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Amateur Radio

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

...pacesetter in Amateur radio

ALL NEW FM mobile!

Here's One for You!

TM-221A/421A

2 m and 70 cm FM compact mobile transceivers

The all-new TM-221A and TM-421A FM transceivers represent the "New Generation" in Amateur radio equipment. The superior Kenwood GaAs FET front end receiver; reliable and clean RF amplifier circuits, and new features all add up to an outstanding value for mobile FM stations! The optional RC-10 handset/control unit is an exciting new accessory that will increase your mobile operating enjoyment!

- **TM-221A provides 45 W. TM-421A is the first 35 W 70 cm mobile!** Both models have adjustable 5 W low power.
- **Selectable frequency steps** for quick and easy QSY.
- **TM-221A receives from 138-173.995 MHz. This includes the weather channels!** Transmit range is 144-148 MHz. Modifiable for MARS and CAP operation. (MARS or CAP permit required.)
- **The TM-421A covers 438-449.995 MHz.** *(Specifications guaranteed for Amateur band use only.)*
- **Built-in front panel selection of 38 CTCSS tones.** TSU-5 programmable decoder optional.
- **Simplified front panel controls**— makes operating a snap!
- **16 key DTMF hand mic., mic. hook, mounting bracket, and DC power cable included.**
- **Packet radio compatible!**
- **Kenwood non-volatile operating system.** All functions remain intact even when lithium battery back-up fails. (Lithium cell memory back-up— est. life 5 yrs.)
- **14 full-function memory** channels store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2 m is automatically selected.** There are **two channels** for "odd split" operation.
- **Programmable band scanning.**
- **Memory scan with memory channel lock-out.**
- **Super compact:** approx. 1-1/2"Hx5-1/2"Wx7"D.
- **New amber LCD display.**
- **Microphone test function on low power.**
- **High quality, top-mounted speaker.**
- **Rugged die-cast chassis and heat sink.**

RC-10 Remote Controller

Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to **either or both** TM-221A and TM-421A with the optional PG-4G cable. When both transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)

Optional Accessories:

• **RC-10** Multi-function handset remote controller • **PG-4G** Extra control cable, allows TM-221A/TM-421A full duplex operation • **PS-50/PS-430** DC power supplies • **TSU-5** Programmable CTCSS decoder • **SW-100A** Compact SWR/power/volt meter (1.8-150 MHz) • **SW-100B** Compact SWR/power/volt meter (140-450 MHz) • **SW-200A** SWR/power meter (1.8-150 MHz) • **SW-200B** SWR/power meter (140-450 MHz) • **SWT-1** Compact 2 m antenna tuner (200 W PEP) • **SWT-2** Compact 70 cm antenna tuner (200 W PEP) • **SP-40** Compact mobile speaker • **SP-50B** Mobile speaker • **PG-2N** Extra DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile mic. with gooseneck and time-out timer • **MA-4000** Dual band antenna with duplexer (mount not supplied) • **MB-201** Extra mobile mount

Specifications and prices subject to change without notice or obligation.
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.

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1111 West Walnut Street
Compton, California 90220

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NEW! Computer Interface!

"DX-cellence!"

TS-940S

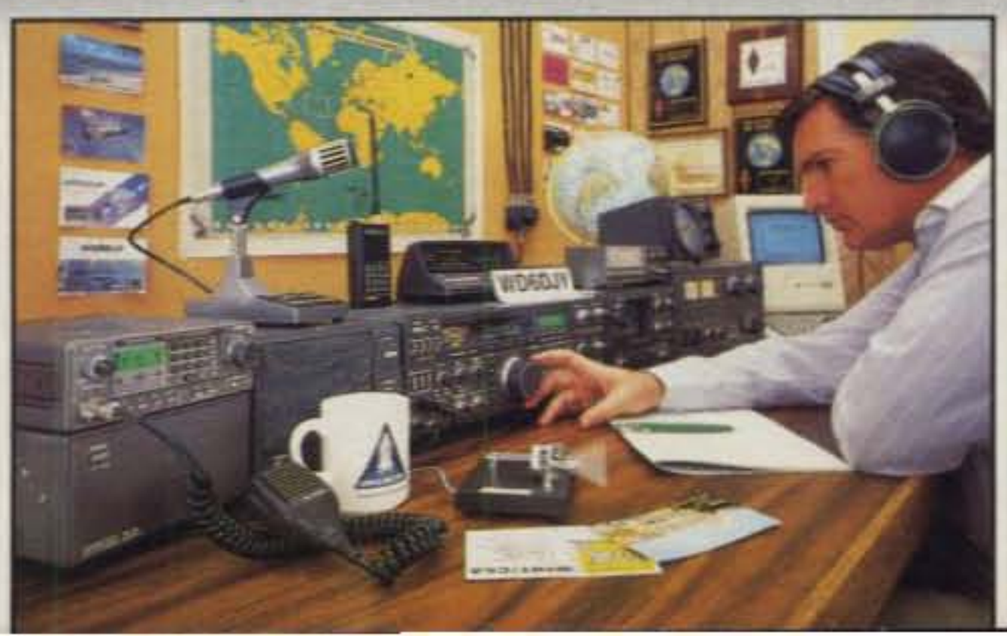
The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT- 940 antenna tuner status.
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **QRM-fighting features.** Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
- **Built-in FM, plus SSB, CW, AM, FSK.**
- **Semi or full break-in (QSK) CW.**
- **40 memory channels.** Mode and frequency may be stored in 4 groups of 10 channels each.
- **Programmable scanning.**
- **General coverage receiver.** Tunes from 150 kHz to 30 MHz.
- **1 yr. limited warranty.** Another Kenwood First!

Optional accessories:

• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL- 922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters.

Interface IF-232C/IF-10B



More TS-940S information is available from authorized Kenwood dealers.

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Good for Satellite Digital QSOs

Matching Pair

Look for FUJI and PHASE III-C

TS-711A/811A VHF/UHF all-mode base stations

The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs.**
  The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).
- **Large fluorescent multi-function display.**
  Shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, and memory channel.
- **40 multi-function memories.**
  Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.

- **Versatile scanning functions.**
  Programmable band and memory scan (with channel lock-out). "Center-stop" tuning on FM. An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
- **RF power output control.**
  Continuously adjustable from 2 to 25 watts.
- **Automatic mode selection.**
  You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.
- **All-mode squelch.**
- **High performance noise blanker.**
- **Speech processor.**
  For maximum efficiency on SSB and FM.
- **IF shift.**
- **"Quick-Step" tuning.**
  Vary the tuning characteristics from "conventional VFO feel" to a stepping action.
- **Built-in AC power supply.**
  Operation on 12 volts DC is also possible.
- **Semi break-in CW, with side tone.**
- **VS-1 voice synthesizer (optional)**

More TS-711A/811A information is available from authorized Kenwood dealers.

Optional accessories.

- IF-10A computer interface
- IF-232C level translator
- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48B 16-key DTMF, MC-43S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters:
  SW-200A 1.8-150 MHz
  SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner
- PG-2U DC power cable

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
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1111 West Walnut Street
Compton, California 90220

MASTHEAD

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Editor
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The Radio Amateur's Journal

ON THE COVER: Perfect antenna weather, sunrise on Virginia Key, in Miami. The silhouette is of a 15 meter beam used by the Dade County Radio Club during a past Field Day. Photo by Larry Mulvehill, WB2ZPI.

APRIL 1987 **VOL. 43, NO. 4**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

At long last it's here! Novice Enhancement became a fact on January 30, 1987. What better way to start a new year? For about 89,000 current Novices and all the Novices to come it finally means you can literally talk to other amateurs all over the world. There are now three —yes, count them, three—phone bands available to Novice class licensees. There are also provisions for new modes previously unheard of for the Novice. Fred Maia, W5YI, has prepared a full explanatory article on the Novice Enhancement program elsewhere in this issue. Check his "Ticket Talk" column this month for complete details.

Lest you get bogged down in the nuts and bolts of what all of this means, let your mind wander as to the tremendous range of possibilities now open to current and prospective Novices. Think of the relief you will feel talking to a prospective amateur when you get to the part about the Morse code. You won't have to mumble the joys of being restricted to limited CW bands, trying to keep a straight face while you do it. If you can't infuse enthusiasm with this package, then you ought to hand in your ticket. Sure we still have Morse code, but it's a part of what is available, not the whole thing. It's in perspective, as it should be.

The new amateur can sample the waters, take part in a wide variety of amateur activities using many modes, and find out for himself what amateur radio is ALL about. For the Novice already licensed, it isn't a hard sell for him to realize what a terrific package he's been handed. The new Novice, or the one licensed for a while, knows something about 10 meters or 220 MHz and may have heard about 1240 MHz. Those are the places where people talk, use repeaters, try out packet communications, and in general have more fun than the Novice is having now. To someone to whom you're trying to explain amateur radio, they are word pictures woven into a world that can be his with a little effort. The enticement, the carrot, the reward certainly is more than worth the effort needed to get a Novice license.

Hold on a minute! We're forgetting another big segment of the amateur ranks who'll directly benefit from these changes. There are about 90,000 Technicians who will also enjoy (hopefully to the utmost) the benefits of Novice Enhancement. We're actually talking about 40% of all currently licensed amateurs, plus all the new Novices and new Technicians to come who will share a bigger piece of the amateur radio pie. It doesn't take too much imagination to see a hefty percentage of those 40% jumping on the bandwagon ASAP.

The VE and VEC programs are doubly important now. The clubs and groups who give amateur radio classes are also doubly important. This is the opportunity we've asked for, and we've been given the chance. We wanted the Novice class license more relevant to total amateur radio activity, and the FCC has complied. We still have to sell the concept and attract the newcomer to amateur radio. "Whom can I talk to?" and "How far can I talk?" are questions that can be dealt with regarding any class of amateur radio license. CW is still with us and is still a basic requirement, but it's not the only thing a new amateur has to look forward to.

While we know that at least 180,000 amateurs are getting a brand new opportunity in amateur radio, we would like to assume that it wouldn't be too hard to double that number. I would expect that many Novices who never got on the air will now give it serious thought followed by action. People who are having a good time tell other people about it, and so it begins. Certainly the incentive is there. Upgrading will take place as it always has; people want more or the opportunity to do more. The new chance to broaden operating experience and skill will only serve to increase the potential for fun and enjoyment. Who wouldn't want more of that?

The infusion of a lot of new people also brings forth a lot of new enthusiasm. Even some of the current Novices and Technicians will have a fire lit under them by this move. So if some of this enthusiasm can be channeled properly, I also see the potential for greater participation in emergency nets and amateur activities that can benefit the local communities as well. Amateur radio classes can well become the source for Net Controls and disaster team leaders to recruit future radio operators and workers.

In addition to the potential for greater public service personnel, the new opportunities offered Novices (and Technicians) puts them right in line for DX contests and achievement awards. With 10 meters and a burgeoning sunspot cycle Novices can fare pretty well, for example, with *CQ*'s WPX Award program. Novices already have within that program a WPNX Award. The *CQ* DX Award will also become within reach of both Novices and Technicians. I would also expect to see increased participation by Novices in our USA-CA program. The *CQ* WAZ program might still present a real hurdle even with the addition of 10 meters. However, working 25 zones or so for a Novice should not be impossible. With this in mind, we are preparing a Novice-level WAZ Award. Complete details on this will follow in a month or so.

Is it exciting? You bet! Can you tell someone that with a little bit of effort he can get a license, get on the air, and have fun talking to people all over the world? A resounding yes! There are scores of positives you could list that make amateur radio immediately more attractive. The next stage is to infuse that excitement into someone else.

With the potential of more people coming into the hobby and more inactive amateurs getting active, the need for handholding becomes even greater. These new people, whether new to amateur radio or new to the bands, need guidance and assistance more than ever. Here's a golden opportunity for amateur radio clubs to really shine. What better exchange could you get than sharing expertise and skills for eager, enthusiastic workers at Field Day and other club events? Just think back to when you were newly licensed with all the enthusiasm you had and that never ending supply of energy. If you think about it, it's also fun and satisfying to be in a position whereby you can teach and encourage someone new. Without harping on the median-age theme again, I'd rather help out newcomers and be thought of as sage than hang around waiting for the postman to deliver my Curmudgeon Award.

What Else Is New?

Well, nothing as monumental as Novice Enhancement, but there is something new in the works that promises to add a lot of excitement in the way of operating.

CQ, in conjunction with *The RTTY Journal*, will be sponsoring a world-wide RTTY DX Contest. The idea had been in the discussion stage for several years, and now we are proud to announce the inaugural contest to be held the end of this September. Complete rules for the contest appear in this issue. From "green keys" to computers, this one's for you. For this inaugural event everyone submitting a log will receive a certificate noting their participation.

Dale Sinner, W6IWO, of *The RTTY Journal*, has put together a first-rate team to handle the administration and to score logs. If you're into RTTY, or have been thinking about it, remember that a contest period is one of the best times to get a lot of people on and to dig out some of those rare ones.

Travels With CQ

The first big event of the season, The Tropical Hamboree, held this past February, came off bigger than last year. There seemed to be more commercial exhibitors sharing the arena, and there were certainly more people selling in the fleamarket this year. Although I didn't find any bargains in the fleamarket, plenty of people obviously did. We brought about 50 of the Archie amateur radio comic books with us, which turned out not to be enough. Unfortunately, no one else had thought to bring them along. Obviously, the big topic of conversation was the passage of Novice Enhancement and what it could mean. What it comes down to is that if we as individuals and collectively as groups get behind it and push it, amateur radio will have a positive and very valuable influx of new people.

73, Alan, K2EEK

NEW!

More Than TNC-2 Compatible

PK-87™ Packet Controller

Amateur Net Price
$179.95

The PK-87 is not just another copy of the popular TNC-2, it's much more. With all the packet program features of the Multi-mode PK-232, the PK-87 is an economical new TNC designed to bring you enhanced, completely compatible packet software plus new hardware features for improved packet operation.

Software Enhancements

* AEA's exclusive "MBX" Mailbox Monitor command lets you read and save received data without confusing headers, callsigns, or repeats.

* New commands let you restrict the use of your station for connects and digipeater functions.

* Host mode for improved terminal program operation and development of specialized programs and applications.

* Compatible with existing WØRLI/WA7MBL PBBS/Mailbox/Gateway programs, with complete software command for remote selection of link rate, modem tone, etc.

* Autobaud routines for terminal data rates from 300 to 9600 baud (programmable down to 45 baud), and software control to set on-air data rates from 45 to 9600 baud.

Hardware Enhancements

* Eight front panel status indicators show Converse, Transparent, and Command modes; Multiple Connects, Data Carrier Detect, Push to Talk, Status, and Connect.

* High sensitivity (5 millivolts RMS), and dynamic range from 5 to 770 millivolts RMS.

* Rear panel AFSK output level adjustment from 5 to 100 millivolts RMS.

* One minute hardware watchdog timer provides system security in unattended VHF/UHF PBBS/Mailbox and digipeater operation

* Modem disconnect circuits guarantee compatibility with future high speed modem applications and developments.

* Zilog 8530 SCC provides dependable hardware HDLC for higher speeds, and AMD 7910 for reliable modem performance without calibration.

While the PK-87 can be used for HF operation, AEA recommends the PM-1 packet modem as a high performance front end for best results in HF packet service. Only the new AEA PK-87 has all these features. Contact your local AEA dealer and join the packet revolution today by ordering the new PK-87.

Prices and specifications subject to change without notice or obligation

P.O. Box 2160
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(206) 775-7373 • FAX (206) 775-2304

Announcing

• **Foundation for Amateur Radio Scholarships** - This nonprofit organization plans to award 26 scholarships for the academic year 1987–88 to assist licensed radio amateurs. Licensed radio amateurs may compete for the awards if they plan to pursue a full-time course of studies beyond high school and are enrolled or have been accepted by an accredited university, college, or technical school. Most of the scholarships require the applicant to hold at least a General class license or the equivalent. The awards range from $350 to $900. For additional information and an application, send a letter or QSL postmarked before May 31, 1987 to: FAR Scholarships, 6903 Rhode Island Ave., College Park, MD 20740.

• **Call for Papers for the ARRL Packet-Radio Conference** - The Sixth ARRL Amateur Radio Computer Networking Conference will be hosted by the TRW Amateur Radio Club, Redondo Beach, California, on Saturday, August 29, 1987. The Conference will feature technical papers presented by internationally known packet-radio pioneers. Papers are invited on amateur radio digital communication, in particular packet radio in the following subject areas: transmission technologies, networking, network expansion and development, applications, operations, message handling, international matters, spectrum management, and integration of data, voice and images. Prospective authors are requested to contact Mrs. Maty Weinberg, ARRL HQ, 225 Main Street, Newington, CT 06111 (203-666-1541) for an author's kit. Camera-ready originals are due at ARRL HQ no later than July 27.

• **Liberia Radio Amateur Assn. 25th Anniversary** - Celebrating this anniversary, throughout 1987 Liberian hams will use the 5L prefix (example: EL2GA becomes 5L2GA). A special postage stamp is being issued commemorating the association's anniversary, a Worked All Liberia event was held in March, International QRP Day will be observed and Liberian hams will be active with less than 10 watts, a special DX Contest will be held on July 26 (details to be announced), and several special club stations with the suffix BSJ will be active for the scouting Jamboree-on-the-Air event. For more information contact EL2GA.

• **NA@A Bicycle Mobile** - From April 1st to May 26th Hartley Alley, NA@A, will be bicycling 2150 miles from Boulder, CO to Lynn, MA to attend his high school reunion. He'll pass through NE, IA, IL, IN, OH, PA, and NY. He'll be counting on his 2 meter rig to provide him with road and weather information, emergency communications, and company. He would like for fellow hams to respond to his call "NA@A BICYCLE-MOBILE TO MY 50TH REUNION."

• **KC2JY From Arcade, NY** - The Pioneer Radio Operators Society (PROS) will operate KC2JY April 4–5, 1400Z to 2200Z for the 4th Annual Arcade Trade Fair. Operation will be SSB with suggested frequencies 3890, 7240, 14.250. For QSL send QSL and SASE to PROS, KC2JY, Box 296, Arcade, NY 14009.

• **Special Event Station WB@HSI** - The St. Charles ARC will operate WB@HSI on April 11 from 1400Z to 2200Z to celebrate its 15th anniversary. This special event station will transmit on 7250, 14325, 21350, 28510, and 146.67 as propagation and QRM permit. For certificates, send a large SASE to the St. Charles ARC, P.O. Box 1429, St. Charles, MO 63302-1429.

• **KA3IUS Special Event** - The Somerset County Pennsylvania ARC will operate KA3IUS on the lower 25 kHz of the General section of 75 and 40 meters on April 11 from 1700 to 2200 UTC on 40 meters, then from 2200 to ? on 75 meters. On April 12 they will operate from 1700 to 2200 on 40 meters. Send SASE for certificate to commemorate the 40th Anniversary of the Pennsylvania Maple Festival to KA3IUS, R.D. #1, Box 394-B, Meyersdale, PA 15552.

• **Historical Crafts Look For Contacts** - The Olympia Radio Amateur Club will celebrate the anniversary of the US Submarine Service by operating from the *U.S. Becuna*, a World War II submarine, and the *U.S.S. Olympia*, flagship of Admiral Dewey 1898. Transmissions can be heard beginning 1300Z, April 11 until 2000Z, April 12 on frequencies for CW 3590, 7050, 14050, 21090, 28150; and phone frequencies 3890, 7240, 21360, 28600 (all frequencies within 10 kHz). Two meter operation is planned as well as Novice bands. The ORAC call is WA3BAT. For a certificate stateside mailings require SASE, business-size. Foreign contacts remit one IRC. Send to Olympia Radio Amateur Club, P.O. Box 928, Philadelphia, PA 19105.

• **Two Egg, Florida Special Event** - The Coronado Wireless Association will operate a Special Events station at Two Egg, Florida during Easter time. The call WO4K will be used, and the operating frequencies will be the lower portion of the General class phone bands. SASE for QSL to WO4K, P.O. Box 1, Edgewater, FL 32032. (Another release received at *CQ* lists the call K4HML and operation on 10–20 meters General phone bands.)

• **Arbor Day Event** - Special events stations will be operating from Nebraska City, Nebraska during the annual Arbor Day celebration. Stations will be operating in the general portion of the phone and CW bands on 80 through 10 meters from 2400 UTC April 20 to 0600 April 26. All amateurs contacting these stations will be eligible to receive a certificate from the Nebraska City ARC. SWLs can participate also. Send a business-size SASE and your QSL card to Nebraska City ARC, P.O. Box 278, Nebraska City, NE 68410.

• **N9GBY From Dubuque, Iowa** - The Great River ARC of Dubuque, Iowa will operate N9GBY from 1600Z until 2300Z April 25 at the site of the annual Boy Scouts of America Grant Pilgrimage in Galena, Illinois. Frequencies will be in the lower 20 kHz of the General bands. For QSL card send SASE to N9GBY, P.O. Box 141, Galena, IL 61036. Station KA9KLZ will simultaneously operate in the lower 25 kHz of the 80 and 40 Novice bands. For QSL card send SASE to KA9KLZ, 213 N. Jefferson, Cuba City, WI 53807.

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

April 4, **Columbus ARC Swapfest**, Columbus, IN. Contact Dave Mann, KA9UUP, 458N Country Club Road, Columbus, IN 47201 (812-342-6302).

April 4, **Rochester Area Hamfest**, Rochester, MN. Contact RARC, c/o WB@YEE, 2253 Nordic Court NW, Rochester, MN 55901.

April 5, **Northwest Oklahoma Eyeball & Swapmeet**, Mooreland, OK. Contact Gerald Bowman, WG5Z, Box 356, Mooreland, OK 73852 (405-994-5600).

April 5, **Madison Swapfest**, Madison, WI. Contact Madison Area Repeater Association, P.O. Box 3403, Madison, WI 53704 (608-274-5153).

April 5, **Charleston, West Virginia Area Hamfest and Computer Show**, Charleston, WV. Contact Ollie Rinehart, KA8TIK, 304-768-9534.

April 5, **Willingboro Repeater Group Hamfest**, Willingboro, NJ. Contact Willingboro Area Repeater Group, P.O. Box 472, Willingboro, NJ 08046, or call Jack, K2KLM, at 609-877-5249 after 6 p.m.

April 5, **South Eastern Michigan ARA Hamfest Swap & Shop**, Grosse Pointe Woods, MI. Contact SEMARA Hamfest, P.O. Box 646, St. Clair Shores, MI 48080, or call Fred Lewis, NK8M, at 313-881-0187.

April 5, **Charleston, South Carolina ARS Hamfest**, Elk's Recreation Site, Highway 7, just off I-26. Contact Hamfest Committee, P.O. Box 70341, Charleston, SC 29405 (803-747-2324). (A hospitality period will be held Saturday night, April 4, at North Carolina Exchange Club Building, North Charleston.)

April 5, **Clarksville Amateur Transmitting Society Swapfest**, Clarksville, TN. Contact Larry, WD4DBJ, 615-232-6141.

April 11, **Durham Region Amateur Radio Fleamarket**, Pickering Village, Ajax, Ontario, Canada. Contact Howard Vardon, VE3DAX, 416-683-7562; or Ray Kosen, VE3NBE, 416-839-9208.

April 24, **18th Annual Hamvention B*A*S*H**, Dayton, OH. Contact Miami Valley FM Assn., P.O. Box 263, Dayton, OH 45401.

April 24, **1987 QCWA Banquet**, Hamvention, Dayton, OH. Contact Bob Dingle, KA4LAU, 657 Dell Ridge Dr., Dayton, OH 45429.

April 24–26, **Dayton Hamvention**, Dayton, OH. Call 513-433-7720.

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Our Readers Say

Wind Stress Clarification

Editor, *CQ:*

I received a letter from a reader who seemed to feel that I failed to elaborate enough concerning my article and computer program, "Calculating Wind Stress On Towers and Guy Wires," *CQ*, January 1987. He rightly observed that a single set of guy wires at the top of a 45 foot mast such as I used in the example would not be adequate, and expressed the fear that someone might attempt to erect such a mast.

I failed to mention that in my final installation the mast is bracketed to a building at the 10 foot level and an additional set of guys is installed at the 23 foot level. This provides more than adequate support for my needs.

Of course, installations with larger loads and projected areas are going to require heavier components.

If anyone else was misled, I apologize, it was not intentional.

George E. Black, WAØYJX
Adrian, MO

A Lazy 8 On The Blues

Editor, *CQ:*

I read K3KMO's article entitled "A Special Event Shipwreck" in the February 1987 issue of *CQ* with interest and surprise. Interest because it was a well-written account of an unusual special event with a dramatic ending, and surprise because I have known the author, Al Brogden, for some time and never knew he was a ham.

Rather, I know Al Brogden in the musician role he so lightly touched upon in the article. His Southern Comfort Jazz Band is a well-known Dixieland Band in the Washington, D.C. metropolitan area. He plays trombone, tuba, euphonium, and heaven only knows what other instruments, and his band had one of the longest engagements (for years) at a local Maryland restaurant and is still going strong at one in northern Virginia.

Al is prominent in the Potomac River Jazz Club, one of the largest and most active traditional jazz clubs in the country, which is how I know him, and is a columnist for their monthly publication, "Tailgate Ramblings."

I have never heard K3KMO's fist on CW, but I have heard his trombone many times and it is RST599X at 40 wpm on fast tunes and a lazy 8 wpm on the blues.

Charles Earp, W3DKT
Lutherville, MD

(continued on p. 88)

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- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8/8T** soft cases with belt hook
- **TU-6** programmable sub-tone unit
- **AJ-3** thread-loc to BNC female adapter
- **BC-6** 2-pack quick charger
- **BC-2** wall charger for PB-21H
- **RA-9A** StubbyDuk antenna
- **BH-3** belt hook

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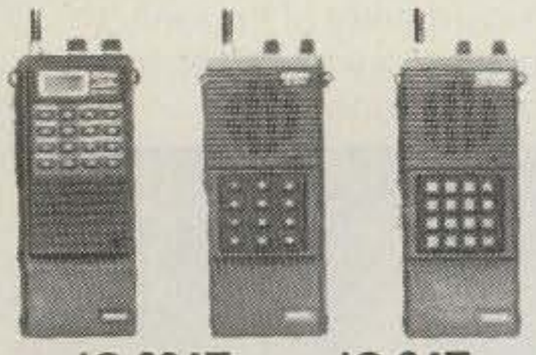

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FREDERICK O. MAIA, W5YI

INFO ON AMATEUR RADIO LICENSING

FCC Authorizes Novice Enhancement!

Exactly 20 years ago the Federal Communications Commission implemented new rules that would change the basic licensing structure of amateur radio for all time. A controversial system called *Incentive Licensing* was adopted and implemented to provide motivation for the upgrading of approximately 100,000 General class ticket holders to higher classes. There is an *unbelievably* close parallel between the major Amateur Radio Service's Incentive Licensing rulemaking of 1967 and 1987's newly authorized Novice Enhancement.

The goal of Incentive Licensing was to reward amateurs with additional privileges if they increased their radio knowledge. The major beneficiaries were primarily long-term amateurs who obtained specially reserved frequencies as an inducement to upgrade to Advanced and Extra class levels. Extras got exclusive use of new prime 25 kHz CW sections of the 80, 40, 20, and 15 meter bands.

The 1967 Incentive Licensing process started with petitions submitted by amateurs, but it was the ARRL's influence that really got the measure rolling and approved by the Commission. Many General class amateurs had their frequencies cut and had to upgrade to regain them. (Most still have never forgiven the League for supporting the measure.)

Incentive Licensing also provided for a new examination to be known as Element 4A—the re-established Advanced class written test. Advanced class licenses had not been available from the FCC for some 15 years prior. The FCC simply divided the knowledge required for the Extra class license into two sections—examination Elements 4A for the Advanced class ticket and 4B for Extras.

Novices permanently lost the VHF (145–147 MHz) phone privileges in 1968, which most of you probably never knew they once had! Back then the 2 meter band was considered *experimental*. Repeater use had not yet caught on. The new Novice Enhancement proceeding sought to once again allow Novice VHF operation.

Some 20 years later the Commission's Incentive Licensing rulemaking still upsets many amateurs who blame the ARRL for its enactment, although most of the 1,700 comments from other amateurs approved of it.

National Volunteer Examiner Coordinator, P.O. Box 10101, Dallas, TX 75207

History Repeats Itself!

In January the FCC did it again! This time the recipients of the sweeping Amateur Radio Service changes are beginners. The action is every bit as important as Incentive Licensing and, in many ways, is merely an extension of it. While the primary goal of Incentive Licensing was to motivate existing amateurs to increase their electronic knowledge, Novice Enhancement seeks to persuade beginners to pursue high-tech careers!

The service has shown a steady decline over the years in the number of new entrants into the Amateur Radio Service. The average ham's age is now well up in years. It used to be in the teens. The general feeling is that this situation exists because the privileges offered at the entry (Novice) level are inadequate to entice newcomers to enter the hobby and are out of touch with today's technology and school classroom environment.

Youngsters are bombarded from every quadrant with high-tech electronics, satellite communications, and the magic of computers. Practically none have any interest in Morse operation, the only beginning amateur radio operating mode currently available to them. Right or wrong, hardly a mention is ever made of Morse code operation in today's school classroom. Newcomers equate the code to radio tubes—it works, but it is inefficient, antiquated, and hardly state-of-the-art.

Novice Enhancement Takes Shape

Novice Enhancement got its start when an amateur from the sleepy west Texas town of Brady, *Larry W. Garens*, KC5OQ (now WD5H), submitted the first of four petitions to the FCC seeking to expand the operating privileges for Novice operators by allowing them voice privileges in the 10 meter and 220-225 MHz band.

His suggestions took on renewed importance when on June 6, 1985, the ARRL (without mentioning the previous Garens' petitions) proposed "to provide greater motivation for amateurs-to-be to obtain their first license without reducing the incentive to upgrade by attaching too many privileges to what is, and should continue to be, an elementary license." While Garens got the bandwagon started, it was the League that got it rolling.

Similar to the Garens' proposals, the League suggested 10 meter Novice sideband voice privileges (which could provide an occasional opportunity for long-distance radio contacts) and the use of the 1.25 meter (220-225 MHz) band, including voice communication through repeaters. The League also added a 1246 to 1260 MHz (.23 meter band) allocation to their petition.

Garens responsed with a fifth petition on November 29, 1985, suggesting that a segment of the new WARC 902–928 MHz band be added to his earlier proposals. He said he felt that this would provide an opportunity for computer hobbyists to enter amateur radio and link their computers via ham radio circuits.

The ARRL suggested transmitter power levels of 200 watts for Novice 10 meter operation, 25 watts for 220–225 MHz, and 5 watts for Novice 1246-1260 MHz use. While Novices could operate through repeaters on the 1.25 and 0.23 meter band, they would not be permitted to be control operators or repeater owners.

The League, feeling that Citizens Band operators might use recrystalled AM rigs in the new 10 meter Novice voice band, asked that double sideband AM emission not be authorized. Practically no amateur operator uses this mode, and a restriction against this emission would force new Novices to communicate with amateurs rather than among themselves. The League felt strongly that exposure to the more disciplined operation of the Amateur Radio Service was very important.

Since Novices (and Technician class amateurs) would be gaining new privileges, the League suggested that the Novice (Element 2) written examination be expanded to 300 questions to provide for 100 additional questions covering the new Novice voice class. The ARRL also insisted that two, rather than one, General class level or higher volunteer examiners test and certify Novices "to preserve the integrity of the Novice examination."

FCC Issues NPRM

That set the stage for the FCC adopting a Notice of Proposed Rulemaking some six months later. On April 18, 1986 the Commission proposed in PR Docket No. 86-161 to "Amend the Amateur Radio Service Rules to Expand the Privileges Available to Novice Operators." The

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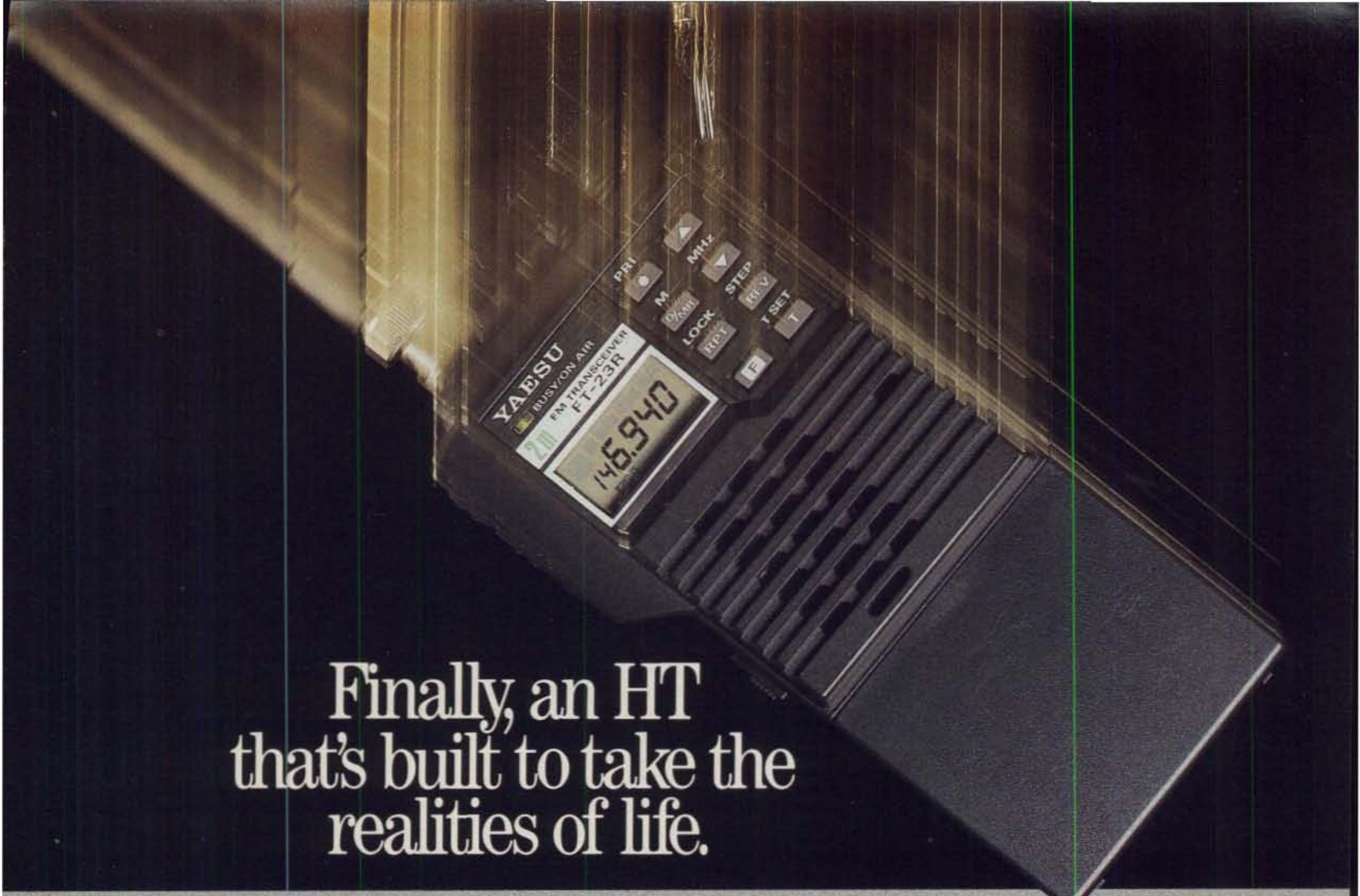

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NPRM became known simply as *Novice Enhancement*, although it affected the Technician Class as well, since Techs would automatically receive any additional privileges granted to the new Novice voice class. The bandwagon was now going full steam ahead!

The NPRM largely supported the features as proposed by the League, although the FCC said they weren't convinced that new Novices needed to be certified by two VEs. The FCC also reminded the amateur community that although their NPRM provided for a 220–225 MHz Novice voice allocation, other commercial services had petitioned the Commission for use of this band. Any Novice use of the band would necessarily be on an interim basis. "We will not finalize the matter of permitting Novice amateurs in the 220–225 MHz band until these petitions are resolved." The outstanding petitions ask for 220 MHz allocations for ACSB (narrow-band) Land Mobile use and reading for the blind services.

The FCC said that they considered including Novices in the new Volunteer Examiner System but were "reluctant to disturb the present procedure under which aspirants to amateur radio receive licenses quickly and free of charge." The Commission also questioned the capacity of its new VE/VEC system to handle a large volume of Novice applicants.

The Notice of Proposed Rulemaking also contained a small surprise footnote! In the fine print, the FCC noted that it would be a simple task to split the present Technician class examination into two sections, separating the MF/HF from the VHF/UHF questions. Element 3(A) VHF and UHF questions could be the requirement for the Technician class with Element 3(B)—medium and high frequency topics—a prerequisite for the General class.

Up until that point we had never given any thought to comparing Novice Enhancement with the Incentive Licensing proceeding of some 20 years earlier. The test Element 3(A) and 3(B) separation suggestion made us remember how the Element 4(A) Advanced and 4(B) Extra class written examination elements came about.

It was then that we realized that Novice Enhancement was beginning to look like an extension of 1967's Incentive Licensing action. We also remembered the flak that the ARRL and the FCC took when amateurs lost privileges because of it. We were careful to suggest in our comments to the FCC that all amateurs be allowed full amateur power when operating on the Novice bands so that the General class and higher would not lose any privileges.

The League had a different view on the power-level matter. They proposed that only operators *previously* authorized higher power be allowed to continue to operate at these higher levels. It seemed strange to us to have amateurs in the same license class operating with different transmitter output power levels.

Comments Close on July 16th

A three-month public-comment deadline was set by the FCC and hundreds of viewpoints poured into the Commission. Surprisingly, many weren't in favor of improving operating privileges for amateur radio beginners at all. Many 220 MHz repeater users didn't approve of being joined by Novice operators. Some said giving Novices phone privileges would discourage upgrading. "It will be CB all over again!" Many were very annoyed at the League's support of what they thought to be a new ARRL policy. Most comments did agree with Novice Enhancement, however.

The League commented primarily in three areas. The ARRL wanted the 220-225 MHz band to be made available to Novices immediately rather than wait until the unresolved petitions were ruled on. They also strongly re-emphasized their position that two rather than one volunteer examiner should be required. The League was also concerned that Novices might cause interference to the existing worldwide network of beacon stations operating in the 28.2 to 28.3 MHz band.

radio classes to literally thousands of new applicants. His excellent amateur

Since the comment date closed on July 16th, the League's comments were necessarily submitted before the ARRL Board of Directors had a chance to meet a week later. At that meeting the Directors voted to change the 1246-1260 MHz Novice voice allocation they previously petitioned for to 1270–1295 MHz to conform with the existing ARRL 1240–1300 MHz bandplan. That bandplan provides for 239 FM repeater channels (1270–1276 MHz/inputs paired with 1282–1288 MHz/outputs) and 39 FM simplex channels between 1294 and 1295 MHz.

At that meeting, many of the League's directors wanted Novice examinations administered exclusively within the VE/VEC program and a non-renewable Novice term of three years. Both suggestions were turned down by the majority. The League asked for the frequency change in the 1240-1300 MHz band Novice allocation in their Reply Comments. (Replies closed last August 20th.) Strangely, the League never addressed the issue of dividing the Element 3 examination into separate Technician 3(A) and General 3(B) tests. One very prominent amateur did, however.

Probably the nation's most proficient and prolific amateur radio educator is Gordon West, WB6NOA, of Costa Mesa, California. Publicly recognized by the ARRL as the nation's leading amateur radio instructor, Gordo has taught amateur radio training materials are widely marketed and used throughout the U.S. He told the Commission that the 574 Technician-General question pool was simply too long and covered too much material to teach effectively at one time.

He commented, "We concur with the proposed suggestion that the Technician class theory pool be cut down to approximately 250 questions that deal with Technician class privileges." He said that if this were done he would be able to specifically train more thoroughly those students who wish only to obtain the Technician class license. His comments carried a lot of weight with the Commission. Another interesting comment from West noted that ". . . less than 2% of our Novice class students ever actually get on the air using CW."

The Envelope Please

The amateur community had thought that final action would be taken by the FCC before the end of the 1986 calendar year. One report had it that amateurs would be "getting a Christmas present." Although the FCC's Private Radio Bureau staff completed their analysis of the comments and recommendations before year-end, the Commissioners didn't get to it until January.

The Novice Enhancement issue was initially scheduled for an Open Commissioners Meeting on February 12th, but more pressing Commission matters required that it be handled in a different manner. The Report & Order document was circulated to each Commissioner's office for his individual approval and signature rather than being addressed collectively at an Open Meeting.

The final signature came on Wednesday, January 28th, when Commissioner Dennis R. Patrick approved Novice Enhancement, PR Docket 86-161. It was unanimous. Every Commissioner agreed to it. The FCC's Private Radio Bureau issued a press release on Friday, January 30, 1987 notifying the public of their action.

The release said that the Commission has amended Part 97 of the Rules to expand Novice class amateur radio operator privileges to include all emission modes for the 1.25 (220–225 MHz) and 0.23 meter bands (1270-1295 MHz) and emission A1A (AM telegraphy), F1B (FM automatic digital—i.e., packet switching), and J3E (SSB analog voice) for the 10 meter HF subband. "This action was taken in order to attract more Novice operators to the Amateur Service without diminishing their incentive to upgrade to higher class operator licenses," the FCC notice said.

Because of the need to prevent interference, Novice operators were not previously authorized higher power. Present Novice and Technician operators were "grandfathered" into the new privileges. The FCC recommended current Novice

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ELH-260D	〃	1W-3W/50W
ELH-730D	430-450 MHz	1W-3W/30W

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EP-110M	10A/11A D.C.MAX	12.10 〃
EP-1510	15A/20A D.C.MAX	13.64 〃
EP-2010	15A/20A D.C.MAX	13.64 〃
EP-3030	25A/30A D.C.MAX	18.70 〃

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Texas Towers - Plano, TX.
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operators who are authorized the new privileges without additional qualifications become knowledgeable in the new requirements before using the new privileges.

The FCC released the Report & Order on February 10th containing the new rules which were effective at 0001 UTC, March 21, 1987. The spectrum approved for Novice (and Technician) amateur operators is as shown in Table I.

Examination Elements and Standards

Additionally, the Commission separated the 50 question Element 3 examination into separate 25 question (Technician) Element 3(A) and 25 question (General) Element 3(B) tests. This will enable the written examinations for Technician and General operators to correspond more closely with the actual privileges. The new Novice Element 2 examination will contain 30 questions.

VECs are presently in the process of agreeing on the makeup of the new Element 2, 3(A), and 3(B) question pools. The new Novice question pool will contain 300 questions, the Technician and General 250 questions each. It is anticipated that these pools will be implemented on the effective date of the new rules, that is March 21st. Technician class operators that have previously passed the old Element 3 are being given credit for the new Element 3(B).

What the Future Holds

Long range, the action seems certain to swell the amateur ranks at the entry level. It could cause a big boom in amateur radio. Although not many predict it will ever reach the magnitude of CB, the potential is there. Many of the new Novices will upgrade and enter the mainstream of amateur radio. Some will simply remain a permanent Novice. All will enjoy their new-found voice privileges.

There will be more operators available to assist in times of emergency. The elderly, the handicapped, and those who are simply satisfied with the Novice privileges will benefit the service, or will receive a benefit *from* the service *which is just as important*. The unmet communications need of the public to communicate among themselves will be partially realized. It will be easier to become a ham.

There is nothing wrong with being a *permanent* Novice if this is the highest level that is wanted or can be attained. Public service, enhancing international goodwill, and socializing via radio ("rag chewing") are also pursuits enjoyed by a good many of the amateur community. I predict they are going to have a lot of company.

A side benefit that will aid us all is, with a larger market, more competitively priced and readily available amateur communications equipment will become available. The biggest benefit, however, will be to the public—to non-amateurs. Novice enhancement will provide our country with an improved method of replacing and expanding our reservoir of high-tech technicians and engineers.

Youngsters and school amateur radio clubs could once again frequent the amateur airwaves. It will be interesting to see what develops and just how many radio enthusiasts are attracted to amateur radio by the new Novice voice class. The FCC said in their NPRM that there are 10,000 less Novices than just three years ago. I predict that we will see more than that much of an increase within a single year. Welcome them as the life blood of our hobby—and our nation. CQ

§Section 97.7 Frequency Privileges
(a) Novice class:

Meter band	Terrestrial location of the amateur radio station: ITU Region 1	ITU Region 2	ITU Region 3	Limitations (see para. (g))
10	28100–28500	28100–28500	28100–28500 kHz	1
	(Allows CW/digital between 28100 and 28300, CW and sideband voice between 28300 and 28500 kHz.)			
1.25	—	222.1–223.91 MHz	—	5
	(Allows operation on 220 MHz repeater input and simplex channels but protects weak signal and repeater output operations.)			
0.23	1270–1295	1250–1270	1270–1295 MHz	5,22
	(Allows low power Novice operation on simplex and repeater channels.)			

§Section 97.7 Frequency Privileges
(g) Limitations: (Only subparagraph 1 was changed as follows:)
(1) Control operators holding the Novice or Technician class license are limited to international Morse code when the station is transmitting emission A1A (telegraphy) in the 80, 40, 15, and 10 meter bands.

§Section 97.28 Examination Administration
(b) . . . examination for a Novice operator license shall be administered by *two volunteer examiners*. The volunteer examiners do not have to be accredited (and) must hold current General, Advanced, or Amateur Extra operator licenses issued by the FCC.

§Section 97.61(a) is revised by adding a new line entry before 28000–28300, by removing the F1B emission limitation on Novice and Technician class operators, and by adding a new limitation 3 as follows:

§Section 97.61 Authorized Emissions
(a) kilohertz

Frequency Band (kHz)	Emissions	Limitations (see para. (d))
28000–29700	A1A (CW)	
28000–28300	A1A (CW), F1B (digital)	
28300–29700	A1A, A3E, F2A, F3E, G3E, A3C, F3C, A3F, F3F, H3E, *J3E* (sideband), R3E	3

(d)
(3) A station with a Novice or Technician control operator is authorized to transmit only emissions A1A (CW) and J3E (sideband telephony) in the 28300 to 28500 kHz subband. (All modes and emissions are authorized to Novice and Technician operators in the 1.25 and 0.23 meter bands.)

§Section 97.67 Maximum Transmitting Power
(d) The peak envelope power output (transmitter power) of each amateur radio transmitter *shall not exceed 200 watts* when transmitting on . . .
(3) 28100–28500 kHz when the control operator holds a *Novice or Technician class* operator license.
(j) The transmitter power of each amateur station at which the control operator holds a *Novice class* operator license *shall not exceed 25 watts peak envelope power* when transmitting in the 1.25 meter band.
(k) The transmitter power of each amateur station at which the control operator holds a *Novice class* operator license *shall not exceed 5 watts peak envelope power* when transmitting in the 0.23 meter band.

§Section 97.85 Repeater Operation
(i) No amateur station at which the control operator or station licensee holds a *Novice class* operator license shall be in repeater operation.

§Section 97.86 Auxilliary Operation
(e) No amateur station at which the control operator or station licensee holds a Novice class operator license shall be in auxilliary operation.

§Section 97.87 Beacon Operation
(f) No amateur station at which the control operator or station licensee holds a Novice class operator license shall be in beacon operation.

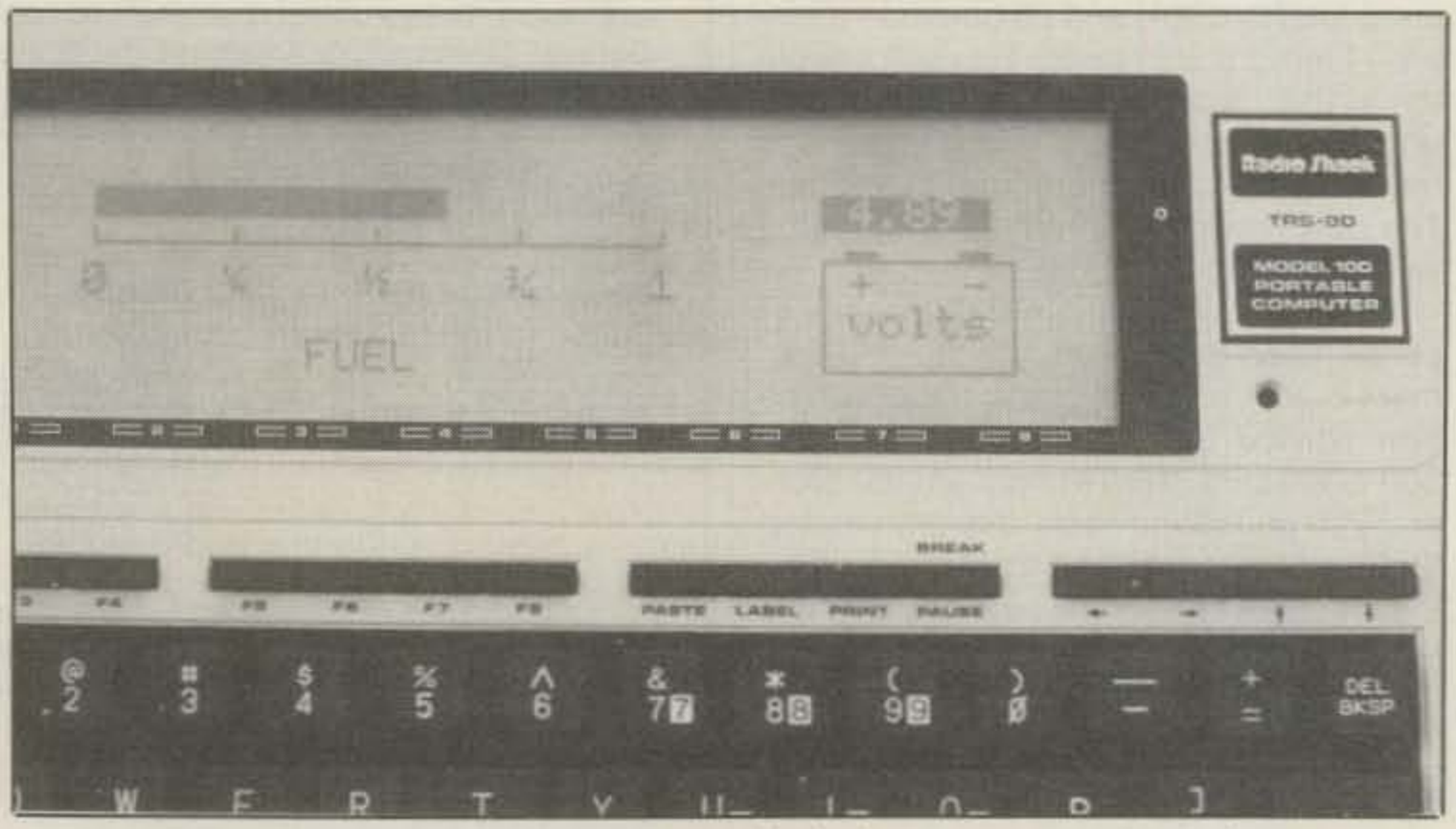
Table I– The spectrum approved for Novice (and Technician) amateur operators per Novice Enhancement, in effect March 21, 1987.

Here's a very clever idea that's sure to tempt some of you. Now you can find out how much "fuel" you have left in your batteries.

How To Add A Fuel Gauge To Your Radio Shack Model 100

BY R.L.L. HU*

Thanks to the advent of personal computers, amateur radio has never been the same again! Historically, the Radio Shack Model 1 was one of the first practical personal computers to find its way to the amateur radio operator's bench. But portable it was not! Now, the diminutive Model 100 computer seems to have taken over all the common functions of its predecessor. It has been used variously for Morse code, RTTY, packet radio communication, etc. But like all portable equipment, the batteries in the Model 100 have the uncanny tendency to go flat at the most inopportune moments. The Model 100 gives no indication of the state of the batteries in use except at T minus 20 minutes when the built-in "LOW-BATTERY" LED comes on. This shortcoming prompted me to build a fuel gauge into the Model 100 computer. Now, the amount of fuel remaining can be displayed at the press of a key, so I can know well in advance when the batteries will need replacement.



The Model 100 viewing screen with the battery program running.

Description

The fuel gauge is basically a voltmeter with a conversion program that correlates the battery voltage to the Ampere-hour capacity of the batteries.

Hardware

The voltmeter is implemented using National's ADC0804, an 8-bit microprocessor compatible, successive-approximation analog-to-digital converter (ADC) chip. The chip has guaranteed monotonicity through the use of 256R ladder network. Unlike the conventional R/2R technique, there is no possibility of missing codes. The voltage range of interest to us is between approximately 6.1 volts (fresh batteries) and 3.7 volts (Model 100 shuts off at around this voltage). An ADC with 8-bit resolution can resolve 1 part in 256 of full scale. Thus, with 6.1 volts as full-scale input, one LSB (**L**east **S**ignificant **B**it) would represent about 23.8 mV with the ADC wired in a typical configuration. We can, however, take advantage of the fact that we would never need to measure below 3.7 volts to squeeze additional resolution out of the ADC. The involves the use of span adjust and DC input offset capability of the ADC. The schematic diagram, fig. 1, shows how this was done using a single reference source. First, the reference provides a stable voltage to set the span at 2.46 volts (2 × 1.23V). Second, the reference introduces 1.23 volts of DC offset at the input, from which the battery voltage is "subtracted." The resolution is now 19.2 mV per LSB, an almost 20% improvement!

The digital interface of the ADC is straightforward. The −CS line is driven by unused I/O ports at addresses 90H–9FH. The −INT line need not be monitored since BASIC line execution time is much longer than the A-to-D conversion time. The CLK IN is driven by the UART clock. The −RD and −WR lines go to their respective pins of the microprocessor. Note that the data pins are flipped end to end; that is, MSB of the ADC is connected to the LSB of the data bus and so on. Physical mounting of the ADC chip necessitated this inversion, but it will be corrected in the software.

The diode and capacitor in the Vcc of the ADC are used to filter out the noise from the main DC-DC power converter, eliminating ADC comparator errors. Ferrite beads are used to help reduce RF noise.

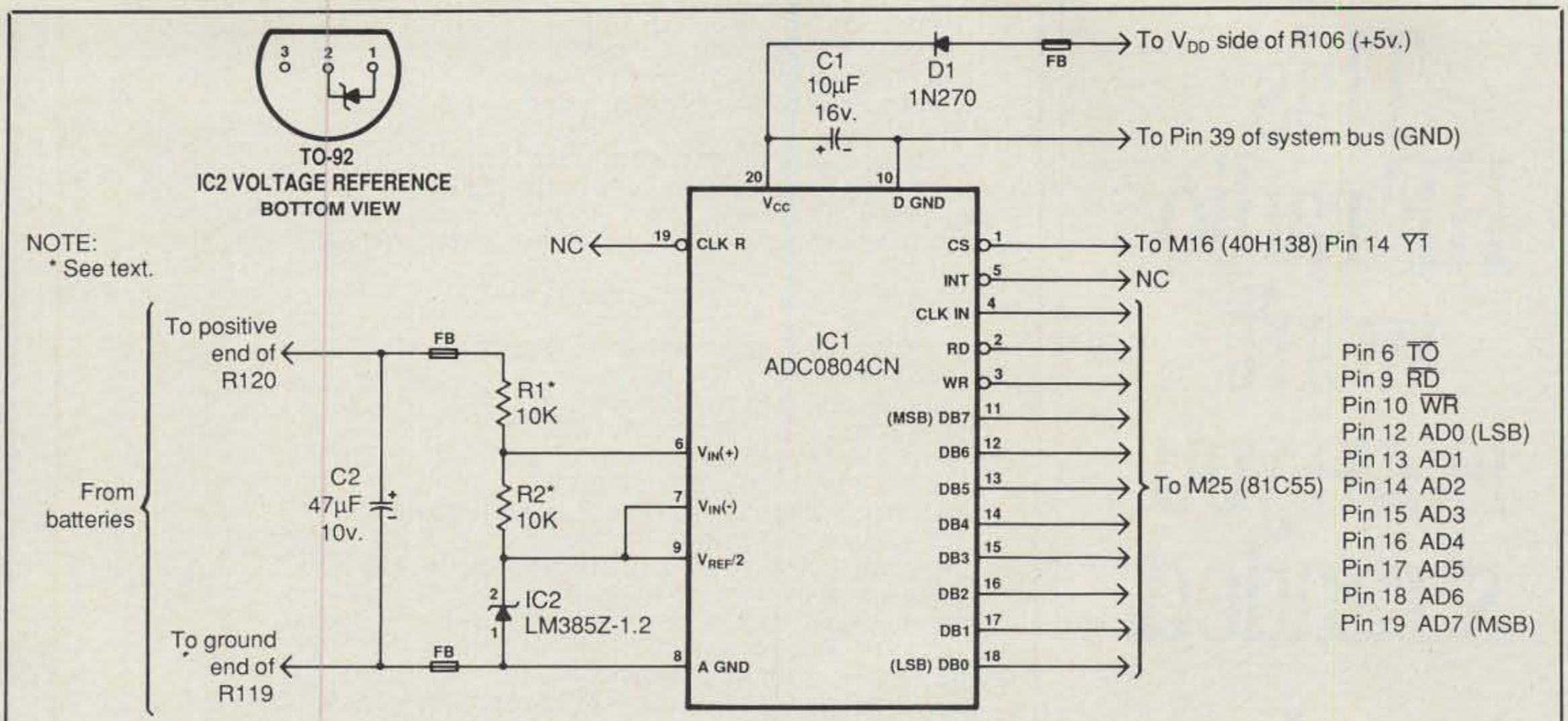
Software

The software program has two basic tasks. The first is to read the ADC converted values and the second is to calculate the Ampere-hour capacity based on the converted values. Refer to program Listing I for the following discussion.

