7H. Propagation worst ever—9U5 & 5Z4 biggest DX—oh well, maybe next year! . . . WB7FDQ. If we added points for having fun I'd have scored a million—sure enjoyed it . . . KJ7N.

"Thunderstorms throughout the whole weekend . . . AG8W (Op. K8MJZ). A real trick to unhook es work a couple of stations in between lightning bolts, but still got 4 new ones . . . KC8JH. Made ST3 and T32 on 1st call. CU next year . . . WA8YTM. Condx very poor, but my score was up 71,000 points over last year . . . KC8RA. Worked contest with a 101° fever the first day . . . K9YAX. CE0AE called me on 40 meters . . . KK9V. Conditions??? . . . AB0I (Op. KM0L). Hoping to snag some rare DX, I abandoned my drainspout antenna at my condo and moved the rig to my sister's house where I put some dipoles in the pines. Unfortunately, the sunspots didn't follow me . . . KS0T.

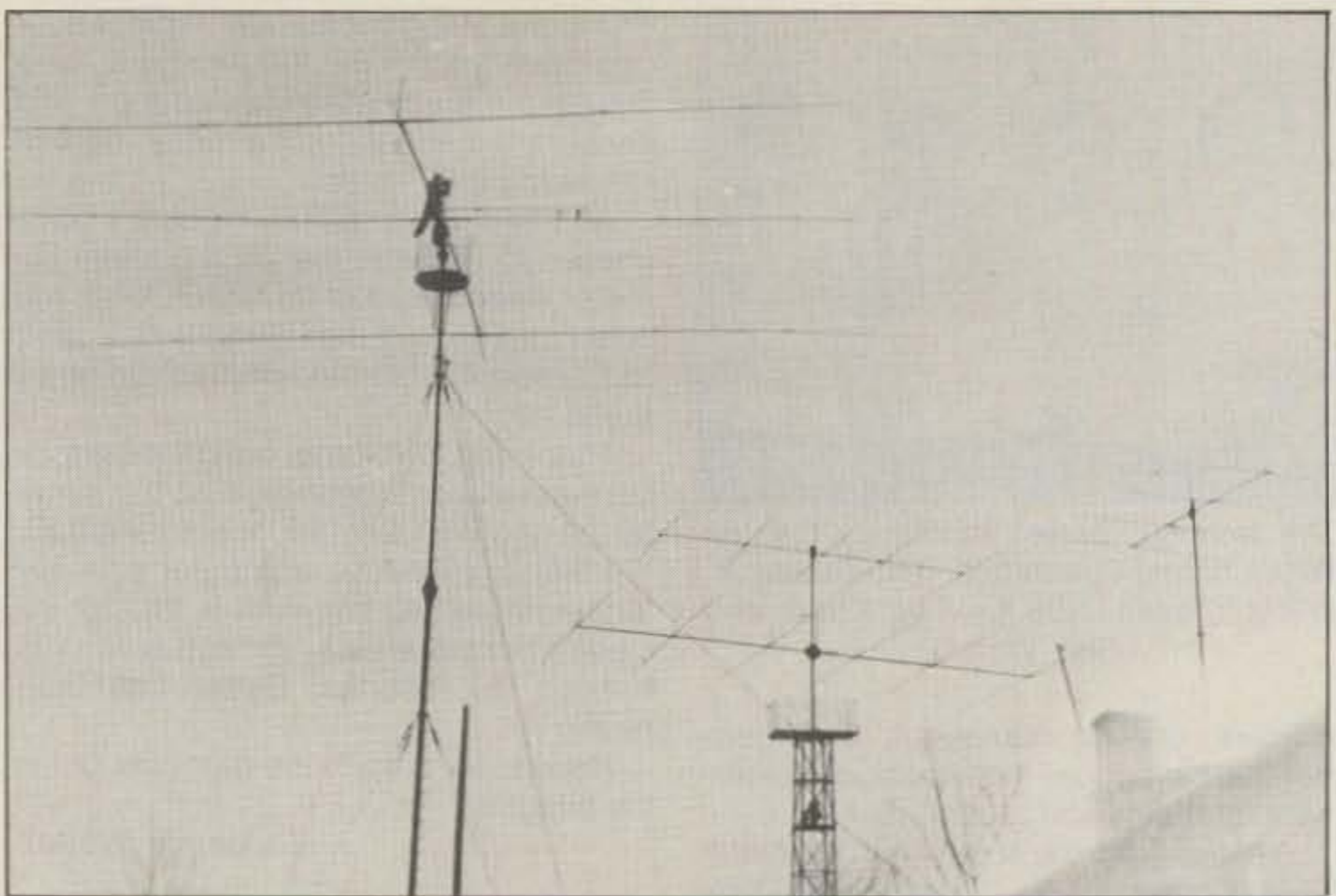
"Sure wish I had a memory keyer . . . KJ0I (Op. KM0Q). Bands were poor here in Alaska. Europe QRP stations had higher numbers than me . . . KL7RA. Had figured an 80–100/hour average QSO rate and got only 55 . . . N5RM/C6A. No 10 meter activity up here. Good test, had fun . . . VE6CNV. Hope everyone had a good total of 'crazy' Canadian prefixes . . . CY1QU. First contest on 40 mtr—single band a lot easier on the body than all band . . .

VC3CRD. Loved it! See you next time for sure, if you can arrange 28 MHz propagation . . . 6Y5HN. I like this contest, but I'm not going to work in Novice bands again. HI . . . WP4CEQ. My next WPX will be from stateside. It just won't be the same! . . . EL2AV.

"Local QRN due to rain but still enjoyed it . . . ZS4SP. I could work only a few USA stations on 21 MHz . . . JG1ILF. PSE QRV many stations for 40 and 80 meters . . . JA6BIF. Worked my first Africa (5Z4CS). I'm very happy . . . JG1WRN. My 1st contest of over 200 QSO's. I enjoyed this contest very much . . . JH1APK. Contest participation difficult as Sat/Sun are work days . . . 9K2BE (Op. G4BWP). Flight from 4S7 vy late. Taxi took us to wrong address. Many power failures, but loved every minute . . . 9N1MM (Op. K9AJ). Thank you for this opportunity and our congratulations for this excellent contest . . . PY2TXW. I have been a ham for over thirty years and never participated in a contest before . . . CE6EAT.

"Despite the time of year, 10 meters opened up pretty well to Europe the second day . . . HK3A (Op. K3ZO). Loudest 40 meter signal here was WD9IIX . . . CE0AE. FB Test, my first ZL/C, TKS CQ! . . . CX8DT. Complete fadeouts at times on 21 MHz. Rather frustrating. I did a lot of sitting and tuning . . . KH6JWK. Great fun, even if I couldn't find a ZL multiplier. CU agn next year . . . ZL3AGI. Tnx for nice contest. Sorry about condx (3.5 MHz) . . . UA9AJO. Interesting contest indeed . . . UA9AAP. A special jubilee call sign in honour of the 250th anniversary of Kazakstan's joining Russia . . . RX7CT. I was without CW filter—vy difficult with 2.3 kHz bandpass. Nevertheless a good time . . . ON4FD.

"I like the break periods, although I think 12 hours off would be better . . . OZ1LO. 10 meters was too much like 2 meters this far north . . . OZ1AUX. Conditions show the way the sunspot count is going . . . GB2FXB (Op. G3FXB). Thanks to USA operators for pulling signals out of the noise (28 MHz) . . . G3UKS. My first big contest since I suffered a direct lightning



Antennas at the Club Station of the Coal Mines in the Ukraine, UK5MAF.

strike last October . . . G4CNY. I worked nearly all SM prefixes. HI . . . OH1AA (Op. OH3OM). First contest on 7 MHz. Nice contest . . . OH2BUU. Many prefixes on the air during this contest . . . F6FJE. Good conditions to N. America—enjoyed the contest . . . DA2AA. Finished my log just 2 days before deadline and departure to my holidays . . . DK8AX.

"Poor propagation on 28 MHz. Had lots of noise on 21 MHz . . . HA0HW. My best contest. IK is new prefix for Italy license . . . IK1AAW (Op. I2VXJ). Very good variety of interesting prefixes. It was a good idea to do a WPX C.W. Contest . . . I1ZYR. Thanks for the fun . . . PA0DIN. Chance to work many new special prefixes . . . LA5VAA. Special prefix for World Cup Spain '82 (Football) . . . AM07AIN (Op. EA7AIN). My impression was that I was sitting under an Aurora umbrella here up at 79 de-

grees north . . . JW5OD. Thanks to CQ mag. and CQ WPX Contest I had the pleasure to work 10 new countries and many new prefixes . . . SM5DAC.

"Condx turned from lousy to just bad when I removed oxide from TX/RX relay. HI . . . SM6HCJ. Short skip, many EU QSO's . . . YU2CQ. When will 10 open agn?? . . . YU3EY. Did fairly well with only two operators . . . KV6O. Great Contest—see you next year . . . KN5H. Who broke the bands? . . . K8NZ. Answered on CQ by 4S7WP & 9U5WR . . . KQ2O. Thunderstorms locally . . . NO4R (Op. KC4WQ). I thought only the big guns worked stations like A4X . . . KK9W. Hardest prefix to find was VC2. HI. CU next year . . . VC2HQ (Op. VE2HQ). A special prefix for the WPX . . . CZ3PCA. It was very difficult to organize multi TX operation from one QTH . . . LZ7A."

#### C.W. & S.S.B. CLUB COMPETITION

Northern Ohio Amateur Radio Association . . . . .	31,420,521	Kiev Radio Club (Ukraine) . . . . .	2,162,455
Ponce DX Club (Puerto Rico) . . . . .	29,647,662	Dayton Amateur Radio Association . . . . .	2,114,218
<b>North Texas Contest Club . . . . .</b>	<b>23,824,512</b>	Moscow Radio Club . . . . .	2,100,293
Lithuanian Contest Group . . . . .	16,881,594	S.D.X.G. (Germany F.R.G.) . . . . .	2,075,212
Kaunas Polytech Institute (Lithuania) . . . . .	16,445,613	Rubber Circle Contest Club . . . . .	1,954,498
YU DX Club (Yugoslavia) . . . . .	14,461,445	Willamette Valley DX Club . . . . .	1,895,040
Potomac Valley Radio Club . . . . .	14,399,863	Staples High School A.R.C. . . . .	1,826,214
Yankee Clipper Contest Club . . . . .	14,057,161	Central Arizona DX Association . . . . .	1,492,702
Ontario Contest Club (Canada) . . . . .	12,807,329	Southern California Contest Club . . . . .	1,471,471
Israel DX Club . . . . .	12,439,116	Murphy's Marauders . . . . .	1,407,963
Frazier Valley DX Club . . . . .	12,396,388	Ventura County A.R.C. . . . .	1,044,605
Halifax A.R.C. (Canada) . . . . .	10,480,349	Radio Club Du Borinage (Belgium) . . . . .	1,020,996
Kansas City DX Club . . . . .	10,193,335	Cork Radio Club (Ireland) . . . . .	1,002,588
Texas DX Society . . . . .	9,946,283	Eastern Michigan A.R.C. . . . .	880,619
The Bullmertz (Sweden) . . . . .	9,937,281	Northern California DX Club . . . . .	671,103
Northern California Contest Club . . . . .	7,761,927	South Jutland Contest Group (Denmark) . . . . .	499,500
Tallinn Radio Club (Latvia) . . . . .	7,268,514	Michigan DX Association . . . . .	433,318
Voroshilovgrad Radio Club (Ukraine) . . . . .	7,258,528	Alaska DX Association . . . . .	419,958
Ill Wind Contesters . . . . .	7,127,569	Canadian DX Association . . . . .	363,740
Marianas A.R.C. (Guam) . . . . .	6,365,142	Ashtabula County A.R.C. . . . .	347,105
Pac Rats (Hawaii) . . . . .	6,242,967	East Iowa DX Association . . . . .	341,775
Frankford Radio Club . . . . .	5,840,941	San Angelo A.R.C. . . . .	326,013
Southern California DX Club . . . . .	4,248,030	Odessa Radio Club (Ukraine) . . . . .	321,030
Northern Illinois DX Association . . . . .	3,972,737	San Diego DX Club . . . . .	225,787
RTV Club (Yugoslavia) . . . . .	3,820,281	Riga Radio Club (Latvia) . . . . .	203,268
Rhein Ruhr DX Association (Germany F.R.G.) . . . . .	2,893,458	Zaliznichny Strk (Ukraine) . . . . .	188,000
Central Indiana Contesters . . . . .	2,871,612	Southeastern DX Club . . . . .	163,628
Fort Wayne Radio Club . . . . .	2,834,528	North Florida A.R.S. . . . .	131,028
Clarkson College Contest Group . . . . .	2,820,147	Central California DX Club . . . . .	127,218
Danish DX Group . . . . .	2,203,140	Big Island A.R.C. (Hawaii) . . . . .	111,126





SVALBARD

Table listing radio call signs and prices for Svalbard, including JW500, SM0DJZ, SK0LM, SM5DAC, SM0TW, SM5ALJ, SM6HCJ, SM7KIL, SM0BVQ, SM7DER, SM5RE, SM5CSS, SM7KNW, SM0CGD, SM0MLL, SM5BDV, SM6AYM, SM5APS, SM0KV/0, SK0HB, SM7TV, SM5CMP, SM2JRK, SM6LAZ, SM5EQW, SM6JY, SM5AOG.

YUGOSLAVIA

Table listing radio call signs and prices for Yugoslavia, including YU3EY, YU7SF, YU7NGO, YU1NZW, YU3TOJ, YU7NZR, YU7ORD, YU4CBC, YU2CQ, YU7BCD, YU7AF, 4N3DX, YU3VM, YU3EO, YU7KMN, YU7NPC, YU7FN, YU9W, YU4EJC, YU2SD, YU5FAU, YU10VU, YU7AJD, YU3EF, YU2HDE, YU4YA.

U.S.S.R. EUROPEAN

Table listing radio call signs and prices for U.S.S.R. European, including UA3DUF, UA3QBP, UA4CK, UA3AAH, UA4CDL, UA1QBE, UA3MDD, UA4CDY, UA6AJG, UA4HBP, UA3DIN, UA3DRT, UA6ARX, UA3EDF, UA4ACA, UA3DSS, UA3GO, UA1CAI, UA3AGZ, UA3AGF, UA3DAT, UA6XAH, UA1CGE, UA3QLT, UA4NBD, UA4NCI, UA3VA, UA3EAL, UA3WI, UA6HKN, UA1CAQ, UA3TAG, UA6APP, UA1WEA, UA3DBB, UK6AJN, UA4AA, UA4FAZ, UW3UO, UW3HV, UA3RDH, UW3GL.

Table listing radio call signs and prices for various regions, including UA3TAM, UV3DN, UA3VAS, UV3GZ, UA6LAM, UA3AGL, UA3UBN, UA3AEX, UA3AMB, UA6AJO, UA3ESN, UA3MAE, UA6AXX, UA3AEZ, UA4WBJ, UA6ALV, UA4AHT, UA3UAR, UA6LNE, UA4SBN, UA4MX, UA3DQS/UA6, UA3RCT, UA3EAH, UA4LBF, UA3LAR, UA3AKS, UA4YAZ, UA1DF, UA4CCB, UA3PAZ, UA3GGF, UA3YAO, UA3AOF, UA1XM, UA3AMR, EZ3QEJ.

BYELORUSSIA

Table listing radio call signs and prices for Byelorussia, including UC20CS, UC2AHL, UC2SE, UC2ACL, UC2AW, UC20DA, UC2WBJ, UC20BP.

ESTONIA

Table listing radio call signs and prices for Estonia, including UR2RHF, UR2RND, UR2RER, UR2ZJ, UR2RRJ, UR2QD.

KALININGRAD

Table listing radio call signs and prices for Kaliningrad, including UA2FEM, UA2FEW, UK2FAA, UA2EC, UA2FCW.

LATVIA

Table listing radio call signs and prices for Latvia, including UQ2GDD, UQ2PD, UQ2GCN, UQ2GKM, UQ2GIU, UQ2GLW, UQ2PM, UQ2GFM, UQ2GDL, UQ2PP, UQ2GLC, UK2GAT.

LITHUANIA

Table listing radio call signs and prices for Lithuania, including UP2BAS, UP2PAW, UP2BEG, UP2PAQ, UP2BAR, UP2BDX, UP2BBF, UP2BAE, UP2PCB, UP2PAP, UP2BAO, UP2BEJ, UP2PBZ, UP2BB, UP2BV, UP2BIP, UP2BJQ, UP2BKJ, UP2BEN, UP2BIF, RP2BFU.

MOLDAVIA

Table listing radio call signs and prices for Moldova, including UO5OWC, UO5OEK, UO5OBD, UO5ODA, UO5ODN.

UKRAINE

Table listing radio call signs and prices for Ukraine, including UB5IJK, EX5UBY, EX5UKW, EX5UKO, UB5ICS, UB5GBC, UB5TN, UB5CBA, UB5ZBS, UB5IPJ, UB5VK, EX5DW, UB5MHP, UY5TE, UB5SG, EX5UBI, UB5IS, UT5HP, UB5DCW, UB5DAV, UB5WBJ, EX5BW, UB5AEZ, UB5AAS, UB5ABY, UB5UCF, UB5RAF, UB5VAL, UB5VAA, UB5GBN, UB5TR, UB5VAW, UT5QG, UB5ITU, UT5WW, UB5ZBG, UB5KAK, UB5QBC, UB5GEL, UT5CF, UB5MMF, EX5UAE, UB5IET, UK5DAA, UB5QDU, UB5UCR, UB5KBV, UB5WCF, UB5KAU, UB5EEP, UB5WCG, UB5ENV, UB5NDD, UB5JLJ, UB5IPN, UB5QAE, UB5ZAL.

OCEANIA AUSTRALIA

Table listing radio call signs and prices for Oceania Australia, including VK3AEW, VK2DZZ.

HAWAII

Table listing radio call signs and prices for Hawaii, including AH6J, KH6B, KH6JWK.

NEW ZEALAND

Table listing radio call signs and prices for New Zealand, including ZL2RY, ZL3AGI.

SOUTH AMERICA BRAZIL

Table listing radio call signs and prices for South America Brazil, including PY2TXW, PY1URQ, PY1DFF, ZY3YEX, PY2FK, PY2RUB, PR7CM, ZY3ZZ, PY1BOA, ZY3CFD, ZY5XFR, PY2SHI.

CHILE

Table listing radio call signs and prices for Chile, including CE6EAT.

COLOMBIA

Table listing radio call signs and prices for Colombia, including HK3A.

EASTER IS.

Table listing radio call signs and prices for Easter Island, including CE6AE.

PERU

Table listing radio call signs and prices for Peru, including OA4AWD.

Don't Be Left Out in the Cold with the Russian Woodpecker

GET A MOSCOW MUFFLER™

Another first from AEA. The Woodpecker Blanker, WB-1 really works. This unit effectively blanks the pulsing interference of the Russian Woodpecker. Two versions are available, the WB-1 for use with communication receivers and WB-1C for use with all popular transceivers.



This extremely useful accessory is designed for direct insertion between your receiver (or transceiver) and the antenna. It is both MORE EFFECTIVE than I.F. type blankers and requires NO MODIFICATIONS to your receiver! The unit operates from a 13 VDC ± 2 VDC power source at less than 575 mA. (AEA AC wall unit AC-1 will operate the blanker.)

The blanker works well on both CW and SSB modes that are being interfered with by a woodpecker. Controls on the front panel include; four push button switches, a synchronize control and a width control The WB-1 also features a low-noise untuned broadbanded 6 db gain pre-amp which can be selected with or without the blanker enabled. The WB-1C uses the same circuitry but includes a carrier operated relay (COR). This provides protection to the receiver section during transmissions from the attached transceiver.

Prices and Specifications subject to change without notice or obligation.

Advertisement for ege, inc. featuring a logo, address (13646 Jefferson Davis Hwy., Woodbridge, VA 22191), order information, and a VISA logo.

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"Trombone"

Model HF6V

Model 2MVC-5  
"Super Trombone"

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**NEW!** Model 2MVC-5 "Super-Trombone"® — Same advanced features as the basic 2MVC 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!



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## WORLD WIDE TOP SCORES SINGLE OPERATOR

ALL BAND			
HK3A	3,542,401	KA1R	1,580,680
YU3EY	2,379,969	GB2FXB	1,487,990
A4XJO	2,366,976	UQ2GDO	1,476,556
N5RM/C6A	1,848,000	RX7CT	1,356,813
KC1F	1,711,843	JG1ILF	1,347,750

SINGLE BAND			
28 MHz		21 MHz	
PY1BOA	218,120	5Z4CS	2,104,245
YU2CQ	157,740	ZY3CFD	1,387,042
G3UKS	97,601	YU7BCD	864,630
YV3AGT	63,910	YU7AF	607,012
N4ZC	22,770	UJ8JAS	478,857
OK1AOV	21,243	OK1DCU	461,304

14 MHz		7 MHz	
4N3DX	1,574,822	OA4AWD	1,752,254
KP4EQF	1,189,015	YU9W	737,460
VC3BMV	992,718	UR2RRJ	699,062
YU3VM	946,036	YU4EJC	513,975
EL2AV	906,840	Y48WO	429,768
K5GA	851,884	HA9RE	354,744

3.5 MHz		1.8 MHz	
UA9AJ0	174,906	YU3EF	38,412
UA9CBM	170,368	YU2HDE	23,542
UR2QD	142,870	UA2FCW	23,244
OH3XS	128,100	UB5ZAL	20,066
YU5FAA	91,728	YU4YA	17,784
OH6EI	74,784	UA9S JL	15,456

QRPp					
4X4UH	AB	1,028,904	UB5KBY	28	17,738
UB5ZEO	AB	340,059	4X6NDE	21	772,304
UA4AEW	AB	284,144	NN4Q	14	58,650
JA1MCU	AB	232,617	OK1DCP	7	61,236
SM5CCT/7	AB	190,820	HA6NL	3.5	55,216
EA8ACL	AB	139,965	UB5PBA	1.8	16,644

## MULTI-OPERATOR SINGLE TRANSMITTER

NP4A	4,208,050	UK2PCR	2,723,840
R6L	3,687,062	YU4EBL	2,659,112
HG6V	2,925,664	4U7ITU	2,608,815
UK9ADT	2,841,770	4N4Y	2,596,572
HG5A	2,750,490	N4WW	2,386,590

## MULTI-TRANSMITTER

YQ8A	5,283,935	YZ4Z	2,783,205
LZ7A	4,411,215	JA2YKA	2,780,910
JA3YBF	2,880,400	K4CG	2,679,846

## U.S.A. TOP SCORES SINGLE OPERATOR

All Band	KC1F	1,711,843
28 MHz	N4ZC	22,770
21 MHz	WA6DBC	287,280
14 MHz	K5GA	851,884
7 MHz	W6BIP	286,136
3.5 MHz	N6PE	15,162
1.8 MHz	W8LRL	1,008
QRPp	WD6EWG	138,972

## MULTI-OPERATOR

Single Xmitter	N4WW	2,386,590
Multi Xmitter	K4CG	2,679,846





# the tempo S-15

## ...a no nonsense radio that provides more power, broader frequency range and simplicity of operation

The S-15 is the kind of hand held most people want. Simple, rugged, reliable, easy to use...it's the hand held for today and tomorrow. The S-15 offers a full 5 watts of power...power that extends your range and improves your talk power. The S-15 operates from 140 to 150 MHz (and 150 to 160 on export models). Compare that to the others. Its state-of-the-art integrated circuitry provides far more reliability and ease of maintenance than conventional circuitry...just one more indication of the kind of quality that goes into the S-15.

Consider all of these features before you decide on any hand held:

- 5 watt output (1 watt low power switchable)
- 10 MHz frequency coverage: 140-150 MHz (For export only: B version 150-160 MHz, C version 160-170 MHz)
- Electrically tuned stages. Receiving sensitivity and output power are constant over entire operating range.
- Three channel memory. (1 channel permits non-standard repeater offsets. 200 micro amp memory maintenance (standby)).
- A new "easy remove" battery pack
- One hour quick charge battery supplied (450 ma/HR)
- Plug for direct 13.8 volt operation

- Speaker/microphone connector
- BNC antenna connector and flex antenna
- Extremely small and light weight (only 17 ounces).
- Ample space for programmable encoder.
- Fully synthesized
- Extremely easy to operate
- Its low price includes a rubber antenna, standard charger, 450 ma/HR battery (quick charge type) and instruction manual.

**OPTIONAL ACCESSORIES:** 1 hour quick charger (ACH 15) • 16 button touch tone pad (S 15T) • DC cord • Solid state power amplifier (S-30 & S-80) • Holster (CC 15) • Speaker/mike (HM 15)

*Available soon!!*

The CS-15.. a new version of the S-15.. for commercial use.

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- ★ Ultra compact, portable
- ★ Internally programmable
- ★ Full 5 watt output
- ★ 10 MHz receiver coverage

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John, KK9A, is the USA 9th District 14 MHz certificate winner.



Dubo, YU2CQ, won top 28 MHz for Europe. His is especially proud of his home-brew memory keyer.

URUGUAY			
CX8DT	3.5	13,860	60 45

VENEZUELA			
YV3AGT	28	63,910	206 110
YV3BNJ	21	54,988	160 118
4M3AGT	7	100,210	150 110

### MULTI-OPERATOR SINGLE TRANSMITTER

#### UNITED STATES

N4WW	2,386,590	1858	530
KV60	1,985,736	1787	471
N5JJ	1,650,897	1518	477
KN5H	1,500,606	1410	471
K8NZ	1,159,216	1112	424
K8ND	1,146,495	1162	427
KY5P	1,051,352	1303	452
AC8W	798,391	926	401
AD10	791,436	1041	404
KF8H	778,104	1033	404
N7UU	677,691	947	279
K9MFI	672,702	849	382
KQ20	552,448	747	332
NO4R	191,540	462	244
KK9W	174,384	439	252
NG6P	145,848	391	206
KM8P	67,662	261	179
W3QHF	56,445	189	159

#### NORTH AMERICA

NP4A	4,208,050	2759	550
VC2HQ	2,263,510	1557	491
VE1DXA	2,207,645	1867	451
CZ3PCA	2,061,444	1583	462
VE3UOT	675,348	716	334

#### ASIA

JA9YBA	1,630,442	1462	407
JA3YKC	865,317	1003	323
JF1YPF	828,160	941	320
JA1YAD	533,984	913	328
HS5AID	293,259	741	201
JA1ZGP	227,360	528	203
JA6YDH	102,084	288	141

#### EUROPE

HG6V	2,925,664	2154	592
HG5A	2,750,490	2385	501
YU4EBL	2,659,112	2059	488
4U7ITU	2,608,815	2617	485
4N4Y	2,596,572	2238	498
G6UW	1,844,210	1988	446
GB2MM	1,717,612	1787	442
HA8KLE	1,468,257	1594	417

SM5GNU	1,427,391	1776	417
LZ2KIM	1,337,182	1489	418
HA6KNB	1,231,524	1578	362
HA9BVK/p	959,798	1350	358
HA5KFL	910,224	1161	344
OH1AF	795,108	1474	346
OK3KEE	737,016	1108	328
LA40	632,710	1172	314
LF2M	610,242	1196	303
HA3KNA	609,708	1039	298
OK2KWI	567,686	899	301
OK3VSI	536,007	920	303
OK3KEX	524,437	612	397
OZ7SCG	499,500	1254	270
Y32ZM	483,552	931	276
LG5LG	402,974	993	286
OK2KYC	333,822	704	246
HA8KAX	330,120	750	252
ID2UIY	303,456	656	218
OH9UW	148,478	528	187
OK3KFO	127,776	325	132
HA1KVL	60,711	274	141
SM5GMG	27,216	140	78
OK3KXR	25,760	133	115
Y06KNT	20,034	205	54
OK1KOK	19,716	151	93
HA5KFZ	16,686	144	81
OK1KPY	16,095	120	87
OK1KMP	14,580	155	81
OK10XP	12,518	99	72
OK3RMW	9,920	75	64
OK2KPS	9,632	80	56
OK3KJF	1,890	32	27
HA5KFV	1,127	27	23

UK3XAB	1,256,235	1645	445
UK5WBG	938,496	1217	384
UK3TAG	803,270	1169	334
UK2PAT	756,338	1160	341
UK2BCO	736,219	1044	341
UK2BCC	576,675	1154	275
UK4WAA	558,450	1031	306
UK5AAA	494,420	916	295
UK1AFA	489,024	1110	288
UK5IAI	414,426	764	289
UK5WBF	317,262	700	253
UK4HAL	206,912	521	112
UK5HAB	148,200	361	195
UK2ABM	145,112	403	194
UK3DBV	128,060	347	190
UK3DDE	82,080	329	135
UK2AAW	76,734	322	126
UK5OAR	37,296	206	126
UK1CIG	14,280	123	85
UK5PAA	10,695	98	69
UK3DAH	8,374	70	53
UK2AAP	6,110	58	47
UK2RAC	2,457	47	39
UK5UBE	1,908	68	36
UK2ABO	1,175	28	25

### MULTI-OPERATOR MULTI-TRANSMITTER WORLDWIDE

Y08A	5,283,935	4527	607
LZ7A	4,411,215	2774	549
JA3YBF	2,880,400	2198	475
Y24Z	2,783,205	3001	487
JA2YKA	2,780,910	2377	477
K4CG	2,679,846	1770	559
JA7YAA	2,099,772	1795	438
JF1ZRO	1,963,566	1724	422
K08M	1,831,890	1784	538
JA1YXP	1,348,286	1238	491
4N8SM	1,263,656	1604	382
JA2YEF	947,646	1068	327
WA8TBO	795,264	907	384
OH5TR	141,546	529	186
VE6ZT	220	10	10

**CHECK LOGS:** The following logs were used for cross-checking. Check logs & SWL logs are always appreciated. Thank you: HA2KME, HA7KPL, K6FM, KC40V, KV4AA, OK1TA, OK2BOB, OK3CAQ, SM7CZC, SM8CMH, UA1TCO, UA3AIF, UA3DAM, UA3DFV, UA3PBY, UA4HLX, UA9WFJ, UB5ECH, UB5EF, UB5JNW, UB5LIE, UB5QKN, UB5ZA, UK4PNZ, UO2GBR, VE1BYD, W1PM, W1WY, W2CJX, WB4VQO, W8IMZ, W8VSK, Y23BF, Y23LM, Y24EA, Y24SK/A, Y25TO, Y26WM/A, Y27KL, Y35TE, Y41ZM, Y46ZB/p, Y47YM, Y54ZA, Y58YF, Y62XG, Y66ZN.

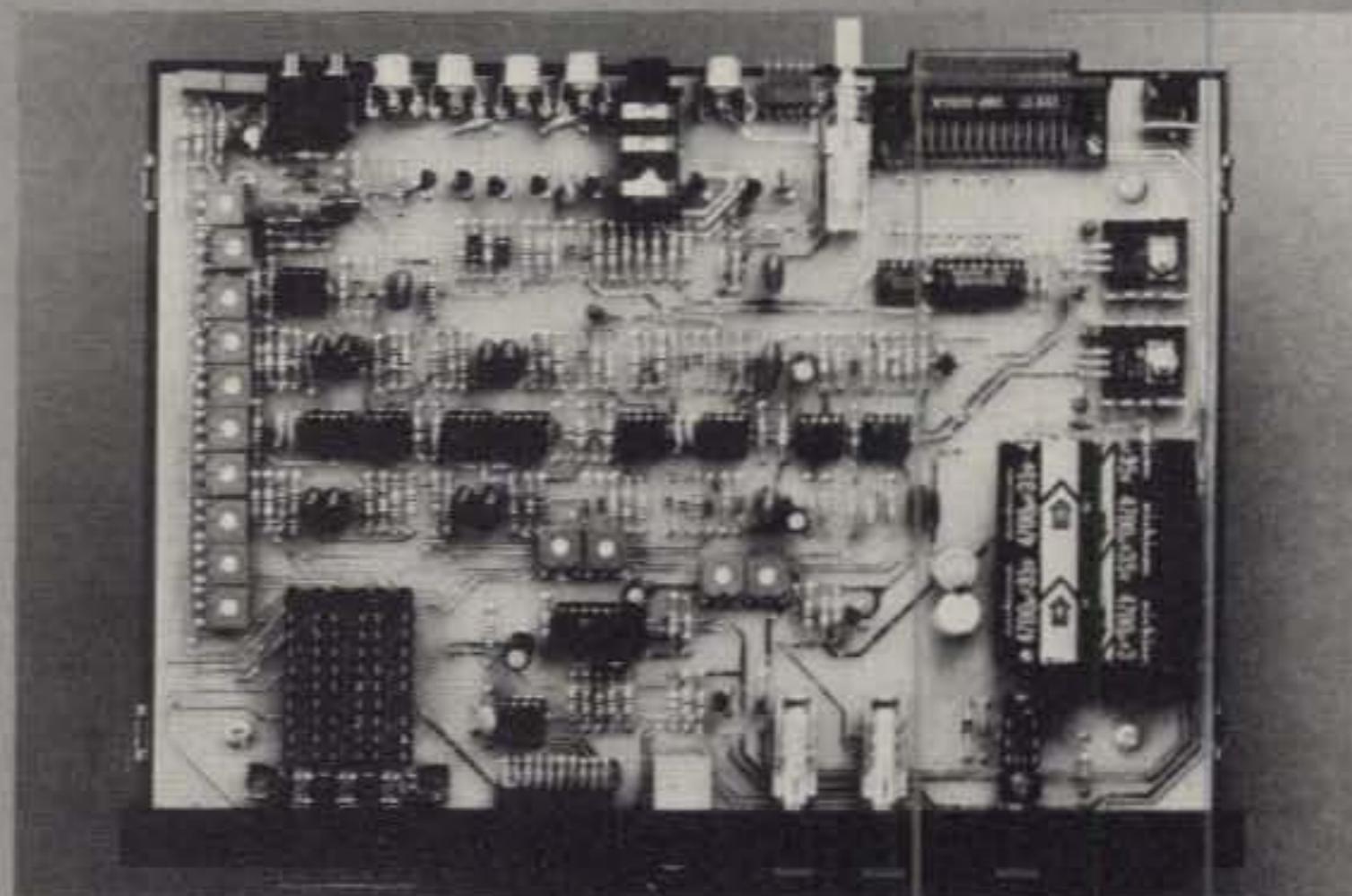


Like father like son. Curtis, OA8CW, is the QRPp certificate winner for Peru. His father, Paul, OA8V, has won top honors QRPping in past years. The snake? Oh yes, that's 2nd op. Arthur.



This FB shack and all those fabulous awards belong to H18LC.

# CHAMPAGNE RTTY/CW on a Beer Budget



## 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.



Please write AEA for more detailed information on the CP-1 or better yet, see your favorite dealer and compare.

Prices and specifications subject to change without notice or obligation.

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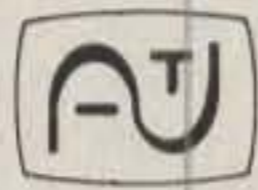
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FILMT XFMR: 5.0 VCT @ 30 AMP, 115/230 VAC Pri., 9.5 LBS.....	\$ 45.00
FILMT XFMR: 5.0 VCT @ 60 AMP, 110/220 VAC Pri., 13.4 LBS.....	\$ 85.00
FILMT XFMR: 7.5 VCT @ 21 AMP, 105/117 VAC Pri., 9.5 LBS.....	\$ 45.00
FILMT XFMR: 7.5 VCT @ 75 AMP, 115/230 VAC Pri., 20.2 LBS.....	\$115.00
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TC-1

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Connect to the antenna terminals of any TV set, add a good 450 MHz antenna, a camera and there you are... Show the shack, home movies, computer games, video tapes, etc.

### ATV DOWNCONVERTER

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TVC-4

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## The Heath IO-4235 Dual-Trace 35 MHz Oscilloscope

BY LEW McCOY\*, W1ICP

The Heath Model IO-4235 oscilloscope is a scope created for use in laboratories, for electronic development work, and "for serious experimenters, including amateurs." It is all of that and more. It is, without a doubt, one of the more advanced kits made by Heath. Over the years, this writer has had the opportunity to build many of the Heath products, including one of their computers, which in my opinion was one of their more complicated kits. The 4235 kit ranks in that category. However, let me hasten to add that any amateur with any reasonable soldering ability who can follow directions carefully can build one of these scopes.

When I received the kit, I was determined to take my time and do a thorough job. However, I guess I am typical of most people and was anxious to complete the unit and fire it up. Being retired, I could start in the morning and finish when I became fatigued. The overall project, for which I didn't keep an accurate time record, was something over 60 hours, not counting trouble-shooting. Trouble-shooting? My own doggone fault—I promised myself that I would take my time and didn't follow my own advice. I ended up with three—yes, just three—soldering and wiring errors. Fortunately, Heath must consider idiots like me, and they provided excellent trouble-shooting information which helped me to quickly (in about 8 hours) locate the mistakes and get the unit working as it should.

Like many of the more complex Heath kits, the project is completed in segments. One starts off in this case with the blanking board, completes it, and then proceeds through the other boards one at a time. This serves to break up the construction project into segments. As you can see from the photos, each subassembly is rather extensive, and it was with some feeling of insecurity that I mounted them to the main chassis. I was afraid they wouldn't line up with the panel or chassis, but my fears were groundless. Everything went together smoothly—and I do mean smoothly. The hardware lined up perfectly with the chassis holes. Holes for alignment to allow access to controls came out right on the nose. In other words, everything worked.

### Some Outstanding Features

Let's talk about some of the outstanding features of the Model IO-4235. It is a dual-trace oscilloscope with a 35 MHz bandwidth. Actually, while 35 MHz is the top rating, we could look at signals above 50 MHz. It has a fast vertical rise time of 10 nanoseconds, plus a 2 millivolt per centimeter sensitivity. Additionally, it features inverting input switches, algebraic add function, vertical delay lines, full X-Y operation with Z-axis control, and a TV coupling circuit for stable display of TV signals.

The vertical input response is rated at d.c. to 35 MHz (–3 dB) and the a.c. coupling from 1 Hz to 35 MHz. The rise time is less than 10 nS. A delay line provides a display of at least 20 nS of pretriggered waveform. Also, the input has an attenuator network that provides each of the two channels with 12 calibrated ranges, from 2 millivolts/centimeter to 10 volts/centimeter. When an input signal is fed into the Y1 input, for exam-



Here is the completed scope ready for action. It makes a nice, neat package. I might add that it is much more portable than the war-surplus clunker I had (weight about 100-plus pounds) and much, much more efficient.

ple, the signal is fed to the attenuator network, which is made up of two sections. One is a divide-by-one and the other is a divide-by-one-hundred. The divide-by-one is used on the six most sensitive ranges, while the divide-by-one-hundred is used on the six least sensitive ranges.

The input is protected against high voltage and is rated for 400 volts peak, combined a.c. and d.c. The input impedance is 1 megohm shunted by 30 pF (the latter also depends on the probe capacitance in use).

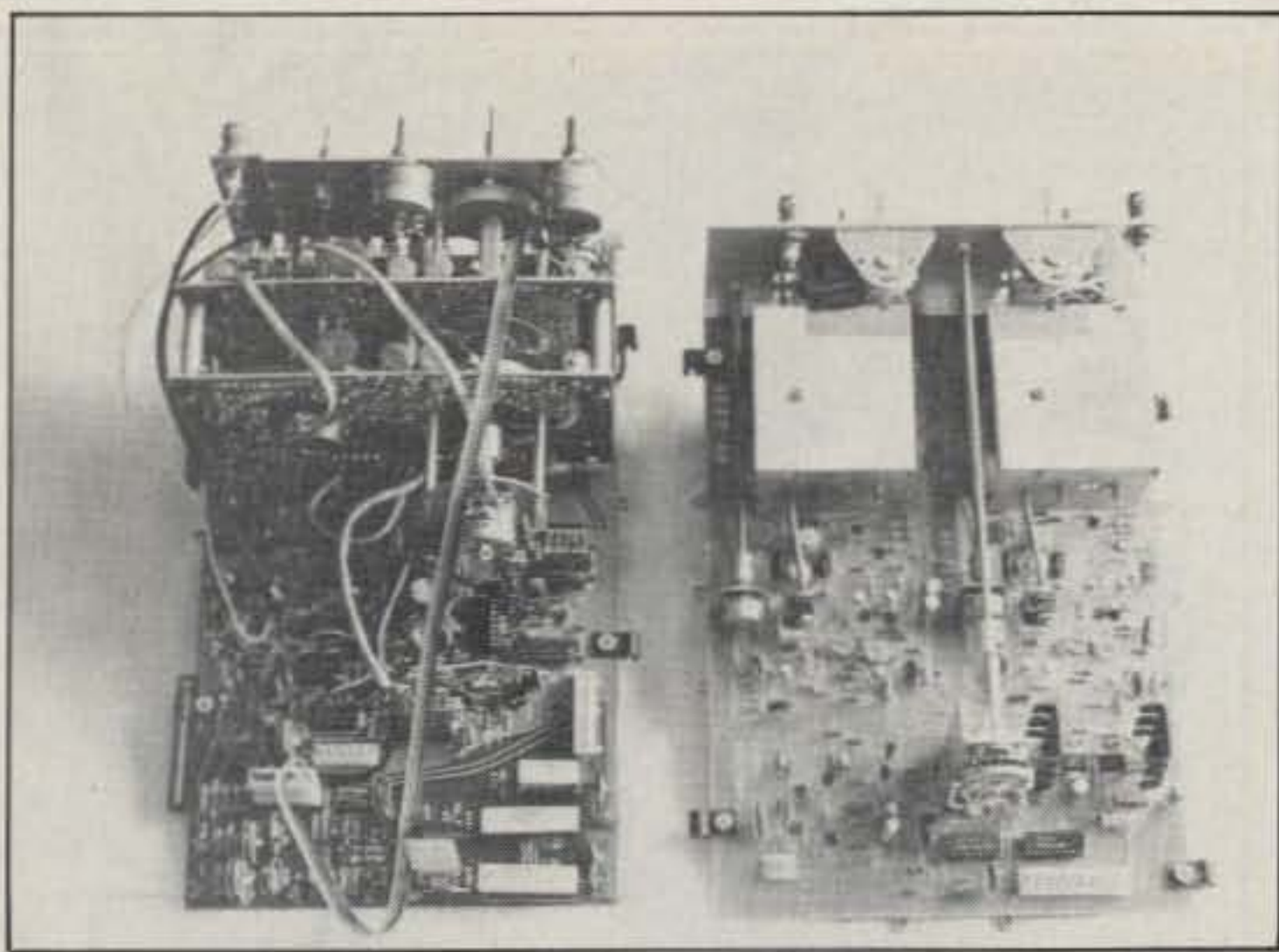
Either or both inputs can be inverted by the pull-to-invert switches. This complements the **Add** function, which displays the resultant waveform after both input signals have been added together algebraically.

The internal vertical delay lines ensure that the horizontal sweep starts before the beginning of the vertical signal. Thus, the complete vertical waveform will be displayed. Because the amplifier rise time is 10 nanoseconds, very fast rise time signals can faithfully be reproduced.

Calibrated horizontal time-base ranges from 0.2 seconds per centimeter to 50 nanoseconds per centimeter are easily switched in a 1-, 2-, 5-step sequence. Additionally, any sweep speed can be expanded five times when a  $\times 5$  switch is pulled out. Delayed sweep is also available (a more sophisticated way of expanding the sweep speed). It allows you to first select the exact portion of the waveform you want expanded, and then it expands the waveform by the factor you select.

Also, the **Trigger Select** switch and **Level** control allow the time base to be precisely triggered at any point along the positive or negative slope of the trigger signal. Other **Trigger-Mode** switches control the trigger input bandpass, cutting off unwanted low frequency trigger signals and triggering only on fast a.c. signals. Also, **Auto** and **Norm** switches are provided which can automatically display a baseline on the screen when there is no trigger signal.

\*200 Idaho St., Silver City, NM 88061



At the right is the vertical preamplifier board assembly prior to installing it on the chassis. Note the "hinge" assembly on the sides. This hinging arrangement simplifies trouble-shooting without having to "unwire" a lot of connections. On the left are the horizontal circuits, triggering, etc. As with many Heath projects, these boards, once you assemble them, have test procedures to follow before installing them on the main chassis.

A calibrated 1-volt peak-to-peak square-wave signal is provided through a front-panel connector. Also, rear-panel switches match the a.c. line from 100 to 280 volts.

The front panel presents an extremely well thought-out appearance and is completely functional in that all switches and controls are easily accessed and operated. At the front upper left are the **Intensity**, **Focus**, and **Power On/Off** controls. Below them and under the CRT are the two vertical inputs via BNC fittings, **Y1** and **Y2** inputs. There is a complete set of switches for each channel. A **Position** control is for positioning the signal; there is an **Invert** switch for inverting the signal. Also, there is the **Volts/CM** and **Variable** switch plus an **AC-GND-DC** toggle. All these switches are duplicated for the **Y2** channel. Additionally, there is a five-position **Vertical Display** switch, **Y1**, **Y2**, **Chop**, **Alt**, and **Add**. These controls are positioned from the center of the panel to the left.

At the right is the row of push-button switches. The top of this row labelled the **Horizontal Display** has **A**, **A Int by B**, **B Delayed**, **X-Y**, and **Ext Horiz**. Below these are the **Trigger Mode** switches, **Auto**, **Norm**, **Single**, and **Reset**. The bottom row is **Trig Coupling** and has **DC**, **AC**, **AC Fast**, and **TV**. Back at the top of the panel are the **Delay Time Position** control and the **Horizontal Position** (with  $\times 5$ ). Below

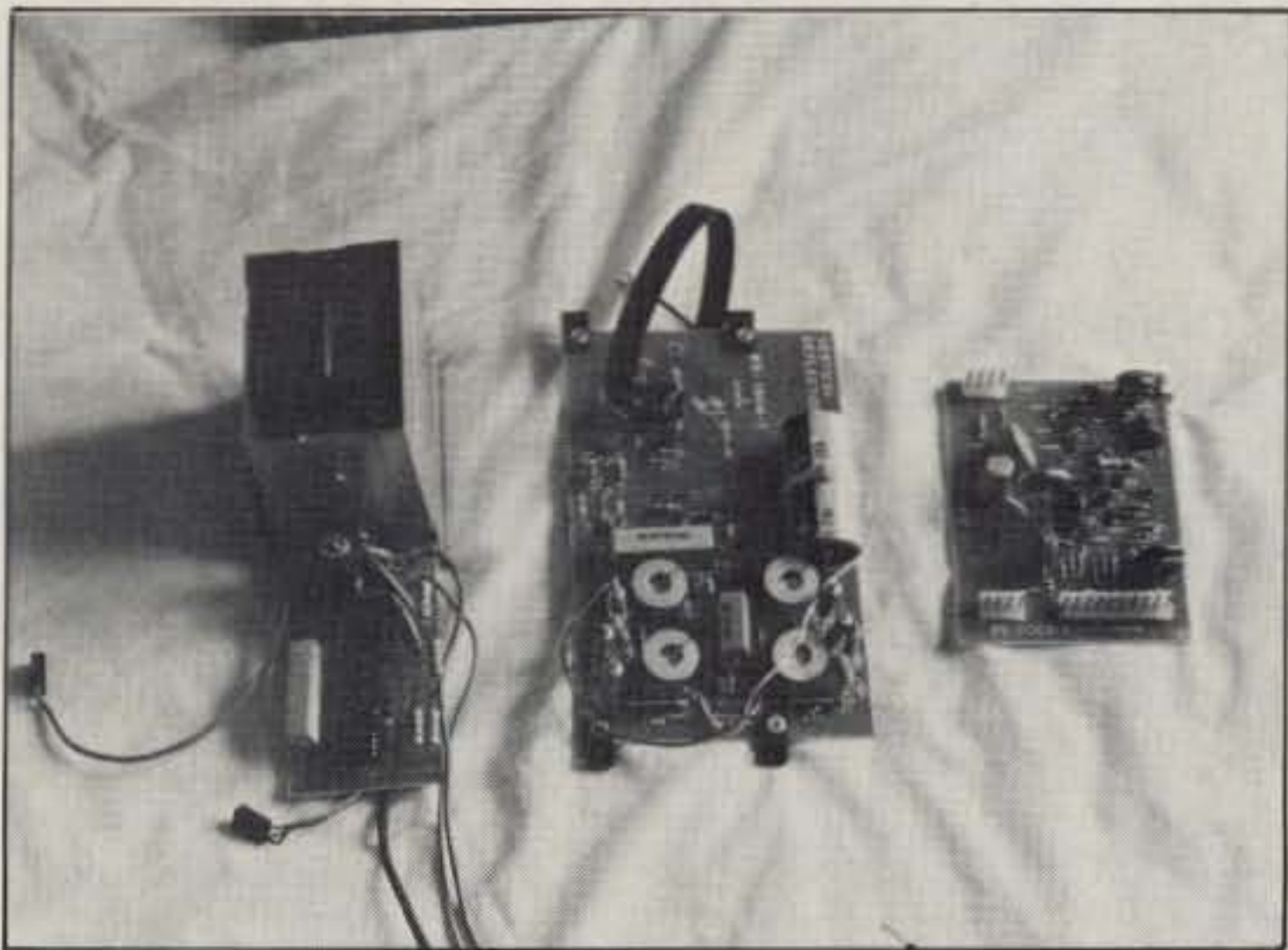
those controls are the **A** and **B Time/CM** and **Variable**, and to the left, the **Hold Off** control. Just below is the **Trigger Select Level**, and at the bottom are the **External Horizontal** input (BNC) and **External Trigger** (BNC). Between two inputs is the source pin for a **Calibrate 1V (P=P)** square-wave signal. The scope is, of course, completely solid-state with the exception of the cathode-ray tube. The CRT is a P31 phosphor with an 8  $\times$  10 centimeter mesh with internal graticule.

The completed 4235 scope weighs 30 pounds and measures 7 $\frac{3}{4}$  inches high, 13 $\frac{3}{4}$  inches wide, and 19 $\frac{3}{4}$  inches deep with the handle folded. The handle serves two functions: one for carrying the scope and the other as a stand to provide an easy viewing angle of the face. The cabinet is painted light blue, and the case has plenty of ventilation. Power requirements are anything from 100 to 280 volts a.c. and 85 watts (at 117 volts).

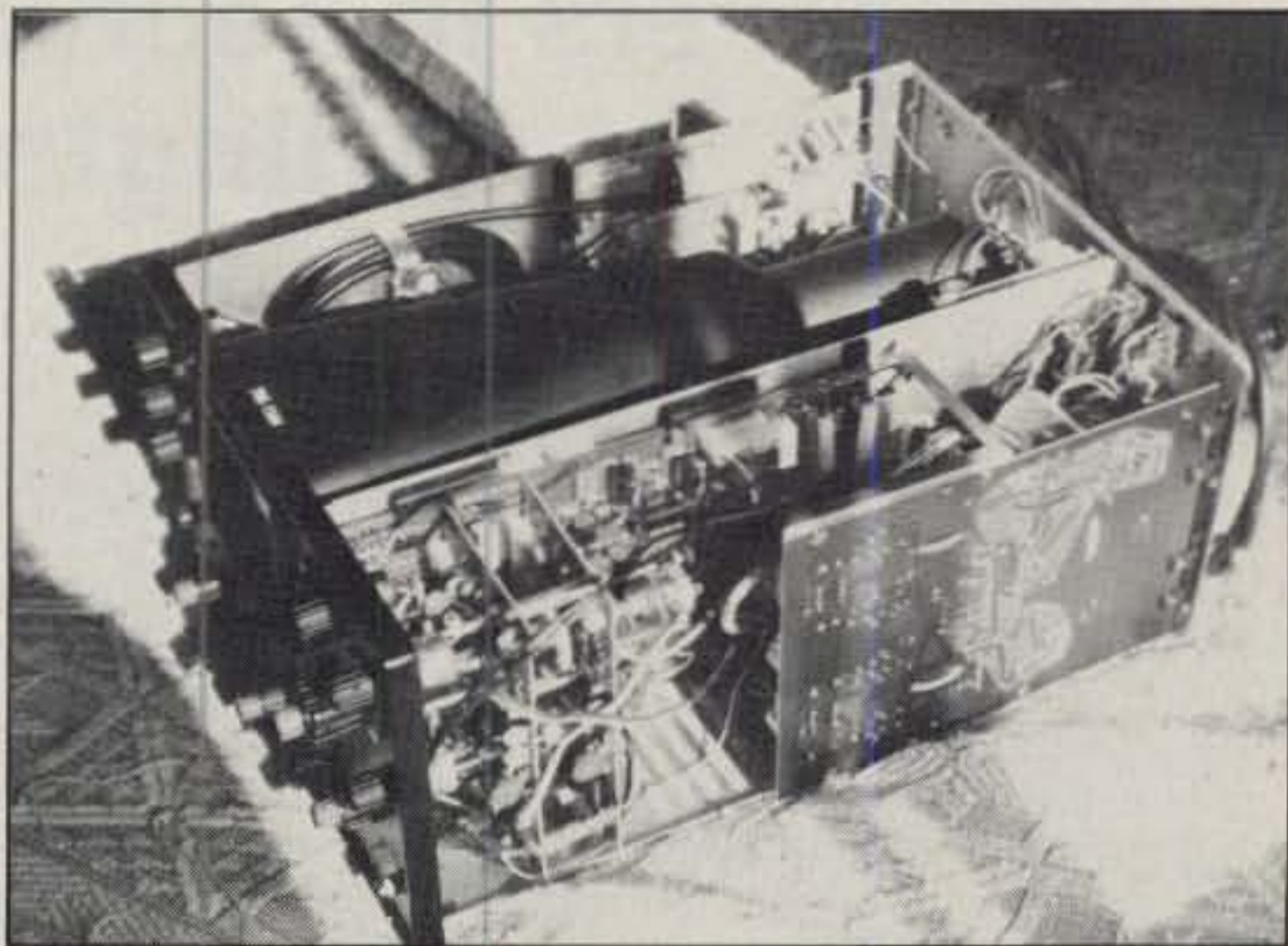
Some of my conclusions are that this is an extremely fine-quality oscilloscope, and one way to acquire an excellent instrument at a lower than normal cost is by building it yourself. The Heath instruction manual is as usual very, very good. In fact, this unit has two manuals, one for construction and the other for adjustments and operating information. One thing building his scope brings to mind is the excellent quality control on components at Heath. There are well over 700 parts in this scope, and if even a one percent error were permitted by Heath, it would mean seven faulty components. It says much for their control that they had zero errors. It is also amazing that their component count is always so accurate. A couple of times I cursed because I thought they had left out a diode or resistor. Not so. The parts always showed up! As I stated earlier, I made three wiring errors which I quickly found through the trouble-shooting information.

I have used the scope to trouble-shoot computer boards, receiver alignment, transmitter work, and, believe it or not, the Heathkit digital scale which I got my wife for Christmas. While this has nothing to do with the scope, I probably had more trouble with the Heath scale than with any other Heath project. Again, it was not their fault. The supreme ego of an experienced kit builder was taken down several pegs by that kit. I figured I could do the job in an afternoon (I did). After all, what could be complicated about a simple circuit board? I failed to read one or two steps correctly and had the indicating LED's in wrong. The Heath scope found the trouble; the trouble-shooting took at least twice as long as building the kit. The moral is really simple: no matter how experienced you are, be doggone sure to read each step carefully, no matter how simple it is.

In conclusion, if you are an amateur who likes to build and experiment, I would give the Heath dual-trace Model IO-4235 oscilloscope the highest of ratings as a necessary instrument for your shack. □



At the left is the high-voltage circuit board, in the center is the vertical deflection board, and at the right is the blanking circuit board.



This top view of the completed kit shows the layout of the various boards as installed on the chassis. As mentioned in the text, everything goes together very nicely.

Dr. Gary Garriott, WA9FMQ.



**Exclusive CQ Interview With:**

*VITA Executive Director Henry Norman.*

# **Mr. Henry R. Norman**

## **Executive Director and**

# **Dr. Gary Garriott, WA9FMQ**

## **Senior Technical Advisor**

# **Volunteers In Technical Assistance (VITA)**

## **Arlington, Virginia**

**BY DR. THEODORE J. COHEN\*, N4XX**

Mr. Henry R. Norman and Dr. Gary Garriott, WA9FMQ, work for Volunteers in Technical Assistance (VITA). VITA, located in Arlington, Virginia, is a private, non-profit organization that provides technical assistance to people and groups in developing countries. It is developing a program to use amateur radio and a low-earth-orbit satellite to permit the communication of technical information to

and from developing countries quickly and cheaply.

VITA has major projects in a number of developing countries, such as Thailand, Upper Volta, Djibouti, Mexico, and Honduras. It has expanded greatly in recent years, and is one of the world's leading private development groups.

Henry has been the executive director since 1978, administering a staff of about 60 and a worldwide network of more than 4,000 "VITA Volunteers." He helps bring the skills of these scientists, engineers, and others to serve people in some of the

world's poorest places. His work often takes him to developing areas; his most recent visits include China, Indonesia, West Africa, Somalia, and the Caribbean.

Henry has long experience in international development. He was the chief of party for a rural primary health project in Afghanistan (before the Soviets invaded), and the director of the Peace Corps program in the West African nation of Guinea. He also was the executive director for a major health consortium throughout the state of Maryland, a consultant to the United Auto Workers Union, and a pri-

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**VITA is a nonprofit, private, voluntary organization which helps to improve the lives of people in developing countries through the application of technology.**

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**CQ:** Henry, what is VITA?

**Norman:** VITA stands for Volunteers in Technical Assistance. It's a nonprofit, private, voluntary organization which helps to improve the lives of people in developing countries through the application of technologies which are environmentally benign, economically sustainable, and culturally acceptable.

**CQ:** Tell me a little about the history of VITA.

**Norman:** Well, Ted, it was started in 1959 by a group of scientists and engineers at the General Electric Laboratory in Schenectady, New York. They got together, and offered to use their skills and spare time to answer technical inquiries from people in developing countries. For example, someone might write in and ask them how to adapt a flashlight to show health filmstrips, how to use mylar film to build a solar-powered oven, or how to grow new crops. These original "VITA Volunteers" would find the answer and reply. Eventually, they also began to publish "how-to" manuals, run projects, and provide other services.

By the way, many of the members who started VITA continue to serve as volunteers. Several of them are still members of the board of directors. The entire effort was completely voluntary for several years until it simply got to be too much of a burden. The number of inquiries just kept increasing—there have been more than 42,000. These first volunteers therefore had to hire a paid staff.

**CQ:** Is this kind of sharing of technical information still an important part of VITA's mission?

**Norman:** Absolutely! We conducted a worldwide survey three or four years ago. The universal conclusion was that there were three essential elements to encouraging development. One was technical information; not just simply documentation, but also information about the experiences people in other countries have had under similar circumstances. The second requirement was technical assistance. Often, somebody expert in both the country's circumstances and the technology itself needs to go to the country and help people develop a prototype, iron out the bugs, and adapt things to local conditions. The third requirement was the availability of small amounts of money that could be given quickly and flexibly according to simple criteria.

**CQ:** Where does VITA obtain its funding?

**Norman:** That has changed through the years. Originally, it was all from dues. There was some fund-raising for small sums of money here and there, but VITA didn't need much when it was a purely voluntary organization. However, as it became bigger and better known, and as costs escalated, VITA had to raise money in a variety of ways.

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**VITA's money comes from contracts that are carried out for development agencies such as the United States Agency for International Development (USAID), the United Nations agencies, and the World Bank.**

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**CQ:** Could you be more specific?

