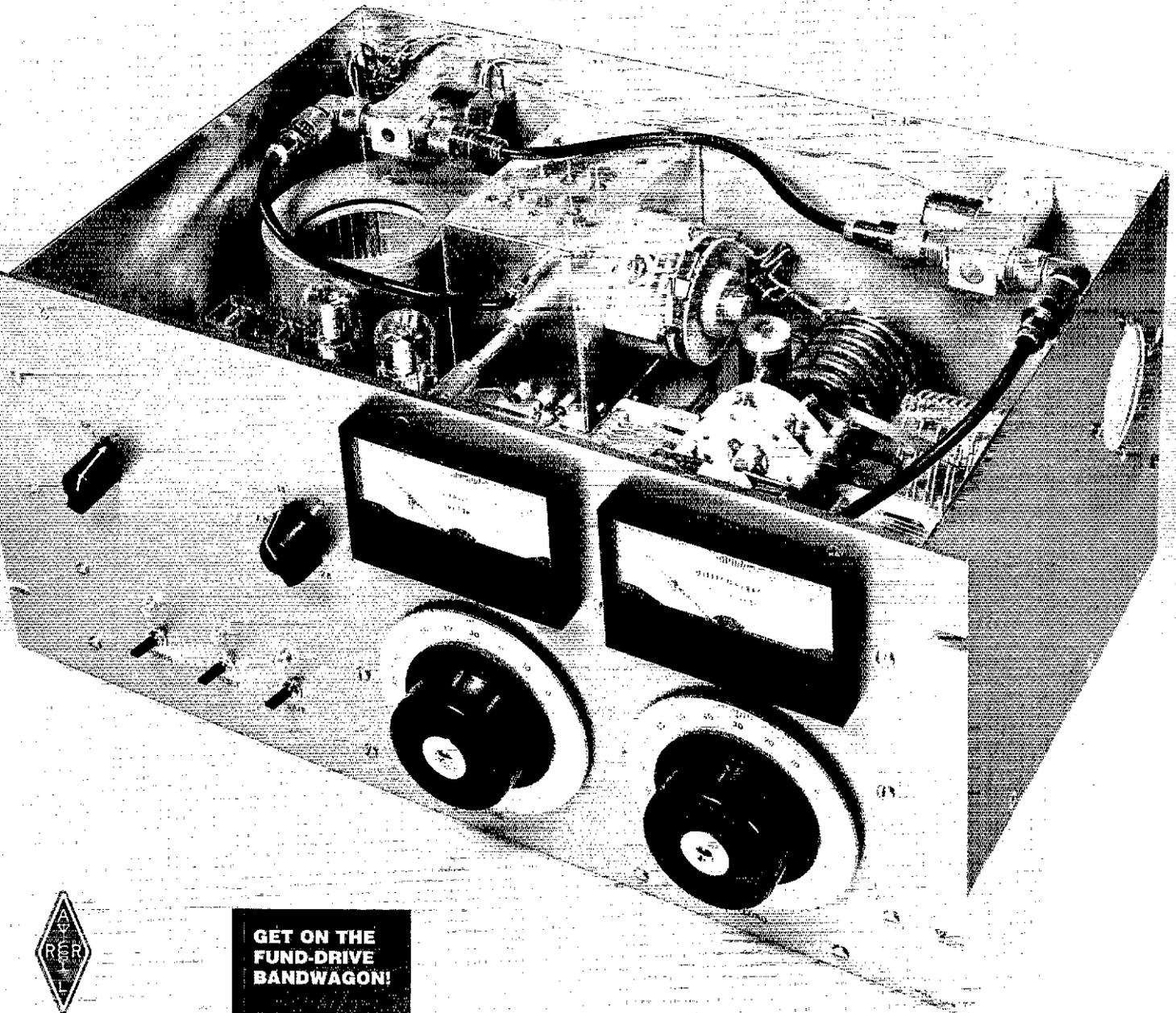


# QST

devoted entirely to Amateur Radio



**GET ON THE  
FUND-DRIVE  
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*Speaks loudly—  
With a whisper of drive*

AMATEUR

# A WONDERFUL WORLD OF RF

BY

# HENRY RADIO

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Since 1927 radio amateurs have known Henry Radio as their reliable source for every kind of radio equipment. It still is for tens of thousands of amateurs throughout the free world.