Lines 100–130 perform the tasks of reading the ADC and displaying the result. Eight conversions are taken before an averaged value is displayed. The subroutine beginning at line 200 is used to flip the converted byte; the reason was explained in the last section.

The subroutine beginning at line 300

1458 Meadowbrook Rd., Ottawa, Ontario, Canada K1B 5G7



Parts List

Semiconductors

IC1	ADC0804CN	analog-to-digital converter
IC2	LM385Z-1.2	1.2V voltage reference
D1	1N270	germanium diode

Resistors

R1,R2 10K ohms ¼ W resistors (see text)

Capacitors

C1	10 uF, 16V tantalum capacitor
C2	47 uF, 10V tantalum capacitor

Miscellaneous

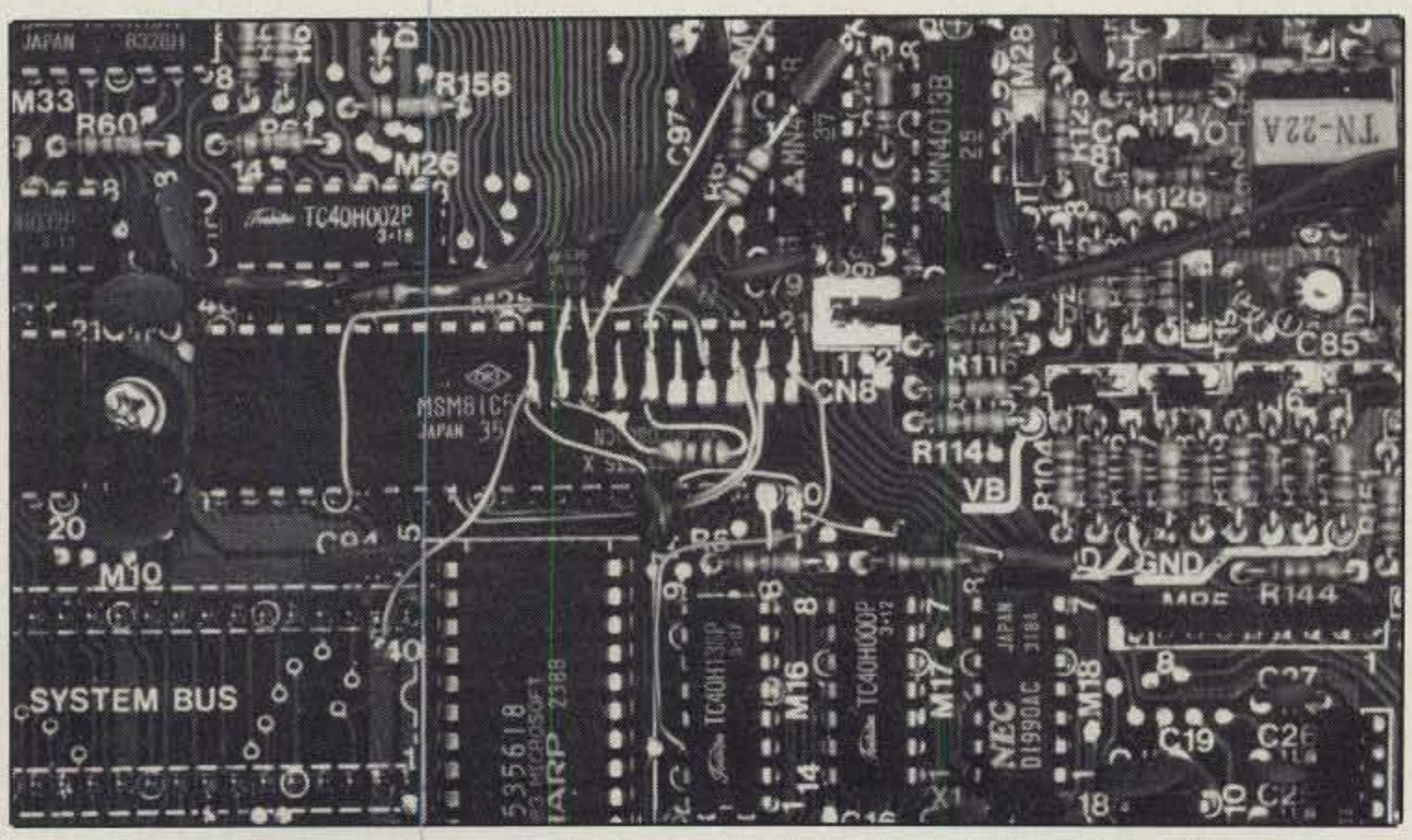
FB Ferrite beads from Radio Shack 273-1601 assortment. Wire-wrap wires, solder, etc.

Fig. 1– Schematic diagram for the add-on fuel gauge.

calculates and plots the capacity by using the battery voltage in a mathematical equation. See the Model 100 Battery Discharge Curve of fig. 2. This curve was obtained experimentally by starting my Model 100 with a fresh set of Duracell Alkaline batteries and then running a short BASIC program that recorded the battery voltage at 0.1 hour intervals. The setup was left running until the Model 100 went into automatic LOW-BATTERY shut down. The curve you see represents 273 such data points (more than 27 hours of continuous service on an 8K machine). Attempts were then made to fit a mathematical equation that would give hours used as a function of battery voltage. By taking advantage of the symmetry of the curve, I broke the curve at its inflection point and then ran one-half of the data points through a fitting program. The resulting equation was a third-order polynominal with coefficient of correlation better than 0.999. This equation is at line 310.

Lastly, several lines deserve mention: Lines 20 and 160 read the original TELCOM settings and restore them when the program is exited; line 30 is used to start and set the UART clock which also drives the ADC clock input. Line 140 causes the voltage reading to be displayed in alternating normal and inverse modes.

Once we have the capacity, we may be tempted to go one step further and try to correlate it to hours of usage remaining. Unfortunately, factors such as memory size, amount of modem and tape usage, and number of I/O devices attached all affect the rate of discharge and consequently the number of hours of usage. But with some experience, one will soon develop an intuitive feel for capacity versus number of hours remaining, much like the way we develop a feel for fuel used versus distance traveled in driving a car.



Interior of the Model 100 showing the completed construction.

Construction

WARNING: Opening the case and making modifications to the Model 100 will void your warranty. You may also be asked to remove such modifications if

```
1  FUEL GAUGE PROGRAM VER 1.0
2  BY  R. L. L. HU    MAY 1986
10 R=1.23:M=0:L=0:C$="":D=63067
20 FORK=0TO4:C$=C$+CHR$(PEEK(D+K)):NEXTK

30 OPEN"COM:87N1E"FORINPUTAS1:CLOSE
40 CLS:PRINT@252,"FUEL";:LINE(180,30)-(2
20,54),1,B
50 LINE(185,28)-(191,30),1,BF:LINE(209,2
8)-(215,30),1,BF
60 PRINT@231,"volts";:PRINT@191,"+   -";

70 PRINT@124,"MPPPP<PPPP<PPPP<PPPP>";
80 PRINT@164,"0    p    /    ;    1";
100 Y=0:FOR K=1TO8:OUT144,0
110 X=INP(144):GOSUB200:NEXTK
120 V=INT((Y/512*R+R)*100)/100
130 PRINT@110,V;:GOSUB300
140 PRINTCHR$(27)+CHR$(112+M):M=MXOR1
150 IFINKEY$=""THEN100ELSEBEEP
160 FORK=0TO4:POKE D+K,ASC(MID$(C$,K+1,1
)):NEXTK:MENU
200 READA,B:IFX>=ATHENX=X-A:Y=Y+B
210 IFXTHEN200ELSERESTORE:RETURN
300 IFV>4.75THENS=1ELSES=-1
310 U=S*(V-4.75):G=14-S*(29.88337*U-25.2
6735*U*U+8.320525*U^3)
320 IFG<0THENG=0ELSEIFG>27THENG=27
330 Z=INT((1-G/27)*120)+26
340 IFZ<LTHENLINE(Z+1,15)-(148,21),0,BFE
LSELINE(26,15)-(Z,21),1,BF
350 L=Z:RETURN
400 DATA 128,1,64,2,32,4,16,8,8,16,4,32,
2,64,1,128
```

Notes: In line 10, change "R=" to read your measured reference voltage. See text.

In line 70, enter the corresponding characters in quote but with SHIFT and GRPH keys held down.

In line 80, except for ´0´ and ´1´, enter the corresponding characters in quote but with the CODE key held down.

The listing is shown in 40-column width. Your program should appear on the LCD exactly as shown here.

Listing I– The software for the add-on fuel gauge.

your unit should need servicing at Radio Shack.

Most of the ICs used in the Model 100 are CMOS, so take all the necessary static precautions. With the power off (there is no need to remove the batteries or turn the "memory power" switch off), remove the 4 screws on the back of Model 100. There are three catches holding the two halves together, one on the bottom and one on each side. The trick to separating the two halves is to gently press the black part inward while lifting the white upper part. Start separating from the **Bar Code Wand Connector** side. Once separated, you will see that the two halves are connected by cables at the **Power ON/OFF Switch** side. There is no need to disconnect any of the cables you see inside either; just open the two halves like a book and lay them down on a clean, static-free work surface.

The ADC chip comes in 0.3 inch standard width 20-pin DIP package. It will be mounted piggy-back on the 81C55 PIO chip (M25 in Model 100). Prepare the ADC chip first by bending out pins 1 to 10, 19 and 20. These pins should come almost straight out of the sides. Stick a piece of thin double-sided adhesive tape on the underside of the ADC chip, and then place the ADC chip on top of the 81C55 so that the Data Bus pins of the ADC (pins 11 to 18) sit on top of the Address/Data pins of the PIO (pins 12 to 19). In this position, LSB through to MSB of the two chips are in reverse order (correction made in software for this inversion). Firmly press down on the chip and then solder the 8 pairs of data pins. You may want to remove the 32K ROM to facilitate soldering. Next, solder D1 and C1 to the ADC. Cut off pin 3 (N.C.) of the voltage reference chip, and then solder the chip to pins 8 and 9 of the ADC, observing the correct polarity. Next, select two 10K ohm resistors and match them to be within 10 ohms of each other; the absolute

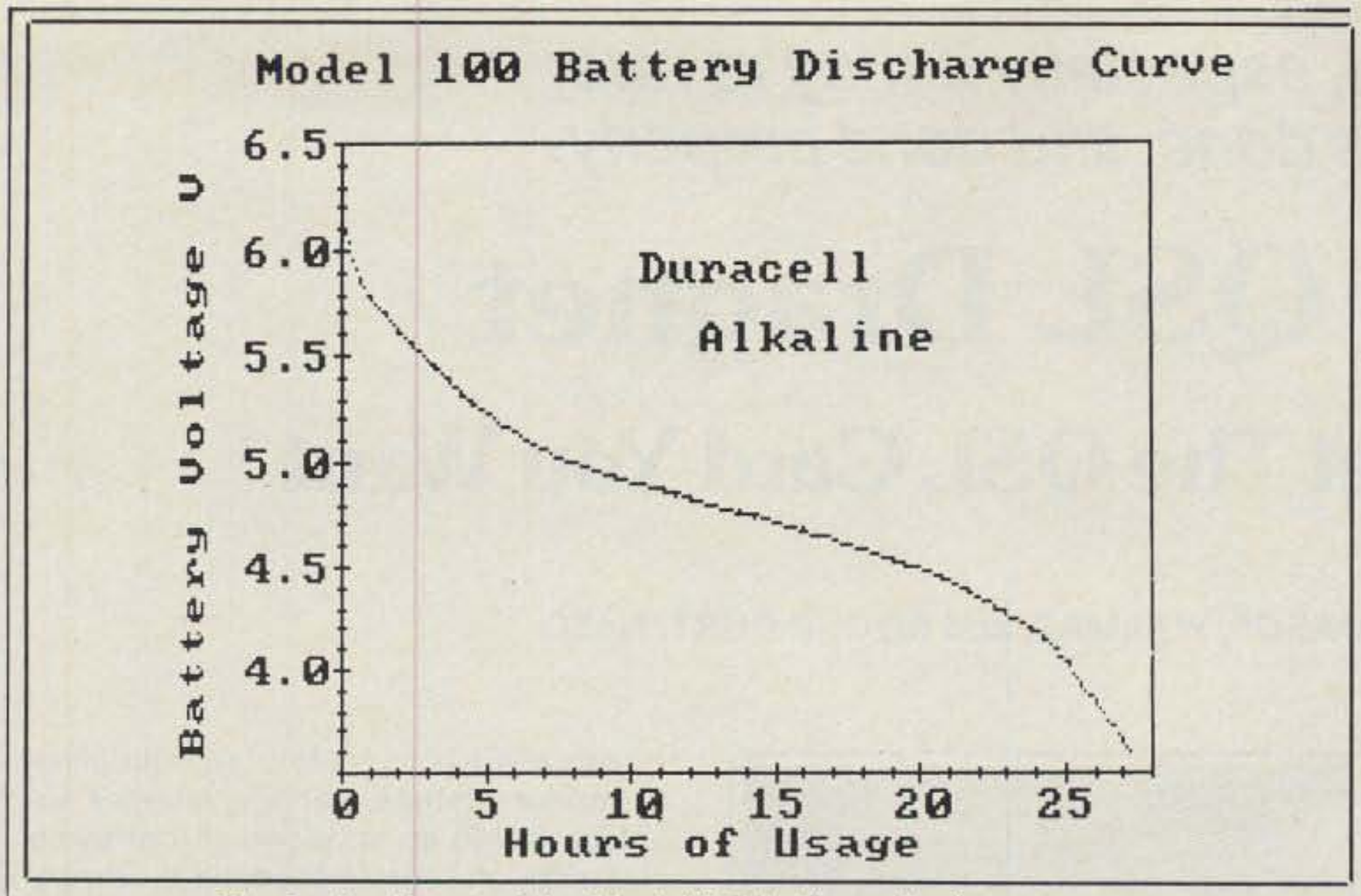


Fig. 2– A printout of the Model 100 battery discharge curve.

value is not important. Solder these two resistors in place. Lastly, take some wire-wrap wires and finish all the remaining connections shown on the schematic diagram. This completes all the hardware installation. Make sure there are no bare wires or protruding pins that could cause a short when the case is closed. Temporarily close the case and power on to see that the machine is still operational. If all is well, proceed to the next section.

Calibration and Testing

Enter the program shown in Listing I. Run the program to see that the ADC is functional. Open the case again, and with the power on, measure the voltage across the voltage reference chip using a digital multimeter. Record this reading. Also measure and record the voltage across capacitor C2. Change "R=" in line 10 of the program to match the voltage of the reference source measured above. Now run the program again and compare the voltage displayed against the voltage measured across C2. They should be within 20 mV. This voltage will not be exactly the same as the voltage measured directly at the battery compartment, since approximately 20 to 50 millivolts are dropped over the power switch and the AC adapter jack contacts. This completes the calibration and testing. Model 100 can now be assembled. The program is normally exited by hitting a key. Exiting in this manner ensures that the original TELCOM settings are restored. If the power is turned off while the program is running, it will be necessary, on power-on, to re-run the program to restart the UART clock.

For your information, the ADC chip uses about 1.2 mA, while the input network draws a maximum of about 250 uA. These current consumptions constitute, at most, about 3% of the operating current of the Model 100. One thing you should be aware of, however: When the Automatic Power Down is activated due to inactivity (default of 10 minutes), the input network continues to draw current, since it is connected directly across the battery via the main power switch. If left in this state, the batteries will be drained in several months. So be sure to turn the Power On/Off switch off when not in use.

Everybody wants them, especially if they're rare. Here's a look at how it's done, and done properly.

The QSL Dragnet

How To Get The QSL Card You Want

BY DON DASO*, WA8MAZ, and ROGER BURT, N4ZC

It was Friday. Friday the 13th. My partner and I were working the day watch at the W4 bureau.

He was working the bulk sort; I was doing an individual letter. Neither of us said anything for quite a while. Finally he said, "It must be an unlucky day."

I looked over. He held a bundle of cards in his hand.

He shook his head. I nodded. I watched the cards fall into the round file. They seemed to slow down as I watched, until I could see each card as it slipped slowly into oblivion. Gone forever.

"Wasted time and effort," he said. "What a shame."

"Wasted money," I said.

We went back to our respective jobs. We each knew I would repeat the gesture in a few minutes. It wasn't a pretty sight—we both knew that—but somebody had to do it.

Across the room the squelch on the FM radio opened: a Bravo Victor, at 7003.9. We kept working; neither of us needed that one. But I knew we were each thinking about the effort required to catch the BV, to get him in the log, and then to confirm that contact, and thinking how those confirmations might end up.

I looked down at the cards in my hand. The top one had a call that wasn't familiar. I checked my envelopes. Nothing. Another one for the round file.

"Sometimes it seems like such a waste of time," I said.

"I know. I've been thinking about that, listening to efforts people make in pileups. You find another?"

I nodded. We watched the card fall into the file. Then we went back to work.

The seriousness of the situation described above in a humorous manner is not a matter of utmost urgency or importance in the life cycle of ham radio. But QSLs are an element within the hobby which is often ignored or taken for granted. They're an element or process which nearly everyone believes he or she fully understands. Yet confusion, misunderstanding, and mistakes permeate the entire process, sometimes in subtle ways, other times in a gross and obvious fashion. We hope to solve some of these problems.

QSLs provide a history of your operating and a means for awards, and a wealth of memories.

This article deals with getting QSLs and is divided into three parts: (1) direct mail, (2) managers, and (3) bureaus and QSL services. (We've also included a section on dealing with special problems and solutions.) Above all, the process of getting cards requires patience, perseverance, some luck, and a certain kind of equanimity.

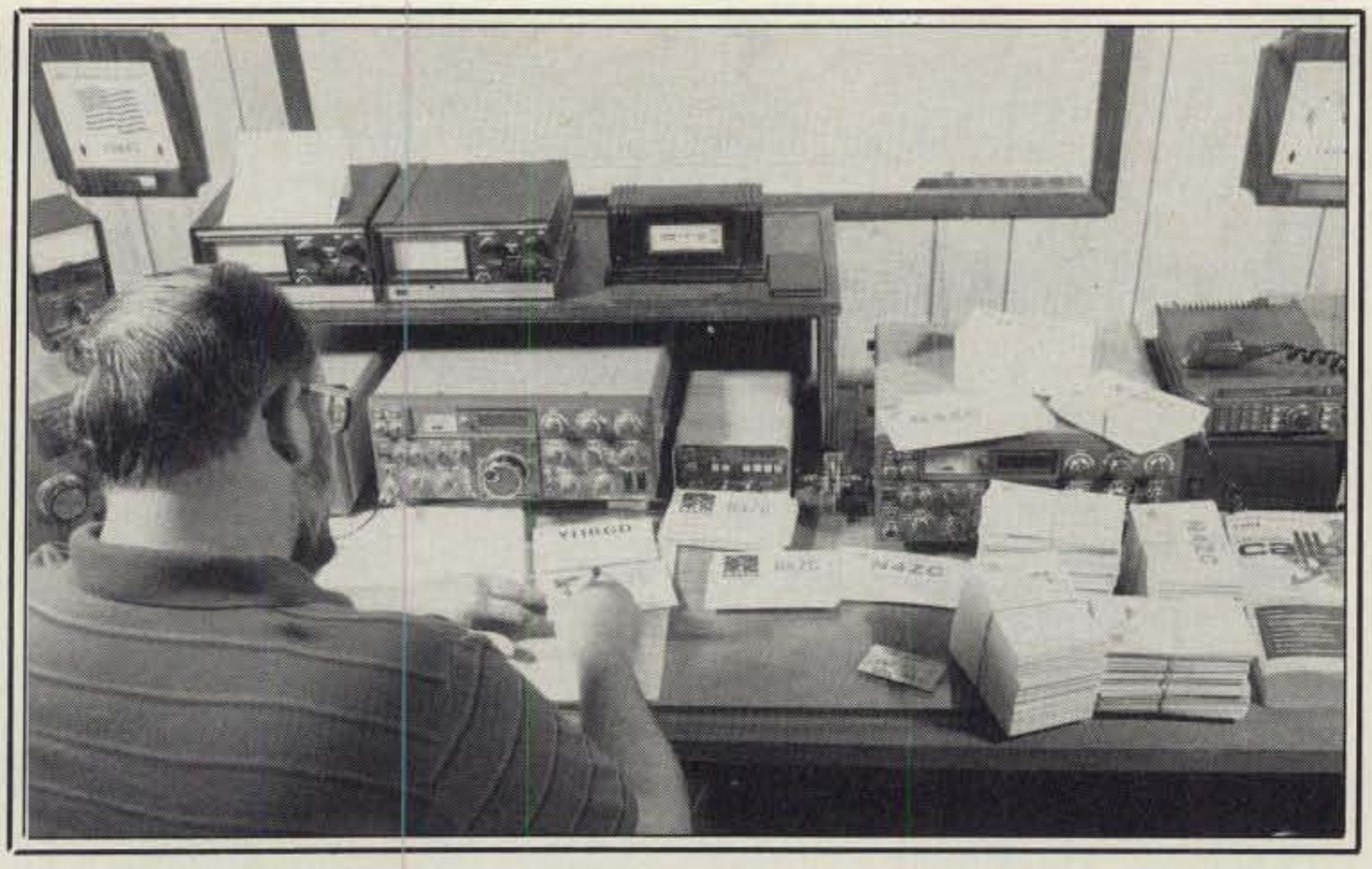
Let's deal with direct mail. The fastest solution to a request for a reply from anyone is to use a self-addressed, stamped envelope (SASE), whether your request goes overseas or stateside. It's obviously expensive, but it will work, in the majority of cases. However, there are some points to consider. Many foreign cards are not "standard" size. So, sending along a normal envelope (usually around 3⅝" × 6½" in size) won't always help. Sending a larger envelope will, but it costs more, both initially and for postage. Sending a larger envelope inside an envelope of that same size can, of course, be done by simply folding the inside envelope. Make certain that you place the folded side of the interior envelope away from the sealed end. That way if the outer envelope is opened with a letter opener, your envelope is not slit in half.

A few words on addressing that outer envelope: do NOT put any mention of amateur radio on the envelope. Nothing. Anywhere. In many countries that callsign can be an open invitation to theft, a hint that there may be money inside the envelope. Simply put a name and address on the envelope, both for the recipient as well as yourself.

Let's talk about money—the so-called "green stamps." It works, but sometimes there may be problems. In some countries residents are forbidden to have foreign currency. This implies that you may be asking someone to break the law within his own country. If you anticipate sending green stamps, ask the station, if possible, if that is all right, or if there are alternatives. When sending money, placing it inside some folded opaque paper is a good idea. Simply hold your envelope up to a brilliant light. If you can see George smiling at you, you need a less transparent setup. (That's the standard rate, by the way.)

There are options to sending money. You can send foreign stamps with your envelope. You may purchase stamps for the appropriate amount (know the weight of your card and envelopes and any other contents) from: DX Stamp Service, 83 Roder Parkway, Ontario, NY 14519. They will supply you with a current rate guide for an SASE. Another option is to use International Reply Coupons, commonly called IRCs. These may be purchased at your local post office for 89¢ each. One IRC is good for one ounce of surface-mail postage, valid most everywhere in the world. The *Callbook* lists those countries which accept IRCs and also gives you the number required to prepay one airmail letter from the relevant country to the USA. Normally this requires two to five IRCs.

*Rt. 1 Box 246, Mt. Holly, NC 28120



The QSL aftermath for an active contest station.

Many of you may ask which option is best. The SASE is, no doubt, easiest. Consider the DX station who may have to go to a provincial capital to redeem or turn in IRCs. Or consider the station with only limited postal services. It is far, far easier to simply drop an already-stamped and prepared envelope into whatever postal system is available than anything else. Remember: YOUR task is to make the other station's work as easy as possible.

Your problems are greatly lessened if the DX station has a QSL manager, especially a manager in the USA. Here your task is to make the manager's work as easy as possible. But remember, the manager must receive logs from the DX station before any QSLing can take place. The manager must receive the DX station's logs—over the air, via mail, or in person, say, after a contest or expedition. In any case, this process may take some time, and you should be patient. Remember, the more active the DX station, the more that station will need the services of a manager, and the busier such a manager will be. Consider for a moment the workload from a DX station which is extremely active. And remember that the manager may also be a DXer with operating needs and desires. Patience is a virtue, and in order. Use an SASE. For managers overseas, using foreign stamps or IRCs or green stamps will help. Again, if possible ask the DX station which method is preferred.

Many times QSL chores can be lessened by using a QSL service. Basically, these services provide a means for you to send DX cards to stations directly, or to their respective managers directly.

The service will hold cards going to a particular station until there is a sufficient quantity of cards, then ship them out directly to the station or manager. The service will receive replies and forward these cards to the relevant bureaus. If you have given the service an SASE, your cards can be sent directly to you, bypassing your bureau. This process can expedite receipt of QSLs and save you money. It's almost as fast as going direct.

The final method of QSL receipt and delivery is by no means the least important, probably the most efficient. We are speaking of bureaus.

Most of the IARU countries have QSL bureaus. Each bureau is divided into incoming and outgoing divisions. As a stateside amateur, you are concerned with the incoming division—the bureaus in each of the 10 US call areas where replies to cards you have sent out will be received. Your cards have been filled out correctly, legibly, and each has arrived at the DX station's QTH and a reply has been sent to the stateside bureau. As a model for how the system operates, we will talk briefly about the incoming stateside bureaus managed by the ARRL.

Basically, each call area has one or more bureaus which act as clearing houses for foreign cards. Each bureau is staffed or run by volunteer workers—usually a radio club or organization. The services they provide are free; membership in the ARRL or any other organization isn't required. (Some foreign bureaus do require that the DX station be a member of the national club in order to use its incoming bureau). Within this structure each call is usually broken down or sorted by the initial letter of the callsign suffix. For instance, K8MM, W8MOL, and WA8MAZ would all be sorted together—out of the initial batch of 8-land cards arriving at that bureau. Once this bulk sort is completed, it's up to an individual volunteer to sort these "M" cards (other volunteers take the other 25 letters) into the requisite calls and see that the cards are delivered to the correct persons.

Claiming your sorted cards from the bureau is easy. Follow one simple rule: *Do what they want!* This makes their work as easy as possible. Usually most bureaus prefer 5" × 7½" size envelopes, so use that unless instructed otherwise. Just as it's difficult to file odd-size cards, it's tough to take care of a multitude of different size envelopes. Print your callsign in the upper left corner of each envelope—large, easily readable. Most people put one first-class postage stamp on each envelope on file, with extra postage (in case there is more than one ounce of cards to be mailed) clipped to their envelopes. Please, please check to see if your bureau wants extra postage, or money, sent. Do NOT send money if they want postage. And, don't simply send money to the bureau, expecting them to buy you both envelopes and stamps, unless they indicate this is possible. Indeed, some sell envelopes and postage, but check first. Each sorter will

A few weeks worth of bulk sort at the W4 bureau. A fascinating job, always.

prefer different methods, and this is the person whose workload you want to lessen. You'll earn the respect of the bureau workers and probably get better service. The largest single problem for any bureau, anywhere, is unclaimed cards. There's only a finite amount of space available for storage, no matter where you go, and unclaimed cards are thrown away after a set period of time. Don't let your cards end up this way! Keep an envelope on file.

Here are some simple points to remember—some **DOs** and **DON'Ts** about working with the bureau system.

DO respond quickly to any request from the bureau.

DO notify the bureau of any callsign change; send envelopes for both calls.

DO send an SASE when writing the bureau.

If you **DO NOT** want QSLs, *please notify the bureau.*

DO NOT expect overseas QSLs for several months after a QSO; it's not unusual for cards to take a year or longer to filter through the system.

DO NOT send outgoing cards to your call-area bureau.

DO NOT send envelopes to your "portable" bureau if you move. WA8MAZ/4 still gets cards from the W8 bureau in Ohio.

Simple, isn't it? If everyone cooperates, it works beautifully!

Here's how to use the outgoing bureau system. For this service you do need to be an ARRL member. This service is, indeed, a bargain. This bureau handles over four million cards annually. The potential for savings in time and money easily outweighs the annual dues charge.

Basically, your cards are sorted and sent in large bundles to the other QSL bureaus throughout the world. You must presort your own cards alphabetically by prefixes like this: AP, C6, CE, CO, DL, G, LU, PY, TN, ZL, 5N, 9Q, 9Y. Bundle the cards in order with a current address label from *QST* to show you are a League member. Payment is $1.00/pound or less for this bureau service. It takes about 150 QSLs to make up one pound. So, whether you send 15 or 150 cards, your cost is $1.00. Obviously, you can send one package each month. Equally obvious is the fact that you can send out 1800 or so cards yearly with this system for only $12.00. Quite a bargain. The League accepts checks or money orders (do not send cash) and appreciates your callsign displayed on the check. Include only the cards, label, and check, wrapped securely, and sent to: ARRL Outgoing QSL Service, 225 Main Street, Newington, CT 06111. Further details are available from the League.

Some Special Problems and Solutions

A few words to prospective QSL managers: Don't volunteer unless you are truly willing to make the extended commitment. Find out up front how the expenses you will incur will be paid—what percentage the DX station can afford to pay or will pay. For instance, who will pay for the cards? What about postage? And if you haven't truly got the time, don't volunteer. If you think you'd like to be a manager, first check with a couple of people who already are managers. Correspond with them. Are there advantages? If you're a stamp collector, it's one good way to get current foreign and domestic stamps. Indeed, many managers are avid collectors. But know what you're getting yourself into *before* you volunteer.

What if you don't get a card back? How long is long enough to wait? These are hard questions—hard because each case is special. How badly do you want or need that card? A year is a long time to wait, but you should allow that much time when dealing with bureaus. Mails throughout the world are not as reliable as the US mail. If one method has not produced a card for you, switch methods and try again. If you've tried going direct, go to one of the QSL services or try the bureau—realizing you're starting another, new waiting period. In some cases try registered mail. In some cases the address may have changed, so check the DX bulletins, the W6GO/K6HHD listings, the addresses and routes listed in the DX columns of *CQ* and *QST*; try asking other operators what they've heard. Be persistent. Don't be above asking for help. Many times someone will have exactly the information you're seeking. And share the information you have with others. Again, making everyone's work "as easy as possible" is the secret. Sometimes a simple request to the station on a postcard—with your QSO information included—will get you a card because your original envelope was lost or stolen.

Remember: Make the other person's work as easy as possible. That's the key to success. Above all, don't try to operate in a vacuum. Be patient. But be persistent. And like us, you'll be rewarded when those "final courtesies of a QSO" arrive in your mailbox. Good luck! CQ

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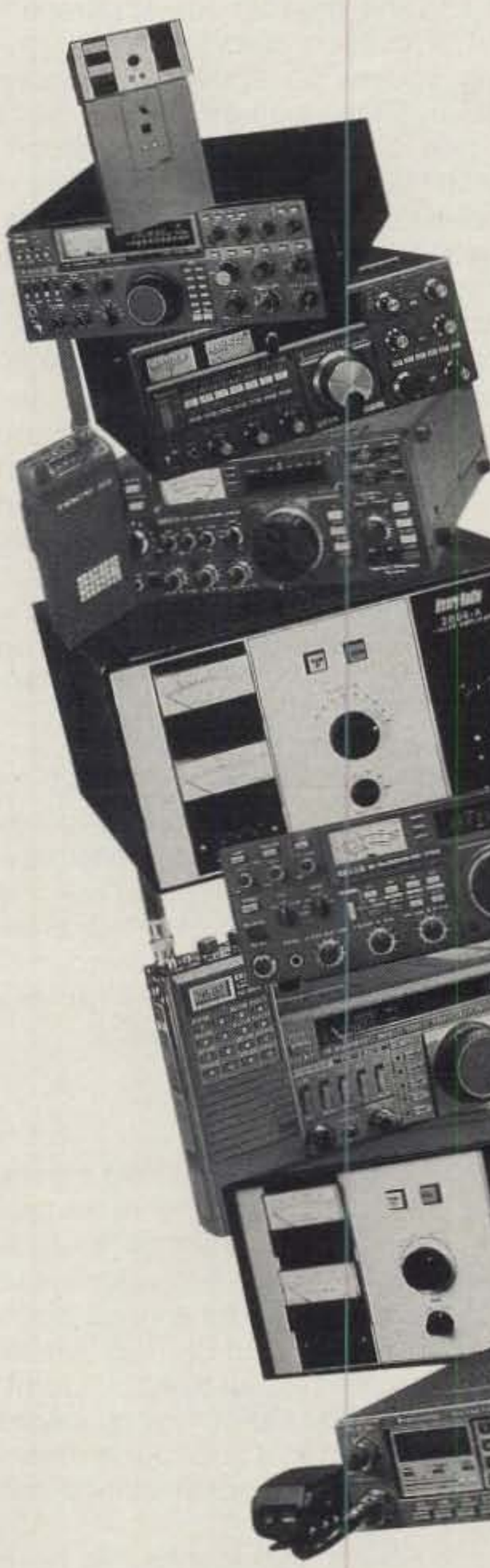

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Where do you turn when you have real problems with RFI or TVI? What is your neighbor thinking when your radio wipes out his TV? KB1N gives some insight into the problem.

Hi! I'm Your New Neighbor—Part II

BY PETER R. O'DELL*, KB1N

Real interference is much like the imaginary kind that I talked about last time, with this one important addition—it has a real technical solution. The major obstacle, though, is often nontechnical, because you frequently must effect the technical solution on the device being interfered with. Tact is worth its weight in gold where interference is concerned.

Let's take a look at this thing from your neighbor's perspective. We'll then go over some of the resources available to you to solve the technical side of the problem once you get past the hard part.

Just what does your neighbor think when he hears a muffled "CQ DX CQ DX CQ DX THIS IS KILOWATT ALPHA THREE ZULU ZULU ZULU" crashing in overtop his new $3000 stereo system? Or what about when he has settled down to watch the tape of this week's "Moonlighting." Suddenly, Matty's diffused glowing face goes negative, and the screen begins to pulsate with the rhythm of Morse code. How does he feel? What is he thinking? Whose fault is it?

Help! Call The Fable Control Commission

The situation is something like this fable: Once upon a time, there was a desert where it *never* rained—NEVER. At first there were only a few pioneers out in this tranquil setting. As word of the desert's beauty spread, all sorts began to follow the pioneers. With the demand for housing came builders who completed fiercely with each other.

One builder hit upon an idea that would allow him to sell his houses for 10% less than the others. Instead of using expensive tiles for the roof, he used papermache copies painted to look like tiles. He reasoned that since it did not rain, there was no need for the expensive tiles. Furthermore, the roof was far from the ground, so most of the buyers would never look close enough to know the difference. Soon the other builders learned of his secret and followed suit. Faux tiles became the *accepted industry standard*.

Then a new neighbor showed up—an old wizard named Mah who came to farm the desert and make it productive. As Mah chanted, clouds formed and the rains began to fall. Mah's crops flourished with his loving care, but his neighbors did not see beauty. They only saw puddles of water on their livingroom sofas.

Furious at this interference into their day-to-day living, they approached their local authorities asking that Mah's activities be banned. Restrictions cropped up like weeds overnight. Mah recognized that the real culprit was shoddy construction practices on the part of the builders and that the only real solution was solid roofs, preferably at the time the houses were built and not after the fact.

It was difficult to convince his neighbors that the source of their problems was their roofs. After all, the roof looked just fine, and there had been no problems until Mah showed up. If he had taken his rain elsewhere, there would be no problem. Mah tried to explain that many others needed the rain, too. The desert had changed and was no more. Rain was inevitable. But they did not want to listen.

So Mah went to the highest authority in the land, the Federal Cloud Commission, which, of course, was made up of a few engineers who understood the weather. But mostly, the Federal Cloud Commission was made up of bureaucrats (lawyers, consultants, and economics majors). The engineers nodded that they understood Mah's plight, but the bureaucrats were not so sympathetic.

Since the bureaucrats really didn't understand the technical aspects of the Federal Cloud Commission, they "put things into the broader social perspective." The builders said that they were building houses to *accepted industry standards*. They also noted that it really didn't rain all that much in the desert, even with Mah's chanting. It would be too expensive to put real tiles on all the roofs. They would have to lay off some fo the workers. They couldn't afford to make large campaign contributions.

At least since the days of Pontius Pilate, any bureaucrat worth his salt has known what to do with a real hot potato like this one. And so it came to pass that the Federal Cloud Commission ruled from time to time that the local authorities couldn't outlaw rain or clouds, sort of. They said that they would rely on the builders to voluntarily put better roofs on their buildings and to adopt better standards of construction.

Being something of a realist-type wizard, Mah is not holding his breath waiting for the builders to adopt better standards of construction. He has even learned how to help his neighbor get in touch with the builder who built their house and pressure the builder into repairing the defective roof. And so goes the battle all across the desert.

A Hole in the Roof

You must realize that RFI is like a leaky roof in a rain storm. The owner of the roof will never learn of the leak until there is rain. An owner of a stereo susceptible to RFI will never know of its shortcomings until it is subjected to an RF field. It is as hard for the stereo owner to admit to himself that his $3000 top-of-the-line stereo is poorly designed as it is for our mythical desert homeowner to admit that he has been had.

No one likes to feel that he has been taken, yet that is about what it amounts to when we tell our neighbor that his stereo

7 Brian Road, South Windsor, CT 06074

is at fault. After all, it worked fine until our radio "started messing it up."

Does this mean that things are hopeless? No, not by a long shot. It simply means that we must be very sensitive to our neighbor's feelings as we deal with them in this sticky situation. Any case of RFI can be cured with the right technical procedures.

Resources Available

The ARRL has two publications that will give you a good background in the various "I"s out there lurking in the shadows. Chapter 40 of the *Handbook* provides an excellent technical discussion of interference. For the most part, the cures involve bypass capacitors, chokes, and shielding. Things are simple and straightforward once you understand what to do, and the *Handbook* is the best starting place that I know of. This chapter alone is worth the $18 price tag on the book, and you get 39 other chapters thrown in at no additional charge.

The second ARRL publication is the *The RFI Book*, which covers much more of the nontechnical aspects of the problem. For instance, there is a procedure outlined for contacting the manufacturer of an offending home-entertainment device (stereo, TV, VCR, etc.). One of the most useful things in both publications is some "flow chart" type diagrams that take you step-by-step through the detection and correction phases of interference problem solving. Chuck Hutchinson, K8CH, is responsible for these diagrams and in my opinion deserves a round of applause from everyone who has ever waded through the maze of what to test and what to do.

The RFI Book also has a bibliography of all published articles that the editors could identify as pertaining to interference. This bibliography is *not* limited to items appearing in *QST*, but includes other amateur radio publications and technical journals. Chances are someone has encountered the same problem as you have somewhere along the line. If he has already published the solution, there is no need for you to "reinvent the wheel."

The ARRL is not the only publisher to put out excellent books and pamphlets on interference. Radio Publications and Tab have produced good reference books on the subject. Even the FCC published a booklet on interference a few years back. *CQ* obtained several thousand copies of this booklet and distributed them at hamfests.

When *CQ* or one of the other magazines publishes an article on interference, take the time to read it. With the author's experience filed away in the back of your mind, you will be better equipped to handle something similar if it should come along.

Your local club can be the most important resource at your disposal to successfully resolve an interference case. Chances are that at least one of the club members has quite a bit of experience in resolving interference cases. If you are a member of the ARRL, you may want to contact them for advice, too.

If all else fails, persevere! A few years back, the smoke detector in our apartment and our neighbor's falsed every time I tried to use the HF rig. The manufacturer refused to even provide me with a schematic diagram and stonewalled every effort to get information from them. Nothing had been published about SDI—Smoke Detector Interference. Working intuitively, I did manage to solve the problem, however.

After my adventure was reported in November 1980 *QST*, I heard from some amateurs employed by major manufacturers that my article had caused a near panic in corporate headquarters. As far as I'm concerned, that's evidence of cosmic justice. *Non illegitimi carborundum.*

Did you ever wonder or think about what goes on with the rest of the family when contest fever hits? VK9NL lets us in on what it's like.

"CQ Contest, CQ Contest"

BY KIRSTI JENKINS-SMITH*, VK9NL

The door to the spare room is closed. The house is quiet as I tip-toe around preparing cups of tea and bite-sized morsels of bread. The cat and I converse in whispers.

"Miaow." It is barely audible. Puss seems to understand that serious business is afoot. She prowls the house restlessly, not even interested in her food.

"It will be all over by Monday," I whisper back to her. "Only two days to go."

It reminds me of when the children came down with measles; the quiet house with the children shut away in their rooms, alone. Only this is not measles. This is the *CQ* WW contest.

It is raining outside. Thick fog droops wetly down over the tops of pine trees. I switch on the car ignition and try. Rrrrgh, rrgh, rr . . . The WD40 is missing from the glove box. A moment's irritation. The can is lying on the lawn next to the 6 meter beam, which is also lying on the lawn waiting to be serviced.

By the time I am back in the car, I have snagged my stocking and stepped in a squishy wet cow pat, but the car does start.

The island has one supermarket and 2000 cars. I throw myself into the fray.

Bruised and battered I lug the week's shopping into the house. The shopping bag contains a new blouse—my consolation prize for the *CQ* WW. One has to keep one's spirits up. I try listening to world news on the radio.

"Britain has . . . CQ contest, CQ contest—over Syria. Libya . . . 59 32 . . . CQ contest, CQ contest . . . Red Cross . . . 59 32 South African delegation . . ."

Bubble bubble, toil and trouble; it is time to do the washing. But the telephone rings before I get there. It is my neighbor calling, asking us over for the evening.

"Oh, I'm sorry, but we can't this weekend. Jim is . . . ah . . . eh . . . indisposed."

"What a pity. Maybe next week then. Say, what's that noise? It sounds like someone talking!"

"Hmm, yes, some other conversation must be breaking through. It shouldn't be allowed!" I hang up, marvelling at what a glib tongue I have developed. Really ought to be somebody's secretary with this newly discovered talent.

I fill the washing machine and turn the tap off. But the water keeps coming and coming. The machine overflows. Something is radically wrong with the tap. However, I have not lived on an island for 23 years without learning the rudimentaries of island plumbing. I find a cork and quickly stuff it into the offending tap. It works wonderfully well, sealing off the water effectively. The water comes from a tank at the back of the laundry. Gravity pressure is not overly powerful—something to be grateful for when the man of the house is indisposed.

The voice from the shack has become a bit hoarse, so I make another cup of tea and bring it in.

"Mind the DX edge! CQ contest, CQ contest . . . Not on the 80 meter log! That's the 160 meter log! Not . . ."

I put the cup down on top of the 80 meter log and go to the bedroom to admire my new blouse.

We are having steak for dinner, and it needs pounding. I attack the meat vigorously, making the cups on the shelf go tinkle-tinkle. It is a way of letting off steam.

"You tripped the VOX, pounding the meat," says Jim later. He has agreed to take time off for dinner. I like the thought of having tripped the VOX. It makes me feel that I belong—part of the scene, so to speak. The contest is going well; bands wide open, even 10 meters.

"It's clearing up," I say. "It's stopped raining."

"Has it been raining?" says he!

I am dimly aware of a frozen body jumping into bed some time during the night. It has gone by the time I wake up in the morning. CQ contest, CQ contest.

The sun is shining so the cat and I go outside, the cat rubbing up against my legs. She does not even look at the closed door of the shack. Somehow she is becoming anti-amateur radio in spite of the nice warm linear amplifier which is so comfortable on cold evenings.

"Never mind," I whisper. "It will be all over by tomorrow. THEN he will have to do the paperwork, he he." I remember the last time he went contesting. Thousands of QSOs had to be analyzed, duplicates eliminated, countries and zones counted for each band. The process took weeks. "He'll be sorry!" I add. The cat smiles back conspiratorially.

"Now, now, we mustn't be nasty," I tell myself. "He is enjoying himself. After all, he could be doing worse things, like . . . ?" I try to think of something worse he could be doing, but give up.

Bringing in his morning tea I stand there looking at him to let him know I have something to say.

"QRX!" He peels the headphones off. "What's the matter?"

"I am bored!" I look at him defiantly.

"Oh? I just worked Iris on 10 meters!"

"The world is going down the drain. Politics has crept into Red Cross and . . ."

"CQ contest, CQ contest."

I wish I had bought a skirt to go with the blouse. Pity it is Sunday and the shops are closed. I could do with a new handbag as well. We'll see tomorrow!

In the evening there is a sudden quiet in the shack. I listen. No sound. It stops me in my tracks. Maybe he has passed out, fallen asleep, electrocuted himself? Lost his voice perhaps? I quickly check my mind for the last time I brought him in a cup of. He was alright then. He has been fed and watered regularly. I have done my duty, so why is he quiet?

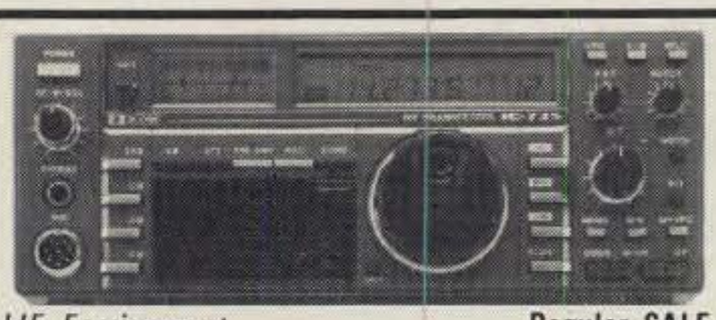
I open the door carefully, worried at what I will find. The cat looks over my ankle.

Ah, he is checking the bands. I know he is looking for rare ones. Multipliers which will increase his totals. Oh, well! With a feeling of relief, I decide to have an early night.

It was Wednesday before the cat forgave Jim for the contest weekend. She just would not talk to him at all, hiding herself away and looking to me when her food plate was empty. Difficult personality, cats. Maybe I should have bought her a new blouse, too.

P.S.: See you all in the *CQ* WW CW.

*P.O. Box 90, Norfolk Island, 2899 Australia



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AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	115.00	**104.95**
EX-310 Voice synthesizer	46.00	
TV-1200 ATV interface unit	129.00	**119.95**
UT-15S CTCSS encoder/decoder	92.00	
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IC-3AT 220 MHz, TTP	339.00	**299.95**
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IC-02AT/High Power	399.00	**339.95**
IC-03AT for 220 MHz	449.00	**399.95**
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BP-8 800mah/8.4V Nicad Pak - use BC-35	74.25
BC-35 Drop in desk charger for all batteries	74.50
BC-16U Wall charger for BP7/BP8	20.25
LC-11 Vinyl case for DIx using BP-3	20.50
LC-14 Vinyl case for DIx using BP-7/8	20.50
LC-02AT Leather case for DIx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
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BP-3 Extra Std. 250 mah/8.4V Nicad Pak	37.50
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Where's HKØ? You're better off working it first then digging out the World Atlas to find out. N3JT tells us what it's like to operate the CQ World-Wide from HKØ.

Operating the *CQ* WW DX Contest From San Andres Island

BY JIM TALENS*, N3JT/HKØ

Anybody who has been one of many callers in a DX pileup has wondered what it would be like to be on the other end. After so many years of that kind of wondering, and the fortune of an invitation from a good friend to use his shack, I decided to proceed with my own mini DXpedition. What follows is a summary of my experiences—and some tips for both would-be DXpeditioners and DX hunters.

There are two varieties of DXpedition—the true, rugged, manly kind and the N3JT kind. Preferring not to endanger life and property by practicing my camping expertise, last used 30 years earlier as a Cub Scout, I really had no choice. But I was, above all, lucky. My long friendship with Pacho, HKØBKX, including an eyeball the year before in Barranquilla, Colombia where we were both vacationing, gave me an opportunity to propose the possibility of using his station during the *CQ* World-Wide DX Contest. In keeping with his exceptional hospitality, Pacho was more than anxious for me to come—provided I arranged my own QSLing! W2GHK graciously agreed to assist with the subsequent QSL onslaught. All that remained, in mid-July, was to get the license and arrange the transportation to San Andres. The island itself, which is part of Colombia and is some 6.8 × 15.5 miles in size, is located about 81 miles east of the Nicaragua-Costa Rica border in the Caribbean Sea.

If ever there was an understatement, it is in the warning that application for reciprocal licensing should be arranged long ahead of time. I believe I set a record for getting permission—about three months—and the actual authority was issued the day of my arrival on San Andres. The decision to leave home without license in hand was based on a certain philosophical abandon, but with alternative activities arranged just in case. Since San Andres is a vacation spot frequented by Colombians and my two week vacation itinerary included other places afterwards, a five day stay with no license would not have been unpleasant. As it turns out, I got to relax on San Andres' beaches, snorkel along two small islands off the coast, and delight in the company of Pacho and other local "fauna," in addition to participate in the contest.

After 30 hours of operating the CQ World-Wide DX Contest N3JT still looks remarkably alert and happy. Jim credits the caffeine in all the Coke® he drank for this look.

With the CQ WW DX SSB Contest scheduled to begin on Friday evening, my arrival on Wednesday morning provided enough time for sightseeing and readying the stations for the main event. Unfortunately, an unresolvable problem developed in Pacho's homebrew amplifier. At home it might not have presented much difficulty, but on San Andres one does not just drop in on the local parts supplier for a replacement Mylar capacitor. Instead, Pacho keeps a second amplifier, an SB-200, and with the fresh set of tubes I brought (just in case!) we were still in business. The transceiver, an IC-751, was a pleasure to use, although we changed microphones to make contest operation more convenient. We also installed an auxiliary fan to make sure the rig and amplifier would survive the unusually hot and humid weather accompanying my visit. The antennas—a TH6DXX and a unique vertical/coaxial loop for 40, 75, and 160—all seemed to load perfectly. I managed about 1,000 "preliminary" contacts before the contest, mostly on CW, and all seemed in order.

Once the contest began, the effect of the almost 100° temperature began to take its toll. After six hours it was increasingly difficult to pick out calls or to see the logs through the perspiration flowing into my eyes. Pacho came to the rescue with

*Box 19346, Washington, D.C. 20036

Pacho, HKØBKX, and Jim, N3JT. The one covered in suntan lotion, wearing the hat and sunglasses, sporting a burnt nose, is N3JT.

a large fan, which he perched atop the bookshelf to my left. For the remainder of the contest I was bathed in a breeze, albeit hot and humid. That didn't stop the mosquitos, however, which apparently found holiday cuisine on my gringo blood. I figure now two bites for every QSO, though it would have been far worse without the bug spray I brought. To protect against unfamiliar bacteria Pacho boiled and then chilled rainwater for drinking. Coke® was the preferred drink (for its caffeine) during the contest, and accounts for my "alert" expression in the accompanying photograph!

While I had imagined what it would be like to be on the receiving end of a pileup, I really was not prepared for the bedlam I would cause just by signing my portable-HKØ callsign. Actually, this was why I had come to San Andres. With dozens of stations calling simultaneously it was frequently impossible to pick out a complete call. Interestingly, it was not always the strongest that got through first. Under intense pileup conditions the call that was heard was the one that happened to sign letters during the random, pause in calling during the 3 to 5 second pileup listening period. In a split frequency situation —*i.e.*, when the pileup is off the DX station's transmit frequency and the callers are spread out—it is more often than not easier for the DX station to catch the next callsign on the same receive frequency than to search for a copiable station on another receive frequency. Of course, the DX station is going to have to change the receive frequency after three or four contacts, but the strategy remains an observably effective means to reduce the waiting time in the pileup. The alternative, calling on what appears to be a clear channel, risks the possibility of cancellation by another station doing the same thing. The best advice, it seems, is to listen, note the DX station's operating style, and respond accordingly.

One hazard of a seaside location is the effect of salt air. During the first evening of the contest we were faced with a suddenly increased VSWR and ineffective signal on 160, 75, and 40. Because 10, 15, and 20 remained open late into the evening and opened early in the morning, the problem of the LF band antennas was not critical, although it was disappointing not to make more than 4 QSOs on 160! After the contest we discovered that a spot of corrosion on the grounding point of the vertical/coax antenna was the culprit. Still, some 4,700 QSOs (after dupes) were made, notwithstanding full meal breaks (more for sanity than hunger), socializing, and sleep. My interest was in working the pileups, so I never chased multipliers; a different approach would be applied for a contest-winning strategy.

Certain patterns emerged: some European operators simply did not fathom the concept of the statement "standby"; on several occasions it was necessary to shift the antenna heading to the northwest because the QSO rate fell so dramatically. Stations in the Far East exhibited the ultimate in control and courtesy. The North Americans, given the number of them, displayed an exceptional level of patience and cooperation, although while working Japan on 21.198 MHz a number of stateside stations called. The overall dupe rate of 3.75%, considered quite good for this kind of operation, perhaps could have been even lower had I signed my call after every QSO. (I suppose a few stations made the contact first and found out who they had worked afterwards.) Several stations were logged three times on the same band, which suggests use of a dupe sheet *during* the contest would help markedly.

I believe I showed a glimpse of true DX disease, for after the contest I operated even more, adding another 1,000 QSOs on CW before departing late Monday afternoon. The departing flight left 11 hours late, which gave me the extra time to operate, since the airport is only 2 minutes from Pacho's QTH. I know I left my mark on San Andres because as the plane taxied down the runway I noted a swarm of mosquitos in a formation that read, "73 N3JT." CQ

CQ REVIEWS:

The T² X "Tailtwister" Rotator

BY JOHN J. SCHULTZ*, W4FA/SV0DX

The Tailtwister rotator from Telex/Hy-Gain is an extra heavy-duty rotator designed along the lines of the famous Ham IV rotator. It will handle just about the largest of single band or triband HF beam antennas or can be used to handle various combinations of HF or HF/VHF antennas, depending upon how the rotator is mounted on a tower or mast and the wind surface area of the antennas involved. Therefore, it is probably "the" rotator to use for those who have antennas beyond the basic three- to four-element tribander type. However, I wouldn't dismiss the Tailtwister even for applications where its usage would seem to be a bit of "overkill." A good beam installation requires money, time, and work, and one has to balance out many factors when making decisions about such an installation. Usually, one wants to put up such an installation to last for a number of years and possibly with the idea of enlarging it (a higher tower or larger or more beams) as time goes on. Also, climatic conditions play an important role. Getting a very rugged rotator at the outset therefore may well make good economic sense in the long run.

Anyway, after that rather long introduction let me just mention that this article is mainly about observations and experiences encountered when actually installing and using a Tailtwister rotator on a tower installation. The beam antenna involved in the setup was the Telex/Hy-Gain TH7DX tribander, but almost all of the remarks presented are applicable to any general type of beam installation using the Tailtwister rotator.

The Tailtwister strikes one as being a very robustly constructed unit.

General

Once one unpacks the Tailtwister rotator, one is immediately impressed by its rugged-looking construction and overall black finish. The standard Tailtwister "package" consists of the rotator itself, a package of mounting hardware, a control unit, and an owner's manual. The rotator is basically meant to be mounted on a flat metal plate. If one wants to mount the base of the rotator on the top of a mast, an optional Lower Mast Support Kit (Part No. 51467-10) must be purchased. This kit allows the Tailtwister to be used as an "in-line" rotator on a mast.

Very much like the HAM-IV rotator, the Tailtwister consists of a cast aluminum upper dome housing which attaches to an antenna mast and a cast aluminum lower motor/brake housing. Both housings are bolted together with an internal rim type fitting to ensure moisture security (no O-ring is used which might deteriorate with time). Both housings, since they are bolted together, rotate together in reference to a base casting which is flush with the bottom of the lower casting. Some of the details can be seen in the photographs.

The basic design is "classic" and totally weatherproof when used vertically. The heart of the rotator is a low-voltage AC motor, geared down to 1 RPM, bolted to the base casting which rotates the base casting in reference to the upper and lower housings. A solenoid operated "brake" secures the rotator motor gearing in place when the rotator motor is not energized. Other internal parts rotate a potentiometer arm to provide for direction indication and activate end-of-rotation switches so the motor will not continue to be energized once the rotator has rotated 360 degrees in either a clockwise or counter-clockwise direction. There are, actually, relatively few parts inside the rotator, but all are of super-rugged dimensions.

Table I lists the specifications for the

SPECIFICATIONS

Input Voltage	120 VAC 50/60 Hz
Optional	220 VAC 50/60 Hz
Motor	24 VAC, 2.25 Amp, capacitor start, capacitor run
Power Transformer	120 VAC/26 VAC 10% duty, thermal switch protected
Optional	220 VAC/26 VAC 10% duty, thermal switch protected
Meter Transformer	120 VAC/13VAC continuous duty
Optional	220 VAC/13 VAC continuous duty
Meter	DC voltmeter 1000 ohms/volts, 1 MA full scale
Meter Scale	Direct Reading: North centered, 5° increments
Optional	Direct Reading: South centered, 5° increments
Maximum Antenna Size:	
A. Tower Mounted as per Figure 3	20 square feet (1.86 m²) of wind surface area
B. Outside Tower or Mast Mounted as per Figure 5 or 6	10 square feet (.93 m²) of wind surface area
Maximum Interconnect Cable Resistance:	
A. Terminals 1 and 2	.8 ohm
B. Terminals 3, 4, 5, 6, 7 and 8	2.0 ohms
Rotation Time	45-60 seconds with 60 Hz input
Brake	positive, electrically operated wedge, 60 segments spaced 6° apart
Rotator Size	9 inches (23.7) maximum diameter by 14.07 inches (35.7 cm) high
Maximum Antenna Mast Size	2 1/16" O.D. (52 mm)
Mounting Hardware	stainless steel hardware and plated steel clamp plate
Control Unit Size	8.5 inches (21.6 cm) wide x 9.0 inches (22.8 cm) deep x 4.3 inches (11.0 cm) high
Shipping Volume	2,280 cubic inches (37,350 ccms)
Shipping Weight	28 pounds (12.7 kg)

Table I– Specifications of the Tailtwister.