**Norman:** A great deal of our money comes from contracts that we carry out for development agencies such as the United States Agency for International Development (USAID), the United Nations agencies, the World Bank, and other agencies of that kind, as well as from some of the development banks around the world. We

also have gotten very generous support from multi-national corporations such as IBM Europe, Exxon, General Electric, Conoco, Mobil Oil, and others.

**CQ:** How many people are on VITA's staff, Henry, and what types of backgrounds do they have?

**Norman:** Well, we have about 60 people on our staff, including engineers, agricultural people, experts in wind energy, experts in woodstoves, and so on. The staff is supplemented by over 4,000 VITA Volunteers in 100 countries around the world who are on a computerized data bank. We draw on them when we need backup skills or consultants. This provides us with immediate access to a vast reservoir of people throughout the world who have very high levels of skill in a variety of areas.

**CQ:** Do you carry on any research and development efforts in your headquarters or in the U.S.?

**Norman:** We generally prefer to carry on our research activities overseas. We use organizations in developing countries and encourage the development of an indigenous research capacity so that the ultimate result is better adapted to local conditions. We can help adapt the results later to other countries. Within the United States, we do have VITA Volunteers doing research.

**CQ:** How about some examples.

**Norman:** Okay. Volunteers from Sperry New Holland in Pennsylvania, and from General Electric in Schenectady, New York, are working on a variable-stroke windmill. This is an implement to vary the stroke of a water-pumping windmill according to the intensity of the wind. It will spare a lot of wear and tear on the windmill, and give the maximum efficiency possible under different conditions. That's important in developing countries, where running water often is scarce and fossil fuels are expensive.

**CQ:** Can you give me some examples of current VITA projects and activities?

**Norman:** The largest program we have ever had was a renewable energy pro-

vate attorney in Syracuse, New York. Henry lives in Kensington, Maryland, with his wife and daughter.

Gary is a senior technical advisor currently coordinating microcomputer initiatives for VITA. He has been with VITA since 1980, working primarily in the areas of renewable energy and microelectronics. Like Henry, Gary often travels to the developing world to assist on VITA projects. Most recently, he visited Central America, the Caribbean, Ecuador, the South Pacific, Thailand, and the Philippines. Gary worked closely with "VITA Vol-

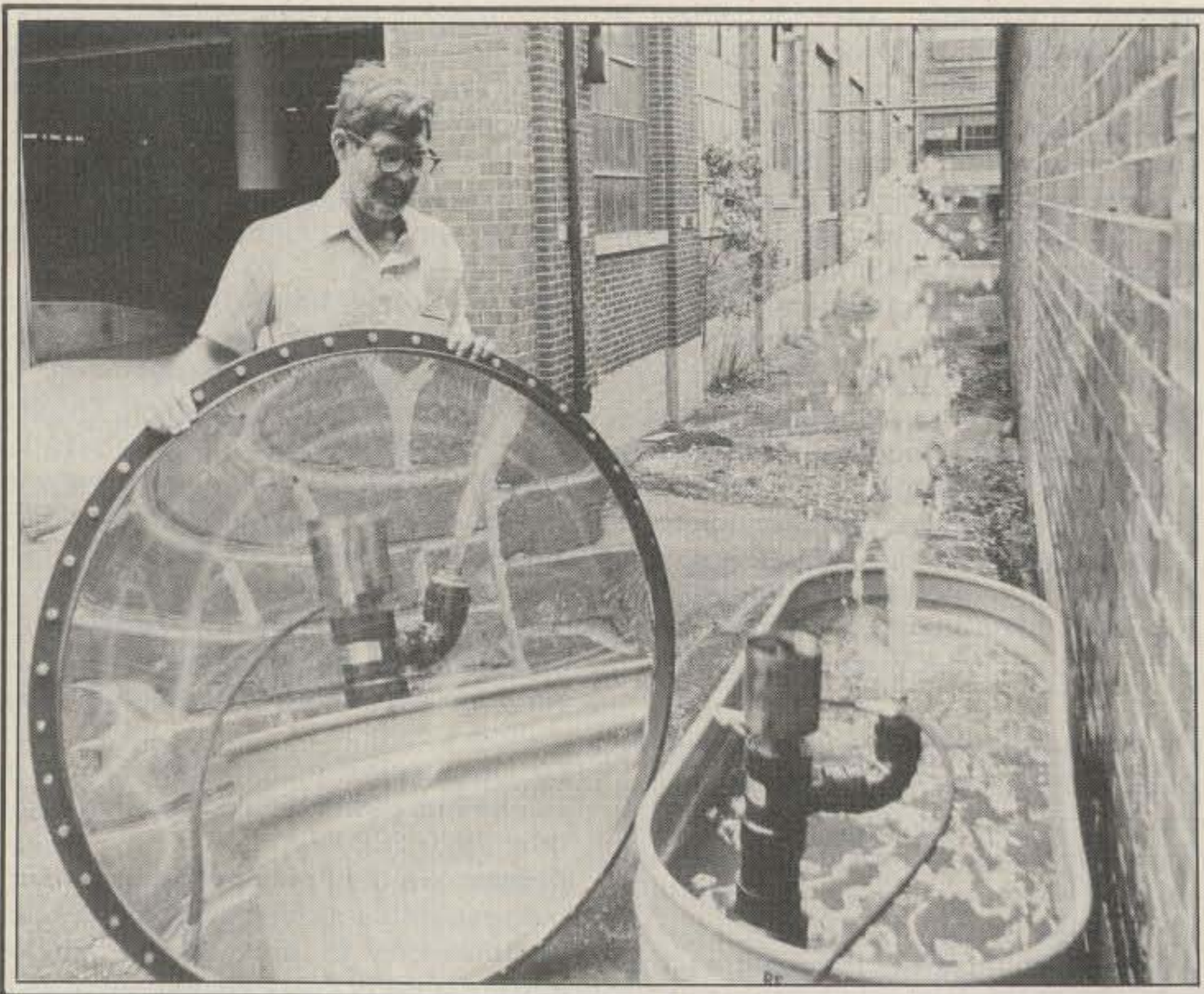
unteer" Copthorne MacDonald, VE1BFL, to establish a radio net among VITA Volunteer and other hams. He also has appeared frequently as a guest on the Voice of America "Breakfast Show," and coordinated teleconferences on renewable energy subjects over NASA's ATS-1 satellite to the South Pacific.

Before joining VITA, Gary managed an educational radio broadcast project in Nicaragua. He was a Peace Corps Volunteer in Ecuador for four years, working on hydroelectric and communications projects. While in Ecuador, he and John

Lund, K9YBC, led a DXpedition to the Galapagos Islands as HC8GG.

Gary has been a licensed radio amateur for 20 years and has a First Class Commercial Radiotelephone Operator's license. He holds a Ph.D. in social technology, as well as degrees in environmental arts and sciences, and electrical engineering. He lives with his wife and two sons in Manassas, Virginia.

We now take great pleasure in presenting this exclusive CQ interview with Mr. Henry Norman and Dr. Gary Garriott, WA9FMQ, of VITA.



VITA Volunteer William Beale developed this solar-powered photovoltaic pump to provide water for irrigation and domestic use in arid developing countries.

gram funded by USAID. This was a \$10 million program over five years which provided VITA with the means to develop, improve, and disseminate renewable energy technologies around the world. VITA also was able to fund a number of activities in developing countries, encouraging research and developing renewable energy businesses and industries.

In addition, VITA is deeply involved in low-cost housing, water resources projects, agriculture, economical wood-burning cookstoves, efficient charcoal production, and a major wind energy effort. It has projects in several countries, and has answered inquiries from more than 100.

**CQ:** Gary, what about VITA projects dealing with electronic communications?

**Garriott:** We've had a number of activities. For example, we have been working with the Voice of America for a couple of years to broadcast information about different projects or useful technologies. As a result, we have received hundreds of technical inquiries from listeners around the world. We have also done about 20 teleconferences using audio channels on the ATS I satellite, which the PEACESAT group has used as a public service for the South Pacific community. These conferences have been on a number of renewable energy topics ranging from micro-hydro power to fuel-efficient woodstoves. We also have an amateur radio station which we have used for weekly meetings of VITA Volunteers and others who are hams.

**CQ:** We're starting to hear a lot about something called PACSAT. What is it?

**Garriott:** PACSAT is a new concept for the

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**PACSAT is a new concept for the Amateur service. . . . it involves placing in orbit a low-earth-orbit satellite which has a digital communications capability and a store-and-forwarding capability.**

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Amateur service. It involves placing in orbit a low-earth-orbit satellite which has a digital communications capability and a store-and-forwarding capability. You can think of it in terms of a flying mailbox. This satellite, being in a polar orbit, would cross every point on the earth at least twice a day. Therefore, messages could be sent up, brought around to the other side of the world, and beamed back down. Reliable communication could be maintained around the world.

**CQ:** Why is that important to developing countries?

**Norman:** Ted, we go to tremendous effort and expense to make our responses to inquiries as quickly as possible. We take enormous pride in the fact that when we get a letter requesting information, we can turn it around in a matter of days, sometimes even within hours. The problem is that it may have taken a month to get the letter to us through the international mail, and our response may take a month or two to get back to the requester. On occasion it is simply lost in the mail. With PACSAT, we would receive an in-

quiry on the very same day that it is sent. We would be able to turn the information around within a day or two, a week at the latest. This would be a tremendous boon. If you're in the middle of something, and you're stuck and have to wait three or four months to get the information you need to continue, there's a strong possibility that you'll lose interest. Other things intervene, and the project simply gets forgotten.

**Garriott:** Let me add something to that, Ted. We've also had problems with our teleconferences. To create a useful schedule in Fiji, for example, VITA Volunteers and staff in this country had to be up at 2:00 a.m. or 3:00 a.m. Scheduling is a great problem. If you don't have to be at the other end of a communication in order to receive the message, that can be very beneficial.

**CQ:** How will PACSAT be developed?

**Garriott:** Right now we're in the process of formalizing a relationship with the Radio Amateur Satellite Corp., better known as AMSAT. AMSAT will be undertaking the major share of the ground and space segment support. It will use its considerable expertise to develop the satellite from the design all the way through the launch. VITA will look for the major funding and will set up demonstration sites in different places around the world, concentrating on developing countries.

**CQ:** Where is the PACSAT work going to be accomplished?

**Garriott:** That's under consideration. Right now, AMSAT has contacts with people in 15 different countries who have supported past amateur radio satellite efforts. They certainly will be going back to some of them for this activity as well. All of that is being finalized at this time.

**CQ:** How about construction of the satellite? Who's going to do that?

**Garriott:** That work is going to be dished out to people who have various levels of expertise and facilities. To my knowledge, all those arrangements have not yet been made, but we expect that the major portion will be carried out by amateur groups in the United States, Canada, and Europe.

**Norman:** PACSAT is very inexpensive in relative terms. It's not nickels and dimes by any means, but it's much cheaper than a satellite in geostationary orbit. It will cost only about a half-million dollars from design to launch because almost everything is donated or volunteered. We probably will hitch a ride on a rocket that will be launching another satellite. Many of the expenses of putting up a satellite will be avoided.

**CQ:** Gary, when do you anticipate PACSAT will be placed in orbit?

**Garriott:** There is a launch opportunity in 1984. More likely, it will be early- to

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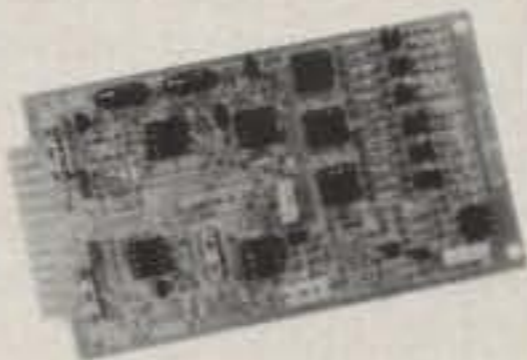
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**There is a launch opportunity for PACSAT in 1984; more likely, however, it will be early- to mid-1985 before it's in orbit.**

mid-1985. Again, it will be a polar orbit, sun-synchronized. This means that the satellite will appear at the same time every day to people on the earth.

**CQ:** Once in orbit, what will be the satellite's capabilities?

**Garriott:** Let me explain how we plan to use it. As Henry said, VITA often sends out pages and pages of technical documentation to provide tailored technical requests. With the satellite, we might be able to send out about 1,400 pages of material on a daily basis to regional centers and remote sites. Using facsimile methods, we could send whole documents, which is important to our operation. I should also mention that in addition to the VITA repeater part of this, there will be an additional repeater available just for amateur radio communication.

**CQ:** Besides this particular VITA program, what other applications for low-orbit earth satellites are there for people in developing countries?

**Norman:** Because the ground station would be so inexpensive, governments could build them in remote areas. This would improve communications enormously. Governments could avoid the expense of stringing ground communications to these places. Using the low-earth orbit satellite, they would be able to get news of disasters and move quickly. There also are a tremendous number of possible health and emergency uses. It becomes possible to leapfrog over all of



*VITA Volunteer forestry expert Jeff Wartluft, right, is helping the Caribbean island of Montserrat to develop improved cookstoves to burn charcoal and other fuels. VITA Volunteers provide technical assistance to developing countries both by mail and on-site.*

the communications infrastructure that is normally necessary to communicate with the far areas of the country.

**CQ:** Are there any other VITA activities that involve the amateur services? If so, can you tell us about them?

**Garriott:** Well, as I mentioned earlier, we have for a couple of years now maintained a weekly schedule of VITA Volunteers who are hams. We use the h.f. bands, with most of the work on 40 meters. In fact, some of the concepts that are now being developed for PACSAT were first discussed on the ham network.

In addition, VITA is thinking about participating in a demonstration of amateur radio and solar energy during the coming Field Day activities in June. The State Department radio club is making arrangements to set it all up on the Mall down here in Washington, D.C. between the Capitol and the Washington Monument. We will demonstrate amateur radio's capabilities and possibly try to conduct some satellite communication with OSCAR 8, which is already up there, or with the new PHASE IIIB satellite, which, we hope, will be launched by that time.

**CQ:** Gary, let's talk a bit about amateur radio. Are you on the air? If so, what are your favorite bands, modes, and activities?

**Garriott:** Well, we do have a VITA amateur radio station which is set up at my house. Unfortunately, because of a recent move, I haven't been able to get the antennas back up in the air. But I normally operate single-sideband on the h.f. frequencies. I also enjoy a lot of c.w., and I've got a 2-meter capability. I hope to introduce 2 meters at work so my lunch hours will be less of a drag.

**CQ:** How did you get interested in ham radio?

**Garriott:** I've been a ham since my high school days. I think the international appeal of it was what got me interested in it originally. It's always stayed with me. I've done a lot of operating from overseas positions, such as in Ecuador and Nicaragua, for a total of five years. In Ecuador, I was a Peace Corps Volunteer in a little village out in the middle of the jungle. Communication was very difficult, and ham radio came to our rescue quite frequently. We used it for emergency communication, such as for getting blood out to give kids transfusions. In Nicaragua, I was working on an educational radio project. We depended heavily on amateur radio just to keep administrative coordination going. We also enjoyed the hobby.

**CQ:** By the way, I can't help but notice that you have the same last name as Dr. Owen K. Garriott, Jr., the first astronaut in space with an amateur radio license. Any relation?

**Garriott:** Owen's a distant cousin. As you know, he went up in Skylab II in his capa-



*Voice of America Breakfast Show host R. Philip Irwin, left, interviews VITA Volunteer Dr. Timothy Wood about developing and testing fuel-efficient cookstoves to conserve firewood supplies in West Africa. Show is broadcast worldwide.*

city as a high-altitude physicist. He's scheduled for the shuttle later this year, and may carry a portable 2-meter transceiver to make contact with hams. Owen assisted me when I was doing research in graduate school on fuel cells.

**CQ:** What other VITA staff members and volunteers are involved in ham radio and with these other operations?

**Garriott:** We don't have any other staff person at this time who is a ham, even though some have held licenses in the past. However, we do have about 40-45 VITA Volunteers who are amateurs. Many of them have checked into our weekly net from time to time. So, we do have an active interest in ham radio as an organization. If and when we get PACSAT up in the air, with a base station located here at VITA, I think we'll see a lot more activity right here among the staff.

**CQ:** If any of our readers wanted to work with VITA, how would they go about joining?

**Norman:** It's very easy. They should simply write a letter to VITA indicating their desire to volunteer. We will send them a volunteer form, which includes a breakdown of the various skills they have. Even some skills they didn't realize they had will come out in the way the questions are posed. When we receive the form, it goes into our computerized data bank.

**CQ:** I guess that just about does it. Any final comments?

**Garriott:** I have one. I'd just like to say that it's been a pleasure talking to CQ. I have subscribed to CQ for many years, and have always enjoyed the magazine.

**CQ:** Thank you, Gary! And on behalf of the CQ staff, let me wish you and Henry all the best on your projects. □



# MICROLOG

INNOVATORS IN DIGITAL COMMUNICATION

## AMATEUR RADIO COMMUNICATION AT ITS FINEST



### Both Systems Provide

You won't find as much well thought out programming, circuitry, and features anywhere, at any price! The ATR-6800 combines the best of both worlds, an easy to use video system for CW/RTTY/SSTV with automatic station control and a stand-alone computer with expandable memory & full instruction set in Motorola assembly language. Add the BASIC language option package and you'll have the unique combination of an RFI proof computer and ultimate RTTY/CW HAM station. And don't forget "easy to use." All of us at Microlog are RADIO ACTIVE on RTTY, so there's a lot of personal attention to detail and ease of operation. "Stick-on" command listing and video status display will get you on the air quick and sounding like a pro.

- SIMPLE DIRECT CONNECTION to your Transceiver.
- COMPLETE SYSTEM, built-in Demodulator & AFSK Modulator with keyboard programmable tone pairs.
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- LARGE, TYPE AHEAD text buffer.
- TEN, programmable message memories, plus ID's WRU & SELCALs.
- RANDOM CODE generator & hand key input for practice.
- Baudot 60 to 132 WPM.
- ASCII 110 & 300 baud.
- SYNC-LOCK MODE for improved ASCII operation.
- RECORDER INTERFACE FOR "BRAG-TAPE" or recording off-the-air.
- CODE CONVERTED Printer output in Baudot or ASCII.
- SSTV/GRAPHICS transmit.
- FULL 63 KEY Computer grade keyboard.

There's a certain thrill to using efficient, reliable digital communications equipment on the air. That's the fun of RTTY. Spice up your Amateur Radio operation with the silent video system that does it all, the Microlog ACT-1. Even if you own a home computer and are considering an out-board interface/program, remember, we've put it all in one RFI tight enclosure that's ready to go as soon as you power up. And, with the "Battery-backed" mem-

ory option, you won't even lose your pre-programmed messages if there's a "blink" in the A.C. The ACT-1 has features that the competition doesn't even have on the drawing board! Check for yourself, you could spend a lot more and still come up short.

**ATR-6800 vs ACT-1** The most often asked question we hear is "What's the difference between the ATR & the ACT-1?" The ACT-1 is a dedicated system for RTTY/CW/SSTV. It provides all the functions and features you need for a multi-mode station. Along with this superior "ON-the-AIR" performance, the ATR-6800 extends your operation into the realm of automatic station control and computer programming. Plug-in applications modules expand the ATR's memory to add new HAM oriented programs which are enabled by simple keyboard commands. By adding the BASIC option package, you'll have pre-programmed full community mailbox, contest dupe sheet, personal station log, message editor, BASIC computer language and 16k of battery-backed (non-volatile) memory. We also provide a subroutine list so that you can write programs to directly control the ATR-6800 in easy to use BASIC language. The ATR-6800 then is the expandable, "do everything" system where your imagination is the only limit! The ACT-1 is designed for the HAM who needs the essentials of a complete video system for digital communications.

## TECHNICAL SPECIFICATIONS ATR-6800 & ACT-1

**INPUTS**  
Speaker Audio 100mv min.  
Digital TTL, Keyer, Hand Key  
\*RS232 ± 12V, 330 Ohm Source

**OUTPUT TO TRANSMITTER FOR CW/RTTY/SSTV**  
- Voltage Keying + 40VDC @ 300ma Max.  
- Voltage Keying -150VDC @ 50ma Max.  
\*Mercury Relay 200VDC or 2 amp (20VA Max.) N.O. & N.C.  
\*Relay Change Over ATR — Relay ± 30V @ 2 amp N.O. & N.C.  
ACT-1 — Transistor +12VDC @ 300 ma. GND on XMT

**FSK Tones, Range** Keyboard Programmable 500 Hz to 3000 Hz  
**FSK Tones, Level** Mic Compatible 30-50mv Audio  
**Low Scan** Mic Compatible Audio. Sync 1200 Hz, Black-1500 Hz, White-2300 Hz

**MISCELLANEOUS CONNECTIONS**  
S 232 ± 12VDC, 330 Ohm Source Impedance, Negative Mark  
Printer Driver ATR — • Hi-speed RS-232 upto 2400 Baud  
• Slo-speed Baudot & ASCII Floating Relay for Current Loop Switching  
ACT-1 — • Slo-speed Baudot & ASCII Transistor Switch + 40VDC @ 100 ma.  
• Optional Hi-speed ASCII RS232 @ 2400 Baud.

**Recorder** Mike = 100 mv Audio  
**"Brag Tape" Scope** Speaker = 200 mv Audio  
Horizontal and Vertical Outputs to Scope for RTTY  
Tuning Aid  
**Auto Speed Tracking** Automatic or Speed Lock

**VIDEO OUTPUT**  
Volt Peak to Peak, Negative Sync Composite Video (American Standard)  
European standard available upon request.

**VIDEO FORMAT**  
Normal 24 lines, 40 characters per line  
Eom 12 lines, 20 characters per line  
Back on White or Keyboard selectable  
White on Black Any location Line 0 (Off) to Line 20, Keyboard selectable  
Display Split Screen  
**SSTV** 3 lines, 6 characters per line + graphics

**TEST MESSAGES:** Quick Brown Fox and RYRY's in Baudot, U"U" in ASCII, /V in Morse.

**SYNC:** Transmits "Blank-Fill" in RTTY and BT in Morse when Text Buffer is empty and unit is in transmit. Keyboard command on/off.

**UN-SHIFT on Space:** Automatically shifts back to "LETTERS" upon receipt or transmission of space. Keyboard command on/off.

**REAL-TIME CLOCK:** Keyboard set, always on screen display, hours, minutes, seconds. Can also be inserted in transmit text buffer by keyboard command.

**WORD WRAP AROUND:** Prevents splitting words at the end of a line. Works in receive as well as transmit.

**CODE PRACTICE:** Random 5 char generator sends at any speed you set via the keyboard. Hand-Key input allows use in code practice oscillator that will also read your sending!

**STATUS DISPLAY** can be called up to show the condition and control commands for 20 programmable parameters, such as AFSK tone freqs, UNOS, printer, etc. Useful as a "HELP" command in case you misplace the manual. There's also a constant "TOP-LINE" display of Time, Mode, Speed, & Code in use.

**DETECTION MODES**  
Direct Phase correlation detector with AGC controlled bandpass filter (100 Hz nominal width — 800 Hz center frequency)  
Demodulator Computer program enhanced dual tone demod. Primary tones fixed @ 2125/2295 Hz, Secondary tones variable @ 500 — 3000 Hz.  
\*\*Terminal RS232 compatible half duplex or full duplex up to 9600 Baud

**DATA RATES**  
Morse 5-199 WPM Keyboard selectable in 1 WPM steps. Auto speed tracking or speed on receive  
Baudot All standard 45, 50, 57, 74, 100 Baud (60, 66, 75, 100 and 132 WPM)  
ASCII 110 & 300 Baud normal & synclock using internal Modem. ATR adds speeds up to 9600 Baud.  
Slow Scan 8 seconds per frame

**OUTPUT OPERATING MODES**  
Symbol Character outputs when typed  
Word Words sent after "Space Bar"  
Line Line sent after "Return"  
Buffer Send entire contents of text buffer

**TUNING INDICATORS**  
Audio Ref. Tone 800 Hz Keyed Regenerated  
Visual LED on Mark (Keydown)  
Scope Tuning ellipse for RTTY

**PROGRAMMABLE MEMORIES**  
Here is: 10-40 character messages (400 total) or  
ID: \* 10-80 character messages (800 total) battery backed  
15 characters maximum in standard ID and 17 in RTTY ID  
WRU: Up to 15 characters  
Selective Call: ATR — 4 memories, up to 15 characters each.  
ACT-1 — 2 memories for printer on and printer off

**COMPUTER CAPABILITY**  
Memory Standard unit has 4000 bytes of RAM for user program. Basic package adds 16K.  
Language Basic or Motorola M6800  
Commands Input; Output; Load; Go with Break Point; or Normal Basic  
Tape Interface Store Programs on Audio Cassette

**POWER**  
115 VAC, 60 Hz 60 VA Max, Act-1, 30 VA Max (230 VAC, 50 Hz optional)  
12 volt version available  
External input for charging expanded battery backed memory. 6-15VDC @ 10 ma. max.

**MECHANICAL**  
ATR-6800: 14 1/4" W x 12 1/4" D x 4" H  
Size 15 lb.  
ACT-1: 17.8 W x 3H x 9.5D  
Size 7 lb.  
ATR-6800 & ACT-1: Beige Top, Black Base  
Color AL5052 Aluminum Alloy  
Material

\*Standard on ATR, Optional on ACT-1  
\*\*Standard on ATR, Not available on ACT-1

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(Left to right) The author, WA2SLK, Steve Russell, W0OGJ, Ralph McMillan, KA2IJM, and Mike Short, WB2TGM, with the cannon on the left and the sub in the background.

WA2SLK (left) and WB2TGM in the USS Croaker's radio room.



**A mini-DXpedition to the World War II submarine USS Croaker was a worthwhile experience for those amateurs involved. However, as they can attest, things don't always go as planned.**

## DOWN UNDER, UP NORTH

BY CHARLES C. BURKE\*, WA2SLK

The old adage "one thing leads to another" not only could be used to describe the way our mini-DXpedition got started, but also how it finally came off. During the summer of 1980, one of our club members took his family on a vacation to Mystic Seaport in Connecticut. On the way up route I-95, they passed over the Thames River and noticed a sign pointing to a submarine memorial. On the return trip home they took a detour and stopped at the memorial, which turned out to be a WW II submarine, the *USS Croaker*.

The *Croaker* is berthed in Groton just a few hundred yards west of the General Dynamics Electric Boat Works, where the modern atomic submarines are now being made. The *Croaker* is still equipped with most of its original hardware, and that which had been removed during decommissioning was replaced with similar gear.

Several weeks after the vacation trip was over we gathered for an informal meeting during a family cookout. The idea for an expedition came up. One thing led to another, and the idea for an expedition to the sub soon took shape. A few days later a letter was dispatched to the people who maintain the sub, and we soon received a green light to go ahead with the project. Since none of us had ever done anything like this before, we were really novices regardless of what our licenses might otherwise indicate.

The first question to be tackled was when we would make this historic trip. It was historic for two reasons: first, we had

never done anything like this before, and second, no other amateur group had ever used the sub for this purpose. We would be the first to operate from its radio room in over 30 years!

Looking over the literature that we had obtained, we found that this vessel had done its fair share of work during the war. Its keel had been laid on April 1, 1943, just a few hundred yards east of its present location. A year and 27 days later the ship was commissioned and assigned to the command of Commander John E. Lee. It set sail on May 28th, 1944, and after a short voyage down the Atlantic, it headed to the Pacific and its part in the war. Within sixteen months it sank one cruiser, four tankers, one minesweeper, and two patrol escorts. In addition, it also damaged another tanker, two freighters, and another patrol escort.

After carefully considering all of the information, we decided to use the date of commission as the target date for our venture. After checking over our own personal calendars, we found that the only date open to everyone was the weekend of May 2nd. Another letter was dispatched to the sub's keeper, and when the reply was received, we had an official date fixed. Calendars were marked and families notified that this was to be kept open for a very special occasion.

Fall was now upon us, and we had plenty of time to get all the details worked out, or so we thought. Lists were prepared noting the equipment needed and who would bring what. The lists were checked and doubled checked to make sure no stone was left unturned. The only real vexing problem was that of developing an operating schedule that would give everyone a crack at making a QSO. After a lot of shuffling, we developed a schedule that covered both s.s.b. and c.w. and included time on all bands for the Novices. As soon as this was worked out, copies were made along with a detailed announcement, and later these copies were sent to all major amateur magazines.

\*Box 164A, RD#1, Georgia Tavern Road, Farmingdale, NJ 07727. This article was written in conjunction with Dr. Mike Short, WB2TGM, Ralph McMillan, KA2IJM, and Steve Russell, W0OGJ.

The only other problem encountered was that of selecting antennas for this unique location. We had a few dipoles, so there was no problem with 40 and 80 meters; however, the higher frequencies were something else. Looking over the ads and literature, we found several verticals that looked promising. Letters were sent out to the manufacturers detailing our unique problem of mounting a multi-band antenna to a submarine conning tower. Sorting through the responses, we agreed that the Butternut HF5V-III Export/DXpedition model was our best choice. Another letter was sent to Butternut asking for specific help, and they were delighted to do whatever possible to see that our venture would be a success. In retrospect, their help was indispensable.

We all sat back and watched the days pass until early spring was upon us. It was now April and time for the details to be worked out. But, as things would have it, we just never seemed to be able to get together. Our personal schedules looked like conflicting train timetables, and the situation started to become critical. It was really funny when we now look back at it all, for there we were with a total of \$4000 worth of radio equipment, the wonders of our modern phone company within reach, and only within 10 minutes of each other, yet we just could not find a common time to meet. In utter desperation, a meeting was held three days before the scheduled mission, and even this was held less one member. But looking over our lists and notes, the situation was not too bad, since we had covered everything; it was going to be a piece of cake.

D Day arrived, and we left for the submarine on Friday afternoon. It was only a four-hour ride up to Groton, and we anticipated hitting some delays as we encountered the New York traffic. The ride was uneventful, and we lucked out by finding a motel within walking distance of the sub. It was about 8 p.m. when we got squared away, and then we did some local sight-seeing. After our brief tour of the neighborhood, we returned to the apartment; it was a two bedroom setup, so there was plenty of room for everyone to rest comfortably. However, things got off to a bad start when we found that one of the crew snored with a vengeance. If sound could cut, we had a sawmill on our hands. A quick reshuffling of beds got a wall between the QRM and the rest of us, and we finally got to sleep.

The next morning greeted us with the blast from a ship's horn at 6 a.m. Little did we know that this rude awakening was merely the start of a downhill slide that would take place over the next 12 hours. After getting up we drove to the sub and proceeded to cart the equipment on board in the driving rain. After several trips we began to wonder if the manufacturers had misplaced the decimal points on the weight of the gear. Those 30

lb. transceivers felt more like 300 lbs. Adding to the problem was the fact that the passageways in the sub were narrow and the compartment doors even smaller. But we got it all in, wet but undamaged, and set it up in the sub's radio room without any major problems.

Now the fun part was about to start, for the antennas had to go up. The 2 meter vertical was easily secured along with the dipole. Our attention was then turned to the vertical, which was housed in an old canvas bag. The rain was still coming down, and assembly of the unit on the deck left a great deal to be desired. We went below and surveyed the forward torpedo room, which was quite long. In fact, it was more than enough space to assemble the 30 foot antenna, and the overhead hatch was in the ideal position for passing it up. It should have been okay; they once passed live torpedoes down through the same passageway! When the antenna was completed, it was passed up and out onto the deck ready for phase two.

Equipped with a full pouch of tools and a set of special universal, do-everything, anyplace antenna clamps, the conning tower was assaulted. Upon reaching the summit and peering in, it was discovered that there was almost no place to stand. Adding to the problem were the piles of pigeon droppings, which, when wet, acted like super grease. To top matters off, the universal super-duper antenna clamps would not fit anywhere. Faced with problem #956, we moved along to a solution, when it was discovered that a set of very large U-bolts just made it around one support beam. Once the antenna was handed up and secured, problem #10,567 was discovered: there was no good ground to be found anywhere. If the sub was not rusted, it was covered with layer upon layer of paint, so finding a ground was hard. However, a small piece of stainless steel was located not far from the antenna base and the final connection was made.

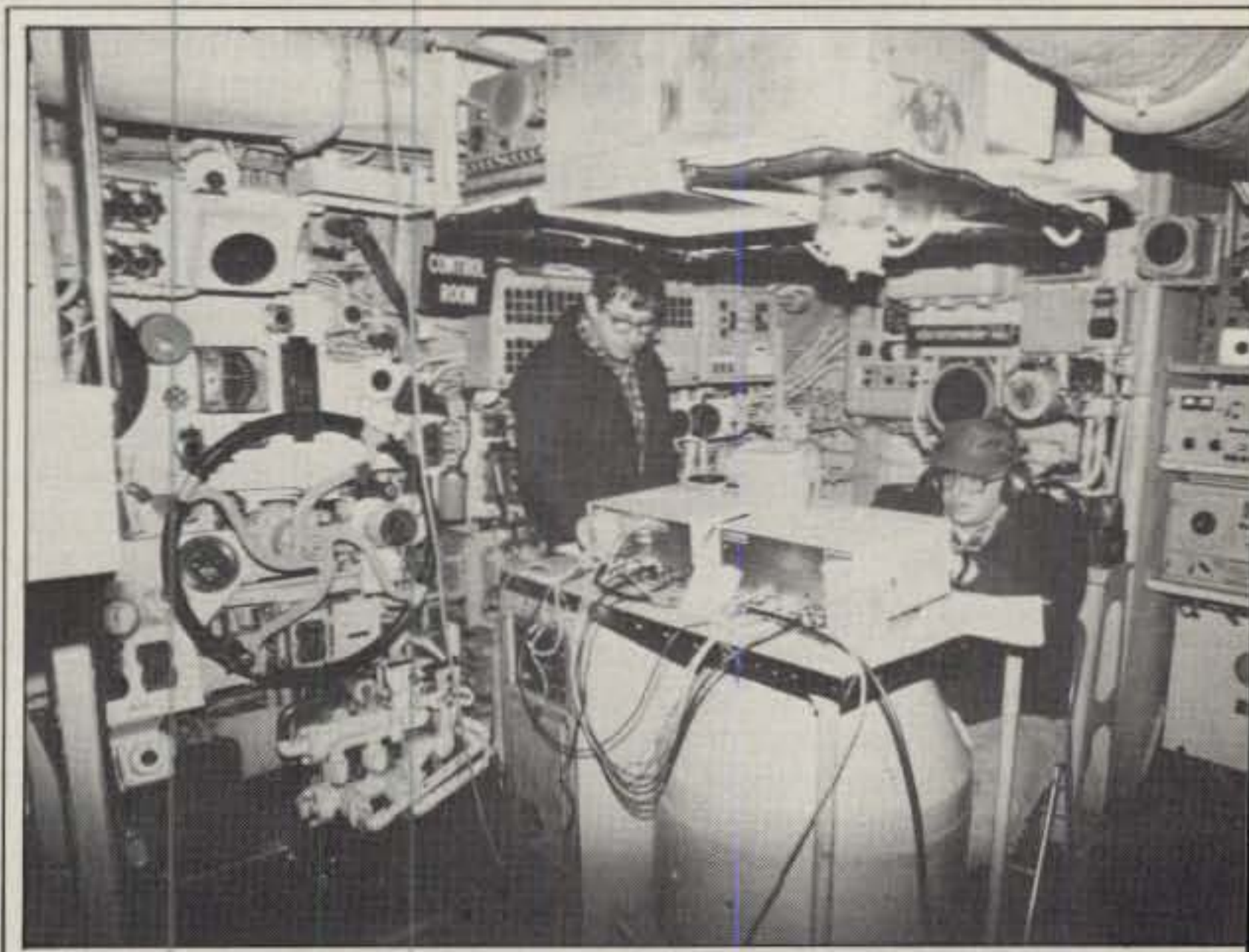
The moment of truth was now at hand, for we had been scheduled to start transmitting at 1400Z, and here it was 1345. We tuned up the primary h.f. rig and, except for a minor s.w.r. problem, were on the air. The a.f. control was turned up, and problem #22,867 came to light: the band was dead. After working 1 1/2 hours, we had a grand total of 12 contacts. At first we thought that things were bad but could only get better. Wrong again! The band was keel up and going down fast. The excitement of the day was fading rapidly, for not only was rigor mortis setting into the band, but it was cold. The outside water temperature was only 40-45 °F, so the sub was not a lot warmer. Adding to the cold was the humidity, which was so high that moisture condensed on the microphone as we talked.

As the day passed, our sunken spirits were buoyed up by per-

*WA2SLK transmitting from the radio room.*



**Say You Saw It In CQ**



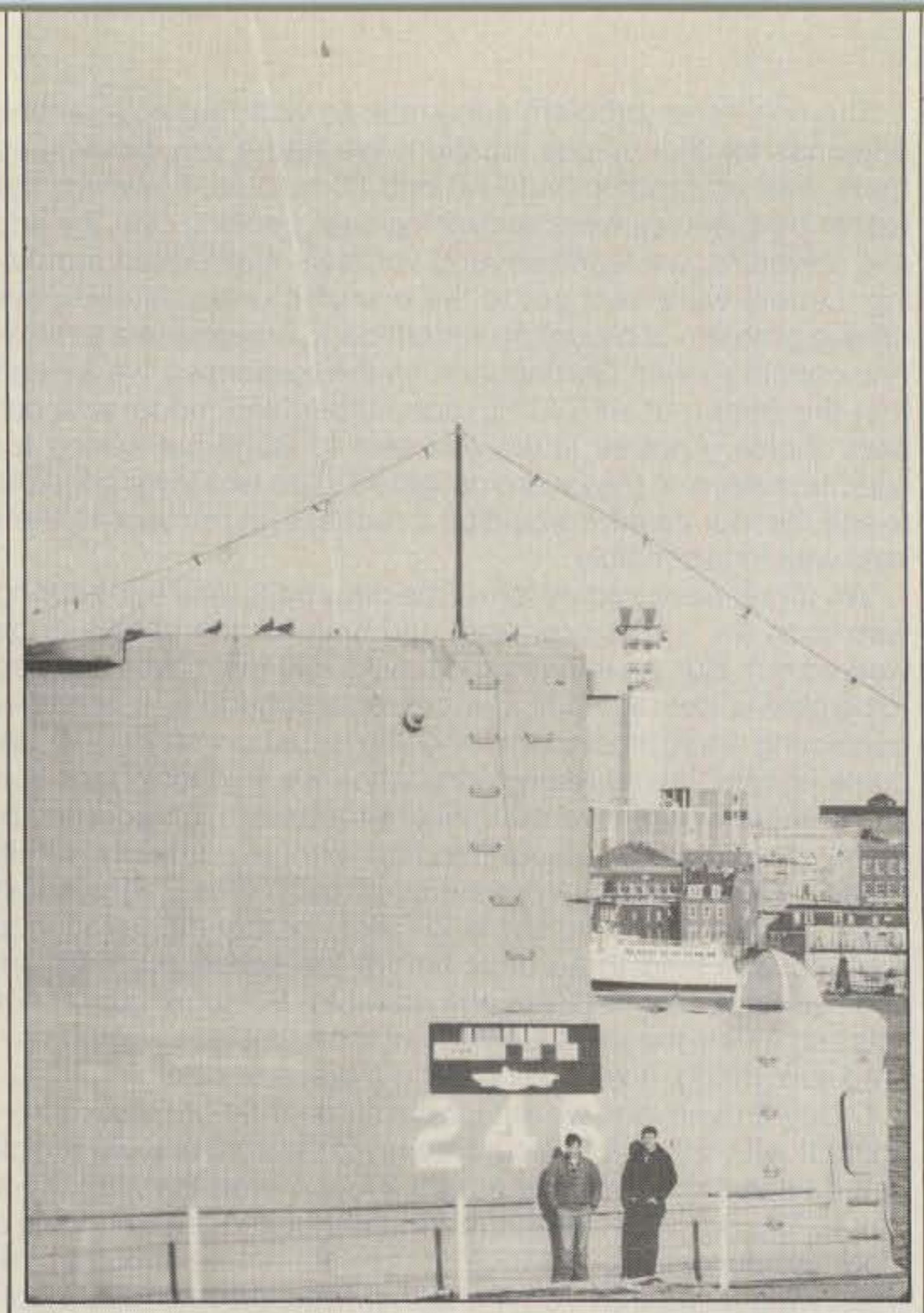
*WB2TGM (left) and KA2IJM in the control room below the submarine's conning tower.*



iodic visits from local hams. They would stop by to say hello and offer assistance if requested. Members of the Norwich Radio Club and those from SCRAM helped to keep our morale high. We also received a lot of help from hams who were monitoring the local repeaters. They assisted us in finding electronic supply stores and eateries. We also had a stream of sightseers passing through on a regular basis as part of the tours conducted by the organization which operates the facility. This also produced an interesting situation, for each group was treated to the sound of the original diving alarm. Unfortunately, that alarm was located only 4 feet from our setup, and its intensity could only be measured on the Richter scale. A blast from it really added something unique to the QSO in progress.

About 3:00 local time we received a call on the 2 meter rig from Senior Chief Petty Officer Tom Fry, WB1CPF. Tom's call marked a turning point in the venture, for things soon turned rapidly upwards. He extended an invitation to visit the atomic submarine base which was located a mile or so up river. It was an offer we found hard to refuse. The h.f. band was still dead, and the 2 meter simplex never got off the ground since we were located at river level and the terrain went upwards on all sides. While we had a schedule which called for continuous operations throughout the day and night, it made little sense to sit in the cold with a dead band, especially when such an interesting invitation had been extended. So a few hours later Tom showed up and drove us to the base. After the security checks were cleared, we found ourselves walking down a pier alongside two class 688 attack nuclear submarines. Tom turned to us and asked, "Would you like to go on a tour of the nuclear sub *USS Groton*? We all looked at one another and then at the long black sub moored to our left and said yes with an air of enthusiasm that had not been felt for days.

The sub was an awesome sight, for its long, smooth, black hull was in sharp contrast to the wooden slate deck of the older ships. She was also massive in beam, and it was possible to fit two of the WW II subs inside this giant. Going down into the vessel was like no other journey we had ever taken. Comparing it to the old subs was like seeing the old Flash Gordon movies and then taking in *Star Wars*. Except for the fact that they were all submarines, the comparison stopped. Making the tour even more pleasant was MMCS (SS) Robert Davis. Time flew, and we suddenly realized that we had to get back to our own ship to finish our mission. After grabbing dinner with Tom and parting ways, we all agreed that our Navy was something to be especially proud of. Not only are we equipped with the finest ships in the world, but they are manned by some of the most intelligent and capable young men and women to be found anywhere. If



W0OGJ (left) and WB2TGM on the deck of the USS Croaker.

we were a bit younger and a recruitment officer had approached us, we would have signed on the dotted line immediately.

We returned to our ship and flipped on the sets. The 2 meter set came to life with a call from Ed, N1BDB, who informed us that about 9 million people were looking for us on 80 meters. When we tuned up and called CQ, it seemed as if all hell had broken loose. It took several minutes for the pileup to calm down, and our first QSO was underway. In the hours that followed we tried to make up for the poor band conditions by giving everyone from DX to QRP a chance to get into the act. We felt really bad for all the people who were out there looking for us, some of whom called earlier on the phone to see what had happened to us. We did our best to take advantage of this hot band opening and tried to work everyone.

However, like all good things this one started to come to an end as the band began to die out. Within minutes the band opening gave way to QRN and the loud static clashes that can be heard on 40 and 80 meters. The night was long and cold, but during this time we did have some interesting, fun-filled events occur. One fellow did not realize that we were working from a sub, and after noting he was 3000 feet up in the Rockies, asked for our elevation. The reply "3 feet below sea level" was met with a pronounced silence until the situation was fully explained. We also unnerved a Novice who suddenly experienced key fright when he learned he was working a submarine. He tried to get his name out and repeated it three times, spelling it differently on each pass. He finally got it out, and the QSO moved along without further incident.

Around midnight we had a visit from a few more hams, one of whom, Ed, N1BDB, treated us to two boxes of hot doughnuts. Back on the air we encountered a slow but steady stream of hams such as Bill, KC5CB, who had tried to nab us all day and halfway through the night. He, like many others, had covered every band that we tried to work and logged a lot of time in the effort. Those contacts were special, and we will never forget them. We also talked with ex-navy men who had served on subs as well as people who had built or designed parts for them.



The night was long and cold with the team taking turns manning the transmitters. While off duty we spread our sleeping bags out in the officer's bunks and tried to catch some shut-eye. The cold and dampness were ever present and hampered not only our sleep, but our efforts on c.w. As the temperature dropped, our fingers got stiff. In one QSO we were asked to QRQ but could not because our fingers were like frozen popsicles. By morning we all realized that this venture was not going to be as successful as we had hoped. While we had over 170 contacts and hit Germany, Japan, France, England, Finland, Greenland, Sweden, and New Zealand, this was a far cry from what had been expected.

Around 6 a.m. we poked our heads out of the forward hatch and were greeted by a clear sky and warm temperatures. We took a break and had breakfast and then returned to our stations where we warmed up the sets, ready to try it again on 15 meters. The band was hot, and a contact was made with the first call of CQ. But within 30 minutes the S-meter was reading a noise level of S-8 and contacts were few and far between. We stayed with it until 9 a.m. and tried making the switch to c.w., but the results were the same. We all agreed that it would be worthless to continue, so the plug was pulled, even though we had three more hours of time scheduled. It took us about 1 1/2 hours to get everything loaded back into the car, and we were ready to go.

We stepped back and looked out over the water at the ship sitting in the morning sun, the river quietly flowing under its hull. A final glance marked the end of this DXpedition, and we started the journey homeward. It was an experience we will never forget, for it was filled with both great satisfaction and great disappointment. It was hard work—really hard—and we had a chance to test not only the equipment, but ourselves as well. We learned that no matter how much one plans, one thing can lead to another, and plans can go astray. But this seems to be what life is all about.

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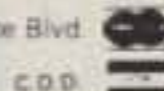
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## Palomar Engineers M-827

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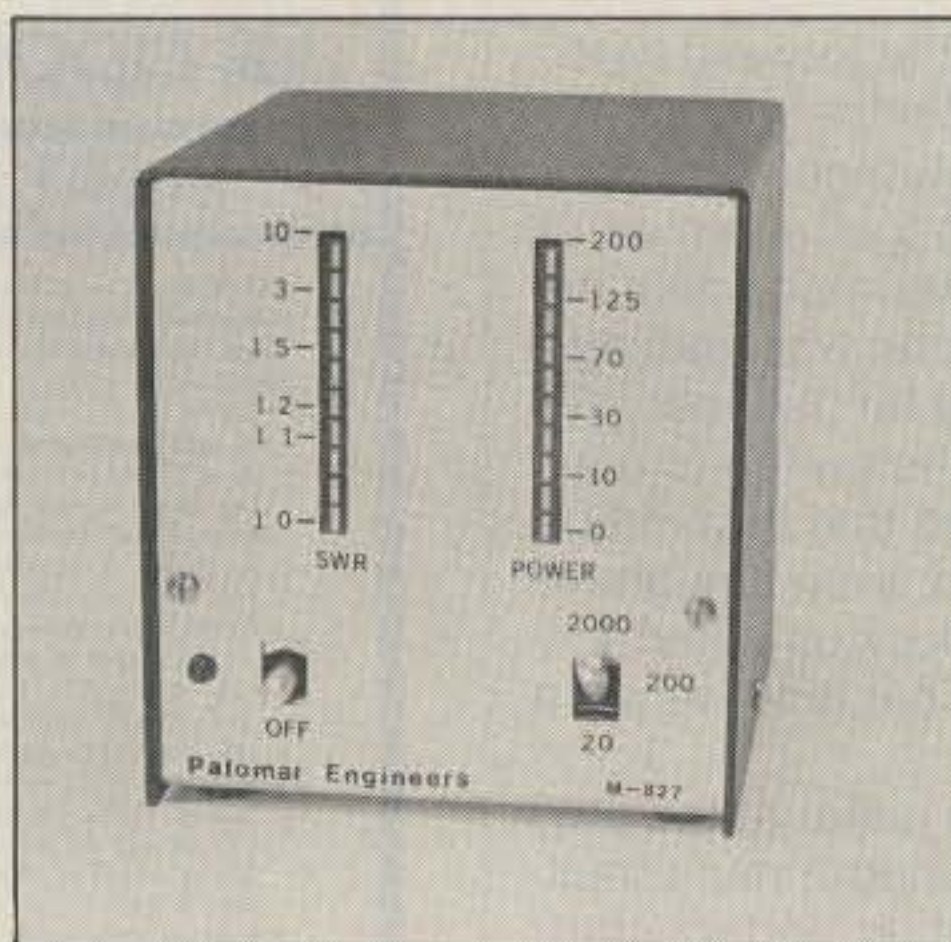
BY JOHN J. SCHULTZ\*, W4FA

In recent years s.w.r. meters have appeared on the market scene in just about any imaginable design and/or form. Some of the meters are good measuring instruments, while others emphasize meter size and other frills more than a good, basic measurement capability. Also, the % power reflected scale on some simple s.w.r. meters (not on meters with a true reflected power scale) has led many amateurs to believe that significant amounts of transmitter output power are lost even at relatively low s.w.r. readings (e.g., an s.w.r. of 1:1.2 or less). In fact, those % reflected power scales indicate a theoretically maximum power rejection by an antenna load, which rarely takes place in practice. A not unusual example would be that when such a meter indicates 25% of the output power as being "lost," less than 6% is "lost" in reality.

Scores of articles have appeared in various amateur radio publications to explain the mysteries of s.w.r. to the average amateur. Some articles have served to clarify, while many more simply have served to add to the confusion. But, for the average amateur at least, the solution to the problem of s.w.r. is probably not a lot of theoretical discussion, but rather is the development of an s.w.r. instrument that avoids any ambiguity at the start.

Of course, a lot of efforts have been made over the years to make the s.w.r. meter a straight-forward, easy-to-use instrument that avoids any ambiguity in the meaning of the meter's indication. The cross-needle s.w.r. meter, which has recently been introduced to the amateur radio field, although it dates back to German commercial designs of the 1930's, is a good example. The latest development, thanks to the development of the IC, has been practical designs for automatic, self-calibrating s.w.r. meters using regular single-needle panel meters as indicators. The logical "next step" had to be a complete divorce from mechanical indicating devices for s.w.r., and that is where Palomar Engineers has already taken us with their Model M-827 Automatic SWR and Power Meter.

The M-827 is a "computing" s.w.r. meter that uses LED's for its display elements. One string of 10 LED bar-type displays indicates s.w.r. from 1:1 to 1:10, and another string of 10 LED bar-type dis-



The M-827 is attractively housed in a two-tone enclosure. The illuminated LED's form a continuous bar-type display.

plays indicates the forward power output in switch-selectable ranges of 0-20, 0-200, or 0-2000 watts. Since it is a "computing" type s.w.r. meter, there are absolutely no "set" controls, and s.w.r. indication is completely automatic over an extraordinary range of 1 to 2,000 watts of forward power. The frequency range is 1.7 to 30 MHz.

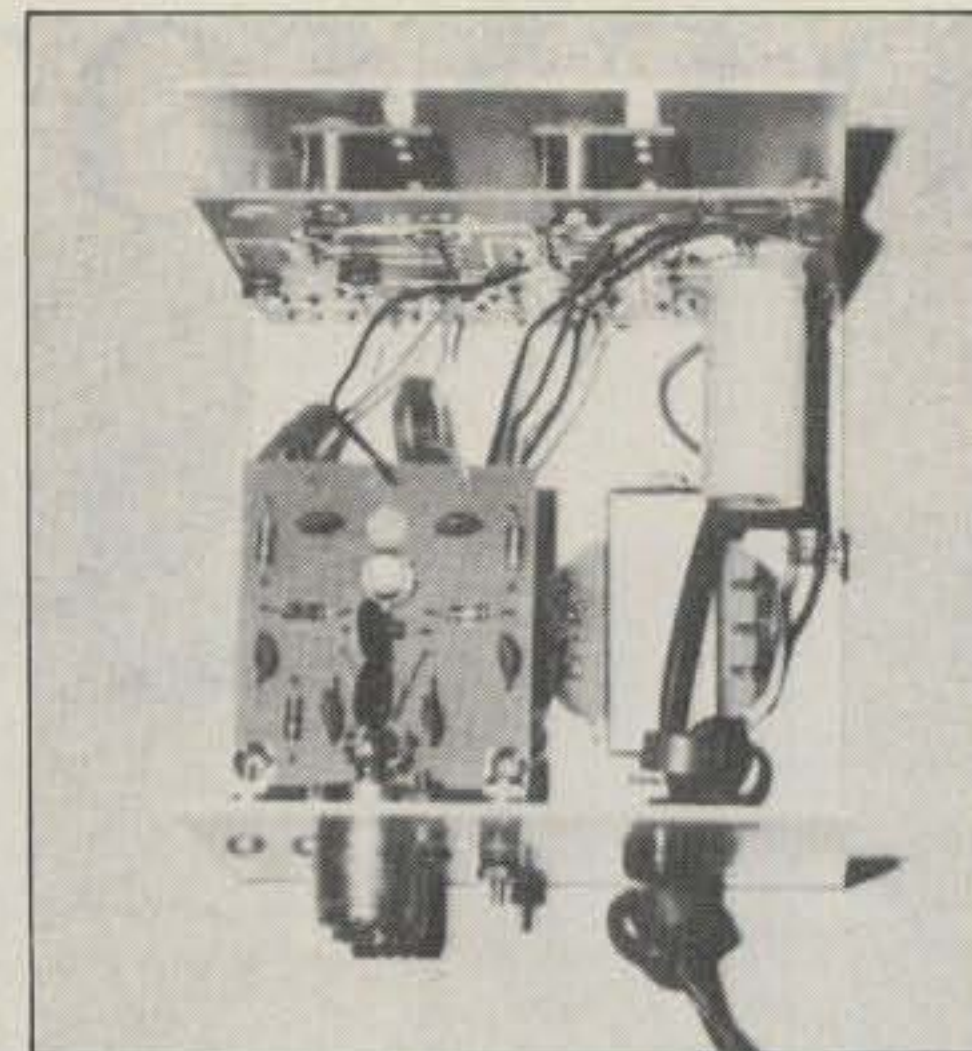
The M-827 is a remarkable instrument for various reasons, some of which will be described in detail. But just to organize a "look" at the M-827, the instrument will be described in terms of its mechanical features, electrical features, and performance results and impressions.

Physically, the M-827 measures about 4 1/4 x 4 x 5 inches and is housed in an attractive cabinet with a brushed-aluminum front panel and black-vinyl-covered top cover. A look at the front-view photograph clearly demonstrates the SWR and Power LED displays and the control switches. The back panel of the M-827 contains SO-239 connectors for in/out r.f.

power connections and a feed-through for the a.c. line cord. The M-827 has a built-in a.c. power supply mainly because battery operation is not practicable considering the relatively high current drain of the LED bar-type displays, although the 110 volt power drain is less than 3 watts.

A block diagram of the functional sections within the M-827 is shown in fig. 1. A directional coupler is used to sample forward and reflected voltages on the transmission line. This information is then fed to what I'll call a computer board, which in turn develops control voltages for the LED driver IC's which actually switch on and off the LED's.

If one takes the top cover off of the M-827 as shown in a photograph, one will see a PC board layout which almost exactly parallels the functional blocks shown in fig. 1. That is, there are four main PC boards within the unit. The board containing the directional coupler, which



There are several different PC boards inside the M-827 as explained in the text. The most obvious is on the inside rear panel and contains a directional coupler.

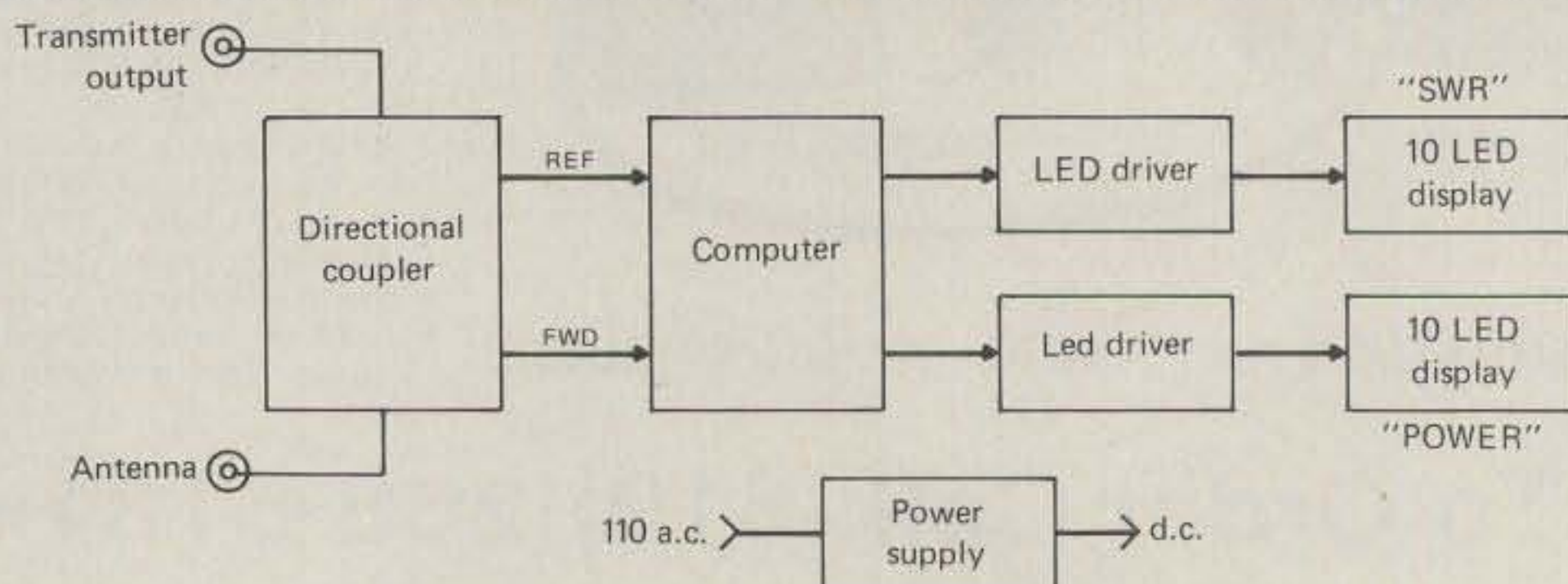


Fig. 1 - Representational diagram of functions within the M-827.

c/o CQ Magazine

uses a small transformer wound on a ferrite toroid as a pick-up element, is mounted on the rear panel to provide the shortest possible leads to the coaxial line in/out connectors. The main board, which is located on the inside of the front panel, contains the computing circuitry, some power supply components, and also serves as a mounting platform for the two other PC boards, each of which is an integrated assembly containing the IC driver for the LED's as well as the bar-graph-type LED's themselves. The IC driver/LED assemblies appear to be very similar to various solid-state LED VU meter driver/displays which are available on the market (e.g., Radio Shack's RS NSM3916). The power transformer is located on the bottom plate of the enclosure.

If one starts to take a really close look at the construction of the unit, it will be seen that a great deal of care was taken to design it carefully. There are a lot of nice little features such as dual ferrite chokes on the a.c. lines, a faraday shield on the r.f. line which goes through the directional coupler ferrite toroid, large ferrite chokes on each lead from the directional coupler PC board to the main PC board, very neat layout of the components on each PC board, and a generous use of regular board and component mounting hardware with lockwashers where some manufacturers might have compromised a bit and used rivets. Palomar doesn't advertise it as such, but it seems that the power transformer used has dual primaries for both 110 and 220 volt operation.