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<b>2,000 watts 45 MHz</b> numerous customers including SHAPE Headquarters, U.S. Dept. of Interior, The Mitre Company, M-A Com., Etc.	<b>5,000 watts 400 MHz</b> Pulse for Laser Excitation, University of California
<b>2,000 watts 13.5 MHz</b> Plasma generator for vacuum etching, many customers	<b>2,500 watts 27.12 MHz</b> to Ignite Argon Torch Photo-Emissions Spectrometry — Switzerland
<b>1,000 watts 13.5 MHz</b> Same application as previous listing	<b>20,000 watts 13.5 MHz</b> Test amplifier, vacuum tubes
<b>5,000 watts 13.5 MHz</b> Same application as previous listing	<b>2,000 watts 27.12 MHz</b> Mass Spectrometry, VG Isotopes, England
<b>5,000 watts various Marine HF frequencies</b> Shore station	<b>2,000 watts 13.56 MHz</b> Sputtering — Munich, Germany
<b>10,000 watts 90 MHz</b> Laser Excitation, Aluminor Co.	<b>3,000 watts 6 MHz</b> Shortwave AM — Broadcast
<b>5,000 watts FM Broadcast</b> Caribbean Communications	<b>2,000 watts 70 MHz</b> Airborne Radar Research, England
<b>3,000 watts 350 MHz</b> Western Research	<b>5K Classic Amateur Amplifiers</b> Japan

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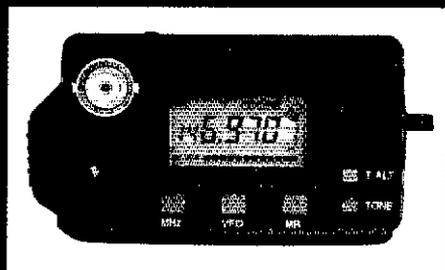
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TH-55AT  
1200 MHz  
Here Now!

## Compact Breakthrough!

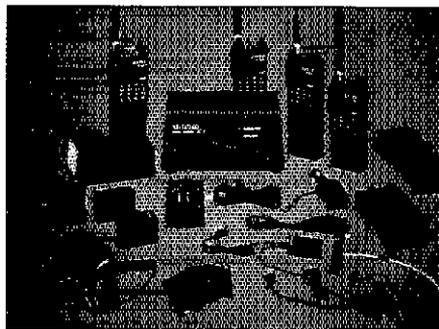


### TH-25AT/45AT

#### New Pocket Portable Transceivers

The all-new TH-25 Series of pocket transceivers is here! Wide-band frequency coverage, LCD display, 5 watt option, plus...

- Frequency coverage: **TH-25AT:** 141-163 MHz (Rx); 144-148 MHz (Tx). (Modifiable for MARS/CAP. Permits required.)  
**TH-45AT:** 438-450 MHz.
- Automatic Power Control (APC) circuit for reliable RF output and final protection.
- 14 memories; two for any "odd split" (5 kHz steps).
- Automatic offset selection (TH-25AT).
- 5 Watts from 12 VDC or PB-8 battery pack.
- Large multi-function LCD display.
- Rotary dial selects memory, frequency, CTCSS and scan direction.
- T-ALERT for quiet monitoring. Tone Alert beeps when squelch is opened.
- Band scan and memory scan.
- Automatic "power off" circuit.
- Water resistant.
- CTCSS encoder / decoder optional (TSU-6).
- **Supplied accessories:** StubbyDuk, PB-6 battery pack for 2.5 watts output, wall charger, belt hook, wrist strap, water resistant dust caps.