Maximum Length	Gauge for Terminals 1 &2	Gauge for Terminals 3-8
125′ (38 m)	#18 (1.19 mm)	#22 (.76 mm)
200′ (61 m)	#16 (1.42 mm)	#20 (.97 mm)
300′ (91 m)	#14 (1.75 mm)	#18 (1.19 mm)
500′ (152 m)	#12 (2.12 mm)	#16 (1.42 mm)
800′ (244 m)	#10 (2.95 mm)	#14 (1.75 mm)

Table II– Wire sizes needed for various control cable runs.

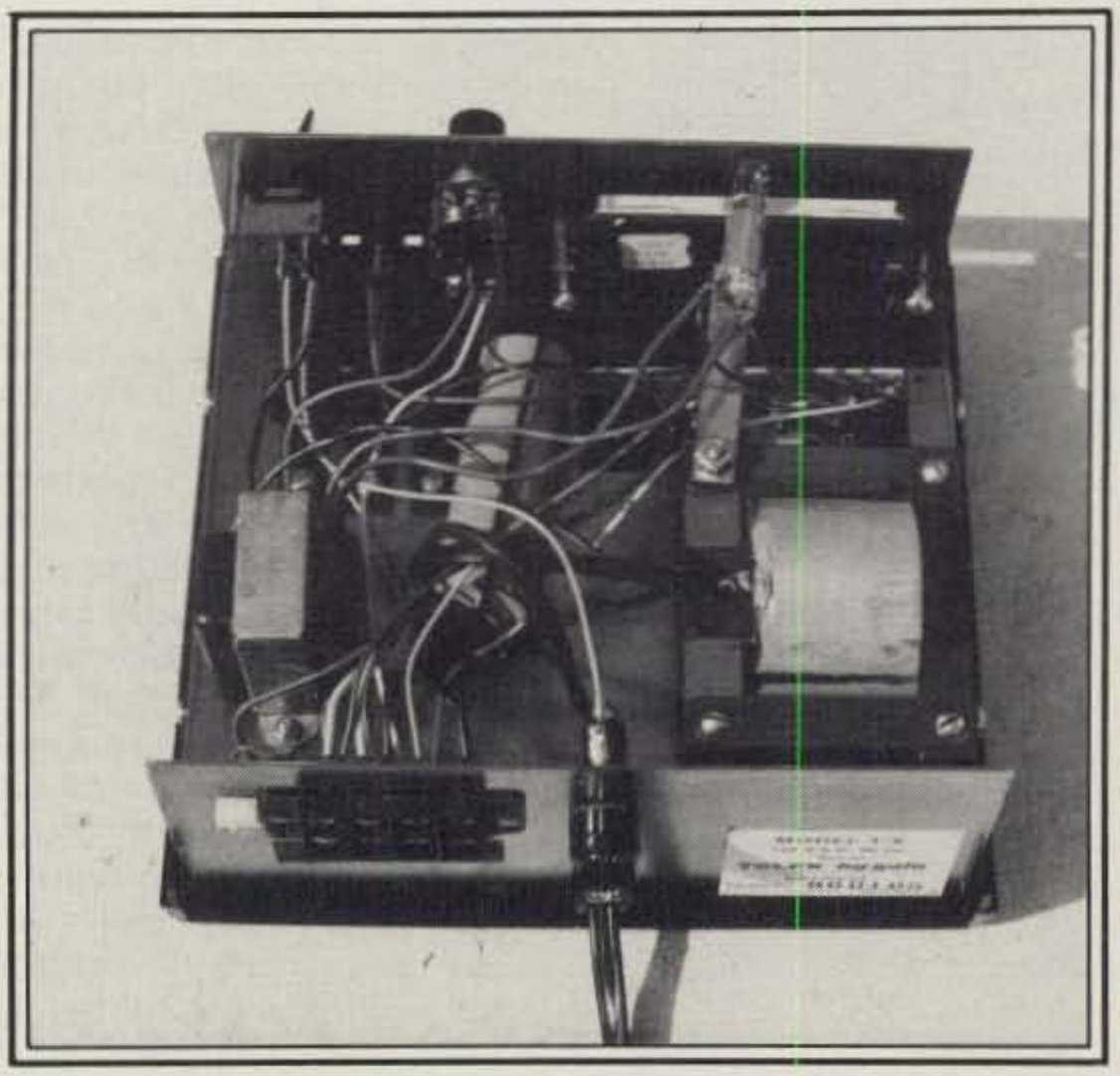
Tailtwister, and one can see from this table some details regarding the size, weight, and antenna handling capabilities of the rotator. The latter will be discussed and illustrated.

The rotator requires an eight-wire control cable to provide power to its motor, activation of the brake solenoid, and to convey direction-heading information to its control unit. The two wires supplying power to the motor necessarily have to be of a heavier gauge than the rest of the wires as illustrated in Table II. The rotator can theoretically be located any distance away from its control unit, but the most commonly encountered situations are covered by Table II. The actual Tailtwister installation illustrated by the photographs in this article utilized a control cable which simply happened to be available. It was far oversized for the installation involved. There is absolutely no reason why one should use a control cable with wire gauge sizes greater than those shown in Table II. Also, as shown in Table II, for the average installation where the rotator is within 100–200 feet of the control unit, the wire gauge sizes needed for the control cable are very reasonable.

Installation Options

The Tailtwister can be mounted in several ways on a tower or mast, but one should appreciate that the antenna-handling capability of the rotator, expressed as the load in square feet that it can handle, will vary according to how the rotator is mounted. In a purely static mounting situation, the only force that will place a strain on the rotator is that due to the unbalanced weight load of the antenna being used. That is, the unbalanced weight of the antenna (referenced to the point where the mast attaches to the antenna and multiplied by the length of the mast from the antenna boom to the rotator) will produce a bending force which places a strain on the side of the rotator where that force is greatest. In a dynamic situation when some wind is present, wind pressure against the boom and elements of a beam antenna will produce an additional bending force. So, even if one had an antenna installation where the static loading forces were minimal, one still would have to contend with the forces produced by wind pressure. If one has an antenna installation where the static forces cannot be compensated for and, in addition, wind pressure forces are produced, the antenna load that can be handled by the rotator must be further reduced. If one further tries to factor into the situation the additional forces created by ice loading in winter, the whole analysis can become very complicated. In order to remain on the very conservative side, Telex/Hy-Gain rates the Tailtwister at either 20

The control unit is dominated by the large meter for direction indication.



A look inside the control unit reveals mainly the larger power transformer on the right for the rotator motor and a small one for control circuitry.

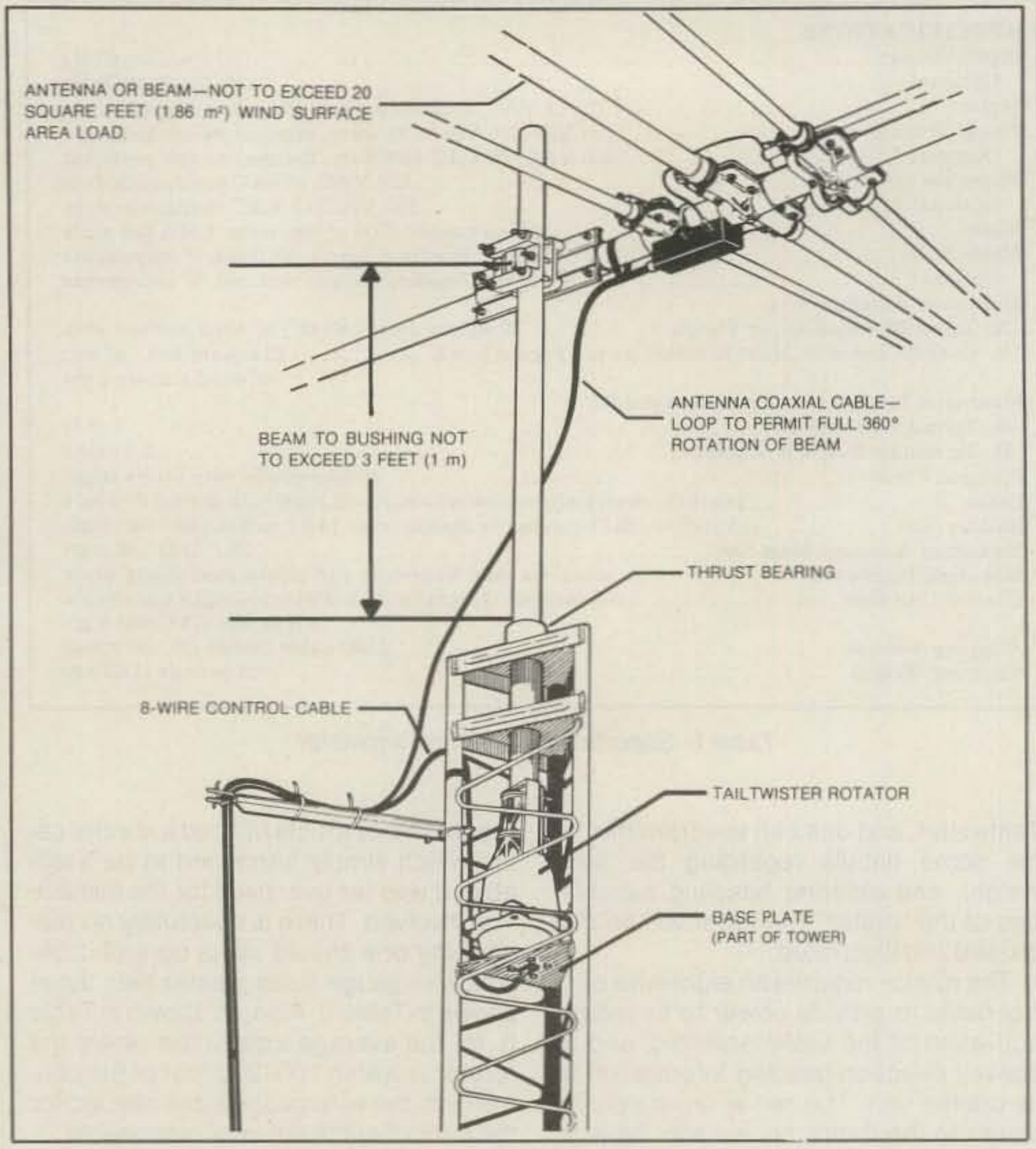


Fig. 1– Preferred "inside tower" mounting method for the rotator to achieve its maximum antenna load capability.

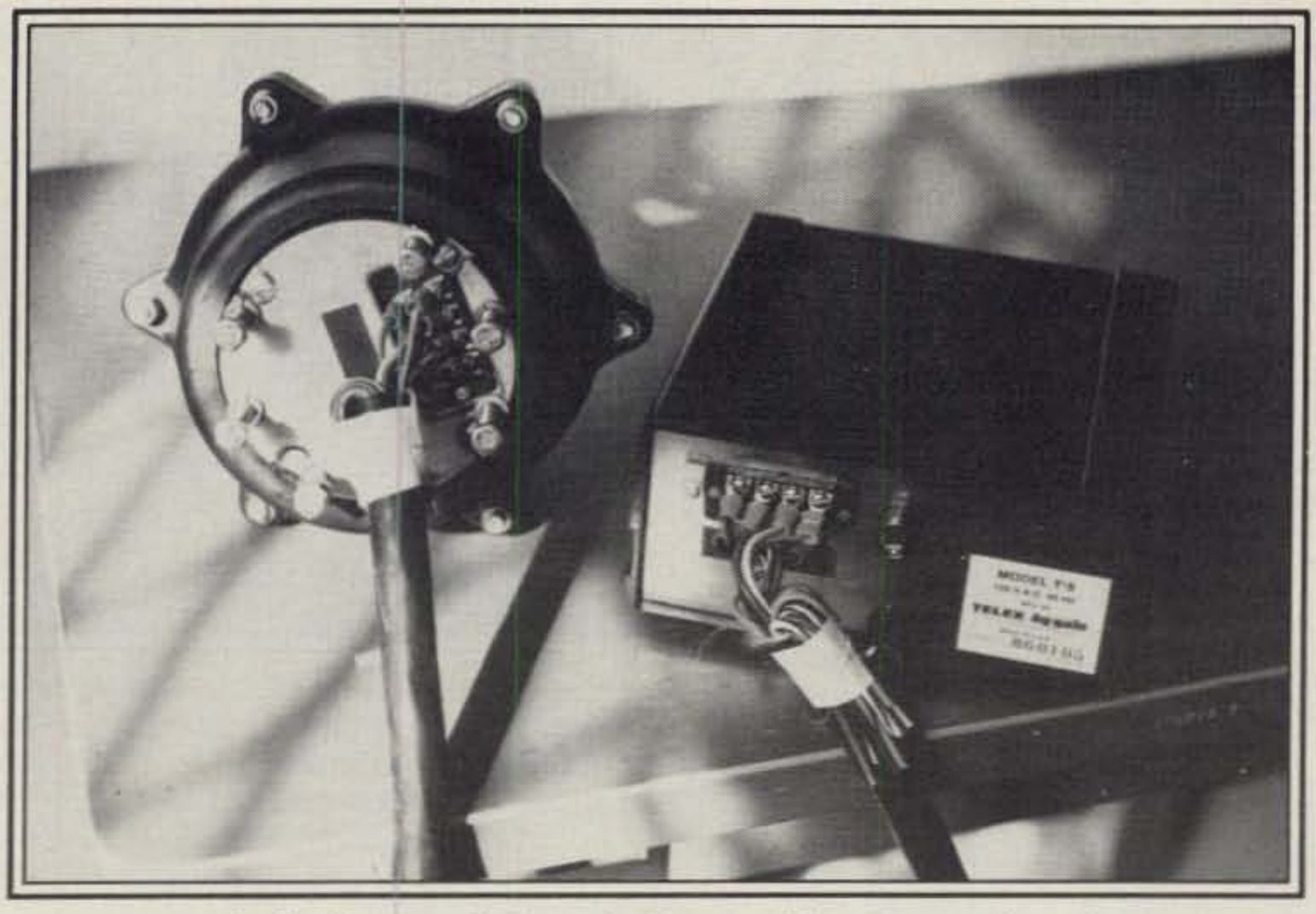
square feet of antenna load for an "internal" rotator mounting or 10 square feet of antenna load for an "external" rotator mounting.

Fig. 1 illustrates the overall preferred mounting method for the Tailtwister. It is mounted *inside* a tower, and the antenna mast passes through a thrust bearing on the top of the tower before it is attached to the rotator. The thrust bearing greatly reduces the bending force applied to the rotator as compared to it not being present. The main point that one does have to observe if this type of installation is to achieve its maximum potential is that the mast is exactly vertically aligned through the thrust bearings and the rotational center of the rotator. This may require that the rotator be shifted a bit on its base mounting plate and that shim stock be used around the mast where it is clamped to the rotator if the mast outside diameter is not exactly 2 1/16 inches. Specifications for the shim stock to be used are given in the Tailtwister's manual.

Fig. 2 illustrates an outside tower mounting for the Tailtwister. This type of mounting was actually used for the Tailtwister that was installed and tested. Obviously, it is simpler to implement, if one compares figs. 1 and 2, but one does pay a price since the mast length from the antenna boom to the rotator top becomes limited to 2 feet and the wind surface area of the antenna load becomes limited to 10 square feet. One does not have to shim the antenna mast where it fits into the rotator. In fact, no adjustments of any sort are required. And, the 10 square foot wind surface load rating of the rotator using this mounting configuration still allows one to handle even large beams such as the TH7DX, which has a wind surface load of just over 9 square feet.

Fig. 3 shows just about the simplest mounting for the Tailtwister—a straightforward in-line mast mounting. As was mentioned before, the Tailtwister requires the optional Lower Mast Support Kit for this type of mounting. As one can see by studying fig. 3, the mast length and antenna wind surface area restrictions are the same as shown in fig. 2.

Figs. 1, 2, and 3 all provide some useful ideas on how to loop the coaxial cable line to an antenna around the antenna



As recommended by the manufacturer, before anything else was done the rotator and control unit were checked out on a test bench.

mast and rotator to provide for unrestricted 360 degree antenna rotation.

Actually Installing a Tailtwister

As was mentioned before, a good beam installation requires money, time, and work. One doesn't make such an installation every day, and it pays to proceed reasonably cautiously. Telex/Hy-Gain strongly recommends that the Tailtwister be bench-tested first using the actual length of control cable involved in the

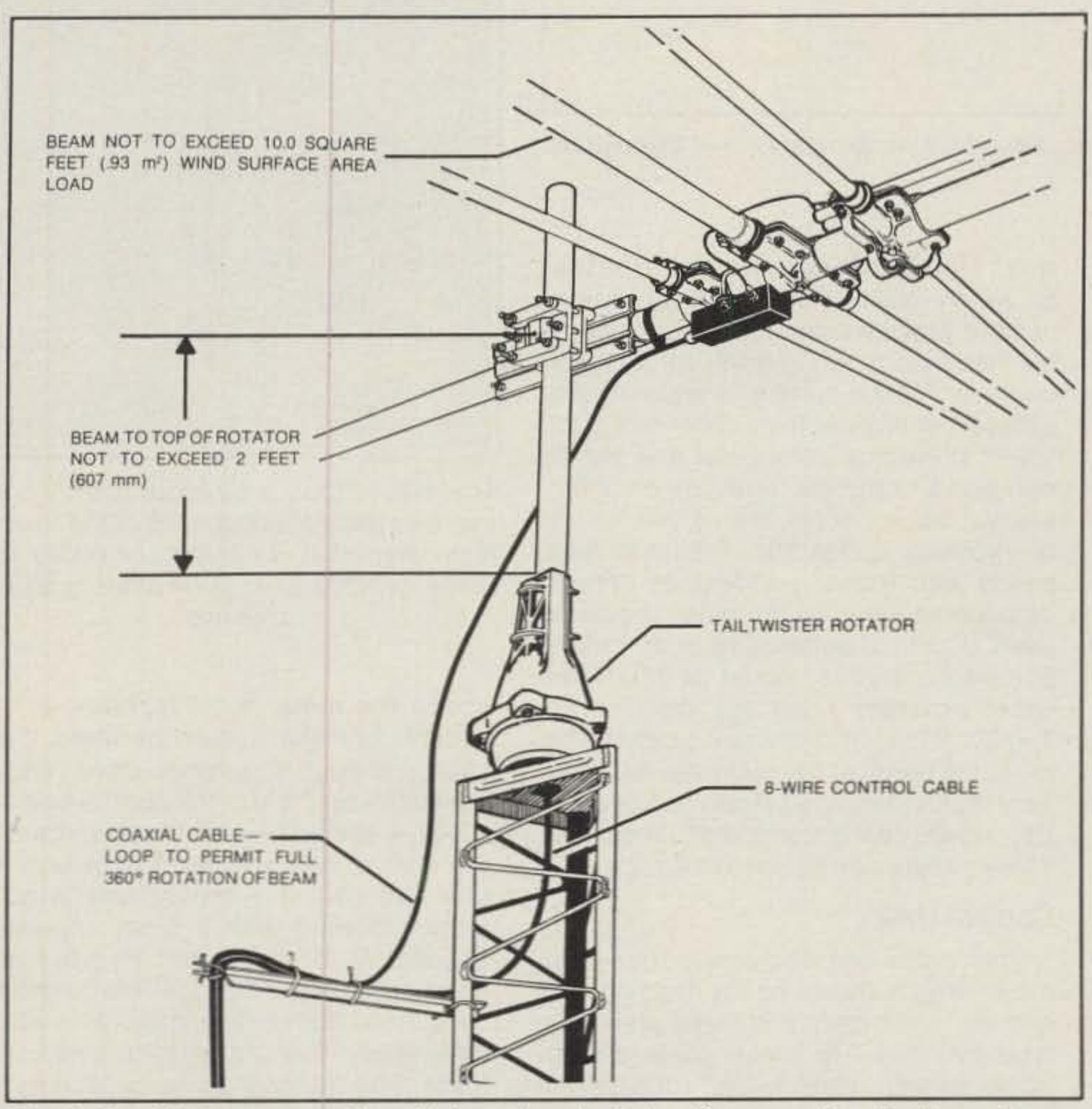


Fig. 2– Outside tower mounting. Note reduced wind surface area load for the antenna.

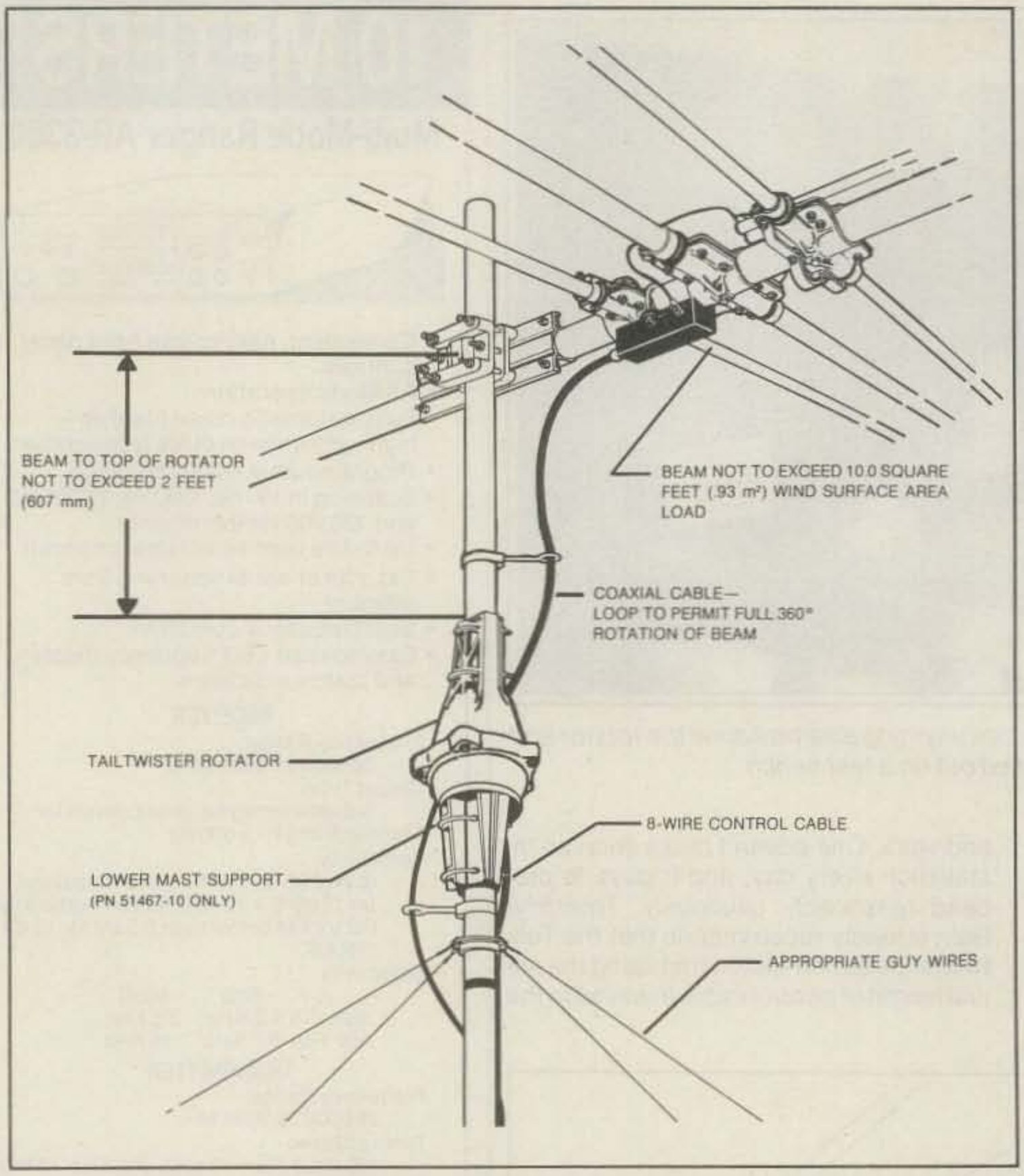
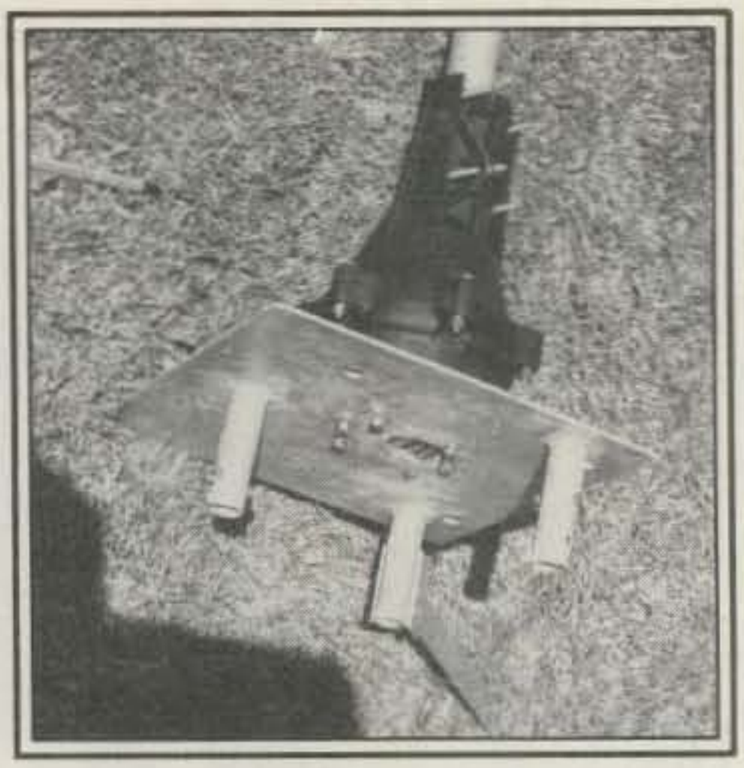
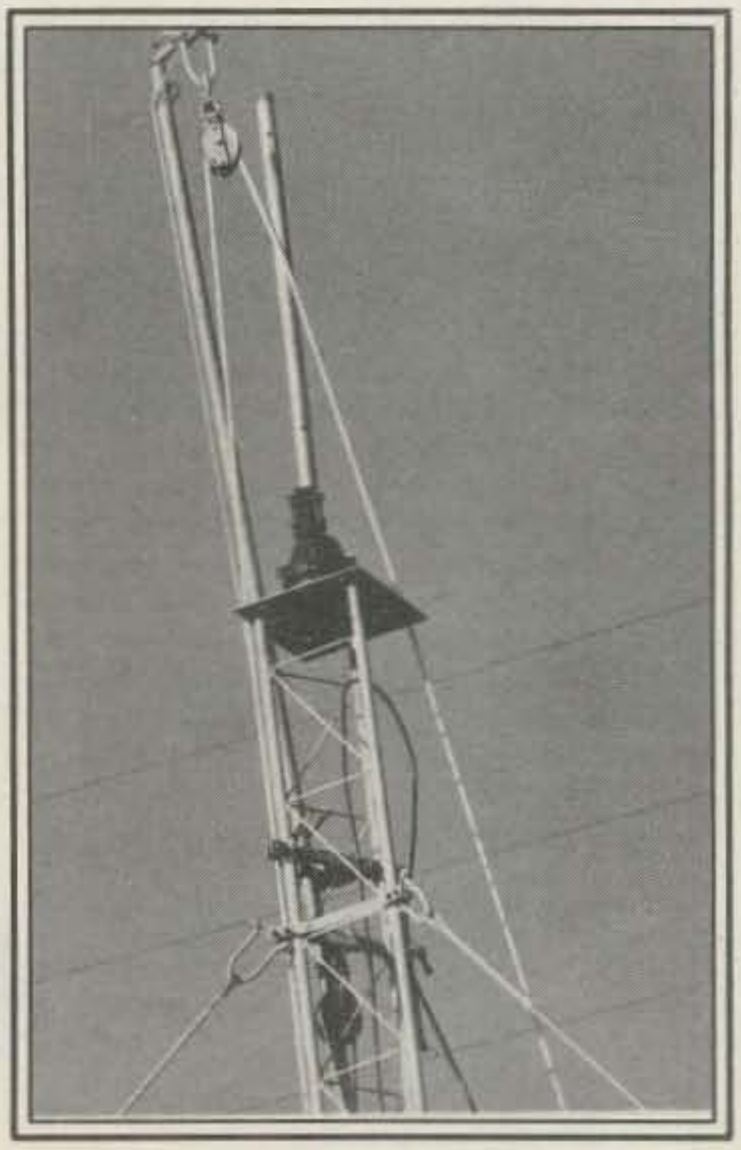


Fig. 3–The Tailtwister can also be used for a relatively simple mast type of installation.



The method used to mount the rotator was to bolt it to a base plate which had three pipe studs welded to it. The pipe studs were dimensioned to fit over the end pieces on a triangular tower.



This view shows a bit more clearly how the base plate fits on the top of the tower. Note also that a temporary pulley arrangement has been put in place to lift the antenna.

final installation. This was done and the Tailtwister worked perfectly. However, the test proved to be more than just useful to test rotator/control-box interconnections and proper operation of the rotator. It confirmed how the antenna mast should be mounted to the rotator, once the antenna is secured to the mast, for proper directional indication on the control box. It's not a difficult matter at all, but sorting it out with the rotator and antenna on top of a tower is a far, far different matter than obtaining a clear understanding of the matter on a test bench. A photograph shows the simple test bench setup.

Various of the photographs show how the Tailtwister was mounted on a base plate which in turn was secured near the top of a tower. Then the TH7DX antenna was hoisted up the guyed tower using a temporary pulley arrangement at the top of the tower and the antenna secured to the mast which in turn had already been secured to the rotator. The beam was mounted pointing south with the rotator in the full clockwise, south position, as per instructions in the Tailtwister manual. A small 3 foot boom extension from the tower, much like that shown in fig. 2, was used to provide room for the coaxial cable feed loop to swing freely through 360 degrees. Plastic cable ties were used to secure the coaxial feed cable along the tower at various points, but one should not place complete reliance on them. Many types will crack after a year or two of exposure to the sun. Stainless steel bands with rubber padding, to prevent damage to the coaxial cable, should be used at critical points. One such critical point, for instance, would be where the cable emerges from the balun on a TH7DX. If the banding which holds the cable to the boom at the point should break, very much increased strain is placed on the coaxial connector going to the balun. This juncture can be seen in fig. 2.

Control Unit

The control unit is dominated by a large meter which shows beam heading in 5 degree increments and three piano-key type switches. The meter scale is north centered with either end of rotation (full clockwise or counterclockwise) being south. The meter scale is, however, reversible to make it south centered, if desired, although this option does require some disassembly of the control unit.

Fig. 4 shows the electrical diagram of the control unit and the rotator unit. As one can see, the control unit is quite straightforward with a small regulated DC supply for the meter circuitry and another AC supply for the rotator motor. Only those electrical components which have to be in the rotator unit are mounted there. The motor starting capacitor, for instance, is placed in the control unit, so if

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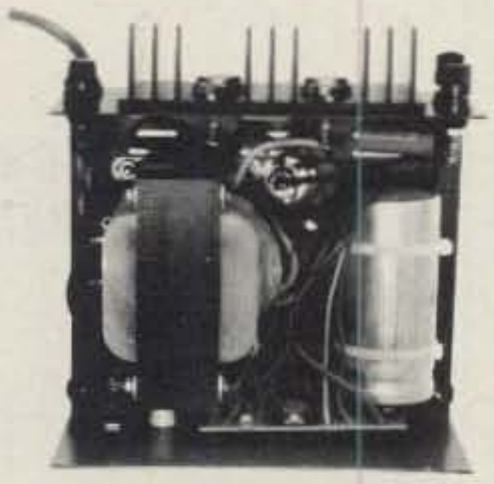

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- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage.
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105 - 125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE: Less than 5mv peak to peak (full load & low line)

MODEL RS-50A

MODEL RS-50M

MODEL VS-50M

RM-A Series

MODEL RM-35A

19" X 5¼ RACK MOUNT POWER SUPPLIES

Model	Continuous Duty (AMPS)	ICS* (AMPS)	Size (IN) HXWXD	Shipping Wt. (lbs.)
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
• SEPARATE VOLT & AMP METERS				
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50

RS-A SERIES

MODEL RS-7A

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W X D	Shipping Wt (lbs)
RS-4A	3	4	3¾ x 6½ x 9	5
RS-7A	5	7	3¾ x 6½ x 9	9
RS-7B	5	7	4 × 7½ × 10¾	10
RS-10A	7.5	10	4 x 7½ x 10¾	11
RS-12A	9	12	4½ x 8 x 9	13
RS-20A	16	20	5 x 9 x 10½	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13¾ x 11	46

RS-M SERIES

MODEL RS-35M

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

VS-M SERIES

MODEL VS-20M

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

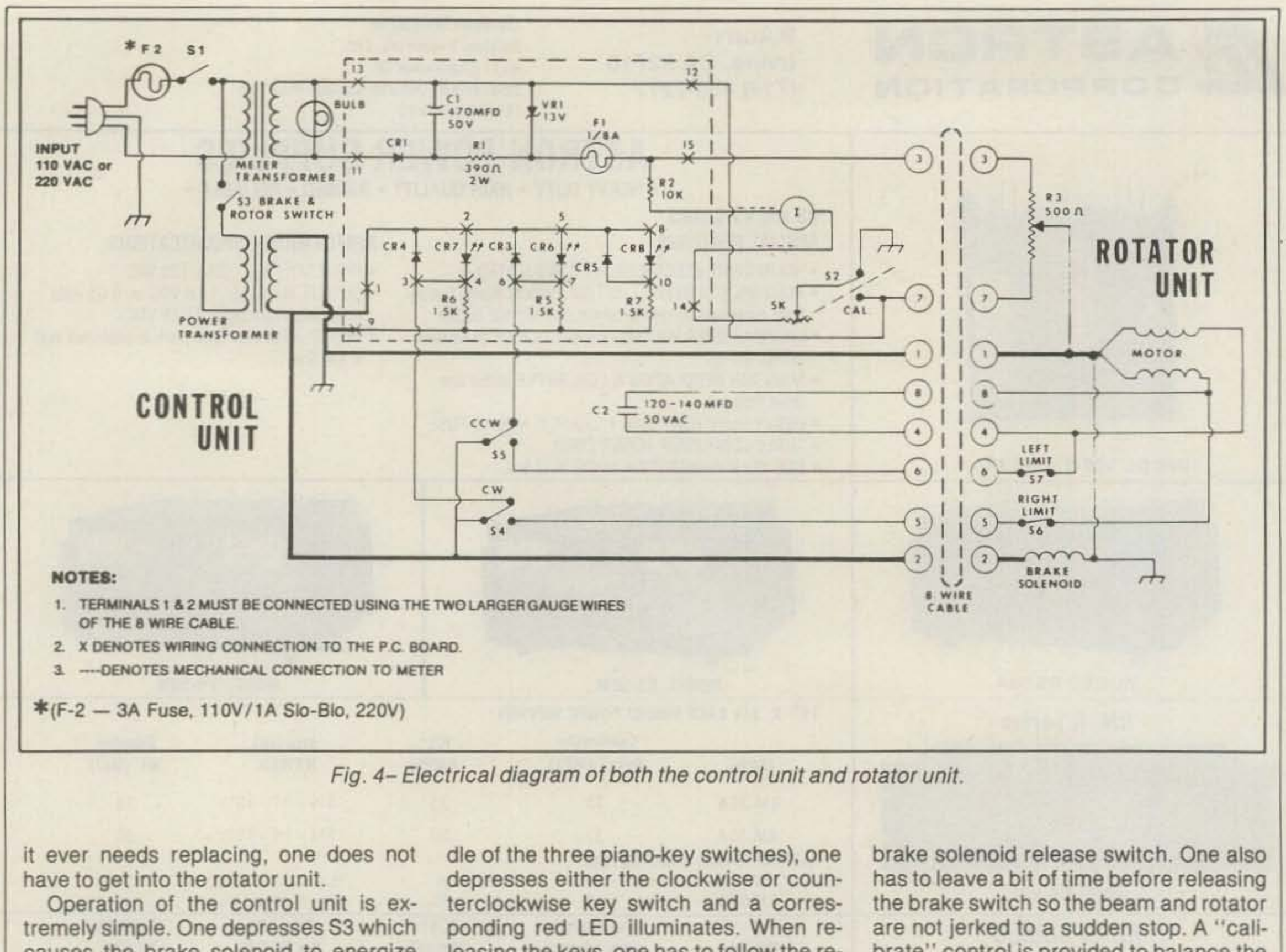
MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H x W x D	Shipping Wt (lbs)
VS-20M	16	9	4	20	5 x 9 x 10½	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13¾ x 11	46

RS-S SERIES

MODEL RS-12S

- Built in speaker

MODEL	Continous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt (lbs)
RS-7S	5	7	4 x 7½ x 10¾	10
RS-10S	7.5	10	4 x 7½ x 10¾	12
RS-10L(For LTR)	7.5	10	4 × 9 × 13	13
RS-12S	9	12	4½ x 8 x 9	13
RS-20S	16	20	5 x 9 x 10½	18



NOTES:

1. TERMINALS 1 & 2 MUST BE CONNECTED USING THE TWO LARGER GAUGE WIRES OF THE 8 WIRE CABLE.
2. X DENOTES WIRING CONNECTION TO THE P.C. BOARD.
3. ----DENOTES MECHANICAL CONNECTION TO METER

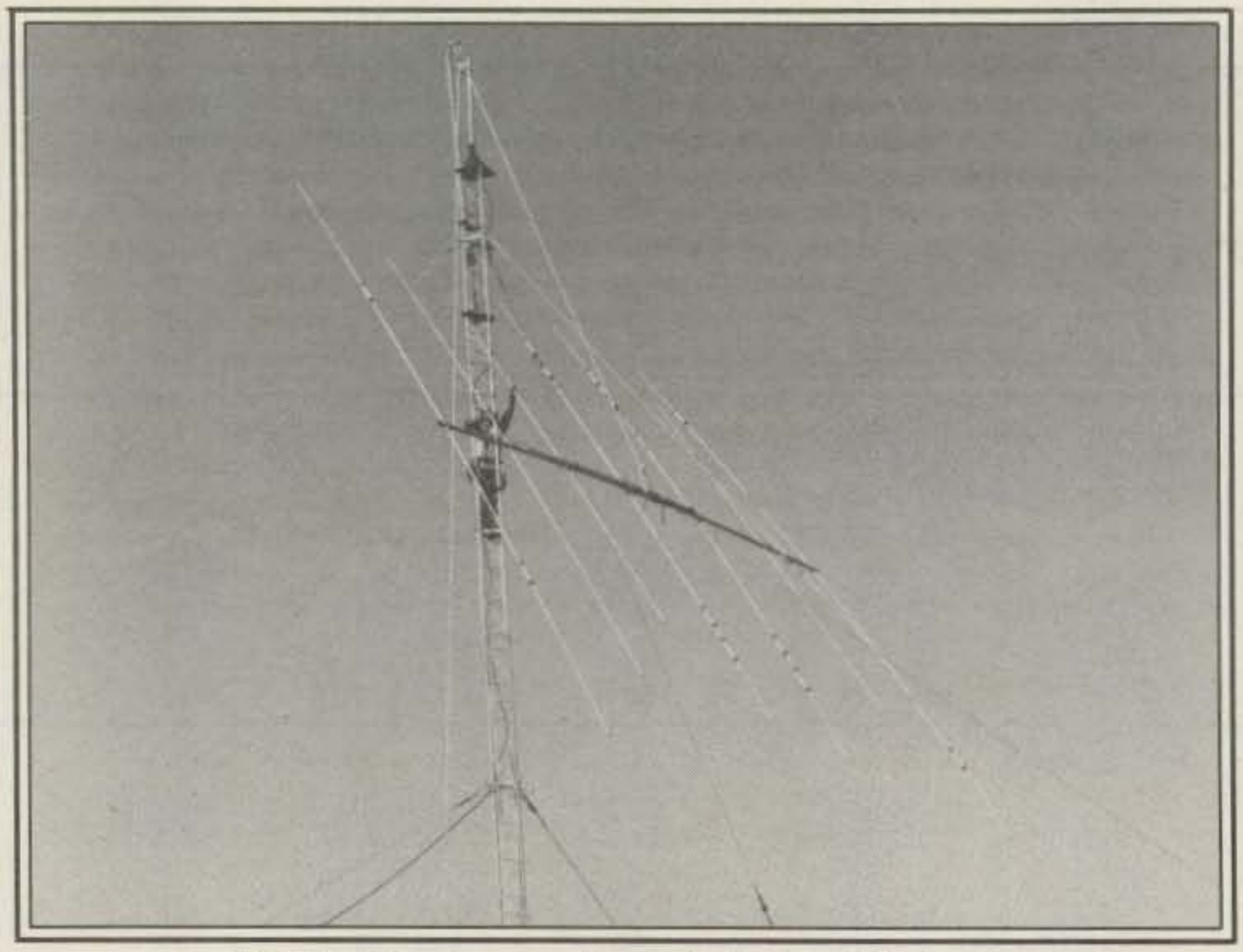
*(F-2 — 3A Fuse, 110V/1A Slo-Blo, 220V)

Fig. 4– Electrical diagram of both the control unit and rotator unit.

it ever needs replacing, one does not have to get into the rotator unit.

Operation of the control unit is extremely simple. One depresses S3 which causes the brake solenoid to energize and a green LED (CR8) to illuminate. While holding S3 depressed (it's the middle of the three piano-key switches), one depresses either the clockwise or counterclockwise key switch and a corresponding red LED illuminates. When releasing the keys, one has to follow the reverse sequence, releasing the CW or CCW key switch first and then S3, the brake solenoid release switch. One also has to leave a bit of time before releasing the brake switch so the beam and rotator are not jerked to a sudden stop. A "calibrate" control is provided to balance the simple resistive bridge circuit for the meter in case some component values have drifted a bit. It is not necessary to activate the rotator to effect the calibration.

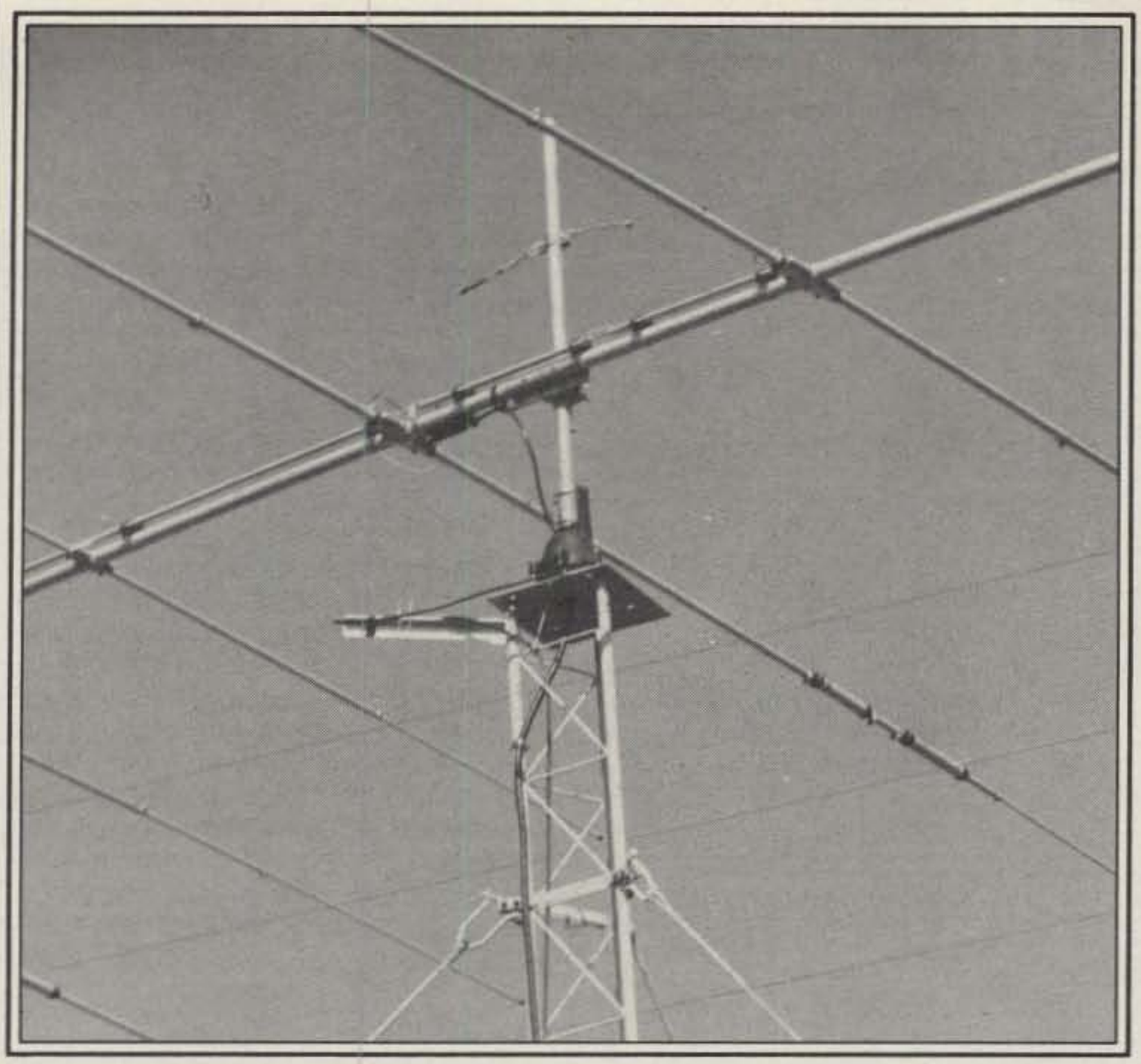
The control unit is perfectly satisfactory for almost all station operations. One does have to exercise a slight amount of discipline, however, especially when using a large antenna, in that the antenna should be allowed to coast to a stop before the brake solenoid switch is released. Overall, the control unit is a rugged, well-built unit on par with the Tailtwister rotator itself.



The TH7DX antenna on its way to the top of the tower!

Performance Results

Obviously with an installation like the combination of a TH7DX beam and a Tailtwister rotator on a reasonably tall tower, one can relate all sorts of tales about working DX or maintaining a path opening after most signals have dropped out. But, the main performance aspect of the Tailtwister itself that stood out was its absolute ruggedness and reliability. It was not always treated as "kindly" as it should have been in a station setup used by several operators, but yet it continued to operate perfectly month after month. The Tailtwister sort of reminds one of a favorite station microphone that has proved itself over a number of years.



Everything in place on top of the tower and ready to operate. Note the small arm which extends out to form the coaxial cable feed loop.

Once one has gotten used to such a unit, it remains while other station equipment comes and goes.

Manual/Warranty

The Tailtwister manual is excellent. It carefully describes various mounting possibilities for the rotator with plenty of hints on points to watch to achieve a long-lasting installation. The chapter on construction and servicing is also very complete with various checklists, including terminal-to-terminal resistance readings, that one can go through to isolate the cause of a problem. If one wants to do so, and the rotator is out of warranty, complete instructions are also provided for disassembly and reassembly of the entire rotator. A complete parts list, down to every flatwasher, is included.

The Tailtwister carries a 12-month limited warranty which covers both material and workmanship.

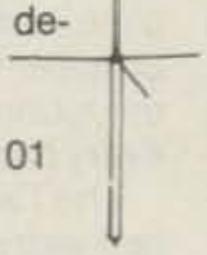
A Final Note

This review has only covered the Tailtwister rotator, but in conjunction with its installation on a tower. Such an installation seems simple enough, but it cannot be overemphasized that such an installation must be carefully planned out and slowly and safely executed. If you're not sure of what you are doing, back off and seek some expert help. CQ

CQ Showcase

CA-2X4Z Base Antenna

NCG is now distributing the CA-2X4Z dual-band vertical antenna. The dual-band antenna covers both 2 meters and the 420 MHz band. Designed to be broad band, the antenna will handle up to 200 watts, is easy to assemble, and mounts to any standard-size mast. The almost 16 foot vertical antenna matches to 50 ohms and comes with a type-N connector. The assembled antenna weighs a little over 5 pounds. For complete details on the antenna write to NCG, 1275 North Grove St., Anaheim, CA 92806 or circle 101 on the reader service card.



Nel-Tech Labs Sound Off Model 10

Now amateur repeater and commercial radio systems have the ability to use natural voice for their call sign. Sound Off Model 10 can be configured as a radio station ID. All control functions and timers are provided for this application. Sound Off Model 10 is a self-contained message generator complete with case and power supply. The Model 10 was designed specifically for applications where repetitive high-quality natural voice announcements are required. The Model 10 stores your natural voice message in nonvolatile EPROM with single message lengths of up to 32 seconds. It provides for both single play and continuous play modes.

Models 20, 100, and 150 are also available for applications requiring random access multimessage capabilities in nonvolatile rerecordable message times of up to 4 minutes. Prices start at $219.00 for the Model 10. For more information, contact Nel-Tech Labs, Inc., 28 Devonshire Lane, Londonderry, NH 03053, or circle 102 on the reader service card.

Jensen Tools Catalog

A new full-color catalog, offered free by Jensen Tools, introduces new Jensen service and maintenance kits and hard-to-find tools for state-of-the-art computer, telecom, and electronics technology. The catalog contains new products for work on site and in the field. Included are VCR alignment and communications adapter kits, AT&T handsets, digital test equipment, work holding devices, lighting/optical aids, tool cases, heavy duty military/aerospace transport cases, soldering stations, hand and power tools, computer accessories, cleaning supplies, and more.

For a free copy, contact Jensen Tools Inc., 7815 S. 46th Street, Phoenix, AZ 85044, or circle 107 on reader service card.

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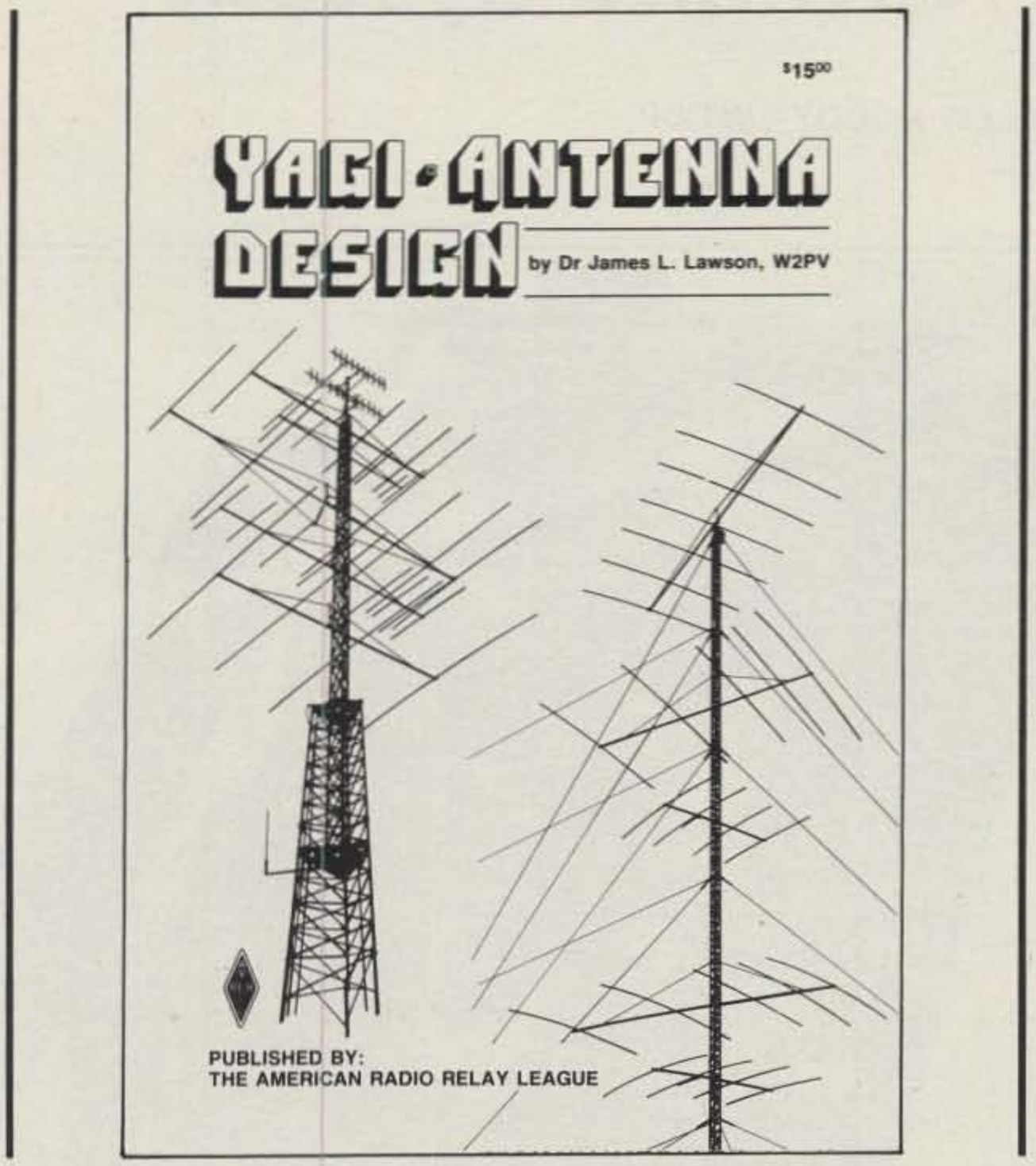

Yagi Antenna Design is based on the series in **Ham Radio Magazine** by the late Dr. James L. Lawson, W2PV. Jim was a highly competitive person and this carried through to his Amateur Radio hobby and work with antennas. Although this book is primarily the work of the author, credit should be given to its editors: Bill Myers, K1GQ; Clarke Greene, K1JX; and Mark Wilson, AA2Z. This ARRL publication stands to be a "classic" that should be added to every radio amateur's technical library. The book is available only in hard cover, and is printed on high quality textbook paper. There are over 210 pages of detailed information on Yagi design. For more detail, refer to the column at right. The retail price is $15.00. Please add $2.50 ($3.50 for UPS) for postage and handling. Also available at your favorite ARRL dealer.

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CONTENTS

CQ REVIEWS:

The ICOM AH-2 HF Mobile Antenna System

BY LEW MCCOY*, W1ICP

The ICOM AH-2 is a complete digitally controlled, HF, all-band antenna system. If that sounds like a mouthful, it is! Basically, the AH-2 is an automatically tuned antenna system that covers 3.5 MHz through the 10 meter band (and with any antenna longer than 12 meters, it will cover 160 also).

There are several pieces of equipment in the system, including an antenna, which is a 9 foot whip. The antenna system is designed to be used with either the ICOM 735, 745, or 751. The controller unit is attached to the transceiver used, and it in turn is connected via cables to the remotely mounted tuner unit (at the base, or end of the antenna). The tuner unit is completely weatherproofed and sealed.