As pleasant as the foregoing is to discover, the biggest surprise comes when one takes a close look at the "computer" board. Readers who are a bit familiar with "computing" type s.w.r. meters and who have followed various published designs realize that they mostly require a handful of IC's to implement. The computer board in the M-827, on the other hand, contains only a single IC (!) plus a small quantity of RC components. Obviously, someone at Palomar has come up with a very clever circuit idea that will probably make the computing-type s.w.r. meter an extremely common instrument in most amateur radio stations in the future. Unfortunately, the circuitry cannot be published at this time because Palomar has applied for a patent on it and their attorney advised against publication. Their instruction manual for the M-827 also does not contain the circuitry used, although they do publish the circuitry used in all of their other equipment.

Using the M-827 is actually a bit of fun because of the striking visual display. It was used with several solid-state transceivers, and as the s.w.r. LED bar-type would "sink" (fewer LED's illuminated) as an antenna tuner was adjusted for a proper match, the power LED bar graph would "rise" (more LED's illuminated). This seesaw visual effect made tuning

very easy to follow, and I would rate the visual indication the most effective one yet to be seen on an s.w.r. meter. It is even clearer than when watching a cross-needle s.w.r. indicator because the response is instantaneous, and there is no possible confusion between the forward and reflected meter movements. About the only possible improvement that could be imagined for the M-827 display would be to have the **SWR** and **Power** LED displays differently colored instead of having both use red LED's.

The automatic s.w.r. readout on the M-827 has an expanded scale such that it is extremely sensitive at low s.w.r. readings and fully 9 LED's cover the s.w.r. range of 1:1 to 1:3. The readout in the s.w.r. range of 1:1 to 1:1.5 utilizes 7 LED's. So, there is no question about being able to read out extremely low s.w.r. values and being able to fine-tune an antenna coupler for an absolute 1:1 s.w.r. ratio when such is possible. In tests using resistive loads to simulate different s.w.r.'s, the s.w.r. scale on the M-827

checked out almost perfectly for s.w.r.'s of 1:3 and below. The most amazing feature, however, was that the automatic s.w.r. indication functioned equally well with transmitter outputs of approximately 1 watt to 700 watts (the latter being the maximum station power available). No test-result table is being presented simply because the differences between the indicated and actual s.w.r. values were so close that a tabular comparison would not be useful (e.g., an indicated 1:1.1 s.w.r. checked out as a 1:1.15 s.w.r.).

The power LED scale on the M-827 also checked out extremely well (see Table I), but one does have to evaluate its usefulness from two distinct viewpoints. On the one hand, the display is extremely useful because of its ability to instantly display peak power output. In that sense it is like using an oscilloscope to monitor a transmitter's output level and to check the effectiveness of speech-processing equipment. On the other hand, the power readings are only correct when the s.w.r. is 1:1 and there is no capability to mea-

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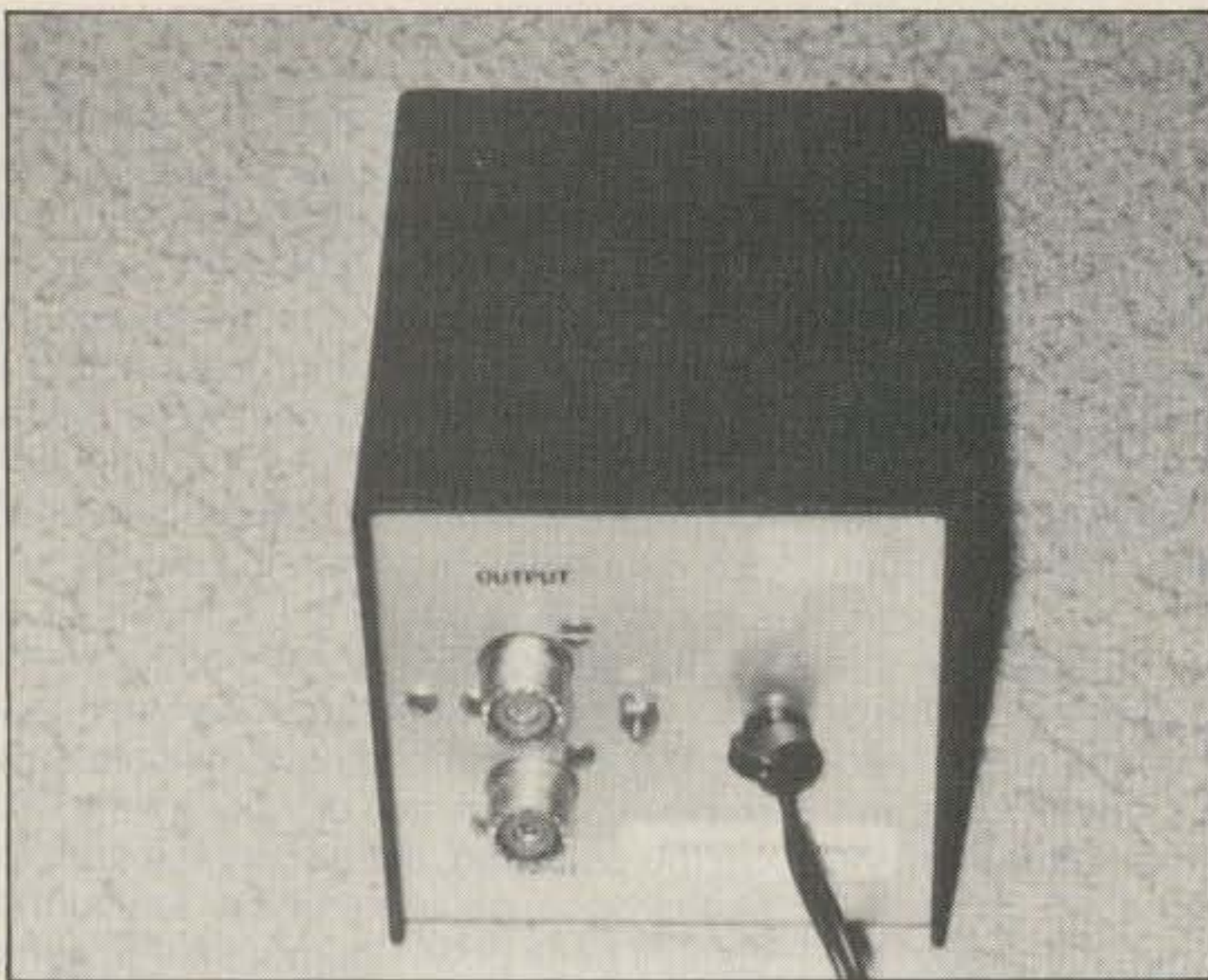
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7	7	70	80	700	700
3	3.5	30	33	300	300
1	1.2	10	10	100	70

\* Could not be measured.

Table I - Power measurement test results.

The rear panel contains the two SO-239 r.f. input/output connectors and a line-cord feedthrough. The a.c. cord is looped through a ferrite toroid on the outside and inside of the rear panel to forestall possible r.f. pickup problems on the line cord.

sure exact power levels. For instance, on the 2000 watt power range only 3 LED's cover the range from 300 to 700 watts, so one could not set a transmitter for exactly 500 watts output. The same situation exists on the other power ranges as one can see from the front view of the M-827. Of course, the relative power output the M-827 displays will remain constant as long as a transmitter is working correctly, and this is usually the main point of interest in actual station operation. For example, a transmitter, when it is properly tuned

and at its normal PEP output, might illuminate the LED's up to the 125 watt calibration mark. On speech peaks, if the LED string only illuminates up to the 70 watt calibration mark, this will alert one that something is wrong or that the transmitter is not being modulated fully. This sort of indication is difficult to achieve with analog meters unless they incorporate extra circuitry for a peak reading and hold capability, but doing that then does not allow them to follow low-level s.s.b. modulation changes.

All in all, if one accepts the fact that the M-827 is not an exact-reading power-output meter but primarily a fully automatic s.w.r. meter with an essentially instantaneous s.s.b. peak-power-output indicator, one should have excellent results using the unit. Its s.w.r. display is absolutely clear and unambiguous. There is, of course, hardly anything to do to place the unit into operation; just install it in the antenna line and plug in the line cord. Palomar's warranty is for 12 months against defects in material and workmanship.

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13828	CB3812	3.0-7.0	-15±0.7	0-20	.48x.51x3.05	7.95
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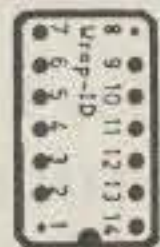
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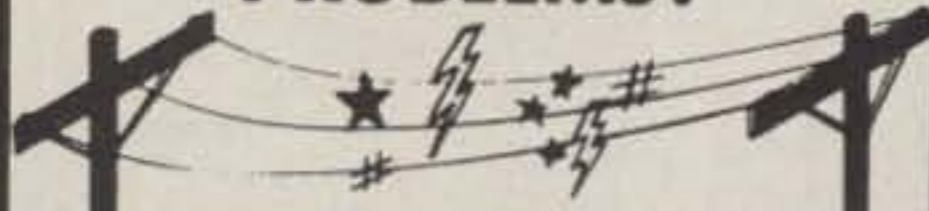
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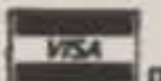
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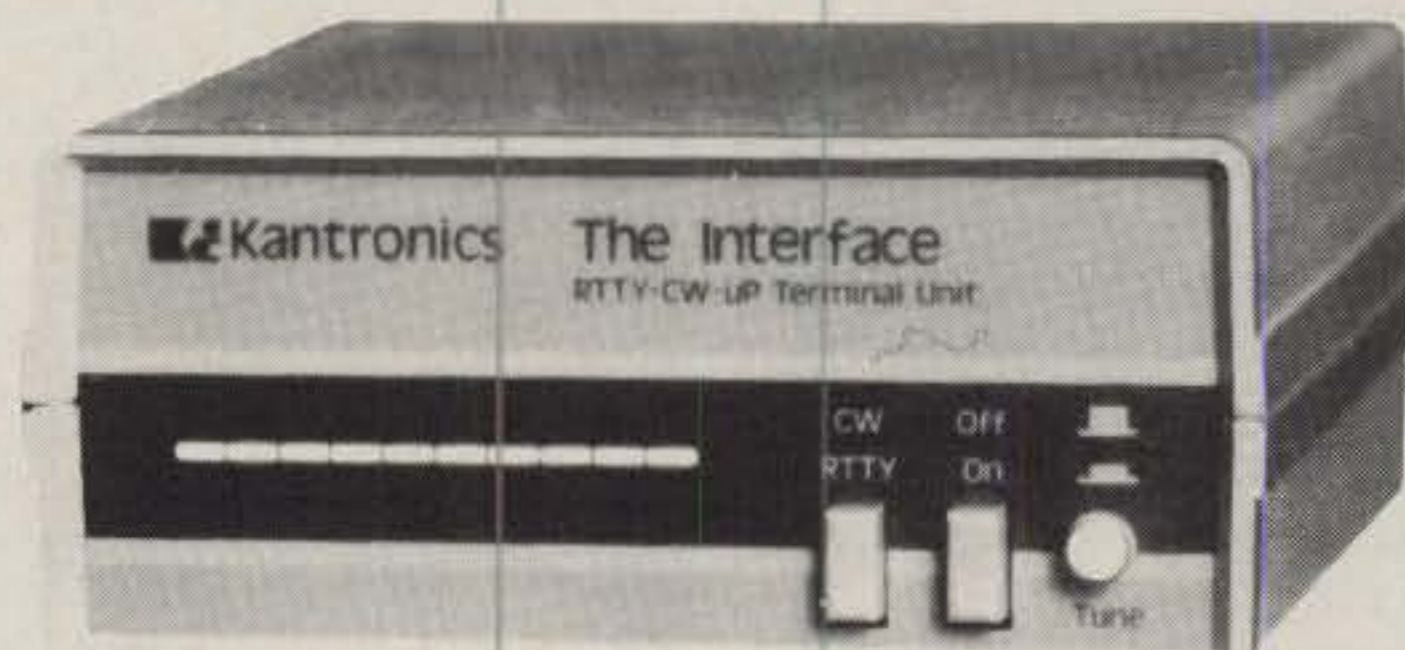


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Turn your existing computer into a complete Ham communications terminal by linking it to your transceiver with The Interface. Send and receive Morse, RTTY, and ASCII with any of six different computers. The new Hamtext program for the VIC-20 and Commodore 64 allows storage of received messages to tape or disc, and is compatible with the VIC printer. Call Dan or Rick for a special price.



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# HOT ROD ANTENNA

Achieve 1 or 2 db gain over ANY 1/2 wave two meter telescopic antenna. The AEA model HR-1 Hot Rod™ antenna was designed by Dr. D.K. Reynolds (designer of the IsoPole) to deliver maximum performance for any hand-held transceiver with a BNC fitting.

The factory-tuned HR-1 is 20% shorter, lighter and places far less stress on your hand-held connector and case. It will easily handle over 25 watts of power, making it an excellent emergency base or mobile antenna. In the collapsed position, the Hot Rod antenna will perform like a helical quarter wave.

The Hot Rod antennas can be expected to make the same improvement to hand-held communications that the IsoPole brand antennas have made to base station operations. Why pay more when the best costs less?

Prices and Specifications subject to change without notice or obligation.

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MRF 911	\$2.15	Thermistor 1K Ohm @ 25°C \$ .74
MBO 101	\$ .45	

LINEAR IC'S —			
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MC 1330A1P	\$1.75	MC 4558CP1	\$ .85
MC 1349P	\$1.40	NE 564	\$2.50
MC 1350P	\$1.20	NE 565	\$1.30
MC 1358P	\$1.70	LM 301AN	\$ .34
MC 1374P	\$2.40	LM 307N	\$ .45
MC 1458CP1	\$ .70	LM 380N	\$ .89
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LOW PROFILE SOLDER TYPE IC SOCKETS —	
8 pin to 40 pin	1¢ per pin (20 pin = 20¢)

RESISTORS - 1/4 Watt 5% Carbon Film —	
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Same Value 100 - 1000	.015 ea.
Same Value - 1000 - up	.010 ea.

MISCELLANEOUS —		
MV2109	\$ .82	Polarized Line Cord
MV2209	\$ .40	5 Foot
IN4001, 4004, 4007	10 for \$ .99	75 - 300 Ohm Matching Transformer \$ .50
Gardiner Solder 60/40 Rosin Core		
.032 dia. 1 Lb. Spools \$8.10		

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CIRCLE 37 ON READER SERVICE CARD

# 1982 CQ WW DX S.S.B. Contest High Claimed Scores

The following are S.S.B. high-claimed scores as of January 15, 1983. These are raw scores only, subject to verification.

USA Single Operator All Band	
W1ZM	3,182,460
K1AR	2,510,235
K1RX	2,431,136
W3BGN	2,414,458
K2VV	2,395,848
K2BU	2,368,314
N2LT	2,320,122
N6BV	2,263,408
K6HNZ	2,212,384
KM6B	2,203,235
AA2Z	2,085,270
K8RF	2,079,660
W1RR	2,037,000
K1UO	1,991,236
N2FB	1,989,198
K3OO	1,955,792
W5XZ	1,834,823
K3ZJ/1	1,771,056
WA8TBO	1,715,472
KG1E	1,651,779
W6MSF	1,642,974
K2DM	1,604,697
N2SS	1,559,948
K1EA	1,377,000
W7CB/6	1,199,556
N6QR	1,176,441
N3RS	1,123,339
W1GD	1,076,277
K3JLT	1,058,471
K5DX	1,048,040
W3HKK/8	1,028,092

28 MHz	
W6YA	538,902
K5RC	461,660
N8II	423,680
N4ZZ	397,062
W1WEF	379,533
K7RI	336,375
KT4W	305,998
N4IJ	291,854
N5DDO	277,562
W0YK	268,732
NN6U	245,960

21 MHz	
W0ZV	631,331
K5GA	506,574
K4ISV	440,076
N4MM	371,790
N8UM	362,666
N2PP	346,500
AG7M	304,437
K3LWM	258,474
N16W	253,456
W2HPF	249,288

14 MHz	
K1KI	696,014
K3KG	389,064
W5WMU	317,264
K2RD	315,896
KK9A	287,196
W1GG	254,185
K7HBN	185,776

7 MHz	
K0GU	195,624
W6AM	169,932
N6SV	119,808
K2IGW	84,164
K4PI	77,337
KB5AS	73,355
W9CH	66,447
AD8C	57,500
K5RR	54,055

3.8 MHz	
K1JX	99,645
K1PT	77,322
N2KK	77,066
AB1A	63,112
WA4SVO	58,104
W8EDU	50,424

1.8 MHz	
W8LRL	16,191
AE6U	5,005
N4IN	4,305
N4SU	4,173
K5YY	3,366
W9ZR	3,366

Multi-Single	
W4QAW	4,455,190
KR2N	4,371,389
KX4S	4,237,545
K1CC	3,244,602
N4ZC	3,148,890
W2YV	3,061,264
W2VJN	2,983,672
AB0I	2,964,632
W8UA	2,900,490
K0UK	2,481,745
K1NG	2,365,792
N4KG	2,135,477
W9DUB	2,096,250
KS8S	1,971,585
NU4Y	1,917,804

Multi-Multi	
N2AA	10,003,266
W3LPL	8,936,587
K1OX	8,456,000
W7RM	7,518,720
N5AU	7,424,865
K9GL	6,191,968
N4RJ	4,370,076
K4VX/0	3,987,462
W3GM	3,776,299
K2UA	3,530,536
W1YN	3,480,764
A16V	3,478,548
K6RU	3,468,168

DX Single Operator All Band	
9Y4VT	11,924,592
HH2WW	8,147,971
4Z4DX	7,188,658
UF6CR	6,983,277
N1GL/6Y5	6,944,060
DJ6OT/CT3	6,432,032
YU3EY	4,913,574
DK3GI	4,735,152
ZF2FL	4,262,180
VP5KP	3,930,480
A4XJO	3,821,976
EA4LH/CE3	3,805,350
8P6KX	3,543,630
ZS3HL	3,316,625
FO0JO	3,175,536
IO6FLD	3,054,612
VE3BVD	2,981,960
VS6DO	2,816,450
I4AVG	2,234,635
EA3CCN	2,224,530
VD3GCO	2,196,920
YV4BOU	2,127,720
F9GL	2,099,580
G5CFJ	2,063,880
8P6J	2,044,875
HL9AZ	2,044,134
HK5BCZ	2,043,340
JA1ELY	2,021,465
JH7DNO	2,005,080
DL8PC	1,999,107
PA2TMS	1,954,568

K4IIF/KV4	1,944,576
6Y5HN	1,941,030
VE7BTV	1,897,038
HZ1HZ	1,882,038
PP2ZDD	1,824,666
UV3GZ	1,813,322
D44BC	1,858,614
UQ2GCN	1,645,893
G4FAM	1,601,334
EA2QU	1,550,601
UL7LAW	1,523,438

28 MHz	
AH0B	1,789,735
4M3AGT	1,627,002
CE6EZ	1,569,198
KB7IJ/KH2	1,435,239
IO4EAT	900,473
JH1AJT	889,776
EA6ET	812,640
YU7AV	797,742
YU7BB	745,368
4X6DF	722,304
IT9KZW	686,826
EA3AIN	669,382
CX4BW	647,938
DU1CPL	602,516
YU3RM/X	529,546

21 MHz	
AH0AB	1,927,296
CX4CR	1,789,031
KG6DX	1,477,431
VP2MR	1,018,776
4X0U	942,829
LZ2KTS	830,790
AH6BK	757,158
CE3NR	729,267
VE6OU	711,540
I1YBM	689,640
IT9GSF	686,224
YU9W	663,660
DJ8RI	621,469
F6KRC	599,379
YU1DW	586,880
OH5TS	559,986
SM2EKM	530,388

14 MHz	
YS1X	1,240,291
N2BZQ/4X	1,180,550
ZS6A00	922,032
VE3BMV	916,120
YV5ANE	915,124
CX7BY	896,600
YU3TWT	769,318
YV2IF	727,958
T32AF	676,783
G3FXB	658,242
UG6LO	630,500
G3VPW	535,262
JA0JHA	520,704

7 MHz	
YV3BRF	557,568
ZY5EG	236,456
OH1IJ	199,440
ZL4BO	186,684
LA7JO	185,096
CT1AOZ	177,016
JA2BAY	172,992
HA9RE	145,233
CS4NH	133,713
VO1CV	131,860
UH8EAA	124,335
SM5GNU	100,626

3.8 MHz	
4M3AZC	205,656
KH6XX	161,622
YT3A	154,972
LZ1KDP	140,658
YU4BR	130,205
IO6NOA	126,324

DF9QO	118,233
C6ADV	102,741

1.8 MHz	
E8BAK	34,220
YU3EF	27,956
EA9EU	27,840
VE1BNN	24,886
VE3MFA	17,640
I4RYC	13,832
UP2BKF	12,516
EA3VY	10,868

Multi-Single	
9Y4W	16,775,034
NP4A	15,065,435
FM7CD	14,613,920
4T4O	13,494,188
RG6G	12,774,174
VP2EC	11,799,840
VP5B	10,523,260
CN8CX	9,968,775
ED9CM	9,638,665
HH2CO	8,639,229
LU4F	8,606,736
I5MPK	8,207,952
IO3MAU	6,887,328
VE1DXA	6,383,436
H44R	5,988,210
EA7TH	5,543,820
Y24M	5,436,501
Y21YK	5,340,600
IO4YSS	5,338,525
F3TV	5,180,560
UK5IBB	5,099,934
UK2RDX	4,766,528
V3DX	4,280,175
VE3PCA	4,149,180
ZS6BPL	4,079,712
UK6LAZ	3,969,133
4U1ITU	3,844,080
GB2AL	3,751,440
HB0BHA	3,747,216
6E5MX	3,626,016
UK5MAF	3,593,876
OK1KRG	3,454,470
JA9YBA	3,447,808
UK7PAL	3,353,400
VE3CYX	3,272,586
UK2BBB	3,266,312
UK2PAD	3,086,792
UK6LAA	3,071,110
JG1ZUY	3,034,148
ZF2GI	3,026,011
VP9IB	3,023,040

Multi-Multi	
EW6V	19,314,912
OH0W	19,033,252
VP9AD	15,929,459
HC0	14,994,328
GB4ANT	9,211,993
HZ1AB	7,691,938
JA2YKA	5,953,860
OK7AA	5,550,235
JA3YKC	3,748,110
VE7ZZZ	3,036,195
KL7RA	3,004,600

QRPP All Band	
TG9GI	1,035,693
UB5UCJ	387,416
K8IA	337,666
UP2BTM	315,563
OABCW	288,674
W8UVZ	248,256
ON6NL	246,749
K4LTA	233,122
G3FTQ	122,570
K7BTB	114,504
W6YVK	66,700
KI9A	64,232
VK3RF	55,062
GM4ELV	49,389
KR7L	47,970

The C.W. High Claimed Scores were being compiled as this issue was being completed. They will be presented next month.

See the Addendum box in this month's Contest Calendar for score corrections for the 1981 CQ WW DX Contest.

## SWD-1 VIDEO CONVERTER

FOR CABLE TV



The SWD-1 Video Converter is utilized on cable TV systems to remove the KHz's signal from a distorted video (channel 3 in/out) and also pass thru the normal undistorted/detected audio signal, Rocker switch selects operating mode to remove KHz's distortion from the video or pass all other channels normally. Simple to assemble—less than 30 minutes. Pre-tuned, Input/output Channel 3. Impedance 75 ohms, 117VAC.

SWD-1 Video Converter Kit ..... \$69.95

## 0-35dB VARIABLE GAIN RF AMPLIFIER

USES TWO REVOLUTIONARY  
NEW HYBRID  
BROADBAND AMPLIFIER ICs

Works on all RF Signals from 40-900MHz



EXCELLENT FOR USE WITH:

- All Antenna Systems
- Voice Communications
- MATV Systems
- CCTV Systems
- Video RF Line Amplifiers
- Frequency Counters
- Oscilloscopes
- FM Broadcasts

Now you can use one TV/FM Antenna to cover all close and distant stations without experiencing overloading problems. Ideal for outdoor and indoor use. I/O impedance is 75 ohms. Power Supply is separate coax feed system which allows amplifier to be located anywhere in cable run. Power Supply has knob to control variable gain, LED power on indicator and on/off switch.

ALL-2VG Wired and Tested. .... \$49.95

## Our New STVA 14.5dB GAIN, 14 ELEMENT CORNER REFLECTOR YAGI ANTENNA

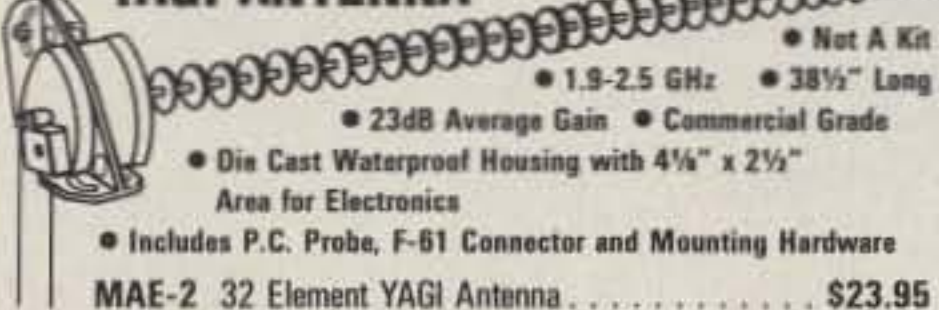


STVA-3 Yagi Antenna, 14.5dB Gain, Selectable 75 or 300 ohm Channel 60-80. .... \$19.95

STVA-4 Yagi Antenna, 14.5dB Gain, Selectable 75 or 300 ohm Channel 44-52. .... \$19.95

RG-59/U 75 ohm Low Loss Coax Cable. . . \$1.2p/ft. F-59 Coax Connector. . . \$ .39 ea.  
MT-1 Special UHF 75-300 ohm Matching Transformer ..... \$1.45 ea.

## AMATEUR — ETV 32 ELEMENT YAGI ANTENNA



- Not A Kit
- 1.9-2.5 GHz
- 38 1/2" Long
- 23dB Average Gain
- Commercial Grade
- Die Cast Waterproof Housing with 4 1/4" x 2 1/2" Area for Electronics
- Includes P.C. Probe, F-61 Connector and Mounting Hardware

MAE-2 32 Element YAGI Antenna ..... \$23.95

## Kato Sons' Regulated Variable DC Power Supply

For use with KSDC-KIT 1.9 - 2.5GHz Down Converter. Completely assembled with Attractive Cabinet, TV/Converter Mode Switch, Frequency Control and LED Indicator.

Model KSPS-1A Assembled Power Supply ..... \$23.95

SPECIAL  
PACKAGE  
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ORDER ALL THREE ITEMS

MAE-2, KSDC-KIT and

KSPS-1A for Only. .... \$74.95

Regular price if ordered separately \$82.85

— CO-AX CABLES ARE NOT INCLUDED —

# Switch to Bambi™!

## Electronically

Bambi Electronic Video Switch ... makes switching of your VCR/VTR, Pay TV Decoders, Cable TV, Video Discs, Video Games, Closed Circuit TV, Antennae and Microcomputer as easy as pushing buttons.

The Bambi Electronic Video Switch is an electronic computerized switching network with memory which can accept up to six different sources of video signals and provide the flexibility of directing the inputs to any or all of the three outputs.

Now you can eliminate ... the drudgery of disconnecting and reconnecting your video equipment each time you use it ... the tangled mess of cables which are impossible to trace out ... not being able to use more than one function at a time.

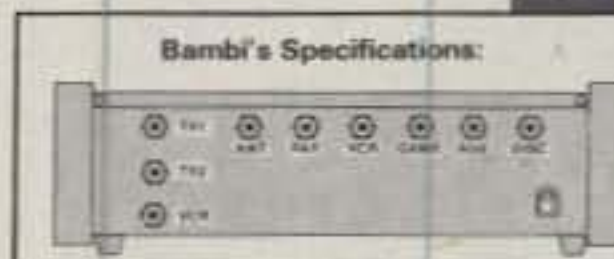
Bambi lets you enjoy using your video equipment the way it should be ... electronically and on line at the push of a button.

Model BEVS-1 Completely Wired and Assembled. Includes comprehensive Instruction/Operation Manual and Decal Set for customizing your Video Switch installation.

\$129.95



Bambi's front panel was designed with the user in mind. Computer styled construction, with soft-touch keyboard (rated for over 10 million operations), arranged in matrix form allows easy input/output selection without referring to charts. Functions selected through the keyboard are immediately displayed on the 18 LED status indicators.



Bambi's Specifications:

- Input/Output Impedance 75 ohm
- Signal Loss 3dB ±1dB
- Noise 4dB ±1dB
- Input Return Loss 12dB min.
- Isolation 65dB min.
- Power Req. 117VAC 60 Hz, 2W
- Dimensions 10 1/4" W x 6 1/4" D x 3 1/4" H
- Weight 4 1/2 lbs

Check the quality of Bambi against that of much higher priced competition. All solid state electronic switching provides low attenuation (3dB), wide frequency response (40-890 MHz), and excellent isolation between signal sources (each I/O section individually shielded for 65dB min. isolation).



FREE  
Bambi  
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with  
any  
purchase

## NEW VCR Quality



Assembly  
Time  
Approximately  
5 Minutes.

## MODULATOR

Not a Game Type Modulator

The MPS-1 Kit converts Video/Audio signals to a crystal controlled RF output for TV Channels 3 and 4. The MPS-1 Modulator's adjustable inputs are designed to match all TV Cameras and VCRs and features a voltage regulated power supply, power switch and LED indicator. No Tuning Required. Operates on 117VAC. Ideal for use with our new Debbie CCTV-1 and revised Bambi BEVS-1S.

MPS-1 Modulator Kit ..... \$39.95

## SEE PACKAGE OFFER BELOW FOR ANTENNA, DOWN CONVERTER, POWER SUPPLY, & RF AMP.

### Kato Sons' Down Converter Kit ★1.9 - 2.5GHz★

Designed for Simple Simon by former Japanese CQ Amateur Magazine's UHF Editor/Engineer. Unit utilizes new ingenious Printed Circuit Probe for maximum gain. Circuit board fits inside MAE-2 antenna housing. Requires mechanical assembly only. All electronics are pre-soldered and pre-tested. Usable up to approximately 15 miles.

Model KSDC-KIT 1.9 - 2.5GHz Down Converter Kit ..... \$34.95

### Kato Sons' RF Amplifier ★22dB Gain★

High quality 2 stage low noise RF Amplifier for 1.9 to 2.5GHz. Unit requires approximately 10 minutes assembly. Fits in same housing with down converter. Covers distances of up to 30 miles.

Model KSRF-2 RF Amplifier ..... \$23.95

SPECIAL  
PACKAGE  
OFFER

ORDER ALL FOUR ITEMS

MAE-2, KSDC-KIT, KSPS-1A

and KSRF-2 for Only. .... \$94.95

Regular price if ordered separately \$106.80

— CO-AX CABLES ARE NOT INCLUDED —

## BE SECURE WITH BAMB!

Bambi Now Provides Home/Industrial Security With The New ...  
**Automatic Sequential Scanning BEVS-1S**

That's right! In addition to Bambi's regular features listed above, we have added Autoscaning with a controlled 1-10 second Variable Delay for up to six input security cameras. The BEVS-1S allows simultaneous recording on a VCR while observing activity on the monitor. Manual lock-on of any one of six inputs can be accomplished at any time. The BEVS-1S coupled with our new Debbie CCTV-1 listed below makes an excellent security system for your Home or Business.

BEVS-1S Sequential Scanning Electronic Video Switch. . . \$199.95

## You Should Have Debbie's™ Quality!

Debbie  
CCTV-1  
CLOSED  
CIRCUIT  
TELEVISION  
CAMERA



Excellent For Use In Home or Business Security Systems, Monitoring Production Lines, Childrens Play Areas, Etc.

Features:

- 2/3" Electrostatic Focusing Vidicon Tube
- EIA 525 Line, 60 Fields Per Sec. Scanning System
- 600 Line at Center Horizontal Resolution
- 1 Footcandle Minimum Illumination
- 10,000 to 1 Automatic Light Control Range
- 1.0Vpp Composite, Negative Sync, 75 Ohm Video Output
- 40dB Signal to Noise Ratio
- Standard "C" Lens Mount
- 110V ±10%, 50-60Hz, 9 Watts

Debbie CCTV-1 Requires C-Mount Lens ..... \$159.95

16mm, F1.6 Hi-Resolution Lens w/Cap ..... 19.95

Mounting Bracket Flexible, Locking, 360° Gooseneck for use in ceiling or wall mounting ..... 12.95

NOTE: When using the Debbie CCTV-1 with Bambi BEVS-1S, an RF Modulator such as our Model MPS-1 is required.

## MODEL IC-1 INFRARED CONVERTER

Adapts to any video camera. Reduces energy costs for night viewing by 60%. Video tape in the dark without being detected. Excellent for • Factory Grounds Security • Home Surveillance.  
Write for Details.

★ PWD FOR DETAILS SEE OUR PAST ADS

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— VISA and Mastercard Acceptable —  
\*Check orders will be held 30 days before shipping.

USS Ault, a 2,200-ton destroyer, refueling in rough Pacific seas from an aircraft carrier. Radio amateurs served in communications aboard every type of ship in WW II. (Photo by Lt. Cdr. Barrett Gallagher, USNR.)



Lieut. Malcolm Robertson, W1BPN, (left) and Stuart Cowan, W2DQT, on Mog Island. W1BPN died aboard USS Hazelwood off Okinawa in April 1945.



Ensign Sam Jackson, W2BZ, killed aboard the cruiser USS Vincennes, August 9, 1942.



Ensign Fred Harrington, W9WDR, killed aboard the aircraft carrier USS Wasp, September 15, 1942.

**For many of you, this story will bring back memories of those brave amateurs who served in WW II. We should follow their example and values more closely.**

# ARE THE TRADITIONS OF AMATEUR RADIO DYING?

BY STUART D. COWAN\*, W2LX



The torment and turbulence which infect the world today are having an effect on amateur radio, and thoughtful amateurs are concerned about the amateur service, if present trends continue.

Malicious interference, obscene language, lack of consideration for others, illegal high power, cheating on DXCC awards, incompetent operation, and decreasing technical interest and ability—these are among the worrisome undercurrents creating today's problems.

I have heard unpardonable rudeness to newcomers by older Extra Class amateurs. Once on 75 meter s.s.b. when a VE3 tried to introduce two youngsters to amateur radio, a K1 uttered an insulting remark and continued his idiotic chatter. Fortunately, a loud W3 broke in, talked with the youngsters, and made friends for amateur radio.

When new amateurs question these disturbing trends, they are often told that these practices have always been present, and not to be overly concerned. I wish this were true, but fifty years as an active amateur, using many modes and bands, tell me that our problems today are more pervasive than in the past.

While the vast majority of amateurs do not engage in these destructive practices, the minority of amateurs who do are present in greater numbers than in years past; the easy availability of high-performance equipment and antennas gives this unstable fringe group increased visibility and power for harm.

The deliberate interference to essential emergency communications—with lives and property in the balance—shows beyond doubt that these amateurs are, in fact, mentally deficient sociopaths and perhaps, in a few cases, actual psychopaths. Unfortunately, every segment of society in every country is plagued with these individuals simply because not everyone's brain components were hooked up correctly by nature, or the components malfunction as a result of external events. This is a situation which we, like society's other groups, must live with, but in our case some degree of prevention is possible, and, I believe, will be implemented by responsible amateurs in cooperation with the FCC, aided by legislation which encourages it. Self-policing by amateurs has always been a proud tradition and can attain a still more effective level which includes precision direction finding.

The irresponsible actions of this relatively small group of amateurs are so frustrating that it is difficult to keep the whole broad picture in proper perspective. The fact is, of course, that the great majority of amateurs possess an ingrained sense of pride and tradition and exhibit the true amateur spirit. Vital emergency communications, message handling,

teaching and encouraging newcomers, helping the handicapped, promoting international friendship, armed forces nets, and technical experimentation—these are the very foundation of the amateur service and why so many nations encourage amateur radio.

The contributions of inquiring amateurs to technical progress and the communications art are a familiar story. Armstrong, Godley, Maxim, Schnell, Reinartz, Hull, and many others less well known are woven into our history. But there is another impressive chapter in the heritage of the amateur service, one perhaps not as widely known as it deserves.

When the United States entered World War I in 1917, there were 6,000 amateurs in the country and 4,000 entered the armed forces, forming the backbone of our communications system. In 1941, there were 60,000 U.S. amateurs of whom 25,000 were on active duty with the Army, Navy, Marine Corps, and Coast Guard by the end of World War II. Another 25,000 worked in defense industries using their skills and experience to design, produce, and service military communications and electronic equipment—including something new called radar. Amateurs also served in the FCC, War Emergency Radio Service, and other organizations. The 1942-1945 issues of *QST* chronicle the work of amateurs in the war and photographs showed hams in aircraft, foxholes, aboard ships, and at key shore facilities.

There is no accurate record of the number of heroic amateurs who lost their lives in the service of their country, but *QST* listed a number of them in its "Gold Stars" columns. Three amateurs who were good friends of mine died in World War II.

In April 1941, I reported for active duty at the U.S. Naval Training Station, Noroton Heights, Connecticut, with 45 other communications specialists. In our class were experts from RCA Communications, Mackay Radio, General Electric, NBC, CBS, and other companies; 15 of us were radio amateurs.

Two of my friends in the officers' school were Fred Harrington, W9WDR, from Chicago, and Sam Jackson, W2BZ, from New York City. Fred was a delightful fellow with a ready smile, a quick sense of humor, and experience in the Naval Reserve. Sam was tall, on the quiet side, with a warm personality. On completion of the 30-day course, Fred received orders to the *USS Wasp*, an aircraft carrier, and Sam to the heavy cruiser *USS Vincennes*. Both were assigned communications duty which took advantage of their experience in amateur radio.

In the bitter night battle of Savo Island on August 9, 1942, torpedoes and shells smashed into the *Vincennes* and left her disabled and burning. In the early morning hours, she rolled over and sank. Sam Jackson, W2BZ, died in the inferno.

On the afternoon of September 15, 1942, the *USS Wasp* was providing air



Amateurs have made major contributions to the electronics industry. Bill Eitel, W6UF/WA7LRU, (left) founded EIMAC with Jack McCullough, W6CHE. The late Percy Spencer, W1GBE, (right) vice president of Raytheon, invented the method of mass-producing magnetron radar tubes during WW II. (1963 photo by the author.)

Radio room aboard ship in World War II. One kilowatt transmitter (left) and receivers (center and right). (Official U.S. Navy photograph.)



\*Box 596, Rye, NY 10580

Shore fire control party directs naval gunfire on targets. Note hand-cranked generator. (Photo by U.S. Army Signal Corps.)



Radio amateurs operated every kind of station ashore and afloat. (Photo by U.S. Army Signal Corps.)



Radio Central aboard a cruiser in World War II. All copy is on typewriters. Transmitters were located in a separate compartment. (Official U.S. Navy photograph.)



In *The Double-Cross System*, Masterman recounts how most of the German agents sent to Britain were bunglers who were quickly caught and either executed or, more often, turned into double agents who maintained c.w. radio contact with Berlin, transmitting false and misleading information. British amateurs played a role in this hush-hush game of deception.

The late Col. Charles Porter, K2ER, was stationed at an Army radio station in Cairo which kept schedules with secret agents in the Balkans. These spies used 6L6 crystal oscillators concealed in loaves of bread, and a wire out the window, to transmit intelligence information to the allies. Radio amateurs in New York City had designed these small, dependable rigs, drawing on their ham know-how and experience.

Another U.S. radio amateur made a major contribution to the cryptographic security of enciphered messages on the Navy's one-way (Fox) fleet broadcasts from NSS, NPG, and NPM.

The Army found amateurs of incalculable value in expanding its communications system. Major General Harry C. Ingles, wartime Chief Signal Officer, wrote, "Amateur radio has confirmed the wisdom of the national policy which encouraged and supported it."

Rear Admiral Joseph R. Redman, former Director, Naval Communications, said, "Naval communications has long recognized the value of the amateur. They served with ability, enthusiasm, and unflinching devotion to duty. Their accomplishments won praise on every ship, on every beachhead, and in every laboratory, radio station or communication office in which they served. The Navy will forever carry to its advantage the mark of the radio amateur."

Two interesting stories—both probably apocryphal—surfaced after World War II. One quoted Reichsmarshal Hermann Goering as saying, in the closing days of the war, that one of Nazi Germany's mistakes was that it failed to encourage amateur radio as did Great Britain and the United States.

In the other, an American marine and a Japanese soldier, both wounded and exhausted, found themselves occupying the same foxhole on a Pacific island where a fierce battle thundered. Through some aberration of fate, they found that they were both radio amateurs, and that ended hostilities in the foxhole. Senseless and terrible as it is, war tends to sort out values.

\* \* \*

You will forgive me if, when I hear the practices mentioned at the start of this story, my memory harks back to the men who built amateur radio, and to those gallant amateurs who gave their precious lives in the service of their country and the cause of freedom. It is on their ability, devotion, and heroism that amateur radio stands today. We, the living, must not fail them. □

cover for a vital convoy carrying the 7th Marine Regiment and 150,000 gallons of aviation gasoline to Guadalcanal where the battle for that strategic island raged. With a shout, a lookout spotted torpedo wakes to starboard. Before the carrier could turn toward them, two "fish" struck the *Wasp*. Violent explosions tossed her flight deck planes into the air like toys. Ammunition exploded with a roar and fires flared from gaping gasoline lines. Then a convulsive blast shook the huge carrier and the *Wasp*, afire and sinking, had to be abandoned. Fred Harrington, W9WDR, gave his life that violent afternoon in the southwest Pacific.

Another friend at the Noroton school was Malcolm Robertson, W1BPN, a Chief Radioman. Four years later, in 1945, I ran into Mal on Mog Mog, a recreation island in the western Pacific. We downed cans of beer and talked of amateur radio, friends, and the war. Mal was now a senior lieutenant and communications officer of the *USS Hazelwood*, a destroyer. I was aboard the *USS Barton* as communications officer for Commander, Destroyer Squadron 60.

The conquest of Okinawa was a searing battle, and the destroyers were under almost constant attack by Japanese kam-

ikaze suicide planes which dived into the ships. On April 29, 1945, the *Hazelwood* sustained a savage kamikaze attack which reduced her bridge and superstructure to twisted, blackened steel. One quarter of her crew, including the captain, was killed in the attack. Lieutenant Malcolm Robertson, W1BPN, died that bloody afternoon.

Nora Hopper's moving poem says it for us all:

"Blow, golden trumpets mournfully,  
For all the golden youth that's fled;  
For all the shattered dreams that lie,  
Where God has laid the quiet dead,  
Beneath an alien sky."

Little is known of the courageous work of radio amateurs in foreign countries in World War II. Many served the cause of freedom in the shadowy worlds of underground resistance, radio deception, radio intelligence, espionage, and counter-espionage. Some of their undertakings still cannot be written about. For those who wish to know more, I recommend *The Double-Cross System in the War of 1939 to 1945*, by J.C. Masterman, Yale University Press, and *The Ultra Secret*, by F.W. Winterbotham, Harper & Row.

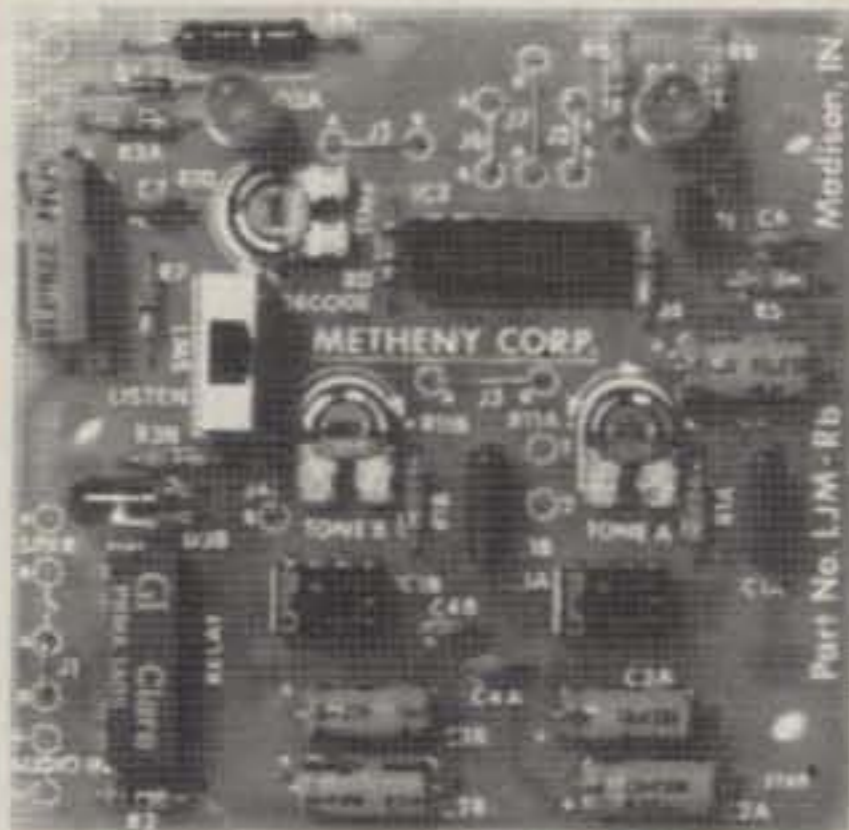
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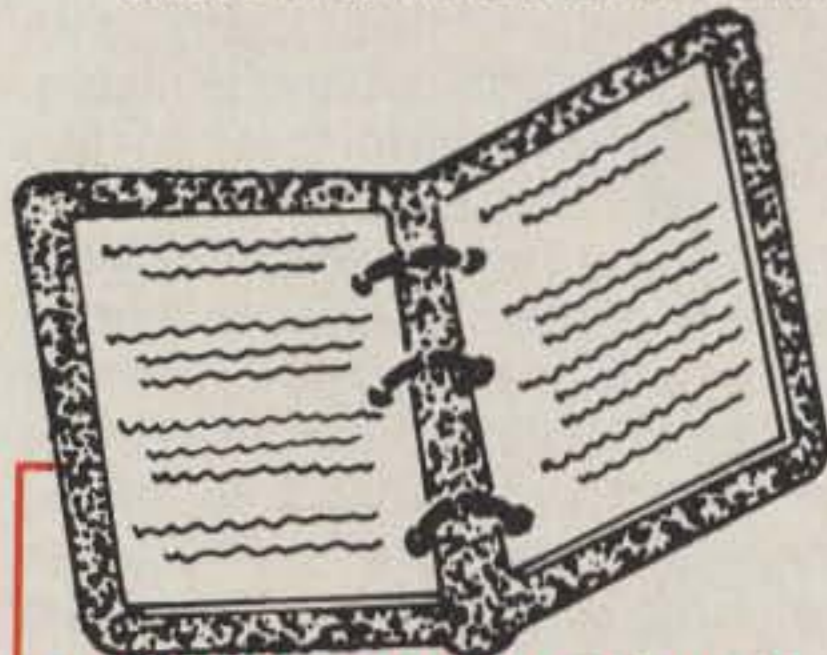
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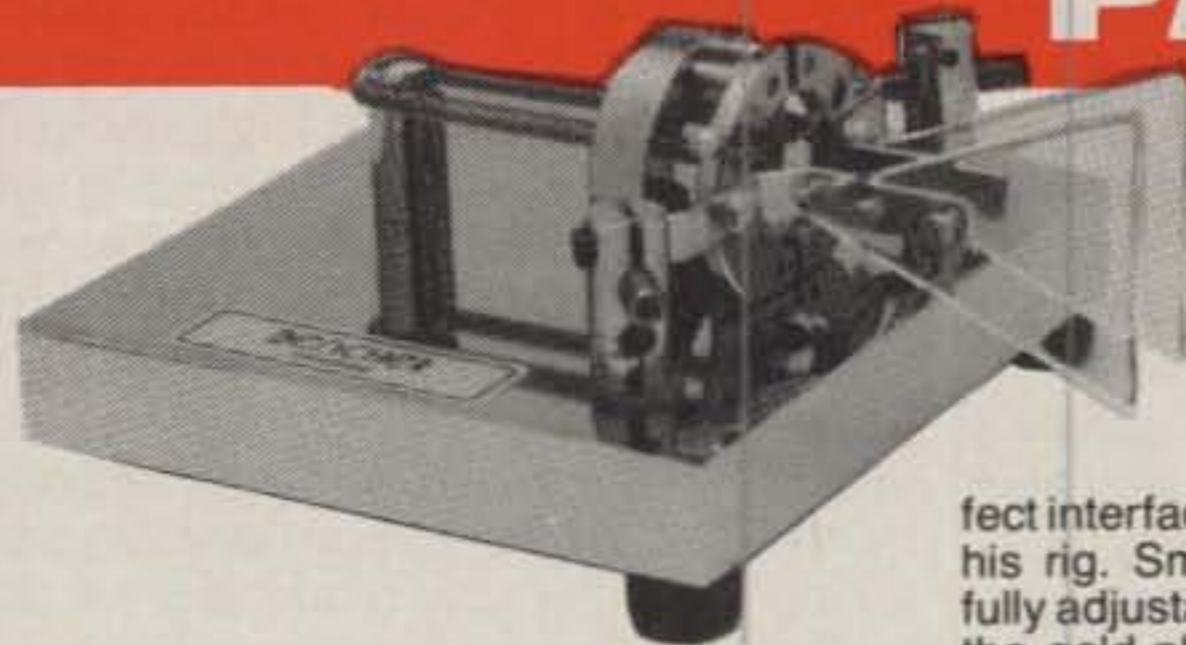
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## THE ART OF VERY LOW POWER OPERATING

### K8IF Steps Down

About eight years ago, I met Tom Davis, K8IF, on the old *Milliwatt* 80 meter QRP Net. I was struck by his dedication to QRP even then. He'd be the first guy to QNI with his little signal from the east coast, at that time signing WB2TEN, and he'd be the last guy hanging around after the Net session, so we ended up having long ragchews about QRP afterwards. After *The Milliwatt* ceased publication and its Nets were discontinued, Tom jumped into the gap, scheduling and NCS'ing nets on 80 and 40 meters, and then on 20. He hung in there alone for about two years, sometimes the only one who showed up, and it was a rough, lonely struggle for quite a while until a few other QRP devotees took over some of the NCS duties and QNI's began increasing. I don't know exactly how it happened, because my complimentary copy of the QRP ARC I newsletter stopped coming for a while, and by the time I began receiving it again, Tom had been elected President of the QRP ARC I club. I hadn't heard from him for quite a while, but I have ever since, and we've become good buddies. Those are fond memories of early experiences that we shared.

This note is about Tom's critical role as a leader on the U.S. QRP scene. He provided the vision and drive and diplomacy necessary for switching the QRP ARC I onto a real QRP track. When Tom took over, the QRP ARC I defined QRP as 100 watts input, required prospective members to sign a "pledge" that they would never exceed 100 watts input, and made all club awards, except two, for operating at the 100 input level. The club's leadership essentially saw real QRP—5 watts output and below—as irrelevant to club policy and direction. I don't want to sound critical of the old leadership because those guys were dedicated and expended a great deal of effort in keeping the QRP ARC I alive in a world of QRO amplifiers. However, they lacked the vision and flexibility for change, and eventually most of us real QRP types would become disenchanted with a 100 watt organization calling itself a QRP club and refusing to recognize reality—that QRP had long since come to mean under 5 watt output operation around the world.

I was always impressed with Tom's positive attitude. I'd "read the writing on the wall" back in 1969 and started *The Milliwatt* because of frustration with the club's old-guard stance. Not so with Tom. He looked at it differently. He'd say, "Well, it's the U.S. QRP club and the only one we've got, so why not turn it around to represent the real QRPers interests." I'd always respond negatively about the old-guard Board of Directors and the futility of trying, but he didn't agree. He went to work, figuring that most of the club's active members were 5 watt output types and that the Board should represent their interests. He was right, of course, but it took years of hard work to produce the desired results.

The process was complex, but Tom handled it very diplomatically and within established channels. He beat the bushes for new Board candidates and had them write up "position papers" for the newsletter prior to Board elections, and he urged members to vote. The complexion of the Board slowly began to change.

Tom opened the question of "100 watts input vs 5 watts output" in an editorial, and a heated discussion followed in several newsletters. Of course, I fueled the fires just a wee bit with a broadside attack on the 100 watts input dinosaur. Tom felt the time was right, and he took a straw-poll of the membership via the newsletter to see what the membership wanted. The poll produced overwhelming support for the 5 watt output direction. Of course, the Board dismissed the poll as invalid and non-binding, but Tom had the Board where he wanted it—faced with such results, the Board logically could not refuse to submit to a real binding vote. And it turned out as expected—overwhelmingly in favor of the 5 watt output definition of QRP for club purposes. The Constitution had to be changed, and Tom very diplomatically dealt with the Board, insisting on the new 5 watt guideline and letting them have the remaining 100 watt guidelines.

There were still other barriers: club awards for 100 watt achievement, club contests with 100 watt categories competing with 5 watt and under types for certificates, and worst of all, the "pledge." The "pledge" had turned away many prospective and current members after they got to thinking about it. In some cases, this problem wasn't a

"who needs 'em" type. When notables such as Wes Hayward, W7ZOI, and Doug DeMaw, W1FB, were turned off by the outdated "pledge," the club lost two individuals who, I believe, have been solely responsible for attention to QRP from the ARRL! A QRP club can't afford to be at odds with two guys who have done so much for QRP in the U.S.!

Tom hung in there and eventually, after about four years of effort, removed all traces of the club's 100 watt input vintage. By 1981, the QRP ARC I was a genuine 5 watt output QRP organization from top to bottom. Frankly, I didn't think Tom could pull it off. But he did, and his contribution to QRP in this country is inestimable and far-reaching. I'm sure that in five years or so new QRPers will join the QRP ARC I, overjoyed to find an organization in existence which represents their particular interest in amateur radio, and they'll assume that it was always that way. I want to make certain that some older QRP operator who has read this tribute will set them straight and tell them, "You have K8IF to thank for that because it wasn't always that way."

Unfortunately, Tom couldn't enjoy being President of the organization that he worked so hard to bring into existence. An increase in workload cut deeply into his time. Then, too, Tom had been seeing a Pennsylvania lady (that's where I'm from) whom he'd met years earlier during his wild life as a rock musician on the road, and when several of us had dinner with him at Dayton in 1981, we sensed that something serious was in the air, although Tom didn't exactly admit it. Well, he finally married her after much cogitation and trepidation and is happy that he did. So, being married and setting up a home takes a lot of time, too, and I'm pleased that Tom is excited by it all. I know he misses the action and phone calls and decisions associated with his stint as President of the QRP ARC I, but he's done his share for QRP. I'm sure we all will miss him, but we all wish him well with a "thank you."

Ed Popp, K5BOT, has taken over as President, and I know he'll provide the active leadership that a growing club requires. Ed has been around for quite a few years and has done much in organizing QRP in the southwest. QRP can only go up from here on. (Membership in the QRP ARC I includes the quarterly newsletter with good material in it, as well as a

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QRP number. Queries should go to Ed Popp, K5BOT, 2212 Deadwood Drive, Austin, TX 78744. Applications [\$6.00 dues] go to Ed Lappi, WD4LOO, 203 Lynn Drive, Carrboro, NC 27510.)

### The Book

New Years has just rolled by, and I figured that I had better report on my progress with the long-promised QRP handbook. The end is in sight—finally! As things look, it will be an 8" x 11" format and about 350-400 pages long. I have 8 chapters (about 850 pages of manuscript) completed and am closing in on the remaining 3 chapters. At this rate we should see a late 1983 or early 1984 publication date.

### Trophy Update

Incidentally, the DXCC QRPp Trophy fund is nearly depleted after a rash of trophy winners whose exploits will be the subject of future columns. At present, 49 DXCC QRPp, 5 DXCC Milliwatt, 5 DXCC 200 QRPp, and 1 DXCC 200 Milliwatt awards have been made. I'm depending upon sale of HW-8 series reprints for funding (test report, plus 2 mods articles plus miscellaneous mods from various sources—the set for \$7.00).

K5WNH/0 WHERE ARE YOU? I need your QTH in order to deliver your One-Watt FD Trophy!

73, Ade, W0RSP



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The HAL CWR6850 brings a new dimension to amateur RTTY operation - PORTABILITY! Even though the size is small, the features are many:

### CWR6850:

- Built-in display screen and demodulators • 5" green CRT display • 32 character display lines • 4 pages of display • 6 user-programmable HERE IS messages • Internal RTTY demodulator for both "high" and "low" RTTY tones, three shifts each (170-425-850) • Baudot or ASCII baud rates of 45 to 300 baud • Morse code send and receive 3 to 40 wpm • Parallel ASCII printer output for received text • Separate, small keyboard • Tape input/output connections • Requires 12 VDC, 1.8 Amperes • 12.75" x 11.75" x 5" (CWR6850); 13.75" x 2" x 7.25" (Keyboard) • 20 lbs, including keyboard



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### DS2050KSR:

- One cabinet for keyboard, display generator, and demodulator • Full 72 character line by 24 line screen • 2 programmable HERE IS messages • Built-in RTTY demodulator for two shifts (170 or 850 Hz) • Send and receive Baudot RTTY at 45 to 100 baud and ASCII RTTY at 110 to 300 baud • Send CW at 5 to 100 wpm • Receive CW (with MR2000 option) from 5 to 100 wpm • RTTY CWID is built-in • KOS (Keyboard operated switch) • Full current loop interface for send and receive RTTY loop (external loop supply required) • SYNC idle • USOS • WORD mode • Bright-dim video to distinguish TX and RX text • 120/240V, 50/60 Hz AC • 14.1" x 8.8" x 4.7" • 18 lbs • Two-tone tan cabinet • External TV monitor required (HAL KG12 recommended).



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### ST5000:

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DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

## Antennas: Random Headings

The past several months have witnessed W8FX's series on various hamshack antenna and r.f. accessories. At this point, columnist Thurber makes a change of pace with a number of antenna subjects of general interest.

The recent series in this Antennas column on hamshack accessories has left precious little time for what might be termed "smelling the roses." We've received a good deal of reader mail in the past few months (mostly complimentary, I should say), and we've perused the literature on a number of interesting new antennas and accessories without having the opportunity to work these items into a column. Now's the time to "shift gear" and catch up with some loose ends.