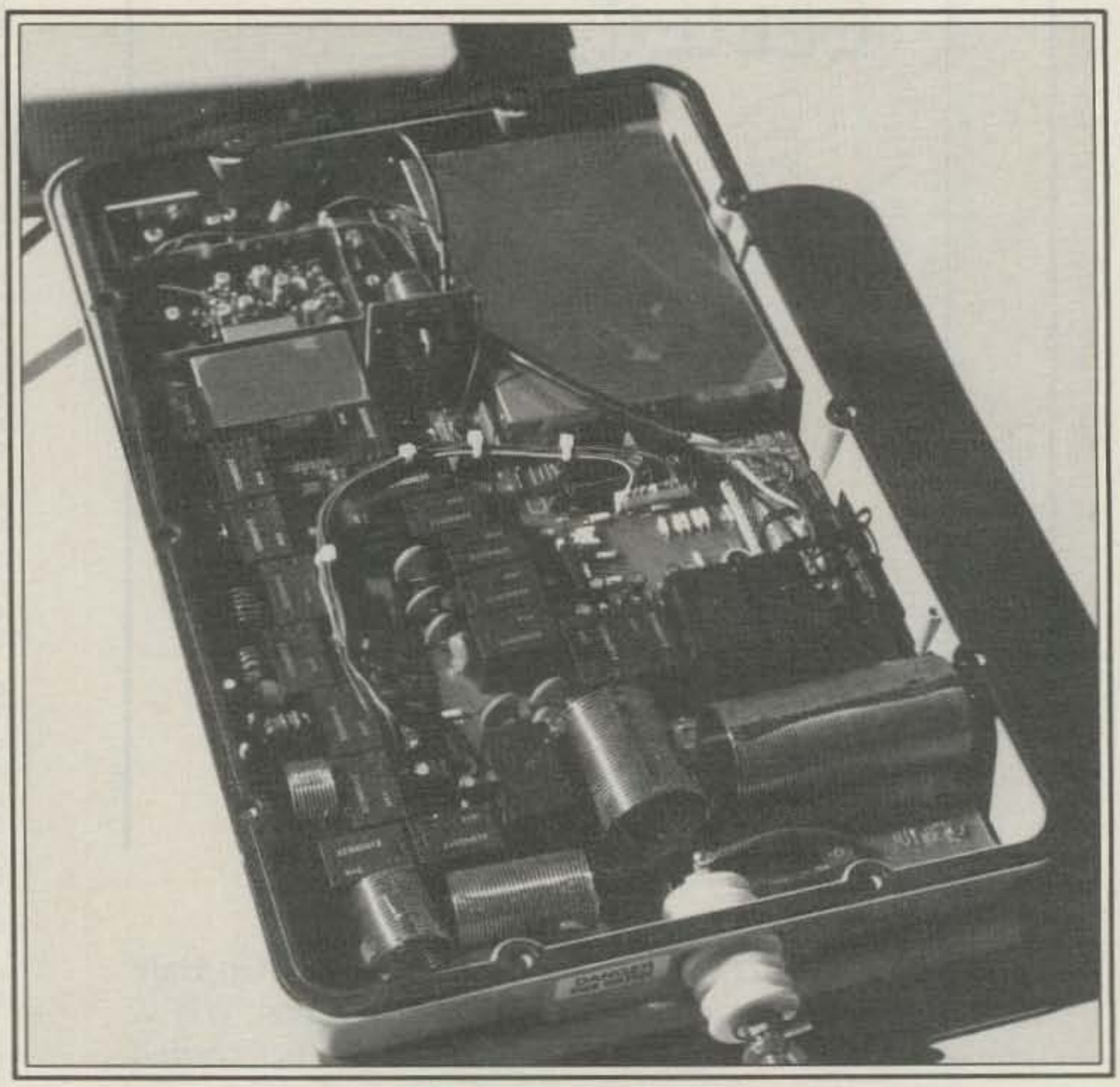
As I found from my tests, the AH-2 has an extremely wide matching range. It is designed for the 9 foot whip, but I tested the system on a wide variety of antennas (including open-wire feed, balanced-fed dipole, but more on that in a moment). Before mounting it in a mobile setup, I first tested it in my home station so that I could try a variety of antennas.

The AH-2 has a controller unit that is connected to the transceiver. The controller unit is mounted to the side of the transceiver and connections are made from the radio. An RF cable from the controller is connected to the transceiver, along with four conductor cables.

Fig. 1 is a circuit diagram of the tuner unit, and as can be seen, it is a complex circuit except for the actual antenna matching portion. I have also included a block diagram of the controller, fig. 2, to provide more information. The actual tuner is essentially an extremely wide-range pi network. Here is basically how the system works.

When the "TUNE" button on the controller unit is pushed, the transmitter comes on (at very low power because the controller also controls the ALC line in the transceiver). This small amount of power is fed to the tuner unit, and both the forward and reflected voltages are analyzed via the rather extensive computer circuitry. Very rapidly, a series of small relays (21) are activated and deactivated, always seeking the greatest range or level of forward to reflected voltages. When the voltage ratio attains a level of 1.5 to 1 or less, the unit considers the circuit matched and shuts down. Now get this: This whole procedure is usually accomplished in 1 or 2 seconds! The secret of the system, to me at least, is that the ICOM engineers correctly realized that an SWR of 1.5 to 1, for all practical purposes, is just as good as 1 to 1, and believe me, it is. The 1.5 to 1 ratio is much, much easier to obtain, and of course quicker.

The unit is designed to work into end-fed wires having a single output terminal. However, like many amateurs, I have an overwhelming curiosity about Transmatches and tuners, having built and described so many over the years. So, I decided to hook up the AH-2 to feed balanced lines (open-wire or Twinlead types of feeders). I hooked up a toroidal balancing transformer such as I have used in the Ultimate Transmatch and others to the single-ended AH-2 output and chassis ground, leaving me with balanced output on the other side of the transformer. Next, I connected open-wire feeders



Here is the tuner with the weatherproof top removed.

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

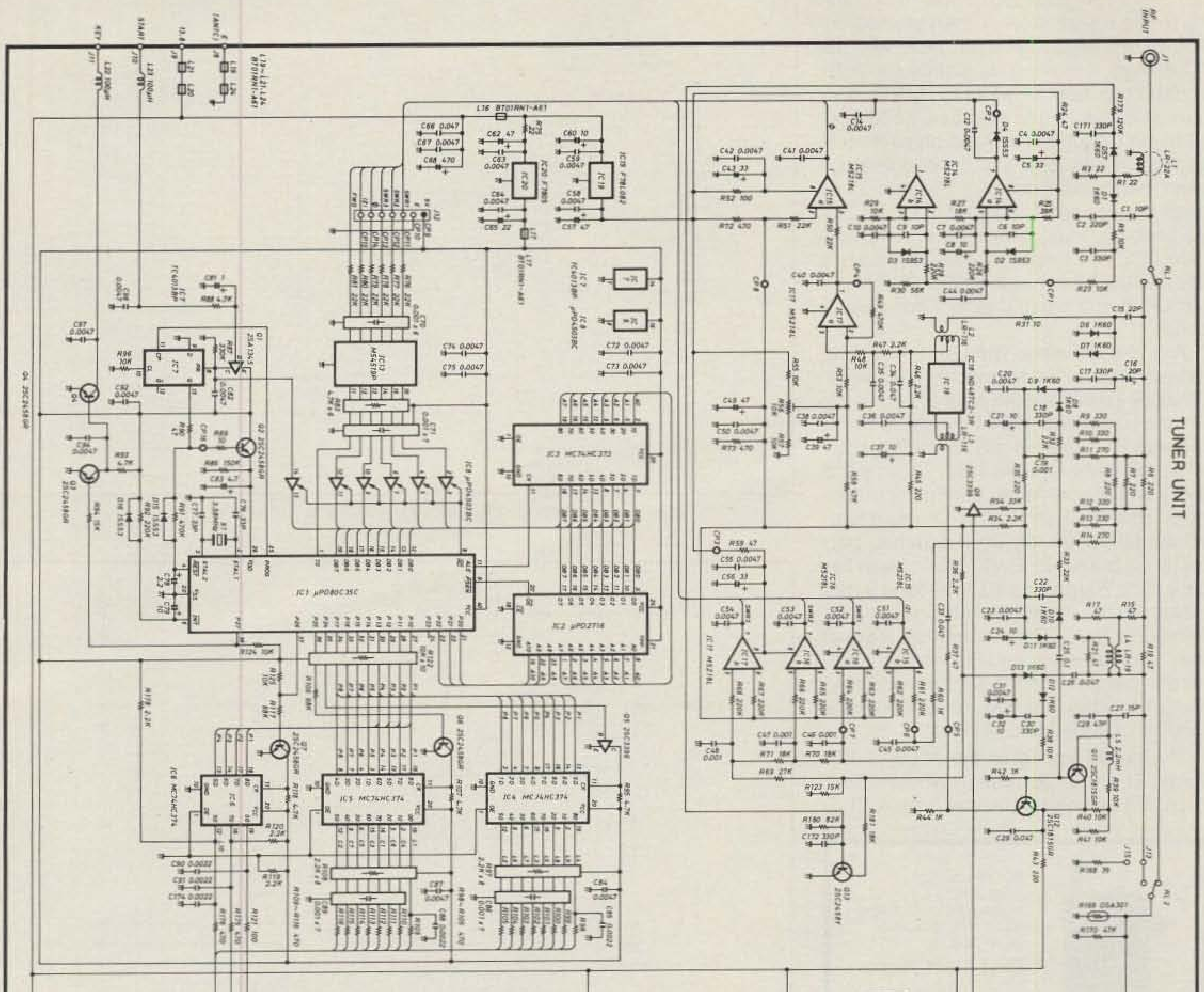


Fig. 1 – Circuit diagram of the AH-2 tuner unit.

from my large (150 foot) center-fed antenna to the transformer. I then started on 160 meters and progressed clear down to 10 meters, covering all bands (at both ends). I can say that without reservation the AH-2 matched to less than 1.5 to 1 on all these frequencies—and on each one as fast as you can say "one one-thousand, two one-thousand." The manufacturer's specs on tuning time are from 2 to 20 seconds maximum with an average time of 2 to 4 seconds. Also, the specs say that the tuner has over 250,000 possible L-C combinations (and I am sure it does).

A 9 foot stainless whip and mounting system is provided for mobile, marine, or RV work. I mounted the whip on top of my 21 foot trailer and tested the setup on 80 through 10. The whip has no loading coils and is simply a straight whip. This means that it would be a rather inefficient antenna on 80 and 40, and that is the way it tested out (although the whip matched perfectly via the AH-2). Performance was excellent on 20 through 10 where the 9 foot length was more realistic for those bands. In the ICOM instruction manual they mention using end-fed wires for better performance on the low bands. Everything I tried in the way of random-wire lengths matched and worked.

The power rating of the AH-2 is 120 watts. There is no reason why the unit could not be used with other types of 120

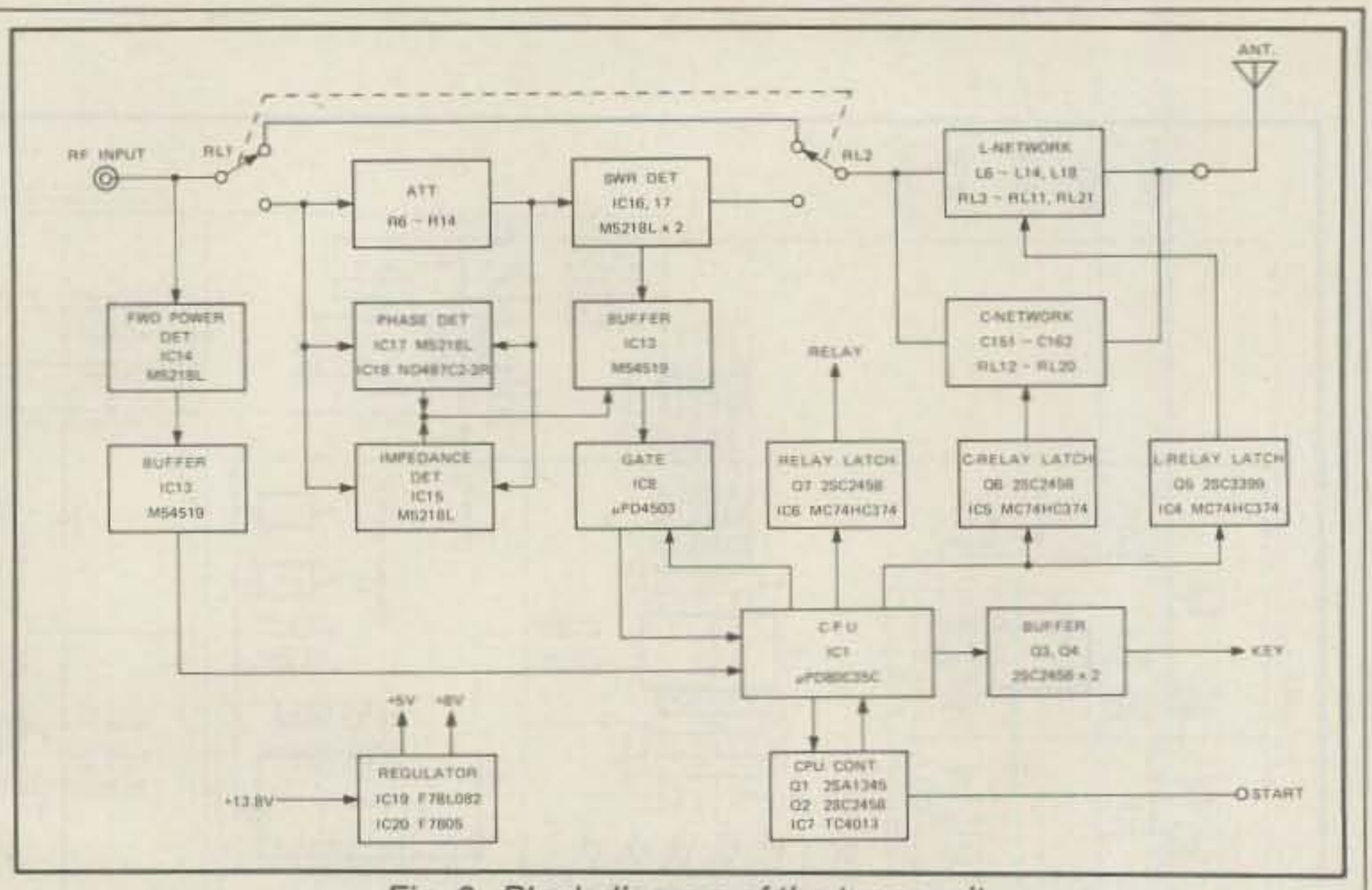


Fig. 2– Block diagram of the tuner unit.

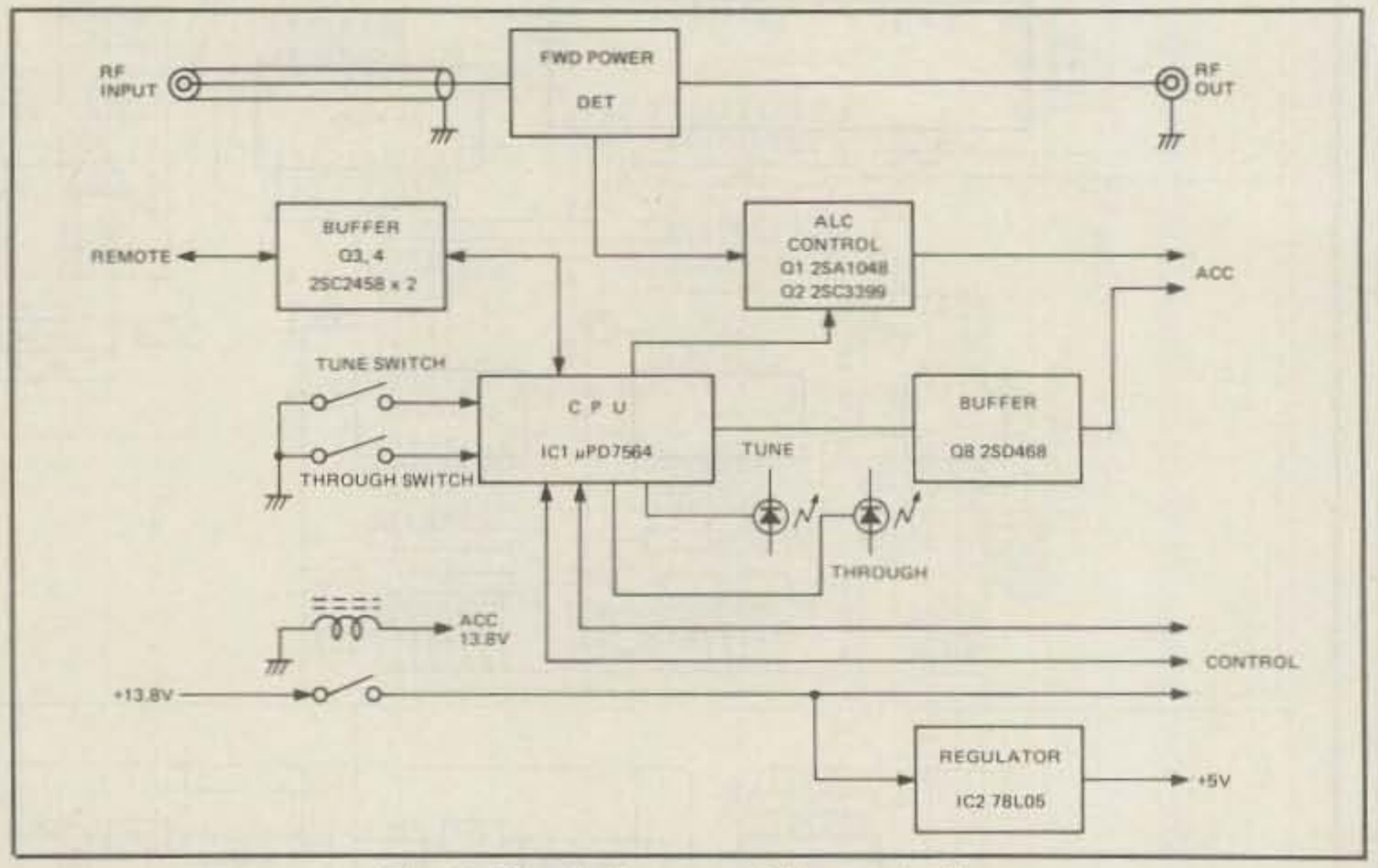


Fig. 3– Block diagram of the controller.

watt rigs. However, and this is very important, whatever rig is used there must be a system setup similar to ICOM's in that when the TUNE button on the controller is pushed, the level of the transmitter is dropped to 10 watts or less (5 to 10 watts). (See fig. 3, block diagram of the controller —Automatic Control Line.) There are two LEDs on the front of the controller, one for TUNE conditions and the other for THROUGH operation. In TUNE a green LED lights when the tuner unit is matched and ready to use. A red LED lights while tuning is in progress, and red (TUNE) and yellow (THROUGH) LEDs light when the tuner is unable to achieve a match. I might add that I never encountered this condition, but I assume it is possible with some extremely high or low reactive loads. The THROUGH LED lights when the tuner is bypassed and the antenna is fed directly.

A 15 foot (5 meter) 4-conductor cable is used to connect the rig and controller to the tuner unit. Additionally, a coax line is needed from the controller to the tuner. Fifteen feet is adequate for most mobile installations, but I can see many cases in which an amateur would mount the tuner at greater distances. Any type of 4-conductor cable could be used as long as the ground and hot leads (12.5 volts) will handle 2 amperes, because that is the maximum power rating of the tuner.

Over the years I have had many requests for the design of a truly automatic tuner that can be used remotely. After using the AH-2, particularly with the tuned feeder system where I had complete matching, I would strongly endorse it.

The AH-2 lists at $495 without the whip antenna and $625 with the whip and whip-mounting hardware. The AH-2 is manufactured by ICOM and distributed by ICOM America, Inc., 2380 116th Ave. NE, Bellevue, WA 98004.

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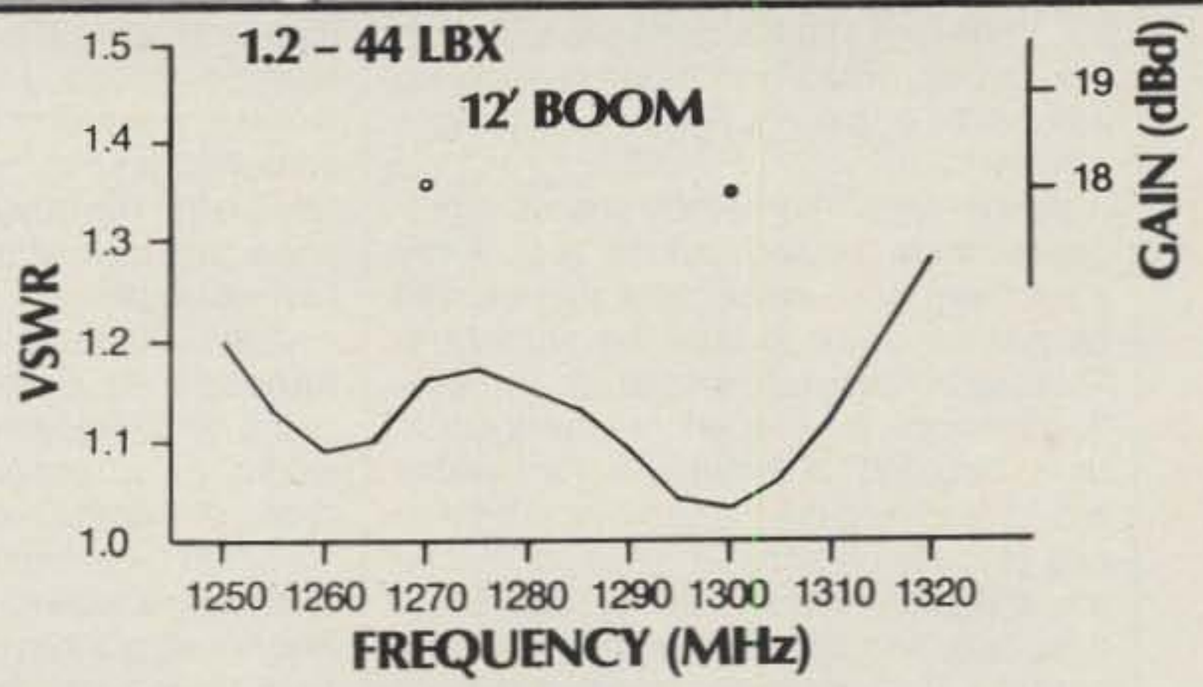
- VSWR . . . . . Better than 1.5 to 1
- Feed Impedance . . . . . 50 Ohms
- Balun . . . . . 4:1 Rigid Coax

Mechanical

- Boom Length . . . . . 12′4″
- Element Length . . . . . 4.5″
- Mast Required . . . . . 2″O.D.
- Windload . . . . . 1 sq. ft.



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CIRCLE 51 ON READER SERVICE CARD

Here's a situation that can happen at any time and can leave most of us feeling anxious and vulnerable. Knowing where to go is just as important as knowing where you are in relation to that destination. K5XY's experience is an important lesson to all of us.

The Emergency

BY ALEX F. BURR*, K5XY

This situation actually happened to me several years ago. It could happen to anyone of us today.

It was a typical day in July—breezeless, hot, with a golden burning sun beaming down on the black heat-radiating parking lot as the two vans were loading their full complement of students for the short ride to the restaurant for lunch. Another New Mexico State University professor and I were taking a group of 16 high-school students, who were attending a special summer physics course, on a weekend shopping and sight-seeing tour of Juarez, just across the Mexican border from El Paso, Texas. It was the first time that many of them had been outside the United States.

Suddenly the driver of the other van appeared at my window. "Gary has just had the van door slammed on his finger. I think we should take him to a doctor at once," he said.

Because my daughter had just recently survived just such an accident with few tears which had quickly gone away, I thought he was overreacting a bit. However, one look at the misshapen digit with the nail unrooted and blood welling up around the edges changed my thinking in a hurry.

At that time, the nearby Juarez emergency room turned out to lack X-ray equipment, so it was decided that it would be just as quick to take the student to Thomason General Hospital in El Paso. Furthermore, the procedures there would be conducted in English, a fact which would reassure the injured boy, who was one of those persons who are somewhat more apprehensive than average about hospitals, needles, and related unpleasantness. Thus it was decided that I should take him and two of his friends to the hospital in El Paso as quickly as possible.

*2025 O'Donnell, Las Cruces, NM 88001

As quickly as possible is sometimes frustratingly slow, especially when you are in a large van and the traffic at the port of entry is backed up to the top of the bridge across the Rio Grande. However, after only a few minutes I had progressed to the point where I could squeeze the van between two lines of cars and thus hurry up to the inspection station, accompanied by a few derisive honks from drivers angered by another vehicle cutting in front of the many patiently waiting their turn in the slow-moving line.

I braked to a quick halt at the head of the line and shouted to the customs official that we were all U.S. citizens headed for the hospital emergency room, and Gary, pale and obviously suffering from shock, waved his finger weakly in front of the inspector's eyes. He waved us through and I quickly headed straight ahead toward the center of El Paso.

There was just one thing wrong: I didn't know where we were going.

I was not, however, too worried—yet. I did know that Thomason Hospital was someplace nearby, and I knew that my 2 meter rig was sitting on the engine cover right beside me. I decided that the passengers would probably be interested in a demonstration of the capabilities of 2 meters on the trip down and back. Little did I know just how effective the demonstration would be.

Just as soon as we cleared customs, I turned the rig on and flipped the switches to the 10–70 repeater. I gave a quick call asking for directions to the emergency room of Thomason Hospital. I was not sure that I would get an answer because there were several repeaters in El Paso and not all of them were monitored all the time. On the way down I had demonstrated and explained the use of repeaters on 2 meters. Several contacts had been made with WB5LUJ and K5DI as they were driving about Las Cruces, New Mexico, our starting point. These contacts were made on 04-64, however. In fact, as we were entering El Paso I had made one call to an amateur heard on 10–70, but he had not answered. I was not disturbed, however, as he had indicated when he signed off that he was about to climb a tower to fix an antenna. As a long time 2 meter monitor, I know that if you answer all the casual stations calling on the repeater you will get nothing done. I expected that when I requested information for use in an emergency, the busy listeners who were monitoring would drop what they were doing and offer to help.

I was not disappointed. I received an immediate reply. Now the communications part of this story begins. Remember that I am heading at a high rate of speed toward as confusing an intersection of multi-lane super-highways as exists, hoping to quickly arrive at a hospital whose location I do not know in a city with which I am not well acquainted.

The first problem was to tell the answering station my location. But I didn't know *exactly* where I was. All I could tell him was that I was rapidly approaching some signs that said "Las Cruces keep left" and "Van Horn keep right." He knew that the hospital was east of the port of entry, so he said, "Keep right."

This I did, and thus I got headed in the right direction. But I still had not been able to communicate to him *exactly* where I was, and while he knew the location of the hospital, he did not know all the interstate exits (not surprising bcause there are so many of them), and I had not been able to tell him just which one I was near. The answering station knew I needed to get to Raynolds, but he was not sure just how I could get there in the shortest possible time from my ill-defined position.

At this moment K5TRW broke in with a suggestion. His suggestion leads me to believe that he had been able to decipher my location more precisely, so I directed my questions to him rather rudely ignoring the first station which had so kindly gotten me started in the right direction. I had to ignore him, however, as I was fast approaching an exit, and I just had time to

tell K5TRW that I was coming up on the Paisano exit from the west and ask if I should take it. He said yes, and that answer arrived back less than one second before I had to act on the information. I told him that I had taken the exit. He then proceeded to sketch out the path along Paisano to the hospital.

Meanwhile I could see that the street I had exited on was going to run several blocks before I reached Paisano. I suspected that I did not have to cover all those blocks before turning, but I could not ask the question because K5TRW was transmitting. Fortunately, he stopped just as I got close enough to the first cross street to read its name.

I just had time to say, "Am approaching Chelsea. Do I turn?"

K5TRW knew that part of the city so well that he was able to immediately, clearly, and correctly say, "Turn right" just in time for me to do it.

He also immdiately realized two essential things. One that I was moving rapidly (legal but a bit faster than usual), and the other that all transmissions had to be kept short so that questions could be answered while the answer was still useful.

Then, through the process of short, rapid transmissions, I was able to keep him fully informed of my exact position and he was able to direct me to the right at El Paso Drive, to merge with Alameda, and to go to the right at Raynolds. By then I could recognize the hospital from his description of it, and I found the emergency entrance on the west side. I signed and took the injured boy inside.

Two meters had come through again. Oh, it was not a very big emergency, but then few of them are. The student's life was never in danger, yet 2 meters and the ability of K5TRW to direct me through the streets of El Paso saved at least half an hour of transportation time. I could have found a telephone, looked up the address of the hospital, and deciphered the maps in the telephone book. But all this would have taken time during which the injury would have swollen so as to make the treatment more difficult. Thus, while 2 meters was not indispensible, it sure did make a difference.

All ended reasonably well. X-rays revealed a very bad break in the finger tip, the bone was set, and the nail was sewn back on with at least a chance of its growing again.

But the story need not end here. This incident, minor as it was (at least to those not directly involved), can be used to point out several things that we all can do to prepare our stations and ourselves to better handle similar emergencies or more routine requests for information. There are four points that can be made to facilitate the handling of emergencies or requests for information.

1. Know whom to contact.
2. Know your area.
3. Break-in correctly.
4. Keep in touch.

Know whom to contact—and how. Most amateurs, particularly in cities with the 911 emergency number, can quickly contact the city police and fire in case of a real emergency. But wider-area repeaters often cover more than just one city. Do you know the number of the state police? What about a fire outside the city limits? Those numbers are available in the phone book, of course, but it takes time to look them up. The ARRL has a convenient form (CD-209) which has spaces for all emergency numbers and which can be easily carried in the car or kept at the 2 meter rig. If you are a member write for it; if not, make your own.

Most calls for information are not emergencies, though. Here a phone book is a good source of information. A camp site on the edge of town, a propane supply for a visitor—they are all listed in the yellow pages along with exact addresses and telephone numbers. Don't throw away your old phone book. Keep it beside your rig.

Know your area. This requirement usually calls for detailed maps. Not everybody can be expected to have the exact

knowledge of the freeway system and surroundings that K5TRW displayed in the account with which this article began. But good maps, which include details of interstate ramps, will allow you to direct anybody anywhere. The telephone book, real estate offices, and the state highway department are sources of good, free maps.

But maps are not everything. You must learn to look at the countryside with the eyes of a stranger. You may know by looking at the familiar countryside that you are one-third of the way from Las Cruces to Deming, but the W4 headed to California doesn't even know that Deming exists and he might not have noticed Las Cruces. All he knows is that he is approaching mile 121. The mile markers are precise and easy to locate but are usually ignored by the natives. Mark them on your map and particularly label your interstate exits with the appropriate mile number, as it is the most unambiguous label available.

Break-in correctly. But what is "correctly"? There is no one correct way of breaking. Some amateurs just insert their call into a pause in the flow of an ongoing conversation if they casually want to be included, will say "break" if there is more urgency, and say "break" three times if there exists a full-blown emergency.

To break into an informational or emergency exchange already underway is a decision which should not be made lightly, yet which is sometimes necessary. Everybody likes to be part of a real emergency or to be helpful to a passing amateur in need of information, but be sure your information is helpful and necessary.

A case in point is given at the start of this article. The amateur who responded to my initial call for help got me headed in the right direction, but it was clear that he didn't immediately know just where I was or how to get me to the hospital. In listening to us, K5TRW was able to determine that he could give the required direction in a quicker manner, so he broke in with a suggestion to the other amateur so as not to confuse me. I then asked TRW a question which he answered, and my further questions were directed to him. The original station gracefully withdrew from the exchange. K5TRW had something necessary to contribute and he did.

Keep in touch. With the good repeaters that are almost everywhere this last point should be easy, but it is not. The best repeater in the world will not help the mobile get in touch with the base station if the base station is talking. Nothing is more frustrating than telling a mobile station to turn at Main Street and turn the repeater back to him for confirmation only to have him launch into a long description of the buildings he is passing, which clearly tell you that he has already gone past the turn, and you can't get in to tell him to turn back.

When giving directions, a series of short, one-sentence exchanges is often what is needed. That way the directions can be continually updated and any misunderstandings cleared up immediately.

In a true emergency, if the mobile requests a call, he should remain at the radio until the base station reports the call completed. The mobile may think that he has given all the important information to the base station, but the called party may ask further questions to which the base station does not know the answers. Be there and keep in touch so the information can be supplied.

These points are suggestions that can apply to your particular emergency or information search. It will make things go more smoothly. May it go as smoothly and as usefully as did mine. CQ

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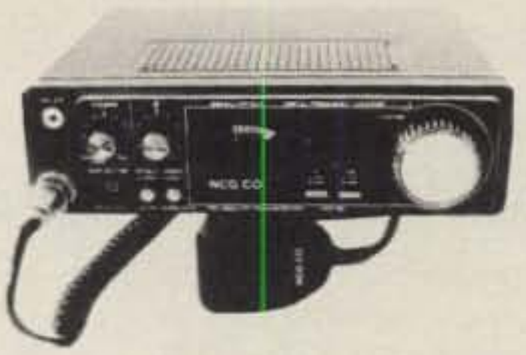

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Flea Market Tickets

We increased Flea Market area by nearly 400 spaces this year and all were sold out by January 10.

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Nominations are requested for "Radio Amateur of the Year", "Special Achievement" and "Technical Achievement" awards. Contact: Awards chairman, Box 44, Dayton, OH 45401.

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Novice thru extra exams scheduled Saturday & Sunday by appointment only. Send current FCC form 610, copy of present license and check for $4.35 (payable to ARRL/VEC) to: Exam Registration, 8830 Windbluff Point, Dayton Oh 45459

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Free parking is available at Hara Arena. In addition, there will be free shuttle bus service from all major motels and designated parking lots. Parking and road information will be available on DARA's 146.34/.94 repeater.

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Free Bus Service will be provided between many Motels and Hara Arena. See the schedules at the motel registration desks. Avoid parking problems at the Arena by taking the HAMVENTION buses.

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Campers and Trailers may be parked at Montgomery County Joint Vocational School. A HAMVENTION bus will provide transportation between the camper parking area and the Arena. No campers or travel trailers will be permitted to park in the Arena lot or Flea Market area.

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Wheelchairs will be available. Send S.A.S.E. for details to "Wheelchair" P.O. Box 44, Dayton, OH 45401.

Alternate Activities

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Award Nominations: April 4
Lodging: April 4
License Exams: March 28
Advance Registration and banquet: USA - April 11
Canada - April 4

Information

General Information: (513) 433-7720
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Announcing:

The First Annual CQ World-Wide RTTY DX Contest

While it may be hard to list each and every distinct special-interest group within amateur radio, one group has had a long history and tradition within the pages of *CQ*—RTTYers. Throughout our long history, we've had columns and RTTY Specials devoted to the "green key" crowd. However, some of the "green keys" are now beige, and there is a definite diminution in those echoing, clanging sounds produced by machines of yore. Times may have changed the hardware (and now software) and perhaps the nature of RTTY, but certainly not the enthusiastic participants both new and old.

In the strictly "green key" era, the mystique of the machines and how they worked kept many at bay. You had to be a combination watchmaker, electrician, machinist, electronics technician, and all-around champion scrounge to get parts. Outside of articles in the amateur press, there were only two good (I say proudly) books produced on the subject, both published by *CQ: The New RTTY Handbook* written by Byron Kretzman, W2JTP, and *RTTY From A To Z*, written by Durwood Tucker, W5VU. These were the standards for amateur radio, and many commercial interests used them for textbooks for their trainees.

These days the "green keys" influence isn't so visible, but it's still there. Today RTTY is a mode that fits in with both the "green key" crowd and the computer generation. Yes, it's not only quite possible but fairly easy to get on RTTY with your computer. There is a proliferation of books, pamphlets, articles, and manufacturers who can show you how to do it simply, easily, and inexpensively (unless you simply have to have the biggest and best), while at the same time utilizing a lot of stuff you already have.

So, one of the things missing from a lot of RTTYers' lives is what to do with all of this stuff. The answer is simple—a contest. The contest idea started with a conversation with Dee Crumpton, N6ELP, at the Dayton Hamvention a few years back. Dee at that time published *The RTTY Journal*. We talked about it at a few other hamfests, and when she turned the reigns of *The RTTY Journal* over to Dale Sinner, W6IWO, he kept the interest going. Well, it's now a fact. *CQ* in conjunction with *The RTTY Journal* will be bringing some DX competition to the RTTY crowd. The rules are simple and it's easy to enter. For this inaugural contest, everyone who submits a log will receive a certificate attesting to their participation. You've got plenty of time to get some gear and brush up on your technique. It's not that hard. You can also operate this one at night without waking up the rest of the house. It's just about totally quiet. Try it out; you'll have fun.

Objective: For amateurs around the world to contact other amateurs in as many *CQ* zones and countries as possible using the digital modes.

Contest Period: 0000 UTC September 26, 1987 to 2400 UTC September 27, 1987. The total contest period is 48 hours, but no more than 30 hours of operation are permitted for single operator stations. The 18 hours of OFF time can be taken any time during the contest period, but OFF periods may NOT be less than 3 hours. All ON and OFF periods must be clearly noted in the log and summary sheets.

Note 1: Multi-Operator stations may operate the full 48 hours.

Note 2: A Single Operator MAY operate more than 30 hours, but only the FIRST 30 hours of operating will count toward the official score.

Operator Class: A. Single Operator. B. Multi-Operator, Single Transmitter (ALL BAND ENTRY ONLY).

Entry Categories: A. All Band. B. Single Band.

Modes: Contacts can be made using Baudot, AMTOR (FEC/ARQ), ASCII, and AX.25. (NO digipeated QSOs allowed.)

Bands: 160, 80, 40, 20, 15, and 10 meters.

Valid Contacts: A given station may be contacted only ONCE per band regardless of the digital mode employed. Additional contacts are allowed with the same station on each of the other bands as well.

Exchange: Stations within the 48 Continental United States and the 13 Canadian areas must transmit RST, state, or VE area and *CQ* zone number. All other stations must transmit RST and *CQ* zone number.

Countries: The ARRL and WAE DX Country lists will be used.

QSO Points: *One (1) QSO point* for contacts within your own country. *Two (2) QSO points* for contacts outside your own country but within your own continent. *Three (3) QSO points* for contacts outside your own continent.

Multiplier Points: *One (1) multiplier point* for each U.S. state (48) and Canadian area (13) contact on each band. *One (1) multiplier point* for each DX country in the ARRL DXCC and WAE lists. NOTE that KL7 and KH6 are country multipliers ONLY, and not state multipliers. *One (1) multiplier point* for each *CQ* zone worked on each band. A maximum of 40 per band.

Note: Canadian areas are VO1, VO2, VE1 N.B., VE1 N.S., VE1 P.E.I., VE2, VE3, VE4, VE5, VE6, VE7, VE8 N.W.T., VY Yukon.

Final Score: Total QSO points times the total multipliers equals the total claimed score.

Contest Entries: All entries must include a SEPARATE log for EACH BAND, a DUPE sheet for EACH BAND, a MULTIPLIER check list for EACH BAND, and an OVERALL summary sheet. All logs MUST show date, time, callsign of the station worked, RST exchanged, state or Canadian area (where applicable), *CQ* zone, and points claimed per contact.

Note: Standard *CQ* World-Wide DX Contest sheets are appropriate for use in this contest.

Disqualifications: Operating in an unsportsmanlike manner, manipulating scores or times to achieve a score advantage, or failure to omit duplicate contacts which would reduce the overall score more than 2% are grounds for disqualification. Decisions of the Contest Committee are final.

Awards: *Plaques* will be awarded to the first-place finishers in each of the operator classes. Certificates will be awarded to second and third place. *Certificates* will be awarded to the first-place finishers in each of the U.S. and VE call areas. *Certificates* will be awarded to the first-place finishers in each DX country. All inaugural contest entrants will receive a certificate.

Logs and Entry Forms: Standard *CQ* contest log and summary forms should be used. Sample log forms and summary sheets are available from *CQ*. Please include an SASE or appropriate postage (stamps or IRCs).

Deadline: All entries must be postmarked NO LATER than December 1, 1987. An extension may be given if requested. Logs should be mailed to CQ RTTY CONTEST, 76 N. Broadway, Hicksville, NY 11801 USA.

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N4LBJ takes another look at an old idea and updates it for today's use.

Variation On A Theme By Marconi

BY DRAYTON COOPER*, N4LBJ

Many amateurs want to work 160 meters, but are frightened away by the prospects of trying to erect a half-wave dipole (about 225 feet overall) on a city lot, or by the cost of a full-size quarter-wave vertical with its attendant ground system.

This article will describe a simple, inexpensive, but effective alternative to either of the aforementioned choices. It is not a new idea by any means, but this version has a new "wrinkle" which may make it attractive to those considering a mainly vertically polarized radiator for 160.

The standard Marconi antenna has been around since the days of the Great Man himself (for whom it was named). It is basically a quarter-wavelength antenna, usually vertical, fed against ground. It is the universal choice of broadcast stations in this country.

*RFD 3, Box 144, Bishopville, SC 29010

As amateurs learned long ago, however, the entire length of a Marconi-fed antenna does not have to be vertical; it can be bent, at a convenient point, making it an "inverted-L." When this occurs, the antenna's radiation becomes partially vertical, partially horizontal.

A major disadvantage to the Marconi antenna is its inherently low radiation resistance, particularly if it is shortened. It also requires an extensive ground system if it is to function properly.

A number of years ago Bill Orr, W6SAI, published a design for a "bent Marconi" which offered a higher characteristic impedance, a higher radiation resistance, and consequently lowered ground losses. As far as I can determine, his original design appeared in one of the early *Amateur Radio Handbook* volumes published by Editors and Engineers. A later version, a bit different from the first, appears in the *Wire Antennas* volume. In both these designs the antenna used 300 ohm twin-lead as the main radiator. Orr suggests that using 300 ohm ribbon, the antenna will present approximately a 50 ohm match to the transmitter. Coupled with the lowered ground losses, this yields an effective 160 meter antenna.

Faced with a problem of finding good-quality 300 ohm ribbon capable of handling a kilowatt of RF, I changed the design slightly and have found this version of the antenna to be unusually effective on top band. The change I made was extremely simple: I substituted 450 ohm "ladderline" for the 300 ohm ribbon.

To construct this version of the "bent Marconi," measure a piece of 450 ohm ladderline a bit longer than a mathematical quarter-wave on the portion of 160 you intend to operate. Use the formula 234/F and then add perhaps 10 feet to the amount. This extra length will give you some "pruning" room when you begin to trim the antenna for minimum SWR.

Pull up the antenna into "inverted-L"

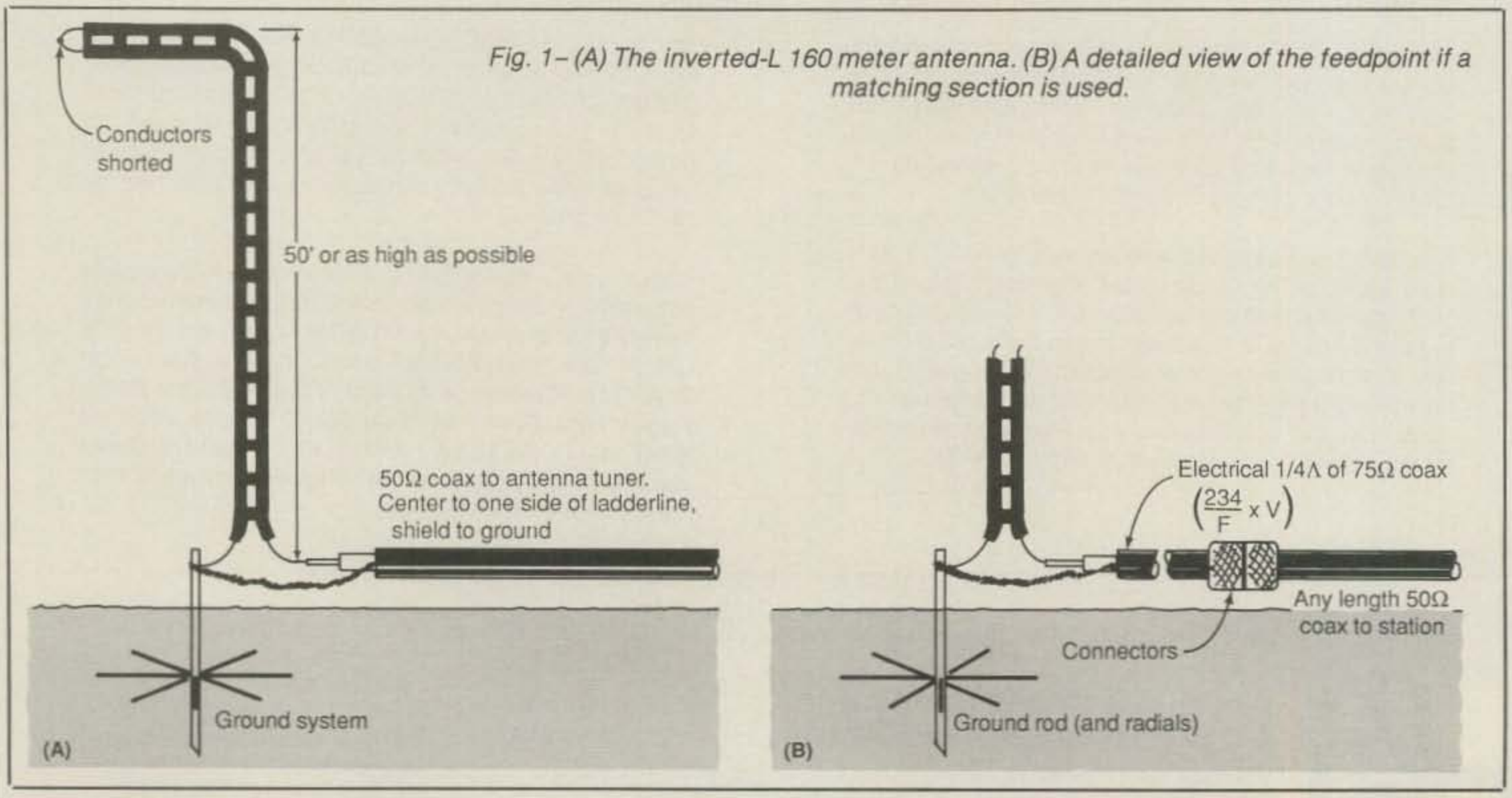

Fig. 1– (A) The inverted-L 160 meter antenna. (B) A detailed view of the feedpoint if a matching section is used.

configuration, trying to get as much of the antenna in a vertical position as possible. You may use a mast, a tree, or a tower for the support. If you use a tower, or metal mast, however, keep the ladderline at least a foot or so from the metal support.

Before pulling up the far end of the antenna, be sure to short the two conductors of the ladderline. It is not necessary to solder this connection at this time, as you will undoubtedly find you will need to shorten the flat-top portion when you bring the antenna into resonance.

The feedpoint of the antenna should be wired so that the center conductor of your coax goes to one side of the ladderline, while the shield goes to the other side, *and ground*.

Since this version of the Marconi exhibits lower ground losses than the standard variety, a simple ground rod driven into earth at the base of the antenna *may* suffice as a ground system. A much better ground system, however, would consist of several radials attached to the ground rod. Tie in a chain-link fence if you have one, or the cold-water pipes in your plumbing system (if they are metal).

The ground system serves several functions in this antenna system. It is beyond the scope of this article to discuss them. The bibliography at the end of the article will provide you with several sources for more information.

I am presently using a ground system of 15 radials, 70 feet each, plus a chain-link fence. I chose this configuration based on information derived from a chart shown in one of the standard works on vertical antennas.

After having pulled the antenna up into place and after having made and checked the connections, it is time to check the antenna for SWR and resonance. You will most likely find your minimum VSWR to be about 2:1. This will have to be overcome by either using a coupler between your transmitter and the antenna, or an impedance matching transformer. Since I have used a wide-range T-match coupler for years, this is the method I use to bring the system into a 1:1 situation.

A simple impedance matching device can be made from a section of 75 ohm coax cut to an electrical quarter-wave and inserted into the transmission line at the base of the antenna. This will present a nominal 2:1 transformation. To find the proper length, use the 234/F formula and then multiply that result by the velocity factor of the cable you intend to use. The answer in the final calculation will yield an electrical quarter-wavelength (234/F × V).

After you have found the proper length of the flat-top which produces the lowest VSWR, lower that portion of the antenna and solder the shorting connection at the far end of the antenna. Check all the other joints for good connections and then raise up the antenna and fire away!

It is customary to run the "brag tape" at this point in any antenna article, and I make no exception to that rule. Using this antenna and running no more than 700 watts out, I have had very good success. During the first 10 weeks of the 1986–87 DX season on 160, I worked all continents, both Russian and Canadian Arctic provinces, throughout Europe, the Caribbean, and South America. In addition, I logged as many new countries in the first 10 weeks of this season as I had in each of the preceding two years. And I had not worked any contests to add to the totals.

For minimum investment in money, time, energy, and real estate, I think you will find this variation on Professor Marconi's theme to be well worth your while.

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Here's a good idea made better by a little old-fashioned ingenuity. KA2SCJ takes an earlier CQ article one step further.

A Fold-Over Tower Support For Your B&W AV-25 Vertical Antenna

BY JOHN E. EVERSON*, KA2SCJ

Back in 1983 we ran an article called "Parallel Verticals" by Robert Johns, W3JIP, of Barker & Williamson. It was a very popular article and described an antenna that many amateurs subsequently built. There was an unfortunate gap in that we had to publish corrections to the article to overcome a few errors that we, not the author, introduced. The original article appeared in the August 1983 issue on page 20. The very important corrections (dimensions) are in the December 1983 issue on page 6. It's still a good antenna project that's made a lot easier to deal with via KA2SCJ. I have to add that the computer-generated drawings were supplied by the author and are most impressive. —K2EEK

In the August 1983 issue of *CQ* magazine Robert H. Johns, W3JIP, presented a construction article on building a copy of the Barker & Williamson AV-25 parallel, multi-element, vertical antenna. Being a fairly new Novice operator at the time, and lacking a decent antenna that would cover all the Novice bands and lend itself to the added privileges at upgrade time, I bit on it and decided to build the antenna.

A letter to Mr. Johns brought a quick and informative reply. In the letter he pointed out several corrections to the printed article and mentioned that others, besides myself, had also asked for his opinion on alternate methods of supporting the antenna.

The article, as well as the commercial version, calls for guying the antenna as its means of support. Mr. Johns was justifiably non-commital on alternate, untried methods of support.

Several factors were prompting me to consider alternate methods of support. The main concern was the hazard the guy wires would present to my three active children who, gratifyingly, run quite free on my four acres. A second concern was that I did not want to locate the antenna too far from the house. This would have made guying practical, but the cost of coax and having to bury it as well as burying the ground system in brushy ground prompted me to make the decision to locate the antenna in the tended portion of lawn surrounding the house.

This led immediately to concern no. 3. I mow approximately 1½ acres out of my 4, and this is done on a large lawn tractor with a 48 inch mower deck. Keeping interferences to a minimum is essential to mental equanimity as I wile away good amateur radio time ensconced upon the "mean-green" hay-eater. Flower gardens and shrubs are bad enough, not to mention the bicycles and baseball bats!

Many possibilities presented themselves as I mulled over how and where to place my masterpiece of plumbing and radio technology. Supporting it directly on the side of my garage or the house was considered, but these locations were abandoned due to an anticipated reduction in the expected performance of the antenna.

I finally borrowed and expanded on a method of support used by one of the amateurs who Elmer'd me into the hobby. George Eisman, W2SPQ, built substantial fold-over supports to hold up the ends of a multiband dipole he fabricated. (George is one of those old-school amateurs who builds most of what he needs and is up-to-date on today's equipment as well as the oldies.)

After looking over how he had done his supports, the basic shape of what I needed to support the vertical became obvious.

One advantage I had that he didn't have when he built his supports was the wide availability of pressure-treated lumber. This took care of the main building material decision. How to fasten the antenna to the support was solved by realizing that the downward moment of the antenna could be carried by the rings of PVC pipe used to separate and hold the three elements. These are rested on ladder–type cross arms affixed to the main support upright.

The antenna is held to these cross arms with simple copper tubing hanger clamps and brass screws. The brass will eliminate corrosion problems and keep the assembly looking neat. Stainless-steel could be used, but it's more expensive.

The main upright is fabricated from two 16′0″ long 2″×4″ pieces of pressure-treated lumber. One 16′0″ 4″×4″ could be used, but unless the lumber you buy has been sitting and dried for a couple of years and is dead straight, it *will* twist and warp. By taking care to ensure that the grain of the two 2″ × 4″ members is opposing, the chance that the tower will twist and rack severely is reduced considerably.

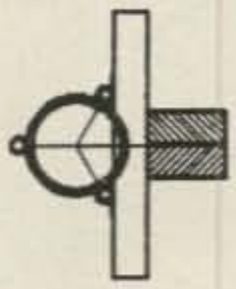
Another hint in building this or any other project from wood is obvious. You get what you pay for! This tower is expected to last a while. Don't chintz and get the cheapest pressure treated available. No matter what you do to prevent it from happening, cheap pressure-treated lumber from chain-type outlets will warp. Spend a few extra pennies for the good stuff and you'll be rewarded with a long-lasting project that should hold its shape.

Use galvanized 16d nails to nail the various sections up. This will prevent unsightly rust stains, and the acid rain that the government says doesn't exist will not eat away your fasteners within 9 months.

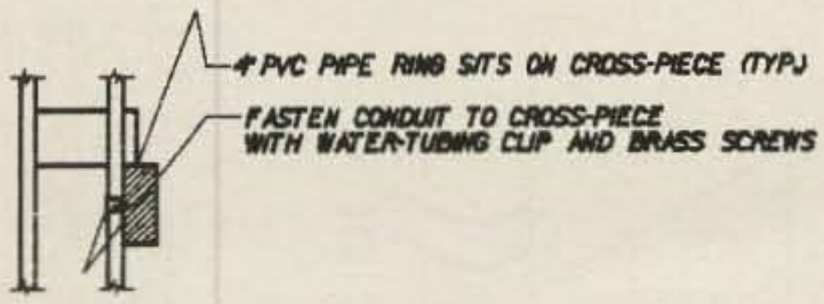
Make sure that you radius the tops of the base-section uprights. If you don't, the first time you try to fold over the assembled tower you'll understand why it's necessary. The corners of the uprights will crimp the two back elements. I luckily foresaw this problem as I was inserting the assembled tower into the uprights and sawed off the corners. It would have looked much neater done ahead of time and radiused instead of just the corners cut off. Conduit is cheap, but in this case miserable to replace!

Attach the antenna to the main support

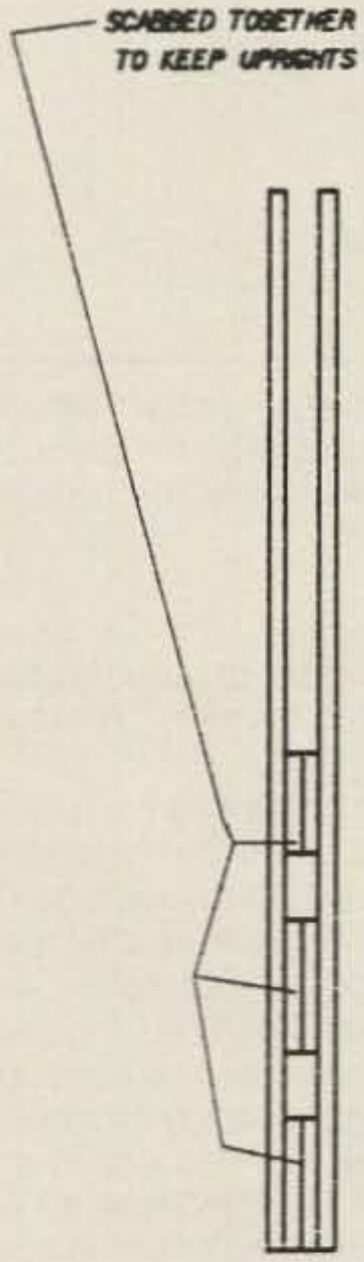
*7506 Stoneylonesome Rd., Williamson, NY 14589



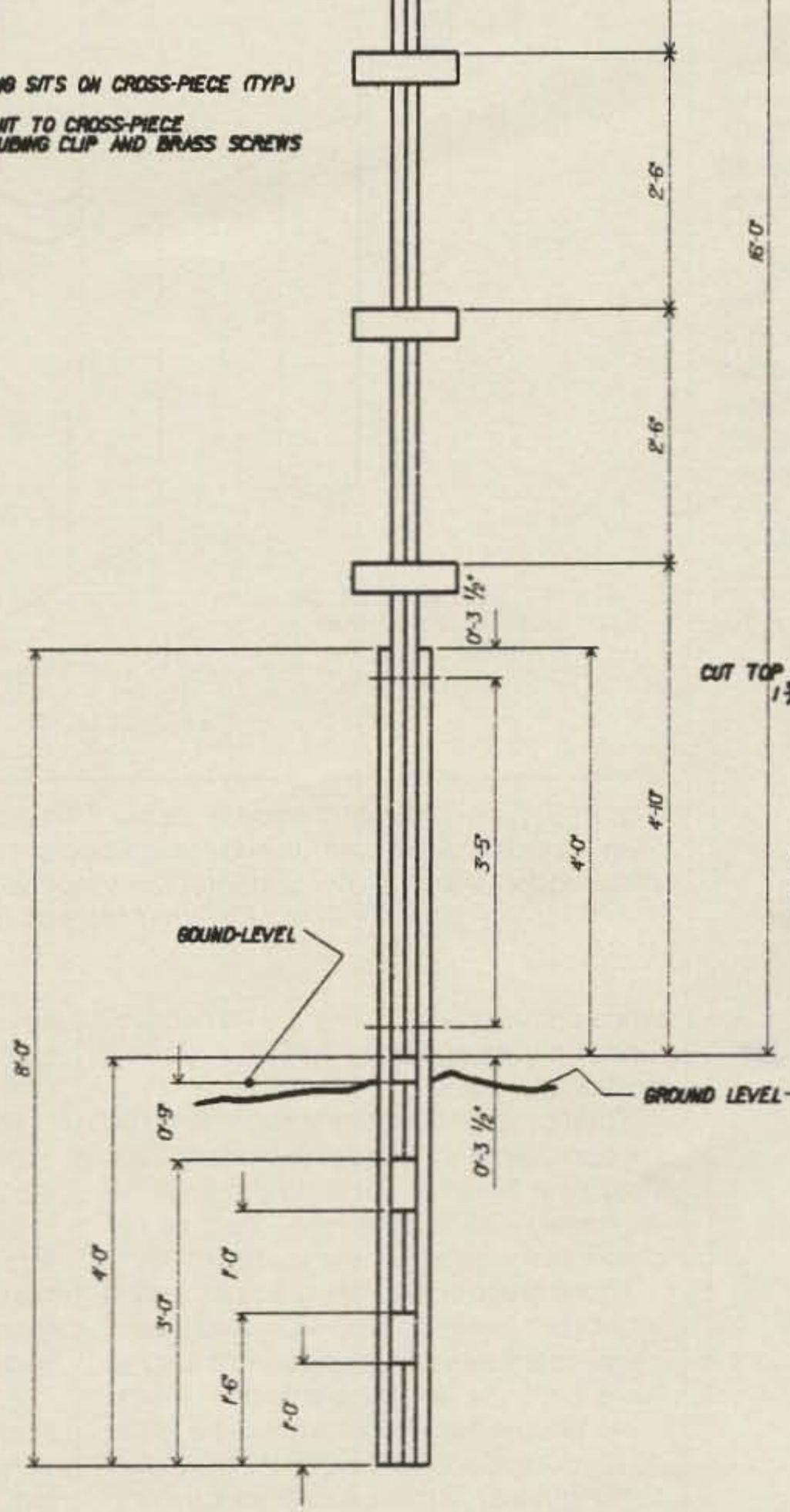
PLAN IN SECTION



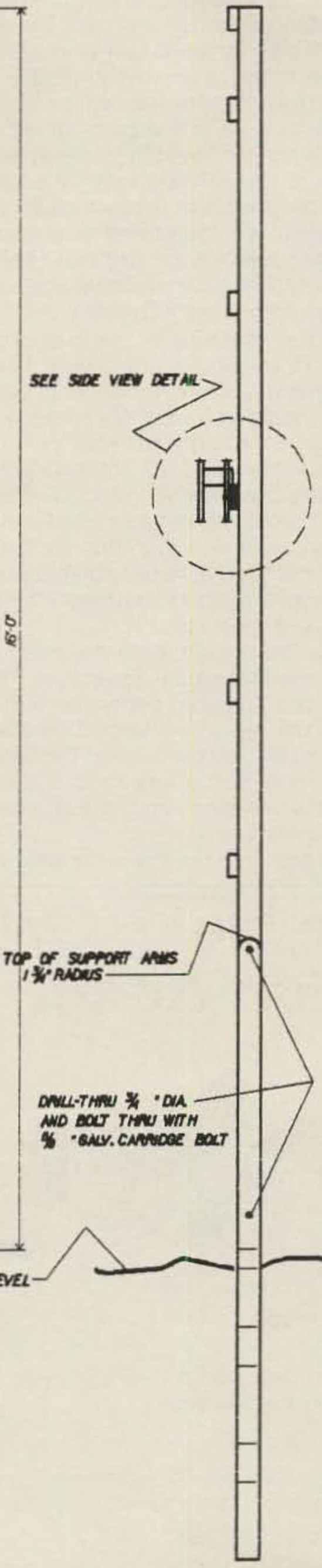
SIDE VIEW - DETAIL



SUPPORT DETAIL



TOWER-SUPPORT ASSY.-FRONT VIEW



ASSY.- SIDE VIEW

Fig. 1– Overall mechanical diagram for the vertical antenna support system. Be sure to use good-quality pressure-treated lumber for the project. The side view detail is also shown in fig. 2.

upright before assembling it with the base section, which should be buried and concreted in place before hand. The assembled tower-antenna unit is awkward to handle, so do the assembly function as close to the final antenna sight as possible. The help of a friend or grudging spouse is needed to set the tower/antenna in place. They'll help you get it upright, and slip the pivot bolts in place for you.