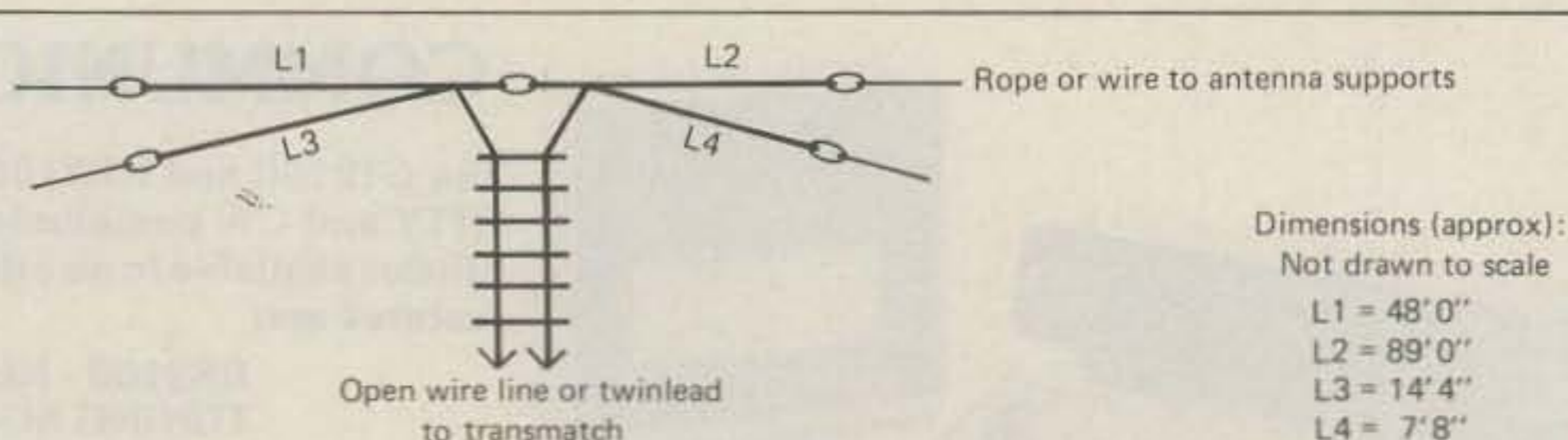
This month, we'll select a few reader letters for highlighting. We'll also take a look at some interesting new Valor antennas and mounts and show how we used them in our mobile installation. Let's first open the mailbag.

### Readers Say

In the January 1982 issue of *CQ*, the column departed from its regular format to trace the early development of the Yagi antenna, going back to the mid-1920s for a look at the life and times of Japanese scientist and father of the parasitic array, Dr. Hidetsugu Yagi. In conducting the research for the article, Tadao Kiga, JA1AR, of the Japan Amateur Radio League (JARL) Central Laboratory helped us a great deal by furnishing important biographical information on Dr. Yagi and his collaborator, Dr. Shintaro Uda—even going to the families for information and photographs. We sent JA1AR copies of the January issue for the JARL files, and we received this nice reply in return:

"... Thank you for sending me two copies of the January issue of the magazine which contained an article on the Yagi-Uda antenna. In my present capacity as chief of JARL's Central Laboratory, not only do I have the function of making study of the amateur radio art, but it is one of my duties to collect vintage things—that is, those which fit in a museum, and information of such. In this con-

317 Poplar Drive, Millbrook, AL 36054



The Windom was originally described in *QST* for September 1929 by L. Windom, W8GZ, as a single-wire-fed, single-band antenna. Over the years, the Windom evolved into a balanced-line fed antenna for multiband operation, usually on 80/75, 40, 20, and 10 meters. This off-center-fed Hertz is a popular compromise antenna for multiband operation, and exhibits a reasonably constant feedpoint impedance that makes matching and transmitter loading easier than with the tuned-feeder antenna (which exhibits widely varying feedpoint impedance). The Windom is usually cut to a half-wavelength at the lowest frequency band to be used, with the flattop fed at a point about 15% from the center with a balanced feedline of any convenient length. The drawback to this antenna configuration is that it will operate only on even harmonics; that is, an antenna cut for 80/75 meter operation will work only on 80, 40, 20, and 10 meters; 15 meters is not covered, having an odd-harmonic relationship with the fundamental frequency. (Contributed by G4DYF)

Fig. 1—The 5-band Windom.

nection, it would be a great pleasure if I could have exchange of information with you on these things should there be a need in the coming years."

Naturally, we are pleased and honored by JA1AR's request for an exchange of historical information; we thank him for his efforts to provide authoritative and detailed information for the Yagi-Uda column. To my knowledge, some of the details provided to us by JA1AR have not previously been published in the U.S.

Going back somewhat further, in the January 1981 column we discussed the Windom and related antennas. We challenged readers to come forward with variations of the basic 4-band (80/75, 40, 20, and 10 meter) Windom design that would allow full 5-band operation, to include 15 meters—difficult to achieve because of the harmonic relationships involved. Picking up on this challenge, Brian Castle, G4DYE, wrote to us more than a year later about some Windom "hints and kinks" he has found useful. Following are excerpts from Brian's letter:

"... Your article on the Windom type of antenna in the January issue of *CQ* interested me very much, as I have been using a Windom on all bands 80 through 10 meters since 1977. Mine works on 15 meters with the addition of a parallel Windom cut especially for that band. The idea for this came from the RSGB publication *Amateur Radio Techniques* (5th Edition),

page 268, of which a photocopy is enclosed. You will notice that the long and short sides are reversed on the added Windom, though this is not justified in the text. I have made it this way. . . . Does it work? Well, I use 4 watts of s.s.b., mostly, and with this have worked all continents, the greatest distance being VK . . . over 50 countries so far."

Brian also went on to describe how he cut "windows" in the 300 ohm TV-type feeder (using a leather punch) so that the feeder is less affected by the weather, and how he developed a universal joint to prevent the frequent breakage of "cheap feeder" when feeding dipoles and Windoms. According to Brian, the twin-lead feeder lasts indefinitely while "flapping happily in the gales," and in fact worked so well that he wrote up his universal joint for the August 1980 issue of *Radio Communication* magazine. Windom and folded dipole enthusiasts may wish to trade antenna and feedline experiences with Brian, whose address is 6 Pinewood Avenue, Sevenoaks, Kent TN14 5AF, United Kingdom.

As shown in fig. 1, the 15 meter Windom he described is cut for a half-wavelength, but is cut in "1/3 and 2/3" segments and suspended below the full-size 80/40/20/10 meter Windom, with the "long segment" of the 15 meter Windom installed on the "short segment" of the longer multiband Windom. As Brian's let-



ter indicated, the five-band version works quite well.

A letter from William D. Bierbaum, WB9KUV, reminded us of the installation and operating difficulties that one experiences with limited space antennas, and some of the solutions that may develop from seemingly impossible situations. I'll pass along what WB9KUV wrote:

"Living in a mobile home can create many problems when antennas are installed. Living in one for 10 years has had me pulling out my hair time after time. What works elsewhere will not work here because of all the metal around. I have experimented with many antennas and have had some successes and failures.

"I recently purchased an FRG-7 and installed a shortwave antenna for it. The antenna seemed to work fine on the receiver, so I tried it on my FT-901DM, and on 40 it really worked fine. Now the problem: How do I get on 80 meters—my lot is 90 feet by 40 feet—too small for any type of dipole; no good for any vertical because of all the metal in the area. So here is the antenna." (Refer to fig. 2.)

WB9KUV continues:

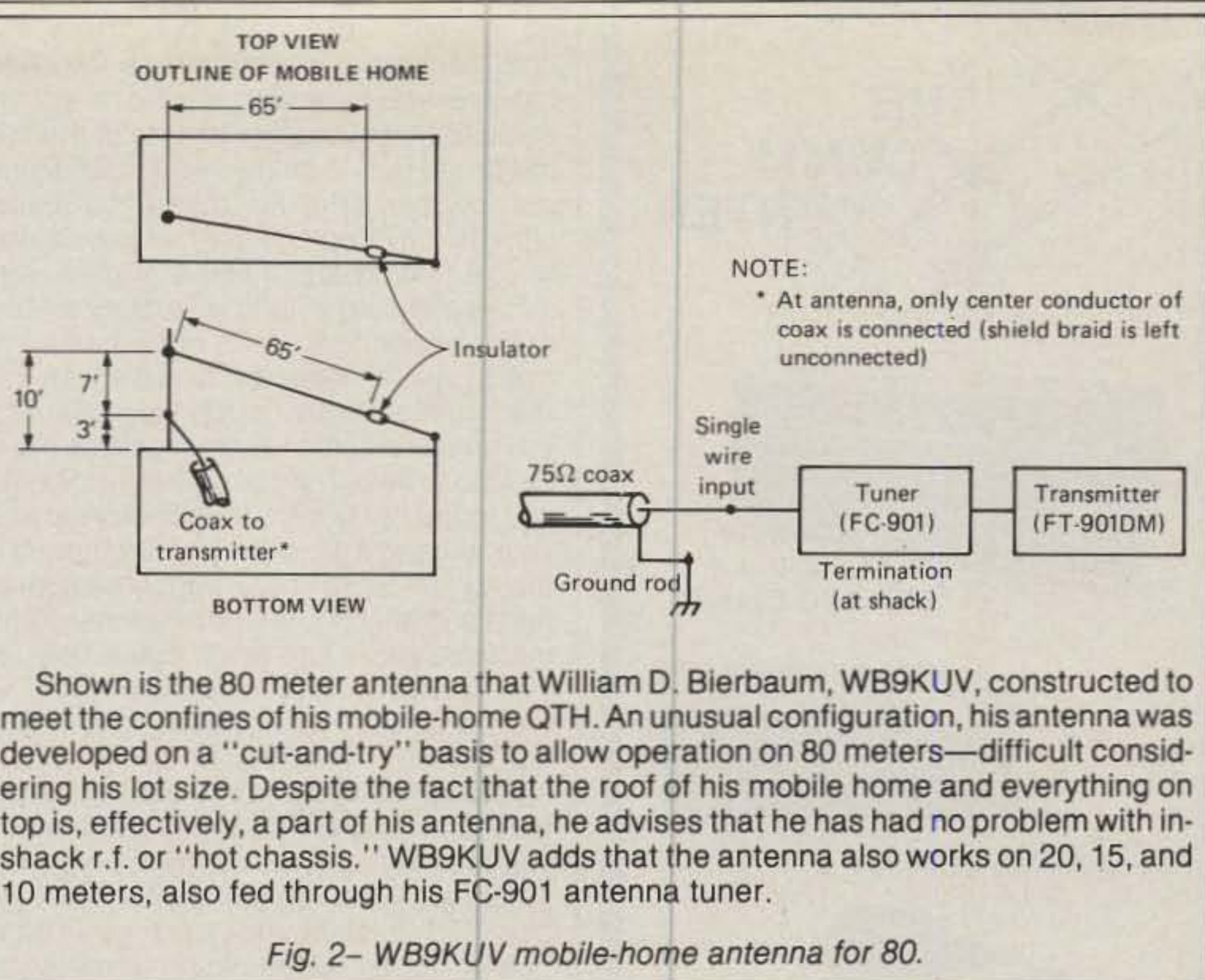
"I only used the center coax conductor at the antenna. Next, I ran the center to my FC-901 (matching tuner to FT901DM). Then I ran my tuner to a 9-foot ground rod. The results were absolutely fabulous . . . By going through the tuner I can maintain a good 1:1 match. Finally, after 10 years I have solved the problem of how to get on 80 meters!"

I'm not sure as to just what principle makes WB9KUV's antenna work so well; his antenna seems to make use of the entire metal roof of the mobile home for a radiator, which could be expected to cause r.f.-induced problems of various kinds. But feeding the antenna, in effect, as a modified single-wire through a shielded transmission line, Bill has hit on something that works for him—which is what *really* counts, and not necessarily compatibility with theory. Mobile-home dwellers might want to contact WB9KUV for more details on his antenna experiments; his address is 3401 East Ridge No. 2, Springfield, IL 62702.

We would be interested in hearing from mobile-home, condominium, and apartment dwellers who have solved seemingly insurmountable antenna-installation problems, especially for operation on the lower h.f. bands (80 and 160 meters). To share your experience with CQ readers, a good sketch, black-and-white photos, and a clear writeup of your antenna are desirable.

In the present era of "ultimate," SPC, and other wide-range transmatchers, it's refreshing to receive a letter from someone who has one of the older classic matching units, such as the Johnson Viking Matchbox (remember?). Dan Nealeigh, Jr., W8CSV, wrote us an interesting letter:

"As a subscriber to CQ magazine, and



Shown is the 80 meter antenna that William D. Bierbaum, WB9KUV, constructed to meet the confines of his mobile-home QTH. An unusual configuration, his antenna was developed on a "cut-and-try" basis to allow operation on 80 meters—difficult considering his lot size. Despite the fact that the roof of his mobile home and everything on top is, effectively, a part of his antenna, he advises that he has had no problem with in-shack r.f. or "hot chassis." WB9KUV adds that the antenna also works on 20, 15, and 10 meters, also fed through his FC-901 antenna tuner.

Fig. 2- WB9KUV mobile-home antenna for 80.

an old one I might add, I have really enjoyed your articles on transmatchers in the last three issues (July through August 1982 CQ). I'm something of a "nut" about antenna tuners, and if you would have the time, I would like to ask a favor.

"Very recently I bought a complete station from an old ham; the only thing it needed was a table to set it on and the antenna strung up. In the collection was a beat-up, and I do mean beat-up, Johnson Matchbox. The cabinet was all butcher-

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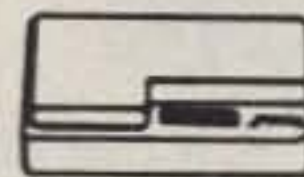
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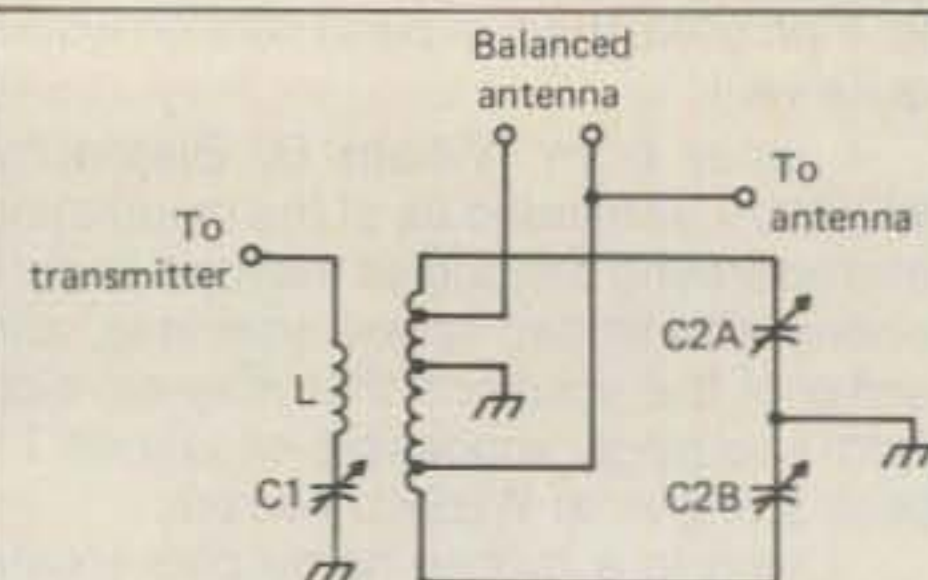
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ed, the coil was a mess, but fortunately, both variable capacitors were OK. As I have several rotor coils around here, I decided to try to incorporate one of them in the tuner, but I'll be darned if I can figure out how to use the dual differential (capacitor) in the circuit. There has to be a way to use that beautiful piece of gear, so I was wondering if in your experimenting or correspondence with other hams you might have an idea how to use it in one of the "ultimate transmatch" circuits, or if you could refer me to someone who might be able to help. I dug back in my old books and found the two QSTs you referred to in your second article (on transmatches) in the August issue of CQ, and remembered that I had built one on the 50-ohmer transmatches years ago when that article (by Lew McCoy, W1ICP, now writing for CQ) first came out. I would be very grateful for any advice or information."

Though other types of transmatches or antenna couplers seem to be more in vogue today than the bandpass-type represented by the Johnson Matchbox—the "L," "T," and ultimate-types—Dan has a "gem" in his Viking which is merely in need of some TLC (tender loving care) to restore it to respectability. In fact, I came upon a "sick" Johnson Viking Matchbox several years ago myself, cleaned it up, put in a few minor modifications (new meter, linear amp changeover relay, 6.3 volt transformer for the relay, etc.) to update the unit, and eventually wrote up the mods for a 73 article about five years back. So I suggested in my reply to Dan that he simply rebuild the Matchbox to its original configuration, rather than change the existing design. I also sent him a partial schematic showing how the dual differential capacitor was used in the original circuit.

The "bandpass" type of matchbox, such as the old Johnson unit, was popular especially for use between coax and balanced (open-wire and twinlead) feeders. It required no balun, since it also works to transform operation from a "balanced" to an "unbalanced" condition. The link coil forms a resonant circuit with the series matching capacitor (though there was no series capacitor in the Johnson unit); the output inductance and dual tuning capacitors also tune to resonance at the operating frequency. The coil taps are adjusted or switched so that the balanced feeders show a good match to the nominal 50 ohm transmitter impedance; a single-wire or coax-fed antenna can also be used with this type of transmatch by connecting the lead-in to one of the coil taps. Although in some tuners adjustment of the link and coil taps is somewhat inconvenient, this is all done fairly simply in the Johnson Matchbox, and the design has a big plus: it characteristically has a "bandpass" type of response—frequencies above and below the operating frequency are attenuated. This is, of course, a very desirable feature from a



Drawing shows the popular bandpass type of transmatch or antenna coupler, of the type similar to the design of the famous Johnson Viking Matchbox and several Drake units. This type of antenna coupling circuit is especially useful for working between coax and balanced (open-wire) feeders; it requires no possibly lossy balun. A single-wire type of antenna can also be used with the bandpass transmatch by connecting it to one of the coil taps, as shown above; even coax-to-coax matches can be effected easily. One big advantage of this type of transmatch is that it characteristically has limited or "bandpass" frequency response for spurious signal and harmonic attenuation, with obvious advantages for both receiving and transmitting.

Fig. 3—Bandpass transmatch.

harmonic-reduction and TVI standpoint. Fig. 3 shows a representative "bandpass" transmatch circuit, similar to that of the Matchbox.

### Mobile Antenna Ideas for 2 and 10 Meters

The recent purchase of a new family automobile, a Honda Accord, necessitated the revamping of my mobile antennas. The replaced vehicle was a large, American-made, 2-door hardtop, with lots of room for multiple antennas, while the new auto was a small hatchback. Rather than adapt the old antennas to the new vehicle, it was decided to scrap them—trunk-lip-mounted 2 and 10 meter verticals—and start afresh. Thus, the search was on for interchangeable, high-quality, but inexpensive antennas to cover the same two bands.

There is no shortage of mobile antennas for 2 and 10 meters, to be sure. However, I was favorably impressed with the quality of the antenna products offered by Valor Enterprises, Inc., in its Pro-Am line. For 2 meters, I selected that firm's "Communications Extender" mobile antenna which, of 5/8-wavelength design, features an adjustable whip for easy field tuning. The 52 inch CX-144 was found to be suitable, could be adjusted to a low (1.5:1) s.w.r. at resonance anywhere over the 144–148 MHz range, and could handle 200 watts. The whip itself is manufactured of 17-7 taper-ground, stainless steel material; the base matching coil uses 16-gauge copper wire; and the base is designed for standard 3/8-24 mounts.

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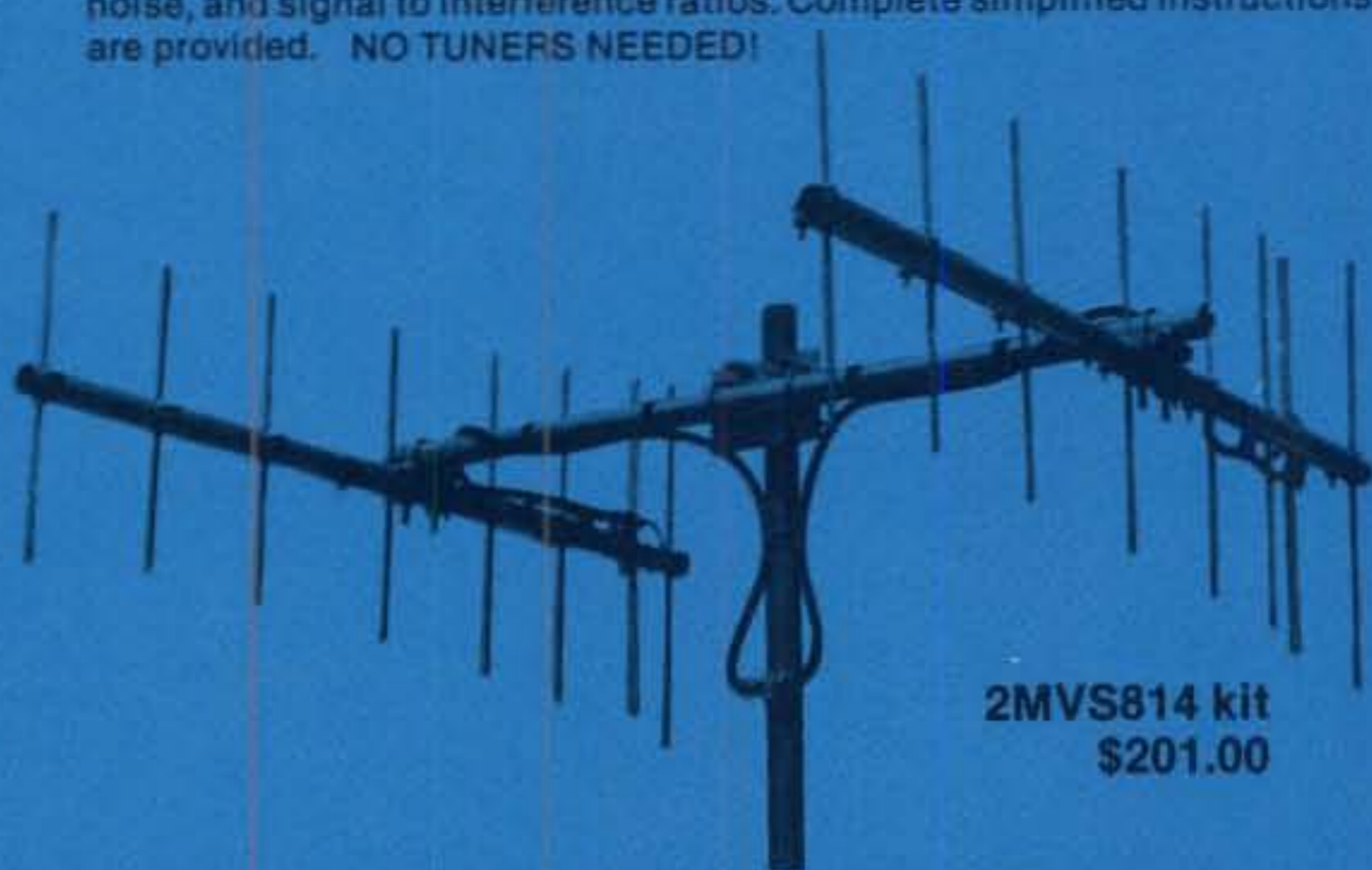
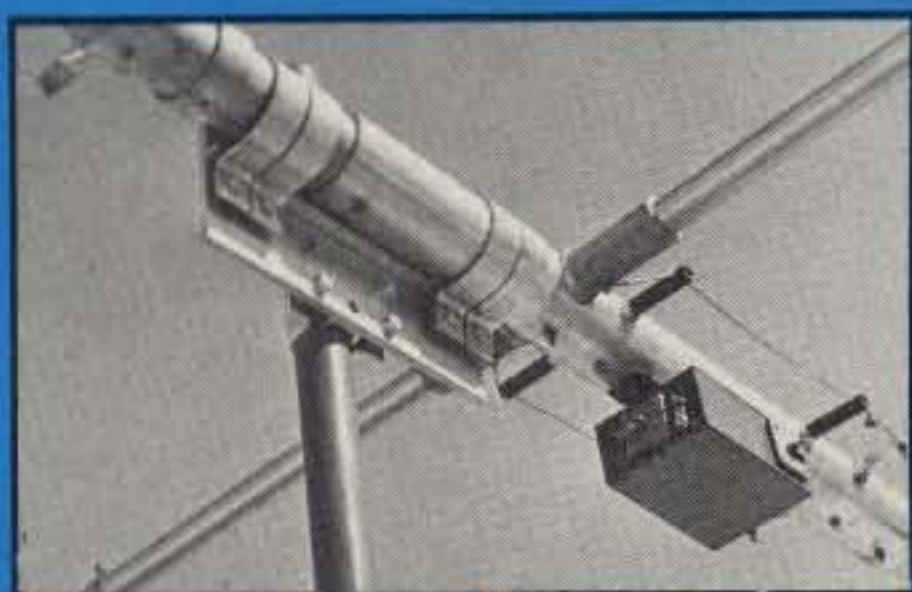
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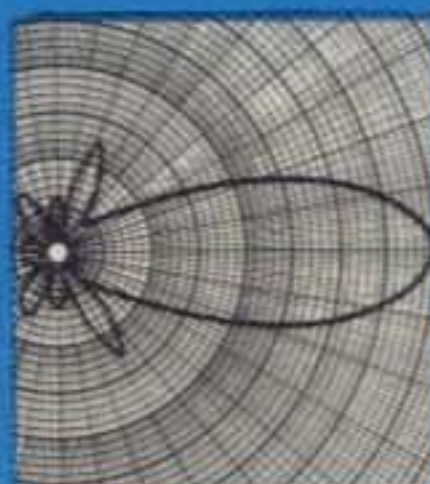
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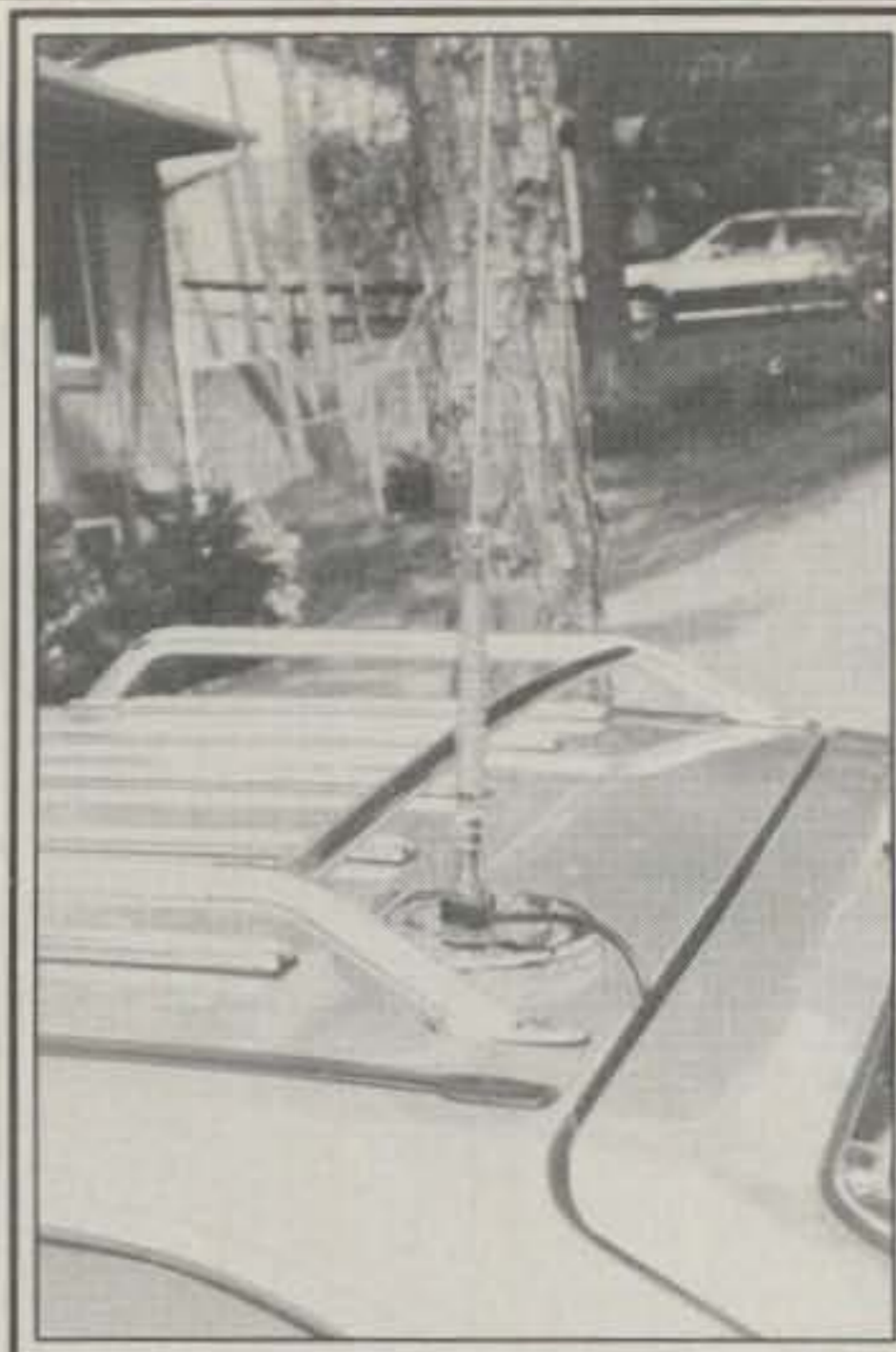
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For 10-meter work, the Model EDM10 base-loaded 10-meter mobile antenna features very simple tuning by means of what Valor calls "Dial-A-Match"™ tuning rings, which slide over the threaded portions of the loading coil; no adjustment of whip length is required. The antenna tunes 28.5–29.7 MHz with a very low s.w.r. at resonance and a power-handling capability of 200 watts PEP, or 100 watts a.m./f.m./c.w. Like the 2 meter series, the antenna is designed to fit a standard 3/8-24 threaded mount.

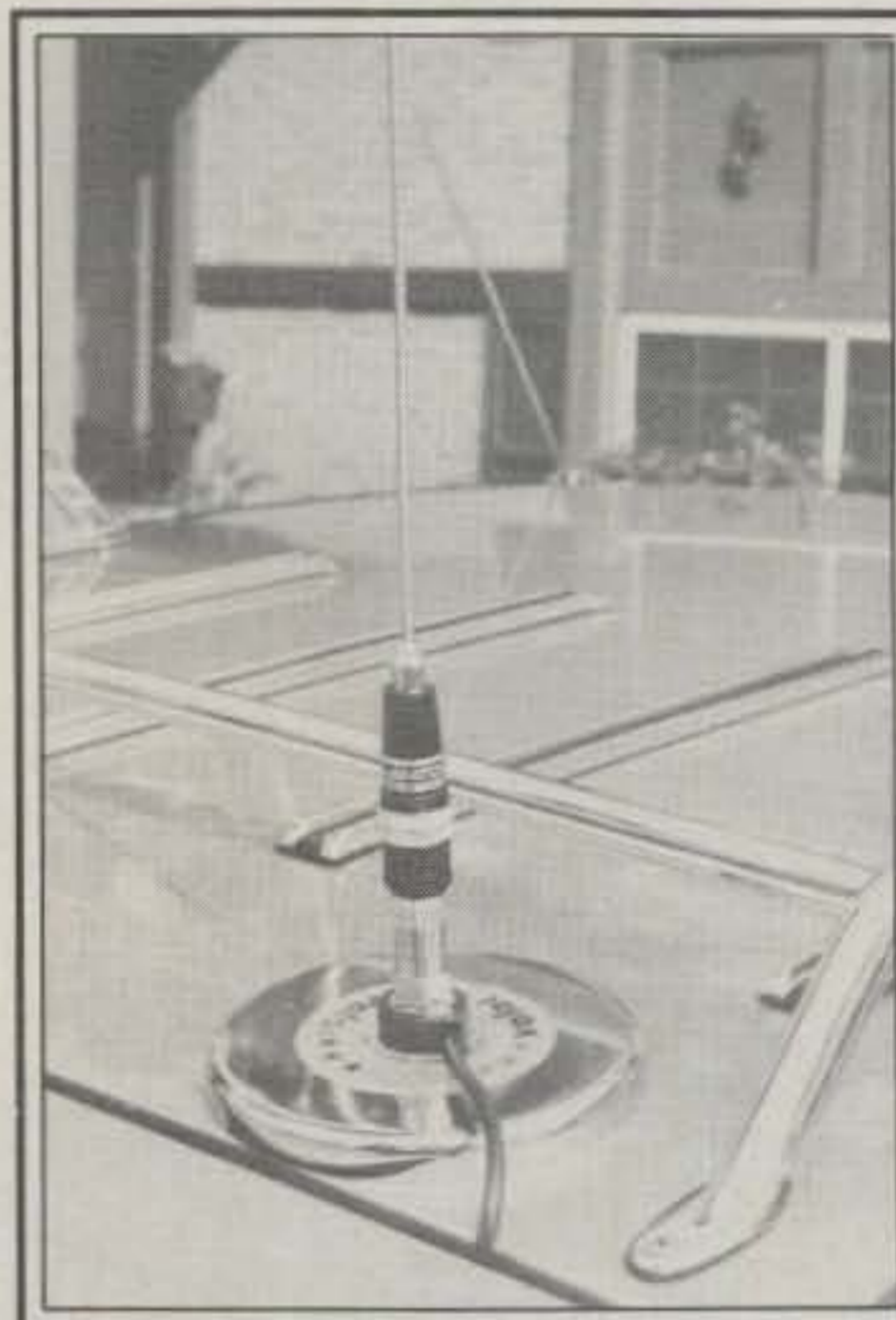
Since both antennas (and most of the others in Valor's line of amateur antennas) have 3/8-24 fittings, it was decided to interchangeably mount the antennas using a common mount, making use of a single transmission line in conjunction with an under-dash-mounted coaxial switch, for changing between 10 and 2 meters.

To avoid any possibility of marring the auto's finish, I used the 401 magnetic mount base. I found it to be one of the heaviest-duty mounts of this type that I have seen; it has a magnet strong enough to be used even with vinyl tops. Thus, it would seem to be unlikely to come loose even at breakneck speeds and with very long or heavy antennas installed. The ground plane established under the antennas has proven to be stable from both a performance and s.w.r. standpoint. A hatchback trunk mount (model SS218K) is also available.

In about six months of operation, the two Pro-Am antennas have given a good account of themselves on both bands. The flexibility of the common-base arrangement has proved to be beneficial, even more so if operation on 220 and/or 420 MHz is considered a possibility for later on. And, having to make but *one* co-



The Valor 2 meter 5/8-wavelength antenna atop the author's hatchback. Note the heavy-duty magnetic mount.



Valor 10 meter base-loaded vertical. Note "Dial-A-Match"™ tuning rings; no physical adjustment of whip length is required for tuning to resonance.

axial cable run in one of the newer compact cars is a big plus. The accompanying photos show my installation.

### Wrapping It

This month, we have publicly answered some reader mail, and we have also taken a look at some new 2 and 10 meter mobile antennas and mounts. Next month, we expect to open the mailbox again, and we will also take a look at several new products. See you then.

73, Karl, W8FX

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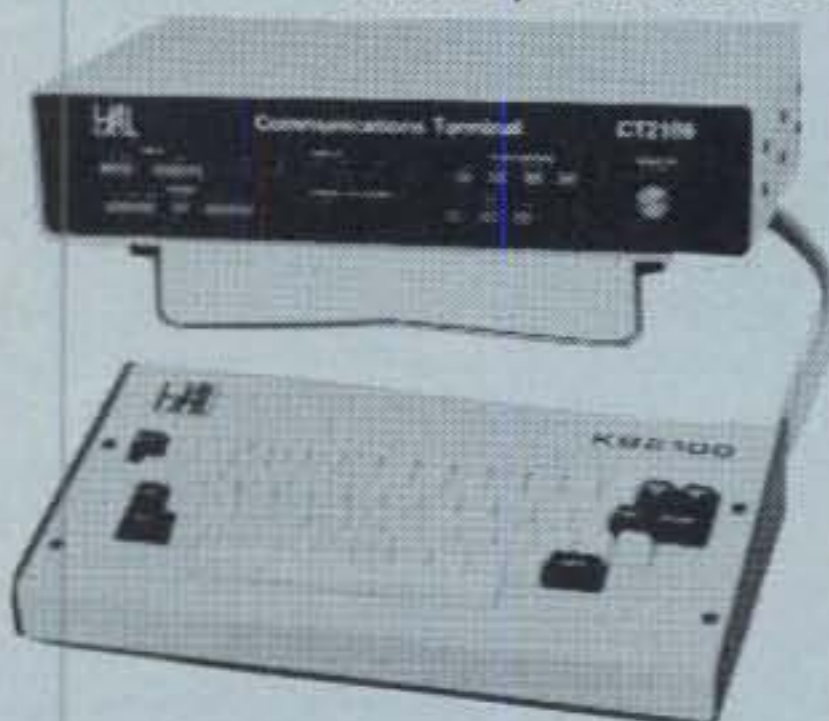
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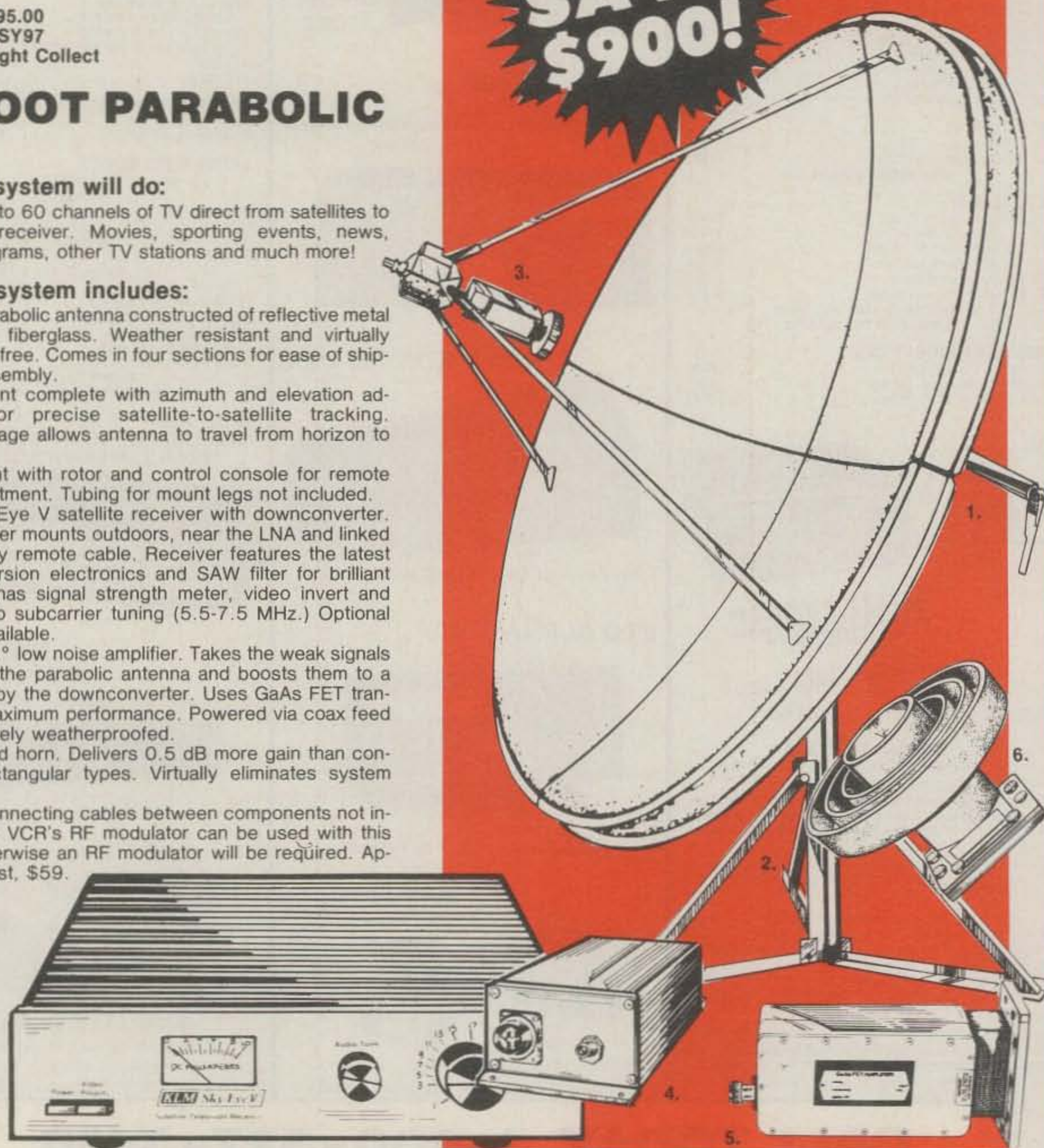
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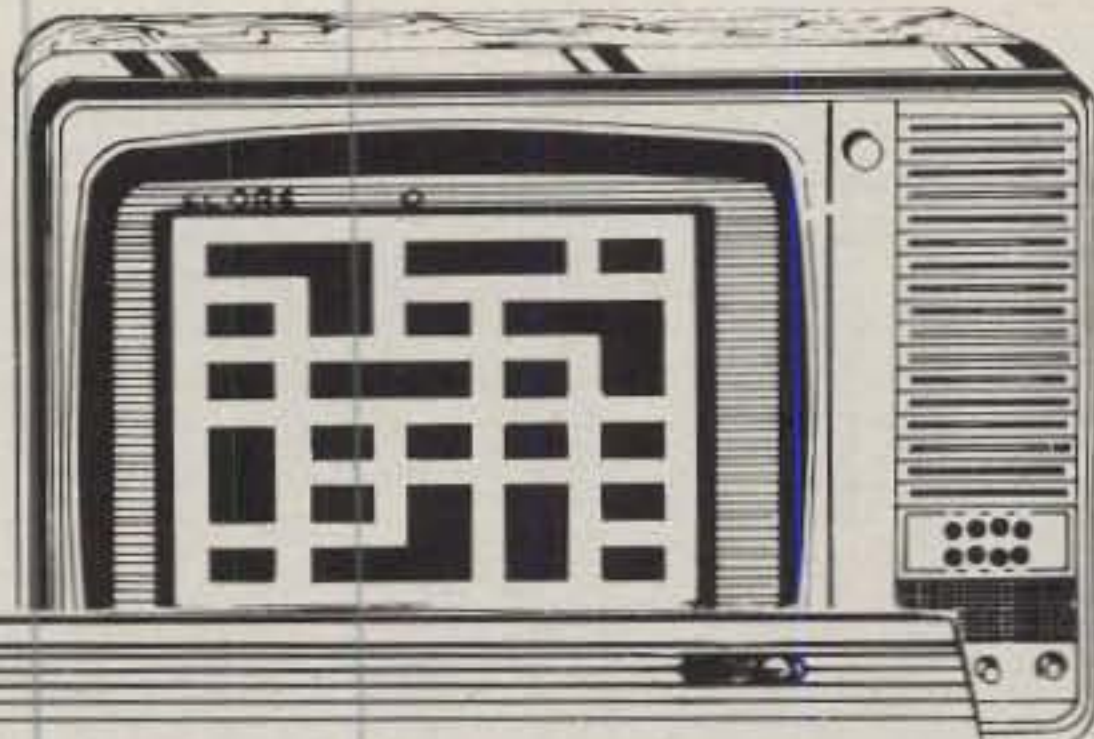
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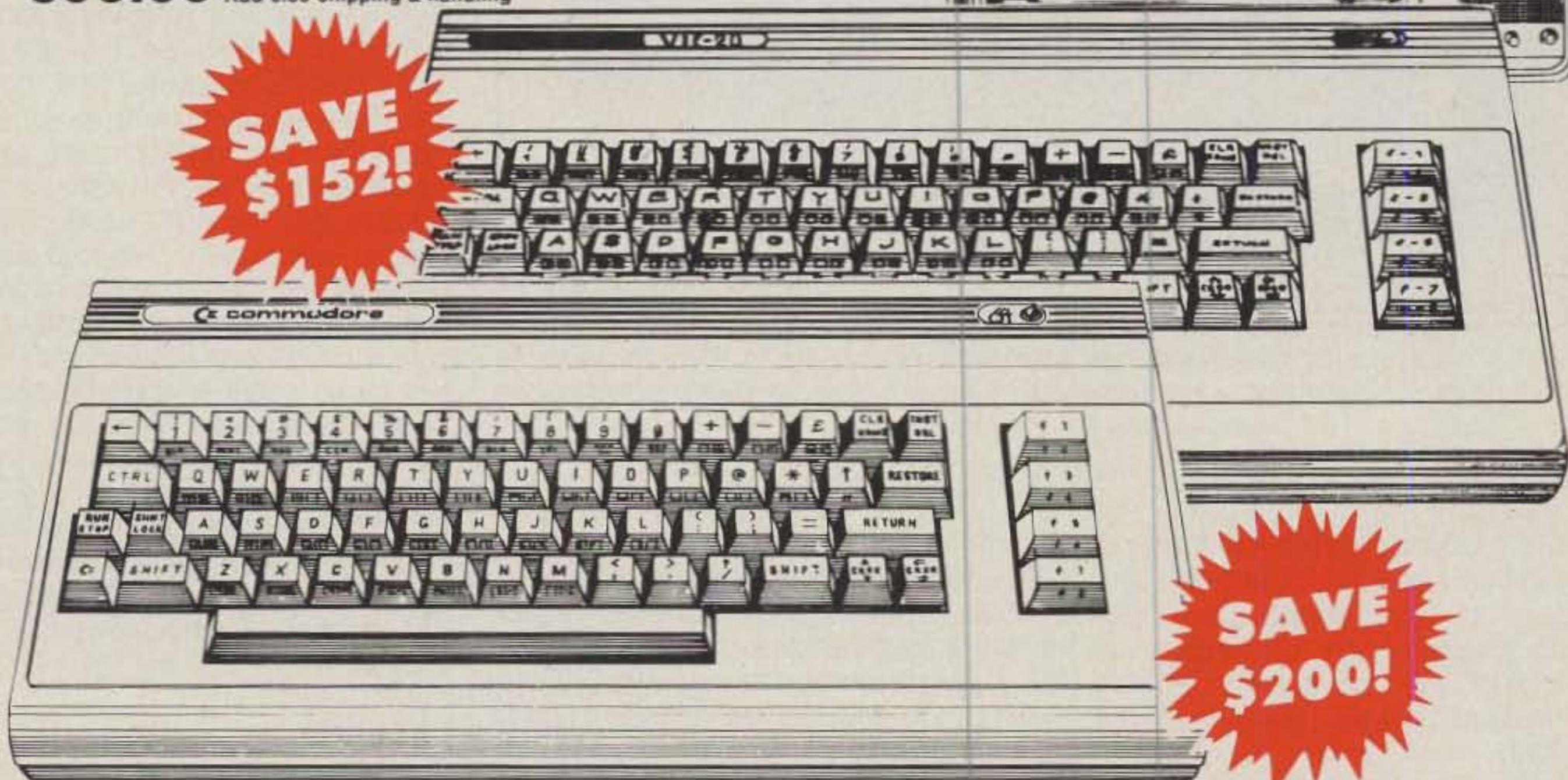
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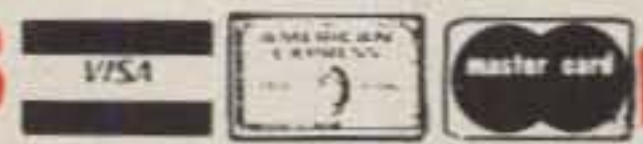
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# CQ Reviews:

## The Ten-Tec Model 229 2 KW Tuner

BY JOHN J. SCHULTZ\*, W4FA



The Model 229 is a smartly styled unit. Two large tuning knobs are used for the variable capacitor and variable inductor elements, while a linear dial scale (0-30) indicates the turns setting for the inductor.

The Ten-Tec Model 229 2 KW Tuner is an interesting example of both old and new ideas. It incorporates many new ideas in a smartly styled "package," and they will be covered in some detail. Table I lists the essential specifications for the Model 229.

However, if one looks at the schematic of the Model 229, as shown in fig. 1, and strips away all the "extras" for the moment, particularly L1 and C7, it will be seen that the basic tuner network used is a single capacitor, single inductor "L" type matching circuit. This approach is in rather sharp contrast to most tuners on the market these days which use various variations of "T" or "Pi" type networks with at least three variable elements: a variable or switched inductor and two variable capacitors. So, before the construction and performance of the Model 229 are even discussed, it might be interesting to digress a bit and discuss the ad-

vantages and disadvantages of various circuits which can be used in a tuner.

The purpose of a tuner these days generally is to match the complex (resistive plus reactive) impedance which is present at the end of a transmission line to the nominal 50 ohms resistive load which most transceivers require (especially solid-state designs) to deliver their maximum power output. The complex impedance which has to be "matched" can vary over moderate ranges, when one considers a multiband trap-type beam antenna, to extreme ranges of resistive and reactive components, when one considers a random-length long-wire antenna being used on different bands. The "numbers" involved in the complex impedance can, however, all be transformed to 50 ohms resistive theoretically by using an "L" network, either in its LC or CL configuration. It is quite possible to confirm this by using Smith charts, although I'll leave this to those who enjoy mathematical exercises.

The component values required in an L network, particularly when considering random-length antennas, are such that

most amateurs years ago found practical components too expensive or too difficult to realize to build wide-range "L" network tuners. Also, in the early 1950s particularly, amateurs were switching to coaxial line-fed antennas and being confronted with all sorts of TVI problems. The "Pi" network tuner came into its own then because it required reasonably dimensioned components for most applications and sometimes could provide a bit of harmonic suppression. The latter, of course, was then something many amateurs were almost desperate to achieve in their TVI battles. So, the "L" network tuner idea faded away, and most amateurs were happy to trade the simpler tuning of the "L" network for the perceived advantages of the "Pi" network tuner.

Later on, the "T" network became popular because it required still more reasonably dimensioned components for wide-range matching. It rarely provides any harmonic suppression, but this factor has faded away in importance as most newer transceivers, even without using a low-pass filter, now have vastly improved harmonic suppression. Of course, the "T" network still requires three tuning controls as does the "Pi" network. So, is it time to go full circle and get back to the "L" network tuner? Obviously Ten-Tec thought so.

### Circuitry

Getting back to fig. 1, one can see some more of the details of the Ten-Tec "L" network tuner. It is a full-feature tuner in the sense that it incorporates

**Circuit:** Modified "L" network.

**RF Power:** 2 kw.

**Frequency Range:** 1.8 to 30 MHz.

**Output Matching Range:** At least 10:1 s.w.r., any phase angle, 1.8 to 30 MHz. 3000 ohms maximum at full power.

**Maximum Balanced Load** (through the balun): 500 ohms.

**Input Impedance:** 50 ohms, nominal.

**Capacitor Voltage Rating:** 3.5 kv.

**Inductor:** 18  $\mu$ h silver-plated roller inductor.

**Finish:** Dark painted front and rear, textured sides and top.

**Size:** HWD 5½" × 13" × 11" overall.

**Weight:** 9 lbs.

Table I—Specifications for the Ten-Tec Model 229.

\*c/o CQ Magazine



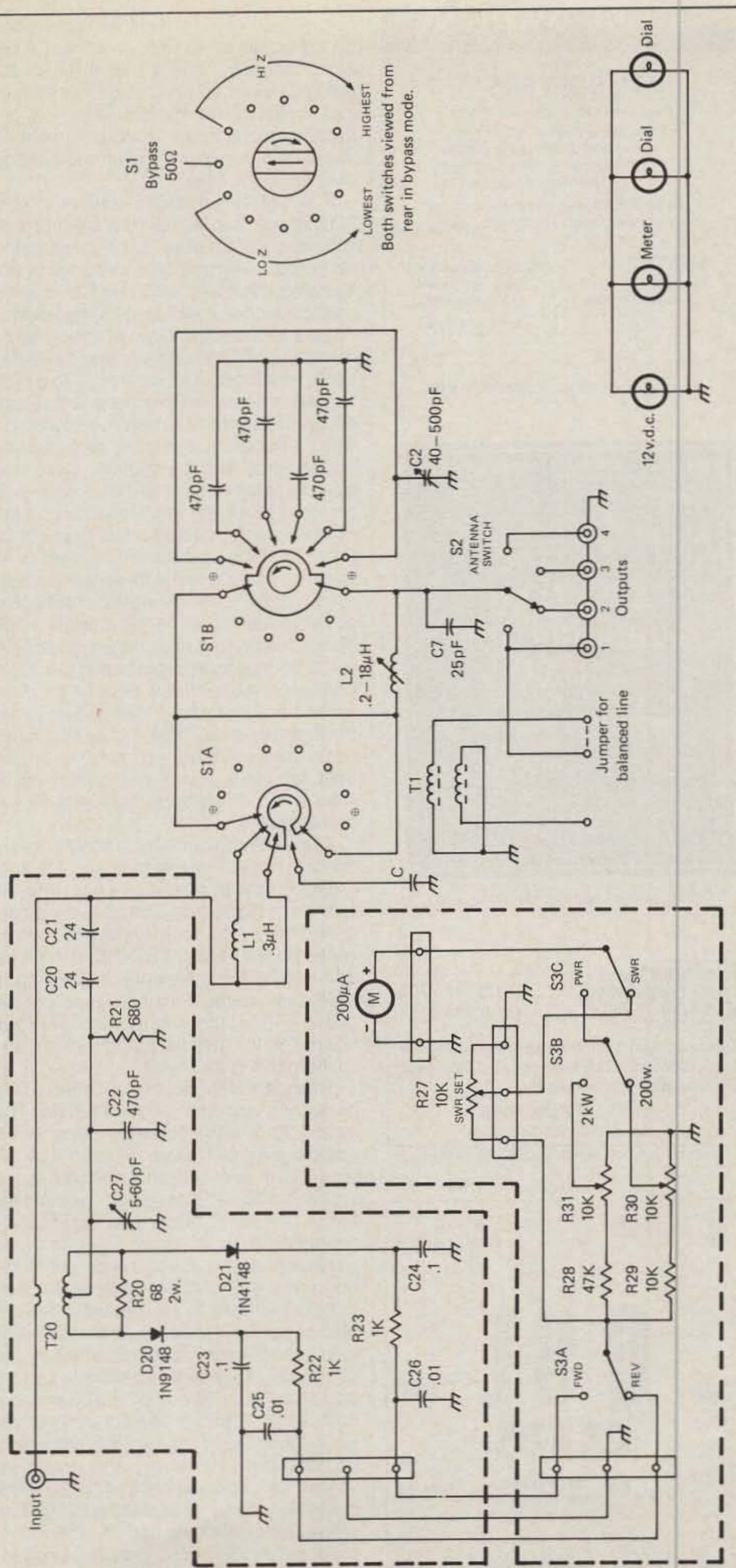


Fig. 1- Diagram of the Ten-Tec Model 229 Tuner.

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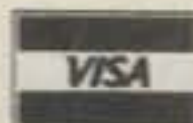
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complete metering facilities, provisions for selecting up to four antennas, a bypass capability, and a built-in balun for feeding balanced transmission lines. Using a sort of left-to-right scanning approach as one looks at fig. 1, it might be interesting to explore the features incorporated in the tuner.

The metering circuitry centers around T20, which is a ferrite-core line-current-sampling transformer. Both forward and reflected transmission line currents are sampled, rectified, and used to drive a meter which is calibrated to read power ranges of 200 watts forward and 20 watts reflected, or 2000 watts forward and 200 watts reflected, or s.w.r. from 1 to 6. The various ranges and functions are selected by pushbuttons. When the power forward/reflected ranges are selected, no adjustments are necessary since the power scale on the meter is already calibrated. The power-scale readout on the meter is such that about two thirds of total scale meter deflection represents either 100 or 1000 watts for forward power readings, or 10 or 100 watts for reflected power readings, depending upon which power measuring range is selected (200 watts or 2 kw as designated on the pushbutton controls). If s.w.r. is to be measured directly, one does have to go through the usual routine of setting a full-scale deflection on the meter using an **SWR set** control and then switching to read s.w.r. directly as displayed on the meter scale.

The metering circuitry is fairly conventional in its general makeup, and it is nicely executed with a generous amount of filtering and bypassing. The circuitry is contained on two PC boards, one mounted directly by the "input" SO-239 connector and one by the meter. It's interesting to note that connectors are used on the boards for interconnection between boards, to the **SWR Set** potentiometer and to the panel meter.

The heart of the tuner is, of course, the circuitry associated with switch S1. The switching is rather cleverly done, but if one traces it out, it will be seen that the tuner can take on the configurations shown in fig. 2. The variable capacitor has a 40-500 pf range and the inductor has a 0.2 to 18 µh range. The unmarked capacitor shown in fig. 2 represents the up to four 470 pf fixed capacitors which can be switched in parallel with the variable capacitor. However, the most clever idea incorporated is represented by the components labeled "C comp" and "L comp" in fig. 2. "C comp" is a 39 pf capacitor, while "L comp" is a 0.3 µh fixed, air-wound inductor. These components compensate for the stray and minimum values of capacitance and inductance present in the tuner and essentially allow the variable capacitor and variable inductor to act as ideal components having extremely low minimum values. At high frequencies and under some matching con-

ditions, this allows a perfect match to be achieved which otherwise might not have been possible. Those who like to home-brew gear might take serious note of the idea. I know I would have saved a lot of frustration with various tuner designs over the years if I had been aware of it.

Switch S2 in fig. 1 allows one to route the output of the tuner to either one of four SO-239 connectors. One of these connectors is also wired to a binding post which can be used for the connection of a single-wire antenna. Or, the binding post can be jumpered to one of the two terminals of a balun transformer which provides for use of a balanced transmission line.

## Construction

Physically, the Model 229 measures about 5½" x 13" x 11". It is very attractively housed, as one can partially see from the photograph, in a style to match Ten-Tec's Omni transceiver and Hercules linear amplifier. It has a black-out front panel which covers the meter and the pointer for the variable inductor tuning scale. Two dial lamps are used to illuminate the tuning scale and pointer, while the meter has its own internal lamp. About 12 volts has to be supplied from an external source for the lamps.

The tuning scale for the inductor is a nice touch compared to the usual digital turns-counter display. It is extremely easy to read and to use for setting the inductor. The pointer for the tuning scale is driven by a dial string mechanism attached to the inductor tuning shaft. The only minor criticism I would make of the scale is that it indicates backwards (i.e., "30" represents minimum inductance, while "0" represents maximum inductance). I would prefer it the other way around, although it doesn't make any difference in operation when one logs control setting.

Taking the top cover off of the 229, as shown in the photograph, one sees a nicely laid out component placement. There appears to be a nice balance between the enclosure size and the placement of the main components, such that the unit is not overly large, while the variable capacitor and inductor have plenty of free space around them. Both components are of very heavy-duty construction. The gauge of wire used on the silver plated roller inductor was not measured, but it seems heavier than that found on most similar components.

The variable capacitor is a rather impressive, large unit as one might expect from a component rated at 500 pf at 3,500 volts. Lead lengths are kept quite short mainly by having the switches used in the tuner mounted on the rear panel near the input/output connectors and using extension shafts from the switches to the front-panel control knobs. The balun in the tuner uses two ferrite cores and is mounted between insulating boards on a side wall of the tuner enclosure. All of the

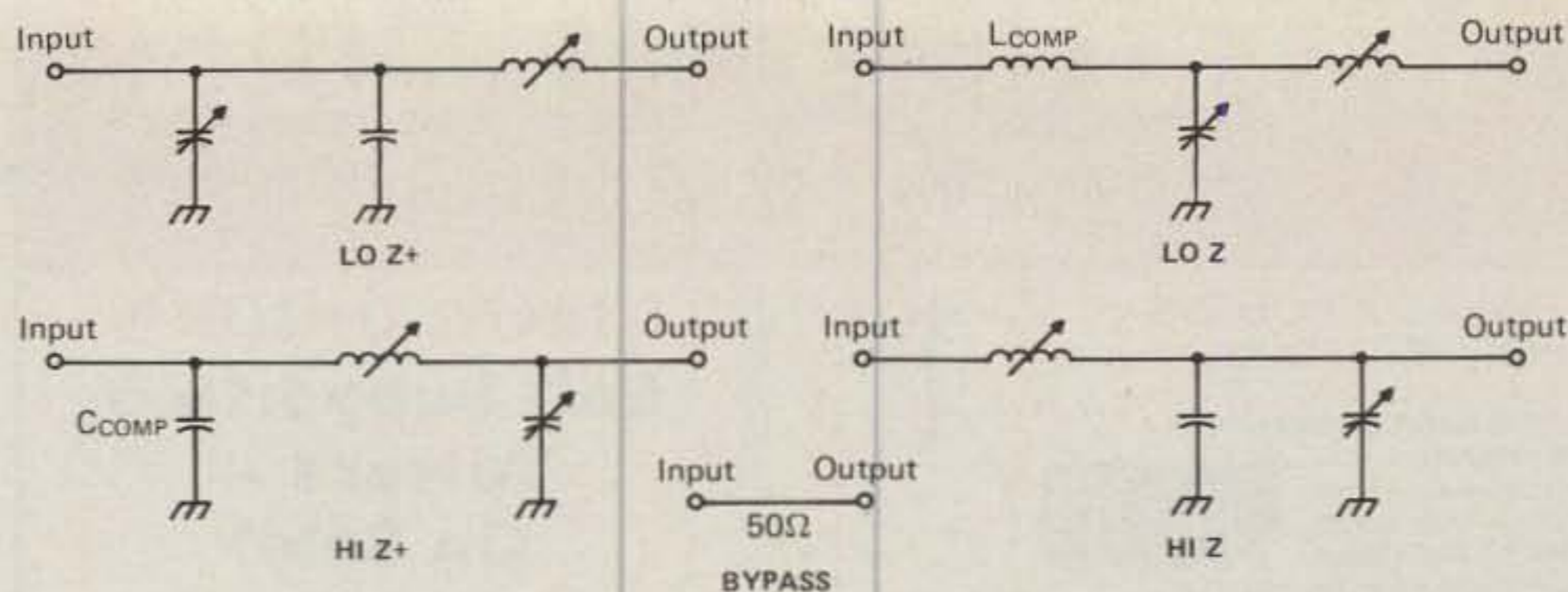
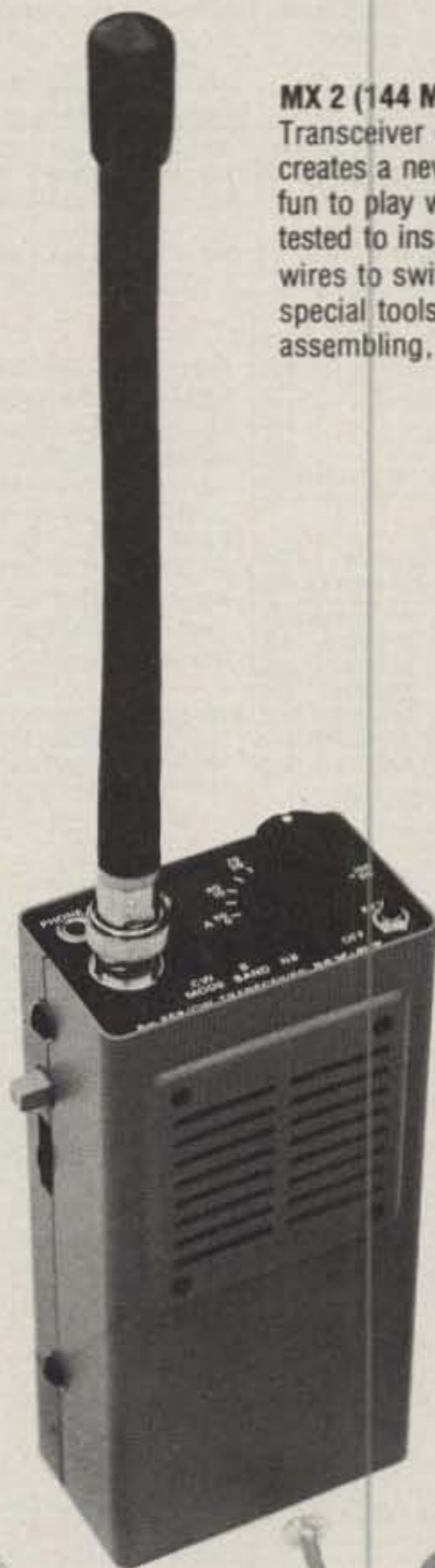


Fig. 2- The components labeled "C comp" and "L comp" are of special interest and are discussed in the text.

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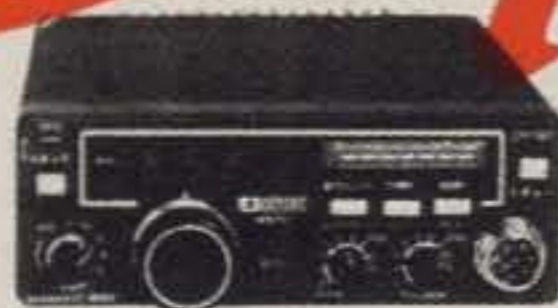
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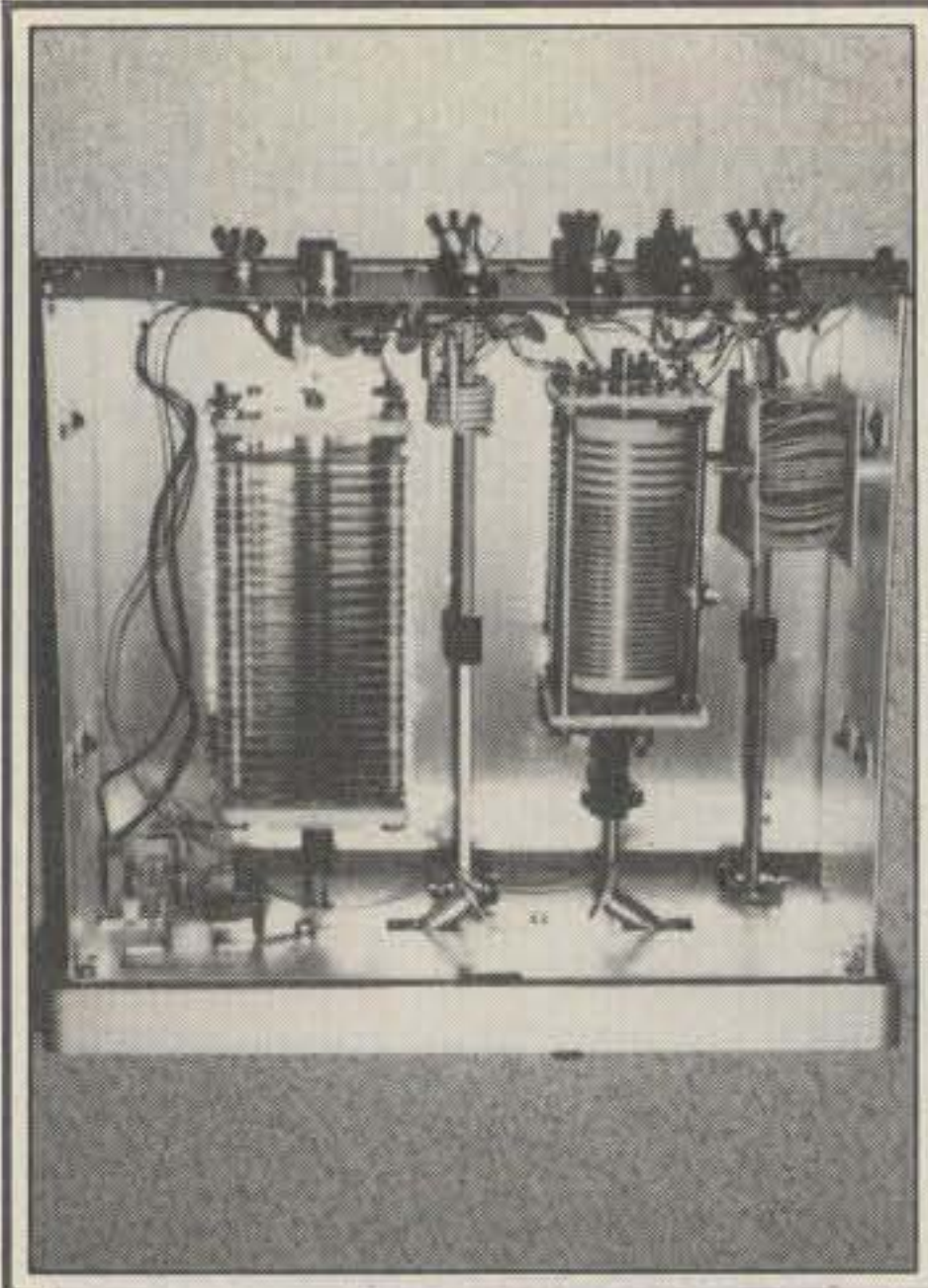
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The main components in the 229 have a generous amount of free space around them. The dual-core balun is mounted on the right side wall. All of the r.f. switches are mounted on the inside rear panel for minimum lead length.

components used are of very good quality, and it appears that the tuner should deliver reliable, long-term performance.

The back panel of the 229 contains a nicely laid out arrangement of five SO-239 coaxial connectors (one input and four outputs), three feed-through insulators with wing nuts for single-wire/balanced-line connection, a ground connection, a phono-plug connection for supplying 12 volts to the dial/meter lamps, and a feed-through insulator for connection of an external padding capacitor across the variable capacitor. The latter is not shown in fig. 1. It is mainly meant to

provide a means to provide for the addition of external capacitance if the tuner is being used on 160 meters and one is trying to match a particularly low impedance antenna. No additional capacitor should normally be required for 80-10 meter operation.

### Operational Results

Ten-Tec advertises the 229 such that its design "eliminates constant retuning" and "you may only once tune per band with this new 2 KW tuner." Both statements appear to be true in practice, although one has to approach each station situation on a case-by-case basis. For instance, I did compare the time and convenience involved in matching a multi-band antenna on 10/15/20 meters using the 229 and one of my own home-brew designs using a switchable Pi/T network. The 229 did win out, mainly because the higher "Q" of my design required rather careful adjustment of the two variable capacitor arms in the network used, while the 229 had only one capacitor to adjust in the inherent lower "Q," more broadband response of an "L" network type tuner. On 20 meters my tuner required retuning every 100 kHz or so, while the 229 required no retuning at all if tuned up at 14.2 MHz as one operated over the entire 14.0 to 14.35 MHz range, accepting a maximum 1:1.5 s.w.r. excursion as a criteria. On 15 meters, my tuner required almost constant retuning, while the 229 required "touch-up" tuning over about every 200 kHz excursion. The situation on 10 meters progressed similarly.

Using other type antennas, the results remained very much the same. For instance, the 229 has to be adjusted only once on 40 meters using a long-wire antenna for the s.w.r. to remain below 1:1.3 at the band extremes. Using a solid-state transceiver and solid-state linear, such

as the Ten-Tec Omni and Hercules, this means that one can tune freely over the entire band without any retuning. DX chasers and contest fans will especially appreciate this sort of freedom from constant retuning.

Initial adjustment of the 229 is fairly simple since it has built-in metering. One can "hot-switch" up to 100 watts of r.f. while finding the optimum setting of the capacitor switch, but one hardly needs so much tune-up power; 10 to 20 watts will suffice. Although one can use the metering to read s.w.r., it normally can be left in the reverse, low-power setting where it reads 0-20 watts. The metering appears to be quite accurate to within a few percent. However, if I had designed the 229, I would have used a larger meter. The meter size is adequate, but hardly as generous as Ten-Tec used, for instance, on their Hercules linear.

All of the controls are well dimensioned and easy to manipulate. Both large tuning knobs have calibration on their skirts for easy resetability. If one logs the settings of the controls on various bands and when using different antennas, it shouldn't take much more than 10-15 seconds to reset the 229 when going between bands. I just recalled that I had tried to log the control setting on my home-brew tuner, but gave up after a while, since on a band like 10 meters there was no such thing as a typical setting for the controls. One shouldn't have that problem with the 229.

No formal loss measurements were made on the 229, but there is every indication that they must be quite low. Using different antenna loads and on different bands, 700 watts key-down was passed through the tuner for several minutes. No heating of any components could be noted (after turning off the r.f.!). In contrast, the roller inductor in my home-brew tuner on some bands and in a T-network configuration would become warm to hot to the touch.

The manual supplied with the 229 is very complete. The operating instructions are straight-forward, but there is also an interesting dissertation on antenna-system matching theory, transmission-line characteristics, and s.w.r. meaning. Alignment instructions are given in case one ever has to readjust the s.w.r. bridge or wattmeter calibration. There are also detailed instructions on replacement of the dial string for the inductor-dial-scale indicator. As a nice little extra touch, Ten-Tec even supplies two hex wrenches with the 229 to fit the different size set screws in the knobs used.

### Summary

All in all, I would rate the 229 as a quality product in every respect. In going back to the "L" network but improving upon it, Ten-Tec has come up with an innovative idea that delivers all the features that Ten-Tec claims. □



The back panel of the 229 is nicely arranged with the various output connectors for coaxial lines, single-wire antenna, and balanced transmission line on the left with input, ground, and dial lamp power connectors on the right.

## A LOOK AT THE WORLD AROUND US

### Highlighting New Trends In RTTY

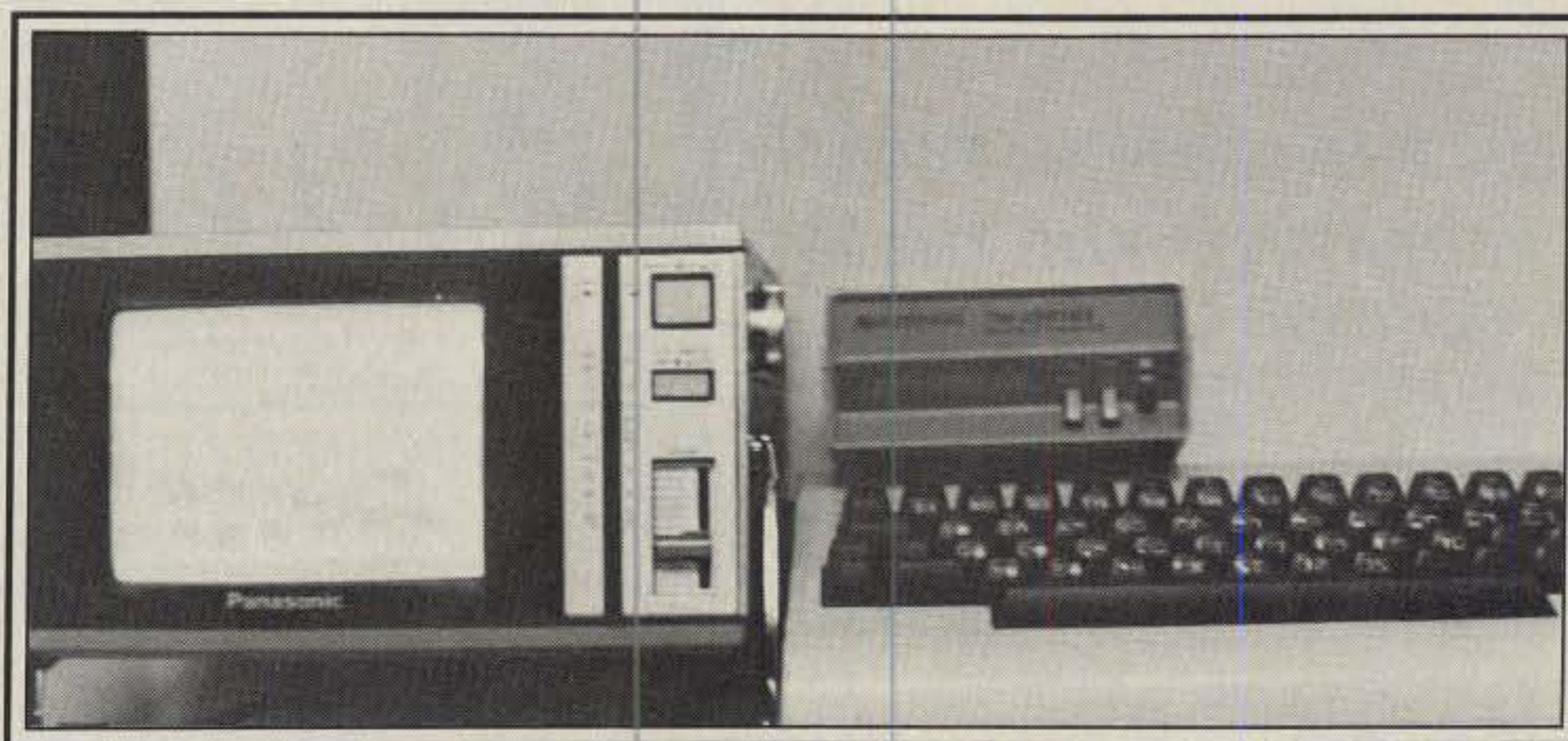
**D**uring quite recent times, RTTY and computer-based ASCII communications have truly captured the interest of radio amateurs and shortwave listeners around the world. Progressing from its time-established position as a "specialized communications mode," RTTY activities are now being thoroughly enjoyed with inexpensive home computers or small converter units with built-in alphanumeric displays. At least two of these converters boast the ability of also converting one's hand-key-generated Morse code to RTTY or ASCII signals for transmission by an existing h.f. or v.h.f. transceiver. The cumbersome and noisy teletype units are rapidly being replaced by quiet video monitors and fluorescence tube displays. Green keys are giving way to computer keyboards, hand keys, and electronic keyers. These are extremely exciting times for printed word communications, and you too can join the action. The cost of a complete "computer system" is usually less than a used h.f. transceiver or a new multimode 2 meter rig.

If your interests lean more toward listening or monitoring than transmitting, there are a vast number of press and news services broadcasting on the international shortwave bands. When these RTTY systems are used with a general-coverage receiver (such as Kenwood's R2000, Icom's R70, etc.), you literally have the world at your fingertips, many times acquiring news bulletins hours or days before they are otherwise available. Those capabilities, you must admit, hold merit! The less expensive home computer-type systems can also serve "double duty" as TV game machines, while the portable converter units can easily be used from summer vacation spots or even from the mobile setup. Think about that: you can probably visualize your own special ideas for their use, right?

#### Computerized RTTY

The aspect of using one of the presently popular and inexpensive home computers in RTTY operations has become a continental craze. Accentuated by the introduction of inexpensive h.f. transceiver modems or terminal units, such "package systems" can be moved from carton to contact in less than an hour's time.

\*Eastwood Village No. 1201 So., Rt. 11, Box 499, Birmingham, AL 35210



General layout of the VIC-20 and Kantronics RTTY system discussed in text. "Interface," or Modem, sits atop computer, while "Hamsoft" board plugs in rear of VIC-20. Display operates in all functions. The television shown here (Panasonic CT-5511) has a 5 inch screen, great for restricted space setups.

(**Modem** is an acronym for **modulator** and **demodulator** unit. It converts binary computer signals to audio tones, and vice-versa.)

Four of the more popularly used home computers at this time are the Apple II, Atari 400 or 800, the Radio Shack TRS-80 Color, and the Commodore VIC-20 (or its new version, the VIC-64). Likewise, one of the very popular RTTY interface and software packages for these units is manufactured by Kantronics of Lawrence, Kansas. The "Interface" unit connects between the mike and speaker jacks on an h.f. transceiver and the selected computer's game port. Solder a few wires according to your rig's pin configurations, snap in a preprogrammed ROM card (or a floppy disc into the Apple II system), and you're ready for action. It takes a few minutes to interpret all screen-displayed information, and some typing skill is definitely helpful. Almost all systems include "type ahead" buffers and "canned" message storage, however, so you'll at least be able to keep others from falling asleep between individual letter pickings.

The TRS-80C, Atari 400, and VIC-20 are essentially glorified TV game machines, whereas the Apple II and Atari 800 are rather impressive (and powerful) home computers (this fact is also reflected in each unit's price). Since a minimum amount of Random Access Memory (the "working memory") is necessary for most amateur RTTY operations, any of these computers perform quite satisfactorily. If you desire the secondary benefit of playing arcade-type TV games with the system, the Atari 400 is a grand choice.

Mode in use (M, B, A)	Time: HMS
Transmit speed	
Receive speed	
Display of in-progress xmsg	
Type ahead buffer area can load while rcvng msg	
Incoming message area shows appx 160 characters, with auto scroll-up as needed	

Fig. 1—A close study of the video display in the photo of the VIC-20 and Kantronics RTTY system illustrating capabilities of the RTTY/ASCII/Morse system.

Its flat and membrane-type keyboard, however, isn't for touch typists. The VIC-20 features a standard-type keyboard which is enjoyable to use, but its TV games can't compare with Atari's. The Atari 800 and Apple II both feature a high-quality keyboard and substantially more non-RTTY capabilities (such as word processing, small business finances, home economics, etc.). Select a computer according to your needs and finances!

Let's assume you recently purchased one of the popular "RTTY package systems" and briefly step through its initial setup and use. We'll single out the Commodore VIC-20 only because of its mass popularity and low price. However, other computers could be operated in a very similar manner (see photo and fig. 1).

This system's assembly begins by connecting a modem such as the Kantronics "Interface" unit to the mike and speaker of one's h.f. transceiver (this unit converts audio tones to binary computer signals,

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The MFJ Enterprises recently announced RTTY/CW Computer Interface/Modem. The unit accepts shifts of 170, 425, and 850 Hz and outputs with TTL or RS232 levels for interfacing with a variety of home computers. The unit boasts a number of features, and should appeal to amateurs who already have RTTY programs set up for their computers. (Computer software is not included with this unit.)

and vice-versa). A cable supplied in the associated "Hamsoft" package is then connected from the "Interface" to the VIC-20's game port, and the RTTY/ASCII/Morse-programmed card is plugged into the VIC-20 (this card sets up the computer for dedicated RTTY/ASCII/c.w. operation). A cable from the computer then carries "raw video" to a TV modulator (supplied with most home computers) which connects to the v.h.f. terminals of a regular TV set (either channel 3 or 4 can be selected). That completes system wiring, so you're ready to switch on everything and become familiar with the computer and its video display.

One of the attractive points of these RTTY/ASCII/Morse systems is its simplicity of use. A knowledge of computers or programming isn't necessary. The TV screen display prompts one in keyboard selection of modes, their speeds, setting of the on-screen time clock, etc. Assuming a supplemental list of commands from the "Hamsoft" instruction booklet is placed in "quick reference view," the 10 "canned message" buffers can be keyboard-loaded and the other system functions can be tried. Within a few minutes, you'll be tapping "CONTL-R" for receive, "CONTL-S" to change speeds, "STOP-RUN" for switching from Morse to RTTY, etc. Meanwhile, received information appears on the TV screen's bottom section, keyboard entries to the "type ahead" buffer appear on the screen's middle section, and an upper screen area displays the mode in use, speeds, and time (local, GMT, etc., as programmed). You can practice "dummy transmissions" by unplugging the modem's cable to transmitter input, tapping a "CONTL-T," and typing on the keyboard. "Canned messages" can be recalled, programmed to transmit individually, before or after the type-ahead buffer, etc., and the output signals (Morse/RTTY/

ASCII tones) can be heard via the displaying TV's speaker. Once familiar with the system, you can reconnect the transmitter's mike plug and take to the airwaves.

Two possible disadvantages of this "computer system" are somewhat limited operations and the necessity of using parallel rather than serial data printers if hard copy is desired. I haven't found a way, for example, to automatically answer CQ's, store incoming call signs, and add them into "canned message" blank spots, etc. Centronics, Epson, etc., are parallel data printers; Commodore's printer is serial and can't be used with this system. All aspects considered, however, these inexpensive computerized setups are extremely popular and quite enjoyable to operate. They're definitely not as sophisticated as a HAL system, but they're also in a different price class.

### RTTY Readers

If you would like to join the excitement of monitoring high-speed c.w., RTTY, and ASCII transmissions on both amateur and international shortwave frequencies, one of the popular "reader only" units could easily become the most used accessory in your setup. AEA's small-sized MBA-RO, for example, boasts a 32-character "Time square" type moving display of incoming RTTY (or ASCII) transmissions (great for receiving W1AW bulletins, news broadcasts from United Press International, etc.). This unit merely connects to the speaker or earphone jack of a communications or general-coverage receiver. Select the proper mode and data rate, and messages begin trekking across the green display at a fairly smooth-reading rate. If you haven't tried this method of monitoring international news broadcasts, you've missed a very informative treat. When used for c.w. monitoring (such as W1AW code practice), the reader is also great for increas-





AEA's MBA-RO copies RTTY, ASCII, and c.w. in a number of speed ranges and displays information on a 32-character readout. It operates smoothly at only normal speaker volume input, and is powered from an external 12 volt, 0.6 amp supply.

ing one's code speed in a "see and hear" manner. Since the unit is small and operates from a 12 volt supply, it can be carried on portable or weekend jaunts—a nice feature for traveling amateurs.

If you prefer a pocket- or palm-sized RTTY reader, the Kantronics "Mini Reader" may prove attractive. This unit is similar to a hand-held calculator in size and shape. It converts RTTY and ASCII signals and displays them on a moving 10 digit display. How's that for RTTY in your pocket?

### RTTY, ASCII, and Morse Converters

Until recently, amateurs interested in full RTTY or ASCII communications were necessarily restricted to the use of larger equipment and the ability to type on a keyboard. This situation was well suited to office-oriented amateurs with large ham shacks, but it left a number of others out in the cold.

AEA's new MBA-RC and Kantronics' Mini Terminal, however, are opening a new and different ball game. These pint-size amateur accessories permit two-way RTTY and ASCII communications with the use of only one external item: a hand key (or electronic keyer). Visualize this modern-day operation with, for example, AEA's MBA-RC. Incoming RTTY (or ASCII) is displayed on the unit's 32-character "time square" moving readout, while during transmit hand-key-generated Morse is converted to the desired RTTY or ASCII speed for transmission. We say "desired" rather than "mating" mode and speed because each function is independently selectable with front-panel switches on the MBA-RC. If desired, you can receive 60 w.p.m. Baudot (RTTY) and transmit 110 baud ASCII or 60 w.p.m. Baudot—your option.

If that isn't enough flexibility, you can take the little 12 volt powered box mobilizing with your hand key or backpacking in the wilderness. Imagine the other opera-

tor's reaction when he assumes you're trucking along with some gigantic teletype unit by your side. Gad!

### Tuning the Action

As mentioned earlier, an intriguing aspect of RTTY operations involves monitoring bulletin transmissions on both amateur and international frequencies. Two outstanding books/directories—*World Press Service Frequencies* available from Long's Electronics, and *Worldwide RTTY Call Sign List* available from the CQ/Popular Communication Book Shop—will steer you onto the right frequencies for initially joining this exciting craze. If you really want to enjoy shortwave monitoring, we heartily suggest you also subscribe to CQ's new publication, *Popular*

*Communications*. This magazine is packed with choice information on both shortwave listening and RTTY monitoring, plus unusual shifts, codes, etc., used by many "restricted services." Bear in mind when receiving RTTY news broadcasts, bulletins, etc., that divulging such information is illegal (TOR and bit transposition codes, for example, were not created without purpose).

All aspects considered, RTTY today is an exciting area for amateurs of all classes and interests. Shortwave listening also takes on new dimensions when interfaced with RTTY. As we've said many times, the best way to renew one's original interest and enthusiasm for amateur radio *et al* is by operating new bands and new modes. Enjoy! [E]



The AEA MBA-RC is a complete RTTY/ASCII communications unit in one box. Add hand key, plus h.f. xcvr, and you're set for two-way RTTY. No external items required.

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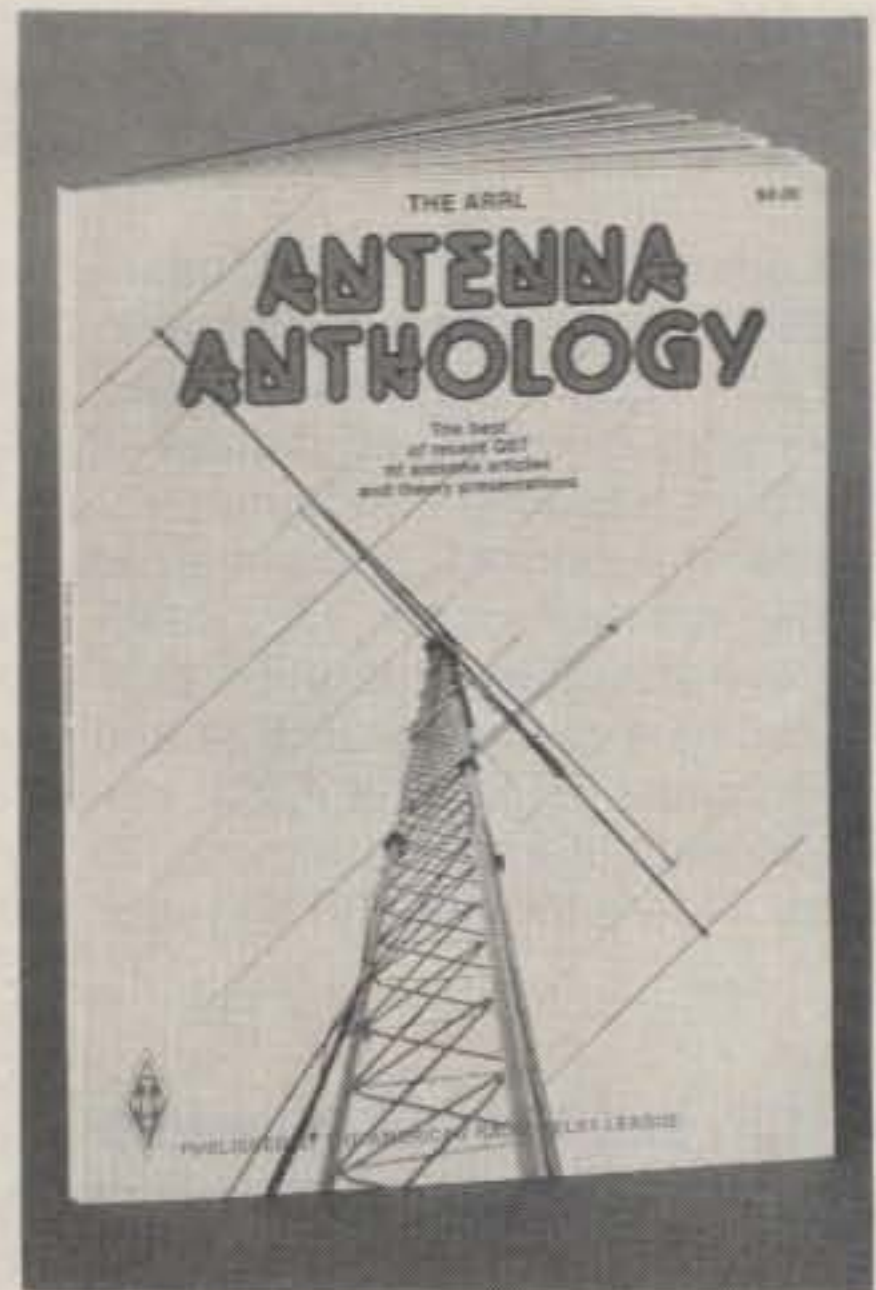
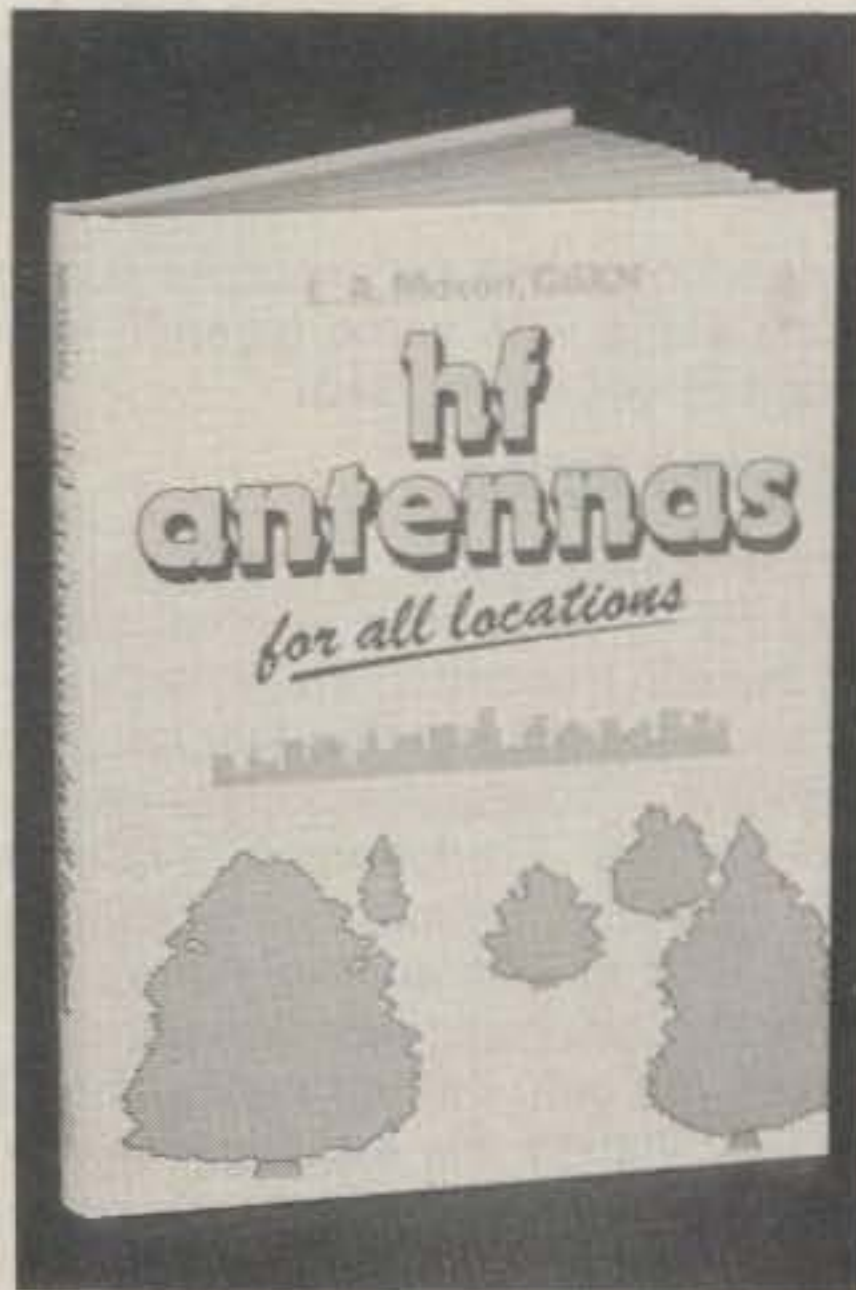
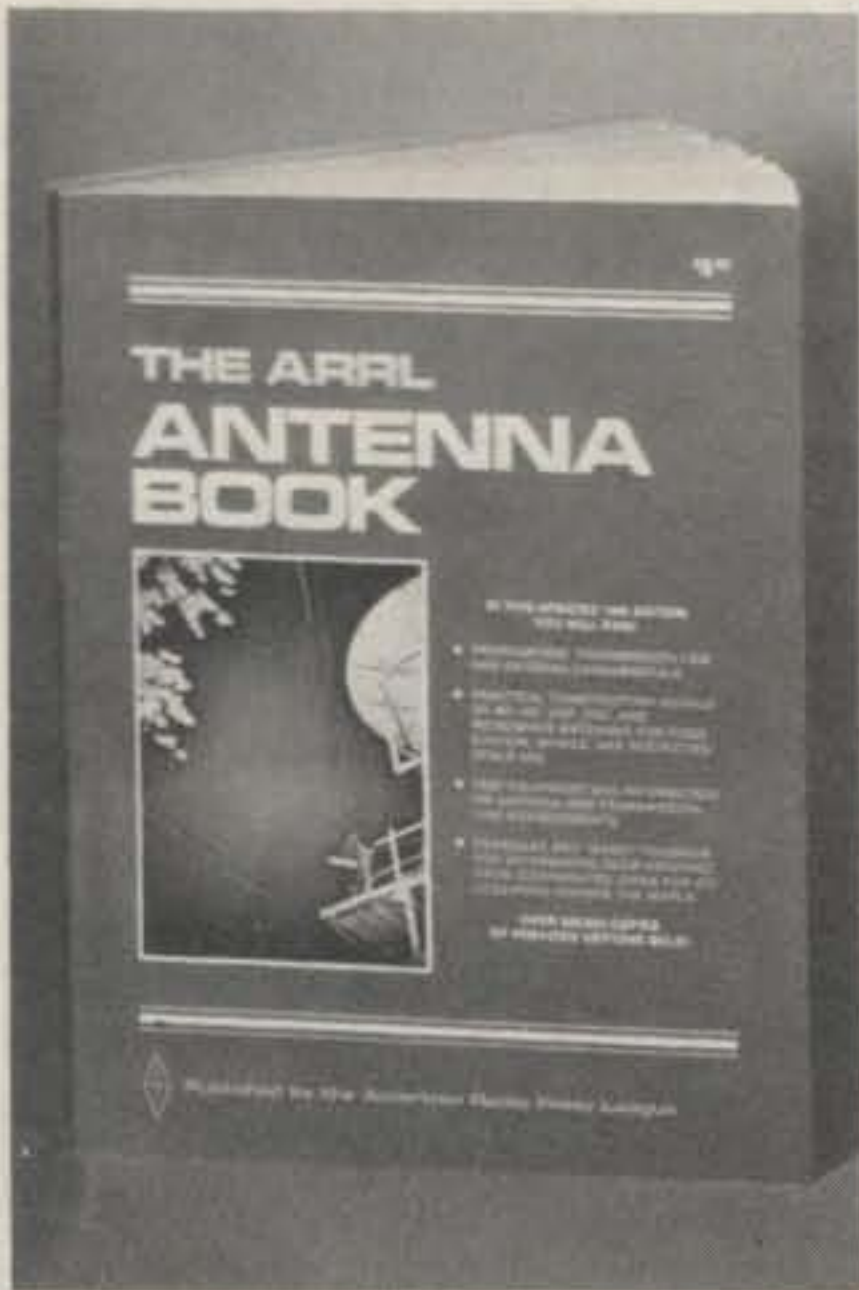
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**HF ANTENNAS FOR ALL LOCATIONS** by L.A. Moxon, G6XN. An RSGB publication. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, although construction information is also given on a small number 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.

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THE INS AND OUTS OF THE WASHINGTON SCENE

**AMSAT and VITA Pursue Development of PACSAT**

In an article by Tom Clark, W3IWI, *AMRAD Newsletter* published details of an agreement between the Radio Amateur Satellite Corporation (AMSAT) and the Volunteers in Technical Assistance (VITA) to pursue the joint development of a low-cost packet radio satellite system called PACSAT.

VITA is a nonprofit organization formed to provide people in developing countries with technical information given by volunteer scientists, engineers, and technologists. In keeping with its goals, VITA Director Henry Norman and VITA Project Coordinator Dr. Gary Garriott, WA9FMQ, announced that VITA has awarded AMSAT a \$15,000 grant to provide a candidate design for a reliable, low-cost, digital satellite system to meet VITA's communication needs in the field. In addition to its work on PACSAT, AMSAT is also expected to participate in efforts to adapt solar power, amateur radio, and personal computer technology for VITA's use. AMSAT's PACSAT project manager is Den Connors, KD2S.

For an in-depth discussion of VITA and PACSAT, don't miss this issue's exclusive interview with VITA's Mr. Henry Norman and Dr. Gary Garriott, WA9FMQ.

**RFI Complaints Drop Attributed to Closing of FCC Offices and Reductions in Staff Levels**

Jeffrey Young, Chief, Enforcement Division, Field Operations Bureau, FCC, reports that during the first quarter of FY83 (October, November, and December 1982) RFI complaints to the Commission totaled 15,447. This is a drop of 25% from the 20,597 complaints filed during the same period last year, and would seemingly indicate that the RFI problem is abating. However, close inspection of the RFI data for the past few years by your Washington Editor suggests that the turndown in the number of complaints reported to the Commission began with last year's closing of field offices around the country and with a concurrent, Commission-wide reduction-in-force (RIF). In short, the public is simply not able to conveniently report cases of RFI today, and

as a result, many cases are apparently going unreported.

Of the 15,447 RFI cases reported, 11,902 involved television receivers. Thus, over 75% of all RFI cases still involve a TV receiver as the victim device. Over the years, TV receivers have generally been involved in 75% or more of the cases reported, and the fact that this percentage has not dropped indicates that the TV manufacturers still have a ways to go in the design of their products!

Amateurs were cited in 922 of the RFI complaints filed in the first quarter, with TVI accounting for 563 of the reports. Amateur-to-amateur interference was the subject of 314 complaints, and this problem—which apparently represents a breakdown in the self-policing of our service—continues to concern the FCC.

Finally, CBers were cited in 9,329 RFI complaints during the first quarter. Of these, 8,302 cases involved a TV receiver as the victim device.

**RFI Susceptibility of Pediatric Pacemakers**

In a story carried by the Associated Press, a 10-year-old boy in Holyoke, MA, is experiencing serious RFI problems with his implanted electronic pacemaker. The pacemaker, which regulates his heartbeat, apparently cuts off when the boy is within 20 feet of an active two-way radio, causing his heart rate to fall from 72 beats a minute to 6.

Pediatric pacemakers do not operate in the same manner as do adult pacemakers, and as a result, they appear to be more susceptible to RF devices. In the boy's case, CB radios, police radios, and microwave ovens have caused interference which led to pains in his chest, dizziness, and fainting.

Amateurs having information on the design and operation of pediatric pacemakers, and especially on improving their immunity to RF signals, are urged to contact your Washington Editor.

**Sears' "Touch-On" Lamp Draws RFI Complaints**

Reports are reaching your Washington Editor from owners of the Sears' "Touch-On" lamp that the units produce strong interference to a.m. radios and to communication receivers operating on the 160 meter amateur band. Some owners

of the lamps also report interference to 80 meter operations, with interference present on 1.84 MHz even when the lamp is turned off.

What is surprising about this situation is that Sears recognizes that the lamps will cause problems of this nature! In fact, under the heading Special Instructions in the documentation accompanying the lamp, Sears says: "THIS LAMP MAY CAUSE SOME INTERFERENCE WITH AM RADIO RECEPTION (*emphasis is Sears'*). The problem can be reduced by relocating the AM radio." One owner noted that his problem with the lamp could be cured if the lamp were relocated more than 75 feet from his house.

Because the Sears device radiates, it falls under the control of the FCC. And, according to Dave Siddall, K3ZJ, since the device was NOT designed to radiate energy, regulation of the lamp falls under Section 15.25 of the FCC's Rules: "An incidental radiation device shall be operated so that the radio frequency energy that is emitted does not cause harmful interference. In the event that harmful interference is caused, the operator of the device shall promptly take steps to eliminate the harmful interference."

Readers experiencing problems with Sears' "Touch-On" lamps should file complaints with both the Commission and Sears. You are cautioned not to modify the lamp's control circuit, however, since that would void the UL approval and could affect your warranty in the event of lamp malfunction.

**Commission Terminates Action on Ignition Interference**

Almost 8 years ago, the FCC adopted a Notice of Inquiry (Docket 20654) to look into the problem of ignition interference to communications systems. In addition to determining the extent of the problem, the Inquiry sought comments on methods for interference suppression and on the cost-effectiveness of interference suppression.

Based on recent studies, the Commission has found that the incidence of spark-plug interference is apparently decreasing and that manufacturers of automotive ignition systems are responding to the need for "quieter" devices. As such, the NOI was terminated by the Commission on 4 January 1983.

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

### Crossband Contacts

Station	Military Freq.	Emission	Amateur Band
<b>AIR</b>	4025 kHz	LSB	3800-4000 kHz
2045th Communications Group	6995.5 kHz	C.W.	7025-7150 kHz
Andrews Air Force Base	7315 kHz	LSB	7225-7300 kHz
Washington, DC	13997.5 kHz	C.W.	14025-14075 kHz
	14389 kHz	USB	14275-14350 kHz
<b>NAV</b>	7385 kHz	RTTY	7090-7100 kHz
HQ Navy-Marine Corps MARS	13975.5 kHz	SSTV	14225-14250 kHz
Radio Station			
Cheltenham, MD			
<b>NHM</b>	4040 kHz	C.W.	3500-3650 kHz
U.S. Coast Guard Radio Station	7346.5 kHz	LSB	7150-7300 kHz
Alexandria, VA	14440 kHz	RTTY	14080-14100 kHz
	20937.5 kHz	USB	21270-21450 kHz
<b>NPG</b>	4008.5 kHz	LSB	3800-4000 kHz
U.S. Naval Communications Station	4010 kHz	C.W.	3650-3750 kHz
Stockton, CA	6970 kHz	C.W.	7025-7150 kHz
	7301.5 kHz	LSB	7250-7300 kHz
	7365 kHz	C.W.	7025-7150 kHz
	13827.5 kHz	RTTY	14080-14100 kHz
	13927.5 kHz	C.W.	14025-14075 kHz
	14470 kHz	USB	14200-14350 kHz
	20950 kHz	C.W.	21000-21200 kHz
	20998.5 kHz	USB	21360-21450 kHz
<b>NPL</b>	7380 kHz	RTTY	7090-7100 kHz
U.S. Naval Communications Station	14385 kHz	SSTV	14225-14250 kHz
San Diego, CA			
<i>Note: SSTV from NPL will run from 1600-2400 UTC 21 May 1983.</i>			
<b>NZJ</b>	7375 kHz	RTTY	7090-7100 kHz
Marine Corps Air Station	14480 kHz	USB	14275-14350 kHz
El Toro, CA			
<b>WAR</b>	4028.5 kHz	LSB	3775-4000 kHz
HQ U.S. Army MARS Radio Station	6997.5 kHz	C.W.	7000-7150 kHz
Fort Meade, MD	13992.5 kHz	USB	14200-14350 kHz
	14403.5 kHz	(see operating schedule below)	
	20995.5 kHz	USB	21270-21450 kHz

### 14403.5 Operating Schedule

Emission	Time	Amateur Band
RTTY	1300-1500, 1800-2200, 0100-0300	14080-14100 kHz
C.W.	1500-1800, 2200-0100	14025-14075 kHz

Table I—Military-to-amateur crossband operations.

### Commission Acts on AMTOR

By Order of the Commission, amateurs should have permission to begin using AMTOR by the time you receive this issue. AMTOR, which stands for AMateur Teleprint Over Radio, is a synchronous modulation technique which permits the transmission and reception of error-free RTTY signals under marginal fading conditions.

Techniques similar to AMTOR have been used for some time by the commercial Maritime community and by amateurs in Europe. This might explain the tell-tale AMTOR "chirp-chirp" signals you've been hearing around 14075 kHz.

According to the Microlog Corporation in Gaithersburg, MD, two versions of AMTOR are available. Mode A transmits a three-character block which has been specially coded so that the receiving station can recognize an error. This block is repeatedly transmitted until the receiving station acknowledges receipt of an error-free block.

In Mode B, which uses a forward error correction, text is repeated and intermixed in transmission. At the receiver, the text is unscrambled and printed. This technique is not as effective as Mode A, but it is better than conventional transmission techniques using Baudot code or ASCII.

For more information on AMTOR, contact Microlog, 18713 Mooney Drive, Gaithersburg, MD 20879.

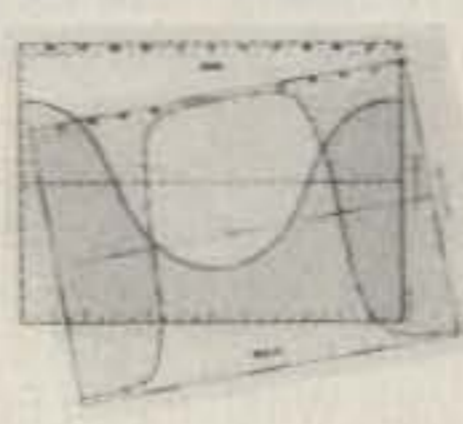
### Armed Forces Day to Feature Communication Tests Between Amateur and Military Communicators

This year's observance of Armed Forces Day—scheduled for Saturday, 21 May 1983—marks the 34th anniversary of communication tests between amateur and military communicators. Designed to emphasize a continuing climate of mutual assistance and warm esteem between our fraternity and the military communications systems, the tests feature the traditional military-to-amateur crossband communication tests on c.w., s.s.b., RTTY, and SSTV. (See Table I.)

Special commemorative QSL cards will be awarded to amateurs achieving a verified two-way radio contact with any of the participating military radio stations. Those who receive and accurately copy the Armed Forces Day c.w. and/or RTTY message from the Secretary of Defense will receive a special commemorative certificate from the secretary. S.w.l. reports will not be acknowledged; however, anyone can qualify for a certificate by copying the Secretary's message.

**Crossband Operations:** The military-to-amateur crossband operations will be conducted from 21 May/1300 UTC to 22 May/0245 UTC. East coast military stations will commence operations at 1300

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UTC, while west coast stations will commence at 1600 UTC. Military stations will transmit on selected frequencies and will listen for amateurs on specified portions of the amateur bands. The military operator will announce the specific amateur frequency on which he or she is listening. QSL cards should be sent to the station worked.

**C.W. Receiving Test:** The c.w. receiving test will be conducted at 25 w.p.m. For tuning purposes, a 10-minute call will begin at 22 May/0300 UTC. The Secretary's message will be transmitted at 0310 UTC.

Transmitting Station	Freq. (kHz)
<b>AIR</b> 2045th Communication Group Andrews Air Force Base Washington, DC	6995.5, 13997.5
<b>NAM</b> U.S. Naval Communications Area Master Station Norfolk, Virginia	4005, 7645, 14400
<b>NAV</b> HQ Navy-Marine Corps MARS Station Cheltenham, Maryland	7385, 13975.5
<b>NPG</b> U.S. Naval Communications Station Stockton, California	4010, 7365, 13927.5
<b>WAR</b> U.S. Army MARS Radio Station Fort Meade, Maryland	4028.5, 6997.5, 14403.5

**Radioteletypewriter Receiving Test:** The RTTY receiving test will be transmitted at 60 w.p.m. Radio Station "AIR" will transmit using 850 Hz (wide) shift. All others will transmit using 170 Hz (narrow) shift. A 10-minute call for tuning purposes will begin at 22 May/0335 UTC. The special Armed Forces Day message from the Secretary of Defense will be transmitted at 0345 UTC. This test is to exercise the technical skill in aligning and adjusting equipment by the amateur radio operator. Transmission will be from the same stations and frequencies as previously listed for the c.w. receiving test.

**Submission of Test Entries:** Transcriptions of the c.w. and/or RTTY receiving tests should be submitted "as received." No attempt should be made to correct possible transmission errors.

a. Time, frequency, and call letters of the military station copied as well as the name, call sign, and address (including zip code) of the individual submitting the entry must be indicated on the page containing the message test. Each year a large number of acceptable copies are received with insufficient information, or the necessary information is attached to the transcription and is subsequently separated from it, thereby precluding issuance of a certificate.

b. Entries must be postmarked no later

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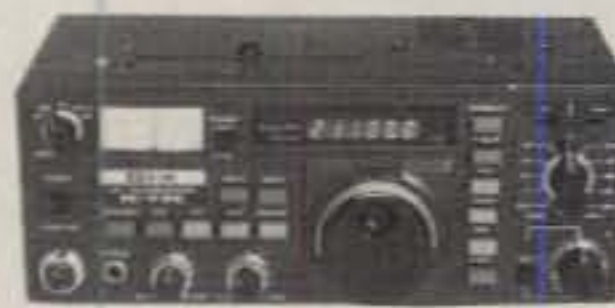
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CIRCLE 68 ON READER SERVICE CARD

Stations copying AIR send entries to: Armed Forces Day Test, 2045th CG/DONJM, Andrews AFB, D.C. 20331.

Stations copying NAM, NAV, or NPG send entries to: Armed Forces Day Test, HQ, Navy-Marine Corps MARS, 4401 Massachusetts Ave., N.W., Washington, D.C. 20390.

Stations copying WAR send entries to: Armed Forces Day Test, Commander, 7th Signal Command, ATTN: CCN-PO-OX, Fort Ritchie, MD 21719.

### ABC Television Network Requests Use of Amateur Band for Olympics

The ABC Television Network has filed for a special temporary authorization to use the 2300-2450 MHz band during the Olympic Games in Los Angeles in 1984. Currently, amateurs share this band with the military on a Secondary basis. It is not unusual for the major television networks to seek such temporary authorizations during special events such as the Olympics, and in all cases, these authoriza-

tions are granted on a non-interference basis only. That is, ABC (in this case) would have to coordinate its activities with amateur and military users of the band in the geographic areas affected.

### Questions Stall Amateur Activity on Shuttle Flight

According to the *Amateur Satellite Report* (AMSAT's newsletter for the Amateur Space Program), a decision has yet to be made on astronaut Owen Garriot's proposed use of amateur radio aboard a shuttle flight. Though it had been thought that the joint AMSAT/ARRL proposal for such an activity would receive NASA's blessing late last year, some technical and political questions still remain unanswered. Regardless, Garriot, W5LFL, apparently has the support of the NASA public relations office and his fellow astronauts on his proposal to be the first ham to operate from space, and efforts continue to secure NASA's approval of the project.

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HAL Communications Corp. has announced the new CWR6750 receive-only RTTY/CW terminal. The CWR6750 is the ideal companion to a shortwave receiver for printing amateur and commercial Morse code and RTTY transmissions. Its small size, the built-in green screen video monitor, and 12 volt operation make the CWR6750 a truly portable unit. The CWR6750 will receive all standard radio-teleprinter speeds from 60 w.p.m. (45 baud) to 300 w.p.m. (300 baud). Both the standard press "Baudot" RTTY code and the computer ASCII RTTY code may be received. Stations using the Continental Morse Code may be received at speeds from 4 to 50 wpm. A "computer style" ASCII printer may be connected to the CWR6750 to obtain a full printed copy of all received text.

The CWR6750 measures 10 1/4 "W x 6 1/2 "H x 11 "D. It weighs 9 lbs. and operates from any 11 to 14.5 VDC source, drawing 1.6 amps. The CWR6750 is easily installed in a camper, boat, or in your home station. For more information, contact HAL Communications Corp., Box 365, Urbana, IL 61801, or circle number 101 on the reader service card.

### Ten-Tec 700 Hand-Held Microphone

The Model 700 series of hand-held microphones are for commercial and amateur radio use. Housed in a rugged ABS plastic case, the microphone uses a high quality electret condenser microphone cartridge with built-in IC preamplifier. Power is supplied either from a self-contained 9 volt battery or from the equipment with which it is being used; steering diodes select the higher voltage if both are present. A push-to-talk switch is built in and a coiled cord, extendable to 7 feet, is included. Performance features in-



clude low distortion with slight rising frequency response for high articulation, sensitivity of -65 dBv, low output impedance, low 300 microamperes current drain for long battery life, high stability diaphragm, operating temperature of -10° to +60°C, and maximum sound pressure level of 130 dB.

Two versions of the microphone are available presently. The Model 700 comes without cable connector and is priced at \$27.95; Model 700-C includes an attached and wired standard four-terminal locking-type connector and is priced at \$29.95. For more information, contact Ten-Tec, Inc., Highway 411 East, Sevierville, TN 37862.



### ICOM IC-290H Transceiver

The IC-290H, a 2 meter multimode mobile transceiver, features a 25 watt output and a highly sunlight readable green readout in the same compact package as the IC-290A. Other features and styling of the IC-290H are the same as the previous model, the IC-290A: 5 memories, call channel, 5 kHz f.m. tuning or 1 kHz/100 Hz tuning on s.s.b., f.m./u.s.b./l.s.b./c.w. modes, programmable offsets, priority channel (monitors two frequencies), and scanning of memories or band.

For more information on the IC-290H, contact ICOM America, Inc., 2112 116th Ave. N.E., Bellevue, WA 98004, or circle number 103 on the reader service card.

## Superbrush™ Cleaner and Burnisher

The Eraser Company has announced the availability of a new cleaning and burnishing tool, the Superbrush™. It is a compact tool which will clean and/or polish a variety of surfaces, including, but not limited to, metallic materials. Applications include rust removal, battery-contact cleaning, burnishing metal, cleaning spark plugs, and many more. Brush length is twist-tip controlled to give a cleaning action from fine emery cloth to coarse sandpaper.



The retail price of the Superbrush is \$2.98. For more information, contact The Eraser Company, Inc., P.O. Box 4961, Syracuse, NY 13221, or circle number 104 on the reader service card.

## Triplet 3500 Digital Multimeter

The hand-held, 3½ digit, 22-range Model 3500 digital multimeter utilizes CMOS LSI circuitry to provide auto-ranging, auto-polarity, overrange, and low-battery indication in a compact easy-to-use tester. The audible continuity tone and buzzer alarm overrange offer additional convenience for laboratory, design, or field service testing. A zero adjustment memory button is used to make zero adjustment and difference for offset measurements. Ranges include d.c. volts: 0-1000 v.d.c. in 5 ranges; a.c. volts: 0-600 v.a.c. in 4 ranges; low power ohms: 0-2 megohms in 4 ranges; hi-power ohms: 0-2 megohms in 5 ranges; a.c. & d.c. current: 0-10 amps in 3 ranges. Frequency response is 40-500 Hz on all ranges. Basic d.c. accuracy is 0.25%.

The Model 3500 has a molded, black, high-impact thermoplastic case that is 3½" W x 6" H x 1½" D with a corrugated, non-slip surface. It weighs 12.5 ozs. with the two 1.5 volt batteries. The tester is priced at \$140. For more information, contact Triplet Corp., One Triplet Drive, Bluffton, OH 45817, or circle number 107 on the reader service card.

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MRF454A	17.00	MRF454A-2	37.00
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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

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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

Model No.	Freq. MHz	Description	Price
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

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CIRCLE 44 ON READER SERVICE CARD

# CQ World-Wide WPX/C.W. Contest All-Time Records

By BERNIE WELCH, W8IMZ, & STEVE BOLIA, N8BJQ

This contest is held each year on the last full weekend of May. The All-Time Records will be up-dated and published annually. Data following the calls below are year of operation, total score, and number of prefix multipliers.

## WORLD RECORD HOLDERS

### Single Operator

1.8	YU3EF('82)	38,412	99
3.5	4Z4DX('81)	379,652	182
7.0	OA4AWD('82)	1,752,254	329
14	4N3DX('82)	1,574,822	457
21	HD0E('80)	3,544,416	496
28	LU8DQ('80)	1,627,660	388
AB	HK3A('82)	3,542,401	499

### Multi-Operator Single Xmtr.

UZ9A('80)	5,000,135	511
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### Multi-Operator Multi-Xmtr.

YT0R('81)	7,545,448	632
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## U.S.A. RECORD HOLDERS

### Single Operator

1.8	AE6U('80)	3,444	42
3.5	K1MM('80)	50,400	112
7.0	K7RI('81)	535,464	222
14	K2MM('81)	859,320	372
21	K6LL/7('81)	1,433,457	459
28	N4ZC('81)	136,086	222
AB	KC1F('81)	2,150,261	499

### Multi-Op Single Xmtr.

N4WW('81)	2,696,980	506
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### Multi-Op Multi-Xmtr.