Once in place, **always pivot the assembly on the upper bolt**. You will find that raising and lowering the antenna is manageable, but again, help is recommended.

As to the suitability of this support, I have had it up for 3 years to date. I live about ¾ mile back from the shore of Lake Ontario and up on a knoll. My property is wide open to the northwest whence cometh the winter and all its blustering nastiness along with the spring, summer, and fall thunderstorms/gales that are a trademark of life along the southern shore of the lake. Both the antenna and tower have withstood anything Mother Nature has thrown at them.

As a whole project, both the antenna and the tower are a great ego builder. The antenna is a fantastic performer with a good ground system attached (needed for *any vertical*, of course). And the benefits of having it on a functional support make maintenance and adjustments straightforward.

At the present time this is the only antenna I have up and running. I run it barefoot with my Kenwood TS-530S and have worked the world.

Total cost for both the antenna and the support came in at approximately $35. Your cost for either or both depends on your ability as a scrounge. Most of my cost was for good lumber for the tower.

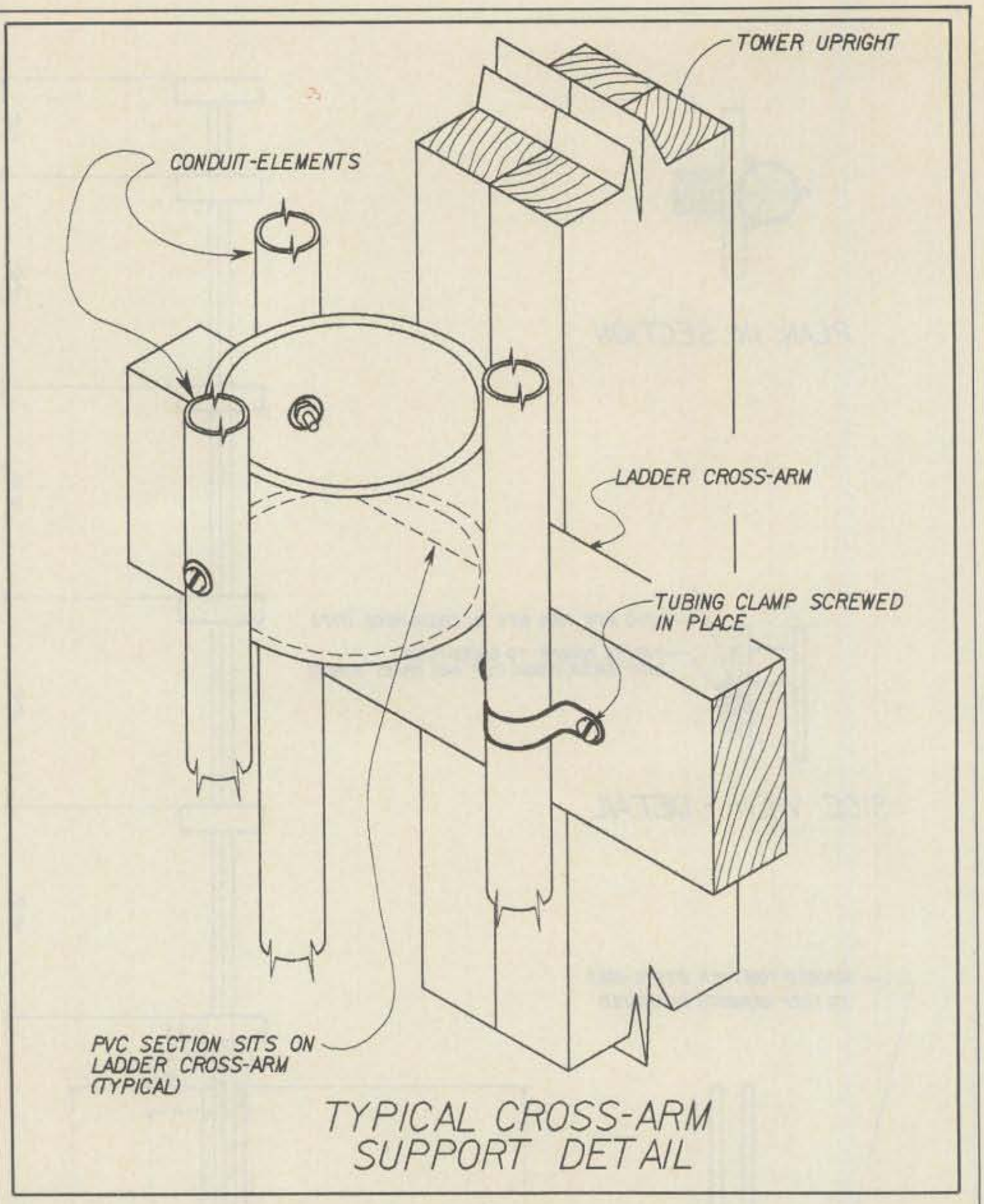
I have given copies of my plan to several people I talked to on the air, and a couple of members of the clubs I belong to have built the antenna and the tower. Most people see the antenna as a great do-it-yourself project, but turn it down due to the guying. This is unfortunate, whereas the antenna, while involved, is a straightforward project that can be carried out without the need for sophisticated tools and equipment. It can easily be fabricated using a few simple hand and hand-power tools.

The antenna itself is an ace performer. I get good reports consistently with it. The key here is the time spent burying an adequate ground-plane system. "There is no free lunch!"

I've talked with hams who were looking into the purchase of the commercial version and who were also discouraged due to proscribed use of guying as the means of support. I think my alternative, while more complex than simply guying the antenna, answers most of the concerns I had and those expressed by others.

An added benefit of this antenna and support is that it fits into limited space very efficiently. If limited space is a problem, many alternatives to a full-blown radial ground plane are possible. Running the radials around obstructions can be done. Burying strips of chicken-wire fencing and connecting these as a ground plane has been tried successfully. The main objective is to have as large and efficient a ground-plane as possible.

Good luck and happy building. HI



TYPICAL CROSS-ARM SUPPORT DETAIL

Fig. 2– Typical cross-arm support detail. This area is also called out in fig. 1 as a side view. Copper-tubing clamps and brass wood screws are used to attach the antenna to the wooden support. The antenna also receives some support from the portion of 4 inch PVC that rests on the cross-arm.

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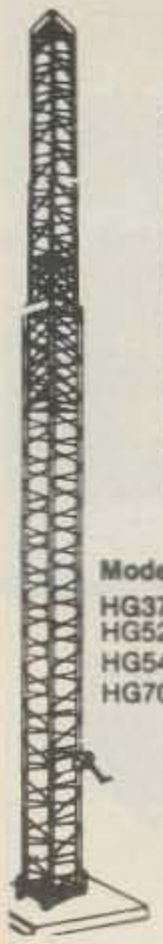

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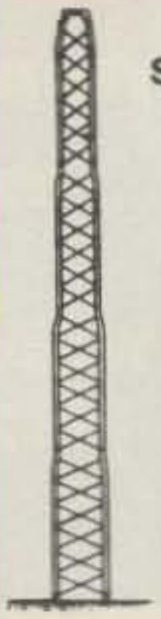

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60'	639	1209	1609
70'	689	1329	1759
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120'	1259	2179	2819

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TX472	23'	72'	18 sq ft	2059
HDX555	22'	55'	30 sq ft	1879
HDX572	23'	72'	30 sq ft	3229

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***Note-towers rated at 50 mph to EIA specifications**

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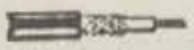

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RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

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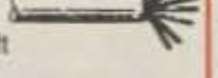

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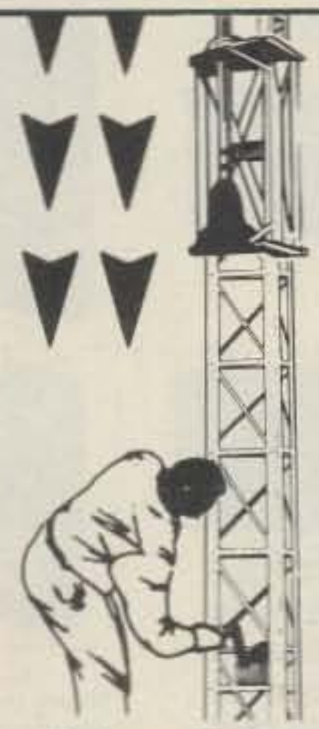

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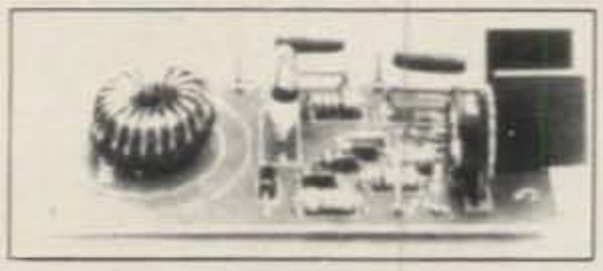

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Here's an interesting idea that's easy to duplicate. If you've got limited space, an RV, or need a simple antenna that travels well on vacation, check out this one.

An HF Mini-Dipole Using Mobile Whips

BY BOB NORLOFF*, W4GEX

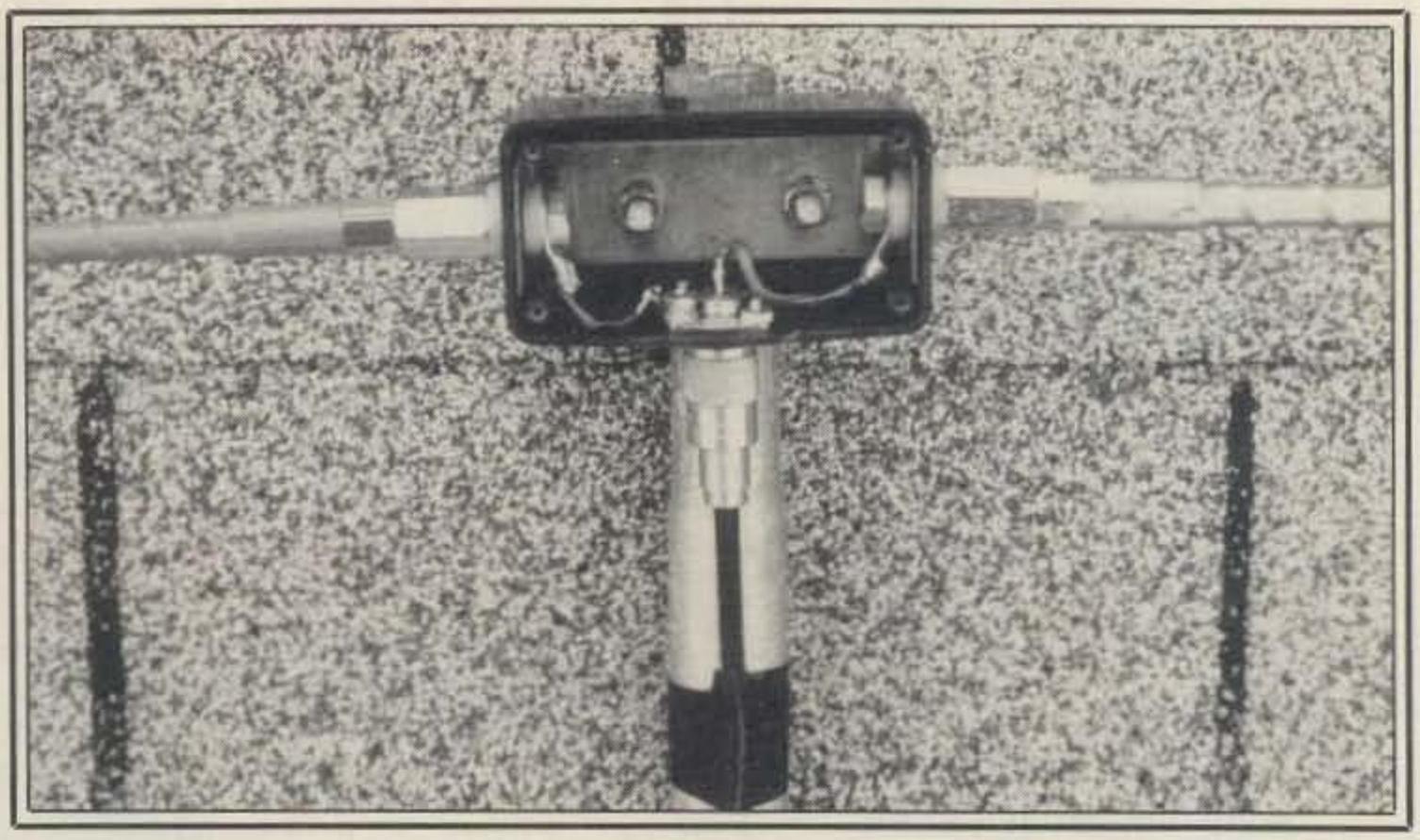
Having had success in mobile HF operation with quarter-wave whip antennas designed by WD4BUM, it occurred to me that two of these would make a very compact dipole useful for either portable or fixed operation. A quarter-wave monoband whip weighs only 9 ounces and is about 7½ feet long. This would make a dipole only 15 feet long, on all bands. This idea was carried forward and a mount made for accepting either 40 or 20 meter whips.

The mini-dipole's short overall length and light weight make it attractive for use in areas of limited space. If your backyard situation is like mine with crisscrossing power and telephone lines and no place for a full-size dipole, then this is the one for you. For portable operation it can be quickly assembled or disassembled and requires only one support, such as a TV mast. Those living in apartments, condos, or buildings with restrictions on outdoor antennas may be able to hang it indoors or from a ceiling.

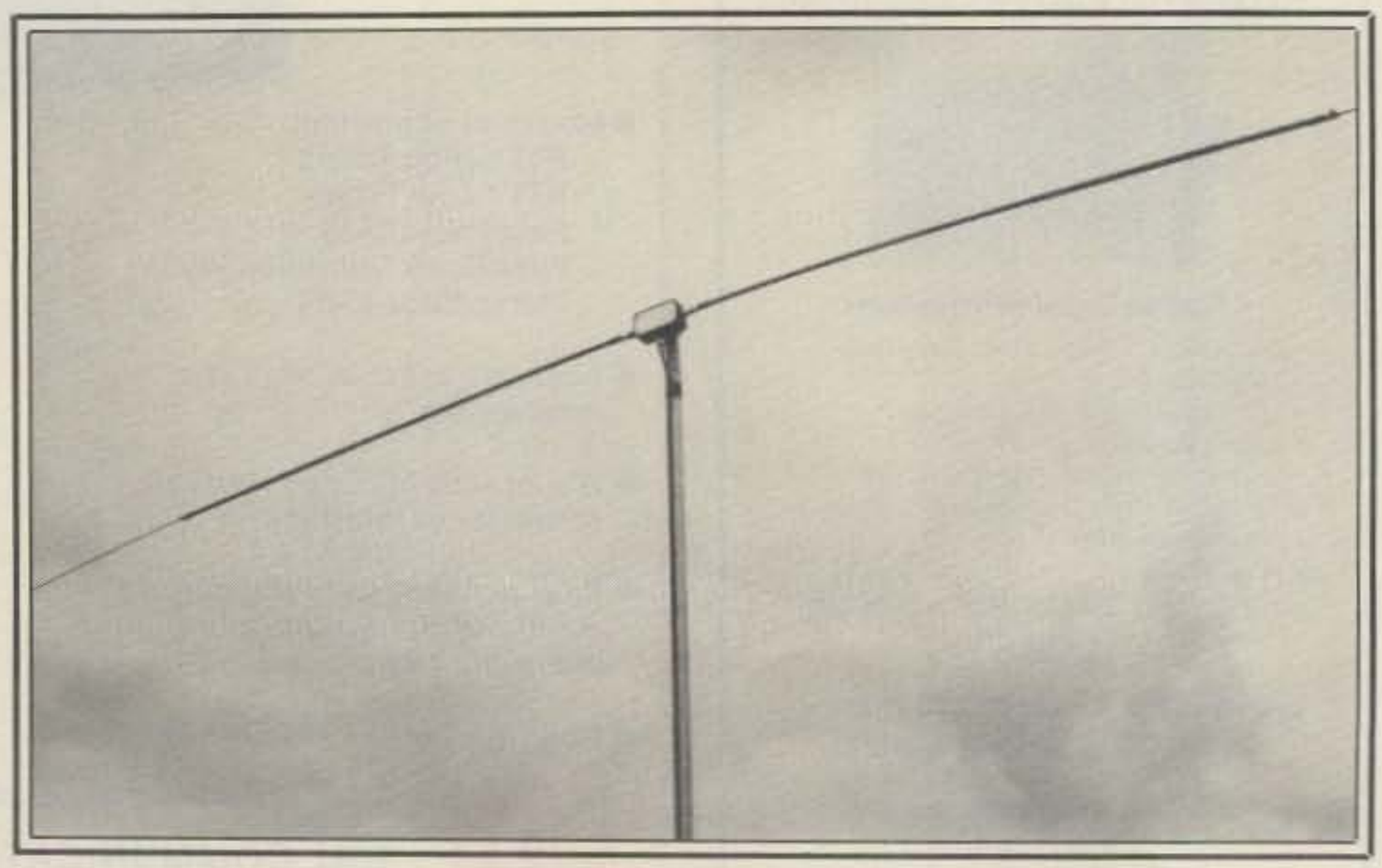
The whips each consist of a hollow fiberglass base section over which is wound a combination of helical and tight-wound loading coils into which a tapered 4 foot stainless steel rod telescopes for field tuning. A base-section diameter of less than a half-inch assures low wind loading and a low profile. These whips are available for bands 75 through 10 meters.

To mount two of the quarter-wave whips as one dipole, a center, weather protected, junction-box mounting was fabricated using a plastic experimenter's box 4" × 2⅛" × 1⅝" with aluminum cover. This box was obtained at a Radio Shack store along with an SO-239 coax

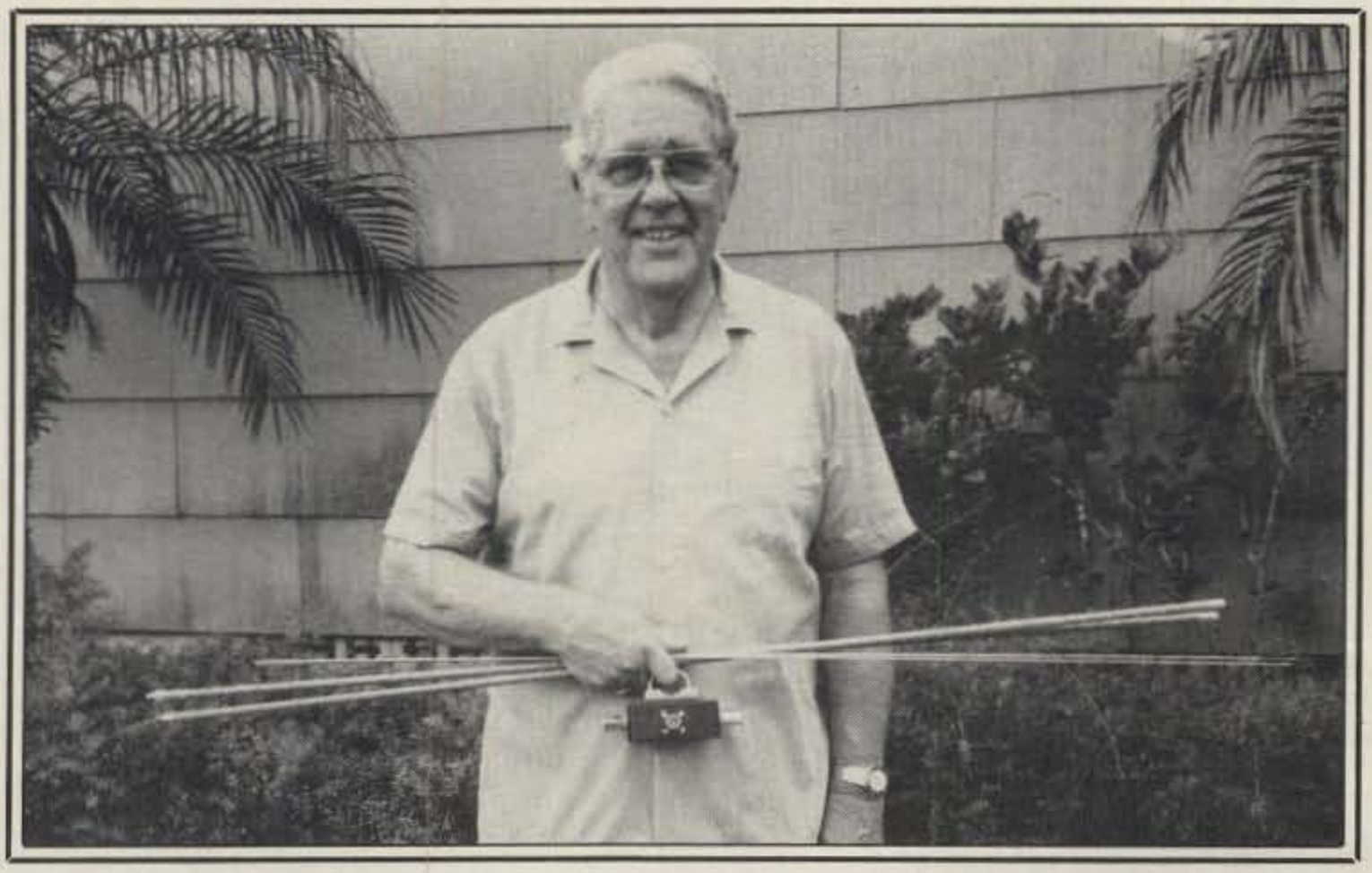
*750 20th Ave. N., St. Petersburg, FL 33704



The center support box with the aluminum cover removed. The "C" shaped support bracket made of aluminum can be seen at the rear of the box.



This is what the antenna looks like installed on a TV mast.



The author holding a disassembled mini-dipole antenna ready to take it on the road.

receptacle, two insulated feed-throughs to accept the standard mobile ⅜ inch thread, and a combination U-bolt/mast-bracket. A reinforcing piece of aluminum 1 inch wide by 7 inches long and 1/16 inch thick was formed into a C-shaped bracket to fit snugly into the plastic box along the bottom and up the small ends of the box. Half-inch holes were drilled at each end of the box through the aluminum bracket to mount the feed-throughs. The bracket reinforces the plastic box to support the quarter-wave whip sections and the U-bolt and mast-bracket assembly as can be seen in the photo. An SO-239 coax receptacle provides a convenient connection to the 52 ohm feedline. No balun is used.

If used indoors, the center insulating support can be made from a small block of wood with two small pipe clamps to hold the threaded feed-throughs in place.

The mobile whips and various mounting brackets can be obtained from the distributor, Mobile Antennas and Accessories, Route 1 Box 406C, Pond Road, Burlington, NC 27215. A set of two whips for one band costs just under $28. The total cost including parts for the junction box less the supporting mast and coax is about $38.

An ICOM 735 HF transceiver was used for checking SWR. Its built-in bridge was checked with that of a Drake SWR/Power meter also in the coax line. As the SWR chart shows, 20 meter resonance at 14,100 kHz produced a bandwidth of 200 kHz with an SWR of 1.8 to 1 or better. The bandwidth was about 75 kHz on 40 for the same limits. Resonate the antenna to your favorite part of the CW or phone band, and if necessary, use a Transmatch to assure full coverage of the band without a reduction in RF output.

One important caution: When adjusting the telescoping rods to the desired frequency at the higher end of a band, it may be necessary to remove 2 or 3 inches from the ends so that the rod does not extend into the close-wound coil. Inductive heating of the rod will occur, reducing antenna efficiency. Also, transmitter output levels should not exceed 125 watts key down.

On-the-air CW tests were made comparing performance of the 40 meter mini-dipole with that of a full-size dipole. Both antennas were 20 feet above ground and oriented in the same direction. As expected, the full-size one was generally superior. However, many times when switching between the two, the reported difference in signal was not noticeable. No full-size 20 meter antenna was available for comparison, but many solid QSO's were had on 20.

The important point in this discussion is that the mini-dipole does perform and does so very well. With its small size it can be used in areas where space is extremely limited, thereby allowing enjoyment of HF operation by amateurs who would otherwise be denied this pleasure.

Perhaps some technically astute person can come up with a design for a two- or three-element mini-beam using these light-weight whips. How about one for 40 meters? Also an evaluation of a rotary mini-dipole, with emphasis on directivity, could be interesting.

I am presently testing a dual/tri-band mini-dipole with a mount that will accept one, two, or three sets of whips for different bands, electrically parallel for one coax feedline and physically arranged in a sort of bow-tie configuration.

My thanks to Larry, K4BJ, and Bob, AA4U, for their help with this project.

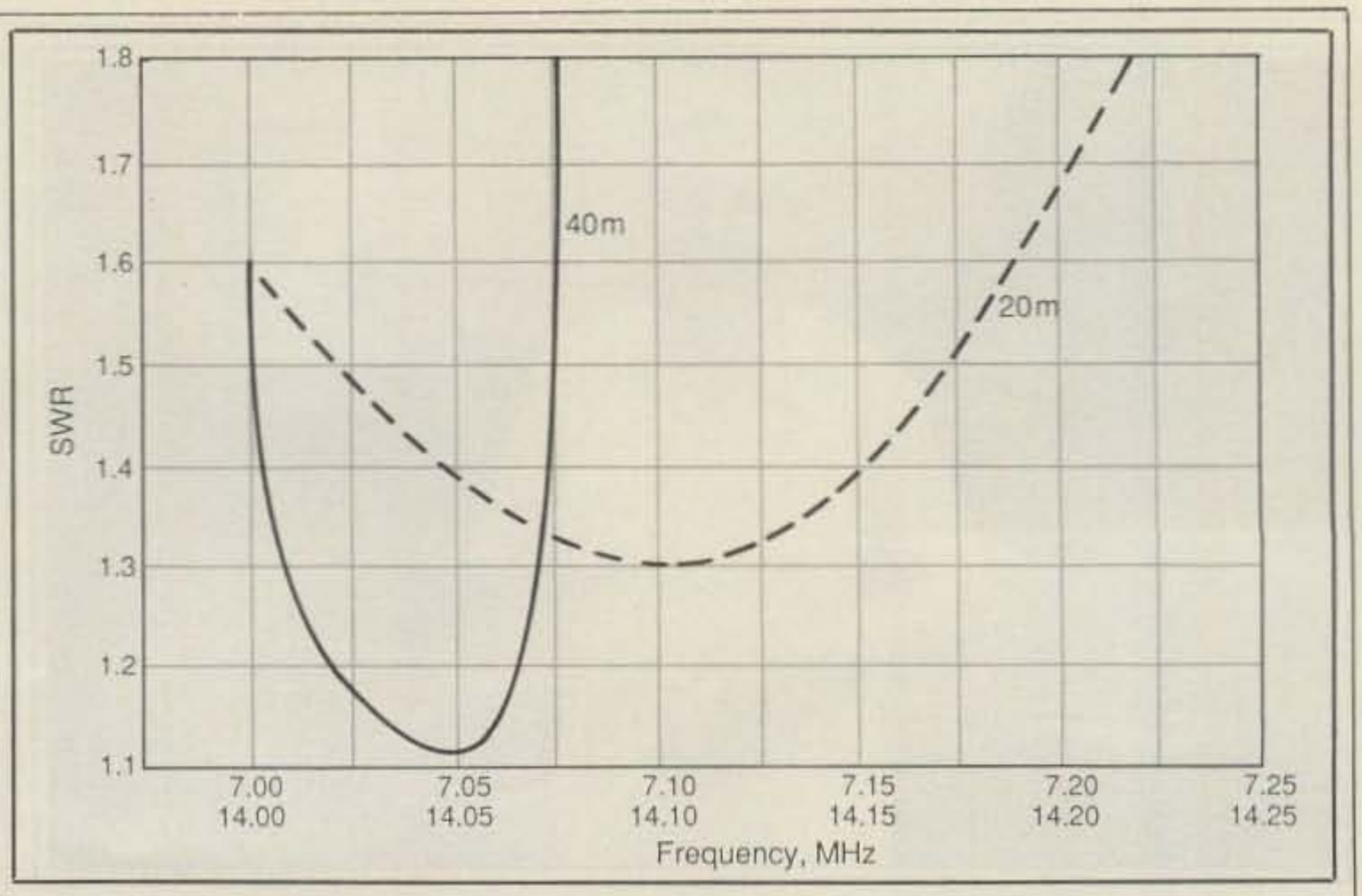


Fig. 1– SWR curves for 40 and 20 meters using the HF mini-dipole antenna.

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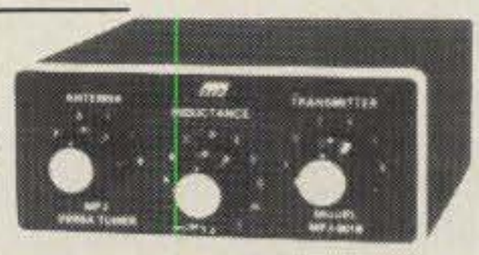

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This is the third part of an eight-part article. New amateurs will find that each part of this article is useful by itself; however, maximum benefit can be derived from reading the entire article. Previous issues of *CQ* can usually be purchased at $2.50 each by writing to *CQ*, 76 N. Broadway, Hicksville, NY 11801.

SWR/Power Meter

Standing wave ratio (SWR) meters are used to get a rough idea of how good (or bad) the impedance matches are between the transmitter output, transmission line, and antenna. The SWR meter is strictly a test device, and it is not required for normal station operation. However, it is now built into the transmitter output section of most transceivers. These rigs are designed to reduce RF power output when the SWR is above 3:1. It is handy to borrow an SWR meter to conduct tests when the station installation is first completed, if you do not have one built into your transceiver. If you are going to use a longwire antenna in conjunction with a random-wire tuner, you will need an SWR meter. It has been a common practice to leave an SWR meter in the transmission line at all times, but this is not really a good thing to do because it involves two more connectors and a separate length of transmission line. If one leaves the SWR meter in the line at all times, there is a slight unnecessary loss of transmitted and received signals.

Don't spend too much time or effort trying to get your standing wave ratio down to the optimum one-to-one on each band. Obviously, it's best to have the lowest possible SWR to make sure that the antenna accepts (and radiates) as much RF energy as possible. A high SWR indicates a lot of power is being reflected back into the transmitter's output stage, which results in undesirable heating and possible component damage. Nevertheless, you can live with a bit of reflected power, and an antenna with an SWR of 2.5:1 (or less) is acceptable. An SWR of more than 3:1 is undesirable.

Power meters are in the same category as SWR meters, and the two are often combined in a single unit. A power meter is a useful piece of test equipment when checking a transmitter's RF output, but it is not required for normal station operation. Most transceivers include capability to meter transmit RF power output.

2814 Empire Ave., Burbank, CA 91504

This is 10-year-old Colleen Brady, KB2BRL, of East Aurora, New York. Her Mom is KA2TDG and her Dad is WB2WPM. Colleen has been pleasantly surprised to learn that subjects she studied to get an amateur license help her in school, and vice versa. Amateur radio has increased her interests in mathematics, geography, and science. She contacted amateurs in 22 states and 3 countries during her first month on the air. The station she shares with her parents includes a Kenwood TS-440S transceiver, Cushcraft A-3 triband beam, and dipoles for use on 40 and 80 meters. Colleen is a Girl Scout. She also enjoys playing soccer and reading. Her cocker spaniel's name is Lasagna.

Dummy Load

The dummy load is used as an RF load for the transmitter when one performs transmitter tests and adjustments. A true dummy load does not radiate RF energy. It is a piece of test equipment that is not required for normal station operation.

Please understand that it is not safe to load a transmitter into a dummy load and to assume that no further transmitter adjustments are necessary when you switch from the dummy load to an actual antenna. The dummy load is a useful piece of test equipment, but it does not present the same electrical load to a transmitter as is presented by an antenna. I sometimes find Novices making this mistake, which results in poor operating results.

Amateurs often use incandescent light bulbs as dummy loads. This is a poor practice because light bulbs radiate signals, and they do not act as the flat resistive load you should have when conducting transmitter tests. Light-bulb dummy loads have been heard by amateurs thousands of miles away from the test location.

Receiver Sections of Transceivers

Whether a receiver is housed in its own cabinet or enclosed as part of a transceiver, it should be sensitive, stable, selective, and simple to operate. The receiver section in almost every modern receiver has excellent sensitivity and stability. Their selectivity is seldom good enough without adding a narrow code filter, and some are not simple to operate.

Sensitivity. A sensitive receiver can produce a useful audio output even when the received signal applied to its antenna input is extremely weak. Modern receivers are so sensitive that they will allow you to work stations which produce less than one-millionth of a volt (one microvolt) at the antenna connection. Simply stated, a sensitive receiver lets you hear extremely weak stations that would be difficult or impossible to hear with a less sensitive receiver. Sensitivity is the most important consideration in selecting a receiver because you just cannot work stations that you cannot hear. Naturally, the reception of a weak station (that is marginal with a less sensitive receiver) becomes much easier when a more sensitive receiver is used to produce a stronger output.

Selectivity. A disadvantage associated with using an extremely sensitive receiver in a crowded Novice band is that you can be greatly bothered by hearing several stations at the same time. A simple way to minimize this problem is to reduce the amount of frequency spectrum you hear, and this is what increased (narrower) receiver selectivity does for us. As previously mentioned in the transceiver coverage, lack of selectivity is easily overcome by using one of the fine internal or external filters that are available. You should have no trouble connecting or using a filter. If you have a receiver which has a code filter available but not installed, it is worthwhile to install it. Operating capabil-

ity and pleasure are greatly improved by eliminating most of the interference that could be bothering you from other stations and atmospherics. Good selectivity is the second most important attribute of a receiver to be used in the Novice bands.

Stability. Stability of two types must be considered—mechanical stability and electrical (thermal) stability. All modern receivers have good mechanical and electrical stability.

Mechanical. If a receiver has good mechanical stability, it is not jarred off frequency when someone or something physically causes it to be moved. If a receiver has poor mechanical stability, it jumps off frequency as anyone walks by your operating position, leans on the operating table, or applies even a slight amount of pressure to the front panel or cabinet of the receiver. It is easy to determine whether or not a receiver has satisfactory mechanical stability. Select a steady signal such as the WWV time and frequency standard on 2.5, 5, or 10 MHz. Then set the receiver to its maximum (narrowest) selectivity position. Select Code/CW mode by setting the appropriate switch to ON or CODE. With receiver setup as described, and with the volume high enough to hear the received signal, jar the receiver's front panel with your hand. If the audible beat tone jumps with even a light touch of the hand, it has poor mechanical stability. If the received tone does not change pitch when the receiver is jarred, the receiver has good mechanical stability. The mechanical stability of some old receivers is so poor that frequency shifts when any front-panel control is touched, whereas others are so stable they won't shift frequency even when a corner is lifted and dropped. If you have a receiver with poor mechanical stability in an old transceiver, you can learn to use it effectively as long as it has adequate sensitivity and selectivity. This problem is partially overcome by setting the mechanically unstable transceiver on a very solid table or desk, instead of on something flimsy such as a card table. You can learn to minimize the pressure you apply to front-panel controls as you operate the receiver. It sometimes helps to set the equipment on a cushioning material. It is nice to have a receiver with good mechanical stability, but this is one feature you can do without and still enjoy excellent operating results.

Electrical. If a receiver has good electrical stability, it does not shift frequency very much between the time it is turned on and when it has heated to its normal operating temperature. It is easy to check the electrical stability of a receiver. As soon as you turn on the cold receiver, tune it to a dependable fixed frequency station (such as WWV) and note the exact setting of the tuning control. As the receiver warms up, you may find it necessary to adjust the tuning control to keep the station tuned in; this adjustment is due to electrical (thermal) instability. Record the amount of adjustment required every few minutes to keep the station tuned in. Even if a receiver is electrically unstable, it usually stabilizes fairly well after about 15 minutes of operation.

Some receivers in old transceivers continue to have slow but gradual frequency shifts, no matter how long they are operated. If a receiver is electrically unstable, this problem can be minimized by leaving it turned on at all times. If a receiver is going to be left on when not in use, the standby-receive switch (if it has one) can be left in the standby position to minimize power consumption.

Simplicity. Simplicity of receiver operation is important to a new amateur. I have known Novices who had a very difficult time learning to properly operate receivers which have a confusing assortment of front-panel controls. An overly complex looking array of controls can decrease the confidence of a new operator and can contribute to poor operating results. The proper use of simpler receivers is more easily mastered by new Novices. Any new amateur using a receiver with a bewildering array of front-panel controls should determine which controls can be left off or at zero and leave them alone until their functions are completely understood. You should take the time to completely understand the exact function of each control on your station equipment, and instruction manuals provide this information. You must know your equipment very well to obtain optimum operating results when you use it.

This concludes the third part of this eight-part article. The fourth part covers stacking equipment, custom consoles, safety, electric power, and RF ground.

Photographs Wanted

Photographs of Novices in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year *CQ* subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs. I have not received a picture from a Novice in Hawaii or Vermont.

73, Bill, W6DDB

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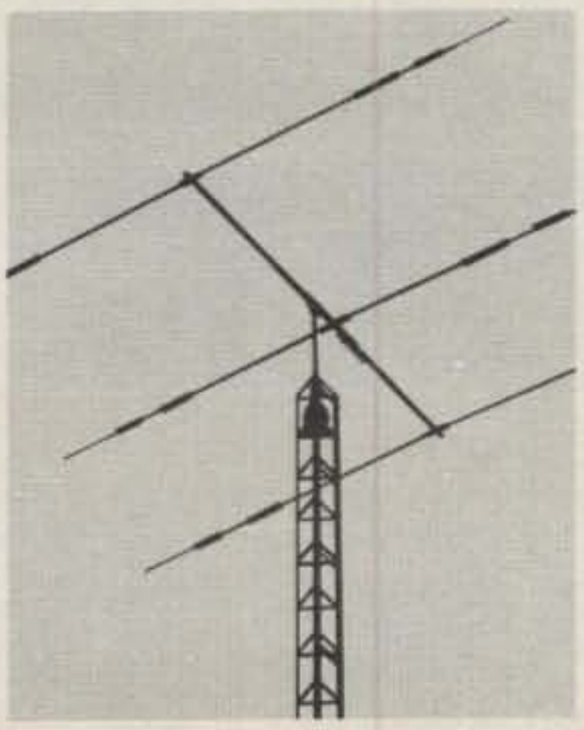

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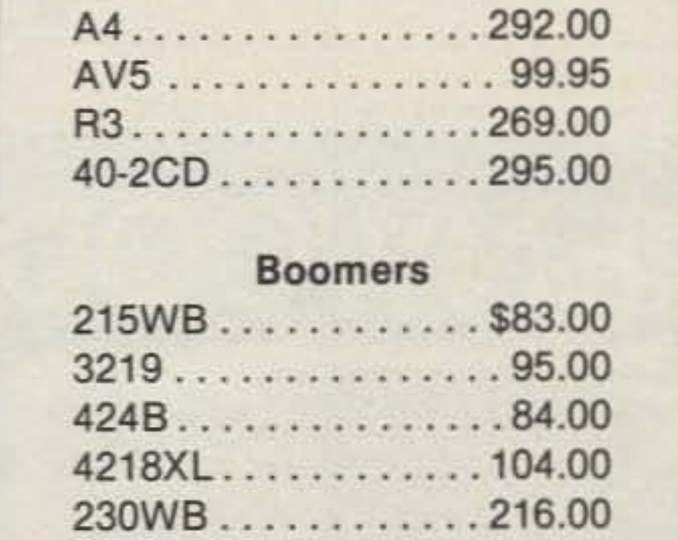

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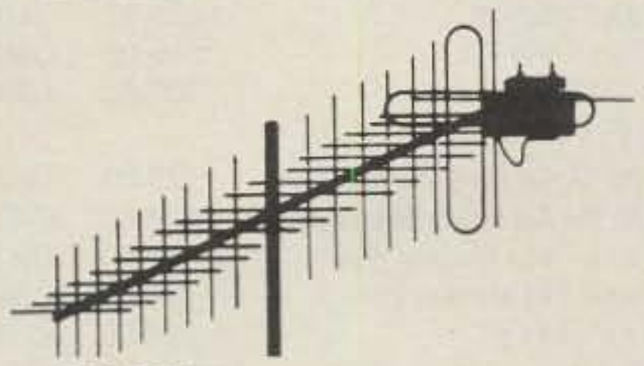

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Awards

a monthly feature by
DOROTHY JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for April is:

Mark A. Stidam, AI9Y
USA-CA All Counties #516, Mixed, 7-9-86

"I was born on November 27, 1961 in Scottsburg, Indiana and have lived here all my life. I first got interested in radio in 1974 when I was 12 years old. My dad purchased a CB for our van, and I found that it provided an excellent way to talk with my schoolmates without tying up the telephone. By 1976 we were full swing into CB with a base station, beam, and other assorted goodies. Up to this point I had never even heard of amateur radio. Then one day I was thumbing through a CB magazine and noticed an article on amateur radio. It sounded very interesting, so I told several of my CB buddies at school about it. All I heard was 'No way,' and 'A guy just failed his General and he was a TV repairman, so just forget about it.' But I always had a bad habit of not listening too well, and fortunately I did not listen this time.

"About six months later, in December of 1976, my dad brought home a book he found at the library entitled *How to Become a Ham*. I read it and was hooked. Later that week my dad went out and purchased a Drake TR-4C as an early Christmas present. After listening for several hours I wanted very badly to be a ham. We attended the Clark County Amateur Radio Club's monthly meeting, became members, and signed up for their Novice class starting in February 1977. My dad and I, along with one of my CB buddies, Prentice Short, attended classes, and with the help of Elmers Pres Loveland, N9PU; Tom Bolly, K9TB; and Roscoe Davis, WA9TJS, we all received our Novice tickets. Prentice received his ticket in June with the call WD9EQE. My dad and I followed on August 1, 1977 with WD9FPP and WD9FPQ, respectively.

"I first learned about county hunting as we were heading to our Novice class one day. Prentice, WD9EQE, mentioned that he had read about a ham who had worked all 3077 counties. My only thoughts were, 'Gosh, I don't know that I will ever do that, maybe WAS.' I had been a Novice for about 4 months and had about 400 contacts when I decided to go for it. I just happened to mention to my schoolmates, during shop class, that I was going to try to work all counties. The teacher, Bill Prichard, walked in and heard what I was

333 South Lincoln Ave., Mundelein, IL 60060

Mark Stidam, AI9Y, in his shack in Scottsburg, Indiana.

up to. Then, to my amazement, I found out that the ham Prentice had read about was the teacher's father, Jack Prichard, W9CNG, USA-CA #174. I wanted to meet him to find out more, and got my chance in March 1978 when Jack was the guest speaker at our club's annual banquet. He gave a wonderful speech on county hunting and how to get more information. I sent my SASE and got the information packet.

"For the next nine years I was on the biggest search and find mission of my life —to gain the coveted USA-CA award. I had hoped to do it in five years, but I was occupied with other goals such as upgrading to General in January 1978, Advanced in October 1978, and Extra in July 1979. I would tune the radio to the net frequency in the morning and then bounce in every 10 to 15 minutes to see what was going on. I was lucky in that I worked all the tough counties first. I had all of Hawaii and Alaska within the first 1,000. After that I seemed to work everything from the coasts inward. My last 20 or 30 counties were in neighboring states, which my dad, now KB9JK, went and got for me. He has given me more counties than any other station, about 60. He gave me my last one, Lewis County, Kentucky. Kentucky was my worst state. It seemed that no one there was ever better than 3-3 copy.

Now with this all over, I will probably start chasing DX and maybe shoot for all countries as my next goal. However, I will be somewhat restricted in chasing countries since I will be attending Indiana State University to complete study for a BS degree in Industrial Arts. I graduated from Indiana Vocational Technical College with an A.S. in Electronics Communications. I have worked at the local high school as an advisor in the Industrial Arts Department where I taught the freshman woodshop classes. I have also worked as a video arcade game, TV, and radio service technician.

"In closing, I wish to thank all the mobiles and net controls. I want to thank Bill Prichard, who has been like a second dad to me, for getting me interested in county hunting and for everything else he has done for me. A special thanks goes to Jack Prichard, W9CNG, for giving me information and advice on getting started. I also would like to thank my dad for the many counties he helped me get, especially the last ones. And, I don't want to forget John Shean, N9TV, who loaned us his 75 meter resonator to make all of this possible. I would like to mention the calls of everyone who helped me, but time and space will not permit. So, thank you all again; and if anyone wants to work me for my USA-CA number, just drop me a card and I will try to set up a schedule."

USA-CA Special Honor Roll

David F. Hulley, N9AUV
All Counties #526, All SSB, 12-5-86

Charles E. Dillard, N4EED
All Counties #527, Mixed, 12-11-86

Sandra Boatman, NØDPX
USA-CA #528, Mixed, 12-18-86

Coy E. Terry, KD4ON
USA-CA #529, Mixed, 12-19-86

Awards Issued

Henry Lybrand, W3HQU, added an enviable endorsement to his All Counties #481 by confirming All 20M CW, dated 12-11-86. This is a first, representing 16 years of effort.

Dirk D. Hughes, WB5MTU, on 12-29-86, added both the CW and SSB endorsements to his USA-CA 500 #1861. Nice going, Dirk!

David F. Hulley, N9AUV, submitted all of his paperwork in one package and received USA-CA All Counties #526, USA-CA 3000 #557, USA-CA 2500 #625, USA-CA 2000 #686, USA-CA 1500 #771, USA-CA 1000 #944, and USA-CA 500 #2147, All SSB, dated 12-5-86.

Charles E. Dillard, N4EED, qualified for a full certificate by claiming USA-CA All Counties #527, USA-CA 3000 #558, USA-CA 2500 #628, USA-CA 2000 #688, USA-CA 1500 #773, USA-CA 1000 #945, and USA-CA 500 #2149, Mixed, dated 12-11-86.

Sandra Boatman, NØDPX, made a clean sweep by qualifying for USA-CA All Counties #528, USA-CA 3000 #559, USA-CA 2500 #629, USA-CA 2000 #689, USA-CA 1500 #774, USA-CA 1000 #946, and

No -75-76

USA-CA Honor Roll

3000		KC7JC	772
N9AUV	557	N4EED	773
N4EED	558	N0DPX	774
N0DPX	559	KD4ON	775
KD4ON	560	KC3AD	776
KC3X	561	KC3X	777
2500		**1000**	
N9AUV	625	N9AUV	944
W3IJT	626	N4EED	945
KC7JC	627	N0DPX	946
N4EED	628	KD4ON	947
N0DPX	629	KC3AD	948
KD4ON	630	KC3X	949
KC3X	631		
2000		**500**	
N9AUV	686	JA2KLT	2144
KC7JC	687	TI2KD	2145
N4EED	688	HB9DCZ	2146
N0DPX	689	N9AUV	2147
KD4ON	690	ONL-4003	2148
KG8I	691	N4EED	2149
KC3X	692	N0DPX	2150
		CP8HD	2151
1500		KD4ON	2152
		KC3AD	2153
N9AUV	771	KC3X	2154

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is $4.00. For non-subscribers, it is $10.00. Initial application must be submitted in the USA-CA record book which may be obtained from CQ Publishing Company, 76 North Broadway, Hicksville, NY 11801, U.S.A. for $1.25. To qualify for the special subscriber rate please send a recent CQ mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending a SASE to the USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, U.S.A. DX stations must include extra postage for air mail reply.

USA-CA 500 #2150, Mixed, dated 12-18-86.

Coy E. Terry, KD4ON, also qualified for a full complement of seals and ribbons by claiming USA-CA All Counties #529, USA-CA 3000 #560, USA-CA 2500 #630, USA-CA 2000 #690, USA-CA 1500 #775, USA-CA 1000 #947, and USA-CA 500 #2152, Mixed, dated 12-19-86.

Hollis E. Thigpen, KC3X, received USA-CA 3000 #561, USA-CA 2500 #631, USA-CA 2000 #692, USA-CA 1500 #777, USA-CA 1000 #949, and USA-CA 500 #2154, Mixed, dated 12-31-86.

George A. Dessert, W3IJT, qualified for USA-CA 2500 #626, All SSB, dated 12-6-86.

Doug Rider, KC7JC, finished his paperwork for USA-CA 2500 #627, USA-CA 2000 #687, and USA-CA 1500 #772, All SSB, dated 12-9-86.

Bob Matthews, KG8I, claimed USA-CA 2000 #691, Mixed, dated 12-22-86.

John Simplair, Jr., KC3AD, submitted his qualifying application and received USA-CA 1500 #776, USA-CA 1000 #948, USA-CA 500 #2153, All SSB Mobiles, dated 12-23-86.

USA-CA 500 certificates went to:

Yoshiaki Maruyama, JA2KLT, USA-CA 500 #2144, 12-1-86, Mixed.

Carlos W. Diez, TI2KD, USA-CA 500 #2145, 12-1-86, All SSB.

Peter Marmet, HB9DCZ, USA-CA 500 #2146, 12-2-86, Mixed.

David F. Hulley, N9AUV, USA-CA 500 #2147, 12-5-86, All SSB.

Egbert Hertsen, ONL-4003, USA-CA 500 #2148, 12-6-86, Mixed.

Charles Dillard, N4EED, USA-CA 500 #2149, 12-11-86, Mixed.

Sandra Boatman, N0DPX, USA-CA 500 #2150, 12-18-86, All 20M Mobiles.

Hernan Serrate, CP8HD, USA-CA 500 #2151, 12-18-86, All SSB.

Coy E. Terry, KD4ON, USA-CA 500 #2152, 12-19-86, Mixed.

John Simplair, Jr., KC3AD, USA-CA 500 #2153, 12-23-86, All SSB Mobiles.

Hollis E. Thigpen, KC3X, USA-CA 500 #2154, 12-31-86, Mixed.

Awards Available

Worked Santa Claus Land Award. Radio amateur station OH9SCL (Santa Claus Land) is situated at the Arctic Circle in Finnish Lapland. All call letters beginning with OH9, OF9, OG9, and OI9 are radio amateur stations located in Santa Claus Land. There are about 150 OH9 stations.

Rules are as follows. All contacts must have been made after January 1, 1986. There are no band or mode limits. The same station can be counted only once. One SWL report per station counts as one contact. List the date and UTC when contact was made, call sign, RST report, MHz, and mode for each station contacted. Enclose $6.00 US or 10 IRCs with your report to cover handling and return postage costs.

After having received your first Worked Santa Claus Land Award, you may wish to apply for additional award stickers. To do so, just send your additional report together with self-addressed envelope. You need not send any money. *(Don't forget to include your return address.)*

Required number of points per continent:

Europe/OH—SCL Award, 20; Sticker, +20.

Europe—SCL Award, 15; Sticker, +15.

Elsewhere—SCL Award, 10; Sticker, +10.

Points: For each OH9, OF9, OG9, and OI9 station contacted you receive one point. In December when you contact these stations, each contact is worth 3 points. Contact with station OH9SCL is worth 5 points. In December this contact is worth 10 points.

Award address: OH9AB/award, P.O. Box 50, 96101 Rovaniemi, Finland.

OI3AX Activity Award. The Signal Regiment Radio Club issues the special award for 5 EU QSOs and 2 DX QSOs with club calls OI3AX or OI3AI. Only one QSO/stations/day/band is valid. Send log dates with 3 IRCs to: Signal Regiment Radio Club, OI3AX, PL 5, SF-11310 Riihimaki, Finland. QSOs in the period 1-11-1981 to 31-12-1988 are valid for this award. For more information or skeds with OI3AX or OI3AI contact OH3GZ.

OI—Prefix Information: The Finnish defense forces radio club stations use the OI prefix. There are 17 different club stations, in 9 call areas OI1–OI9. Power maximum is 30 watts, CW only, on frequencies 3510–3545 kHz, 7010–7040 kHz, 21030–21150 kHz, 28040–28200 kHz. Send QSL cards via OH-QSL Bureau. For more information, send SASE to OH3GZ.

New address for OH-QSL bureau: SRAL QSL Bureau, P.O. Box 30, SF - 00381, Helsinki, Finland; or direct to the manager at SRAL QSL - Bureau, SF-11301, Riihimaki, Finland.

RRDXA Award. The Rhein Ruhr DX Association (RRDXA) in DARC invites radio amateurs and SWLs all over the world to apply for the RRDXA Award. This award is issued in three classes and three modes, Mixed, 2×SSB, 2×CW; Class I, 100 points; Class II, 75 points; Class III, 50 points.

RRDXA Award offered by the Rhein Ruhr DX Association.

The first QSO with a member of the club counts one point. You may get one extra point by working the same station on CW. A member may be worked as often as possible in different contests. Each contest QSO counts two points toward the RRDXA Award. All QSOs must be made after January 1, 1967. Send application (no QSLs required) together with 10 IRCs or the equivalent of DM 5, to RRDXA Award Manager, Rainer A. Schlotbohm, DL3YCJ, Postfach 1222, D-4240 Emmerich/a. Rhein, West Germany. An RRDXA Member List is available from the manager for one IRC.

In 1987 to celebrate the RRDXA's 20-year jubilee, a special award, "RRDXA 20 Year 1967–1987," is being given. It is available for 20 points for all classes, Mixed, SSB, and CW. The cost is $4.00 US plus 3 IRCs for airmail.

YASME Awards. *YASME:* A beautiful plaque will be issued to any amateur or SWL who submits proof of contact, QSL cards, from 30 contacts with YASME officers past and present. Any call they had counts, and any contact with past or future DXpeditions by any YASME member, W6KG, W6QL, Danny Wiel, OH2BH, W0MLY, W6AM, W6OAT, W6RGG, N7NG, and others also counts. Over 205 calls are valid.