AI6V('81)	4,174,927	551
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## CLUB RECORD

YU DX Club ('81)	41,003,768
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## WPX (Prefix) RECORD

YT0R('81)	632
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## QRPP RECORD

4Z4UH('82)	1,028,904
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## CONTINENTAL RECORD HOLDERS

### AFRICA

1.8	No Entrant		
3.5	EA8RL('81)	108,648	108
7.0	EA9GT('81)	579,824	217
14	EL2AV('82)	906,840	330
21	5Z4CS('82)	2,104,245	429
28	ZS6BUX('81)	8,850	50
AB	ZD8TC('81)	1,413,270	369

### ASIA

1.8	UA9S JL('82)	15,456	42
3.5	4Z4DX('81)	379,652	182
7.0	4Z4DX('80)	717,336	243
14	UA9ADQ('81)	924,536	326
21	JH3LPT('81)	1,214,356	386
28	4X4UH('81)	1,081,262	338
AB	A4XJO('82)	2,366,976	402

### EUROPE

1.8	YU3EF('82)	38,412	99
3.5	YU2BOB('81)	175,104	171
7.0	YU9W('82)	737,460	306
14	4N3DX('82)	1,574,822	457
21	YU3BO('81)	1,550,390	394
28	9H1CH('81)	307,433	259
AB	YT2D('81)	2,826,075	525

### Multi-Op Single Xmtr.

AF	4K1A('81)	79,249	97
AS	UZ9A('80)	5,000,135	511
EU	4N4Y('80)	3,831,300	550
NA	NP4A('82)	4,208,050	550
O	KH3AB('81)	1,547,451	333
SA	No Entrant		

### NORTH AMERICA

1.8	AE6U('80)	3,444	42
3.5	VE3IY('81)	91,304	113
7.0	K7RI('81)	535,464	222
14	KP4EQF('82)	1,189,015	397
21	KP4CC('81)	1,717,632	426
28	KP4EQF('81)	577,500	300
AB	KP2A('80)	3,463,593	483

### OCEANIA

1.8	No Entrant		
3.5	No Entrant		
7.0	ZL1AMO('80)	351,050	165
14	VK4QK('80)	1,276,584	344
21	AH6BL('81)	566,765	263
28	KG6DX('81)	1,238,806	334
AB	KG6SW('79)	2,848,320	345

### SOUTH AMERICA

1.8	PY5AAX('81)	96	6
3.5	CX8DT('82)	13,860	45
7.0	OA4AWD('82)	1,752,254	329
14	ZW4OD('79)	1,410,320	340
21	HD0E('80)	3,544,416	496
28	LU8DQ('80)	1,627,660	388
AB	HK3A('82)	3,542,401	499

### Multi-Op Multi-Xmtr.

AF	No Entrant		
AS	JA3YBF('81)	3,087,336	476
EU	YT0R('81)	7,545,448	632
NA	K5IU/C6A('81)	4,688,730	531
O	KH6XX('81)	7,424,460	540
SA	HD1A('79)	6,052,032	474

## QRPP

AF	EA8ACL('82)	139,965	155
AS	4X4UH('82)	1,028,904	344
EU	UB5ZEQ('82)	340,059	263

NA	N3RS('81)	419,100	300
O	KH6CP('82)	69,750	93
SA	OA8V('81)	444,768	246



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- AUTO-TECH GLR 500..\$1994
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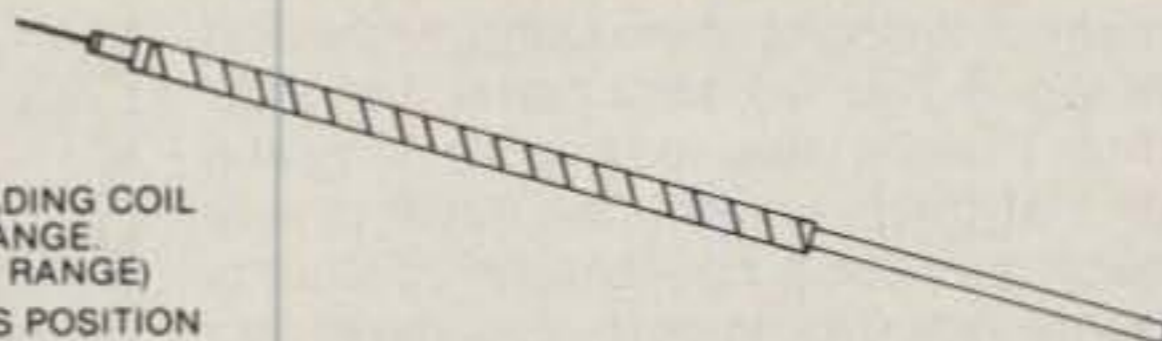


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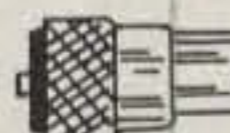
- RG6A/U double shield 75 ohm.....25¢/ft.
- RG59/U 100% foil shield TV type... \$7/100 ft or .10¢/ft.
- RG8U 96% shield mil spec... \$27.95/per 100 ft or .31¢/ft.
- RG11U 96% shield 75 ohm mil spec.....25¢/ft.
- RG58AU Stranded Mil Spec 96% Shield.....12¢/ft.
- RG58U mil spec 96% shield.....11¢/ft.
- RG62AU 96% shield 93 ohm mil spec.....12¢/ft.
- RG142/U Double silver shield... Teflon.....95¢/ft.
- RG174/U-mil spec 96% shield... \*8./per 100 ft or .10¢/ft.
- RG213 noncontaminating 96% shield mil spec...36¢/ft.

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CIRCLE 112 ON READER SERVICE CARD

## NEWS OF CERTIFICATE AND AWARD COLLECTING

**T**he Story of the Month for May as told by Ace is:

### **Ace Burdett, N9CHU All Counties #372 4-14-82**

"To me my life and life-style have been interesting and fulfilling, but they really took off after I became involved in County Hunting.

"In the early 40's, at the age of 16, I managed to enlist in the Navy. I dropped out of high school in 1943 and took off for many of the ports of the world. At the end of World War II I went home, but after three months I realized that the Navy and all that travel (a liking for travel is very necessary for a county-running County Hunter) were too important for me to stay away from it. So, back I went to remain until 1967, when I retired at the age of 40 after 24 years of service.

"The excitement of that life was addictive, but most importantly it introduced me to a new language which was music to my ears—Morse code. Even though I didn't understand any of it, I hung around the various ship's radio rooms to hear it coming in.

"After 14 years with the Navy, long enough for them to have known better, I was commissioned an LDO Ensign in 1957. The thought crossed my mind that now I had it made—a lot of loafing and very little work. We all make mistakes, and that way of thinking was one. The work and the hours increased, and so did the sea duty. There is no one more mistreated than an Ensign. Thank God it was only 18 months to that first promotion to Lieutenant (Junior grade).

"One of my duty assignments was the Naval Communications Station, Guam (left there missing the soon-to-arrive LCDR Harry, KB0TD, by only a couple of weeks), where I was really bitten by the c.w. bug. Still, there was no time to learn the code.

"While assigned to the Naval Air Station, Coronado, California, I needed a diversion from the daily routine. At that time the San Diego Police Department was recruiting for police reserve officers. My application for membership was accepted. This was a new and different challenge and was very interesting, but little did I suspect that it would lead to my second career. As a part of the training (it was and is my opinion that California po-



*Ace Burdett, N9CHU.*

lice officers are among the best trained in the world) I started taking police science courses at a local college. As a result of the training, the Navy began assigning me to law enforcement billets, including one tour with Naval Intelligence at the Pentagon.

"In 1967 I retired at the Naval Administrative Command, Great Lakes, Illinois, where I had been Provost Marshall and Security Department Director. That same year I went to work for the DuPage County, Illinois (after Cook County, Illinois, this is one of the very rare ones for County Hunters), Sheriff's Police as a patrolman. A return to the college classroom was also made about that time. After five years I received a degree in Police Science and another in Administration.

"The rise in the Sheriff's Department took me from patrolman, through the ranks and the various bureaus to Deputy Chief, where I am currently assigned as Commander, Corrections Bureau. If anyone feels his job is too routine, may I suggest a change to correctional work. I assure you there is no compatibility between routine and that job, especially if it is located 30 miles due west of Chicago.

"After five years of work, coupled with an equal amount of night school at the same time, my graduation from college left me with more spare time than I could handle. My thoughts again returned to Morse code. The decision was made that 'it's now or never.' The code was learned through self study, and a Novice class at a local ham equipment dealer gave me enough theory to pass the Novice and

General class tests. That instructor had to be a genius at it, because I barely knew the difference between AC and DC.

"The license was issued in May 1978, and the problem of too much spare time ended. For many months thereafter, hundreds of hours were put in with a straight key or keyer, mostly on the Novice segments of the various bands. It is always a great thrill to be a new ham's first contact. I had that thrill seven times while working the Novice bands. I'll never know what happened to the mike on that first rig. It was certainly never used by me.

"It was about 1979 when I was introduced to c.w. county hunting—another new challenge. It was fun, but any code speed above 25 w.p.m. loses me, and those operators are great—and fast.

"In October 1980 my first contact was made on 14.336. Now the bug had really dug in. Between that time and the National Convention in Des Moines the following July, I came to know by voice many of the County Hunters. It was a big thrill for me to meet dozens of them out there for the first time. Since then I have gone to as many of the minis as possible to meet more County Hunters: Wisconsin, Tennessee, Minnesota, and Ohio. Each place has brought eye contact with some of the finest people I have met—County Hunters. Many of them have said, 'It's not chasing counties that keeps me in it, it's the people.' I agree with that sentiment wholeheartedly.

"As this is being written, I am very busy on the second time around. I've been asked why I'm so involved again after having worked them all. Well, someone told me you are not permitted to do it the third time until you've finished the second. Look out W8WT, here I come.

"Running the counties is a very big part of the fun of this hobby for me. In 1981 and again in 1982 each of the 102 Illinois counties was put on the Net at least once by me. God willing I'll do it each year until my second retirement in 1987. After that I'll be running the Ole Home State of Georgia.

"To help me with motivation to continue putting them out, I decided to issue two awards: the Half Ace Award for working me in half of the Illinois counties (51) and the All Ace Award for all 102 of them. It's working, too, because I seem to be more excited and more anxious now to get 'that county' than the first time around.

"My thanks to everyone on the Net, God bless, and I'll be seeing you down the road in Illinois counties."

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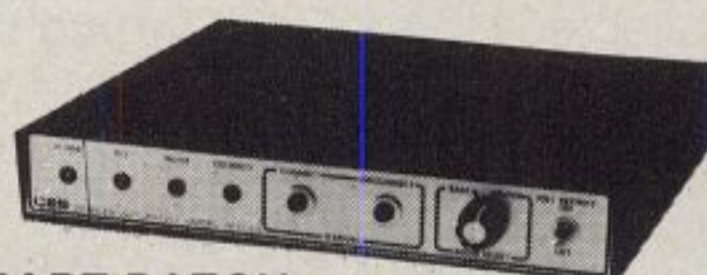
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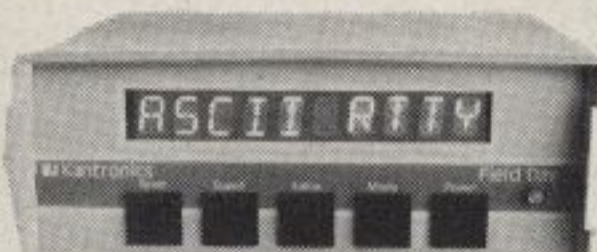


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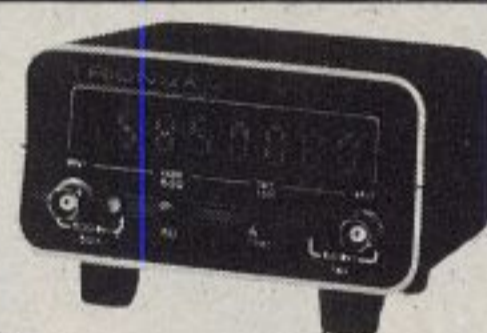
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**Special Honor Roll  
All Counties**

- #412 Robert Lamberton, WA3QNT  
1-10-83
- #413 Herbert J. Morgan, WD9GBH  
1-17-83
- #414 Roger D. Hathaway, WB2WZE  
1-22-83
- #415 John A. Alexander, W8GZF 1-24-83

**Awards Issued**

Bob Lamberton, WA3QNT, added All Counties, endorsed Mixed, to his nice collection.

Herb Morgan, WD9GBH, also added to his fine collection USA-CA-2500 and 3000 endorsed All S.S.B., All Mobiles, All 20, and All Counties endorsed All S.S.B.

Roger Hathaway, WB2WZE, who has been a County Hunter (on and off) for a long time, waited until he had them All and collected USA-CA-500 through USA-CA-3000 endorsed All S.S.B., All Mobiles, All 20, and All Counties endorsed All S.S.B.

John Alexander, W8GZF, who has been at it (on and off) since 1967, kept plugging (whenever possible) to obtain All Counties endorsed Mixed.

Mike Mardit, WA2VQW, requested USA-CA-500 through USA-CA-3000 endorsed Mixed.

James Grandinetti, WA2SRM, keeps

plugging and added USA-CA-3000 endorsed All S.S.B. to his impressive collection.

William Hudzik, WA2UDT, won USA-CA-2000 endorsed Mixed.

George Lee, K5HT, sent for USA-CA-1000 endorsed Mixed.

So you think I'm perfect, well I'm not. Even though I have three ways to check things, I goofed last year. On January 18, 1982 I issued USA-CA-500 #1685 endorsed All A-1 to Erling Heiberg, OZ1DKG (#5 to OZ). On January 20, 1982 I issued to David Wilcox, KC8CC, USA-CA-500 #1685, so Dave's number has to be USA-CA-500 #1685-A.

USA-CA-500 Certificates were claimed by:

William R. Corp, K2POF, endorsed All S.S.B., All 20, All Mobiles.

Bill J. Lorton, KC7WO, endorsed Mixed.

Chris Hursta, KA9FCZ, endorsed Mixed. (He is trying for all fixed stations.)

**USA-CA Honor Roll**

<b>3000</b>	WA2UDT 556	<b>500</b>	OZ1DKG 1658
WA2VQW 440	WB2WZE 557	KC8CC 1685-A	WA2VQW 1798
WA2SRM 441		K2POF 1799	KC7WO 1800
WD9GHB 442	<b>1500</b>	KA9FCZ 1801	WB2WZE 1802
WB2WZE 443	WA2VQW 621	DJ6ZB 1803	WB9OOG 1804
	WB2WZE 622	WB3CQN 1805	
<b>2500</b>			
WA2VQW 500			
WD9GBH 501	<b>1000</b>		
WB2WZE 502	WA2VQW 758		
	WB2WZE 759		
	K5HT 760		
<b>2000</b>	KA4UEM 761		
WA2VQW 555			

Franz-Joseph Bolwin, DJ6ZB, endorsed All 2 x C.W.

Mark A. Behrens, WB9OOG, endorsed Mixed.

Ruthanna Pearson, WB3CQN, endorsed Mixed.

**Awards**

**Hainaults Award:** The Goldfields Amateur Radio Group of Western Australia is pleased to announce their first award, which is available to all licensed amateurs and s.w.l.'s. All contacts made after January 1, 1982 are valid for the award.

1. *Requirements:* (A) VK/ZL—Work five resident Goldfields amateurs, including two G.A.R.G. members, within the 250 km radius of Kalgoorlie, including the town of Windarra. (B) Overseas—Work three resident Goldfields amateurs, including one G.A.R.G. member, within the 250 km radius of Kalgoorlie, including the town of Windarra.

2. *Cost:* (A) VK/ZL—\$3 Aust. (or equivalent) or 8 IRCs. (B) Overseas—\$4 Aust. (or equivalent) or 10 IRCs.

3. *Application:* QSL's not needed. Send certified extract of log, signed by two other amateurs, to: The Awards Manager, P.O. Box 463, Kalgoorlie, Western Australia 6430.

4. All contacts are to be made in accordance with applicant's license requirements.

5. No official G.A.R.G. net contacts allowed.

6. Contacts to be two-way s.s.b., c.w., f.m., or other recognized mode of transmission; no cross-mode or cross-band contacts, except via satellite.

7. All contacts endorsed "mobile" or "portable" to be made from the same call area. (Thanks to Bill, VK6ZX, for this data.)



Goldfields Amateur Radio Group Award.

**The Kenya Award:** The Radio Society of Kenya will issue this award to any licensed radio amateur located outside the Republic of Kenya who qualifies under the following conditions.

*Technical requirements:* Ten points are necessary. These are established as follows. A contact with each 5Z4 station who must be a member of the RSK is 1 point. A contact with 5Z4RS, the club station, is 5 points. A contact with 5Y4ITU is 5 points. All modes and bands are applicable.

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Award's Manager \_\_\_\_\_ Date \_\_\_\_\_

The Kenya Award.

**Administrative requirements:** Submission of log book photocopies witnessed and signed by a responsible official of the local radio society/club or the licensing authority. Only contacts made after 31 December 1977 are eligible. For surface mail the charge is \$5.00 US, and for airmail \$10.00 US. Checks and banker's drafts must be crossed and made payable to the Radio Society of Kenya. A self-addressed adhesive label must be enclosed with the letter of application, which should be addressed to The Radio Society of Kenya, P.O. Box 45681, Nairobi, Kenya, and marked "Kenya Award" at the top left-hand corner of the envelope. (Thanks to Karl, K4YT/5Z4RK for this data.)

**OA 1 Award:** The Peru-Zona 1 (OA 1) Award is issued by the Radio Club Piura to foreign stations who have worked 5 (five) OA 1 stations on any band, any mode after July 15, 1982. Peruvian stations must work ten stations: five on 40 meters and five on 80 or 160 meters.

Send certified log data, 8 IRCs (do not send QSL's or money) to: Radio Club Piura, Awards Manager, P.O. Box 362, Piura, Peru. (Thanks to Jorge, OA4FW/OB1, for this data.)

## RADIO CLUB PIURA

DIPLOMA

PERU - ZONA 1

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Titular de la Estación \_\_\_\_\_ S.A.M.P.L.E.

Como testimonio de haber cumplido con las bases reglamentarias, comunicando con las estaciones:

Piura de \_\_\_\_\_ de 19 \_\_\_\_\_

The OA 1 Award (Peru).

## Notes

As a help to County Hunters, The B & B Shop, 1348 Pinewood Drive, Woodbury, MN 55125, puts out many things like the County Hunting Information Flyer, County Hunter Handbook, County Hunters Directory, County Hunter Logbook, and special County Hunter Reply Cards. Write for prices.

Arnie Bachmann, K9DCJ, came through with some interesting data:

25 of the first 200 who received USA-CA-500 went on to get All Counties.

83 of the first 200 who received USA-CA-1000 went on for All.

122 of the first 200 to get USA-CA-1500 went on for All.

144 of the first 200 to get USA-CA-2000 went on for All.

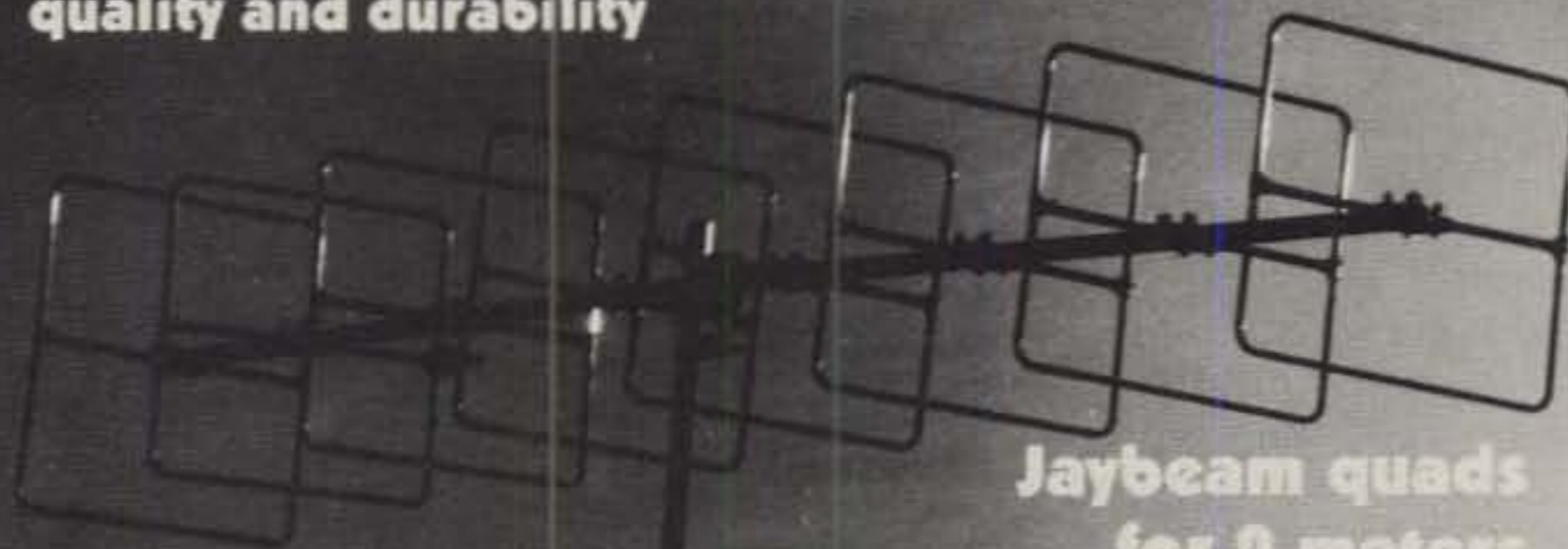
164 of the first 200 to get USA-CA-2500 went on for All.

186 of the first 200 to get USA-CA-3000 went on for All.

Thanks to Arnie for the hard work digging up all that data. He had to check each issue of CQ from about 1961 on.

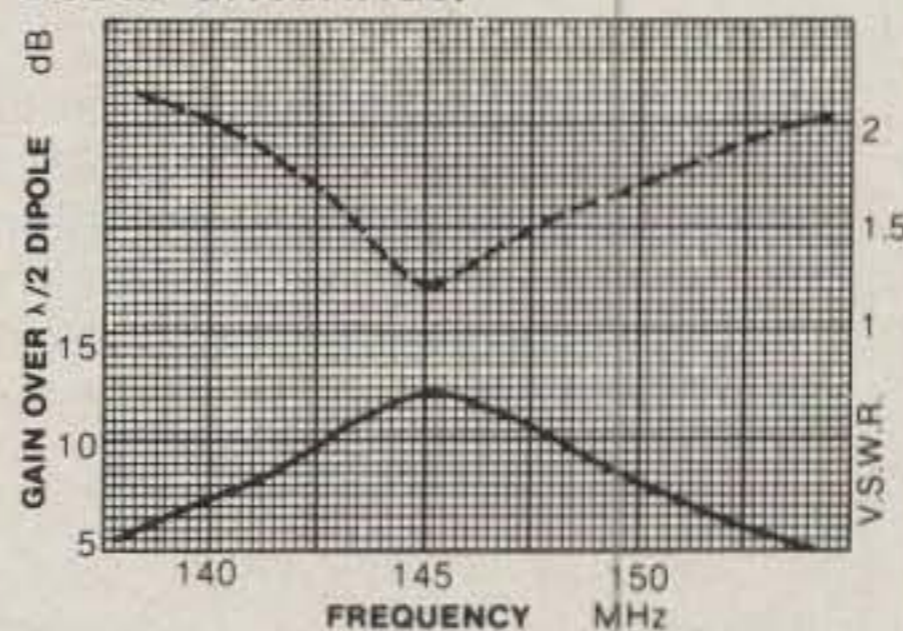
73, Ed, W2GT

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GAIN dbd	9.4	10.9	11.9
FRONT TO BACK RATIO	20dB	22dB	25dB
3dB BEAMWIDTH	E48°	E40°	E37°
	H50°	H42°	H38°
BOOM LENGTH	4.92'	8.2'	11.6'
LONGEST ELEMENT	24.4"	24.4"	24.4"
TURNING RADIUS (APPROX)	2.6'	4.2'	5.87'
DESIGN IMPEDANCE	50 Ohms	50 Ohms	50 Ohms
POWER RATING (PEAK)	1 kw P.E.P.	1 kw P.E.P.	1 kw P.E.P.
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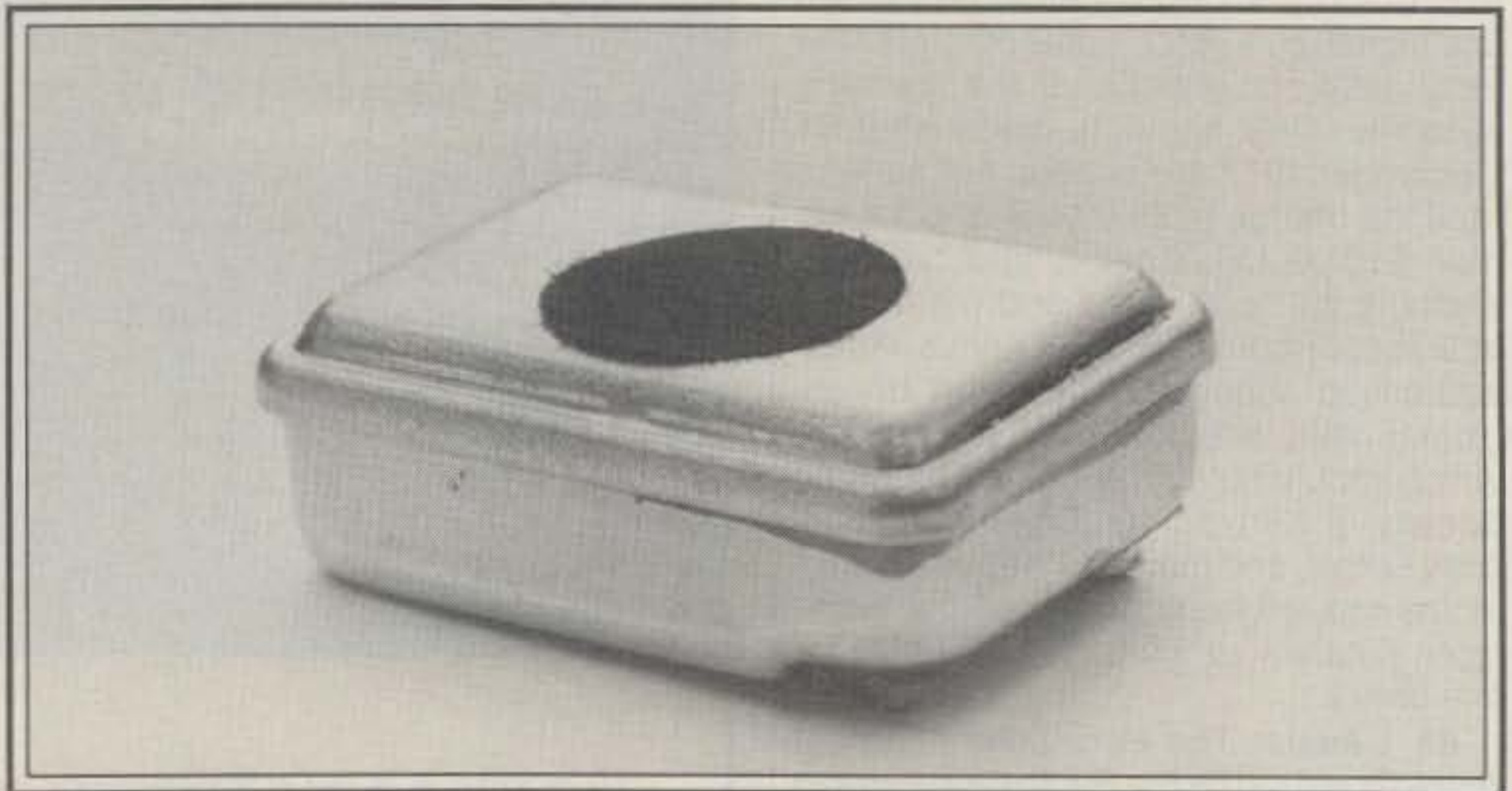
## HEIL SOUND'S HC-3 MICROPHONE CARTRIDGE

BY JOHN J. SCHULTZ\*, W4FA

**D**o good things really come in small packages? XYL's would probably agree if one is talking about diamonds or other precious stones. OM's will probably agree after experimenting with one of Heil Sound's new HC-3 microphone cartridges. The HC-3 cartridge is meant to replace the transducer element in practically any existing microphone for increased speech transmission clarity and effectiveness on s.s.b. Heil Sound claims that it is the first such cartridge developed in many years that was specifically engineered to suit the needs of radio amateurs operating primarily on s.s.b. They spent three years developing the unit and only now, after a lot of testing, are introducing it generally on the market. It certainly is of semi-miniature size, measuring only about  $\frac{1}{8}$ "  $\times$   $\frac{5}{8}$ "  $\times$   $\frac{5}{16}$ ", and weighing less than half an ounce. The size specifications for the HC-3 are shown in fig. 1, and fig. 2 presents the electrical specifications for the cartridge.

I'll return to a specific discussion of the HC-3 cartridge shortly, but it might be of value to digress for a moment to Heil Sound's EQ-200 Equalizer, which was reviewed in the July 1982 issue of CQ. The EQ-200 represented Heil Sound's first attempt in the amateur radio field to market a product specifically designed to improve station "talk power" using a station's existing microphone. By a combination of attenuate/boost active filters centered on 490 and 2400 Hertz, it allowed one to tailor an existing microphone's pickup response to one's individual voice characteristics to then achieve the overall best response for s.s.b. modulation. Usage of the EQ-200 could eliminate most of the useless (communications-wise) bass response of many microphones and emphasize **sibilance** (the ability of an acoustic system to produce with minimum distortion the high frequency presence of "s" and "t" sounds and hence clarity).

Denny Burgess, K8DB, did some extremely interesting experiments with the EQ-200 and a Kenwood MC-50 micro-



The HC-3 microphone cartridge is a semi-miniature, completely sealed unit meant to be used in an existing microphone enclosure.

phone. Although he was concerned primarily with the EQ-200, the test process he describes in a NOARS (Northern Ohio Amateur Radio Society) bulletin to evaluate the EQ-200 is very applicable when considering an evaluation of a new mi-

crophone cartridge such as the HC-3. K8DB's report is as follows:

"In short, I obtained an EQ-200 for testing. To perform the test, I developed a list which was composed of words which could be confusing if the "s" or "t" sound

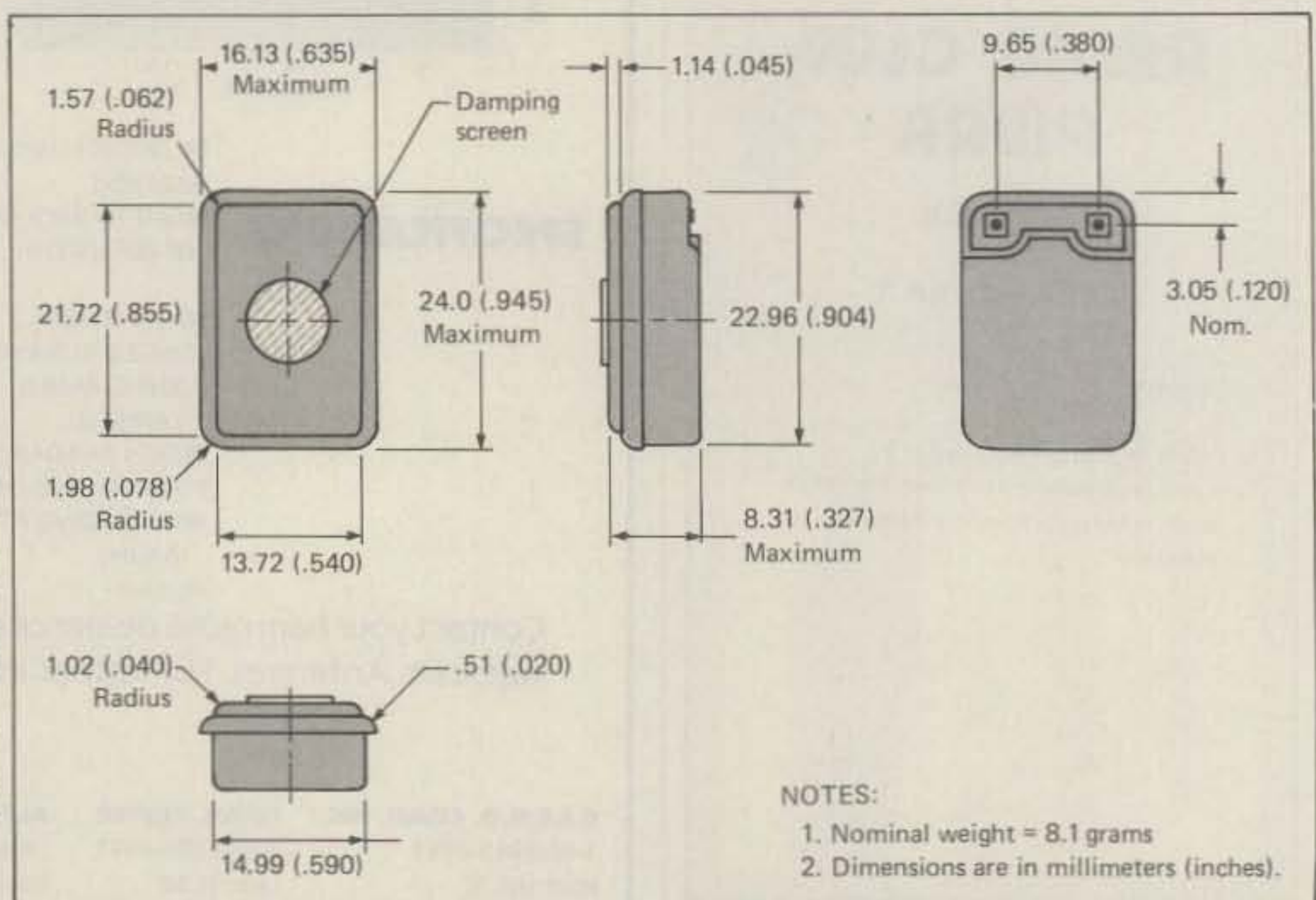


Fig. 1- Physical dimensions, in millimeters (inches), of the HC-3 cartridge.

\*c/o CQ Magazine

was missing. Also, I included words which contained a sound referred to as a **diphthong**. A diphthong requires an extraordinary "puff" of air which would drive an unequaled bass-emphasizing mike like the MC-50 crazy. A partial list of the words utilized follows.

"Words with sibilance which could be confusing if "s" and "t" are not heard: steam, speak, scab, scar, score, sink, space, stop, strip, scream, send, tact, trash, thicket, tweed, twig.

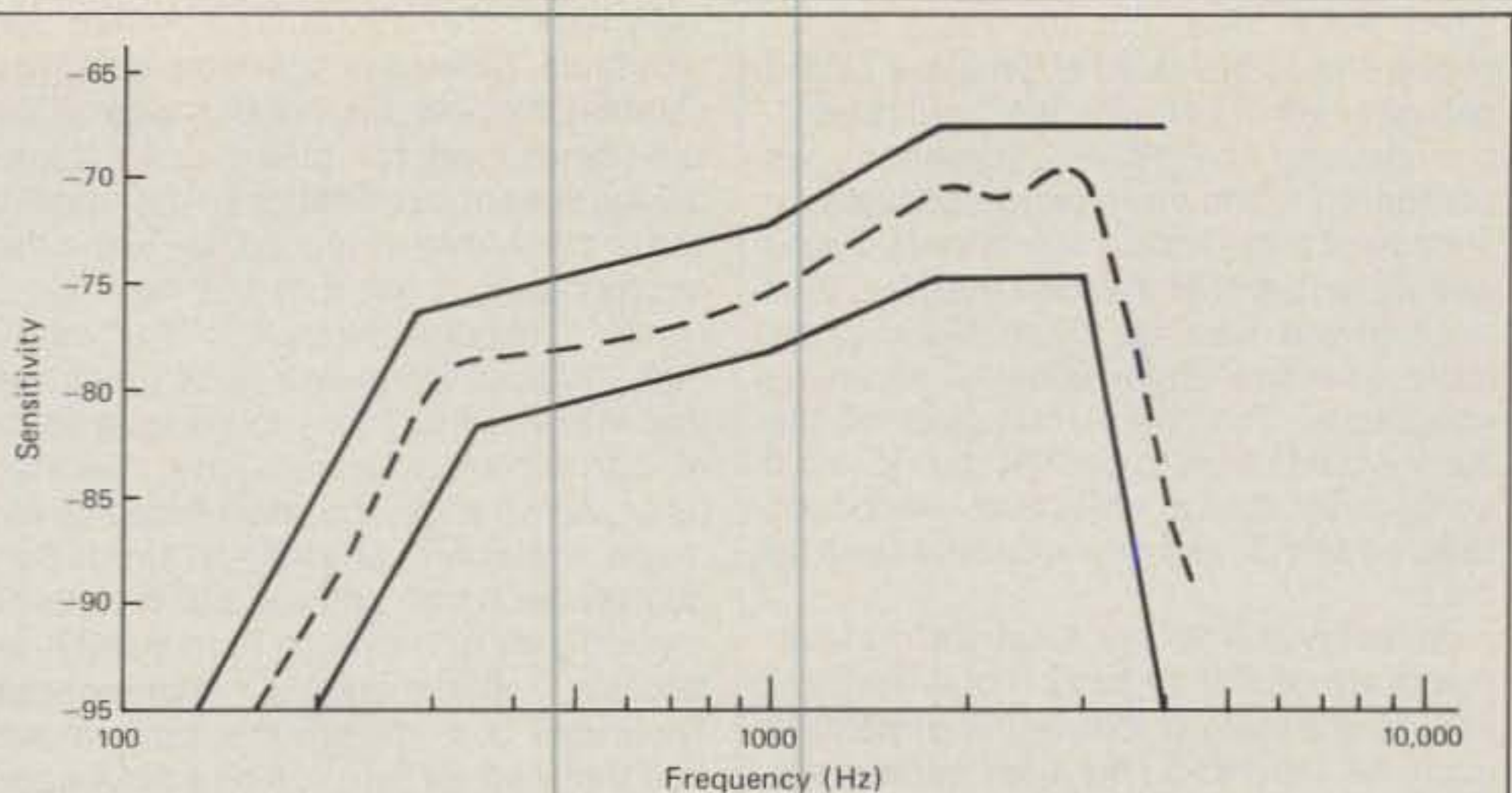
"Words with a diphthong sound: throw, thrust, thwart, throng.

"These words were utilized in an on-the-air test conducted intentionally under less than ideal signal-to-noise (QRN and QRM) conditions. During the tests, the listeners were requested to record what they heard and read it back. With the EQ-200 in line, the listeners were three times more likely to hear correctly what was said. It must be stated that most listeners first stated that they liked the sound of the MC-50 unequaled because it sounded more like me. But I attributed their preferences first to the natural tendency of Americans to equate bassness with quality, and secondly the fact that they were not used to the flat or "equalized" sound. In fact, many thought I was running a processor. Interestingly, a speech processor *in effect* eliminates the overemphasized bass of most microphones by clipping it out. Unfortunately, the combination of overdriving the speech amplifiers of our rigs with overdriven and processor-clipped 600 cycle bass causes distortion and splatter on the crowded bands. Thus, one should equalize the microphone first, then process it!"

One of the main points K8DB notes is that with proper equalization (frequency response shaping) "listeners were three times more likely to hear correctly what was said." The obvious parallel, in many cases, is that under the same conditions one is much more likely to have one's call sign understood correctly under adverse receiving conditions.

Of course, the ideal situation would be not to have to equalize a given microphone, but to have a perfect microphone to begin with. Unfortunately, although better microphone cartridges can be developed, as the HC-3 was found to prove, there are still enough variations between individual voices such that the "right" microphone plus some equalization will still remain the ultimate answer to s.s.b. tailored speech.

The HC-3 cartridge was tested out in a similar manner as done by K8DB with the EQ-200 by comparing a microphone which housed an HC-3 against other microphones. Listeners were asked to indicate which microphone provided the best audio clarity under adverse, noisy conditions. No speech processing was used, since presumably a microphone which sounds good without processing will still be the best microphone to use if one be-



1. Sensitivity in dB relative to 1.0 volt/microbar (0.1 N/m<sup>2</sup>).
2. Load resistance for sensitivity measurement: 2000 ohms.
3. Nominal impedance at 1000 Hz: 2000 ohms.
4. Nominal d.c. resistance at 20°C: 260 ohms.

Fig. 2— Specifications and frequency response curve for the HC-3. Solid lines indicate limits, and the dotted curve typical response.

lieves that a light amount of audio processing is worthwhile. This is particularly true if a very low distortion form of audio processing is used such as that which Collins developed for the KWM-380 (see CQ November 1982). The HC-3 microphone was tested against many microphones of both U.S. and foreign manufacture that were all rated by their manufacturers to be suitable for close-talking,

speech-type applications. The types included dynamic, electret, controlled-reluctance, ceramic, and crystal—in short, about every microphone I could find in my own collection or borrow. During s.s.b. contacts, the HC-3 microphone was consistently rated superior to any dynamic, controlled-reluctance or electret-type microphone that was tried. The gap narrowed a bit when ceramic and crystal

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types were tried, but the HC-3 microphone was still favored on balance. Some persons didn't care for the "crispness" provided by the HC-3 microphone as compared to the more extended bass response of a dynamic microphone, but no one would contest the idea that the HC-3 microphone was far more likely to be more effective under adverse receiving conditions. The long and short of the story would seem to be that the HC-3 did achieve its design objective—response tailored specifically for effectiveness on s.s.b.

In reality, it is not necessary to conduct elaborate on-the-air tests if one wants to initially evaluate a microphone element such as the HC-3. My own experience has been that using a good-quality tape recorder one can record some of the words suggested by K8DB using different microphones with an inexpensive a.m. radio in the background as a QRM generator, and then hear the result on playback. Admittedly, this sort of test leaves out the influence of an s.s.b. receiving system's frequency shaping and is subjective. But, it will suffice to quickly separate the microphones with "talk power" from those that sound dull and flat. Remembering that test also reminds me of an interesting microphone experience I had some 15 years ago. I purchased a

fairly expensive microphone from a very reputable European manufacturer who claimed the new microphone was especially developed for clear, crisp, close-talking speech applications. After making some comparative recordings with other microphones, I felt that the new microphone's response was plain "flat" rather than "crisp." On-the-air tests confirmed that impression. There followed a round of correspondence with the manufacturer. Apparently, the manufacturer had made a sincere attempt to produce a good speech microphone, but their background was primarily in high-quality, expensive, studio-quality microphones. Their idea of a speech microphone was one that had a slight roll-off below about 200 Hz and then an almost perfectly flat response out to 10,000 Hz!

The HC-3 cartridge was mounted in an old microphone housing which had the usual metal mesh screen and about a quarter inch of acoustic material behind it before contact was made with a microphone cartridge. Some experimenting was done with the HC-3, and it was found that it requires about  $\frac{1}{4}$ – $\frac{3}{8}$  inch of acoustic material before its sound port for clear reproduction. Simple foam plastic material will usually work very nicely (e.g., the packing material which comes with the cartridge). One does have to use a bit of



The HC-5 is a very handsome base-station microphone, available from Heil Sound, which uses the HC-3 cartridge.

care when soldering leads to the terminals on the HC-3 housing. Too much heat or unusual static voltages can damage the transducer element. So, a low-voltage, low-wattage, or at least a grounded, soldering iron should be used.

The HC-3 seemed to be very tolerant of the load impedance it was worked into. It was tried with a transceiver having a 600 ohm nominal microphone input and with a high input impedance (1 megohm) pre-amplifier. The frequency response seemed to change only very slightly with the different load impedances, which was a bit surprising, since the HC-3 utilizes a ceramic transducer element. In any case, the output of the HC-3 was sufficient to properly drive the low-impedance microphone input of a typical transceiver and the input of the preamplifier. The HC-3 does seem to have a slightly directional pickup characteristic, although the housing in which it is mounted would certainly influence such a characteristic. When compared to an omnidirectional microphone, the HC-3 microphone did seem to produce less acoustical feedback when a situation was created such that pronounced ringing was experienced with the omnidirectional microphone.

Many readers who feel that their s.s.b. transmitted "audio punch" can be improved might want to give an HC-3 cartridge a try considering its reasonable price. Considering its small size, it should fit into practically any existing microphone enclosure. For those who are willing to spend a bit more money, Heil Sound will also be offering the HC-5, which is a complete base-station microphone incorporating the HC-3 cartridge.

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(+ \$4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient air-wound 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

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(+ \$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

**\$229<sup>95</sup>**  
(+ \$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

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(+ \$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

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(+ \$10)

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

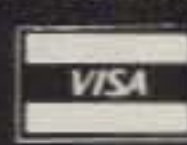
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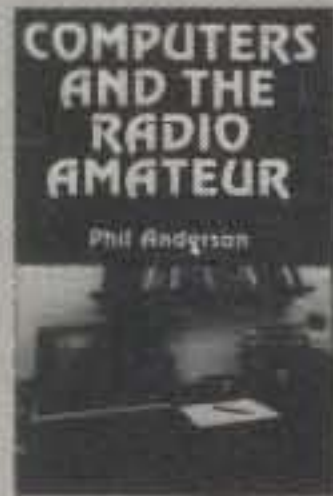
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To give full listening potential USB, LSB, CW, AM, and FM are provided for easy selection by push buttons having adjacent LED indicators.

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Each of the ten memories can be tuned by the VFO, thus operating as ten built-in digital VFO's. The original memory frequency can be recalled by simply pressing the appropriate memory channel key. All information on frequency, band, and mode is stored in the selected memory. The "auto M" switch allows two types of memory storage: when the "auto M" switch is off, data is memorized by pressing the "M in" switch; when the "auto M" switch is on, the frequency being used at that time is automatically memorized.

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Scans all memory channels or may be user programmed to scan specific channels. Frequency, band and mode are automatically selected in accordance with the memory channel being scanned.

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Two 24-hour quartz clocks are built in to allow for programming two different time zones. An integral timer is provided for on and off switching of the receiver.

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In the AM mode 6 KHz wide or 2.7 KHz narrow may be selected. In the SSB mode 2.7 KHz is automatically selected. In the CW mode 2.7 KHz is again chosen and if the optional YG455C filter is installed then 500 Hz in the narrow position. In the FM mode 15 KHz bandwidth is automatically selected. Other important features are: squelch on all modes, noise blanker, a large 4 inch front mounted speaker, tone control, RF attenuator, AGC switch, high and low impedance antenna terminals, optional 13.8V DC operation, record jack and, of course, provision for a VHF converter.

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## NEWS/VIEWS OF ON-THE-AIR COMPETITION

Several operating events usually held in May have not been listed due to lack of information: notably the Rocky Mountain QSO Party, the Massachusetts QSO Party, the Ibero-American Phone Contest, and a few others.

I have listed the World Telecommunication Contest which has always been held on the indicated dates in celebration of "World Telecommunication Day," May 17th. But please note that no official announcement has been received from L.A.B.R.E. Hope they don't let me down.

Too late to make the April issue was the Roman Castels Contest, sponsored by the A.R.I. and scheduled for April 1-17. Activity was listed for c.w., s.s.b., and RTTY on all bands. Scoring system was rather complicated, but if you did work any stations calling "ROMCAST" during that period, your logs go to: Awards Mgr. Nuccio Meoli, I0YKN, P.O. Box 10, 00119 Ostia Antica, Rome, Italy.

The c.w. section of our 160 Contest in January showed a lot of activity, especially in the DX areas, and should produce interesting scores. Conditions could be called good to very good, depending on your location and how well equipped you were for Top Band operation.

Having only a modest, average layout, I found it difficult digging out the DX in the upper portion of the band. Since many European countries do not permit operation below 1830 kHz, the upper limit of the "DX Window," stations in those countries did not have the advantage of split-frequency operation in the "DX Window." I would therefore again recommend that the "DX Window" should be extended to 1835 kHz for contest operation. Your comments and recommendations are solicited.

We should receive more entries this year, now that there was no QSO number in the exchange to tell you how your competition was doing.

The s.s.b. section of the contest is coming up in less than two weeks as this is being written. I will reserve any additional comments for the future, after we see what the fellows have to say about the changes we made this year.

Please note the following deadlines: May 15th for events in August, and June 15th for September. And send the information to my home address please.

73 for this time, Frank, W1WY

### Calendar of Events

May	7-8	Florida QSO Party
May	7-8	County Hunters SSB Contest
May	7-8	G-QRP Group SSB Activity
May	7-8	USSR "CQ-M" Contest
May	7-8	"Seville" WW Contest
* May	7	World Telecomm. Phone
* May	14	World Telecomm. CW
May	14-15	Georgia QSO Party
May	21-23	Michigan QSO Party
May	28-29	CQ WW WPX C.W. Contest
† June	4-5	RSGB National Field Day
† June	11-12	South American CW Contest
June	18-19	All Asian Phone Contest
June	18-19	NINE Land CW Contest
† June	25-26	ARRL Field Day
† July	2-3	Venezuelan Phone Contest
† July	9-10	IARU Radiosport Contest
† July	16-17	SEANET CW Contest
† July	16-17	Colombian Contest
† July	23-24	Venezuelan CW Contest
† Aug.	6-7	DARC WAE CW Contest
† Aug.	13-14	SEANET Phone Contest
† Aug.	20-21	SARTG RTTY Contest
Aug.	27-28	All Asian CW Contest

\* Not official.

† Estimated date.

### Florida QSO Party

Sat., May 7, 1400-1900Z

Sun., May 8, 0001-0500Z & 1500-2300Z

This is the 18th annual QSO Party sponsored by *Florida Skip*. The same station may be worked on each band and on each mode. Phone and c.w. are separate contests and require separate logs. Fla. stations may work other Fla. stations, but for QSO points only.

Fla. stations are divided into two classes. Class A—Portables and mobiles operating outside own county, using emergency power of 200 watts or less. Class B—All other single operator stations.

**Exchange:** RS(T) and QTH. County for Fla.; state, VE province or country for others.

**Scoring:** For Florida—One point per QSO. Multiply total by sum of states (49), VE provinces (12), and DX countries (maximum of 27) worked (maximum multiplier of 88). Class A stations multiply score by 1.5 factor.

**Out-of-state**—Two points for each Fla. contact. Multiply total by Fla. counties worked (maximum of 67).

**Frequencies:** C.W.—3555, 7055, 14055, 21055, 28055. S.S.B.—3945, 7279, 14319, 21379, 28579, 50.2, 146.52.

**Awards:** Certificates, both phone and c.w., to the top single operator in each state, province, and DX country, and

each Fla. county. Five plaques as follows: to the top single operator in Fla. and out-of-state, both on s.s.b. and c.w., and to the Fla. club with the highest aggregate score (minimum of 5 contacts for a certificate).

There is a disqualification clause for excessive dupes, multipliers, and other obvious reasons. Disqualification of stations or operators means being barred from participation in next year's party.

Include a summary sheet showing the scoring and other essential details, a dupe sheet for entries with 200 or more contacts, and a signed declaration.

Include a large s.a.s.e. if you desire a copy of the results. All entries must be received no later than June 1st and go to: Florida Skip Contest Committee, P.O. Box 501, Miami Springs, FL 33166.

### County Hunters SSB Contest

0001-0800Z Sat., May 7

1200 Sat. to 0800Z Sun., May 7-8

1200-2400Z Sun., May 8

This is the 12th annual contest sponsored by the Mobile Amateur Radio Awards Club to increase activity for the County Awards program.

Emphasis is on mobile operation. Fixed stations may work other fixed stations, but once only regardless of the band. Mobiles may be worked from each county change or band change. Mobiles contacted on a county line count as one QSO but two multipliers. Net frequency contacts are not permitted.

**Exchange:** Signal report, county and state, and country for DX stations. (Mixed-mode contacts are permitted providing one station is on s.s.b.)

**Points:** Contacts with a fixed W/K or VE count 1 point; 5 points if it's a DX station (KH6 & KL7 are DX). Mobile contacts 15 points; mobile teams 30 points.

**Multiplier:** Each US county and each VE station worked.

**Final Score:** Total QSO points from all bands times (counties + VE stations worked).

**Frequencies:** Plus or minus 10 kHz, 3930, 7230, 14285, 21385, 28635. There will be a "Mobile Window" 5 kHz each side of 3930, 7230, 14285.

**Awards:** Certificates to the top 10 fixed stations in the US and Canada, top 10 mobiles, top 10 mobile teams, and to the highest scoring station in each DX country. There are five plaques: overall US or Canadian winner, DX station, 1st and 2nd place mobile winner, and mobile team.

14 Sherwood Road, Stamford, CT 06905

It is suggested that you write to W0QWS for detailed rules and log and summary sheets. Include a large s.a.s.e. with your request.

All entries must be received by June 15th and go to: John Ferguson, W0QWS, 3820 Stonewall Ct., Independence, MO 64055.

### G-QRP Club SSB Activity

Sat. & Sun., May 7 & 8

The G-QRP Club announces the following schedule for its SSB Activity. The following times (GMT) and frequencies will be used.

3690 kHz—1200 to 1300, 1400 to 1500, and 2100 to 2200.

7090 kHz—1100 to 1200 and 1300 to 1400.

14285 kHz—0900 to 1000, 1300 to 1400, 1730 to 2000 and 2200 to 2300.

21285 & 28885 kHz—1000 to 1100 and 1500 to 1730.

This is not a contest, but QRPers are invited to participate and report their activity to: Christopher J. Page, G4BUE, Alamosa, The Paddocks, Upper Beeding, Steyning, West Sussex, BN4 3JW England.

### World Telecomm. Contest

Phone: 0000-2400 GMT Sat., May 7  
C.W.: 0000-2400 GMT Sat., May 14

This activity is sponsored by the L.A.B.R.E. to commemorate "World Telecommunications Day" (May 17th).

It's a world-wide contest, the object being to contact as many stations as possible in other ITU Zones. Scoring will be based on all-band operation, single operator and multi-operator, phone and c.w.

**Exchange:** RS(T) plus your ITU Zone number.

**Scoring:** QSO points as follows. Between stations in (1) same country, 0 points (but okay for multiplier); (2) different country, same Zone, 1 point; (3) different Zone, same continent, 3 points; (4) different Zone, different continent, 5 points.

**Final Score:** Total QSO points multiplied by different ITU Zones worked. The same station may be worked on each band for QSO points but Zones are counted only once.

**Awards:** Diplomas to the highest scorers, single and multi-operator, in each country. Gold, silver, and bronze medals to the top three world single operators. A silver plate to the top multi-operator station. Separate awards for phone and c.w. Additional awards if participation warrants.

The ITU Trophy goes to the country with the highest aggregate single operator scores. The Trophy remains in the possession of the national association of that country affiliated with the IARU for one year. It is retired by the country winning it 3 times in a 5 year period.

Mail logs before June 30th to: L.A.B.R.E., U.I.T. Contest Coordinator, P.O. Box 07-0004, 70.000-Brasilia, Brazil. Include a self-addressed label and IRC's for results.

### USSR CQ-M Contest

2100Z Sat. to 2100Z Sun., May 7-8

We have received official announcement from the Chief of the Krenkel Central Radio Club for this year's CQ-M contest. Rules are the same as last year, but will be repeated for the benefit of those who did not see them last year. Participation from the USA was much better than in previous years.

Keep in mind that this is a world-wide-type contest, so do not limit your operation to the USSR only. Contacts may be made on c.w. or s.s.b., 3.5 through 28 MHz. The same station may be worked on each band, but not both modes, for QSO and multiplier credit. Contacts via Oscar count as an extra band if made on u.h.f.

**Classes:** (A) Single operator, single band. (B) Single operator, all band. (C) Multi-operator, single transmitter, all band only. (D) S.w.l.

**Exchange:** RS(T) plus a 3-figure QSO number. USSR stations add the number of their region (oblast) to their report.

**Points:** Contacts between stations on the same continent 1 point; different continents 3 points. Own country may be worked for multiplier credit but no QSO points.

**Multiplier:** Is determined by the number of countries worked on each band. The USSR "R-150-S" list is the standard, which essentially is the same as our DXCC, plus the following oblasts: 002, 013, 014, 056, 084-5-6-7-8-9, 090-1-2-3-4-5-6-7-8, 159, and UA1 Novaya Zemlya, UA0 Kuril Is., UA0 New Siberian Is.

**Final Score:** Total QSO points from all bands times the country/oblast multiplier from each band.

The s.w.l.'s get 1 point for reporting one station in the exchange, and 3 points if both stations are reported.

**Awards:** A large selection of trophies, medals, and badges in all classes for overseas winners. Badges to all entries contacting at least 10 USSR stations.

Contest contacts may be credited for USSR awards in lieu of QSL cards if request is made with entry (R-150-S, R-100-0, W-100-U, R-15-R, R-6-K, R-10-R).

Mailing deadline is July 1st to: Krenkel Central Radio Club, CQ-M Contest Committee, P.O. Box 88, Moscow, USSR.

### "Seville" World Wide Contest

2000Z Sat. to 2000Z Sun., May 7-8

Again organized by the Seville Radio Club of Spain, this could become a popular activity. Take note of the Special Grand Prize; it's for real. The World winner last year was Steve Sussman, W3BGN, of the Frankford Radio Club.

It's a world-wide-type contest similar

### 1982 CQ-M USSR Contest Results

All Band USA		Dom. Rep.	
		HI8GB	3,186
K1KI	437,415		
K3EST	382,302	Panama	
N4WW	216,937	HP1AC	7,072
WB4TDW	130,824		
AD5Q	91,760	14 MHz USA	
K5KIA	46,896	N8II	81,447
WA4OML	38,136	N5DKG	41,410
W3ARK	27,048	K7NW	32,112
W8DCH	13,950	WD9IIC	29,664
W1PQE	11,718	W8UVZ	15,939
W2XQ	10,230	K2SX	15,807
W3JWG	9,867	N4MM	7,656
WB8YJF	9,588	N6IC	7,176
N6AW	9,144	KB5FU	6,750
K8EF	9,021	WB4UBD	6,630
WB3HAZ	7,200	WA4QQV	1,170
K8PYD	7,050	WA2UDT	1,092
KM0Q	6,873	W4PTT	960
W1CNU	6,678	K0UKO	780
WA4QMQ	6,318	WB3DNA	759
W0YBV	6,210	N3KR	540
W3YFI	4,725	K8HF	510
N8BNE	4,278		
W1FJ	3,600		
AK5B	3,402	Canada	
WA3DMH	3,180	VC2PD	540
K1KOB	3,036	VE2JO	540
WA8EUK	2,958		
W10PJ	2,808	21 MHz USA	
W4KMS	2,772	NE4F	24,928
WA8WMT	2,640	WA1FCN	15,066
WD8JLM	2,394	AA4NC	3,591
WB3HTK	2,394	K07G	1,638
WB3JRU	2,376	W3DCN	1,053
AC8Y	1,953	W5ELJ	231
N4AOC	1,890		
AA6KE	1,782	Canada	
W8OHV	1,326	VE3IR	525
KC4ZT	1,305		
WA7CGR	1,248		
KA2MXO	1,092	USA Multi-Opr.	
N6JM	1,056	N4OL	275,220
WA9TZE	780	WD8CRY	191,290
KA4MBC	720	K5VWW	175,380
K8BIC	663		
K0CS	360	World AB Single Opr.	
		K1KI was #1, K3EST was #2, N4WW was #5.	
Canada			
VO1AW	7,491	N8II was #2 on 14 MHz.	
VE2DPO	4,676	NE4F was #3 on 21 MHz.	
VC3LAJ	4,560	WA1FCN was #5.	

to our CQ WW. Use all bands, 1.8 through 28 MHz. Only single operator, all band, s.s.b., or c.w. operation. The same station may be worked on each band, but not both modes for QSO and multiplier credit.

**Exchange:** RS(T) plus a QSO number starting with 001.

**Points:** Contacts with stations in the same country, 2 points. Between stations in different countries, 3 points. (Between EA, EA6, EA8, and EA9, 2 points.)