YASME Supreme: A replica of the yawl

Calls eligible for YASME award: NEED 30 FOR AWARD ☆ R 60

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[ ] 3C1EG	[ ] HC8VB	[ ] OJ0DX-Marty	[ ] W6BWS/KG6
[ ] 3D2KG	[ ] HI6XQL	[ ] OJ0MR-Marty	[ ] W6DOD
[ ] 3D6QL	[ ] HI8XAL	[ ] PJ8KG	[ ] W6GN
[ ] 4T4WCY	[ ] HK0AA-Danny	[ ] SV1GA/A	[ ] W6IPF
[ ] 4W1WY	[ ] HK3WBB	[ ] TI9RC-W0MLY	[ ] W6KFD
[ ] 5L2KG	[ ] HR0QL	[ ] TU2CA	[ ] W6KG
[ ] 5T5KG	[ ] HS1ABD	[ ] TY2KG	[ ] W6KG/4X
[ ] 5V1KG	[ ] HS3AL	[ ] TY2WY	[ ] W6KG/A4
[ ] 5V4WY	[ ] HS5ABD	[ ] VK2EO	[ ] W6KG/A7
[ ] 6L6WY/QATAR	[ ] HZ1AB **	[ ] VK2HD	[ ] W6KG/AJ3
[ ] 6T1YP-Marty	[ ] HZ1WY	[ ] VK9TW	[ ] W6KG/CE0
[ ] 6W8CD	[ ] J2AHI	[ ] VP1KG	[ ] W6KG/CP6
[ ] 7P8KG	[ ] J20DU	[ ] VP2ARS	[ ] W6KG/HC8
[ ] 8P6QL	[ ] J2USA	[ ] VP2AY	[ ] W6KG/HK0
[ ] 9G1KG	[ ] J3ABV	[ ] VP2DW	[ ] W6KG/KG6
[ ] 9J2LC	[ ] J6LOO	[ ] VP2EEQ	[ ] W6KG/PZ1
[ ] 9K2QL	[ ] J7DBB	[ ] VP2GDW	[ ] W6KG/SV5
[ ] 9L1KG	[ ] JA1KSO	[ ] VP2KAH	[ ] W6KG/SV9
[ ] 9N1OAT	[ ] JA2KG	[ ] VP2KF	[ ] W6KG/TI5
[ ] 9Y4KG	[ ] JA2US	[ ] VP2KFA	[ ] W6KG/ZS
[ ] AA5LES	[ ] JY8KG	[ ] VP2LW	[ ] W6LDD
[ ] AC0WLY	[ ] K2CC	[ ] VP2MAQ	[ ] W6WLY
[ ] AJ3AA	[ ] K3ZO	[ ] VP2MX	[ ] W6OAT
[ ] AX2HD	[ ] K3ZO/HK3	[ ] VP2SAX	[ ] W6QL
[ ] C21NI *	[ ] K4BVD	[ ] VP2SW	[ ] W6QL/6Y5
[ ] CN8HF	[ ] K4KCV	[ ] VP2VB	[ ] W6QL/BR1
[ ] CR10AB	[ ] K4MAB	[ ] VP2VDJ	[ ] W6QL/CE0
[ ] CT2YA	[ ] K5JLQ	[ ] VP4DW	[ ] W6QL/HC1
[ ] CT3AU	[ ] K5RC	[ ] VP5VB	[ ] W6QL/HK3
[ ] CT3BZ	[ ] K6ALH	[ ] VP7VB	[ ] W6QL/PJ2
[ ] CT9AT	[ ] K6AM	[ ] VQ6WY	[ ] W6QL/SV5
[ ] DL4ZB	[ ] K6WAP	[ ] VR1B	[ ] W6QL/VP2A
[ ] DL4ZBD	[ ] K7JDG	[ ] VR1Z	[ ] W6QL/ZZ
[ ] DL4ZC	[ ] K7JG	[ ] VR2EO	[ ] W6QL/ZP5
[ ] EA8CR	[ ] KC6SZ	[ ] VR4AA	[ ] W6RGG
[ ] FA8JD	[ ] KE6ITU	[ ] VR8B	[ ] W7JFG
[ ] FG0FOK	[ ] KG4KG	[ ] W0WLY	[ ] W7KG
[ ] FG0FOL/FS	[ ] KG6SZ	[ ] W0WLY/TJ8	[ ] W7YA
[ ] FK0KG	[ ] KG6SZ/KC6	[ ] W0WLY/TL8	[ ] W8EWS
[ ] FL8WY	[ ] KL7DTB	[ ] W0WLY/TN8	[ ] W9AC
[ ] FW0FOL	[ ] KL7JDG	[ ] W0WLY/TR8	[ ] W9SZR
[ ] FO0DCW	[ ] KL7KG	[ ] W0WLY/TT8	[ ] WA5LES
[ ] FO0XX	[ ] KL7USA	[ ] W0WLY/TZ2	[ ] WA6DFR
[ ] FO0XX/WW	[ ] KW6ALH	[ ] W2USA	[ ] WA7WIW
[ ] FO8AW	[ ] KV4AA	[ ] W4KE	[ ] WW6ITU
[ ] FW8DW	[ ] KZ5WD	[ ] W4DVL	[ ] XE2FU
[ ] FY0FOL	[ ] LU5HFI	[ ] W4ODZ	[ ] YJ8KG
[ ] G2DC	[ ] W6KB	[ ] W4TO	[ ] YV0AB
[ ] G3ACI/AA	[ ] W6SF	[ ] W4ZEW	[ ] ZB2AX
[ ] G7DW/WW	[ ] W7WG	[ ] W5IGJ	[ ] ZD3I
[ ] GC5ACH/W6KG	[ ] OH0AW	[ ] W5WC	[ ] ZF2CI
[ ] GC5ACI/WB6QEP	[ ] OH0W	[ ] W6AHI	[ ] ZK1BY
[ ] GD5ACH/W6KG	[ ] OH2AW/OH0	[ ] W6AW	[ ] ZW6AW
[ ] GD5ACI/WB6QEP	[ ] OH2BH	[ ] W6AWS	[ ] ZS3/W6QL

* 3/1/76 thru 3/25/76
** 2/19/83 thru 2/20/83

rev. 05/16/86

YASME Award Custodian
Dick McKercher, W0MLY
Box 7
Rippey, IA 50235

Calls eligible for awards YASME and YASME SUPREME.

Yasme will be issued to any amateur or SWL who will submit proof of contact, QSL cards, from 60 YASME members. The replica of the Yasme is a brass ship mounted on a base, with name, call, and award number on the base.

All applications are to be submitted to the YASME awards manager, George McKercher, W0MLY, Box 7, Rippey, Iowa 50235, USA. All applications will include QSL cards, list of contacts, showing call, date, time. Some DXpeditions with OH2BH, Marty Laine, were operated by other than Marty; the QSL should show who was operator, and if Marty is not indicated as operator it cannot be valid for the YASME awards.

The ALARA Award. This YL award is available to YLs, OMs, and SWLs contacting ALARA members on or after 30 June 1975. Five contacts including four call areas are needed. All contacts must be made from the same call area. Repeater contacts and official ALARA net contacts do not qualify. Special endorsements are available for Mixed, Phone, All 28 MHz, etc. Endorsement stickers are available for each five additional members contacted.

Applicants must submit a log extract, certified correct and signed by two other amateurs, under the following headings: Date, Time, UTC, Band, Mode, Callsign and Name of ALARA member contacted, Report sent and received. In lieu of certification, QSL cards must be sent. Full name, address, signature, and callsign of applicant are received. Fee to accompany application is three Australian dollars or seven IRCs. Additional stickers applied for at a later date cost $1.00 Australian.

Send application to ALARA Awards Custodian (Mavis Stafford, VK3KS), 16 Byron Street, Box Hill South, Victoria 3128, Australia.

Province of Ontario Counties Certificate. The Province of Ontario Counties Certificate, sponsored by Alan F. Harnois, VE3LFH, is issued for confirmed contacts with a specified number of counties within the boundaries of the Province of "Ontario."

The W.A.O. Certificate Award is available to all licensed amateurs everywhere in the world for working all counties in Ontario, regardless of calls held, operating QTHs, or dates of contacts.

All contacts must be confirmed by QSL and all QSLs must be in one's possession, but they do not have to be submitted to acquire the certificate. All QSLs must be in proper condition with no alterations. Cards found to be altered will disqualify

Province of Ontario Counties Certificate sponsored by Alan F. Harnois, VE3LFH.

the amateur from acquiring a W.A.O. certificate.

A map is available showing all counties needed to qualify for a W.A.O. certificate and can be obtained by writing to the following address and asking for an index map of Southern Ontario: Map Unit, East Building, 1201 Wilson Avenue, Downesville, Ontario, M3M 1J8, Canada (phone 1-416-248-3476).

All contacts must be made by SSB or CW only. No other mode will qualify. To acquire a W.A.O. certificate send $2.00 for handling fee, and complete list of counties worked to: Alan F. Harnois, VE3LFH, 400 Lafferty Street, La Salle, Ontario, Canada, N9J 1K6.

73 and Good Hunting, Dorothy, WB9RCY

QRP

a feature by
ADRIAN WEISS, K8EEG

THE ART OF VERY LOW POWER OPERATING

QRP Field Day 1986 Results—Part I

Spring is back and that means that Field Day is just around the corner. It's time to begin planning for the most exciting, challenging, frustrating, and rewarding experience in hamming—operating out in the field with temporary antennas, battery power, bugs, thunderstorms, skunks, and all the other phenomena that make QRP Field Day the best! *CQ*'s annual wrap-up on the previous QRP Field Day is deliberately delayed until spring in order to get the adrenalin gushing after a long winter. We try to pack in as much as possible in the way of useful hints and experiences from which something valuable can be learned and put toward a more successful upcoming QRP Field Day.

Entries were down in the One Watt class this year. This may be due to the fact that diehard milliwatters from past years didn't manage to find time to get out into the field. The One-Watt Trophy was taken by "The Great Salt Lake Island Milliwatters," **Jim Stevens, KK7C**, and **Bob Joiner, WB7BIV**, who made the long trip from Oregon this year to team up with KK7C again. They operated from Stansbury Island in the middle of the Great Salt Lake (UT). It must have been an inspiring QTH, as Jim reports: "Stansbury Island is a real desert island with mountains rising up 2400 ft. above the most perfect ground plane on the continent. We found a spot on an eastward sloping (30–45 degrees) concave hill and set up our station on the brow. We were about 700 ft. above the salt-water. We had planned for several different antennas initially in order to optimize gain from the slope and the salt-water reflections, but because our earlier height estimate (250 ft. above water) was so far off, we decided on the spot to settle for a sloping V-beam with an apex angle of 60 degrees and 560 ft. legs aimed eastward. The antenna legs sloped downward and outward toward rock protrusions 200 ft. lower and about 700 ft. away at the edges of the 'bowl.' It was necessary to insert support poles along the way to keep the wires 10 ft. off the ground. We ran 950 mw to an Argo 509 with solar-charged battery power and used CW only. Most of our QSOs were made on 20 meters, which was open around the clock. When we switched to 40 and then 80, we were unable to hear many west coast stations, much less work them easily, and the QSO rate on 40 was 7/hour. Fifteen meters was dead on Saturday, but an opening Sunday morning consisting mostly of W0's produced 16 QSOs per hour for 2 hours. We discovered that we were getting out better on 15 than on the other bands, working virtually every station that we heard. In the final analysis, we figure that the lack of a short-skip antenna for the west coast cost us 100 QSOs or so on 40 and 80. Last year these QSOs were our only salvation. This year we had the long game working, but we lost the short one! Finally, we heard QRPers NM7N, W6SKQ, and W7LNG, but were unable to work them." Good show, guys. Despite the antenna deficit, Jim and Bob bettered their last year's total by 46 contacts.

833 Duke Street #83, Vermillion, SD 57069

QRP Field Day 1986

Station	CW	SSB	Total QSOs	Total
One Watt Stations				
*KK7C/WB7BIV	236	0	236	2982
WB7APW	161	0	161	2082
KI0G	40	38	78	1086
KH6CP/1	54	0	54	798
KO7V	19	0	19	378
Five Watt Stations				
*WA9IRV/KB8N	500	0	500	3150
NR0J/W0KEA	228	103	331	2136
WB0RXF/WA0ZPT	201	64	265	1740
NM7M	263	0	263	1578
NJ7M	236	0	236	1566
W0UY/K0WRY	228	0	228	1518
KN1H/KC5EV	96	123	219	1464
W0UY/K0WRY	228	0	228	1368
NM7N	167	0	167	1152
NY5T	163	0	163	1128
N3ANW	1	73	74	594
N4KEZ	31	20	51	456
W4DGH/N4NMD	0	63	63	378
NU4B	25	0	25	300
N5AE	43	4	47	282
Club Stations				
K9NG	411	122	533	6546†
*W1ECH	467	437	904	5574
W6JTI	449	380	829	5124
W6SKQ	459	253	712	4422
W2LZ/W2TFL	526	16	542	3402
W3TS	408	101	509	3204
W0VM	375	0	375	2400
N7FU/N7CEE	326	0	326	2106
N9TW	212	92	304	1974
N8CGY/N8GNI/NM8L	213	50	263	1728
N2CYJ	150	96	246	1626
WB8IEK	150	50	200	1350
KA9HAO/7	38	41	79	1098†

**Award winners.*
†One-watt club stations.
(Same station eligible for award once every three years.)

Jack Meadows, WB7APW, did quite well as a beginner: "This was my first Field Day attempt. I decided to try 1 watt output for starters and was kept busy enough—up to 15 QSOs per hour—that I stayed at that power level. What fun! My location was on the Mongollon Rim at 7500 ft. My antenna was an inverted-L dipole fed with twin-lead through a transmatch. Using a slingshot, sinker, and fishing line I was able to raise the center of the antenna to 50 ft. in a pine tree. Each leg was 42 ft. long and it seemed to work great. I tried 'CQ FD' several times but had no success, so I played the pounce-on-calling-stations game. I had the greatest success in the high end of the CW band and in the Extra class portion. Unfortunately, I couldn't make it through the night. I was overcome by monster flying insects attracted to the lantern near the rig. Next year I'll be in a camper or tent!"

Zach Lau, KH6CP/1 , operated Sunday in a park in Newington, CT with a 40 meter dipole up 15 ft. and an 80 ft. wire up 12 ft. using an Argo 515 and HW-9 with solar/battery power.

Perhaps the most interesting entry is from

The N2CYJ setup in Forestville, NY. A Kenwood TS430S at 5 watts fed the 12AVQ vertical in the foreground. The group includes Tom, KA2KGP, Bob, KA2RWL, and Dan, N2CYJ, who is a deaf operator. The group had a great FD with good contacts.

Mike Cizek, KO7V, who operated an Argosy at 1 watt output from mountains near Ironwood, MI. Entitled "Abortive Milliwatt Field Day Attempt by KO7V," Mike explains: "Here's my humle submission of a not-too-serious FD exursion. It was actually done during my honeymoon. I figured this would get my new wife started out on the right track. The one major benefit is that she learned how to solder and decided it was fun. Maybe I'll get her an HW-9 for Christmas!" Stretching it a bit, Mike's scorng listed: "Plus 1000 pts. bonus for trying to work FD on my honeymoon (or do I lose 1000 pts. for stupidity?)." Mike comments on this column: "Reading your column was one of the things that attracted me to QRP operating in the first place, and I think it's a good way to attract new QRPers. Especially now at the bottom of the sunspot cycle when operation is more difficult, reading of others' successes with QRP is encouraging for the rest of us and acts as an incentive to stay with low power." We appreciate the feedback!

Five Watt Category

While only two 5 watt entries were above 300 QSOs this year (as opposed to four last year), the number above 200 QSOs jumped to 8, perhaps indicating that conditions weren't all that poor. The 5 Watt Trophy goes to **Paul Schaffen, KB8N**, and **Ron, WA9IRV**, for their 500 contacts. A bit of history was behind their effort. As Paul notes: "My buddy Ron and I had talked about doing QRP FD ever since were in high school in the mid-sixties. Our first try in 1980 netted over 500 QSOs and third place in the ARRL competition. A second try in 1981 yielded over 700 QSOs and second place. After a four-year break, we tried again in 1985 and took first. Since this year would be our last chance to compete for several years, we decided to pull out all the stops and go for a record score. Even so, this year's total is the least impressive of all our FD outings, probably because we had perfect weather, no wind or rain, and nothing to disrupt our operating other than our self-induced antenna problems. Despite the struggle, we learned a lot during the '86 FD. We hope our experiences will help us all next time."

Paul offers the following description of their approach: "We did a detailed analysis of our previous successful outings, trying to determine the populated areas for which we should improve our coverage and hence increase our QSO rate. We designed a stearable V-beam arrangement that used a 'chef's secret' relay box on top of the mast. This relay box would permit selection of any of four directions with a single control cable and single feedline. Additionally, we had our old reliable 132 ft. center-fed Zepp for 80–10 meters. Our V-beams were optimized for 20 meter operation with an apex angle of 70 degrees and 132 ft. legs. Here is a summary of the lessons we learned:

"(1) If you are going to make a serious effort at QRP FD, it is almost imperative that you field test your equipment and concepts before trying them in competition. We ran into too many problems with our V-beams. Although we tested the switching network on the ground successfully, the tension on the control cable caused a short on one relay cable-pair which left us unable to switch to the west—our most needed direction! We also discovered that a 70 degree apex angle produced an extremely narrow bandwidth. We had to readjust our tuner every time we moved more than 10 kHz. Increasing the spacing to about 90 degrees dramatically improved the bandwidth, but of course decreased gain.

"(2) Keep things simple. Ironically, we've had our best results with really simple antennas. With more wire in the sky this year than ever before, we had more problems than ever. I think that our grounded control cable interacted with the feedlines and antennas and caused some losses. In 1985 about 95% of our contacts were made with just two antennas—the 132 ft. Zepp and a 40 meter folded dipole, suspended perpendicular to each other from a 35 ft. mast. Our best ever single-band performance was 260 QSOs on 40 meters with a folded dipole in 1981. We had rather poor results that same year using a 3-element tribander on 20 meters. Antennas don't have to be large or exotic to be effective.

QRP Field Day Trophy Winners

Five Watt Class

1970	K4OCE	220	1470
1971	WA6ABP	137	1175
1972	W7DRA	55	562
1973	WA5WYO*	79	1098
1974	W0IYP	439	2748
1975	WB8OSM	220	1470
1976	K6TG	128	918
1977	N2AA	389	2790
1978	WA4IAR	442	2804
1979	WD5BKO	287	1872
1980	K1JX*	741	9042
1981	N4BP	999	6144
1982	N5EM	259	1704
1983	WA0VBW	435	2760
1984	N4BP	1046	6426
1985	W0KEA	486	3066
1986	WA9IRV	500	3150

**One-watt entries adjusted to ×8 power multiplier*

Milliwatt Class

1981	K5WNH/0	239	3018
1982	—	—	—
1983	N0BYC	241	3042
1984	W8ILC	425	5250
1985	KN1H	373	4626
1986	KK7C	236	2982

Position 1 of the Berry's Mtn. ARC is manned by Mike Michael, W3TS, who is an avid portable transceiver designer with several rigs features in the QRP Quarterly. *We've seen a couple of examples of his work at the Dayton Hamvention QRP bash, and they look good and work even better! The large unit at the top of the table is an MN2700 transmatch. The small unit in the middle is Mike's pride and joy—his personally designed 160–10 meter CW transceiver. Mike is obviously enjoying the ultimate QRP thrill—QRP FD with a rig he made from scratch! There's nothing to compare!*

"(3) Be flexible. If things just aren't working well, it may be necessary to reposition antennas or try new antennas. When we realized that our west V-beam was dead, we repositioned another antenna to give the needed coverage. Always use pulleys at the top of masts for raising and lowering antennas. Too bad our relay box system wasn't pulley-mounted!

"(4) Location does seem to make a difference. We operated four years from four different locations, and lacking any technical explanation for it, I can only say that some locations are just 'hotter' than others. If you find a good spot one year, stick with it."

In general, KB8N's suggestions are worth serious consideration and illustrate the type of planning that strengthens FD chances of success. I think that the first point should be emphasized. A dry-run with equipment and antennas is about the only way to avoid unexpected difficulties on FD. If there is a weakness in your system, it will show up out in the field. Furthermore, a particular site may seem ideal at first glance, given the topography and antenna-mounting trees, but unexpected hitches may crop up when you actually attempt to install your antennas.

Bill Ferguson, NRØJ, and WØKEA, last year's 5 Watt Trophy winners, experienced the opposite of NB8N's comment on location. Bill notes in regard to their drop from the 1985 total of 486 QSO's to 1986's 228: "Conditions sure were down on Saturday. We used the same antenna (40 meter Extended-Zepp) as last year hung from the same trees and used the same rig on 40 meters but less than half the QSOs! People just were not hearing us. We only lost about 2 hours to thunderstorms, although a nearby group was down for over 6 hours and lost two rigs!" NRØJ/WØKEA operated at the 11,400 ft. level on Aspen Mtn (CO).

While NB8N and NRØJ's experiences may seem contradictory, they are not. Propagation is the hidden variable. It must be borne in mind that one-eleventh of the solar cycle has transpired between the two operations, and this time period can bring with it considerable modifications in propagation from a given site. The most practical approach to averting NRØJ's second year disaster is through a month-long monitoring of propagation conditions, assuming that the FD site is within about 75 miles of the home QTH. First, check WWV's broadcasts of the solar flux and A-index levels at 18 minutes past the hour for the general trend of activity. This need not be a daily check. Every 4–7 days suffices to establish the trend. A comparison with the previous year should provide a trustworthy indication as to the similarity (or dissimilarity) of propagation conditions, or of the change to be expected in results. For example, suppose that in the first year the solar flux moves from 85 through 93, and in the second year it slides along in the mid-70's. Long-skip possibilities in the second year will be markedly lower. In turn, selection of antenna type and height should be geared for short-skip work. These topics are discussed in considerable detail in my book (*The Joy of QRP: Strategy for Success*, $10.95 from WØRSP). But enough—back to the gang.

Tom Lappin, WØUY, and **Kent Hoskinson, KØWRY**, were out again using an HW-9, 80 meter dipole, full-wave 40 meter loop, and 3-element tribander. Tom reports: "1986 FD was our third time to go the QRP route, but not the charmed one. Our score is not as good as last year, but weather and band conditions were not too favorable in Kansas this year. It was really windy and very hot and the bands were noisy, so we were really burnt out after 23 hours of operation. Our effort was 100% CW using an HW-9 to work 47 states including Alaska and Hawaii. We missed Oklahoma, North Dakota, and South Carolina. Just one time it would be great to work WAS QRP FD! Each QRP FD is more fun than the last one and plans are in the mill for 1987. QRP FD is like a bag of potato chips. You can't try just one and walk away!"

Dick, N5AE, has made it out for the past ten years, but a recent move cancelled the opportunity and he operated from the home QTH and comments: "The bands were poor, but NOTHING spoils the fun of a QRP FD weekend!"

Larry Maso, NU4B, was short on time so settled for a minimal antenna: "Once again I used my HW-9 but settled for a ground-mounted vertical instead of the wire beams I had last year. Even so, I enjoyed the 25 QSOs and hope to do better next year. QRP is addictive! Also, if anyone in east Tennessee is interested in a 2-person QRP effort in 1987, please contact me at 9003 B Creekside Lane, Knoxville, TN 37923." Any takers?

Steve Herczeg, N3ANW, wrote up his FD experience for the local club newsletter and entitled it "Field Day with Almost No Watts"! During his first attempt three years ago, Steve used an Argo and trap vertical with unfortunate results: "After six hours of operation and no contacts I folded my tent and went home. I was discouraged, but not disenchanted." The next May he read this column and realized that a trap vertical and QRP "are not the ideal combination" for FD. Fritz, W3NZ, suggested a fullwave 40 meter loop and helped Steve erect it, resulting in 97 contacts. This year Steve operated out back of his new QTH: "I have a lot of room and proximity to the shack would allow for something to do in off-periods. I set up by the creek, giving away 40 ft. in elevation but gaining a real sense of being out in the field. Things did not go exactly as planned. The battery I had carefully charged the week before developed a bad cell and I wound up taking the battery out of my tractor. Bill, N3WW, had shown me how to resonate the 40 meter loop on 80 meters, but I found that I had a problem with my 4:1 balun. I had to connect the loop directly to the antenna tuner." Steve provided the following hints: "When you are operating QRP, you realize that you will not be able to work every station you hear and that you will have to work hard for each contact. When you make a contact you have a feeling of accomplishment; and on those occasions when you connect on your first call, you get a real charge. While there are many techniques that can be used to work a QRP contest, my principal method is to skim the band looking for big signals and operators with a 'contest' style. The strong signal tells me that either propagation to that station is right or that a directional antenna is pointed my way. In either case, the odds of making contact have increased for me. The operator's style is important because I know that even under the best conditions my signal is several S-units below other signals and it takes operator skill on the other end of a QRP contact."

Position 2 of the Berry's Mtn. ARC manned by N3ELR at the Argosy and KW3O doing logging duties in a fold-out tent camper. Power source was a car battery charged by homebrew solar panels. An 80 meter dipole at 60 ft. helped account for the group's 509 QSOs.

Ed Ringer, W4DGH, and **N4NMD** operated at the home QTH. Ed writes: "I was out on Sand Mtn with Barry, KA4LKH, for FD last year and did not expect to participate this year, since he was away in Florida. However, I was asked about QRP FD by Dudley, N4NMD, a new ham, so I invited him over to my QTH. We hung an 80 meter dipole fed with twinlead in a pine on the lot next to my QTH and set up the Argosy II, transmatch, and wattmeter on a card table in the carport and used a 12 volt battery for power. With 5 watts output, N4NMD worked most of the 7 hours we were on to net 63 stations in 22 sections plus VE and KZ5—all SSB on 20 and 15 meters. We'll be back next year with better planning and a keyer!" CQ

(To Be Continued)

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Antennas & Accessories

a monthly feature by
KARL T. THURBER, JR., W8FX

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

More Letters

Our columnist W8FX again opens the mailbag, this time with more correspondence on the popular G5RV and Extended Double Zepp skyhooks. Stay with us for more information on these two popular designs.

—K2EEK

Last month we opened the mailbag to look at two letters on the perennially favorite Zepp antennas. These letters were in response to our earlier call for reader experience with Zepps; they were from Tom Sanders, W6QJI, and John F. Rollins, W1FPZ. Their correspondence described similar, but slightly different Zepp-type skyhooks. Tom wrote us with some informative material on the early Zepp, thus reminding us of the fact that several different types of antennas go under the collective Zepp name. John, with a different perspective, described his experiences with the Extended Double Zepp antennas. We'll follow that with news of several new antenna products, highlight some interesting and informative reading matter, and examine some new hamshack software. First, a peek into the mailbag.

From the Mailbag

G5RV Notes de W6RQ. Al Lotze, W5RQ, wrote to share in our enthusiasm for the G5RV multiband antenna, which we have featured several times in the Antennas & Accessories column, and to offer several personal and historical perspectives on this antenna design.

As Al points out in an article he had written for a radio club newspaper several years ago, the G5RV is a multiband wire antenna design developed just following World War II, in 1946, by Louis Varney, G5RV. Despite the significance of the design, it didn't get into print until it made the pages of the *RSGB Bulletin*, first in 1952 as a letter, and later in 1954 and 1958 as complete articles. To the disadvantage of the stateside amateur, the "antenna establishment" in the US was not enthusiastic about the G5RV concept, involving as it did a flattop that measured an "oddball" 102 feet. Conventional antenna wisdom would normally have one construct HF wire antennas that were on the order of 33, 66, 132, or 264 feet long.

Several variations of the G5RV are to be seen. The generally favored one makes use of a dipole-like 102 foot flattop, cut in the middle and fed with a convenient length of openwire feeder, which connects to the transmitter or transceiver through an antenna tuner. Another version uses the same flattop configuration, but is fed with a specific length of openwire feeder (typically, 33–34 feet, though this length is subject to discussion) which connects to a length of 72 ohm coax, and which in turn connects directly to the transmitter. This second design may or may not involve the use of a balun where the two feedlines join.

Writes AL: "From my experience, the G5RV's great advantage is its all-band feature—that's where Louis's 102 feet is the magic measurement. Using the small Johnson Matchbox as a tuner, my TS-830S loads neatly on all bands—the new WARC bands load up beautifully. I'll bet that I'm the only fellow who used just one antenna to work the recent Clipperton Island DXpedition on 80, 40, 30, 20, 15, and 10 meters! We G5RV *aficionados* have now driven up the fleamarket price of old Johnson Matchboxes. Louis [G5RV] says he's never seen a Matchbox overseas, so he continues to pump for his homemade antenna tuners.

"My openwire feedline is about 35 feet long, with four right-angle bends in it. The G5RV article I first found in the 1961 *RSGB Handbook* had an arrow pointing to the feedline and a note 'convenient length.' I've always found a 'convenient length' to be the distance from the center feedpoint of the antenna to the terminals on the back of the antenna tuner. Incidentally, that wonderful computer-calculated off-resonance feedline length chart, p. 59 of July *CQ*, assumes the line is absolutely straight. Remember [that] every bend adds a bit of inductance and increases the electrical length.

"Another interesting thing I've encountered is the differences in the operation of several different makes of SWR meters. Although any meter will read 'one-to-one' when tied to a 52-ohm dummy load, there are sometimes surprising differences when [SWR meters are] used between a transmitter and an antenna tuner. I first tried tuning a G5RV antenna using an *ARRL Handbook*-construction SWR meter. Although this meter [worked] perfectly on a 52-ohm load when connected normally, or when connected backwards as a check, the dumb meter read more reverse power than forward power indicated on 10 and 80 meters.

"I always have an RF ammeter in the openwire feedline: this meter is the bottom line in tuning the antenna system . . . . For optimum operation, maximum antenna current occurs with a minimum SWR in the cable connecting the transmitter to the antenna tuner. In the setup I have now, a Bird meter was the best I found. Recently, I acquired one of these small Kenwood SW-100 meters, which works as well and has the advantage of a remote sensing head."

Bill indicates that he has "never tried the G5RV version which employs the 33 to 34 foot matching line and the coax feed. The friends who have tried that version found themselves with an antenna which may have worked well on one or two bands, [but] which ended up a second-rate multiband antenna. True, I don't believe any of them tried trapping the coax as Louis now recommends. With the coax feed, I'd lose my beloved RF ammeter in the feedline which tells me all is well!"

In the copy of his *FDT Newsletter* G5RV article which he sent me, Bill calls attention to the problem of a yard that is too short for a G5RV antenna, a very common problem in today's environment of condominiums and postage-stamp lots. Bill indicates that the flattop portion of his antenna is only 98 feet long—extending the west end would put a guy wire into the sidewalk, while extending the east end would put the antenna under a 9 kv powerline. Bill could have picked up the additional 4 feet by bending down the ends, but this would involve mechanical difficulties. The shortening of the flattop probably reduces the antenna's effectiveness on 80 meters, but, he feels, shouldn't have any appreciable effect on the higher frequency bands.

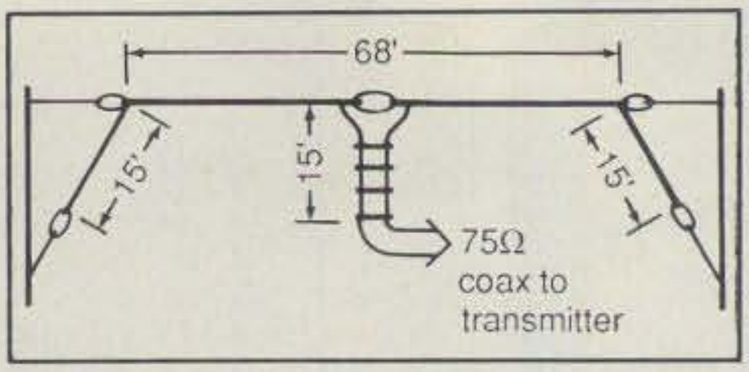


Fig. 1– "Hybridized" G5RV dipole. The so-called "hybridized" G5RV, a shortened version of its bigger brother, has but a 98 foot flattop. G3OJV found this shorter version better suited for his small yard, and described the antenna in the April 1972 issue of Radio Communication.

Clearly, with a small city lot you need to call on your ingenuity in constructing a viable G5RV. A "hybridized" G5RV was developed by G3OJV, and appeared in the April 1972 issue of *Radio Communication*. This version, shown in fig. 1, also makes use of a shortened, 98 foot flattop, but is fed via a short (15 foot) length of openwire or 300 ohm ribbon line, making use of coax for the final run to the transmitter. (However, in view of the loading problems some amateurs have experienced when using the openwire/coax feedline combination, you may wish to use openwire line all of the way to the shack, using an antenna tuner at or near the transmitter.)

Extended Double Zepp via WD5T. Tom Mannino, WD5T, wrote to us about his experience with this type of antenna, which we have covered previously in the column. He indicated that he had good luck in using the antenna, though a good deal of experimentation was required to "get things right."

Tom has separate Zepps for 160, 80, and 75 meters. Having a good deal of real estate available for his experiments, he started with a 0.64 wavelength-per-side Extended Double Zepp for 160. Wrote Tom: "After finding resonance using a noise bridge and a general-coverage ICOM 720A (it was around 1700 kHz), I tuned the antenna for resonance at 1830 kHz, not by trimming the wire, but by looping it back around the antenna for capacitive loading (about 8–10 feet). As predicted, the lowest SWR was approximately 2:1 at 1830 kHz."

317 Poplar Drive, Millbrook, AL 36054

Not liking ladder line, and after looking for a 2:1 balun that could handle high power, Tom opted for a toroidal transmission line transformer with a 2:1 inpedance transformation ratio. Using the toroid, based on a design by Jerry Savick, W2FMI, and using a Palomar Engineers F-240 ferrite core, the SWR dropped to 1:1 at resonance as measured at the feedpoint. Final bandwidth of the antenna is about 90 kHz on 160 meters with a 3:1 SWR.

Tom has more: "Later I added the 80 and 75 meter radiators to the same feedpoint; this changed the resonance slightly on 160 meters [necessitating some readjustment on that band]. The feedpoint of the antenna is 35 feet above ground. Bandwidth on 80 meters is 190 kHz but only 80 kHz on 75 meters. This combination is also resonant on 10.1 MHz (3:1 SWR) and on 24.9 MHz (2:1 SWR); I have loaded the system [on all these bands] with 650 watts CW with no heating of the balun transformer .... In order to adjust these antennas properly I 'walked miles'—who says you don't get exercise with ham radio?"

Tom adds: "The ends of the antennas are tied to pine trees at about 35 feet with 440 lb. test nylon. The ultraviolet light at my 7000 foot elevation [Tijeras, New Mexico] turns the nylon to powder if the 60 to 70 MPH winds don't get the ends first .... Soon the feedpoint will go to 65 feet and I'll let you know what happens."

New Product News

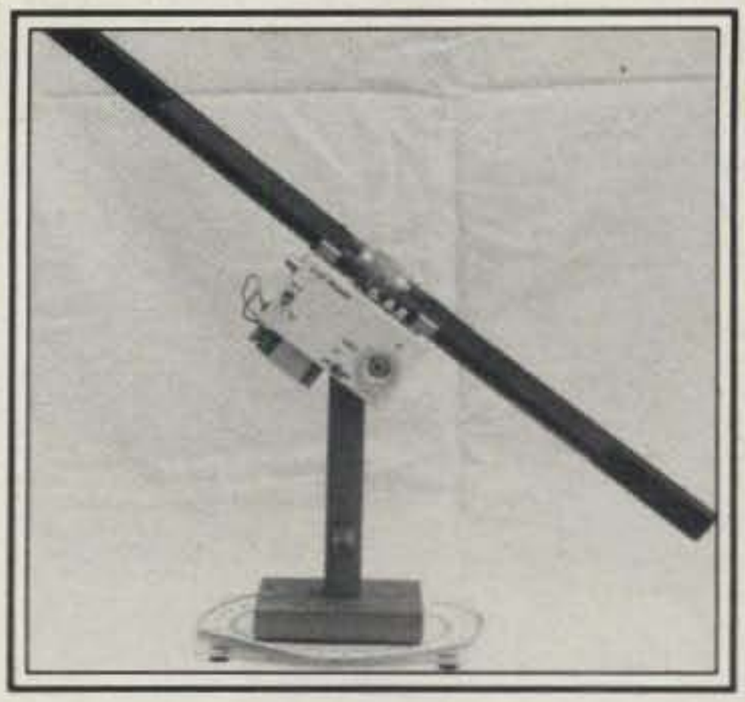
SWL Stuff from Radio West. We've found that a good source of antenna and other supplies for the shortwave listener community is Radio West, 3417 Purer Road, Escondido, CA 92025. Operated by Grant Manning since 1977, the firm is a major supplier of receivers, antennas, selectivity filters, frequency converters, books, clocks, and other accessories.

One of the more in-demand items Radio West sells is a line of compact, portable, and lightweight medium-wave loop receiving antennas. One of their most popular models is a compact loop that occupies about one cubic foot; the actual loop itself is encased in a 16 inch plastic tube which can be swiveled a full 360 degrees on both the horizontal and vertical axes for precise alignment with the signal of interest, or nulling-out of an interfering signal. The output of the loop is fed to a transistorized preamplifier that can be tuned to the frequency being monitored while adjusting the loop for maximum signal.

Radio West also sells several brands of receivers, including Sony, Japan Radio, Liniplex, Kenwood, Grundig, ICOM, Yaesu, and ESKAB (of Swedish manufacture). The firm also installs special selectivity-enhancing kits for several of these receivers.

MET Antennas. John Weatherley, G3KQL/W4, sent us some information on the fast growing line of British Metalfayre VHF/UHF antennas which he imports into the U.S. An interesting flyer—as John put it, "heavy on useful info and light on vague sales promise"—accompanied the information package I received.

MET specializes in so-called NBS gain-optimized VHF and UHF Yagis; at least 15 different designs for 50, 70, 144, and 432 MHz are offered. The catalog provides a good deal of technical information on Yagi stacking and baying, circular polarization techniques, power splitters (for combining antennas), and the use of non-metallic masts for best results where vertically mounted antennas and crossed Yagis are required.

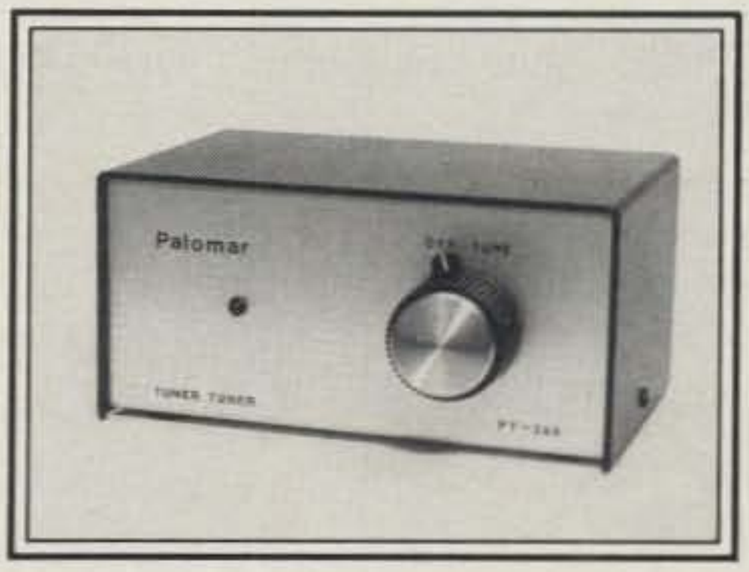


Shown is the Radio West Ferrite Loop whose intended frequency range is in the 500 to 1600 kHz range, and as such is of interest to mediumwave DXers. (Photo courtesy Radio West)

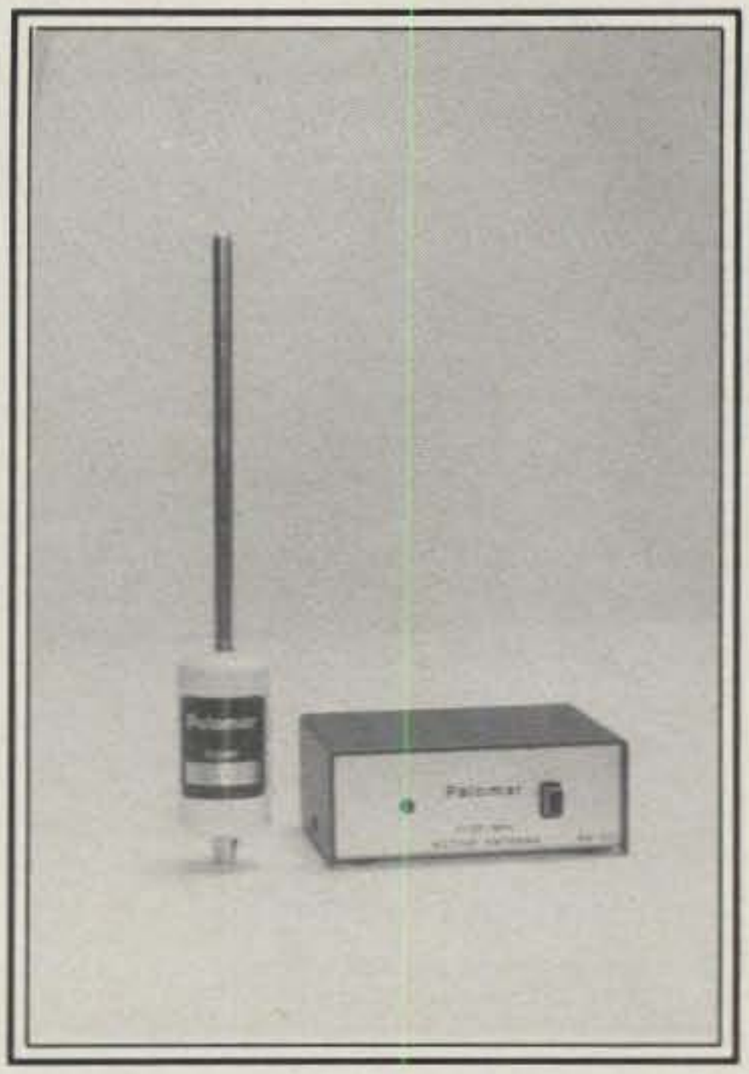
Incidentally, the MET Yagis are based on the designs contained in a 1976 National Bureau of Standards (NBS) study, authored by Peter Viezbicke, detailing some nine man-years of work undertaken in the optimization of Yagi design. The investigation described in the study took place on the NBS antenna ranges located at Sterling, Virginia and Table Mountain, Colorado. The investigation focused heavily on the interrelationship between director and reflector lengths, spacing, and diameters, as well as the effects of the metal supporting boom, in order to achieve maximum possible forward gain. According to Metalfayre's technical literature, the MET VHF/UHF Yagis have been designed and engineered within the strict specifications of the NBS report.

For more information and a copy of the interesting MET flyer, contact John Weatherley, G3KQL/W4, at Leeward Marketing Co., 1300 Pinetree Drive, Indian Harbour Beach, FL 32937.

New from Palomar Engineers. Several months ago Jack Althouse, K6NY, of Palomar Engineers, sent me an update on Palomar's product line and new offerings. Palomar makes an extensive line of amateur radio accessories, including active and loop receiving antennas, noise bridges, SWR/power meters, transceiver/receiver preamps and converters, baluns, audio filters, computer interfaces, and antenna tuners, as well as toroid cores and beads.



Palomar Engineers Model 340 Tuner Tuner is an unusual accessory that allows you to "tune your antenna tuner" without transmitting. It contains a noise bridge and the necessary switching and protection circuitry to allow its "on the air" insertion between the transceiver or transmitter and antenna tuner. (Photo courtesy Palomar Engineers)



The Palomar PA-351 3–30 MHz Active Antenna should be of interest to CQ readers who are also active SWLs. The unit has a claimed noise figure of 2.5 dB and a gain of 20 dB. The 36 inch probe may be mounted in a high location far from manmade noise, up to 200 feet from the control unit. (Photo courtesy Palomar Engineers)

One of the more interesting new products that Palomar offers is the Model 340 Tuner-Tuner, an unusual accessory that enables you to tune your antenna tuner without actually transmitting a signal. The device (not a complete antenna tuner itself) contains a noise bridge and the required switching and protection circuitry to allow its insertion between the transceiver and the antenna tuner. With it you simply connect the accessory between your existing antenna tuner and rig, turn it on to tune and turn it off to transmit. Jack says it has a "power pass" capability of 3000 watts when off, and it works over the range 1.7 to 30 MHz.

Another product, of interest to SWLs, is the 3–30 MHz Active Antenna. We all know that the best receiving antenna is a full-size, outdoor antenna. But if space or zoning restrictions prevent such an antenna from being erected, a small whip can be used, placed outside in a low-noise location. Its signal can be brought to the receiver using coaxial cable. However, the very short antenna used doesn't match the coax's impedance, and so much of the signal is lost. To overcome this problem an amplifier is needed between the antenna and the cable, thus the "active" name. The Palomar system makes use of a 36 inch remote probe (whip), a low-noise FET amplifier, and a built-in 3 MHz highpass filter for the elimination of overload from local broadcast-band signals. The package includes 30 feet of coax to connect the probe to the control unit, though up to 200 feet of cable can be used if necessary.

Jack also indicated that his toroidal core business has expanded in recent years. It used to be that his cores were mostly purchased to fabricate transformers and baluns. Recently, though, the most common application has be-

come interference suppression, and so Jack has expanded the line of cores and ferrite beads. Jack's current catalog shows nine different sizes of ferrite toroid cores in 8 different "mixes"; 22 iron powder toroid cores in 9 different mixes; and 10 ferrite beads in 3 different mixes. "Experimenters' assortments" or iron powder and ferrite cores are also available.

Jack has written up an interesting and informative application note on the use of ferrite beads and toroids to keep RF out of TV sets, VCRs, burglar alarms, computers, and other electronic equipment, and conversely to bottle up RF in such equipment. The application note points to the several ways to tackle such problems, and shows how to determine the right bead or toroid for a given application, both in terms of the physical size of the bead or toroid and the material mix required. For more information, contact Palomar Engineers, P.O. Box 455, 1924-F W. Mission Road, Escondido, CA 92025.

Good Hamshack Reading

Radiosporting and the IRSA. *Radiosporting* is a specialized operating publication billed as an "international monthly magazine for active radioamateurs." Edited and published by Yuri Blanarovich, VE3BMV, the magazine is dedicated to the promotion of quality and sportsmanship in amateur radio operating. Articles typically are in the areas of DX news, DXpeditions, propagation, contest rules and results, antenna construction, emergency traffic, FCC news, and the like—the focus being on the "hands on" aspects of the hobby.

The magazine is sponsored by the nonprofit International Radiosport Association (IRSA), which has among its objectives the promotion of international friendship and goodwill through sportsmanship, radio contesting, and DXing. The organization also strives for the improvement of the quality of amateur radio operating techniques through education and experience, including the promotion of contesting and other operating activities as a sport.

IRSA sponsors an annual International Contest Symposium, which is held in parallel (in the evenings) with the Dayton Hamvention. IRSA runs both an annual World Radio Championship Contest and World Contest Championship based on the results of a number of major contests, with the annual "Contester of the Year" awards in various categories. A Contest Hall of Fame is promoted for the purpose of awarding membership to those who have significantly contributed to the sport of contesting.

Radiosporting magazine costs $18 for a year's subscription in the US; in Canada it's $24 (Canadian). IRSA has a $9 initial membership fee, while annual membership costs $4. For a sample copy of *Radiosporting* and more information on the IRSA, contact Radiosporting Magazine, P.O. Box 282, Pine Brook, NJ 07058.

Radio Publications Books. A library of some nine amateur radio and electronics books is offered by Radio Publications, Inc., Box 149, Wilton, CT 06897. They are, of course, the publishers of the highly successful Bill Orr, W6SAI, and Stuart Cowan, W2LX, antenna handbook series, as well as a few books by others.

Bill Orr, W6SAI, preceded yours truly as Antennas Editor of *CQ*. Bill left *CQ* early in 1980 to do a monthly column, Ham Radio Techniques, for *Ham Radio* magazine. Bill's material is highly respected for its technical accuracy and easy-to-understand nature, and so his books constitute a treasury of good information. The antenna book series offered by Radio Publications includes *Simple, Low-Cost Wire Antennas for Radio Amateurs, The Radio Amateur Antenna Handbook, All About Cubical Quad Antennas, Beam Antenna Handbook,* and *The Truth About CB Antennas*. All of these books are co-authored with W2LX.

In addition, Radio Publications offers four other amateur radio titles: *Care and Feeding of Power Grid Tubes*, by Robert Sutherland, W6PO, and the EIMAC laboratory staff; an updated *VHF Handbook for Radio Amateurs*, by Orr and the late Herb Brier, W9EGQ; *Better Shortwave Reception*, by Orr and Cowan; and *Interference Handbook*, by Orr and William Nelson, WA6FQG.

While most of us are familiar with the Orr and Cowan antenna handbooks, the *Interference Handbook* is not so familiar, yet it is one that constitutes a timely reference book on all kinds of radio frequency interference and provides solutions based on years of experience in solving TV, audio, and powerline problems. The book includes an introductory chapter on RFI, as well as chapters on natural and manmade RFI sources; spark discharge interference and cures; electrostatic discharges; and interference caused by powerlines themselves. The book also includes chapters on noise reduction techniques at the receiver, eliminating RFI caused by poor circuit design in audio equipment, and tracking down RFI using a multiband radio as a detection device. A chapter devoted to amateur radio and CB related RFI is also included. The book is priced at $9.95. These books are available from the CQ Bookshop.

U. S. Government Books Catalog. The United States Government Printing Office (GPO), which operates a number of regional offices which include well-stocked bookstores of low-cost federal publications, is currently involved in a new awareness program concerning its mail-order bookselling program. The GPO offers a wide variety of books priced quite reasonably, covering a multitude of interests. Not only does the GPO have regional offices where you can browse through about 15,000 titles on just about anything you can think of, but they also offer an attractively printed catalog featuring more than 1000 titles, including many in the areas of science and technology, business and industry, and computers and computer science. If you would like a copy of their catalog, write to: New Catalog, P.O. Box 37000, Washington, DC 20013. Best of all, the new catalog is free of charge, and it also tells you where you can find a GPO regional store near you.

Consumer Information Catalog. Not to be outdone by the GPO, the United States General Services Administration, GSA, offers a variety of consumer-oriented publications. The publications, books, and booklets which they sell are priced quite low (some are free), and they cover a multitude of interests. The GSA's consumer Information Center publishes a new Consumer Information Catalog four times a year. Each quarter, they search out the best new federal consumer booklets and review everything in the catalog for accuracy.

The Consumer Information Catalog may be obtained free of charge by writing to the Consumer Information Center, P.O. Box 100, Pueblo, CO 81002. Granted, it's a general-interest catalog with little of immediate interest to amateurs. But the catalog is a good starting point to see what's out there in the way of government publications, many of which are useful to amateurs.

Computer and Software Notes

Dynamic Color News. If anything, technical support for the popular Radio Shack Color Computer (CoCo) is on the increase, with Tandy introducing an upgraded CoCo with 128K memory in its 1987 catalog. Bill Chapple, W4GQC, confirms this trend with a note to *CQ* about his *Dynamic Color News*. Bill's monthly, three-year-old newsletter's purpose is to provide instruction of BASIC and machine-language programming, computer theory, operating techniques, and computer expansion, as well as to provide a forum for readers' questions, operating hints, and solutions to problems. The programs published in the newsletter are written in Microsoft BASIC, and so will work with little or no modification on all Radio Shack computers, IBM-PC clones, and other computers using Microsoft BASIC. Bill indicated that he's expanded the newsletter to include an amateur radio section, which will be continued if sufficient interest is shown.

Contact Bill Chapple at Dynamic Electronics, Inc., P.O. Box 896, Hartselle, AL 35640.

Micro-Professor. If you're an amateur with something of a technical interest in computers but one who is still somewhat intimidated by their complexity, then you may be interested in an educational computer package by Etronix known as the Micro-Professor.

Designed to enhance your basic grasp of microcomputers and how they work, the Micro-Professor is a complete, fully developed hardware package that provides step-by-step, hands-on instruction. It covers key aspects of the popular Z-80 microprocessor, and includes an interactive monitor, line assembler, two-pass assembler, text editor, and disassembler. Optional languages include BASIC and FORTH. The package also shows you how to "breadboard" and prototype your own microprocessor-based hardware, and also lets you create the software you need to make the hardware work in a specific application.

The basic Micro-Professor package includes the Z-80 chip with 4K RAM and 8K ROM, a 49-key keyboard, and an internal power supply. A cassette-tape interface is provided, as is a 20-digit, 14-segment "green tube" display and three texts. The basic package is priced at about $200, and several optional accessories and texts are available. Contact Etronix, 5326 9th Ave., Seattle, WA 98105-3617 for more details.

Wrapping It Up

This month we've discussed some additional correspondence received on G5RVs and Extended Double Zepps, described several new product offerings, looked to some new hamshack reading material, and examined some computer-related products of note. Next month we'll continue with more Antennas & Accessories items of timely interest. See you then.

73, Karl, W8FX

Our Readers Say (from p. 8)

QSLing Made Easier

Editor, *CQ:*

The following information may be helpful to some of your readers.

Have you ever gotten tired of putting the same information down on your QSL cards time after time, or trying to read the information on a card written by someone whose first language is ancient Sanskrit? Are you working on a special award via a net, where you may make several contacts in a few minutes, or a mini vacation-pedition?

Your rig, antenna, and call don't change (often). I have gone to a local quick-print shop and had custom rubber stamps made up for those repeated items. I also had one made up with my call only, and I use that one to add to the back of my QSL cards. Then anyone reading the card can verify all the necessary info without flipping the card back and forth and trying to find the contact in his logbook. It is also used as part of my return address on the outside of the envelope that I send my QSLs in.

If you are going after a special award, such as Worked All States on RTTY, use red ink to stamp the mode on your QSL. It is surprising how much more it stands out. I use a stamp with "MOBILE" to designate in my logbook that the contact was while I was mobile, and again on my QSL.

If you use more than one antenna for the same band, use a stamp with the appropriate antenna in red ink in your logbook. The red ink can be written over, or seen through on your log or QSL. Then a year or so later if you get a QSL request (like a DX card from the Buro) you will know which antenna was in use for the contact.

I hope that some of you can make use of this to help take the chores out of QSLing.

Bob Hinshaw, WD6L
Chino, CA

Amazing Speed!

Editor, *CQ:*

I must write to convey my appreciation of my fellow amateurs' CW ability. Some of these people seem to be going 90 mph. My hat is off to them . . . in amazement! Also bewilderment. Either these amateurs are using computers to gain this kind of speed (shame, shame) or else they are more than qualified to use other segments of the bands and would be more appreciated if they would. After all, a 50 kHz segment is just so big and that's it.

Dennis Murphy, KB6LZW
Fort Bragg, CA

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BELDEN

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8267 RG213	55c/ft.
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8448 8 conductor rotor cable	33c/ft.
9405 Heavy duty 2-16 Ga 6-18 Ga	56c/ft.
9258 RG8x	20c/ft.
9269 RG-62A/U	16c/ft.
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AMPHENOL

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UG176 reducer RG8X	.30
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31-216 UG201 A/U N Male-BNC Female	2.00
31-2 BNC-RG58	1.50
34025 N Male, RG58	3.00
34125 N Female UHF male	9.00
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AEA PM-1	149.00
New AEA UDC-232 Firmware, No modem, List 279.00	249.00
New Kantronics KAM	299.00

See you at Dayton Flea Market, Spaces 2435-37.

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HF2V, 80 & 40 vertical	119.00
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Hustler G7-144	119.95
Hustler 6BTV	139.00
KLM HF World Class Series Antennas	Call Don
Alpha Delta Twin Sloper	49.00
Coax Seal	2.00/roll
B&W Dipoles	Less 10%
KLM KT-34A	399.00
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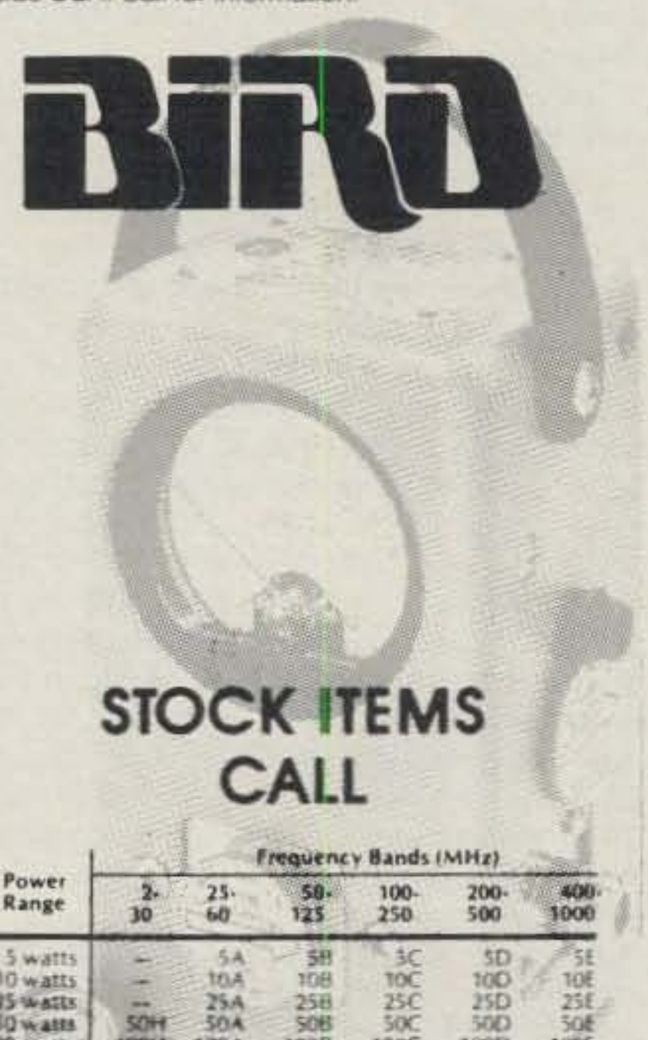

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PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

New Equipment Reviews

Well, it's about time, Katz. I've been piling up all kinds of VHF/UHF gear and have finally begun performance testing in my new workshop. The first two items tested are reviewed in this column, and there's plenty more where these came from. Let's get started.