**Multiplier:** Each different DXCC country worked on each band.

**Final Score:** Total QSO points from all bands multiplied by the sum of countries worked on each band.

**Awards:** Plaques to the 10 top scorers. Certificates to each station making 300 or more QSO's. A "Special Award" to the two overall winners, Spain and the World: an all-expense-paid trip for two to the "Seville April Fair Feast" offered by the Seville City Council for the following year.

Use a separate log sheet for each band. Indicate each multiplier only the



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CK-2 Contest Memory Keyer	.....120.00
KT-2 Keyer/Trainer	.....95.00
BT-1 Trainer	.....72.00
Hot Rod Antenna	.....17.95
<b>ALLIANCE</b>	
HD73 (10.7 sq. ft.) Rotator	.....\$99.00
U-100 Small Rotator	.....45.00
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RS7A 5-7 Amp Power Supply	.....\$49.00
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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
<b>AZDEN</b>	
PCS 4000 2M Xcvr	.....\$289.00
PCS 300 Handheld	.....285.00
<b>B&amp;W</b>	
Folded Dipole 80-10 Meter	.....\$135.00
<b>BENCHER</b>	
BY-1 Paddle	.....\$36.00
ZA-1-A Balun	.....16.50
<b>BUTTERNUT</b>	
HF6V 80-10 Meter vertical	.....\$119.00
<b>CUSHCRAFT</b>	
A3 Tribander 3 EL	.....\$179.00
A4 Tribander 4 EL	.....225.00
214FB Boomer 14 EL FM	.....89.00
A4-7-11 ZM Beam	.....36.00
32-19 Super Boomer 19 EL 2M	.....83.00
ARX-2B Ringo Ranger II 2M	.....36.00
<b>DAIWA</b>	
CN-520 1.8-80 MHz SWR/Pwr Mtr.	.....\$63.00
CN-620B 1.8-150 MHz SWR/Pwr Mtr.	.....110.00
<b>DRAKE</b>	
TR7A Xcvr	.....\$1,375.00
R7A Receiver	.....1,349.00
TR5 Xcvr	.....675.00
12 inch Green Monitor	.....139.00
<b>ETO</b>	
Alpha 78	.....\$2,495.00
<b>ENCOMM (SANTEC)</b>	
ST-144/P	..... call
ST-440/P	.....309.00
ST-220/P	.....299.00
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DS3100/MPT/ST8000	.....\$2,825.00
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CIRCLE 33 ON READER SERVICE CARD

first time it is worked on each band. Use a separate sheet indicating your duplicate contacts on each band. Include a summary sheet showing the scoring, comments, and other essential information, plus the usual signed declaration. Logs will be closely checked for excessive dupes and other violations and will be subjected to disqualification.

Entries must be postmarked no later than June 15th and go to: The Seville World Wide Contest, Radio Club Sevilla, P.O. Box 555, Seville, Spain.

### Georgia QSO Party

1600Z Sat. to 2400Z Sun., May 14-15

The Atlanta Radio Club is again the sponsor of this year's QSO Party. There are three classes of entries: single operator, multi-operator single transmitter, and Georgia mobile/portable operating outside own county.

The same station may be worked on each band and each mode for QSO credit, but a multiplier is counted only once. Georgia-to-Georgia contacts are permitted for QSO point credit, and mobiles in each county change.

**Exchange:** QSO no., RS(T), and QTH. County for Georgia; state, VE province, or country for others.

**Scoring:** Ga. stations multiply total QSO's by number of states, provinces, and continents worked (maximum of 6). Others multiply total Ga. QSO's by the number of Ga. counties worked (maximum of 159).

**Frequencies:** C.W.—1805 and 60 kHz up from bottom of each band. S.S.B.—3900, 3975, 7245, 14290, 21360, 28600. Novice and Tech.—3718, 7125, 21110, 28110.

Try 160 at 0300Z, 10 on the hour, and 15 on the half hour from 1300 to 2300Z.

**Awards:** Certificates to the top scorers in each state, VE province, DX country, and each Ga. county. Second and third place awards where activity warrants. There are three plaques to the overall winners in Georgia, out-of-state, and Ga. mobile/portable.

Include a summary sheet and a check sheet for those making 200 contacts or more.

Logs must be received before June 30th and go to: Atlanta Radio Club, At: Dave Thompson, K4JRB, 4166 Mill Stone Court, Norcross, GA 30092.

### Michigan QSO Party

1800Z Sat. to 0300Z Sun., May 21-22  
1100Z Sun. to 0200Z Mon., May 22-23

This year's party is again being sponsored by the Oak Park ARC. The same station may be worked on each band and mode, portable/mobile in each county change. Contacts between Mich. counties are permitted for multiplier credit.

**Exchange:** RS(T), QSO no., and QTH.

County for Mich; state or country for all others.

**Scoring:** For Mich.—One point for phone contacts, 2 points if on c.w., and 5 points if with W8MB. Multiply the total by (states + countries + Mich. counties) worked for final score. KH6 and KL7 count as states; VE as a country (maximum of 85 possible).

**Out-of-state**—One point for each Mich. phone QSO, 2 points if on c.w., and 5 points if it's with Club station W8MB. Multiply total by Mich. counties (maximum of 83).

V.H.F. scoring same as above except multipliers from each band are added together for total multiplier. Repeater contacts are not permitted.

**Frequencies:** C.W.—1810, 3540, 3725, 7035, 7125, 14035, 21035, 21125, 28035, 28125. S.S.B.—1815, 3905, 7280, 14280, 21380, 28580. V.H.F.—50.125, 145.025, 146.52.

**Awards:** Certificates to winners in each state, country, and Mich. county. Seven plaques to top Mich. winners: single operator, Upper peninsula, multi-operator, V.H.F., mobile, and aggregate Club score, and out-of-state top scorer.

Party contacts do not count toward the Michigan Achievement Award unless one fact about Mich. is exchanged.

A summary sheet is requested with your entry showing the scoring and other pertinent information, plus a signed declaration that rules and regulations have been observed. Include a large s.a.s.e. for copy of results.

Mailing deadline is June 30th to: Mark Shaw, K8ED, 3810 Woodman, Troy, MI 48084.

### Michigan Achievement Week

All contacts with Michigan stations made during Michigan Week, May 21-28, as well as Party QSO's, may be used for this award if the following requirements are fulfilled.

1. Michigan stations: Submit a log with information, name and address of station worked if possible, of 15 or more QSO's with out-of-state or DX stations with information about Michigan.

2. Out-of-state stations including Canada: Submit a log with information, name and address if possible, of at least 5 Mich. stations worked who related facts about Michigan.

3. DX Stations: Work at least one Mich. station, with log information, name and address, and relate fact about Michigan given by the station worked.

4. Only contacts made during Michigan Week are valid for this award.

Applications for certificates must be postmarked no later than July 1, 1983, and mailed to: Governor James Blanchard, Lansing, MI 48902.

(Facts about Michigan: State Bird, Robin; Fish, Trout; Flower, Apple Blossom; Tree, White Pine; Stone, Petoskey. Or any local facts.)

### All Asian Contest 1982 Phone Results

U.S.A.			
All Band		* W1BL	1,456
		* NI4Y	345
* K6HNZ	239,010		
* KI7M	11,020	Multi-Op.	
* K1KI	7,296	* KN6M	383,520
* KC4OV	7,296	* KM7U	284
K1AR	6,888	* WB2QEU	255
* KA2BBZ	644		
W4WIJ	336	Dom. Rep.	
N4UH	255	14 MHz	
W6OKK	210	* HI8GB/6	420
* W3ICM	90		
3.5 MHz		Jamaica	
		14 MHz	
* N6RO	5,760	* 6Y5DA	228
7 MHz		All Band	
* KB5FU	1,008	* 6Y5HN	9,300
14 MHz		U.N.	
		Multi Op.	
* K6XT	4,039		
W6OK	2,784	* 4U1UN	190
W6SZN	2,550		
* W7CGR	780	* Certificate Winners.	
* WB9MSV	395		
* K3TW	273	KN6M was World High	
K7NF	72	Multi-Op and K6HNZ 2nd	
21 MHz		World High Single Opr.	
		Both will receive JARL	
* W2FG	1,568	medals.	

### CQ WW WPX C.W. Contest

0000Z Sat. to 2400Z Sun., May 28-29

This is a reminder of our WPX C.W. Contest coming up at the end of this month. Results of last year's contest in this issue may give you an idea of what class would be the best for you to enter.

Rules and scoring are exactly the same as for the s.s.b. section last March, and were given in detail in the January issue, with a follow-up in the March Contest Calendar.

Not to be confused by some of the regulations in our fall World Wide Contest here are a few items to keep in mind.

**Par. I**—Only 30 hours out of the 48-hour contest period are permitted for single operator stations. The off times may be taken in up to 5 periods.

**Par. IV**—Multi-operator, single transmitter. Only one transmitter and one band permitted during the same time period, defined as 10 minutes. (No QSYing to another band to pick up a new multiplier.)

**Par. VI**—QSO points on the three lower bands, 7., 3.5, and 1.8 MHz, are worth double those for contacts on 28, 21, and 14 MHz. Own country may be worked, but for multiplier credit only. (No 10.1 MHz operation permitted.)

**Par. VII**—The prefix multiplier is counted once only, not once on each band. Stations operating in a call area other than that in the call sign are required to indicate the area of operation. The portable prefix is the multiplier (i.e., W8IMZ/4 counts as W4).

**Par. XI**—This year there are 17 plaques awarded in the c.w. section of the contest. Eligibility remains at 2 years except for categories as indicated.

**Par. XIII**—An alphabetical/numerical check list is required with your log.

Mailing deadline is July 10th, but will be extended for entries from rare isolated areas. Indicate c.w. on the envelope.

Logs may be mailed to CQ Magazine, WPX Contest, 76 N. Broadway, Hicksville, NY 11801, and/or to Steve Bolia, N8BJQ, 7659 Stonesboro Dr., Huber Heights, OH 45424.

### Addendum

The following calls were either left out or incorrectly shown in the results of the 1981 CQ WW S.S.B. and C.W. Contests. The Committee apologizes for the deletions and errors.

The following are s.s.b. corrections:

1. **DL0UE**: 2,072,064 2061 113 313  
Score left out. Multi-operator, single transmitter, #3 in F.R.G. Operated by DF2OA, DF3AV, DJ5FT, DJ5MG, DL0LU, DL5OL, DL7BI, DL8RL.

2. **JA3HTT**: 955,691 1204 103 307  
Score left out. Single operator, All Band, #4 in Japan, certificate winner.

3. **LA5QK**: 6,560 135 5 35  
Score left out. Single operator, single band, 3.8 MHz, #1 in Norway, certificate winner.

4. **F6FNA**: 21 MHz *not* 28 MHz, certificate winner.

5. **JA6VZB**: 21 MHz *not* All Band, QRP #1 in the world, certificate winner.

6. **TR8DG**: Log lost by post office, received August 1982.

7. **OH1IJ**: 150,104 934 89 27  
Score left out. Single operator, 7 MHz, #1 in Finland, certificate winner.

8. **KA2CDJ**: 3.8 MHz *not* 7 MHz, certificate winner.

9. **K5KG**: 1,217,160 1065 116 304  
Score left out. All band, first in 5th call area, certificate winner.

10. **WA3VUQ**: 7 MHz, *not* WA3VOQ.

11. **SP9CTW**: Score left out. 14 MHz, 215,760, #1 in Poland.

12. **JA0ZUN**: Score left out. 28 MHz, 15,631.

13. **OH2AA**: Score left out. Multi-operator, single transmitter, 3,746,234, #2 in Finland.

14. **VE7ZZZ**: Score left out. Multi-operator, single transmitter.

15. **LA7JO**: Score left out. 3.8 MHz, new LA record.

16. **KA1CZH**: Should be QRP, *not* QRO.

The following are c.w. corrections:

1. **W3GG**: 22,002 137 16 41  
Score left out. 7 MHz, #1 in third call area.

2. **SM2DIR**: 7 MHz, #2 in Sweden. Listed as check log by mistake.

3. **JA9YBA**: Multi-operator, single transmitter, *not* multi-operator, multi-transmitter.

4. **VE3PCA**: 3,711,956 2794 135 373  
Multi-operator, single transmitter (Ops. VE3KKB, VE3CRG, VE3FOX, VE3MHI, VE2ZP). New Canadian record.

5. **SP3KPN**: Score left out. All band, 285.

6. **SP5FM**: Score left out. 28 MHz, 28,426.

7. **SP9CTW**: Score left out. 14 MHz, 62,451.

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# A Single-Frequency A.M./F.M. Receiver For 2 Meters

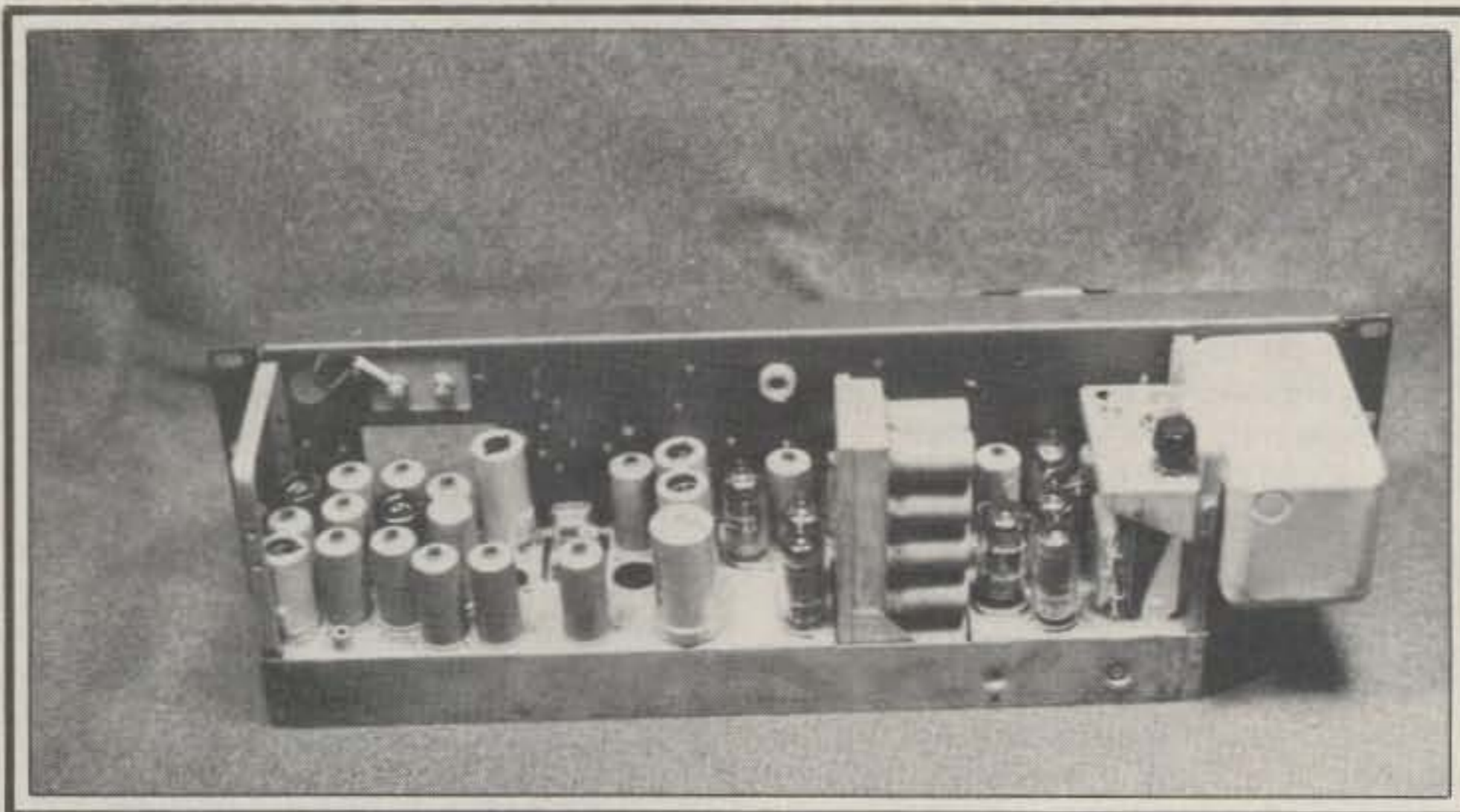
BY BYRON H. KRETZMAN\*, W2JTP

**S**ome years ago a low-power 2-meter a.m. transmitter was built to enable us to participate in the local 2-meter "Happy Hour" net operation on 145.350 MHz.<sup>1</sup> (When this became an f.m. repeater frequency we all moved to 144.350 MHz.) An old aeronautical service fixed-frequency a.m. ground station receiver was used.

After some time it became obvious that the receiving capability was not all it should be. It was difficult copying the more distant stations, and a drifting squelch setting was also a problem. What to do?

Looking around we came across an old "junk" Motorola PA-9033A fixed-frequency high-band receiver strip. It had no adapter chassis for rack mounting, and all tubes and crystals were missing, as was the output transformer. The 457 kHz i.f. filter was there, but it was "wide-band," meaning it was for  $\pm 15$  kHz deviation—that is, for a 30 kHz bandwidth. The receiver was also designed for a 150 to 174 MHz frequency range, a minor point.

Although designed for crystal oven operation, a non-oven crystal was ordered to a  $\pm 0.005\%$  tolerance, as was a replacement for the missing 8.457 MHz i.f. crystal. The receiver was initially tuned up on 146.940 MHz f.m. (for which we had a crystal), and it was found to perform according to specifications—namely a sensitivity of 0.5 microvolts for 20 dB quieting. All r.f. coils, including the oscillator multiplier coil, were padded with 3.3 pF tubular ceramic capacitors, and then the new crystal for 144.350 MHz was plug-



The a.m./f.m. 2 meter receiver for the "Happy Hour" net.

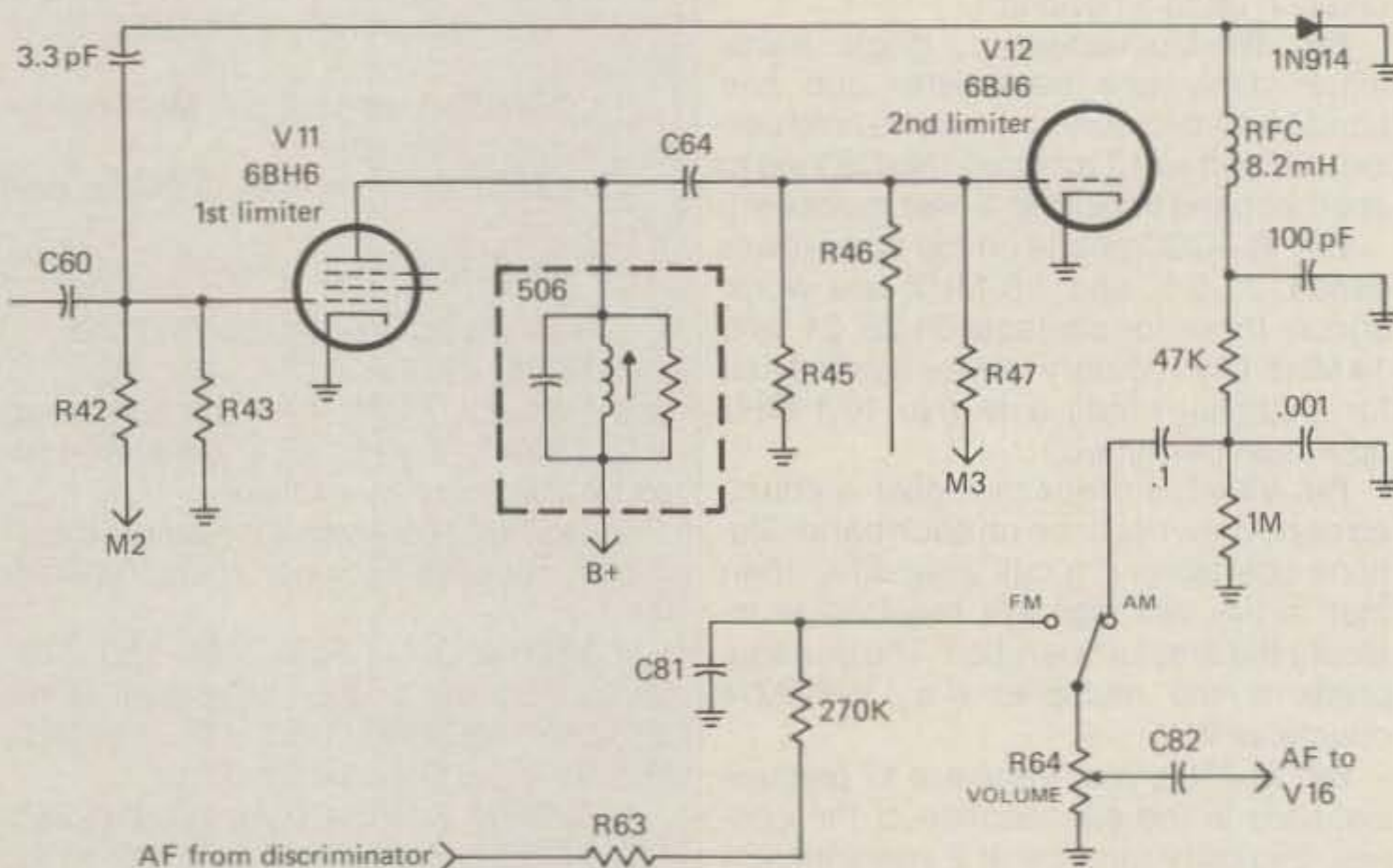


Fig. 1—Schematic diagram of modifications.

\*431 Woodbury Road, Huntington, NY 11743

<sup>1</sup>Kretzman, B. H., "A Two Meter Transmitter for A.M.," CQ, Nov. 1978, p. 41.



ged in. Everything tuned up with ease, and even the noise-compensated squelch circuit performed perfectly.

### Modification for A.M.

Building-in an a.m. detector for this receiver was a simple matter, in spite of the component-crowded underside of the narrow chassis. Fig. 1 is a schematic diagram of the modifications. Component part numbers given are the original numbers from the Motorola schematic diagram and indicate no change. (They are given for reference only.) A miniature SPDT toggle was installed on the volume-control sub-panel, above the new output transformer, and was wired to switch the a.f. input of V-16 to the discriminator (f.m.) circuit or to the a.m. diode detector load.

The a.m. detector is simply a 1N914 silicon diode coupled to the grid of the 1st Limiter V-11 through a 3.3 pF ceramic capacitor. Do not connect this capacitor to any other place, nor increase its value; i.f. instability will occur if you do. The r.f. choke is a National Part No. B17311 with a value of 8.2 mH. The value is not critical. Anything from about 5 mH to 10 mH can be used. Of course, it should be small.

A 10k ohm squelch control was installed next to the volume control. Because no adapter chassis was available, the receiver was side-mounted on a surplus 5 1/4" relay rack panel, which explains the

extra holes. After mounting the receiver on the panel, enough space was left to build-on an a.c. power supply. Using surplus components, the power supply delivers the required voltages—6.3 volts a.c. for the tube heaters at about 3 to 4 amperes, and 200 volts d.c. plate voltage at about 50 ma. The a.c. line was fused with a 1 amp fuse.

### Performance

Performance of the modified receiver exceeded our most fond expectations. The AM-FM switch is a boon because occasionally somebody shows up on the frequency with f.m. The sensitivity is more than adequate. The wide i.f. bandwidth has also been a boon, because characteristically, not everyone on the "Happy Hour" is right on frequency. And, with a Motorola-type test set plugged into the receiver, we can look at the discriminator reading and see just how far off frequency someone might be, even with the receiver switched to AM.<sup>2</sup> (Audio distortion does not set in until a station is more than 15 kHz off frequency.)

Muting of the receiver, when transmitting, can be accomplished by switching its B+ off by a relay in the transmitter.

The particular f.m. receiver strip used was for single-frequency operation. However, the necessary holes are in the chassis for the second oscillator tube, coil, and crystal socket required to modify it

for two-frequency operation. This is a near-future consideration. The frequency separation between the two frequencies should not be more than about 1 MHz, by the way, and it should be tuned up about halfway between the two if a suitable crystal can be found for this purpose.

The squelch circuit is very stable, and because it is of the noise-compensated type, the audio does not open up on ignition noise even when the receiver is switched to AM. And, the wide i.f. bandwidth is not a problem, because there is little QRM on the low end of 2 meters, below the repeater segment. Truly, the receiver is a joy to use. □

<sup>2</sup>Kretzman, B. H., "A Test Set for FM," CQ, Nov. 1963, p. 74.



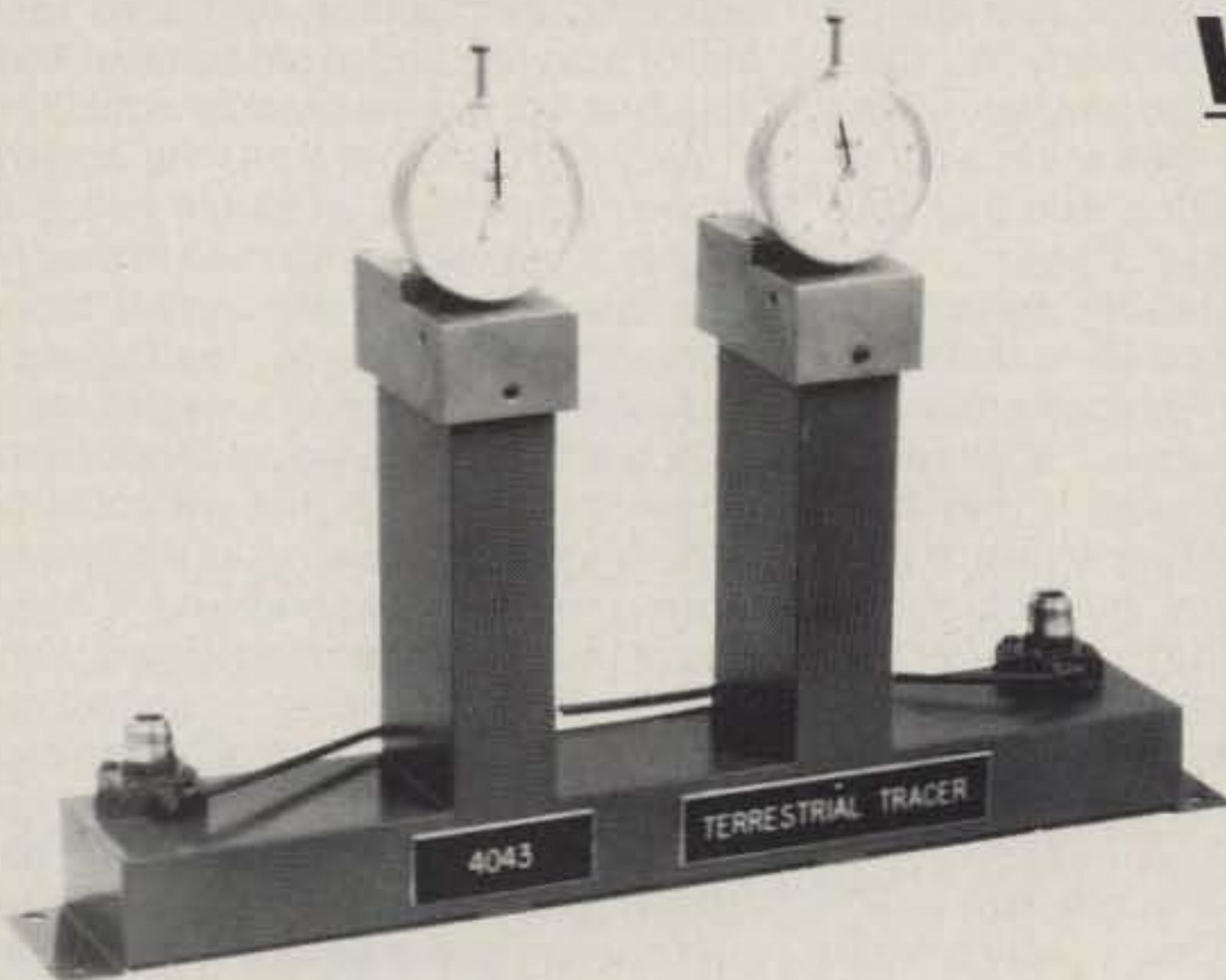
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CIRCLE 115 ON READER SERVICE CARD

## NEWS OF COMMUNICATIONS AROUND THE WORLD

*What do DXers talk about?  
What is their mystic theme?  
Those too young for the Honor Roll,  
Yet old enough to dream. . . .*

**W**ith spring at hand and the days warmer, one can quickly learn that there are things other than DXing about which to talk. If you are young you might wish to talk of one thing; a bit older, and one learns the delights of remembering some of the other days—the days that brought sometimes a laugh, sometimes a bit of insight and wisdom, sometimes a bit of interest about DXing.

Certainly it is a truth that DXers have done everything, known everyone, and been everywhere. One has only to listen to learn. DXers have a good and valid explanation for most everything. With some of the more DX types out blinking in the sunshine these days, there are always a few more bits of enlightenment to add to what has been said before.

Recently we again encountered one of the local DXers who has definitely added to his girth in recent years. No longer is he the 165 pounder we knew in school; no longer does he wear his shirt any way but outside his pants. The years have broadened him, and in reply to some pointed comment, he was quick to blame it all on World War II. We stopped to figure that that one went into history over 35 years back, but we shook him not at all.

"It all happened to me over in Europe," he claimed very stoutly. "I was in an outfit whose acronym was 'EATS.' That's the truth and that's exactly what it was. Everywhere you looked on the base you saw equipment stenciled with 'EATs.' It was a constant urging.

"We were at an aerodrome called Villacoublay just outside Paris, and there were civilian French cooks for the mess halls. So we dutifully followed the constant exhortations and look what it did to me! All in the service of my country!"

Perhaps we let a bit of skepticism show, for the years have brought a bundle of war stories. But this one would not tolerate even our slight doubt and found some old papers to show the name of the outfit (European Air Transport Service) and to note that clearly visible was the use of EATS. "I was in the 323rd Troop Carrier Squadron," he said smilingly, "and we sure did eat well." What could one say but the words that all true-blue DXers know: "I believe!"

77 Coleman Dr., San Rafael, CA 94901



*Here is just about all of the Syrian DX heard over the years. On the right is Rashheed Jalal, YK1AA. On the left is Michel Siouffi, YK1AN. Tom Dugec, YU2DX, is in the middle. This was taken when Tom visited Damascus a bit back; the temperature at the time was over 100°.*

Once one of the locals showed up with a reversed collar and a pious mien. It was hardly the combative spirit we had learned to expect and to recoil from in contests. Seems as if he had been ordained a mail-order minister for a \$15.00 fee. He was out working for better things.

"If I can sign up 25 additional candidates for the ministry," he told us, "I will be ordained a bishop." His eyes were shining at the idea. "Just think," he continued, "how it will go in a pile-up when I jump in and shout, 'This is your bishop calling!' I'll be the first on every list, absolutely irresistible. Certainly when others hear the bishop's call they will in all proper respect and reverence stop their calling and step aside, won't they?"

Always one to agree with the premise of the born nobility of the DXer and reluctant to jump into any religious argument, on or off the air, we kept our silence and merely nodded our heads. It may have been that he was thinking we were bowing our heads devoutly, but actually we were thinking about the local QRPer who was fired with the beauty of Methodology. Not only fired himself, but determined that everyone else would have the blessings of his insight.

"There is a quick and efficient way to gain the Honor Roll," he crisply advised we unenlightened types, "and all one has to do is plan one's effort along methodical lines." This one came seeking knowledge, or as he put it, "... the experience of the years." We thought that the Old Timer deserved this one, so we headed him up the hill. We knew that the Old Timer would always be glad to sit and listen; he has had a lot of practice developing patience.

"Tell me something," the methodical

QRPer said, "what is the basic essence of success in DXing and the early attainment of the Honor Roll? Tell me, what is the Shining Key?" If we had thought the answer would be long in coming and involved in text, we were wrong. The Old Timer spoke quickly and briefly: "Shut up and listen!" And it is just as true today as it was then.

One can learn a lot about DXing as the Old Timer suggested. But at times to listen is to hear the unbelievable. Some years back there was an instance that ran us square into the wall of the uncomprehending.

One of the always close but never in fringe element of amateur radio came by to visit, as he regularly did, to speak his mind and mostly to complain about the inanity of requiring any code skills for an amateur license. Early on we had tried to slip in the thought that perhaps codeless licenses were in the CB program and possibly had led to that vast swampland. He was not ready to listen to such truths. He has his own truths to proclaim.

"The code requirement is archaic," he would shout in a voice that always started loud and got louder. "That in this day and age to continue to require code is to ignore that times have changed and the technology has changed, and to ignore the state of the art. Are we to be strapped by outdated concepts, meaningless bureaucratic ambiguities, and tired rationale, or are we going to get some acknowledgement of our inalienable rights?"

We were really not sure if he would get an appreciation of all of his needs and "rights," but we had learned to stay neutral. Our initial experience had brought some hint of possible sympathy, and we had learned to regret our weakness.

"Look at me," he would shout, leaning closer to make sure that we could hear him. "I've been working at a license for years. I started with a bug, and now I have one of those programmed keyers. I've no trouble at all in sending. I can just rattle along at 35 words per minute and probably could go even faster, but the keyer won't. I send that code like you'd never believe and I still can't get a license. It just doesn't make sense! None at all!"

Initially it also didn't to us, for we knew well that he could get a Novice or Tech license for 15 words a minute, and a General or Advanced for 13 words a minute. The mistake was in pointing this out.

All we got was some of the irritation that perhaps properly belong to the FCC. "That's easy for you to say," we were told heatedly, "but what do you do when you can't copy 5 words per minute? You'd think they'd have the sense to give

## The WPX Program

### Mixed

1032	KR8N	1034	N1BCV
1033	WA8YTM	1035	KA3CRC

### S.S.B.

1565	I2EOW	1569	NØBZV
1566	HB9BVV	1570	I2HLY
1567	F6GPG	1571	K3LUE
1568	PA3ATZ		

### C.W.

2191	VE4AEX	2193	SM4ASI
2192	WBUMP		

Award of Excellence: G4BUE with 160 Meter Endorsement

### Endorsements

Mixed: 450 KR8N, K2POF, AE1X, KA3CRC, 500 KR8N, N3KR, K1BB, K2POF, KA3CRC, 550 VE2PD, 700 N2AIF, 750 N8BM, 800 N8BM, 850 CT1LN, KP4V, 900 G4BUE, KP4V, 950 K2OLG, WB8ZRL, G4BUE, 1000 G4BUE, 1300 K9BG, 1550 N4NO, 1600 N4NO, 1650 N4NO, 1700 N4NO.

S.S.B.: 350 F6GPG, NØBZV, N2AIF, 400 K8HF, 450 WA3GNW, 550 YU5RK, 700 G4BUE, 750 WB8ZRL, G4BUE, 800 WB8ZRL, G4BUE, 900 KL7AF, AE5B, 950 AE5B, 1000 KC4OV, AE5B, 1050 AE5B, 1100 WA1JMP, 1150 HB9AAA, N4NO, 1200 HB9AAA, N4NO, 1250 HB9AAA, WD8MGQ, N4NO, 1300 HB9AAA, WD8MGQ, 1350 HB9AAA, 1400 HB9AAA, 1450 HB9AAA, 1500 HB9AAA.

C.W.: 350 WB8ZRL, K2POF, SM4ASI, 400 WB8ZRL, SM4ASI, 450 WC4K, SM6HCJ, SM4ASI, 500 VE1ACK, SM4ASI, K8HF, 550 VE1ACK, 600 DJ2IW, K2AIF, 650 G4BUE, 700 G4BUE, 850 WA1JMP, 1050 VE1MF, 1250 VE7CNE, 1350 N4NO, 1400 N4NO, 1450 N4NO, 1700 ON4QX, ZL3NS, 1750 ON4QX.

10 meters:	YU5RK.
15 meters:	OE1KJW.
20 meters:	K2POF, SM6HCJ.
80 meters:	W5UR.

Asia:	JE1GBI, HB9AAA.
Africa:	HB9AAA.
Europe:	HB9AAA, HB9BVV.
So. America:	HB9AAA.
No. America:	HB9AAA, K2POF.
Oceania:	HB9AAA, K2OLG.

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.

you credit for receiving code at the same rate for send, wouldn't you? Big deal! They want you to receive what they send and that stops me every time."

One learns to make quick reversals on concepts. We can truly understand the burden on one who can send at 35 words a minute—maybe even faster—and to have one's burning ambition thwarted by petty, legalistic laws. But one also learns that often there is a reason for most everything, and possibly this one suffers from a multitude of misplaced dits and dahs. Sometimes, one does understand, but it may be better to keep silent.

Once it was mentioned to the Old Timer that one could find a variety of endless joys and enlightenments in the DX scene. We got no disagreement with this.

"One only has to listen," the Old Timer said, "to learn that in DXing there will always be a simple solution to any problem—plausible and neat and usually wrong. One can learn things by listening; one always does. Maybe sometimes even some DX."

What else can one say to that? For one will also learn that there is more to DXing than just accumulating country counters. Sometimes this is difficult to understand,

but not if you are a DXer. True-blue DXers always understand everything.

## DXCC No. 1

We may be a bit late with this, but it is certainly worth calling attention to it. Last fall, Frank Lucas, W3CRA, became a Silent Key. He also gained DXCC #1 back before WW II.

Back then Frank lived near Canonsburg in western Pennsylvania on top of a high hill, and his antenna was an end-fed wire 133 feet and 33 feet high. This worked, and more than one skeptical DXer dropped by to check; they were skeptical because they could not hear what W3CRA was working.

Back in those days Clark Rodimon, W1SZ, was editor of *QST* and a constant DXer. Times change, people change, and even DX changes. But back when DXCC first started, W3CRA was definitely #1 and had the certificate from the ARRL to prove it. You cannot change that.

## W6AM Open House

Most DXers are ready to acknowledge seniority. The older ones know that it is merited, and the younger and newer DXers are always ready to revere what has gone before and to scorn what comes after. But Don Wallace! He was here before most everyone and has been working DX before most everyone. There must be a reason.

The second Sunday in June will give anyone with curiosity a chance to see for himself. Don and Virginia will welcome all comers to the antenna farm on top of the Palo Verde Hills. From 1 p.m. to 5 p.m. it is open house. The QTH is on top of the hills that can be seen south of the L.A. Airport on a clear day. Don says that from the top you can see Catalina Island on a clear day, though some have muttered that he probably can see the Hawaiian Islands.

Anyhow, if you are in the neighborhood, it is south on Harbor Freeway to Anaheim Street, right (west) to Palos Verdes Hills at Five Corners, and bear left up the hill on Palos Verdes Drive to Hawthorne Blvd. Go left again 2 miles past the shopping center to High Ridge Road. Go just under a mile to 28503 High Ridge, where the Palos Verdes Amateur Club will help you park, and they with the help their XYLs will welcome you to the QTH and the coffee table. It will be something to be remembered.

## New Bands

While only the 10 MHz band has any W/K activity authorized so far, the other bands coming from the 1979 WARC conference are showing in other lands.

Recently the *DX News Sheet* noted that there is action on both the 17 and 24 meter bands with a number of stations accumulating a good handful of countries on them. As of earlier this year, amateur activity was on both the 24 MHz and

# LEARNING THE MORSE CODE?

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Morse Code



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\*Education Technology & Services, see page 81, October 1981 issue of Ham Radio Magazine.

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## 5 Band WAZ

Standings as of February 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 Fernande (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 McKercher (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)

### The top contenders for 5 Band WAZ:

- |                |                |
|----------------|----------------|
| 1. JA3EMU, 199 | 7. EA8QL, 197  |
| 2. N4WW, 199   | 8. K1MEN, 197  |
| 3. CT1FL, 198  | 9. K7UR, 196   |
| 4. W1NG, 198   | 10. K4CEB, 196 |
| 5. N4RR, 198   | 11. F6DZU, 196 |
| 6. W8UVZ, 198  |                |

### 190 Stations have attained the 150 zone level

18 MHz allocations. As of then, these amateurs were in A2-Botswana, A3-Tonga, A4-Oman, DL-West Germany, F-France, G-England, HB-Switzerland, J2-Djibouti, LA-Norway, OA-Peru, OY-Faroes, OZ-Denmark, PA-Netherlands, VK-Australia, YB-Indonesia, ZF-Caymans, ZS-South Af-

rica, 4X-Israel, 5N-Nigeria, 7X-Algeria, 9H-Malta, and 9L-Sierra Leone. These bands currently are not authorized for the W/Ks VEs, but probably will be one of these days, just don't ask when.

As for the 10 MHz band, it still is not possible to work a DXCC on these bands, but if you work hard enough you probably can find some of the Deserving W/Ks and VEs. Countries currently allowing amateurs on the 10 MHz band are A2, A3, DL, DU, EA, F, G, H4, HB, J2, JA, LA, LX, OY, OZ, P2, PA, PJ, PZ, VE, VK, W, XE, YB, YK, ZF, ZL, ZS, 4X, 5N, 7X, 9H, 9L, 9M.

### HP3JRP

This is Jim Perry, sometimes signing K4WVX, who was at one time very active as TI2WX, and who this spring will be in Panama. Anyone looking for an HP3 card from Jim can fire off a message to him at Latin America Imports, 19 South San Mateo Ave., Ventura, CA 93004.

Jim is at Puerto Armuelles in Panama and is working mostly 10 meter c.w. He figures to also work 15, 20, and 80, mostly around 28550 kHz and 21050 kHz. Jim is a County Hunter and is trying to corner the last 20 he needs. Thus, he will also show on the County Hunter's frequency. He also goes back to TI2WX once in awhile and a QSL via the K4-CBA is always good. What, besides DXing, might Jim be doing in Panama? Some say that he is a big banana with the Chiquita outfit.

### Heard Island

Most everyone knows that both Heard Island efforts finally got on the air, some sections hearing them a lot better than others, but most sections hearing at one time or another.

The VK0CW/VK0HI group was planning to operate into March, their closing down dependent on the culmination of the mountaineering activities of that part of the effort. This might end the operation earlier.

Jim Smith with the VK0JS effort reached Heard after some delaying troubles, arriving the first week in February. They were planning to be on for about 10 days and will have been long gone by this time.

The attention to Heard given during the last year as the two efforts bore in on their objectives brought a good deal of information on the island and its history. One book is quoted as stating that the American effort was made in 1966/1967 by W9WNV who signed VK2ADY/VK0. We remember that one! There is also a report that W7ZFY and WB4HWP were part of a year-long stay on the island, signing VK0WR while WB6AEM signed VL0HM. Actually Bill Rohrer was there off the USCG Southwind signing the VK0WR some time before WB6AEM showed for a long stay. All of this shows that getting information on Heard is not the easiest thing—sometimes harder than working VK0CW.

## First International DX & Contest Symposium

The Texas DX Society out of Houston is aiming to present the First International DX and Contest Symposium at the ARRL National Convention in Houston this October 6-8th.

The Texas Society has been soliciting participation and papers from both prominent DXers and contesters. There will be an evaluation of the papers to determine topics of interest and relevance. There will be presentation of selected papers, expositions, and the opportunity for the audience to ask incisive questions. Then at the conclusion of the Symposium, the moderator will attempt to summarize the salient points made in the discussions or papers, and hopefully will determine a resolution on the issue at hand. That alone might be worth the trip to the far country.

This all promises to be interesting and innovative. It might be just what will bring you to Houston in October for the annual ARRL gathering. And if you have some golden words or need more information, Bob Evans, N5DU, is the Symposium Coordinator.

### CQ DX Awards Program

#### S.S.B.

1209	I1ZHH	1218	WB0UFL
1210	WB4KTG	1219	WA9PWN
1211	W9BW	1220	W4UNP
1212	WA2BGE	1221	I1WXY
1213	W9TA	1222	W8SYR
1214	XE1RM	1223	VE3JPJ
1215	K4LR	1224	YB2BLI
1216	I2EOW	1225	N0BLD
1217	I0YKN		

#### C.W.

567	KR0S	569	W8SYR
568	KA2DIV	570	AG9S

#### S.S.B. Endorsements

310	K6WR/315	275	WB4KTG/281
310	K6YRA/313	275	WB0UFL/277
310	W9BW/312	275	K9TI/277
310	OZ3SK/312	275	W6NLG/277
300	W2SUA/309	275	W8LKG/275
300	K4XO/308	250	ZL1BOQ/271
300	9H4G/304	250	W4UNP/268
275	K9QVB/295	250	XE1RM/251
275	K9HQM/298	200	K4LR/247
275	WA9PWN/294	200	I0YKN/248
275	KV2S/291	200	WA2BGE/202
275	W6SN/289	200	I1WXY/201
275	W9TA/289	150	I1ZHH/171
275	I8KCI/288	28 MHz	W6NLG
275	I5BDE/288	28 MHz	K4CXY
275	KCBJH/284		

#### C.W. Endorsements

300	K4XO/305	275	N5DX/291
300	SM3EVR/300	250	K4CXY/263
275	K9QVB/298	200	GI4DQO/200
275	W6SN/295	3.5/7 MHz	K9TI

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. Effective with the next report, all totals will be adjusted to reflect the deletion of Serrana Bank, Bajo Nuevo and the Saudi Arabia/Iraq Neutral Zone. Total countries will be 315.

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	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	
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	866A .....	9.50	
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	6005 .....	5.25	
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	6360 .....	6.50	
	6528A .....	75.00	
	6550A .....	7.50	
	6883B .....	9.00	
	7360 .....	12.25	
	7558 .....	7.00	
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## Colombian Radio 50th Year

This year the Liga Colombiana de Radioaficionados celebrates its 50th anniversary. To mark the occasion, a variety of special prefixes will be heard during the year.

Sorting things out, the prefixes will show on a four-month rotating basis; what you heard in January will again be heard in May and September.

Jan/May/Sept: 5J3/7, 5K1/5/9

Feb/Jun/Oct: 5J4/8, 5K2/6/0

Mar/Jul/Nov: 5J1/5/9, 5K3/7

Apr/Aug/Dec: 5J2/6/0, 5K4/8

The LIGA will also put some special stations on the air, these to be identified by an LR suffix. Work eight of the special 5J-LR stations or eight of the 5K-LR stations and you have won a certificate—no charge, just send photocopies of the QSLs received to LCRA, Box 584, Bogota, Colombia.

All of this came from Fred Laun, remembered for his SEAsia activity in other years, but more recently stationed in South America and currently signing an HK call.

## RAEM

Some months back we mentioned RAEM, the call of Ernst Krenkel, this in noting that sometimes new DXers have difficulty learning of some of the notable events that went before. Actually, all of that was almost a half-century back. It was in 1934 that the Soviet vessel S/S Cheluskin was in the polar region and was trapped in the ice. Eventually the pressure of the ice smashed the ship and it sunk.

The callsign of the ship was RAEM and Ernst Krenkel was the ship's operator. Sticking to his post while the ship was gradually destroyed, he was the link that advised of the ship's plight and supplied communications for the rescue efforts. For his efforts he was named a Hero of the Soviet Union, and the ship's call was given to him for his personal use. He was also the operator on other polar trips, being the operator on a polar expedition in 1937-38.

He remained active as a DXer throughout his life, and many DXers still treasure an RAEM QSL. We still lean to the belief that there are shining moments in most lives that live long after the actuality, to be recalled sharp and clear when memories of other things fade. A lot of DXers, old in the years but still young in memory, remember Ernst Krenkel.

## Antartica

Years ago we worked an LU1ZF station and were proud to later exhibit our budding DX erudition in noting that the 'Z' denoted an Argentine Antarctic station. It was nothing that got us far; we were soon told that every DXer knew that. Chastised as we were, we found along the way that there were a few who did not know of it.

But who owns what and why? You can get confused in this area. Recently we saw a note that said that England claimed sovereignty in the Falklands, South Georgia, and South Sandwich Islands, so only VP8 licenses are valid from these spots. The South Shetlands, South Orkneys, and the Antarctic (Palmer) Peninsula are south of 60° south latitude, and by international treaty all territorial claims from there to the South Pole are held in abeyance. Thus, any country can issue licenses south of 60 and a lot do. You will find a multitude of prefixes (VP8, LU, CE, KC, AA, FB8, 4K1, VK0, 8J1, ZS) and possibly even a few more.

North of 60°S there is consensus on who owns what, and some have been known to rise in wrath when claims were threatened. But you might work LU3ZY at Corbeta Uruguay in the South Shetlands and what do you have? A good DXCC counter for sure. Each country that lays claim to some piece of real estate must be assumed to be firm in its belief of sovereignty. So work them now and worry later. As one DXer has been remembered for saying, "My job is to work 'em; let the DXCC Desk worry about who's right and who's wrong!"

## A Pocketful of Notes

A third-party agreement was signed between the U.S. and St. Vincent early this year. The SP stations should be back on the air now. Early this spring there were signs that things might be moving with a lengthy license renewing procedure being developed. You might not find SPs as plentiful as they once were, and not every former operator will get operating privileges. This also applies to club stations.

The eventual result may be the development of military-supported stations (K prefixes) and the PZK Clubs (P suffixes) will disappear. There are parallels to such actions in other fields and precedents have been established. Some of the members of club stations, SP9KRT for example, were interned during the troubled period of martial law. There are changes in SP-land; that's for certain.

The Colvins were active in Oman and Qatar early this year. In Oman they signed W6KG/A4, making some 5000 QSOs in 127 countries. In Qatar they signed W6KG/A7 until mid-February. As in all their operations, QSLs go to the YASME Foundation, POB 2025, Castro Valley, CA 94546.

John Thompson, W1BIH, was in the Netherland Antilles most of this spring signing W1BIH/PJ2. This is a regular trip for John, and he was signing P42J in the spring DX Tests. He says not to go via the PJ Bureau. QSLs for this operation go to W1RM, the exclusive agent for W1BIH/PJ2 and P42J and no others.

If you are traveling this summer, note that the DXers in the Paris area meet on the third Friday of each month at 2000 lo-

cal time. They meet at Bar des Facultes, 62 Blvd de l'Hopital, Paris 13. The closest Metro station is St. Marcel, which we once knew was on the Pl d'Italie—Gare du Nord line; Blvd de l'Hopital is just south from Gare D'Orleans.

A month or so back when talking about Abu Ail, we dug out the file, had correct information in front of us, but then said that the first activity was 1979. No! No! It was 1971 as we knew from looking at the DXCC country list. ET3ZU/A was the first operation. And Rick Dorsch, out of Ecuador with a handful of HC calls, goes to Box 62, Rochester, Michigan—not Minnesota. The ZIP Code was correct (48063), and that might have helped.

Aris Kaponides, 5B4JE, goes to POB 1723, Limassol, Cyprus. Aris jumps when some say DF4FX is his manager; that was only for German stations, and DF4FX became a Silent Key in June 1981. Just send things to Limassol. Aris is positive there is no other way. If you sent a card in the past to DF4FX and received no reply, Aris says that he is still waiting at the box and will take care of the deserving. He needs s.a.s.e. or s.a.e./IRC. Last

## The WAZ Program

### 10 Meter Phone

231	OK3CFA	234	WD9EQU
232	JH1GZV	235	W6EUF
233	NL7P	236	K2QIE

### 15 Meter Phone

156 ..... W2LOG

### 20 Meter Phone

437	W1NW	439	DF1SD
438	KC8CC	440	K6SVL

### 15 Meter C.W.

83	W7CNL	85	VE2FOU
84	JE2GAL		

### 20 Meter C.W.

185 ..... K2SX

### 40 Meter C.W.

39 ..... G3LPS

### All Band WAZ

#### S.S.B.

2595	W4WFB	2605	IV3GQL
2596	W8WVM	2606	I0YMP
2597	ON7EM	2607	CP1FO
2598	K1DWQ	2608	DK6KK
2599	PP8DD	2609	KB4CL
2600	WB0UFL	2610	KB5WQ
2601	PA8VST	2611	DF2JE
2602	LA2TO	2612	K6VMN
2603	N6AHV	2613	WD8FAZ
2604	I0DJV		

### C.W. and Phone

5512	N7AYK	5521	DL9ZS
5513	PA3AIK	5522	W5LVD
5514	K6FO	5523	KA7AMB
5515	YU2CQ	5524	YU3YLT
5516	K2SX	5525	JH7OFH
5517	VE3FDP	5526	WB0TTL
5518	GM4FVQ	5527	KC7V
5519	N8DL	5528	KH6JWK
5520	DJ3HZ		

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 Hajjman, 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.

year he was in a car accident, lost a lot of property in a fire, and would appreciate getting his mind onto better things by filling out some QSL cards.

Rick Todd, N8CWX, will be out in the Philippines for a three-year tour, active on c.w. and QSLing via N2BCF. That covers most everything but a possible Philippine callsign.

Father Dave Reddy, CE0AE, who has long supplied Easter Island to the needy DXer, has the new TS-830S working and would like to get the linear working one of these days. Among changes made was changing the nylon guys to the tower to wire. As many have found to their chagrin, nylon rope stretches, and sometimes it stretches a lot. Dacron rope does not, nor does wire.

T42AMC was used in Cuba for the World Communications Year. 5X5FS has left Mauritania after a 30-year stay. Terry went back home to EI-land. If you worked an XL1 a month or so back, it was a special VE prefix to mark the 200th anniversary of St. Johns in Newfoundland. EE1ONS was a call used at Ons Island by the URE group out of Madrid in early April. Ons is off the coast of Pontevedra in the Galicia region, 42°N and 8°W. QSL for this one to URE, Caballero de Gracia, 18,1° dcha B, Madrid 14, Espana.

Although there has been a burst of Nepal activity in recent months, you still might want to watch for Father Moran on weekends: 21257 kHz at 0900Z and 1200-1300Z. Many have felt they were better DXers after Father Moran said, "73s and God bless you." It certainly never hurts. The *DX News Sheet* notes that the Russian Net meets Tuesday and Thursday at 3640 kHz at 2030Z.

The 3A QSL bureau is reported as bouncing back 3A0SI QSLs, saying that it must be Monaco Slim. Portuguese stations are signing a CR1-4 prefix to the end of June. Then it will be CS1-4 through September and CU1-4 to the end of the World Communications Year. The ITU has replaced the 9A block at San Marino with T7A-T7Z. Don't be surprised if you still continue to hear the old prefix for awhile.

We would not be reluctant at all to hear from DXers who are planning things or who have shaken the bands. It need not be a literary masterpiece, just the DX scene.

### 5B WAZ No. 48

Dr. Norwood Lowry, W3AP, is the winner of the 48th 200-zone 5B WAZ to be achieved. First licensed in 1950 as W3QOR, Dr. Lowry is a member of the Frankford Radio Club, is married, and has two sons. He is a medical specialist in psychiatry.

As most everyone knows and expects from a member of the dread Frankford Radio Club, Dr. Lowry is an avid contestant in both c.w. and s.s.b. tests. He also holds the 5B WAS and 5B DXCC, and is on

the DXCC Honor Roll. He has worked a 160 WAS from what he terms an excellent location atop a hill west of Reading.

Antennas are cubical quads on 10, 15, 20, and 40 meters. He uses a sloper on 80 and a vertical with a multitude of radials on 160.

We tried to find out what the problems were in earning the 5B WAZ award, but we still do not have any answers. Dr. Lowry runs a Drake R4C and T4XC along

with a National NCL-2000 amplifier. Some have said that the keystone Frankford Radio Club logo will always get your attention, but we suspect that those quads might help just a bit.

Whatever it took, the results are impressive. Dr. Lowry now holds what is considered probably the most difficult award in amateur radio to attain. Congratulations to another who has attained the best and hardest.

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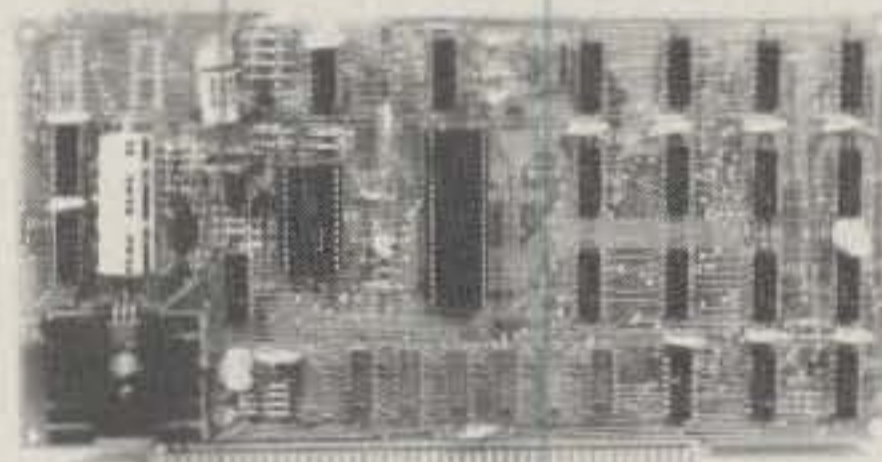
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B&W Traps 40/80-10mtrs	\$26.75/pr
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B&W 593/595 coax switch	\$23.00/\$27.35
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HY-GAIN TH5MK2S/TH7DXS	\$306.00/\$375.00
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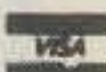
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**CQ DX Honor Roll**

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. This report reflects the deletion of Serrana Bank, Bajo Nuevo, and the SA/I Neutral Zone. Total countries are now 315. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsements involving the issuance of a sticker is \$1.00. The basic award fee is now \$4 for CQ subscribers and \$10.00 for non-subscribers. Please attach your latest CQ mailing label to qualify for the \$4.00 rate.