The Tokyo Hy-Power Labs HL-120U UHF Power Amplifier

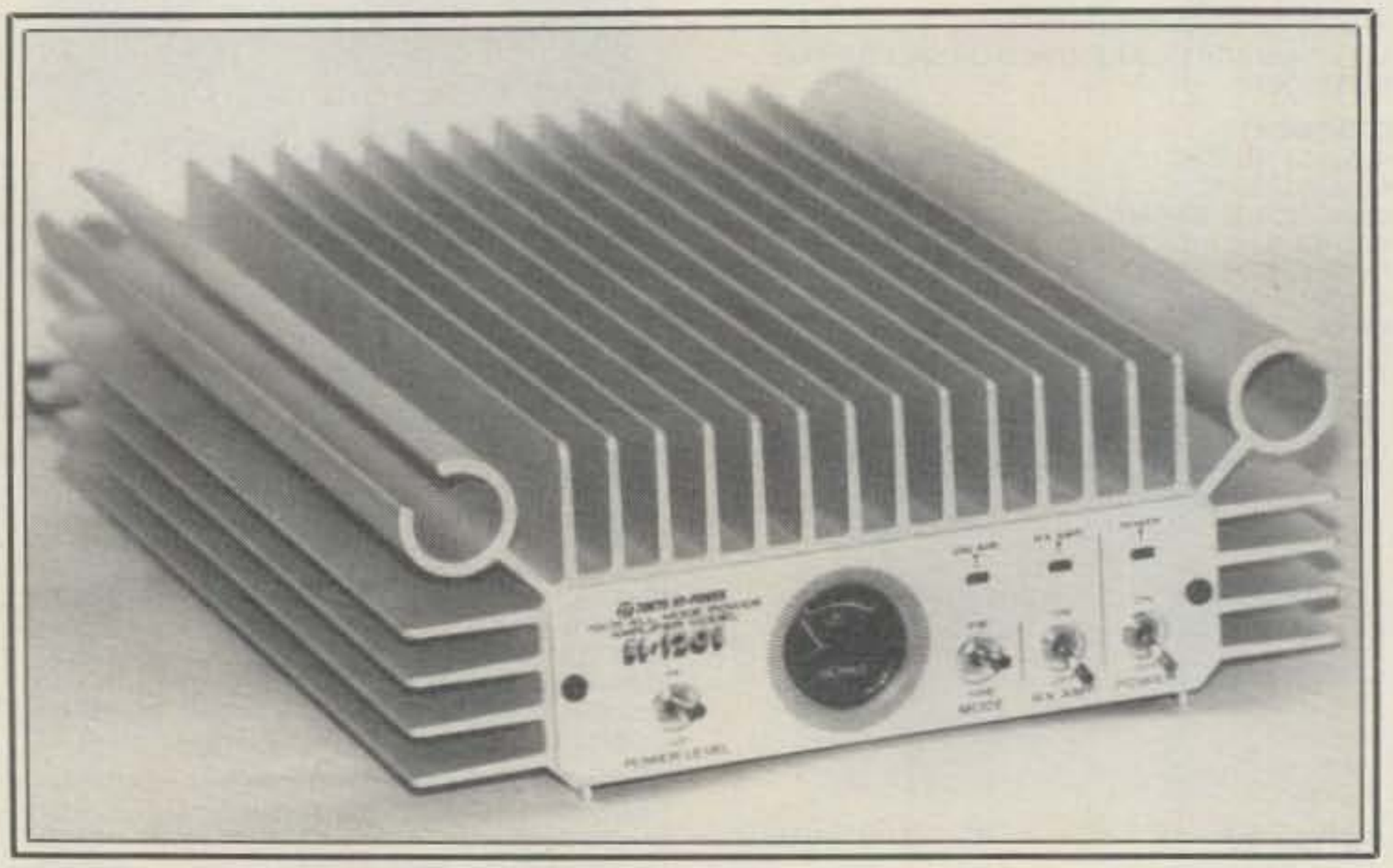
Tokyo Hy-Power Labs, Inc. has been selling their products in the U.S. market for a few years now, being a featured Japanese line imported and distributed by Encomm of Plano, TX. One of THL's more interesting products is their highest-powered amplifier for the 70 cm band, the model HL-120U. This rugged little amp occupies only two-tenths of a cubic foot and weighs less than 8 pounds, yet delivers a powerful 100 watts RF output with less than 10 watts drive across the 70 cm amateur band. I have had an HL-120U in my possession for about 7 months now, and have given it sufficient on-the-air time to know its strengths and weaknesses, so I feel aptly qualified to write this product review.

The HL-120U is rather unique in that it provides a "HI/LO" power switch that does more than merely switch the amplifier on and off line; it also includes a GaAsFET receive preamp that works well.

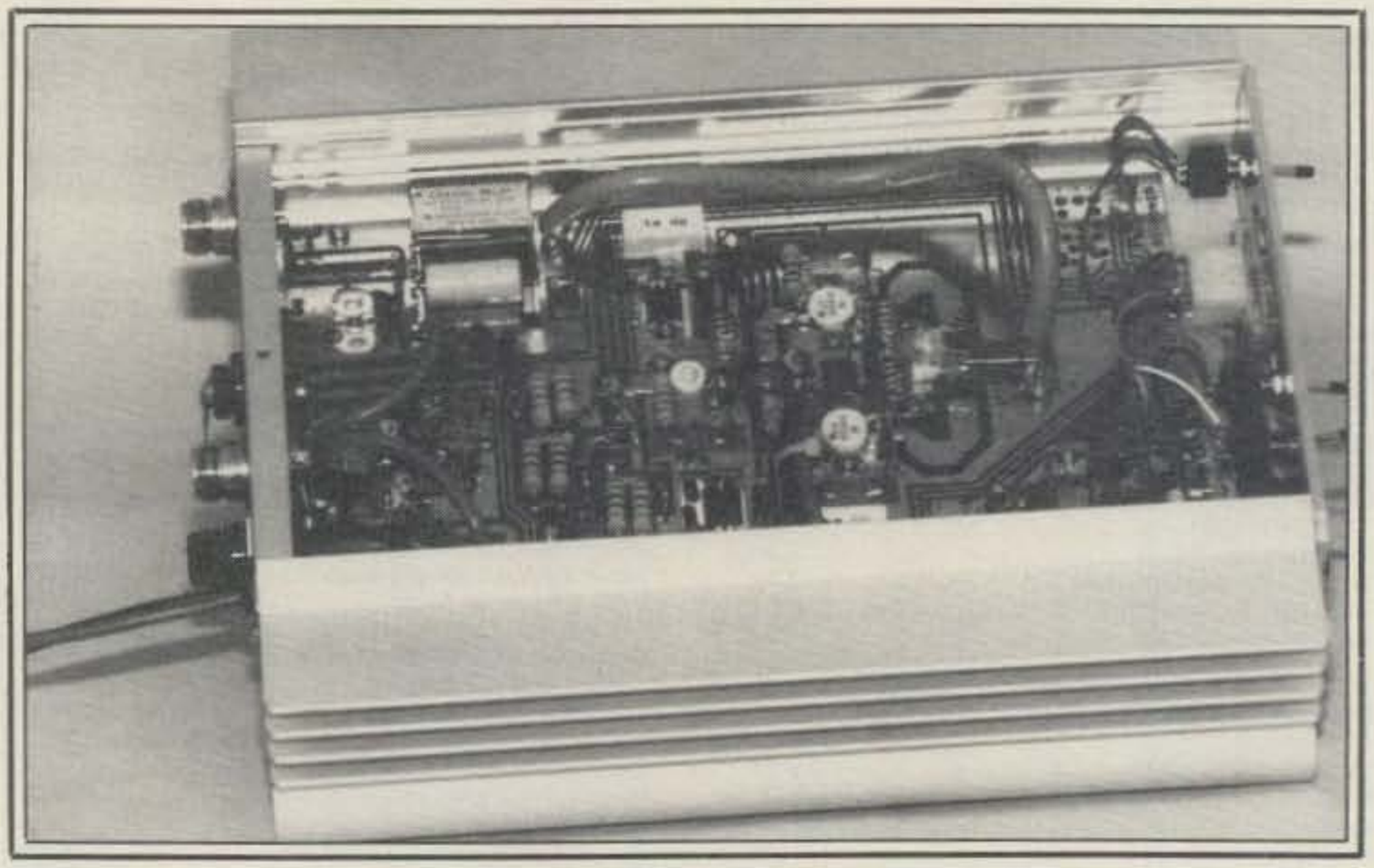
The power amplifier itself is straightforward, with a Toshiba 2SC2381 bipolar driver and dual Motorola (American made) MRF648 final PA transistors the outputs of which are added in an etched hybrid combiner. Since panel switches would not be capable of switching energy at 432 MHz, the "HI/LO" function is performed by PIN diode switches which insert or remove resistive attenuator components in series with the driver stage. I believe the goal was to achieve a 3 dB (2:1) change in output power when going from "HI" to "LO"; however, the actual difference is closer to 2 dB. It would be easy enough for the owner to change resistive elements to accomplish a greater or lesser difference between the high and low power settings.

PA driver bias is supplied by a 2SC1173 bias amplifier, while final PA bias is supplied by a thermally compensated 2SD526 power transistor which adjusts bias according to the junction temperatures of the PA transistors using tracking diodes which are thermally bonded to the PA heatsink. The goal here is to maintain optimum linearity over a wide range of operating temperatures, and the technique described is tried and tested. PA bias is adjustable in the HL-120U, but not for each individual output device.

The receive preamp is a 3SK121 dual-gate GaAsFET which is switched by M1301 PIN diodes using quarter-wave lines for added isolation. For those unfamiliar with PIN diodes, they differ from standard rectifiers or dectectors in that they are optimized for on/off switching characteristics in high frequency applications, and offer lower "on" resistance and higher "off" resistance to VHF signals than would ordinary diodes. The T/R relay in the HL-120U may be driven by an RF "sniffer" (detector) or "hard keyed" via a rear-panel receptacle which accepts either a contact closure or +12 VDC on transmit, thus offering the owner complete versatility in station wiring. When "hard keying" is not employed, the RF "sniffer," a 1K60 point-contact diode followed by a 2SC1815 current amplifier, will successfully



The Tokyo Hy-Power Labs HL-120U features a HI/LO power switch (far left), output meter, mode switch, RX preamp switch, and power on/off switch. The RX preamp can be switched "in" or "out" regardless of the other switch settings.



Inside the THL HL-120U the layout is clean and simple. The PA transistors may be seen near the center of the circuit board, with the bright white top caps. The coaxial output relay is in the upper left-hand corner.

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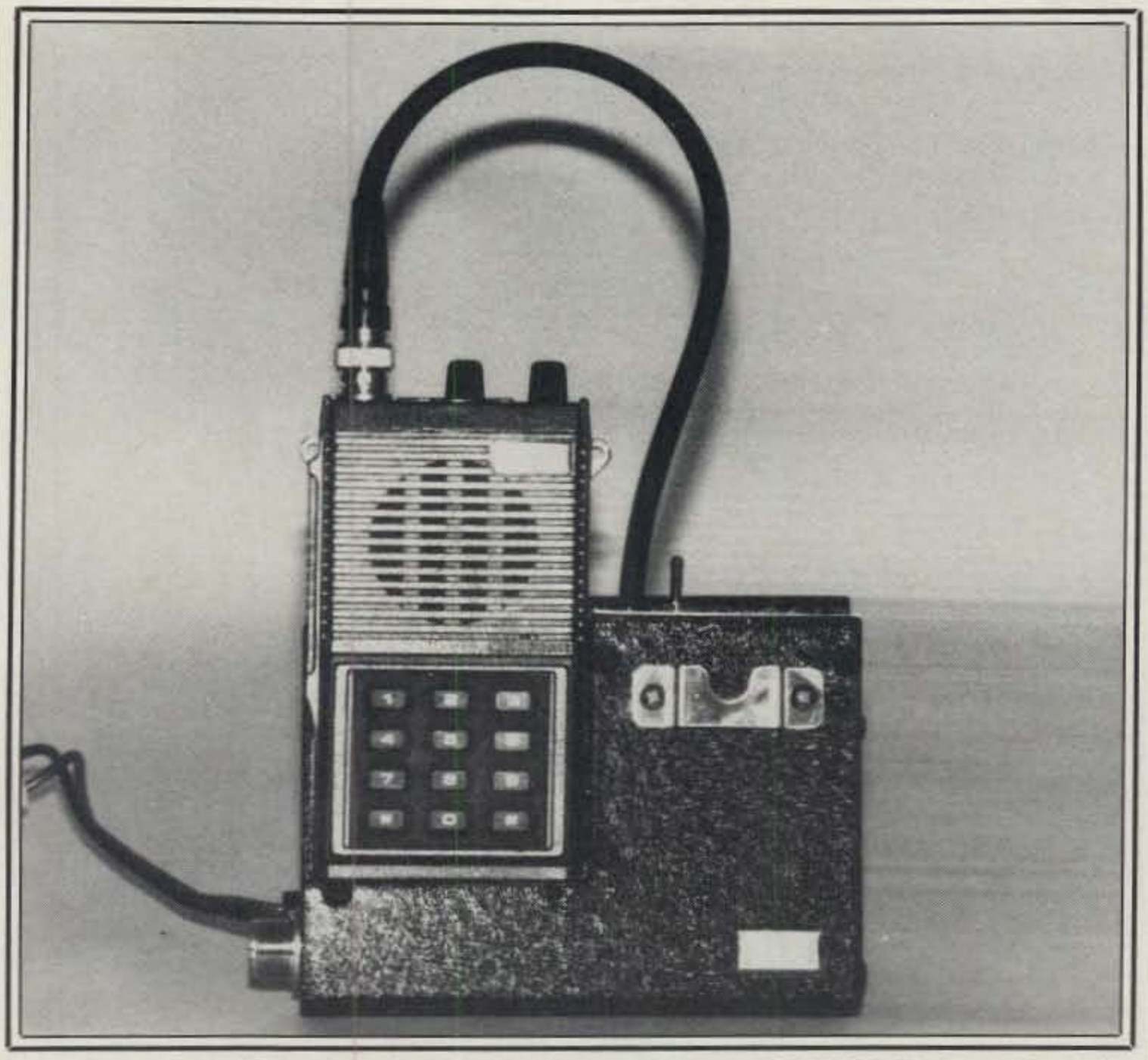

Here's the WP-3200DX and mating hand-held transceiver, an ICOM IC-2AT, viewed from the front. The Docking Booster's SO-239 coaxial receptacle may be seen at the lower left; its mike bracket is at the upper right, on the front of the unit.

key the amplifier at RF input (drive) levels above about 1 watt. The 2SC1815 in this circuit charges a large capacitor in the SSB mode (this capacitance is switched out of the circuit for FM) to add drop-out delay when required. The two internal relays, RL1 (most functions) and RL2 (PA output switching only), are energized by separate driver transistors.

The HL-120U has effective reverse-polarity protection in the form of a large stud rectifier wired across the 13.8 VDC mains (after the inline fuse). This rectifier is normally reverse biased, but will draw enough to blow the line fuse if ever forward biased by the incorrect application of DC polarity. I should mention that this is about the only protective circuitry the HL-120U has; there are no high-temperature or high-VSWR shutdown circuits, so one must be careful to present a proper terminating load, as well as allow enough room around the amplifier for good convection cooling.

The front-panel RF output meter is another unique feature of the HL-120U. The meter itself is driven by a 1K60 diode detector compensated by a D33A thermistor for enhanced linearity. The detector derives its current from an etched RF line section (coupler) which functions to monitor only forward, not reflected, power. The circuit works reasonably well, showing full-scale accuracy within the constraints of the minimal meter markings. At reduced power levels, or with the amplifier "off," the RF output meter continues to function at greatly reduced accuracy.

The THL layout is clean, with most inductors and transmission lines etched on the epoxy-fibreglas circuit board. I'd prefer to see the more stable, lower dielectric constant Teflon-fibreglas boards used at this frequency, but selling price is always a prime issue in amateur products, and I imagine going overboard on quality would price the unit out of reach for many potential users. The manufacturer has chosen to switch the 13.8 VDC mains to the amplifier, including the heavy buss to the PA transistors, with a panel-mounted toggle switch—an unusual approach, since the switch must conduct up to 18 amperes when transmitting at full power. (Most high-powered solid-state amplifiers apply full collector voltage at all times, and switch only a relay coil which brings up operating bias and allows the drive signal to be applied to the base.) The DC power cable, permanently wired into the unit, is not well decoupled from the circuit, its only isolation from the PA collectors being a pair of air-wound RF chokes and a few paralleled bypass capacitors mounted to the circuit board. I'd add my own RFI filter near the exit point for the power leads if I intended much continued operation with the HL-120U.

Type-N connectors are used at the input and output of the HL-120U, and silver-plated straps ground the receptacle shells to the main printed circuit board ground plane. Although the receptacles are of the "bulkhead" variety which are secured by a single nut each, they never showed any tendency to loosen up during months of use and frequent connection and disconnection of mating cables.

The RF output relay (RL2) is a 50 ohm coaxial relay (hooray!) made by Yasuda Denken Co., their type CX-220P. The PA output line from the hybrid combiner to the relay is not etched, but made of coaxial cable similar to "mini-8" type RG-8/X.

Externally, the HL-120U is an attractive piece of gear with 24 heatsink fins serving to effectively cool the PA transistors. The THL amp has no rubber feet to protect the bench or equipment on which it will sit. This could be a problem, as in many installations the amp will sit atop other expensive equipment which might be scratched by the aluminum rails which are the HL-120U's bottommost points.

A minor annoyance is that the HL-120U is supplied with only a short power cable (32 inches), creating the need for splicing in most installations. I'd recommend #12 copper wire be used as a minimum for such additional cable. Number 12-2 stranded speaker wire, becoming popular with the advent of high-powered stereo systems, would be a good choice where high ambient temperatures are not encountered.

As in most similar products, the HL-120U has a "mode" switch labeled "SSB/FM." This switch only controls the relay drop-out time and has no effect whatever on biasing or other circuit parameters. The amplifier operates as a "linear" in all modes, up to the point of input saturation, which will be discussed. Unlike some competitive products, the THL's receive preamp functions regardless of the positions of all the other switches, as long as the preamp switch is "ON" and the unit is connected to a DC source. All amplifier functions are indicated by front-panel LED status indicators (POWER, TX, ON AIR).

Based on both laboratory tests and actual use, I'd recommend the use of the HL-120U's internal GaAsFET preamp in many situations. It will surely improve the receive sensitivity of the multimode transceivers and most transverters. Since the preamp has 15 dB gain, it should be used judiciously to avoid overloading stages which follow. Certainly, the preamp can be left on line when searching for signals on a dead band, and then switched out in the presence of very strong local signals.

Did the HL-120U meet its published specifications? Most assuredly, but its published specifications are somewhat sketchy. For example, the manufacturer does not rate preamp gain, noise figure, or intercept point, nor does it list "thru-loss," wattmeter accuracy, or power amplifier gain. THL does rate power consumption as "5 A – 17 A"; I measured current drain as 2 A (keyed, but idling with no drive applied) to 18 A (driven to saturation). They also rate output power as "10 W–100 W," a rather confusing rating which might imply that the amplifier oscillates! The actual output power of the unit under test was zero (no drive applied) to 125 watts (driven to saturation). They list input/output impedance as 50 ohms. I couldn't measure output impedance, but the HL-120U's input impedance is indeed 50 ohms, showing better than 1.1:1 input VSWR—excellent performance which is far better than I'm used to seeing with comparable solid-state UHF amplifiers.

I measured receive preamp gain to be 15.0 dB and 1 dB compression point at +2 dBm (output, –12 dBm input), a good figure for a GaAsFET at 432 MHz. I also measured PA stage gain as 10 dB in the "LO" power position and 12.2 dB in "HI," within the linear operating region. The HL-120U goes into saturation with about 13 watts drive, where it produces 95 watts ("LO") or 125 watts ("HI") output when supplied by a regulated 13.8 VDC source.

The HL-120U's built-in wattmeter was within 10% accuracy (compared with my standard

Bird model 43 and 100D element) when used near full output power, but it becomes far less accurate downscale (25% or so at 10 watts). Still, the meter could be a handy indicator that the amplifier is at least working.

The THL amplifier demonstrated 0.73 dB "thru-loss," the amount of transmitted or received signal which is lost in internal circuitry when the amplifier is switched "OFF." This would be a high figure for a 2 meter amplifier, but is reasonable at 432 MHz, the test frequency.

In all, I'd recommend the THL HL-120U to anyone currently running lower power on the 70 cm amateur band and wishing to increase his station capability. Its PA design and assembly is sound and has offered hundreds of hours of trouble-free service. Its internal RX preamp is one of the better around and should improve the performance of most transceivers and transverters being used on the band.

The Tokyo Hy-Power Labs HL-120U is available from Encomm, 1506 Capital Ave., Plano, TX 75054, and from authorized dealers.

Now how about another review? I was busy this month.

The World Systems Engineering WP-3200DX "Docking Booster"

"What," you may ask, "is a Docking Booster?" It sounds like some sort of boating accessory, but the Docking Booster model WP–3200DX is one of a series of mobile VHF-FM products designed to enhance the performance of hand-held transceivers (HT's) without putting too much strain on the budget. You've probably seen these things advertised or being sold at a local hamfest and wondered how effective they are. I know I have.

Wonder no more, for I have the 2 meter Docking Booster in hand and have taken some time to run lab tests on it. My findings: good and bad. Good concept, pretty fair power amplifier, poor receive preamp—this sums up my feelings about the WP-3200DX.

First, let me discuss the good. The WP-3200DX Docking Booster, which is intended for use with the ICOM IC-2A, IC-2AT, or IC-02AT, is an attractive package which hangs from your automobile door's interior window ledge. The Booster is supplied with plenty of DC power cable to reach nearly anywhere it might have to go, although I'd guess that in 99% of all installations the cable will be terminated in a cigar-lighter plug and pushed into a hole in the dashboard. Since most of us don't smoke anymore, this is a fine application for the cigar lighter socket in our cars. If you do smoke, maybe you should buy a Docking Booster just to have something to plug up the cigar lighter hole and help you forget about smoking. You'll have a stronger signal into the local repeater, plus the side benefits of fewer seat-cover burns and a longer, healthier life!

The appropriate handie-talkie (in this case, an ICOM) simply slides sideways into the Booster, mating with a pseudo battery top which replaces the normal battery pack used to power the talkie. The battery cannot be left attached to the HT when using the Booster, but the belt clip can. You simply plug your antenna (not a rubber duckie, a real antenna) into an SO-239 "UHF" receptacle on the Booster, then plug a BNC coax "pigtail" (supplied with the Booster) into the top of your talkie, and you're on the air. The whole installation takes perhaps 30 seconds, so nobody should complain about not having the time to have a proper signal from the car. Since most of us won't want to bend over to scream into our HTs as we drive down the road, the use of a mating remote microphone—like the HT manufacturer's "speaker mike"—is highly recommended.

The WSE WP-3200DX "Docking Booster" has a simple control panel, with just a low-off-high switch. The handie-talkie is inoperative when the Docking Booster is switched "off," and the RX preamp is active at all times.

The Docking Booster in no way interferes with access to the hand-held's top control panel, although access to the rear panel may be obstructed in some installations. (The IC-2AT used for this review has important slide-switched functions located on its rear.)

The WP-3200DX has a handy mike bracket on its front, and its easily accessed function switch is accompanied by two panel LED's which serve as power ON and TX status indicators.

The first problem I encountered with the Booster was an intermittent connection between the DC terminals on the HT's base and the Booster's battery top simulator. This is exactly the kind of problem which could occur when mating an ICOM battery pack with the HT, so I was not disturbed by it. Sliding the handie back and forth across the Booster's mating surface until the DC connection was securely made cured the problem.

Now we're cooking. The WP-3200DX, and presumably the other Docking Boosters made for Kenwood and Yaesu handie-talkies, has slightly more power output than claimed. By supplying the HT with higher and better regulated voltage than it normally receives from its battery pack, the RF output from the handie even "barefoot" will be higher than normal. My IC-2AT with a freshly-charged BP3 battery pack produces 1.6 watts output to a 50 ohm load; with DC power supplied by the Docking Booster, this is increased to 2.5 watts output. That 2.5 watts was enough to drive the WP-3200DX to more than 30 watts output as measured by my Bird 43 meter/50C element, when terminated by my commercial microwave resistive load. Although W.S.E. only rates the Booster to have 30 watts maximum output, the test unit provided up to 34 watts output when initially keyed. This drops to 31–32 watts after a minute or so, as the PA transistor heats up. In all cases the DC supply voltage to the Booster was 13.8 volts.

Switching the IC-2AT to its own "LO" power position, and driving the Booster with 500 mw, resulted in 18 watts output. This is probably enough power for most applications, and is easier on both the talkie and the Booster, as they run much cooler at this reduced output level.

Current drain under full "HI" power output conditions is more than 5 amperes, although the manufacturer rates consumption to be 4 amps maximum and protects the unit with a 5 amp glass fuse installed in the DC cable. I'd change the fuse to a 6 or 7.5 amp unit, for it would only be a matter of time before the 5 amp fuse blows under normal operating conditions. The published 4 amp figure seems a bit optimistic anyway, since the IC-2AT alone draws more than one-half ampere at full output when powered by the Booster's DC-DC converter/regulator. This would leave only 3.5 amps for the Booster's PA stage, which at 13.8 VDC would have to be more than 70% efficient to achieve the published 4 amp rating. At 5.5 amps input current, allowing 5 amps for the Booster's PA stage, the efficiency is a more realistic 49.2%, average for solid-state VHF amplifiers.

The only active device in the PA section of the Docking Booster is a 2SC1946 power bipolar transistor, operating in grounded-emitter Class C; as such, the Booster is inappropriate

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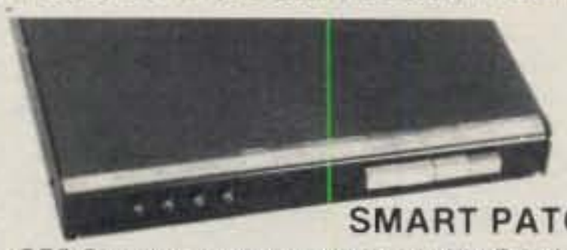

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for SSB work. Input and output circuits are microstrip (printed lines on a circuit board), and only one peaking adjustment exists—a trimmer capacitor, TC1, which tunes the collector tank to resonance. It is a very simple circuit, with a two-section low-pass filter following the PA stage. T/R switching is accomplished by a voltage-doubling RF "sniffer" (detector), driving a pair of cascaded 2SC1815 current amplifiers to pull in RL1, the carrier-operated relay. It's all very straightforward.

The Docking Booster contains a simple 3-terminal IC regulator which produces 10.0 VDC output to power the handie. A diode across the DC line inside the case provides reverse-polarity protection.

Now for the not-so-good part: The receive preamp in the Docking Booster, which cannot be bypassed when the amplifier is switched on line, is a 3SK97 GaAsFET circuit with claimed 16 dB gain and 1.5 dB noise figure. In the test unit, I measured actual gain to be 17 dB, far more than anyone could possibly need. The problem is that the preamp overloads dramatically, showing a 1 dB compression point of −4 dBm output (−20 dBm input). This represents only 22.3 mv input level, which is not exceedingly strong considering the Booster's normal operating conditions will include motoring down highways passing lots of other vehicular transmitters in the VHF spectrum. The unfortunate part of using this kind of preamp in a mobile situation is that the preamp will undoubtedly saturate with only moderately strong signals, then that saturated output signal will be fed as a very high level to the handie-talkie, forcing it to really "wipe out" with severe desense, intermodulation, and all kinds of bugaboos.

A better design would use a GaAsFET setup for much less gain, perhaps 6 dB, and a much higher saturation point, like +10 dBm. The 3SK97 is certainly capable of this kind of performance, although a designer might have to "throw away" a lot of gain after the FET by using a resistive attenuator between the device and the T/R relay. But this would be smart, as it would prevent early saturation of the HT in use while offering a solid 50 ohm termination to the finnicky GaAsFET device.

An easy fix for the Docking Booster's preamp problem would be to provide for a way to simply shut off and bypass the preamp without disabling the transmit power amplifer. With rewiring this could be accomplished.

In the Booster preamp circuit there are a pair of "back to back" transient protection diodes directly across the input to the FET, and I might suspect these of early conduction and possibly causing the "crushing" of the front end, but I don't think the 1S1588 diodes used are conducting as early as 22 millivolts. I did not try lifting them from the circuit board to see if this would help the compression point performance. The preamp is switched in and out of the RF line by a relay, RL2, and not diodes.

One last test, C.O.R. (carrier-operated relay) sensitivity, was run just to see if the Booster would work satisfactorily with very low-powered handie-talkies. It will, as the relay pulls in with just 20 mw of drive power. However, being a class C (non-linear) amplifier, the PA section will not generate any output until drive levels are appreciably higher than this.

The Docking Booster WP-3200DX weighs just 1⅛ lbs. (without HT; it's 1¾ lbs. with IC-2AT installed) and is an attractive accessory which should prove useful to those who run handheld transceivers in their cars. It would be a terrific product if the receive preamp offered better strong-signal performance, but for those living in the "boonies," this shouldn't matter. The transmitter PA section and battery eliminator circuits work well.

The World Systems Engineering Docking Boosters are available from Naval Electronics Inc., 5417 Jetview Circle, Tampa, FL 33634, and from authorized dealers.

Well, another review bites the dust. I've got several more to write featuring products such as the Microwave Modules ATV transmitter and receive converter, the KLM 44-element 23 cm Yagi, the Microwave Modules MML144/100S VHF power amplifer, and the SSB Electronic LT33S 902 MHz linear transverter. Give me a break. I'm still tired from unpacking and decorating a new house.

Rumors

It is mid-January as this is written, and the VHF Sweepstakes is over. How did you do? I intended to just fool around for a few hours, partly because my 6 meter beams aren't up yet, but also because we had plans to attend a first-year birthday party for KT2B's son. We also looked forward to attending WA2VUN's 40th birthday party Saturday evening. Well, you know what they say about the plans made by mice and radio operators. My XYL, Lori, was terribly ill with the worst cold of her life, and because she is expecting a baby, she couldn't take any of my proven cold remedies (like two shots of bourbon per hour until you don't care about your cold anymore). As a result, I didn't stay at KT2B's party very long, and never did make WA2VUN's party. The latter was a real sacrifice, because parties at Mike's house can be pretty memorable. Problem is, when I wake up several days later I usually can't remember anything.

Anyway, I fired up the freshly-assembled home station at about 8 o'clock local time Saturday night, just in time to call CQ on 220.1 MHz in the first minutes of the traditional 135 cm "activity hour." I was warmed by the sound of a dozen stations, one of whom was W3HQT/1 in Maine (some 350 miles away), responding to my CQ. I fired back my first reply, or at least I thought I did, but the transmitter wouldn't key again. Murphy visited awfully early for this one. I hadn't been on the air more than a minute when something went wrong.

It turns out that a set of contacts on one of my main controlling relays wasn't mating properly, and the solution was to burnish the contact surfaces. This took only minutes to find and fix, and I was back on the air by 8:15.

Not bad! The first 30 minutes on 220.1 MHz SSB yielded 30 QSOs, a one contact per minute rate that surely wouldn't keep up forever. But, after all, I was just fooling around and "handing out a few points," as they say.

At 12:30 AM local time Sunday I had worked a lot of stuff and decided to take some needed rest. After all, I wasn't really in the contest. At 8:00 AM Sunday morning I found myself back on 220 MHz, coffee cup in hand, ready for action. Damn, this was fun! Let me just spend a couple of hours handing out points, and I'll get back to the important work of tending to my sick wife's needs and decorating the house.

The couple of hours became the rest of the contest. Except for a 2-hour break between 5 and 7 o'clock local time on Sunday afternoon when I did some food shopping and prepared dinner for my poor, sick wife and myself (I don't remember, but dinner was probably a pizza—I'm not much of a cook), I operated Sunday

straight through on the 144, 220, 432, and 1296 MHz bands. I cursed myself for not having the 6 meter antennas installed yet, but I didn't know what I was missing on 6 because I couldn't even listen, and nobody was talking about it. My couple of hours of giving out points became 17.5 hours of operating the four bands, "giving out points" to 451 stations in 90 grids. Sucked in again.

Here at 'WIK I noticed some interesting propagation changes during the Sweepstakes. On at least a few occasions I found signals to be stronger on 70 and 23 cm than on 2 meters when contacting the same stations within a few minutes on the various bands. That sounds like tropo, but this was January in the northeast—cold weather and all. WA1OUB in FN43 (central NH) asked me to try a 23 cm sked with him on Saturday night when his signal on 2 meters was 20/S9 over the 300 mile path. We tried—results nil. Bob explained he was in the middle of a dense snowstorm, and this may have made the path on 1296 MHz impossible.

Then near the end of the contest on Sunday night I heard WA1OUB on 2 meters again and asked him if he'd like to try one more shot at it. "Is it still snowing, Bob?" "No," came back the reply, and off we went to 1296.120 MHz. I gave a long call, and Bob's reply nearly blew me out of my chair. He was S9 on 23 cm, while minutes before he was only S6 on 2 meters! Weird, but exciting.

I think my point is that contests are really a lot of fun, so if you haven't tried it yet, please jump in! The water's fine. The water is probably finest of all in mid-July, when we sponsor our *CQ* World-Wide VHF WPX Contest. I mean, who doesn't swim in July? Contest logs/entry forms are available for the 1987 VHF WPX. Just ask for them, and then plan to be part of this year's activity.

I received an enlightening letter from Jim Stewart, WA4MVI, of Greer, SC. Jim is one of those guys who has done it all, so to speak. He holds WAS (Worked All States) on 50, 144, and 432 MHz. As if this weren't enough, he's also Worked All Continents on the three bands. You don't accomplish these things by watching the grass grow between your toes. Jim's outstanding VHF/UHF DXer status is the result of thousands of hours of hard work. He wrote to fill us in on his recent EME expedition to KH6 (Hawaii). Jim says, "During December, I operated a small station on 432 MHz EME from KH6. I am pleased to say that we made a few very happy with this rare state! Due to the nature of my travel *(he's an airline pilot—ed.)*, I departed on very short notice, so I am sure many didn't know I was QRV . . ."

WA4MVI/KH6 ran a homebrew dual 8930 final to four homebrew long Yagis aimed by "eyeball," using the "Armstrong" method (no rotors). His modest portable station included a Yaesu FT780R and ancient FDK/KLM Echo 70. Stations worked include K1FO, N7ART, K4QIF, W8IDU, W0SD, and K4PKV. Jim says that other stations were heard weakly, but no QSOs resulted. "Many thanks are in order to all those who tried a QSO and gave us support and assistance" expresses WA4MVI's sentiments about his impromptu operation.

Jim's also run EME DXpeditions from the Idaho/Wyoming border and Nevada, and says he'll probably continue with more such operations when time allows. He's very interested in propagation and would enjoy hearing from others who are students of the subject. Interested parties may write to Jim at 20 Country Club Dr., Greer, SC 29651.

Scott MacGregor, WA7ECY, of Troutdale, OR wrote to tell us a bit about his operations in the Pacific Northwest. Scott's been active on VHF since 1965, when he was on 2 meter AM with a Heathkit "Twoer" (remember the "lunchbox?") and fondly recalls that "those were the days." Scott, I'm not sure if they really were the days, but I also ran a Twoer back in 1965.

WA7ECY is in the process of reworking his antenna system and intends to erect a pair of 8-element KLM Yagis for 50 MHz. He currently uses an ICOM IC551D and a Drake TR-6 with a Swan Mark VIB power amplifier (2 × 3-400Zs). Scott, I remember the warm glow of the Mark VIB from back when my local contest group, WB2GKE, used to operate VHF contests in the late 1960s. I'm glad there are still a few of these boxes around. MacGregor also has an IC251A, Mirage 80 watt amplifier, and Cushcraft 4218XL "Boomer" antenna for 144 MHz, and looks forward to getting on 220 MHz SSB. Keep up the good work, Scott, and let us know how you're doing!

Boy, this sure got too long. Have fun in the Spring Sprints and keep writing.

73, Steve, WB2WIK

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATION AROUND THE WORLD

And DX shall be music
When no one is near,
A fine song for singing,
The rare one to hear . . . .

April usually comes about this time every year, and everywhere one sees joyous Locals capering in the warm spring air. They come out like the crocus—a couple of warm days and they are hippity-hopping everywhere. One even hippity-hopped up the hill to ask a question we were sure he had been saving since the New Year. It was about the Fiftieth Anniversary of DXCC. He asked the question sometimes heard these days: "Who invented the DXCC?" We thought we were ready with the answers, but in a bit we were not so sure.

We started out by running the story that most are now familiar with, and again we had to wonder why if the popular image of amateur radio is that of a youngster tinkering in the basement of the family home are there so many old codgers among us? Really old! Old like Sam and Arch and Merle and Ham, not still young as you and we are. But first we had to answer the question of the Local, and thinking to avoid additional fill-in questions, we tried to sketch the DX picture of a half-century back.

"You have to keep in mind," we said, jumping right back into those glorious days , "that when amateur radio opened up the higher frequencies the goal at first was to see how far you could work a station. Naturally the fellow who could work the farthest was the acknowledged best-est. But by the mid-twenties DXers were working halfway around the world looking for new goals and new challenges. The Worked All Continents Award was a big thing back then, and in looking back it is sometimes surprising to learn what appears so simple now was then a bit of a puzzle. Clint De Soto was working in the IARU track, and for the WAC a list of 150 continental countries was prepared to help in the application and administration. Instead of straightening things out, this brought more problems, and within a year or so they went to a continental boundary map for WAC with the continental areas clearly delineated."

We were rolling along and working up a bit of steam when the Local interrupted. He wanted to know about DXCC, while we

77 Coleman Dr., San Rafael, CA 94901

It is true that some DXers never want to wander far from the rig, and even in Lima, Peru, DXers have learned that eternal truth. Here is Carlos Siewczynski, OA4CIT, right at the edge of a sand trap on a golf course, but ready to work a needed one between putts. The gear includes an ICOM 740 with a couple of 12V batteries for power. The antenna is a Hy-Gain mobile.

wanted to finish the WAC segment. Guess who won! In DXing the old fogies always win . . . mostly.

"Stick with us, kid," we cautioned the Local, and he did. If he wanted answers, he had little other choice. "Though this continental division helped in the WAC program, there were still mounting questions on DX countries, the problem being that there was no universally accepted guide for what was a country. After some study it was proposed that 'Each discrete geographical or political entity is considered to be a country.' The thought was that with such a definition every DXer would come up with approximately the same list. However, it hardly worked at all. It soon was evident that following this rule there might be as many as 700 DX countries. So they tried again.

"In January 1937 they issued a new country list, this being based on a map prepared for radio amateurs, and the alphabetical index at the bottom of the map was a guide." Having come this far, we thought that the picture might be getting understandable to the Local. We paused to ask, "Maybe you've heard some of this before?" We thought we were being solicitous, but the Local showed reactions as though we were long-winded. Again we had to wonder how the Local expected ever to be an informed DXer if he was reluctant to listen. DXers always learn to listen!

But with the Local showing some slight signs of being resistive, the thought came that he was waiting for answers and ignoring the rhetoric. We were still of the belief that unless one understands all the factors, the decisions and the thinking that went into DX developments of a half-century back, it might be difficult to understand the answers. But then, like the U.S. Cavalry thundering over the ridges with banners flying, the Old Timer came striding down the hill on dismounted patrol. We greeted our rescuer and quickly included him into our circle of Historical DX Review. It was easily done. All we had to say was, "Maybe you could add something to what we have been telling the Local about how the DXCC got started." As was said so many years ago, ". . . a DXer never tires of talking about DX: a DXer never tires of hearing about DXing." This is as true today as it was then. Some say it has been written in stone.

"Depends on what you want to know," the Old Timer said, starting right in with that firm delivery that always tells the listener that this one knows! "If you are looking to find out how the DX country list got its start, you will have to give a lot of attention to Clint DeSoto. His work in the IARU section did bring out a lot of attention and emphasis on the development of the DX program, and his thinking did tie a lot of loose ends together. But you should keep in mind that Clint got a lot of input from interested and active DX types back then. With the whole technology rapidly developing in those years before WW II, there were top DXers like Jules Wenglare, W8DVS; Ned Jacoby, W8KPB; Charles Mellen, W1FH; George Morrow, W8BKP; and Frank Lucas, W8CRA, these being prominent in the eastern area. Out west there was W6QD and W6CUH in the Los Angeles area, while at ARRL headquarters in downtown Hartford there was a bunch of DX types. These included Clark Rodimon, W1SZ, certainly the big pusher for DX at headquarters, and there were a lot of others whose names should be familiar if you have been a long-time reader of *QST*. These include Don Mix, W1TS, George Grammer, W1DF, and especially Byron Goodman, then W1JPE and later W1DX. Byron, incidentally, is the only one surviving of that bunch back from the mid-thirties. Actually, any so-called DX Desk was yet to be created, those people at ARRL headquarters working in other departments. Grammer and Goodman were in the Technical Department. Clint DeSoto worked in administration, working within the ARRL Secretary's office. Back then the Technical Department was a big part of the push on DX, Don Mix also being in that area, and later on Grammer was the Technical Editor while Clark Rodimon

The WPX Program

Mixed

1251	IK8CNT	1257	JA4FCC
1252	9V1WE	1258	WB9ZHS
1253	JF2BAV	1259	KY3V
1254	EA1SQ	1260	DL1NP
1255	I1TBE	1261	NQ6E
1256	YU2TY		

S.S.B.

1860	AA4IF	1865	JA1ASO
1861	K5IC	1866	JH8WGR
1862	KV5F	1867	JR1UBR
1863	EA5BD	1868	EA3FP
1864	W4ZYQ	1869	CE4ETZ

CW

2415	YU7DR	2418	CT1BIQ
2416	IK4DCT	2419	OK3CND
2417	AG9S	2420	JE1BQE

WPX

249 F11ADB

Endorsements

Mixed: 450 I1TBE, JA4FCC, KY3V, DL1NP. 500 I1TBE, W5EW, KY3V, DL1NP. 550 NK2W, I1TBE, W9IAL. 600 I1TBE. 650 I1TBE. 700 W9JBR, I1TBE. 750 W9JBR, AB9O, AG9S. 800 W9JBR, AB9O, AG9S. 850 W9JBR, AG9S. 900 K2CIC, AG9S. 950 N4OM, AG9S. 1000 N4OM, AG9S. 1200 OK3IF. 1250 K2POF. 1300 K2POF. 1450 SP9CTW. 1500 SP9CTW. 1550 SP9CTW, N4UH. 1600 SP9CTW. 1650 SP9CTW. 1700 SP9CTW. 1750 SP9CTW. 2050 N9AF, N2AC. 2100 N9AF. 2400 W4BQY.

S.S.B.: 350 G4CPJ, EA5BD, VE2DRN, EA3FP, CE4ETZ. 400 G4CPJ, EA5BD, VE2DRN, EA3FP, CE4ETZ. 450 G4CPJ, EA5BD, VE2DRN, EA3FP, CE4ETZ. 500 G4CPJ, EA5BD, EA3FP, CE4ETZ. 550 G4CPJ, NE8Q, EA3FP. 600 G4CPJ, W5ILR, EA3FP. 650 G4CPJ, G4KHF, K@REF, EA3FP. 700 G4CPJ, G4KHF, K@REF, EA3FP. 750 G4CPJ, AB9O, K@REF, AG9S, EA3FP. 800 G4CPJ, ABPO, N2CIC, AC3T, K@REF, AG9S, EA3FP. 850 G4CPJ, AG9S, EA3FP. 900 G4CPJ, AG9S. 950 WA2FKF, G4CPJ, EA8AKN, IK5ACO, AG9S. 1000 G4CPJ, EA8AKN, DF7QD, W@ULU, EA3AQC. 1050 G4CPJ, EA8AKN, W4UW, EA3AQC. 1100 G4CPJ, NF@X. 1150 G4CPJ, NF@X. 1200 K2POF. 1300 AC2J. 1350 NJ@C. 1750 W4BQY. 2400 ZL3NS.

C.W.: 350 YU7DR, NF5Z, DK4DCT. 400 YU7DR, NF5Z, KS3F. 450 YU7DR, W3GXK, NF5Z, KY9P. 500 YU7DR, NF5Z, KY9P, IK6CGO. 550 NF5Z, KJ8M, IK6CGO. 600 NF5Z, G3VQO. 750 OK2BFX. 800 OK2BFX. 850 G3HB. 900 G3HB. 1200 IT9VDQ.

10 Meters: VK9NS
15 Meters: VK9NS, AG9S, JR1UBR
20 Meters: VK9NS, VK9NS, K5IC, IK6CGO
40 Meters: VK9NS, AG9S
80 Meters: VK9NS, N4OM
160 Meters: VK9NS, I1POR, OK2BFX, JA4BAF

Asia: VK9NS, JR1UBR, IK6CGO
Africa: VK9NS, AG9S
No. America: VK9NS, NC9I, WB9ZHS, OK2BFX
So. America: VK9NS, VK9NS, N4OM
Europe: VK9NS, OK8CNT
Oceania: VK9NS, AG9S, JR1UBR

Award of Excellence Holders: ZL3GQ, W4BQY, I@JX, WA1JMP, K@JN, WAVQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM@DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM@AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO.

Award of Excellence Holders with 160 Meter Endorsement: N4NX, SM@DJZ, DK5AD, W3ARK, LA7JO, W4VQ, K6JG, W4CRW, N4MM, SM@AJU, KF20, K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, N4NO, W8RSW, N4KE, I2UIY, W8ILC, W1BUS, NN4Q, G4BUE, LU37L/W4, I4EAT, VE7WJ, W9NUF.

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.

Look at that grip on the microphone! One glance and you will know it's a DXer! And one of the three valid licenses in Nepal. This is 9N1MC; the others are 9N1MM and 9N1RN. But wait! This is also the Chief Engineer at the Ministry of Communications, Krishna B. Khatry. What did you suppose the suffix 'MC stood for anyhow? Krishna says he is on the air often after 0900Z to 1400Z, usually 10, 15, or 20 meters, but he can also operate on 40/80. Work Krishna and you QSL direct—no other way.

was the Managing Editor of *QST*. Possibly all this made things receptive for DXing back then." The Old Timer paused just a bit to see if the Local was still with us. Definitely the body was still there, though we had some doubts about the mind. But the Old Timer was not as yet finished. He moved to get the attention again focused in the right direction.

"Maybe you might consider that Byron Goodman started out as one of the Locals, just like yourself," the Old Timer said, and the audience, what there was of it, was instantly galvanized. "He was originally W6CAL out of San Francisco, living out on Alton Avenue then. About the time all of this great DXCC action was developing, Goodman started out writing 'How's DX?' in *QST*, this in addition to his other duties at the ARRL. The WAC Award, which previously had garnered a lot of attention, started to recede in prominence, but DXing was rising triumphant and over the years has continued to be the big interest." By this time we were thinking to ourselves that the Old Timer had arrived in the nick of time, and we could tell from the way he was dropping those names and calls that to him those days 50 years back were like last week to us. But the Local was not yet on the same frequency on which the Old Timer and we were communicating, and he started waving his hands again.

"But who invented the DXCC?" he asked. "Can't anyone tell me just that?" If he could it was evident that the Old Timer was going to do some thinking before speaking. Finally he just shrugged his shoulders and started talking again.

"In the fall of 1937," the Old Timer continued, "I think it was the September issue of *QST*, but it may be one close to that month, F.E. Handy, W1BDI, announced the DX Century Club Award. W1BDI headed the Communications Department at the ARRL and back then there was the Communications Department and little else. Handy made the announcement, but it was obvious back then, and still even now, that the award came only after a lot of thought, discussion, argument, and input from both within and without the ARRL. But as to who was first to suggest the DXCC Award, there does not appear to be any conclusive proof. The award was announced in the same year that the revised DX Country List was announced. Even Byron Goodman, W1DX, who was close to the action back then and who wrote the first 'How's DX?' columns, is unable to nail down from where the suggestion for the award came. In a recent letter to K4IIF, W1DX notes that Clark Rodimon, W1SZ, was a big advocate of DX and possibly he might have been the conduit by which the idea was brought to fulfillment. Possibly it developed from in-house discussions on the new DX Country List, possibly from just general discussion on DX matters, or it may even have been suggested from outside Hartford. Some have mentioned

The WAZ Program

10 Meter Phone

311	JA1ATK	312	I2UIY

15 Meter Phone

239	I2UIY	240	DF7OG

20 Meter Phone

587	I2MWZ	590	TI2KD
588	I2UIY	591	VK3APT
589	CE1BEQ	592	KE3A

40 Meter Phone

39 SM5HPB

80 Meter Phone

39 DF9ZP

20 Meter CW

252	I2UIY	253	I@AFO

40 Meter CW

60 SM6DYK

All Band WAZ SSB

3068	I2MWZ	3071	IK8CNT
3069	I2UIY	3072	K6XJ
3070	CT1TM		

Phone and CW

6032	I2UIY	6039	N9BOK
6033	I2UIY (CW only)	6040	JA6OXT
6034	DL1SN	6041	WA2TMP
6035	YU3VQ	6042	DK7SB
6036	VE7OR	6043	EA1SQ
6037	YU3ZZ	6044	JA1OJZ
6038	GM4KLO		

All Phone

590 OX3KM

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

5 Band WAZ

Standings as of January 1, 1987

New recipients of 5 Band WAZ with all 200 zones worked:

126. DF9ZP
127. Assigned
128. HK3DDD
129. W6GO
130. F6BEE
131. SP7KTE
132. W3GG
133. DL8AN

The top 13 contenders for 5 Band WAZ are:

1. JA1BWA, 199
2. JA3EWU, 199
3. N4WW, 199
4. K5YRA, 199
5. W8UVZ, 199
6. JA0CWZ, 199
7. K9CEB, 199
8. G3GIQ, 199
9. SP6JCY, 199
10. W2YY, 198
11. K7UR, 198
12. K9GX, 198
13. DJ9ZB, 198

398 Stations have attained the 150 zone level.

the DX activity among the W8s in the Pittsburgh area. But no clear, definite, and conclusive proof has as yet been uncovred. Possibly it never will."

At this point the Local had heard almost enough and was holding up a hand. "What you are telling me," he said in a demanding tone, "is that there is no record as to how the DXCC Award originated, only when it originated. I can't believe that! Certainly there must be something in the magazine files or there is someone who remembers just who first suggested the award. Don't you think so?" The Old Timer shook his head.

"I won't say that there isn't," he continued, "but as yet no one has been able to come up with it. Byron Goodman is reported as having made inquiries at ARRL Headquarters, even going through the files of *QST* for that period, but the search disclosed nothing. Some recall Frank Lucas, W8CRA, who got DXCC #1, and tend to believe that Frank might have suggested the award, but there never as yet has been anything to clearly identify the source. Frank was a big gun DXer back in those days, the first to work most everything showing on the air. In one of his early DX columns Byron Goodman put the finger on W8CRA's success, noting that he had a fine antenna system. Back then Byron urged DXers to put up the best possible antenna, and 50 years later that DX advice is still shining." At that point, and even though it is generally accepted locally that the Old Timer knows everything that ever happened in DXing, the Local was not yet ready to buy all his story.

"You mean to tell me," the Local demanded with some heat, "that in this year when we DXers are hailing the half-century mark of the DXCC, that no one at all can tell me who invented DXCC? Is that what you are telling me?" It was.

Even though there are still a number of old timers around from those days back in the thirties when the DX country list and the DXCC award came charging out to make a permanent change in DXing, no one can really come up with facts that would positively show from whom and how the idea came. Many still recall those days once so crowded with meaning. But the years change us all, and what was once so sharp and clear can at times turn to but formless echoes and strange faded laughter. Time warps many things, even DXers. But though the Local had not received the complete answer he had come seeking, he did seem to have found something to keep him going.

"Maybe they'll find the answer one of these days," he finally commented, the heat of the previous moment gone. "Maybe there are still DXers who have not yet been asked about those days and who might remember. What do you think?"

We had thought the same thing for a long time, and even the Old Timer was nodding in agreement. "It is still surprising to me," the Old Timer said, "to find that while many believe that their own memories of every great day of DXing will live forever, a decade later they will find much of the memory faded. And the files of club bulletins, DX bulletins, amateur radio magazines, and other sources of information will have been discarded as waste. Then one will come up against a situation, such as the DXCC Award, and hear the frustrated cry: 'But I'm sure I know it. I know it for sure!' And the reply must be: 'But can you prove it?'"

Later when the Local had hippity-hopped down the hill and we were still thinking about DX and the Fiftieth Anniversary, we finally asked, "Do you really think that we are losing something valuable in not maintaining our files and records with a view toward a historical perspective of DXing?" The Old Timer nodded his head.

"I think we are," he said, "but some have already thought along the same lines and moved to preserve the record of DX past. The Northern California DX Foundation in a farsighted move a few years back set up a 'DX Archives' and will take and save most anything relating to DX. They especially are looking for logs from old DX efforts, photos of such efforts, as well as any narrative reports. There is also a recurrent rumor that surfaces from time to time of a fabled DX Gnome living back in the redwoods of the Coast Range here who is compiling every bit of DX information he can find, all the way back to the days of Clint DeSoto and Clark Rodimon. But everytime I hear that vagrant whisper, I also hear that it is a long-range effort and nothing will be released, let alone even acknowledged, until the whole DX story is told. And until then, don't even think of asking!"

For awhile we just sat there in the April sun, thinking of the DX Archives and the DX gnome feeding DX information into his Cray main-liner. Finally we had to ask: "Have you ever thought why DXers might be interested in DX things that happened a half-century back? What do you think?" The Old Timer thought for a bit, then shook his head slowly.

"You would think you should hardly have to ask that question of a true-blue DXer," he said, "but as you get older there is one thing that every DXer, maybe even some others, learn." The Old Timer paused in his talk and we waited for him to continue, finally having to nudge just a bit. "And that is?" we suggested.

The Old Timer smiled, not a joyous smile but perhaps a reflective one. "One does seem to learn for sure that always somewhere there is a band playing "The Roses of Picardy."" We had to be silent on hearing this. Most DXers eventually learn the old songs.

PY1BVY put Fernando de Noronha on the air last summer. The 3387 QSOs included 620 on 160 meters. Ron signed PY0FE on his second trip to the island. The Brazilian Air Force supplied accommodations and some support during the eleven-day stay. Ron lives in Niteroi, across the bay from Rio de Janeiro, and you can QSL PY0 FE to him there: Box 1502, 24000 Niteroi, R.J., Brasil.

Top of the Hill

Once a year the membership in the DX Century Club is published, and what took but a few inches of space 50 years back now takes five full pages. The list runs all the way from W1GKK in lonely splendor atop the list at 368 countries to WB2CZB, the last entry. It is easy to understand how one can accumulate 100 DX countries, but how about 368? For the last roll call for countries on the Honor Roll there were only 316 countries responding. George De Grenier, W1GKK, was right there in the top level, but some quick computation will show that he also has 52 deleted countries on the wall of his shack. But being at the top and all alone there, it does seem that George must know something. So we got the word, all the way from North Adams, Massachusetts.

George DeGrenier, W1GKK, is another one from the thirties with 50 years of DXing behind him. He started out with home brew and a 201A rig. The tubes changed with the years, all the way up to 100THs and 813s. The first receiver was a breadboard creation, a phrase which might be unfamilair these days, and he later upgraded to a SW-3. Later on it was NC-200, NC-303, and then to the Drake TR4C along with an SB-200. For those who wonder what an NC-200 might be, it was a receiver manufactured by National, a name long gone from amateur manufacturing.

George went through five towers, three wooden ones which eventually rotted out and

This is George DeGrenier, W1GKK, who presides all alone at the top of the DXCC with 368 countries. The photo is from some years back, and it does show what it did take to work DX back then. Old timers will recognize a lot of the lash-up, while newer Locals will wonder if George lives at the Smithsonian. But it did the job—368 countries!

two steel ones. His beams were monobanders, again home-brewed, and his early years were spent working CW and AM running a KW. In recent years he has a Yagi at 52 feet, the current rig is a Kenwood TS830S, and everything he has worked until the last year or so has been on 20 meters. That's right, George has only worked 20 meters over the years, though in the last year or so he has been wondering what life might be on 80 meters. He finally put up a Vee antenna to see if there was intelligible life there. He found some and says that now he has 111 countries on that band.

There has long been the fable that a top DXer never leaves home, mostly from fear of missing a new one. Some even have tales to tell of how they missed a needed one when they took the dog for a walk. In this case, George says he was not active for a few years when Don Miller was operating. He also missed a number of new countries the first time they were out, these including Kingman Reef, Tuvalu, Mt. Athos, Comoros, and a number of others including Desecheo. On top of that, he spends the winters in Florida with no amateur gear at hand. But in spite of all of this, he has picked up DX countries as they came down the pike . . . eventually, and resides in lonely splendor at the top of the DXCC list.