**C.W.**

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DL7AA 314	K4CEB 310	W4OEL 303	DJ7CX 297	W7CNL 283
ON4QX 314	K6JG 310	W2GT 301	N4MM 297	W0SR 282
W3GRS 313	W4BQY 307	WA8DXA 301	K1MEM 297	K8PYD 281
W9DWQ 313	N6CW 307	AA6AA 301	W6SN 295	K7ZR 280
K6EC 312	W1NG 306	SM3EVR 300	W0IZ 292	W4BV 277
N4PN 312	DL3RK 306	K3FN 298	AB4H 291	WB4RUA 277
W6ID 311	K4XO 305	OK1MP 298	N5DX 291	K4SE 275
K9MM 311				

**S.S.B.**

K2FL 315	W4SSU 311	K9BWQ 304	K9QVB 295	NA5W 284
W6EUF 315	K9LKA 311	9H4G 304	W1LQQ 294	W0KU 284
K6WR 315	K4MQG 311	AA6AA 303	XE1NI 294	WB3HAZ 283
W3GRS 315	CT1FL 311	XE1J 303	WA9PWN 294	WB6GFJ 283
W3NKM 315	EA4LH 310	ZL1BIL 303	K4SE 293	VP9CP 283
DL9OH 315	OE2EGL 310	XE1KS 302	WD8MOV 293	XE1OW 283
W9DWQ 314	DK2BL 310	LU1BAR/W3 302	K9IW 293	XE1OX 283
I0AMU 314	W0SD 310	WA4WTG 302	I6PLN 292	VE3CKP 283
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VE3MJ 314	VE3GCO 309	WB4NDX 301	W9RY 291	A19R 282
W4UG 314	K8LJG 309	WA4JTI 300	WA4DAN 291	TG9EP 281
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XE1AE 313	K5OVC 308	LA7JO 299	WD8MGQ 290	WB4KTG 281
I4ZSQ 313	VE7WJ 308	A18S 299	W2FGY 290	I2MQP 280
I8KDB 313	K4XO 308	N5FG 299	YU1DZ 290	KB3OQ 280
W9KRU 313	I3LLD 308	VE3MRS 299	W6SN 290	W8IMZ 279
ZL3NS 313	N6AW 308	W8PCA 299	JA5PUL 289	KK0C 279
VE3GMT 313	W1NG 308	W7OM 299	KM6B 289	KA8T 279
YV1KZ 313	W9SS 308	WA0TKJ 299	W9TA 289	EA3KW 279
W3AZD 313	DL6KG 308	W6FET 298	W7FP 288	A18M 278
ZS6LW 313	YV5AIP 308	K9SM 298	I3OBO 288	K4BYK 278
DJ9ZB 313	K6XP 308	K9HQM 298	K0GT 288	N9AMF 278
K6YRA 313	OK1MP 308	I8LEL 298	KB8DB 288	VE3IUE 277
ZL1AGO 313	W0YDB 307	K8NA 298	I8KCI 288	WD0BNC 277
VE2WY 312	N2SS 307	W2CC 297	I5BDE 288	KB8O 277
K6JG 312	VE4SK 307	HP1JC 297	EA9IE 287	KP4EQF 277
F2MO 312	K8PYD 307	DJ7CX 297	AB9E 287	K1VHS 277
K9MM 312	N4KE 306	K5DUT 297	KB9KD 287	WB0UFL 277
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W4DPS 312	VK4VC 306	W6DN 297	W4BQY 286	K9TI 277
W9JT 312	4Z4DX 306	I0MBX 297	YU2RTW 285	W6NLG 277
N4WF 312	K1UO 306	I8ACB 295	WD9IX 285	N7ASL 276
W9BW 312	YV5DFI 305	WB1DQC 295	K4CXY 284	I8INW 275
I8YRK 312	W8ILC 305	IV3YRN 295	K8VJV 284	JH4PRU 275
OZ3SK 312	N4PN 305	K9UAA 295	KC8JH 284	W8LKG 275
K6EC 311	W0SR 304			

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TT8BC to KP4HE	9N1WW to JA8BMK
V3ZC to N6MM	CE8EVG to Box 3016, Valparaiso, Chile
VP2MDB to W2WSE	EA9KQ to Box 21, Melilla, Spanish North Africa
VK8CW to N2DT	HC5EE to Rick Dorsch, Box 62, Rochester, MI 48063
VK0HI to N2DT	HP3JRP to Latin America Imports, 19 South San Mateo, Ventura, CA 93004
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4K1A to UA3AEL	
4K1D to UA1AFM	
4K1G to UA0UCJ	
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4K1J to UA1JJ	

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SV1DB/A was on from Mt. Athos, and the ARRL was still sitting on the VK9JW Mellish Reef cards. There were 6400 at Dayton and 310 DXers at the California International DX meeting; there the place fell apart when a nude female jumped out of a cake and into the lap of W6AOA. XV5AC was on from Vietnam and VS9DX was on from the Maldives. The JA DX Assn. was asking the ARRL about possible country status for Parce Vela. They were thinking of going if it were DXCC material. They asked. It was. They went. There were screams. It wasn't. It isn't! Remember Okino Torishima! Parcel Vela under another name.

73, Cass, WA6AUD



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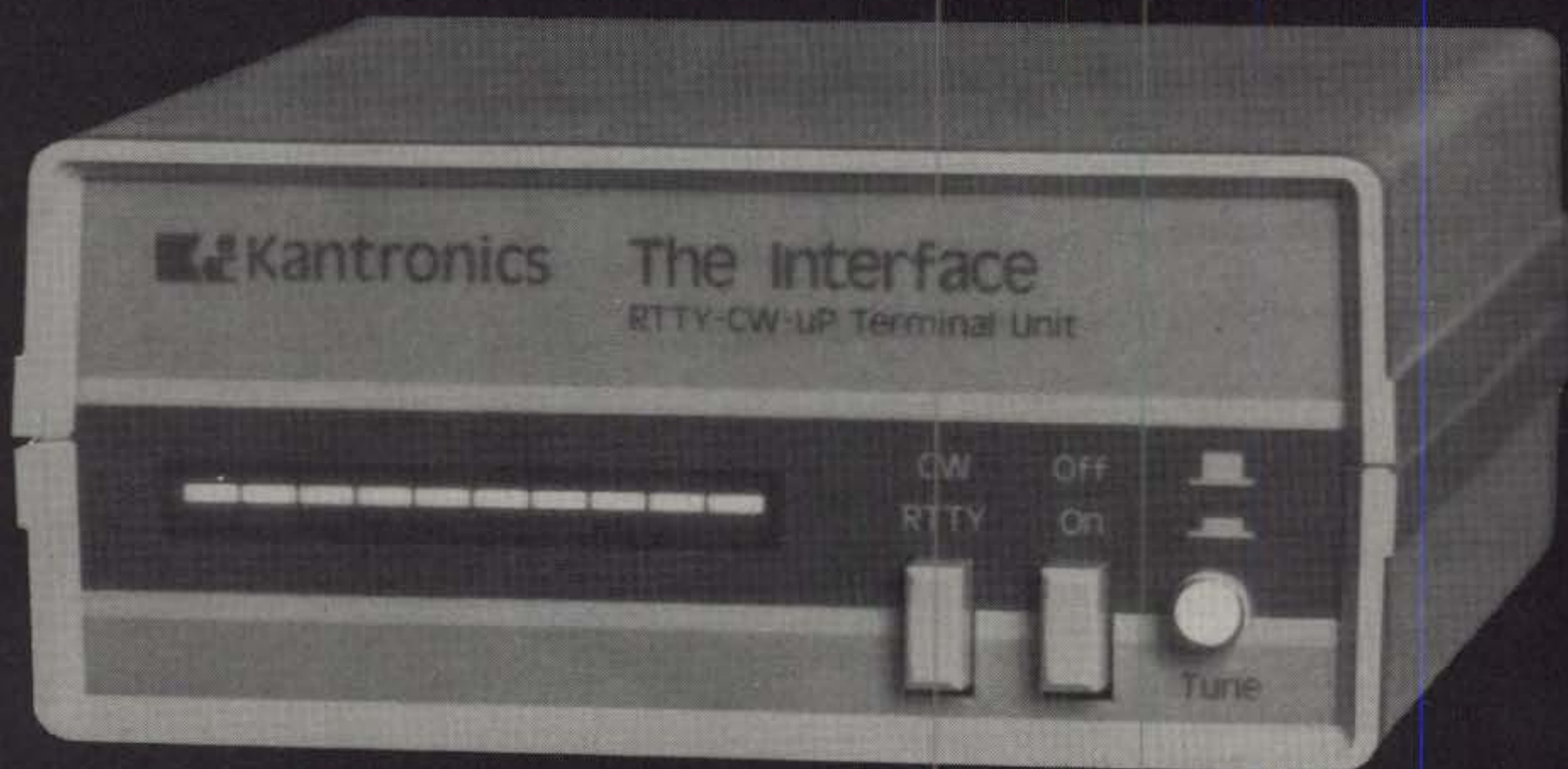
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## "HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

### Dipole Antennas: Part I

This topic will be presented in three parts. These three parts do not stand alone; all parts must be read and used to gain maximum benefit from this article. The written explanations are supported by seven figures and two tables. This is a useful aid to distribute to new and prospective amateurs.

#### Introduction

I work with many new amateurs each year, and I have noticed that one of the first obstacles they encounter as they prepare to get on the air is that of erecting an antenna. If they are putting up a commercially manufactured antenna, such as a vertical or Yagi-Uda, they simply follow the printed assembly directions, and the possibility of difficulties is reduced. However, the first antenna erected by most amateurs is the dipole, which is also known as a doublet antenna. This article is intended to provide complete information about dipole antennas for use on the Novice bands. One can spend several hours searching through any of several antenna books without finding required details regarding the gauge (size) and type of wire to use, the exact length to which each side (leg) of the dipole should be cut, which types of insulators are preferred, how a dipole is constructed, and how an antenna should be installed. Most of the antenna books I have read appear to assume that the reader does not need such basic information. This article is not intended to replace the excellent data that is printed in the text books documenting antenna theory; this is just a detailed explanation of the facts new amateurs should know about the most commonly used first antenna, the dipole. You are urged to read the entire article carefully before you build a dipole to have a complete understanding of how it works, what its good and bad points are, and how it should be constructed and erected to provide optimum performance. When you have finished reading this article, you will be able to build and install a good dipole antenna that can do a satisfactory job as a part of your station.

#### Importance of a Good Antenna

A new amateur can quickly become discouraged by poor operating results, and a bad antenna system can cause one's operating results to be very poor.



Paul Winroth, KA8NYO, of Upper Sandusky, Ohio, has been a Novice since September of 1981 and expects to have upgraded to General by the time this picture is printed. His station includes a Heath HW-101 Transceiver, 40 meter dipole, 80 meter dipole, and a vertical antenna for 10 and 15 meter operation. Paul has contacted all states and more than 50 countries. His Dad, Ransom, WB8NLN, got Paul started in amateur radio.

Almost all of the current (and recent) amateur equipment is excellent. Unfortunately, receiver sections in modern transceivers are so good that one can hear stations from all around the world, even while using a poor antenna. This situation can deceive a new amateur into believing that she/he does not need a good antenna to have good results. This assumption is incorrect; one's degree of operating success is directly related to the quality of his or her antenna system. It is much easier to hear other stations than it is to contact them. You must radiate a good signal to consistently receive answers, and the antenna is the device that radiates the radio frequency energy from your transmitter.

**Mobile Antennas.** Some new amateurs decide that they can resolve their antenna problems by purchasing expensive multiband mobile antennas. Unfortunately, the best of these antennas are not as efficient as an inexpensive dipole at Novice band frequencies.

**Trap Antennas.** Resonant (tuned) circuits are used to make several types of multiband antennas, including dipoles, ground planes, verticals, and Yagi-Uda antennas. These multiband antennas provide operating flexibility on two (or more) bands with a single antenna and a single transmission line between the antenna and the station equipment (transceiver, or transmitter and receiver combination). However, extreme care must be exercised in grounding and tuning a

transmitter being used with a multiband antenna; otherwise, harmonic energy will be accepted and radiated by such an antenna. It is best to use monoband (one band) antennas to minimize the probability of harmonic radiation and interference. Most trap-type antennas are purchased instead of being built. They have been covered in previous Novice columns.

**Trapless Duoband Dipoles.** If you want to operate on 15 and 40 meters with just one dipole, cut it to be resonant at 7050 kHz in the 40 meter band and it will also be resonant at 21,150 kHz in the 15 meter Novice band. You will be sacrificing some antenna efficiency on 40 meters, but the antenna will work reasonably well on both the 15 and 40 meter Novice bands. It is advisable to use at least a 16-gauge wire when constructing a trapless multiband dipole, since larger diameter wire produces a broader resonance curve. In other words, the antenna is useful over more of the band if larger diameter wire is used. In a similar manner, an 80 meter dipole can be cut to resonate at 4 MHz to provide reasonably good performance on the 80 and 10 meter Novice bands. However, the frequency difference is greater with an 80/10 meter trapless dipole than it is with a 40/15 meter trapless dipole, and efficiency is reduced. The 15 meter signal (14.18 meters) is the third harmonic of the 40 meter signal (42.54 meters). The 10 meter signal (10.75 meters) is similarly the seventh harmonic of the 80 meter (75 meters, actually) signal. It is common to have an amateur put up a combination 40 and 15 meter trapless dipole, but the combination 80 and 10 meter trapless dipole is less often erected because it is less efficient, and because the more efficient monoband 10 meter antenna is small enough to fit almost anywhere.

#### Radio Wave Velocity

Radio and light waves travel through space (vacuum) at about 186,284 statute miles per second. Since there are 5280 feet in a statute mile, radio waves can also be said to travel through a vacuum at about 983,579,520 feet per second. Since a meter is 39.37 inches (3.28 feet) long, radio waves can also be said to travel through a vacuum at about 299,776,000 meters per second. As a matter of convenience, radio and light wave velocity of propagation is rounded off to 186,000 miles per second, and 300 million meters per second.

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Relationships between frequency, wavelength, and velocity of propagation are expressed as follows:

$$\lambda = \frac{300,000,000}{f} \text{ or } f = \frac{300,000,000}{\lambda}$$

where:

$\lambda$  = wavelength in meters

$f$  = frequency in Hertz

300,000,000 = radio wave velocity (speed)

Amateur operating frequencies are usually expressed in kiloHertz (thousands of Hertz) or megaHertz (millions of Hertz). Consequently, the preceding formulas are commonly altered as follows to show these values:

$$\lambda = \frac{300,000}{f \text{ (kHz)}} \text{ or } \lambda = \frac{300}{f \text{ (MHz)}}$$

$$f \text{ (kHz)} = \frac{300,000}{\lambda} \text{ or } f \text{ (MHz)} = \frac{300,000}{\lambda}$$

Using any of the formulas shown, it is easy to determine that 3,725,000 Hertz (also 3725 kHz and 3.725 MHz) is equivalent to 80.54 meters. Similarly, 7.125, 21.15, and 28.15 megaHertz are equivalent to 42.11, 14.18, and 10.66 meters, respectively. You are invited to do the mathematics work to become familiar with these values.

## Wavelength

Wavelength is precisely what the word implies; it is the physical length of a specific radio wave. A frequency of 7125 kiloHertz is equivalent to 42.11 meters, as we have already determined. This means that a single cycle of this radio frequency energy is 138.12 feet long. Another way to think about this is to visualize a single wave of this 7125 kHz signal radiating away from an antenna. Realize that the front end of this radio wave will have tra-

velled 138.12 feet away from the antenna when the next wave starts to follow it. A 7125 kHz signal is composed of 7,125,000 separate cycles of radio frequency energy, which occur during each second of time. If you divide 7,125,000 into one second, you will determine that each cycle occurs over a time span of about 0.14 millionths of one second, which is commonly referred to as 0.14 microseconds. Since radio wave speed is 186,284 miles per second, we can multiply the time duration (0.14 microsecond) of one cycle of 7125 kHz energy times its velocity (186,284 miles per second) to verify how far the forward end of one cycle (Hertz) of this radio frequency will travel before the next Hertz starts to be radiated. Multiplying these two values produces a product that is 0.026 miles. Multiplying 0.026 times 5280 (feet per mile) shows that this wavelength is approximately 138 feet long, verifying the previously established figure. If values are not rounded off, the result matches better. However, this example verifies that the length of one cycle of 7125 kHz energy is about 138 feet, and we have arrived at the same answer using two different methods. This simple exercise should have helped you attain a good understanding of the relationships between wavelength, frequency, time, and radio wave velocity.

## Half-Wave Antennas

An antenna "rings" when radio frequency energy is applied to it at its resonant frequency. Energy applied to the input terminal of a single wire that is electrically one-half wavelength long travels out to the open (insulated) further end (extremity) of the wire, and it is then reflected back to the input (source) end. Since the energy travels out and back over the same wire, the antenna length is half as

long as its full electrical wavelength to be resonant at a desired frequency. The energy reflected back from the open end of the wire returns to the input end exactly in time to be in phase with the next cycle of radio frequency energy, causing the desired resonant/ringing (flywheel) effect to occur.

## Non-Half-Wave Antennas

This article covers dipole antennas, and the preceding paragraph discusses fundamental resonance of a half-wave long antenna. It should be understood, however, that antennas do not have to be one half-wave long to resonate; they will resonate if they are of any length that makes the reflected energy return to the input end in phase. This is why a 7050 kHz (42.54 meters) functions well at 21,150 kHz (14.18 meters). A one-half-wave long antenna will ring at each odd multiple of its basic (lowest) resonant frequency. In this example the 7050 kHz antenna also resonates with 21,150 kHz energy (third multiple of basic frequency) applied to it. Fig. 1 shows the forward and reverse (reflected) energy waves that result in antenna resonance at the fundamental frequency, plus the third and fifth harmonics of the fundamental frequency.

## Velocity Factor

Another thing that should be understood about antenna wire and transmission line is velocity factor. Velocity factor is expressed as a percentage of how fast (velocity of propagation) radio waves travel through conductors, as compared to how fast they travel through space. Radio waves travel faster through space than through a conductor; consequently the velocity factor of any antenna wire or feedline is less than 100 percent, and

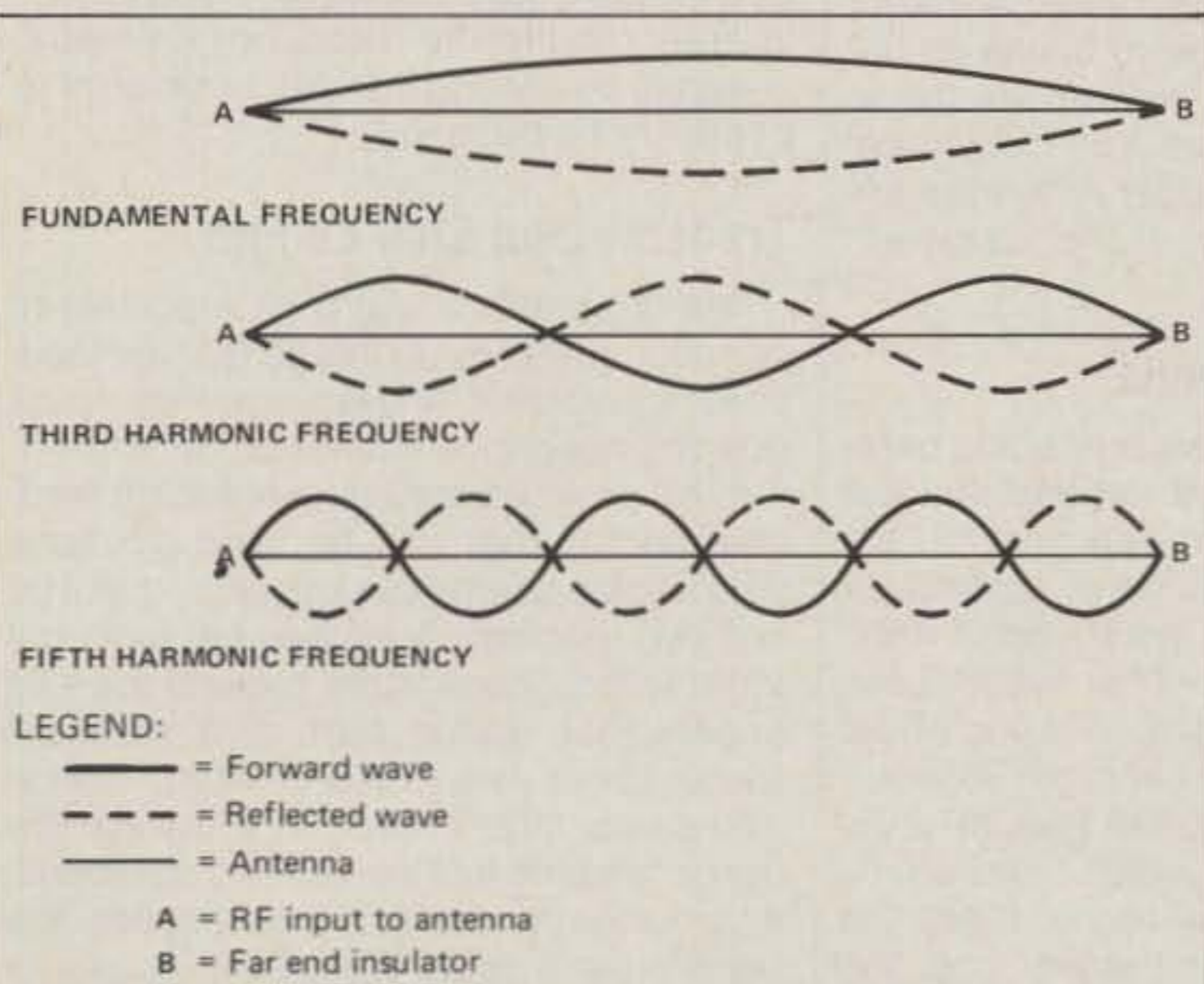
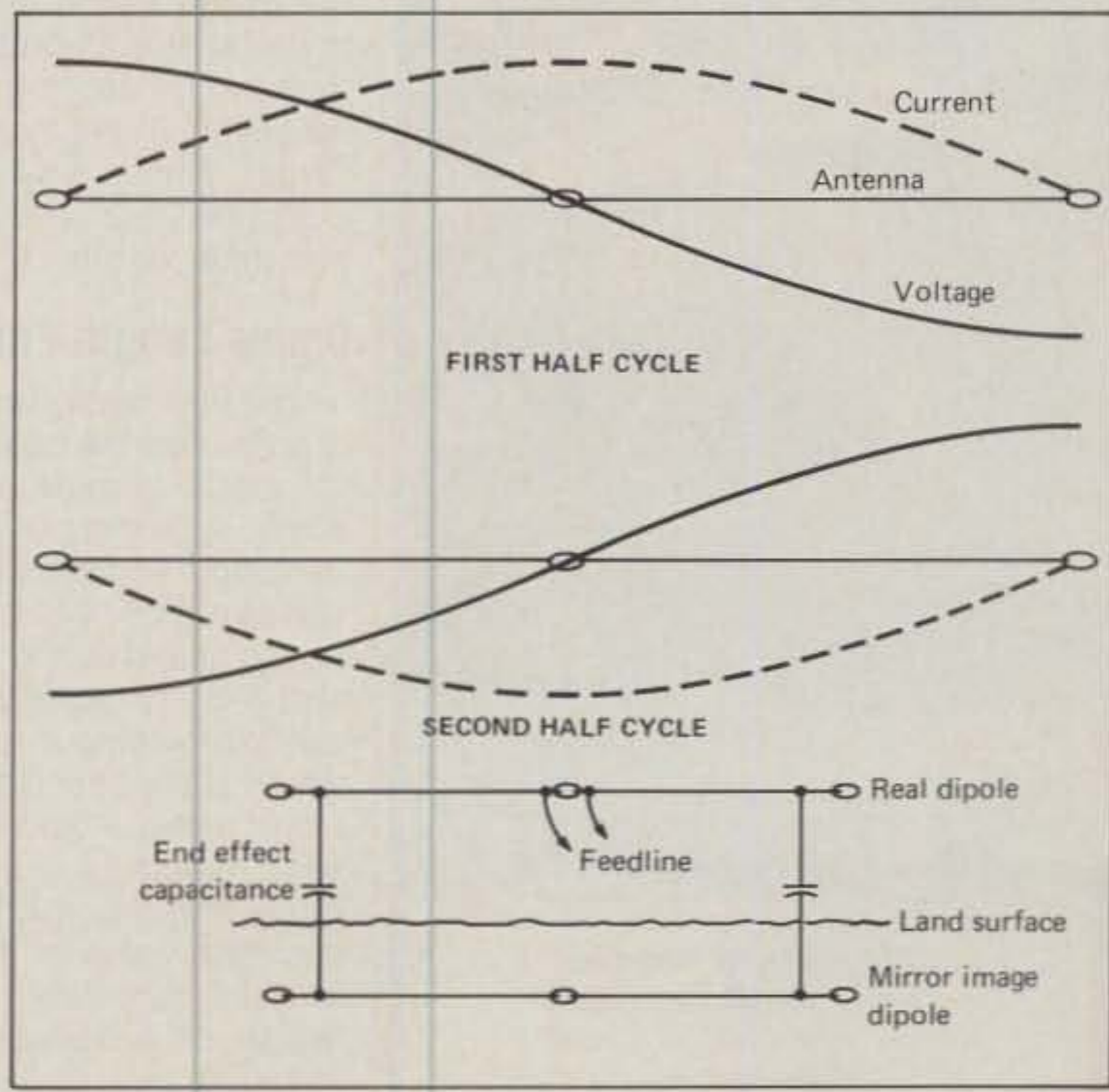


Fig. 1—Antenna resonance at a fundamental frequency, and the odd multiples thereof.

Fig. 2—Voltage and current minimum and maximum points along a resonant dipole.



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Frequency (in kHz)	Overall Resonant Length	Length to Cut Each Leg (2)	Resonant Length Per Leg (3)
3725	125' 8"	63' 10"	62' 10"
4000/28,000 (4)	117' 0"	59' 6"	58' 6"
7050/21,150 (5)	66' 4"	34' 2"	33' 2"
7125	65' 8"	33' 10"	32' 10"
21,150	22' 2"	12' 1"	11' 1"
28,150	16' 8"	9' 4"	8' 4"

#### Notes:

- (1) These dimensions are for single-strand copperweld or solid copper wire.
- (2) This dimension includes 6 inches at each end of wire to thread it through eye of insulator and to wrap it back around itself.
- (3) This is the dimension between the discontinuities (soldered wire wraps) at both ends of the wire.
- (4) This dipole is for use on 80 and 10 meters.
- (5) This dipole is for use on 40 and 15 meters.

Table I—Dipole dimensions (1).

these values usually range between about 70 and 95 percent. Each type of conductor has a specific velocity factor. The two materials that are most often used in amateur antennas are copper and aluminum. The velocity factor of aluminum is higher than that of copper; therefore an aluminum antenna is physically longer than a copper one of the same type that is resonant at the same frequency. The velocity factors of typical transmission lines are as follows:

Coaxial Cables	V.F. %
Semi-Solid Polyethylene	84
Cellular (Foam) Polyethylene	78
TFE Teflon	69.5
Polyethylene (Solid)	66
Open-Wire Ladderline	82
TV-Type 300 Ohm Twinlead	80

#### End Effect

As shown in fig. 2, voltage maximums exist at the insulated ends of a dipole antenna. The dipole antenna works against its mirror-image in the earth ground, and there is a capacitive effect between both dipole ends (extremities) and the ends of the mirror-image dipole. Velocity factor and end effect combine to cause an antenna to be about 4.8 percent shorter in its physical length than in its electrical length. This is why dipole antennas are cut to be 95.2 percent of their apparent electrical length.

#### Dipole Length Formula

The information in the preceding paragraphs can be used to understand the standard formula for determining the physical lengths of halfwave dipoles for specific frequencies. The speed of radio waves (983,579,520 feet per second) can be multiplied by the combined end effect and velocity factor percentage (95.2 percent), providing a result of 936,367,703, which is the speed at which radio waves travel along a dipole antenna. Since the basic dipole is one-half wave long, the preceding figure is divided by two, producing a value of 468,183,851, and the formula for determining the physical length of a halfwave dipole has been shown to be:

$$l = \frac{468,183,851}{f}$$

where:

l = dipole end-to-end length in feet  
f = frequency in Hertz

Since we commonly work in kiloHertz or megaHertz, it is more convenient to modify the preceding formula to one of these variations:

$$l = \frac{468,184}{f \text{ (kHz)}} \quad \text{or} \quad l = \frac{468}{f \text{ (MHz)}}$$

#### Dipole Dimensions

This formula can be used to determine the overall (end-to-end) physical lengths of dipole antennas for use in Novice bands. Table I shows these dimensions, assuming the use of solid copper or copperweld (steel core coated with copper outer conducting surface). The use of other conductive materials and/or twisted wire requires one to use a different formula to determine antenna physical length. Similarly, drooping dipoles (so-called inverted Vees) are too long, and they resonate below the desired frequency if they are cut per the preceding formula; they require the frequency (in megaHertz) to be divided into 462 to determine overall antenna length.

#### Transmission Line Length

Many amateurs cut their feedlines to be resonant. They do this so that the feedlines will radiate any energy that exists due to impedance mismatch conditions. Table II provides minimum resonant feedline lengths that can be used by those who decide to employ this technique. I do not use resonant feedlines because my interference committee experience has shown that having part of a resonant transmission line in the amateur station can cause interference. It is my opinion that a feedline just serves two purposes: it provides a conduit that applies the transmitter's radio frequency output to the antenna, and it similarly carries received signals from the antenna to the receiver. I do not want my feedlines to resonate; I just want my antennas to radiate and receive my signals.

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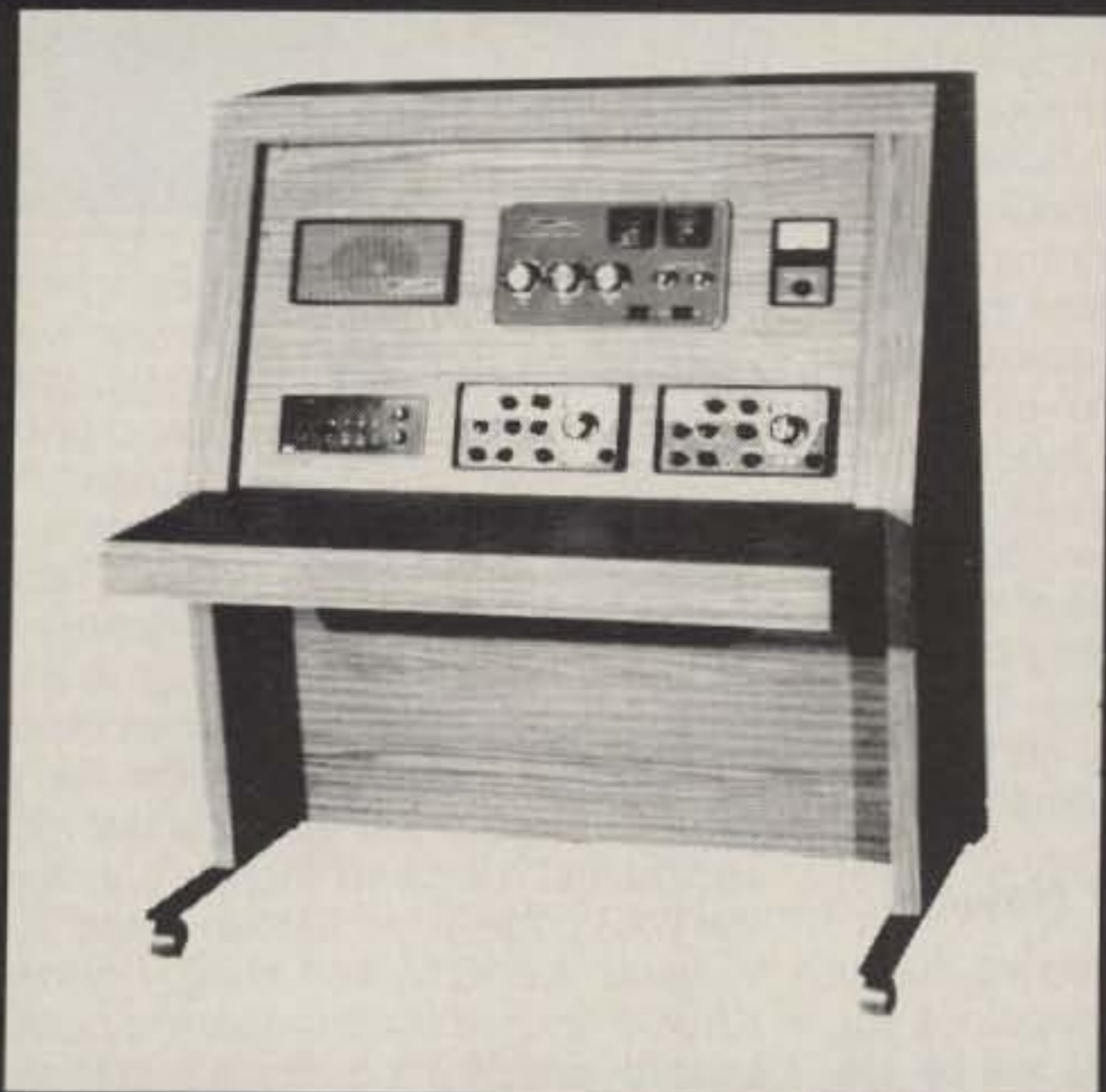
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Frequency (in kHz)	Semi-Solid Polyethylene	Cellular/Foam Polyethylene	TFE Teflon	Polyethylene (Solid)	TV-Type Twinlead
3725	110' 11"	103' 0"	91' 10"	87' 2"	105' 8"
4000	103' 4"	95' 11"	85' 6"	81' 2"	98' 5"
7050	58' 8"	54' 5"	48' 6"	46' 1"	55' 10"
7125	58' 0"	53' 10"	48' 0"	45' 7"	55' 3"
21150	19' 6"	18' 2"	16' 2"	15' 4"	18' 7"
28150	14' 8"	13' 8"	12' 2"	11' 6"	14' 0"

Notes:

- (1) The feedline should be cut 6 inches longer than the listed dimension if it is to be stripped back (separated) to be attached to the antenna and/or station equipment. The length shown in this table is the uninterrupted length of the unstripped (whole) portion of the feedline.
- (2) Exact whole-number multiples of listed dimensions will also resonate/radiate.

Table II—Resonant feedline lengths.



Charles P. Lamb, KA0NNF, is a power company engineering technician who lives in Columbus, Nebraska, with his wife and their two daughters. Charles has contacted amateurs in 27 states using a Kenwood TS-830S Transceiver with a Hy-Gain 5-band dipole. He operates on the 15 and 40 meter bands and sends his QSL card if he has the other amateur's mailing address. Charles has been licensed since April of 1982. He operated from Utica, Nebraska, during the June 1982 ARRL Field Day Contest.

If an antenna does not do its job better than the feedline that is connected to it, the antenna needs to be changed. Nevertheless, I realize that some amateurs prefer resonant feedlines, so Table II provides these dimensions. Whole number multiples of the indicated lengths are also resonant. If the 18 foot 2 inch resonant length of a foam dielectric coaxial cable connecting to a dipole cut to resonate at 21,150 kHz is too short to interconnect your rig to the antenna, you can use double (36 feet, 4 inches), triple (54 feet, 6 inches), or any other multiple of the listed halfwave resonant length and still have this signal radiation capability.

This completes the first part of this three-part series on dipole antennas.

**Philippines Contacts for Novices**

Rick Todd, N8CWX, advised me that he will be operating from the Philippines during the next three years. He will be stationed at Clark Air Base. Rick will be listening for American Novices whenever propagation conditions are favorable. As usual, it is advisable to limit your exchange to the RST report, your name, and

your QTH; this will enable Rick to contact more amateurs. The best way to get his card is to send your QSL card to Timothy J. Fiebig, N2BCF, 616 Canterbury, Pitman, NJ 08071, and enclose a self-addressed and stamped envelope to expedite the response.

**Used Equipment and Parts Flyer**

If you would like to receive a single, free copy of a multi-page flyer about parts and used amateur radio equipment, you are welcome to request an issue of "Rigs & Stuff" from WA4OSR, P.O. Box 973, Mobile, AL 36601. S.F. Mitch Mitchell, Jr. does not require it, but you are advised to supply the usual number ten s.a.s.e. with your request.



Dave Mitchell, KH6UN, of Ewa Beach, Hawaii, held WN8VWC when he was a Novice in Ohio in 1966-1967. His interest in flying overpowered his interest in amateur radio and he flies in Lockheed P-3B Orion antisubmarine warfare patrol aircraft as a tactical coordinator (Tacco). Dave picked up a Technician license last September and he has been active on the Novice bands since he finished building his equipment on October 20th. He has averaged about 100 contacts per month and he just needs six more states to get the WAS (Worked All States) award. Fred V. Raley, KH6QW, and Jim E. Portwood, KH6OU, helped Dave prepare to pass the license examination. Dave's station includes the Heath HW-101 transceiver, SA-2060 tuner, and micromatic tuner. His antenna is a Cushcraft AV-5 vertical. He expects to have upgraded to General by the time this photograph is printed.

## THE SCIENCE OF PREDICTING RADIO CONDITIONS

The Royal Observatory of Belgium reports a monthly mean sunspot number of 85.8 for January 1983. This results in a smoothed sunspot number of 115 centered on July 1982. The cycle has dropped two points from its previous smoothed level of 117.

The present sunspot cycle is expected to continue to decline. A smoothed sunspot number of 90 is forecast for May 1983.

During May days continue to grow longer in the northern hemisphere, and the sun is higher in the northern sky. Optimum frequencies for long-distance propagation are expected to be somewhat lower during most of the daylight hours, and somewhat higher during the late afternoon, early evening, and nighttime hours, than they were during the winter months. Static levels also increase noticeably during May, and signals may sound weaker on DX openings during the daylight hours.

The 10, 15, and 20 meter bands should provide DX propagation during the hours of daylight. Considerably fewer east-west openings are expected on 10 meters, but conditions should continue to be good to South America, Africa, and other southern areas of the world. Good world-wide DX conditions are expected on 15 meters, but the band should peak later during the day.

Peak world-wide conditions are expected on 20 meters for an hour or two after local sunrise and during the afternoon hours. From sundown to midnight, excellent DX conditions should exist on 20 meters to many areas of the world. Forty meters should provide good openings towards Europe, Africa, and the east. Good DX openings should also be possible on 15 meters towards southern and western areas of the world. Some DX should also be possible on the 80 and 160 meter bands, but signals are expected to be mainly weak and noisy. Eighty meters should open towards Europe and the east, while an occasional 160 meter opening may be possible towards the Caribbean. From midnight to sunrise, look for openings to most areas of the world on 20 and 40 meters, with some DX possible on 80 and 160 meters as well. All in all, May is expected to be a good month for

### LAST MINUTE FORECAST

Day-to-Day Conditions Expected for May 1983

Propagation Index . . . . .	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 6, 17, 24	A	A	B	C
High Normal: 5, 8, 14, 18, 23, 25, 28	A	B	C	C-D
Low Normal: 1, 4, 7, 9, 12-13, 15-16, 19, 22, 26-27, 29	A-B	B-C	C-D	D-E
Below Normal: 2-3, 10-11, 20-21, 30-31	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 good-to-fair (B-C) on May 1st, fair-to-poor (C-D) on the 2nd and 3rd, good-to-fair (B-C) on the 4th, etc. Conditions during the CQ WW WPX CW Contest are expected to be High Normal on the 28th and Low Normal on the 29th.

For updated information, subscribe to bi-weekly MAIL-A-PROP, David D. Meisel, Editor, 54 Westview Crescent, Geneseo, NY 14454.

DX propagation conditions on most of the h.f. amateur bands.

For specific times of DX openings, refer to the DX Propagation Charts which appeared in last month's column. This month's column contains a Short-Skip Propagation Chart valid for both May and June, as well as Short-Skip Charts centered on Hawaii and Alaska. The Short-Skip Chart contains propagation forecasts for openings varying in distance between 50 and 2300 miles. For day-to-day variations expected in propagation conditions during May, see the Last Minute Forecast, which appears at the beginning of this column. Eighty meters is expected to be the best band for short-distance openings between 50 and 250 miles, both night and day. For openings between 250 and 750 miles, 40 meters should be best during the day and 80 meters at night. Twenty meters should be optimum for daytime openings between 750 and 1300 miles, while 40 meters should be best at

night. Try 20 meters for daytime openings between 1300 and 2300 miles, although 15 meters may be equally as good during most of the daylight hours. At night, both 20 and 40 meters should be optimum for openings over this distance range. Twenty meters should have the edge until midnight, with 40 meters best from midnight to sunrise.

### V.H.F. Ionospheric Openings

May is generally a good month for v.h.f. ionospheric openings. A sharp seasonal increase in sporadic-E ionization is expected during the month, which should result in some fairly frequent 6 meter short-skip openings over a range of 1000 to 1400 miles. During periods of widespread sporadic-E ionization, two-hop 6 meter openings occasionally may be possible over longer distances. An occasional 2 meter short-skip opening, between approximately 1200-1400 miles, may also be possible during periods of intense sporadic-E ionization. Openings are most likely to occur between 9 a.m. and 2 p.m., and between 6 and 10 p.m., local daylight time, although they may occur at other times as well.

Some fairly good meteor-scatter openings of short duration should be possible on the v.h.f. bands during the *Eta Aquarids* meteor shower which is expected to take place between May 3-6. This is a major meteor shower, and it is expected to peak with a count of approximately 20 meteors an hour. Intermittent openings over distances between approximately 800 and 1200 miles may be possible on the v.h.f. bands during the shower period.

An occasional trans-equatorial scatter (TE) opening may be possible on 6 meters during May between the southern tier states and South America. Openings will be weak, noisy, and fading at best, but may occur between 9 and 11 p.m. local daylight time.

Auroral activity is generally at a seasonally low level in May, but some displays may occur. The best times to check for auroral activity on the v.h.f. bands are when the h.f. bands are Below Normal or Disturbed. See the Last Minute Forecast at the beginning of this column for those days during May that are expected to be in these categories. During auroral periods openings are likely to occur on 6 and 2 meters for distances up to approximately 1200 miles as a result of reflection or scatter from ionized patches produced by the auroral display.

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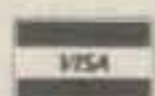
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## Shortwave Propagation Handbook

The revised 2nd edition of the popular *Shortwave Propagation Handbook*, by George Jacobs, W3ASK, and Theodore J. Cohen, N4XX, contains up-to-date sun-spot and solar data and additional prediction charts. It is written in simple, understandable language and is intended to be read and used by radio amateurs, shortwave listeners, and all others who make use of the shortwave radio spectrum.

73, George, W3ASK

### HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distances column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 40 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An \* indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

- (4) Opening should occur on more than 22 days
- (3) " " " between 14 and 22 days
- (2) " " " between 7 and 13 days
- (1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. On the Short-Skip Chart appropriate daylight time is used at the path midpoint. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are HST. To convert to daylight time in other USA time zones, add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone, and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to daylight time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone, 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters; a half-wave length above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the propagation index will increase by one level for each 10dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Department of Commerce, Boulder, Colorado, 80302.

### CQ Short-Skip Propagation Chart May & June, 1983 Local Daylight Time at Path Mid-Point (24-Hour Time System)

Band (Meters)	Distance Between Stations (Miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	08-10 (0-1) 10-14 (0-2) 14-18 (0-1) 18-22 (0-2) 22-00 (0-1)	08-10 (1-2) 10-14 (2-3) 14-18 (1-2) 18-22 (2) 22-00 (1) 00-08 (0-1)	08-10 (2-0) 10-14 (3-1) 14-16 (2-1) 16-19 (2) 19-22 (2-0) 22-08 (1-0)
15	Nil	07-10 (0-2) 10-14 (0-3) 14-18 (0-2) 18-20 (0-3) 20-00 (0-2) 00-07 (0-1)	07-10 (2) 10-14 (3) 14-18 (2-4) 18-20 (3-4) 20-22 (2-3) 22-00 (2) 00-07 (1)	07-10 (2-1) 10-14 (3-2) 14-16 (4-3) 16-20 (4) 20-22 (3-2) 22-00 (2) 00-07 (1-0)

20	10-13 (0-1) 13-19 (0-2) 19-01 (0-1)	07-10 (0-2) 10-13 (1-3) 13-19 (2-4) 19-21 (1-3) 21-01 (1-2) 01-07 (0-2)	07-10 (2-3) 10-13 (3-4) 13-19 (4) 19-21 (3-4) 21-23 (2-4) 23-01 (2-3) 01-07 (2)	07-10 (3) 10-16 (4-3) 16-23 (4) 23-01 (3-4) 01-03 (2-3) 03-07 (2)
40	07-09 (1-2) 09-12 (2-4) 12-20 (3-4) 20-22 (2-3) 22-01 (1-2) 01-07 (0-1)	07-09 (2-4) 09-10 (4-3) 10-16 (4-2) 16-18 (4-3) 18-22 (4) 22-01 (2-3) 01-07 (1-3)	07-09 (4-3) 09-10 (3) 10-16 (2-1) 16-18 (3-1) 18-20 (4-2) 20-22 (4) 22-07 (3-4)	08-10 (3-1) 10-18 (1-0) 18-20 (2-1) 20-22 (4-3) 22-06 (4) 06-07 (4-3) 07-08 (3)
80	08-11 (4) 11-19 (4-3) 19-23 (4) 23-08 (3-4)	08-11 (4-1) 11-17 (3-0) 17-19 (3-1) 19-21 (4-2) 21-06 (4) 06-08 (4-3)	08-09 (1) 09-11 (1-0) 11-17 (0) 17-19 (1-0) 19-21 (2-1) 21-23 (4-3) 23-06 (4) 06-08 (3-2)	08-09 (1-0) 09-19 (0) 19-21 (1-0) 21-23 (3-2) 23-04 (4-3) 04-06 (4-2) 06-08 (2-1)
160	06-09 (4-1) 09-10 (2-0) 10-19 (1-0) 19-21 (3-1) 21-23 (4-2) 23-06 (4-3)	06-09 (1) 09-19 (0) 19-21 (1-0) 21-23 (2-1) 23-01 (3-2) 01-04 (3) 04-06 (3-2)	08-09 (1-0) 09-21 (0) 21-23 (1) 23-01 (2-1) 01-04 (3-2) 04-06 (2) 06-08 (1)	08-21 (0) 21-01 (1) 01-04 (2) 04-06 (2-1) 06-07 (1) 07-08 (1-0)

### HAWAII May & June, 1983 Openings Given In Hawaiian Standard Time #

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	15-17 (1)	07-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-15 (1) 15-18 (2) 18-20 (3) 20-22 (4) 22-00 (3) 00-02 (2) 02-04 (3) 04-07 (2)	19-20 (1) 20-23 (3) 23-02 (1) 20-21 (1)* 21-23 (2)* 23-01 (1)*
Central USA	12-15 (1) 15-17 (2) 17-18 (1)	05-07 (1) 07-12 (2) 12-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	08-12 (1) 12-16 (2) 16-18 (2) 18-22 (4) 22-00 (3) 00-02 (2) 02-06 (3) 06-08 (2)	19-20 (1) 20-21 (2) 21-01 (4) 01-02 (2) 02-04 (1) 20-21 (1)* 21-00 (2)* 00-03 (1)*
Western USA	09-12 (1) 12-17 (2) 17-19 (1)	06-08 (1) 08-10 (2) 10-12 (3) 12-17 (4) 17-19 (3) 19-22 (2) 22-00 (1)	06-08 (4) 08-16 (3) 16-22 (4) 22-02 (3) 02-06 (2)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-07 (1) 19-20 (1)* 20-21 (2)* 21-03 (3)* 03-04 (2)* 04-05 (1)*

### ALASKA May & June, 1983 Openings Given In GMT #

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	Nil	18-20 (1) 20-22 (2) 22-01 (1) 01-03 (2) 03-05 (1)	20-22 (1) 22-02 (2) 02-06 (3) 06-08 (2) 08-10 (1) 10-14 (2) 14-16 (1)	06-11 (1)
Central USA	Nil	18-21 (1) 21-23 (2) 23-01 (1) 01-04 (2) 04-06 (1)	02-08 (3) 08-14 (2) 14-22 (1) 22-02 (2)	06-09 (1) 09-12 (2) 12-13 (1)
Western USA	00-03 (1)	18-20 (1) 20-23 (2) 23-02 (3) 02-05 (2) 05-07 (1)	02-04 (3) 04-08 (4) 08-14 (3) 14-18 (4) 18-20 (3) 20-02 (2)	06-09 (1) 09-11 (2) 11-13 (3) 13-15 (2) 15-16 (1)

# See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.

\* Indicates best time for 80 Meter openings. Openings on 160 Meters are likely to occur during those times when 80 Meter openings are shown with a propagation index of (2), or higher.

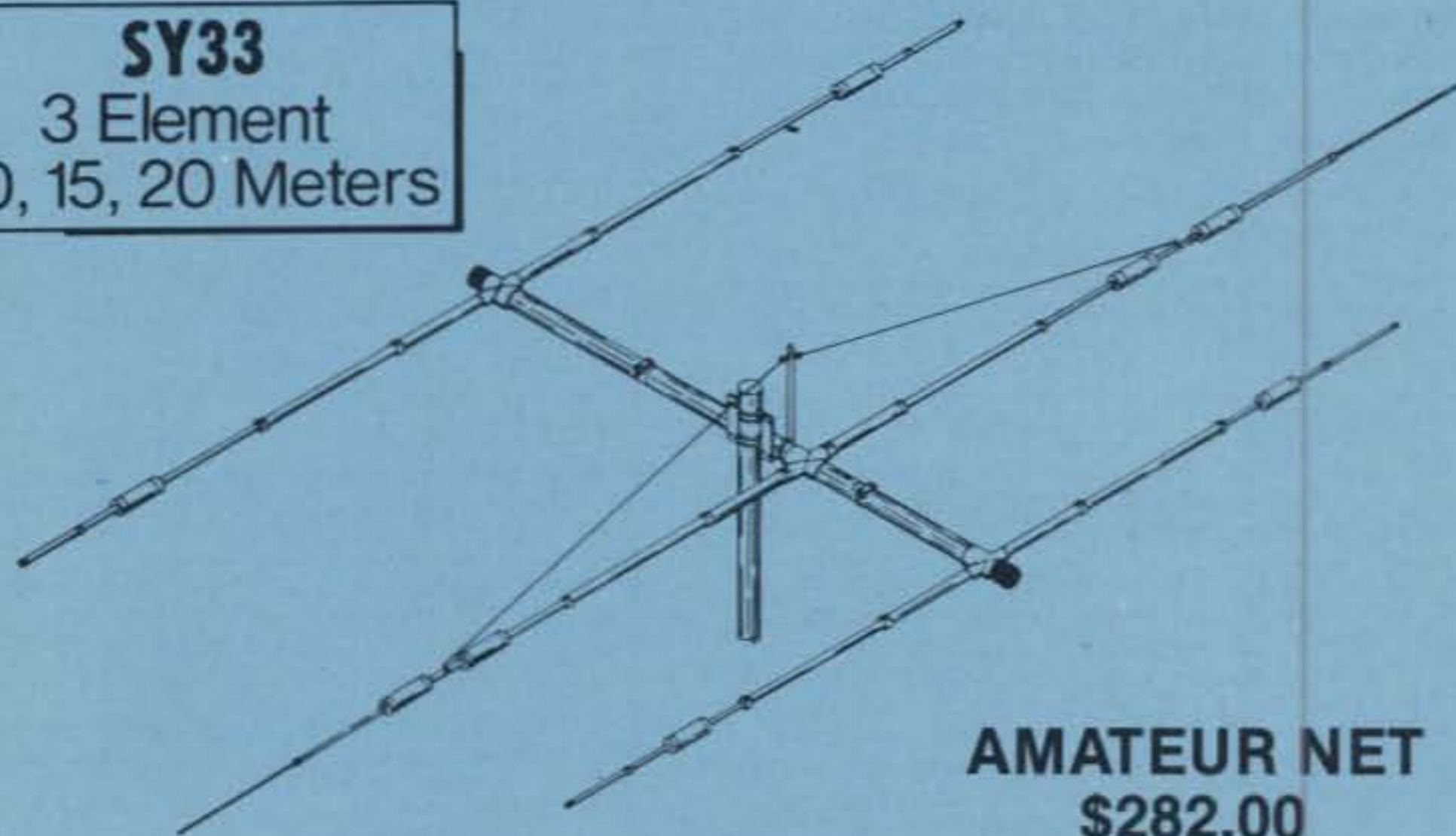
Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 2300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.



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**SY33**  
3 Element  
10, 15, 20 Meters



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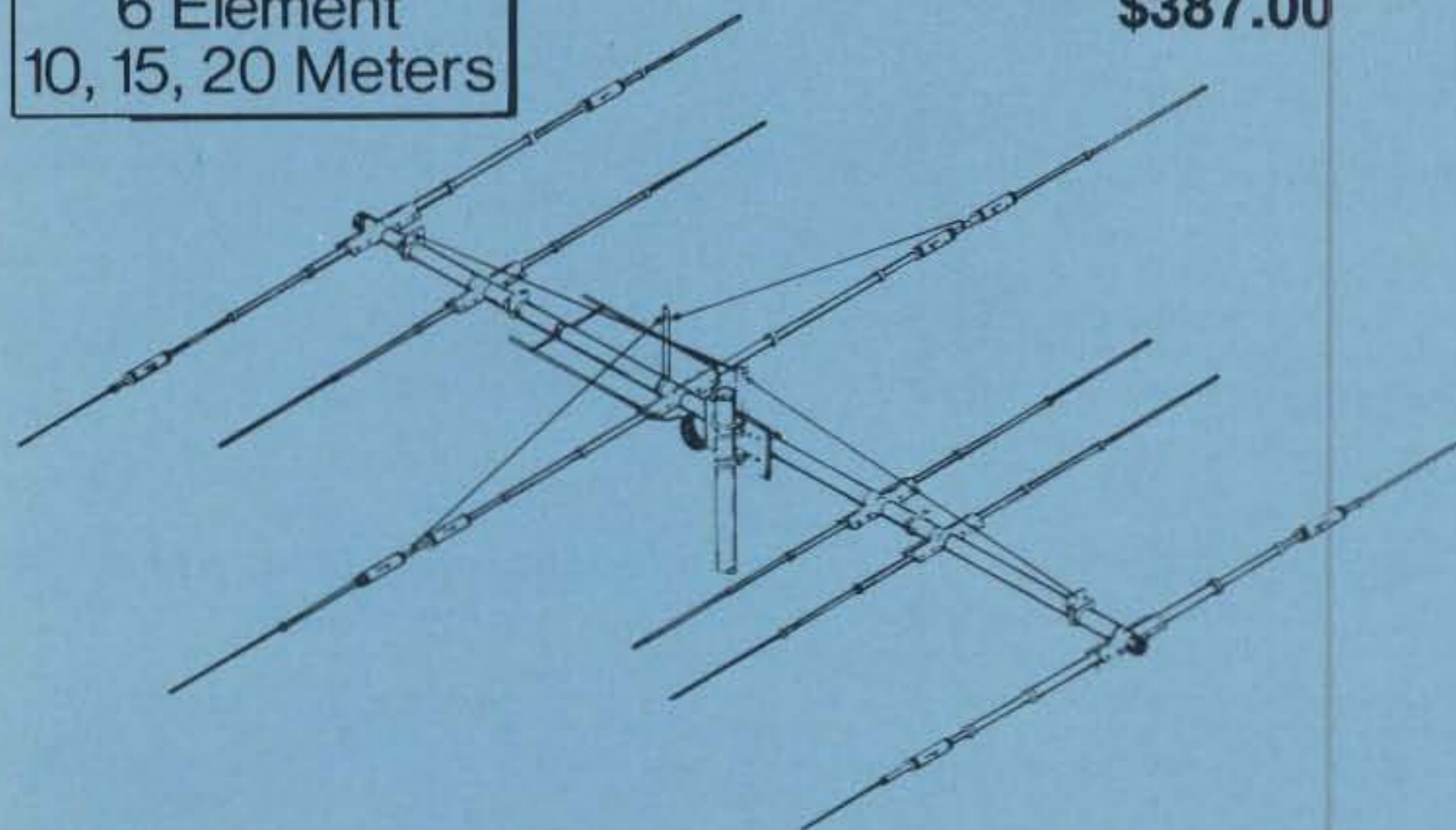
Band MHz:	14-21-28	Longest element:	27'4"
Maximum power input:	legal limit	Turning radius:	15'9"
Gain (dbd):	up to 8 dB	Maximum mast diameter:	2" O.D.
VSWR at resonance:	1.3:1	Surface area:	5.7 sq. ft.
Impedance:	50 ohms	Wind loading at 80 mph:	114 lbs.
F/B ratio:	up to 20 dB	Assembled weight (approx.):	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

**M68**  
At last the Big 6 Meter Yagi is back—8 Elements on a 36'10" Boom... Proven Design and Light Weight (34 lbs.) make a Superior 6 Meter Beam. Handles a full 2 KW PEP. Gamma fed for Simplicity at 50-54 MHz.



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**SY36**  
6 Element  
10, 15, 20 Meters



**AMATEUR NET**  
**\$387.00**

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

**M68**  
**6 Meter Monobander**

**SPECIFICATIONS:**

Frequency Coverage	50-54 MHz
Gain	13.5 dB
Front To Back Ratio	26 dB
Front To Side Ratio	30 dB
Matching Method	Gamma
No. Elements	8
Boom	2" To 1 1/2" O.D. x 36'10"
Longest Element	9'8"
Turning Radius	19'0"
Wind Surface Area	2.4 Sq. Ft.
Wind Load At 80 MPH	48 Lbs.
Assembled Weight (Approx.)	34 Lbs.
Shipping Weight (Approx.)	39 Lbs.

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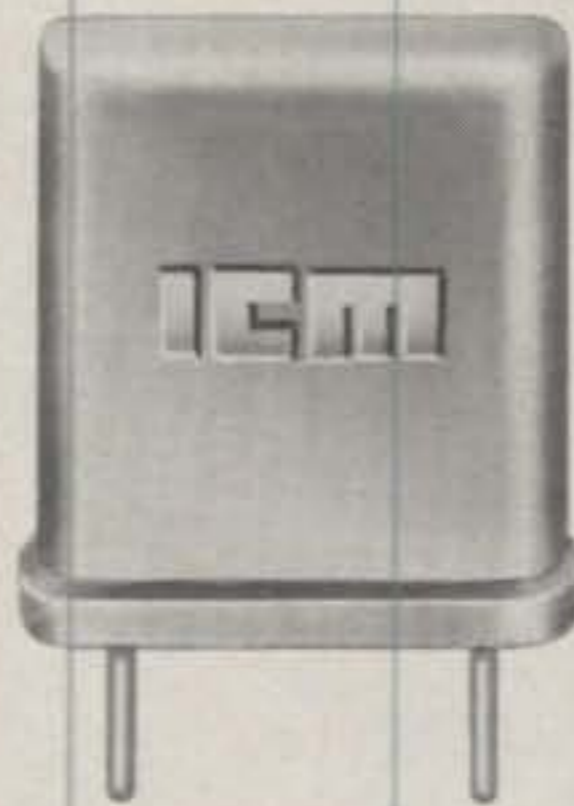
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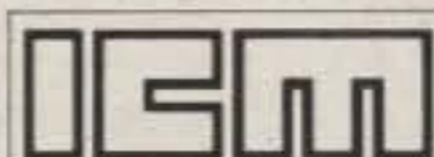
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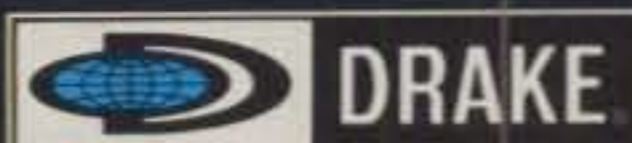
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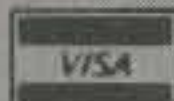
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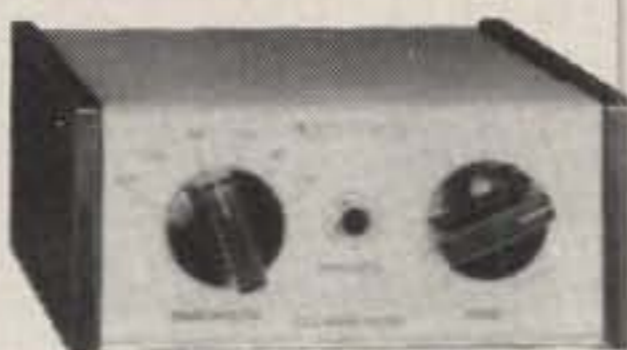
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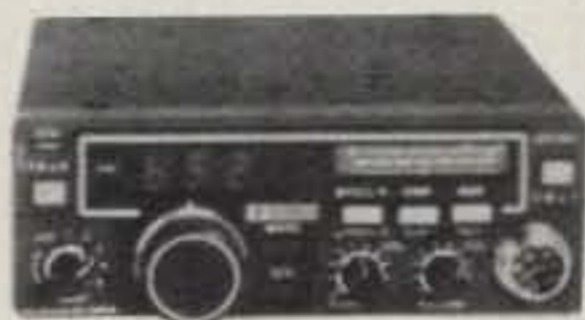
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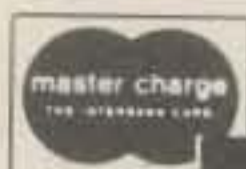
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