George is now retired and has been for a number of years. Maybe now when someone tells you how tough things are in W1-land and how they never hear any DX until most everyone else has worked it, ask about W1GKK.

Son of a Gun! Then how does George do it? Moderate power, a home-brew beam, winters in Florida. There must be a secret. Some say the secret is longevity.

If it is longevity, we would like to hear from some youngsters on the Honor Roll. Not how young you were when you attained the glory but rather how young you are now.

WPX

A recent note from Norm Koch, K6ZDL, indicates how the WPX program continues to grow. Norm notes that during last year there were: 74 CW original applications, 89 SSB original applications, 64 Mixed original applications, 2 WPNX original applications, 6 VPX originals, and 8 Award of Excellence applications. This does not include the applications received for the CQ DX Honor Roll. Norm moved during the year, always a traumatic experience for a DXer and especially when you try to figure how to move that beloved tower. K6ZDL continues to wind-up putting all the WPX files into the great, green computer, and one result has been a tighter audit on claims for credit.

WPX? When you start to run light on new countries and are looking for some continuing action, look at WPX. You might think so at times, but be assured, you will never run out of prefixes. Never!

Keeling-Cocos Islands

Ask most old timers where Keeling-Cocos Islands are and they will be quick to tell you that it is where the Australian cruiser *Sydney* cornered and sank the German raider *Emden* in WW I. But ask some of the new ones, maybe ones who perhaps have never even heard of Slim operating on Cray Island, and mostly they will tell you that it is VK9Y-country and they need it. For those needy DXers, there may be some hope . . . maybe.

Cres Thursby-Pelham, VK9YC, has at times over a number of years lived on Home Island, one of the two inhabited spots in the Keeling-Cocos group. Often requests come his way asking how one can get to operate with that VK9Y prefix. Cres advises that things might be

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00 (U.S.) for each mode, with no fees required for up-dates.

MIXED

3074	YU2AA	1898	PA0SNG	1420	EA9IE	1141	N4IB	864	I1EEW
2865	F9RM	1895	YU1AB	1414	IT9QDS	1123	3A2LF	853	K7CU
2803	K2VV	1863	I2PJA	1401	N6JM	1117	K8CC	848	W9JBR
2750	W2NC	1836	I8YRK	1391	IS0LYN	1114	N8BJQ	840	I2EAY
2572	K6JG	1786	W9NUF	1359	KL7AF	1108	SM0AJU	821	KX1A
2502	K6XP	1786	EA2IA	1347	I2UIY	1100	AC2J	820	W2XO
2416	VE3XN	1785	WA8YTM	1322	NN4Q	1060	WD9IIC	800	I2TZK
2366	W9DWQ	1701	W0SFU	1312	LA7JO	1044	I1WXY	800	AB9O
2315	W4BQY	1665	IN3ANE	1308	W6OUL	1038	YU2CBK	759	OE1KJW
2297	YU2TW	1662	YT7DX	1305	DK5AD	1028	PY1DFF	745	VE6VW
2224	N4NO	1661	K9BG	1291	YU7AJD	1025	WD4RAF	715	KL7VZ
2218	N4MM	1575	N5TV	1283	K2POF	1012	AI8S	679	K6UXO
2103	YU7BCD	1562	PY1APS	1266	YU2CQ	995	KC2RS	678	W4WKQ
2074	N6JV	1537	N6AW	1263	I1POR	943	I0AOF	668	N3KR
2040	N9AF	1516	PY4OD	1249	W7CB	923	N2CIC	664	G4SDJ
2040	N6CW	1512	K7NN	1247	W5PWG	917	NE6I	652	G4OBK
2006	K0BLT	1490	CT1LN	1234	SV1PL	914	EA1CIM	650	JO1BMV
1994	YU7BPQ	1481	I2MQP	1227	WB8ZRL	901	W0JIE	633	Y44UI
1940	N2KC	1470	K8LJG	1215	G4FAM	883	WI4K	600	YU1PJ
1924	K5UR	1433	SM3EVR	1153	N2AIF				

SSB

2789	F9RM	1638	CT4NH	1095	KL7AF	945	EA3AQC	710	N2AIF
2538	I0ZV	1599	I8YZP	1088	KC8CC	939	WA2FKF	707	K9BQL
2360	K2VV	1479	WF4V	1088	W4UW	936	W3GXK	702	I3ZSX
2273	K6JG	1470	WA4QMQ	1079	N2AC	935	XE1XF	699	I2KKL
2271	ZL3NS	1466	I2MQP	1071	NN4Q	930	N4IB	698	G4KHF
2210	K6XP	1451	VE1YX	1062	EA8AKN	828	I8WYD	692	YB3CEV
2163	K2POA	1431	I4CSP	1048	I2UIY	888	I5AFC	686	W6YMH
2057	CT1UA	1413	CT1LN	1048	PP2ZDD	885	AG2K	680	IT9ONV
1993	N4MM	1341	W9NUF	1037	KC4OV	871	EA4KK	666	LA1XDA
1904	I4ZSQ	1312	W3ARK	1035	WB8ZRL	857	I1EEW	662	CT1AHU
1900	W0YDB	1293	AC2J	1032	CT4UW	847	N2CIC	661	VO1AW
1859	I2PJA	1286	EA2IA	1030	F6BVB	845	I2EOW	661	KC2FC
1832	I3ZKD	1283	XE1OX	1008	SM6DHU	818	IN3AHO	659	I4UFH
1765	I6ZJC	1274	N5TV	996	K5RPC	817	ON6IT	653	KX1A
1724	YU7BCD	1264	G4CHP	984	W0ULU	813	WN5MBS	652	CP8HD
1716	W4BQY	1234	LA7JO	981	K8LJG	800	AB9O	642	OE5BGL
1693	N4NO	1218	W2NC	965	IK5ACO	798	K3IXD	635	KE6KT
1667	I8YRK	1201	I8KCI	964	WB6GFJ	788	W6OUL	616	NE6I
1661	PA0SNG	1171	W2CC	950	PY4OD	769	KK5P	607	YB3CDL
1642	W9DWQ	1112	KK0L	948	CT1BY	758	WB6SRK	606	WA8YTM
1638	K5UR								

CW

2511	W2NC	1701	N2AC	1215	KA7T	899	I2UIY	700	N4IB
2266	K2VV	1672	YU7BCD	1116	IT9VDQ	889	F6HKD	669	ZS6ACR
2066	N6JV	1569	YU7SF	1098	K2POF	854	KN7K	667	W2XQ
2025	WA2HZR	1551	LZ1XL	1026	K8LJG	847	W9PWM	663	LA7JO
1973	N6CW	1526	N4MM	1000	I7PXV	823	G4FAM	659	KA1CLV
1951	K6JG	1525	K5UR	993	KL7AF	818	AK2H	655	K6UXO
1924	N4NO	1502	VO1AW	980	W1WAU	800	JH1VRQ	654	W0JIE
1912	ON4QX	1415	EA2UA	961	DJ1YH	799	SM5DAC	647	WB8ZRL
1880	K6XP	1378	W9NUF	952	SM6DHU	767	TI4BGA	644	JA2GCW
1878	W9DWQ	1357	N4YB	936	N2AIF	751	VE1ACK	641	NE6I
1836	W3ARK	1306	I1YRL	922	OH3TQ	744	WA8YTM	625	W6YMH
1821	W4BQY	1287	PY4OD	906	W6OUL	725	SM0AJU	621	CT1LN
1805	VE7CNE	1250	N5TV	904	NN4Q	724	VE4AEX	611	W4RHZ
1801	G2GM	1246	JA1KRU	904	YU2CQ	711	I2EAY	603	I8YRK
1799	OZ5EV	1233	I2DMK	901	AK2H	705	OE1KJW	600	G3VQO

CQ DX Awards Program

SSB

1516	JK1MOC	1518	YB0EZA
1517	YC0BOK		

CW

690	KB4GID

SSB Endorsements

310	K9AB/314	275	AG9S/293
300	SM4CTT/309	275	G3XTT/287
300	K8CMO/306	200	JK1MOC/213
300	NS7Z/305	1.8 MHz	G3XTT
300	W6SN/305	28 MHz	W2HG

CW Endorsements

310	SM6CST/310	150	AG9S/164
250	NS7Z/267		

Total number of active countries is 316. 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.

a bit easier now with provisions being made to accommodate visitors. The best part is that an amateur station is available on Home Island, complete with a tower and beam antenna.

If this sounds interesting, get all the information before rushing off for the next *CQ* DX Test. You can get more information from Cres, VK9YC, at his address there in Western Australia. His full address is: Cres Thursby-Pelham, VK9YC, 107 Melvista Ave., Nedlands, Western Australia 6009. Cres can supply a lot of information. Years back there was a big-gun DXpedition type who went out to Cocos-Keeling for an opeation and had a big total of contacts. At the end of the scheduled stay the expected transportation did not show and the big-gun was stuck, and for a lot longer than he ever anticipated. He continued to operate and operate and operate and definitely dried up the demand for VK9Y. Even got to the point where complaints were heard that there was nothing on but that everlasting VK9–!

CT3-Madeira

If all the planning jells, Bob Mitchell, N5RM, will be in the Madeira Islands for the CW WPX activity next month. Previously N5RM has been out for other WPX action, operating from C6A-The Bahamas, GU-Guernsey, and 3D2-Fiji. QSL to Bob at Rt. 4, Box 99J, Greenville, TX 75401 and with SASE.

IARU

Going through the file to check on the DXCC Honor Roll we came across the IARU page in the July *QST*. You can learn something if you read everything that comes in the mail, so we stopped to note that K1KI, the N.E. Director, made a survey to see what is read in the magazine. He found that the higher class licenses tend more to read IARU news than the other classes. Naturally, you will be saying, as DXers tend to be found in the higher class license group, they are the ones interested in international things like DX. After all, in addition to their acknowledged qualifications in most everything, DXers are the true internationalists of amateur radio.

But in that issue we also read about the Amateur Radio Administration Course the IARU has been running. We had just finished reading a note from KC3VU wherein he told of going to Europe to study, being diverted enroute to another country where he had to make a lay-over. Then suddenly he realized that the amateur gear in his carry-on gear was illegal. Would they catch him during the lay-over? They did! But his interrogator did not know anything about amateur radio and eventually accepted Dave's explanation. During travels other amateurs have run into problems where the lack of local knowledge about amateur radio was a problem and a burden. The IARU has held two classes on Amateur Radio Administration and the representatives from their home country telecommunication agencies should help when they return home, knowing what amateur radio is and the benefit it will bring to their areas. As with a lot of other efforts, you may not see the benefits immediately. You may not even realize that things have changed for the better. But often the actions of the IARU result in changes affecting DXers. Keep always in mind that the IARU has some big DXers in their very highest echelons. It is an activity as well as an organization that you might want to know more about.

4U1VIC

As are a couple of others, the Vienna International Radio Club continues to seek country status and wrote a letter to all League directors prior to the recent board meeting. The letter, among other things, cited statements from the DXAC that the status of 4U1VIC was still an open issue, and that a legal opinion had been given that it could not be excluded under rule 5(b), this opinion being given prior to the last change in rule 5(b) which would exclude 4U1VIC. The contention is made that the requirements of the criteria were met prior to the last rule change. Citing the whole thing as a matter of granting simple equity, the Vienna International Amateur Radio Club was asking for nothing more than fair play.

By the time you read this some of the recommendations on the study of the DXCC by the DXAC should be known, though it is thought by some that it is possible that there will be time given to study and review before any decisions, changes, or firm suggestions might be made to change or modify the DXCC.

Keep close, listen, and seek enlightenment. We recently came across another worker in the vineyard of DXing who believes that Guernsey should be a separate country from the Islands of Sark (Great Sark, Little Sark, and Brecqhou). The contention is that while both are part of the Baliwick of Guernsey, they have separate parliamentary bodies. On Guernsey it is "The States of Deliberation," while on Sark it is the "Court of Pleas." There is a bit more to the whole thing, but this might help you understand the niceties of the deliberations on the DX country criteria and how one must hear not only the words but the nuances. Add in some widely varying concepts, and as they say in Proverbs 3:13, "Happy is the man that finds wisdom and the man that gets understanding." Certainly it is around there somewhere.

A Lot of DX Notes

Palmyra Island went on the market a month or so back, no price mentioned. Included is a 6000 foot runway, a 300 foot dock, some buildings in various states of decay, and a DXCC

country all to yourself. Inasmuch as Kingman Reef operations usually require Palmyra as a staging point, you could control two countries. Savio Realty in Honolulu has the listing.

The Brussels DX Team (BDX) has a computerized list of over 11K QSL managers which they have made available. They will rush it to you by surface mail for 850 Belgian Francs or 44 IRCs, by airmail it takes 1000 Belgian Francs or 53 IRCs. All those prices are quoted before the monetary markets rearranged themselves a few months back. Anyhow, send any correspondence or orders to: E. Vancraenbroeck, ON7RN, Ave. De Mai 133, 1200 Woluwe-St. Lambert, Belgium.

TELECOM 87 will be held in Geneva later this year, from October 20th to 27th, at the exhibition center PALEXPO. This is right across the *CQ* WW Phone Test. If you are out that way operating at a DX spot for the *CQ* WW you might want to include the TELECOM. The TELECOM also follows the ITU Administrative Radio Conference for Mobile Services, and there will be exhibits organized by the ITU. The IARU will have an exhibition near the main entrance. There will also be opportunity for visiting amateurs to operate 4U1ITU.

VP8AQT was on from South Georgia operating from Grytviken Base and was there doing routine maintenance on the main base. Dave initially could not operate, but permission was eventually granted. If you worked him, check the QSL information for the needed route.

Jim Smith, VK9NS, is handling the QSLs for the recent Heard Island activity by VKØDA. From Heard Frank went on to Davis Base in the Antarctic before heading back home to Australia. Jim in his Heard Island DX Assn. bulletin continues to feel some dismay over the duplicates in the log, often these apparently being made to improve a previous call with a less than spectacular signal report. Years back the question put to the DXCC Desk was what signal report was necessary to make a QSO valid and the QSL acceptable for credit. The advice was that the signal report was not that important, only that the QSL certified that a valid two-way contact had been made.

Even after the turn into this year there were some still not certain about the bottom of the sunspot cycle. Did we have it last year? Will we have to wait until this year? Groups with reversed polarity and high-latitude locations have been apearing, sometimes outnumbering the areas from the last cycle. One way or another the determination will be made before long. But when we recently asked the Old Timer what his feeling was, all he said was, "What did I tell you last summer?!" But though the definitive word may not yet be heard, things are sure to get better. Definitely.

FT8WA is reported by Jim Smith as active from Crozet, sometimes appearing at 14220 kHz around 2000Z. LU6UD was due in the South Shetlands for a two month stay starting in March.

Aves Island is due to be operational about the time this issue goes into the mail. The callsign 4MØARV will be used to celebrate the 20th anniversary of the Radioamateurs Association of Venezuela.

A European DX Foundation has been formed, this being along the lines of the Northern California DX Foundation with similar objectives—to bring DX to the needy. Dieter Loffler, DK9KD, is the president, and you can get more information by writing to him.

Steve Lamp, W9NUF, is the new president of the Northern Illinois DX Assn. Ed Goodbout, W9DWQ, is the vice- president; Bob Farkaly, K9RHY, the secretary; and Larry Greenberg, WA9MAG, the treasurer.

The Great DX Meeting will shortly be upon us, the Grosvenor Hotel in Visalia, California April 3–5, the International DX Convention hosted this year by the Northern California DX Club. Nothing but DX and DXers. Visalia is the Gateway to Sequoia National Park and the Sierra Nevada. This is the meeting where the call is often heard: "Bring me DXers with scores to match my giant Sequoias." And they do bring them with matching tales to tell. Absolutely unbelievable! There's nothing like this International DX Convention. Be there!

73, Cass, WA6AUD

DX Ten Years Back

In April 1977 some ZLs were announcing plans for a Kermedec operation during the *CQ* WW DX Tests, WA7VVU was operating /KW6 from Wake, and 4X4TT was signing VR1AP from the Gilberts. Angolan authorities confiscated the gear, logs, and even the QSLs from the shack of D2ASW. Pete Smith, K4FOK, signed 3B8DT from Mauritius but could not get on the air from 7Q7-Malawai or 9J-Zambia. Ted Cohen, N4XX, was up at every dawn watching for the arrival of Cycle 21, and SVØWZ was heard from the Dodencanese. With the sunspots back then at the bottom of the cycle, 9M8HG was jubilant with his first QSO with W1DA in some years. W6YO showed from Pitcairn, and OH2BDA was on from the Aaland Islands.

Silent Key

Last July we had an item about Don Riebhoff, who has been signing CR4AT from Portugal. Many will remember the activity from Southeast Asia back in the late 1960s and early 70s, and Don Riebhoff was always in the center of the action in downtown Saigon. On January 18th Don was killed in a head-on auto crash in Europe. Don worked for the U.S. State Department. The sketchy early report indicated that Don had driven his fiancee to the airport in Madrid and was returning to his QTH outside Lisbon when the accident happened. Don operated not only in Vietnam, but also in Laos and Cambodia. He was on some DXpeditions including the second effort ever from Spratly. Don was buried in Minnesota.

QSL Information

A6XJC to PAØGAM
C3ØLAY to EA3AOC
D68QL to YASME
FT8YA to F6DZU
FH/W6KG to YASME
FOØWLW to W7TB
JW2FFA to LA5NM
KH8AC to KA1NYE
KL7LF/KH3 to KL7VZ
KN4BPL/KH3 to WB4MJH
LAØFH to WA3YJA
PZ5ES to KX20
SVØAC/SV9 to AA4LU
TP2CE to F6EYS
TT8AQ to F6EYS
TZ6FIC to FE6CRS
V22A to WB7RFA
V22LJ to VE3JDO
VP8BGO to GØBAU (86 CB)
VKØDA to VK9NS
VKØGC to VK9NS
V31FX to K3CI
V31GS to V3UM
V44KAX to G4UGB
XX9SP to KS7P
YW6A to YV6CAX
ZF2IK to K5WA
ZK1XU to W7TB
ZLØAAC to KS7P
ZLØAAZ to W7TB
3C1MB to EA7KF
3D2SP to W7TB
3D2TP to W7TB
3G3Z to CE3ZI
4M7A to YV7QP
4M7B to YV7QP
4N7V to YU7AJJ
5T5XX to DL1VJ
5V7WD to WB4LFM
9L1FC to WAØCAE
9N5DYD to JA8RUZ
CO2QV to Box 14, Regala, Havana, Cuba
FR/G/FH4ED to Box 44, DZAUOZI, 97610 Mayotte, via France
FK25DD to B.P. 3040, Noumea, New Caledonia
KP4CZ to Jim Imhof, Box 1556, Villalba, Puerto Rico 00766-1556
VP8AQT to D.T. Jones, 19 Park End, Croughton, Brockley, North HantsNN13-5LX
YBØACL to Jack Sproat, W4LCL, 2791 Fla. Mango Rd., Lake Worth, FL 33461
YIØIF to P.O. Box 7147, Baghdad, Iraq
3G3Z to CE3ZI, Box 13630, Santiago, Chile
3Y2GV to LA DX Group, Jacob Fayes vei 6, 0287 Oslo, Norway
3Y2EE to LA DX Group, Jacob Fayes vei 6, 0287 Oslo, Norway
9N1MC to Krishna B. Khatry, Ministry of Communications, Panchayat Plaza, Kathmandu, Nepal

All of this was compiled with help from W9LNQ, who thirsts for the QSL route for 4W1AA in 1963 and VP8AEO/CE9 on South Georgia. Bob says that someone out there must know how to get a QSL for 4W1AA. CQ

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

My commentary this month is going to be a bit on the negative side. Since this is being written right after our 160 Meter CW Contest in January, I feel that I have cause to express my criticism.

Conditions during the contest were fairly good, and like in any contest, activity was intense and competitive—as a matter of fact, a little too competitive.

As in all sporting events, there are certain rules and guidelines that must be observed. One of our rules was that U.S. and Canadian stations keep the DX Window (1825–1830 kHz) free of activity so that DX stations could use it for split-frequency operation. However, many prominent stateside stations blatantly ignored this regulation and solicited contacts with other stateside stations in the DX Window during prime DX hours. Whether you do or do not approve of this regulation is not the point. The fact remains that it was a contest rule, and it was being violated.

To their credit, many Europeans tried to use the DX Window band plan, but it was very difficult copying them through the heavy stateside QRM, cancelling any advantage we tried to give them. What makes it more disturbing is the fact that many prominent contesters who will be claiming high winning scores were the biggest offenders. This is hardly fair to those stations who were observing this regulation.

The top band, which was known as the "Gentleman's Band" at one time, was comparable to the well-known sport of "golf." Now it has suddenly deteriorated to the level of another well-known sport, "hockey." A rather unusual comparison, but I'm sure you get the point.

But they do have penalties in hockey, don't they? So do *CQ* and *73* in their 160 contests. It is going to be interesting to see what action is taken when the final results are published. (Those who participated in the ARRL 160 Contest don't have to worry. Any reference to the DX Window was completely left out of the 1986 rules).

The Tennessee QSO Party scheduled for March 21 to March 22, 2100Z Saturday to 0500Z Sunday, and 1400Z to 2300Z Sunday was received much too late to include in the March calendar. Rules are the same as last year, and logs go to the Middle Tennessee ARC, ATT: William Fulcher, N4WF, P.O. Box 1702, Hendersonville, TN 37077-1702.

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	**Mar.**	**28-29**	**CQ WW WPX SSB Contest**
*	Mar.	28-29	UBA SWL Phone Award
	Apr.	4	Holiday-in-Dixie QSO Party
	Apr.	4-5	IBM QSO Party
	Apr.	4-5	Connecticut QSO Party
	Apr.	4-5	Poland "SP" DX Contest
	Apr.	8-10	DX YL to NA YL CW
	Apr.	11-12	Montana QSO Party
	Apr.	11-12	CARF Commonwealth
	Apr.	15-17	DX YL to NA YL SSB
	Apr.	18-19	ARCI QRP Spring CW
	Apr.	25-26	Swiss "Helvetia" Contest
	Apr.	25-26	North Carolina QSO Party
	May.	2-3	Utah QSO Party
	May.	2-3	County Hunters SSB
	May	9	Nevada QSO Party
	May	23-24	UBA SWL CW Award
	May	30	ARCI QRP CW Sprint
	May	**30-31**	**CQ WW WPX CW Contest**
	June	6-8	PVRC On The Air Reunion
	June	13-14	ARRL VHF QSO Party
	June	13-14	South America CW Contest
	June	20-21	SMIRK (6 M) QSO Party
	June	27-28	ARRL Field Day
	July	11-12	IARU World Championship
	July	**18-19**	**CQ WW WPX VHF Contest**

** Covered last month.*

There are three events in this month's list—the IBM QSO Party, the SP DX Contest, and the CARF Commonwealth Contest—that have not been covered because of lack of official information. All three organizations failed to respond to my request for rules and other necessary information, although we do have the dates. Rules will probably be the same as last year. You can check back if you are interested.

Deadline for events in July is April 15th, and May 15th for your August announcement. Some of you are still sending them to the *CQ* office. My home address at the bottom of this column is where you should send them.

73 for this time, Frank, W1WY

Holiday-in-Dixie QSO Party

1800Z to 2300Z Saturday, April 4

The Holiday-in-Dixie Celebration is an annual 10-day event commemorating the Louisiana Purchase and is held in Shreveport and Boosier City, Louisiana. The QSO Party is one of the many events during the celebration, and demonstrates ham radio to the public.

Exchange: Name, QTH, and RS(T). (Be sure to get the operator's name.)

Frequencies: SSB is the primary mode, 7235 on 40 and 14245 on 20. There will be some CW operation for Novices on 7115 and 21115 kHz.

Awards: A Holiday-in-Dixie certificate will be awarded to all participants.

Send your QSL card and an SASE to: Holiday-in-Dixie QSO Party, c/o WA5ARJ, P.O. Box 4842, Shreveport, LA 71134.

Connecticut QSO Party

2000Z Sat. to 0500Z Sun., April 4–5
1200Z Sun. to 2000Z Sun., April 5
Rest Period: 0500Z to 1200Z

The Candlewood ARA is again sponsoring this year's party. Rules the same as those used in previous years.

The same station may be worked on each band and each mode for QSO points. DX stations count for QSO points, but for only one multiplier.

Exchange: RS(T), QSO number, and QTH. County for CT stations, ARRL section for others.

Scoring: One point per contact, 2 points if it's with a Novice, 3 points for Oscar contacts, and 5 points if you work W1QI, the club station.

CT stations multiply total QSO points by ARRL sections, plus one DX station worked for their final score. Others use CT counties worked for their multiplier (maximum of 8).

Frequencies: CW—40 kHz up from bottom of each band. SSB—3927, 7250, 14295, 21370, 28540. Novice: 3725, 7125, 21125, 28125.

Awards: Certificates to the highest scorer in each state. A "Worked All Connecticut" certificate to those working all counties.

Mailing deadline for all entries is April 30th to: Candlewood ARA, Att: R. Dillon, N2EFA, RFD #7, Noel Court, Brewster, NY 10509. Include a large SASE for a copy of the results.

DX-YL to NA-YL Contest

CW: April 8–10 SSB: April 15–17
1400Z Wednesday to 0200Z Friday

This is strictly a YL affair in which DX YLs will be contacting YLs on the North American continent. (KH6 and KL7 are considered DX.)

All bands may be used. However, cross-band, nets, repeaters, or contacts with OMs do not count. The same station may be worked on each band and mode for QSO credit. Phone and CW are sepa-

rate contests and require separate logs. Only 24 hours out of the 36-hour contest period may be used for scoring. Off times must be indicated in the log.

Exchange: QSO no., RS(T), and state, province, or country.

Scoring: One point per contact. Your multiplier is determined by the number of states, VE provinces, and DX countries worked. Counted once only, not once on each band.

There is a power multiplier of 1.25 for stations using 150 watts or less on CW, 300 watts PEP on SSB.

Final Score: Total QSO points times (states + provinces + countries) × power multiplier if any.

There is a penalty for each duplicate contact removed from the log by the Contest Committee of three additional and equal contacts.

Frequencies: CW—3555, 7055, 14055, 21195, 28195. SSB—3955, 7255, 14295, 21395, 28595 (plus or minus 15 kHz).

Awards: Four cups will be awarded to the 1st place winners, DX and NA, on both phone and CW. And two plaques to the highest combined CW/phone scores for DX and NA certificates to the 2nd and 3rd place DX and N.A. winners.

Submit separate logs for each contest. Include a summary sheet showing the scoring, transmitter power, and other essential information. The usual signed declaration is also requested.

Entries must be postmarked no later than May 4th and received no later than May 27h. This year they go to: Mary Lou Brown, NM7N, 504 Channel View Dr., Anacortes, WA 98221.

1986 Results

CW Winners

NA		DX
WD8MEV	Gold Cup	IT9JLA
KM8E	2nd Place	VK3KS
WD4NKP	3rd Place	I5UNA

SSB Winners

KM8E	Gold Cup	IT9JLA
WA3HUP	2nd Place	I2KYM
WD8MEV	3rd Place	EI7CW

CW and SSB

KM8E	Plaque	IT9JLA

Montana QSO Party

0000Z Sat. to 1800Z Sun., April 11–12

The Yellowstone Radio Club reactivated this event and intends to continue it in the spring each year. The same station may be worked on each band and each mode. Mobiles in each county change. Only single operator stations are eligible.

Exchange: QSO number and QTH. County for Montana stations; state, province, or DX country for others.

Scoring: One point per QSO on phone, 2 points if on CW. Montana mobiles are worth 5 points on phone, 10 points on CW.

Multiplier: Montana stations use states, VE provinces, DX countries, and Montana counties. Non-Montana stations use Montana counties (maximum of 56).

Frequencies: CW—3565, 7065, 14065, 21065, 28065. Phone—3940, 7260, 14280, 21370, 28600. Novice—3710, 7110, 21110, 28110 kHz.

Awards: Certificates to the top scorers in each state, VE province, and DX country, and the top 10 Montana stations. There will also be plaques for the overall winners in seven different areas—U.S., U.S. Novice, DX, VE, Montana fixed, mobile, and Novice.

All logs must be received by May 15th and go to: Gina Williams, N7IBG, 11 Gatewood Drive, Billings, MT 59102.

We all know about W6AM's antenna farm, but not too much about the operating position. Looks like a very compact layout. Here's Jan Perkins, N6AW, back in the 1983 CQ WW CW Contest using the rhombics for high U.S. score on 7 MHz.

ARCI QRP Spring CW Contest

1200Z Sat. to 2400Z Sun., Apr. 18–19

Participation is open to members and nonmembers. Operating time is limited to 24 hours out of the 36-hour period. The same station may be worked on each band for QSO and multiplier credit.

Exchange: RST and state, province, or country. Members will include their QRP number; non-members their power.

Scoring: Contacts with a member 5 points, with a nonmember in the same continent 2 points, but 4 points if on a different continent.

There is a power multiplier as follows:

4 to 5 watts output— × 2
3 to 4 watts output— × 4
2 to 3 watts output— × 6
1 to 2 watts output— × 8
Less than 1 watt out— × 10
Over 5 watts output—check log.

There is a bonus multiplier of ×2 for stations using solar or wind power. And ×1.5 if using battery.

Final Score: Total QSO points × (states + provinces + countries) worked on each band, × power multiplier × bonus multiplier if any.

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50360. Novice: 3710, 7110, 21110, 28110.

Awards: Certificates to the highest scorers in each state, province, and country with two or more entries. Scores will be credited for the annual "Triple Crown" QRP award. Also a special certificate from Adrian Weiss, W0RSP, to stations using less than 1 watt.

Use a separate log sheet for each band and a summary sheet showing the scoring and other essential information. Scoring sheets are available from KA5NLY. Include a large SASE with your request. Include an SASE if you desire results of contest.

Logs must be received no later than a month after the end of the contest and go to: QRP ARCI Contest Chairman, Eugene Smith, KA5NLY, Pentagon, P.O. Box 46599, Washington, D.C. 20050-6599.

Swiss Helvetia Contest

1300Z Sat. to 1300Z Sun., Apr. 25–26

The Swiss usually try to activate some of the rare Cantons, so this offers a good opportunity to build up your totals for the attractive Helvetia Award. Confirmation of all 26 Cantons is required. Only contacts made after January 1, 1979 are valid.

All bands may be used, 1.8–28 MHz, phone or CW (but not the new WARC bands). The same station may be worked

on each band for QSO and multiplier credit, but only on one mode, either phone or CW.

Exchange: RS(T) plus a three-figure QSO number. Swiss stations will also include two letters identifying their Canton. Abbreviations of the Cantons are as follows: AG, AI, AR, BE, BL, BS, FR, GE, GL, GR, JU, LU, NE, NW, OW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG, ZH.

Scoring: Each HB contact is worth 3 points. The sum of Cantons worked on each band is your multiplier (a possible total of 26 on each band).

Final Score: Total QSO points multiplied by the sum of Cantons worked on each band.

Awards: Certificates to the top scorers in each country and each USA and Canadian call area.

Indicate a Canton in a separate column for each band the first time it is worked. Check your log for duplicate contacts and include a summary sheet showing the scoring and your name and address in block letters. The usual signed declaration is also requested.

Mail your log within 30 days to: USKA Traffic Manager, Walter Schmutz, Gantrischweg 1, CH-3114 Oberwichtrach, Switzerland.

Applications in the form of QSL cards for the Helvetia Award go to: Max Bindschedler, HB9MX, Strahleggweg 28, CH-8400 Winterthur, Switzerland.

North Carolina QSO Party

1200Z Sat. to 0400Z Sun., April 25–26

The Alamance ARC (K4EG) of Burlington, North Carolina is sponsoring this one. The same station may be worked once on each band and mode and mobiles on each county change.

Exchange: RS(T) and QTH. County for NC stations; state, VE province, or DX country for others.

Scoring: One point for phone contacts, 2 points for CW contacts, and 5 points for Novice contacts.

NC stations multiply total QSO points by (states + provinces + countries + NC counties) for their final score. Others multiply NC QSO points by number of NC counties worked (maximum of 100).

Frequencies: CW—3540, 3740, 7040, 7140, 14040, 21040, 21140, 28040, 28140. SSB—3860, 7260, 14260, 21360, 28360 MHz.

Awards: Awards and certificates will be awarded commensurate with number of entries received.

Mailing deadline is June 30th to NC QSO Party, c/o K4EG, P.O. Box 3064, Burlington, NC 27215. Include a large SASE for copy of results and certificates.

Utah QSO Party

0000Z to 2400Z Saturday, May 2

This is a joint effort sponsored by the Utah ARC and the Utah DX Assn. to make this rather rare state available for WAS and other awards.

Exchange: RS(T) and QTH. County for Utah; state, VE province, or DX country

1985 All Asian Phone Contest North American Results*

U.S.A.	
3.5 MHz	
W6RJ	**3,960**
14 MHz	
NA5S	**24,300**
W6SZN	**18,304**
K9RHY	**5,288**
W2FCR	**4,268**
K3ZJ/4	**3,825**
N4MM	3,680
WX4G	2,850
NG2X	2,840
W8EX	**2,457**
NQ4I	2,124
W3GG	**1,566**
LU3YL/W4	1,288
W6OK	946
W100	**713**
W4WIJ	651
KA7FEF	**214**
WA3DMH	156
W1FJ	120
KW2J	88
JF1FZI/W6	35
W5EIJ	6
28 MHz	
K7SS	**247**
All Band	
K3EST/6	**318,592**
K6NA	309,408
K6EID	15,521
KØVVV	**14,420**
K3ZO	**13,464**
W7NO	**6,968**
KC7V	2,850
Alaska	
All Band	
KL7XD	**24,479**
Canada	
14 MHz	
VE3XN	**3,432**
Costa Rica	
14 MHz	
TI2ANL	**980**
All Band	
TI2KD	**13,629**
Multi Opr.	
U.S.A.	
N6AW	**87,840**
WI6Y	15,435
KM7U	**8**
U.N. Hq.	
4U1UN	1,344

Certificate winners are in boldface.

for others. (Novice and Tech. stations must identify by signing "N" or "T" after their call.)

Scoring: Utah stations score 5 points for Novice or Tech. contacts, 3 points for all other QSOs.

Out-of-state stations score 5 points for Utah Novice or Tech. contacts, 3 points for all other Utah QSOs.

Multiplier: States + VE provinces + DX countries worked for Utah stations. Utah counties per band for out-of-state stations (maximum of 29 per band).

Frequencies: CW—1810 and 60 kHz up from bottom of each band. SSB—1860, 3980, 7280, 14280, 21380, 28680. Novice—3710, 7110, 21110, 28110.

Awards: Certificates to the winners in each state, VE province, DX country, Novice in each state, and the top three winners and Novices in Utah.

Mailing deadline is June 1st to: Curt Wilbur, K7CU, 907 East 250 South, Bountiful, UT 84010. (Include an SASE for a copy of the results.)

County Hunters SSB Contest

0001Z Sat. to 2400Z Sun., May 2–3
(Off: 0800 to 1200 each day)

This is the 16th annual contest sponsored by the Mobile Amateur Radio Awards Club to increase activity for the County Awards program. The two four-hour rest periods are mandatory.

Emphasis is on mobile operation. Fixed stations may work other fixed stations, but only once regardless of the band. Mobiles may be worked from each county or band change. Mobiles contacted on a county line count as one QSO but two multipliers. QSOs made on a Net frequency do not count.

Exchange: Signal report, county, and state; country for DX stations. (Mixed-mode contacts are permitted providing one station is on SSB.)

Points: Contacts with a fixed W/K, 1 point (including KH6/KL7). W/K contacts with VEs, 3 points. W/K contacts with DX, 5 points. Contacts with U.S. mobiles, 15 points.

Final Score: Total QSO points times total number of U.S. counties worked.

Frequencies: 3870–3890, 7225–7250, 14250–14285, 21360–21380, 28570–28600. Following spots considered "Mobile Windows": 3875, 7240, 14270 (plus or minus 5 kHz). Fixed stations must QSY after working a mobile.

Awards: Plaques to the first- and second-place U.S. mobile, top-scoring fixed U.S./Canadian, DX station, and Mobile Team. Certificates to the top 10 mobiles, and to the top scorers in each state, province, and DX stations.

It is suggested that you send a large SASE to WA5DTK for detailed rules and log forms. All entries must be received by June 3rd and go to: Barry Brewer, WA5DTK, 1013 North Blvd., Universal City, TX 78148. Winners will be announced in the MARAC Newsletter. (Include a large SASE for copy.)

Tech Talk from ICOM

ICOM

Performance, Reliability, and Customer Support: The Winning Team

While attractive front panels and impressive magazine advertisements may initially glamorize any amateur radio item, they can also reflect the classic proverb of beauty being only skin deep. The favorable returns from any unit and the success of its manufacturer, however, are directly influenced by **after-purchase reliability and factory-backed service.** Knowledge of such performance records and readily available customer support encourage the peace of mind to use and enjoy a new unit to its maximum potential.

ICOM considers the aspect of service from two interrelated standpoints: daily in-field use and possible "down the line" repairs if, and when, needed. This concept is pursued by first building **professional communications quality and reliability into every unit,** confidently backing it with a full warranty, then substantiating that dependability with **uncompromised factory authorized service and customer support.** All ICOM HF transceivers and shortwave receivers reflect that philosophy with their **full one-year warranties**...and service centers that are not bottlenecked with backlogs (stout performers simply give less trouble). ICOM isn't playing down customer support, but building a positive long-term reputation on it!

Today's era of advanced technology and seemingly endless consumers tends to replace old-time "concerned treatment" with attitudes of "being one of a vast number in line." Returning a unit for adjustment or repair and later attempting to check its status sometimes proves to be a frustrating experience. While no one is infallible, ICOM honestly strives to avoid an attitude of "too many customers to provide congenial service." ICOM's customer service **hotline** at (206) 454-7619, for example, will put you directly in touch with the main service department. The only prerequisite is **mutual understanding** in sharing this resource so everyone can have queries answered and radios repaired. If a problem can't be alleviated via telephone, ICOM strives for a service center "turnaround time" of three to five days.

Continuing that customer support, **ICOM is the only amateur radio company with four factory-owned service centers in North America.** The centers are located in Atlanta, Georgia; Dallas, Texas; Bellevue, Washington; and Vancouver, British Columbia. Most ICOM service centers are also situated near major airports to further minimize transportation problems.

The amateur radio industry is ICOM's major interest; it's not a sideline or spin-off of other pursuits. ICOM doesn't manufacture stereos, VCRs, or televisions. ICOM is communications industry oriented with secondary involvement in top quality marine, land mobile, and avionics equipment.

The stouthearted reliability of ICOM equipment is continuously praised in testimonial letters from proud owners. A few samples from those "believe it or not" files include stories of transceivers literally drowned in salt water two or three hours, yet continuing to operate flawlessly...of no failures to date in the IC-735 and IC-751 power amplifiers...of handheld transceivers dropped from towers, and one was even run over by a truck(!), yet continued to operate after outer case repairs (fortunately, ICOM handhelds include a separate metal frame to protect PC boards and a high impact plastic "outer case").

The next time you switch on a deluxe HF transceiver, compact VHF mobile rig or handheld FM unit, pause a couple of seconds and think about its less apparent aspect of customer support and service. Who would you call if a problem arose, what would be their attitude, and approximately how long might you anticipate being off the air? If you're a proud ICOM owner, those answers are reassuring rather than aggravating.

Again, ICOM's dedication to top performance, exceptional reliability and unsurpassed customer support may not be visible on a front panel or in a colorful ad, but they're **included in every ICOM item.** ICOM equipment is simple to use and the best in quality. It's "Simply the Best" and an increasing number of amateurs are proving that statement in their setups every day. Isn't it time you, too, joined the ICOM winning team?

ICOM America, Inc., 2380-116th Ave. NE, Bellevue, WA. 98004 **Customer Service Hotline (206) 454-7619**
3150 Premier Drive, Suite 126, Irving, TX 75063 / 1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349
ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada

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Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

A very low level of sunspot activity was observed during December 1986. The Royal Observatory of Belgium reports a monthly mean sunspot number of 6.4. This results in a smoothed sunspot number of 14 centered on June 1986. Solar activity has held constant at this level for three months, making it difficult to determine the starting point for Cycle 22, the new sunspot cycle.

A smoothed sunspot number of approximately 20 is predicted for April 1987, with a 90% certainty that it will fall somewhere between 15 and 24. A year ago the cycle stood at 14, so a slight improvement can be expected in propagation conditions on the HF amateur bands this April as compared to last year.

The 10.7 cm solar flux level for December was 72.6, as reported by the Algonquin Radio Observatory at Ottawa, Canada.

April DX Propagation

Twenty meters should continue to be the optimum band for DX during April. The band should open to most parts of the world shortly after sunrise, and remain open for DX during most of the daylight hours. With longer hours of daylight the band will often remain open well past sundown, with a late peak in conditions towards South America between 10 p.m. and midnight local time.

Expect fewer openings on *15* meters compared to the winter months, but some fairly good DX still should be possible during the daylight hours. Best bet is for openings towards southern and tropical areas during the afternoon hours when conditions are High Normal or better.

Not many DX openings expected on *10* meters this month, but an occasional one should be possible from all USA time zones towards Central and South America, and from the western states towards the South Pacific. Be sure to check this band during the afternoon hours when conditions are High Normal or better.

Expect an improvement in DX conditions on *40* meters during the month. The band should open towards Europe and the east an hour or two before sundown; towards the south an hour or two after sundown; and towards the west after *midnight and peaking* an hour or so before sunrise. Expect good DX openings throughout the hours of darkness.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for April 1987

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 2, 5, 16	A	A	B	C
High Normal: 1, 4, 6, 12, 15, 20-21, 27-28	A	B	C	C-D
Low Normal: 3, 7, 10-11, 13-14, 17, 19, 24-26, 29	A-B	B-C	C-D	D-E
Below Normal: 8-9, 18, 22, 30	B-C	C-D	D-E	E
Disturbed: 23	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 (B) on April 1st, excellent (A) on the 2nd, good-to-fair (B-C) on the 3rd, good (B) on the 4th, excellent (A) on the 5th, etc.**

Good DX openings to many areas of the world should also be possible on *80* meters during the hours of darkness and at sunrise.

There is also a chance for some *160* meter DX openings during the same time period as *80* meter openings.

Seasonably favorable propagation conditions should continue during April for openings between the northern and southern hemispheres. Best time to check these openings from the USA to Australasia, South America, southern Africa, etc., is during the twilight period at sundown and sunrise on *20* meters. These intercontinental openings can take place at other times and on other bands as well, as shown in the DX Propagation Charts.

Thunderstorm activity is expected to increase during April in the northern hemisphere, and this should result in increased levels of static on all HF bands, but especially on *40, 80,* and *160* meters.

Short-Skip Propagation

For openings between 50 and 250 miles, use *80* meters during the day and

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart approprate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:
(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days
Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, *not GMT.* To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado, 80302.

April 15 - June 15, 1987
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	12-17 (1)	05-07 (1) 07-10 (2) 10-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	18-19 (1) 19-21 (2) 21-01 (3) 01-03 (2) 03-04 (1)	20-22 (1) 22-01 (3) 01-02 (2) 02-03 (1) 22-00 (1)* 00-02 (2)* 02-03 (1)*
Northern Europe & European USSR	11-16 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-16 (2) 16-18 (1)	19-20 (1) 20-23 (2) 23-01 (1)	20-00 (1)
Eastern Mediterranean & Middle East	14-16 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-19 (1) 22-00 (1)	19-21 (1) 21-23 (2) 23-00 (1)	21-23 (1)
Western Africa	12-14 (1)** 10-12 (1) 12-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	20-22 (1) 22-02 (2) 02-03 (1)	00-02 (1)
Eastern & Central Africa	10-13 (1) 13-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	21-01 (1)	22-00 (1)
Southern Africa	12-14 (2) 14-15 (1)	16-17 (2) 17-18 (3) 18-20 (1) 23-01 (1)	22-00 (2) 00-02 (1)	

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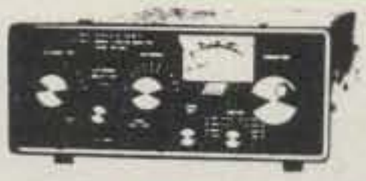

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Central & South Asia	17-19 (1)	07-10 (1) 14-16 (1) 19-21 (1)	05-07 (1) 19-21 (1)	*Nil*
South-east Asia	*Nil*	08-10 (1) 18-20 (1)	*Nil*	*Nil*
Far East	17-19 (1)	08-10 (1) 18-19 (1) 19-21 (2) 21-23 (1)	04-06 (1)	*Nil*
South Pacific & New Zealand	15-18 (1)** 09-11 (1) 15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-20 (1) 20-23 (2) 23-02 (1)	02-03 (1) 03-04 (2) 04-06 (3) 06-07 (1)	02-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)*
Austral-asia	17-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 15-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (1)	03-05 (1) 05-07 (2) 07-08 (1)	04-07 (1) 04-06 (1)*
Carib-bean, Central America & North-ern Countries of South America	11-14 (1)** 14-16 (2)** 16-17 (1)** 10-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	04-06 (1) 06-07 (2) 07-08 (3) 08-10 (4) 10-11 (3) 11-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-07 (1)	21-02 (1) 02-05 (2) 05-07 (1) 03-06 (1)*
Peru, Bolivia, Para-guay, Brazil, Chile, Argen-tina & Uruguay	12-15 (1)** 15-16 (2)** 16-17 (1)** 08-09 (1) 09-11 (2) 11-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-22 (2) 22-00 (3) 00-01 (2) 01-03 (1)	20-21 (1) 21-04 (2) 04-06 (1)	23-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)*
McMurdo Sound, Antarc-tica	*Nil*	07-08 (1) 08-09 (2) 09-10 (1) 16-20 (1) 20-23 (2) 23-00 (1)	01-05 (1)	*Nil*

April 15 - June 15, 1987
Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Southern Europe & North Africa	14-16 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	19-21 (1) 21-23 (2) 23-01 (1)	21-00 (1)
Northern Europe & Euro-pean USSR	*Nil*	07-08 (1) 08-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 20-22 (1)	20-20 (1)	21-22 (1)
Eastern Mediter-ranean & Middle East	*Nil*	07-09 (1) 13-15 (1) 15-17 (2) 17-18 (1) 22-00 (1)	20-00 (1)	*Nil*
Western Africa	12-14 (1) 14-15 (2) 15-16 (1)	07-09 (1) 12-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	20-01 (1)	*Nil*
Eastern & Central Africa	13-15 (1)	07-09 (1) 13-16 (1) 16-19 (2) 18-19 (1)	21-00 (1)	*Nil*
South-ern Africa	09-11 (1) 11-13 (2) 13-14 (1)	14-16 (1) 16-18 (2) 18-21 (1)	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1)
Central & South Asia	17-19 (1)	08-10 (1) 17-19 (1) 19-21 (2) 21-22 (1)	05-07 (1) 19-21 (1)	*Nil*
South-east Asia	*Nil*	08-10 (1) 19-22 (1)	05-07 (1)	*Nil*
Far East	18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-20 (1) 20-22 (2) 22-23 (1)	03-05 (1) 05-06 (2) 06-07 (1)	05-06 (1)
South Pacific & New Zealand	15-17 (1)** 11-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	16-19 (1) 19-21 (2) 21-23 (3) 23-03 (2) 03-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-13 (1)	00-02 (1) 02-04 (2) 04-05 (3) 05-06 (2) 06-07 (1)	02-04 (1) 04-05 (2) 05-06 (1) 04-05 (1)*
Austral-asia	16-18 (1) 18-20 (2) 20-21 (1)	06-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-16 (1) 16-18 (2) 18-21 (1) 21-00 (2) 00-02 (1)	02-04 (1) 04-06 (2) 06-07 (1)	04-06 (1)
Carib-bean, Central America & North-ern Countries of South America	11-13 (1)** 13-16 (2)** 16-17 (1)** 09-11 (1) 11-12 (2) 12-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-19 (1)	00-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	19-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1)	21-23 (1) 23-04 (2) 04-06 (1) 00-05 (1)*
Peru, Bolivia, Para-guay, Brazil, Chile, Argen-tina & Uruguay	12-15 (1)** 15-16 (2)** 16-17 (1)** 08-10 (1) 10-12 (2) 12-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	06-08 (1) 08-09 (2) 09-10 (3) 10-16 (1) 16-18 (2) 18-19 (3) 19-20 (4) 20-21 (3) 21-23 (2) 23-01 (3) 01-02 (2) 02-04 (1)	21-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-05 (1)	00-04 (1) 01-03 (1)*
McMurdo Sound, Antarc-tica	15-17 (1)	08-10 (1) 16-18 (1) 18-22 (2) 22-00 (1)	00-06 (1)	*Nil*

April 15 - June 15, 1987
Time Zone: PDT (24-Hour Time)
WESTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & South-ern Europe & North Africa	*Nil*	07-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-18 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1)	21-23 (1)
Central & North-ern Europe & Euro-pean USSR	*Nil*	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 22-00 (1)	20-23 (1)	21-22 (1)
Eastern Mediter-ranean & Middle East	*Nil*	07-10 (1) 10-12 (2) 12-13 (1) 22-00 (1)	20-23 (1)	*Nil*
Western Africa	10-14 (1)	07-09 (1) 12-15 (1) 15-17 (2) 17-19 (1)	20-23 (1)	*Nil*
Eastern & Central Africa	10-12 (1)	07-09 (1) 12-14 (1) 14-15 (2) 15-17 (1)	20-22 (1)	*Nil*
South-ern Africa	10-13 (1)	07-09 (1) 13-14 (1) 14-16 (2) 16-17 (1) 22-00 (1)	19-22 (1)	20-22 (1)
Central & South Asia	19-21 (1)	08-09 (1) 09-11 (2) 11-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	04-07 (1)	*Nil*
South-east Asia	19-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 21-22 (1) 22-23 (2) 23-01 (1)	04-07 (1)	05-06 (1)
Far East	19-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 18-21 (1) 21-23 (2) 23-01 (1)	02-03 (1) 03-06 (2) 06-08 (1)	03-07 (1)
South Pacific & New Zealand	15-18 (1)** 11-13 (1) 13-16 (2) 16-19 (3) 19-20 (2) 20-22 (1)	06-08 (1) 08-11 (2) 11-17 (1) 17-20 (2) 20-21 (3) 21-23 (4)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1)	01-02 (1) 02-05 (2) 05-06 (1) 02-05 (1)*

		23-00 (3) 00-02 (2) 02-04 (1)		
Australasia	16-18 (1)** 13-16 (1) 16-17 (2) 17-19 (3)	06-08 (1) 08-10 (2) 10-12 (1) 18-20 (1)	01-02 (1) 02-04 (2) 04-06 (3) 06-07 (2)	02-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)*
	19-20 (2) 20-22 (1)	20-22 (2) 22-02 (3) 02-03 (2) 03-04 (1)	07-08 (1)	
Caribbean, Central America & Northern Countries of South America	11-14 (1)** 14-16 (2)** 16-17 (1)** 09-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	00-06 (1) 06-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-00 (2)	19-20 (1) 20-21 (2) 21-02 (3) 02-04 (2) 04-06 (1)	21-00 (1) 00-03 (2) 03-05 (1)* 01-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	13-16 (1)** 09-10 (1) 10-12 (2) 12-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-18 (1)	06-08 (1) 08-10 (2) 10-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	20-22 (1) 22-02 (2) 02-04 (1)	21-03 (1) 00-03 (1)*
McMurdo Sound, Antarctica	16-19 (1)	07-09 (1) 16-18 (1) 16-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-00 (1)	03-06 (1)	*Nil*

*Indicates best time for 160 meter opening.
**Indicates best time for 10 meter opening.

160 meters at night. Between 250 and 750 miles, use *40* meters during the day, *80* meters at sunrise and sunset, and *160* meters during the hours of darkness. For openings between 750 and the short-skip limit of 2300 miles, use *20* meters during the day, *40* meters at sunset and sunrise, and *80* meters during the night. Expect an increase in short-skip openings on *15* and *10* meters between distances of about 500 and 1300 miles during the daylight hours, but these will occur sporadically. There is also the possibility for openings on *15* meters during the afternoon hours between distances of approximately 1300 and 2300 miles. Check the *CQ* Short-Skip Propagation Chart which appeared in last month's column for more details.

VHF Ionospheric Openings

Lyrids, a major meteor shower, should take place April 21–23. Expect it to peak during the early morning hours of April 22, with an average of 15 good-size meteors entering the earth's atmosphere every hour. This should make possible meteor-scatter type openings on the VHF bands.

A seasonal increase in sporadic-*E* ionization usually begins during April and continues through the spring and summer months. Expect an increase in short-skip openings on both *15* and *10* meters during April, as well as an occasional opening on *6* meters. The openings on *10* and *15* meters will range between approximately 400 and 1300 miles, while those on *6* meters will usually be between 750 and 1300 miles. While sporadic-*E* ionization can occur at just about any time, there is a tendency for it to peak between 8 a.m. and noon and again between 5 and 9 p.m. local time.

Widespread auroral displays can occur during April, bringing with them unusual ionospheric short-skip openings on the VHF bands. Best times for these to occur are during periods of radio storminess on the HF bands. Check the Last Minute Forecast at the beginning of this column for those days during April that are expected to be Below Normal or Disturbed.

DX propagation predictions for each amateur band between *10* and *160* meters for the period April 15 through June 15, 1987 appear in the DX Charts with the column. Beginning this month and continuing through the summer and fall, the times shown in the Propagation Charts will be local *daylight* time (EDT, CDT, MDT, and PDT).

Check the day-by-day *general* propagation forecast for April, which appears in the Last Minute Forecast at the beginning of this column.

73, George, W3ASK

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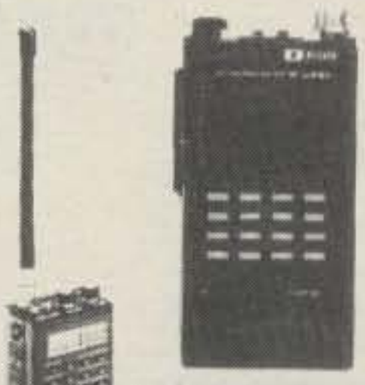

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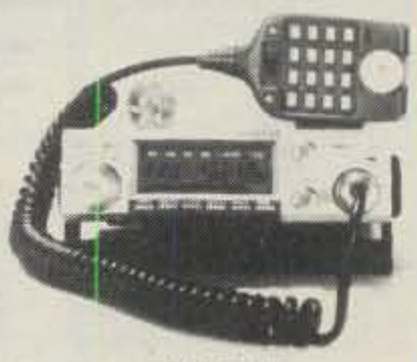

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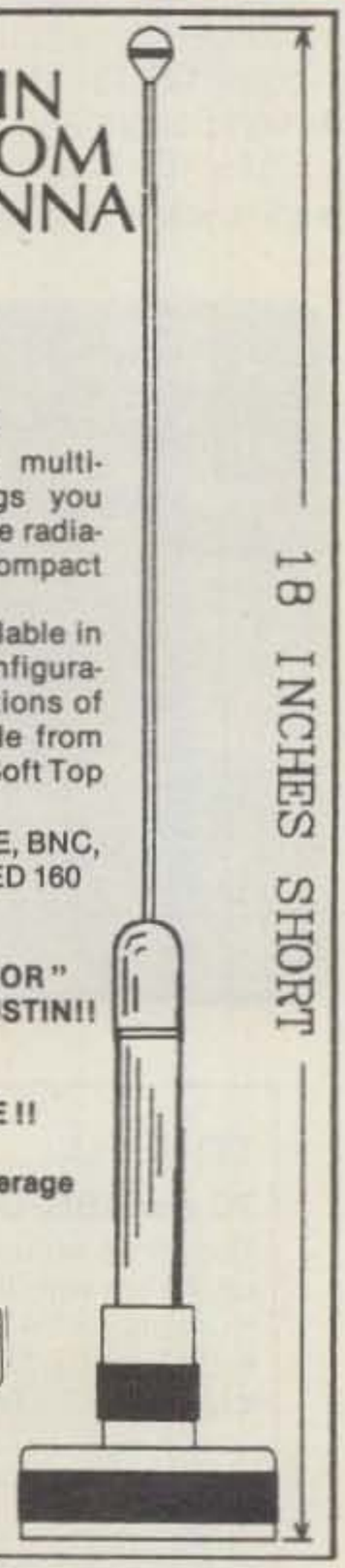

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R-390A Receiver: $195 checked; $115 repairable. Parts, tubes, sections. Info SASE. Mint military-spec pull-out 12AT7, 6AG5: $15/dozen. CPRC-26 six meter transceiver (see *Ham Radio*, March 1985) $17.50 apiece, $32.50 pair (add $4.50/unit shipping). Baytronics, Box 591, Sandusky, OH 44870 (419-627-0460 evenings).

CABLE TV CONVERTERS. Scientific Atlanta, Jerrold, Oak, Zenith, Hamlin. Many others. "New" **VIDEO HOPPER** "The Copy Killer." Visa, M/C, and Amex accepted. Toll-Free **1-800-826-7623.** B&B Inc., 10517 Upton Circle, Bloomington, MN 55431.

FOR SALE: Ten-Tec Omni A transceiver model 545 with all filters, power supply, speech processor, and mike. Looks good and works great, $600. Worked 1000 USSR. Bought new Ten-Tec. Gene Reynolds, W3EAN, 215-649-1447.

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