#### Optional accessories:

- PB-5 7.2 V, 200 mAh NiCd pack for 2.5W output • PB-6 7.2 V, 600 mAh NiCd pack • PB-7 7.2 V, 1100 mAh NiCd pack
- PB-8 12 V, 600 mAh NiCd for 5W output • PB-9 7.2 V, 600 mAh NiCd with built-in charger • BC-10 Compact charger
- BC-11 Rapid charger • BT-6 AAA battery case • DC-1/PG-2V DC adapter • HMC-2 Headset with VOX and PTT • SC-14, 15, 16 Soft cases • SMC-30/31 Speaker mics. • TSU-6 CTCSS decode unit • WR-1 Water resistant bag

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ICOM

IC-781 HF Transceiver



# THE FUTURE OF AMATEUR COMMUNICATIONS

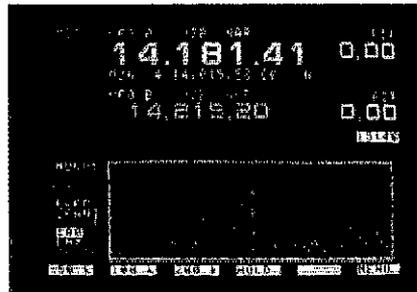
Once in a lifetime, a transceiver is introduced that's so extraordinary and innovative that it opens a totally new era in HF communications. ICOM's pacesetter IC-781 proudly exhibits that hallmark achievement with futuristic designs and features of true legendary proportions. Whether DX'ing, contesting, pioneering new interests or enjoying unquestionable top-of-the-line performance, the IC-781 is indeed today's standard of excellence!

**Multi-Function Five Inch CRT.** Displays frequencies, modes, memory contents, operating notes, RIT, two menu screens, plus a panoramic view of all signals in a selected range. A portion of the screen also serves as a display for data modes like RTTY, AMTOR, and PACKET.



**Unique Spectrum Scope.** Continuously indicates all signal activities and DX pileups with your operating frequency in the center. Selectable horizontal frequency spans of 50,

100, and 200KHz for each side of the frequency you're listening to. Vertical range indicates relative signal strengths. A contest's dream!



**Dual Width Noise Blanker** includes MCF filter plus level and width controls to eliminate pulse and woodpecker noise with minimum adjacent-signal interference.

**Incomparable Filter Flexibility.** Independent selection of wide and narrow SSB filters plus CW filters. Second and third CW IF filters are independently selectable!

**Dual Watch.** Simultaneously receives two frequencies in the same band! Balance control adjusts VFO A/B receive strength levels. You can check additional band activity, even tune in your next contact, while in QSO without missing a single word!

**DX Rated!** 150 watts of exceptionally clean RF output. Easily drives big amplifiers to maximum power.

**Twin Passband Tuning with separate controls for second and third IF stages!** Increases selectivity and narrows bandwidth, independently varies low and high frequency response, or functions as IF shift. It's DX'ing Dynamite!

**A Total Communications System!** Includes built-in 100% duty AC supply, high speed automatic antenna tuner, iambic keyer, semi-automatic or full QSK CW break-in to 60 wpm. Audio Peaking Filter (APF), RF speech processor, multiscanning, 105dB dynamic range, all-band/all-mode receiver with general coverage, and much more!

**ICOM Dependability.** The phenomenal IC-781 is built for action and backed with the most extensive warranty in the industry.

See the IC-781 at your local ICOM dealer.

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First in Communications

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3150 Premier Drive, Suite 126, Irving, TX 75063  
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3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4  
All stated specifications subject to change without notice or obligation.  
All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 781188.

# QST

QST (ISSN: 0033-4812) is published monthly as its official journal by the American Radio Relay League, Newington, CT USA. Official organ of the Canadian Radio Relay League.

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Second-class postage paid at Hartford, CT and at additional mailing offices. Postmaster: Form 3579 requested.

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QST is available to blind and physically handicapped individuals on flexible discs from the Library of Congress. National Library Service for the Blind & Physically Handicapped, Washington, DC 20542.

Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No: 21-9421.



## OUR COVER

This attractive amplifier is another example of the fine handiwork of Dick Stevens (W1QWJ), a frequent QST and Handbook contributor. Using a grounded-grid 3CX800A7, the amplifier requires a normal drive power of only 20 W to produce 750 W of RF output on six bands from 80 through 10 meters. See p 22 for the story on this smooth performer. The W1AW photo (lower left) is by W2ABE.

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Others May Try to Imitate, But...

# Only One Can Be The Best



Morse Code - Baudot - ASCII - AMTOR - Packet - Facsimile - Navtex

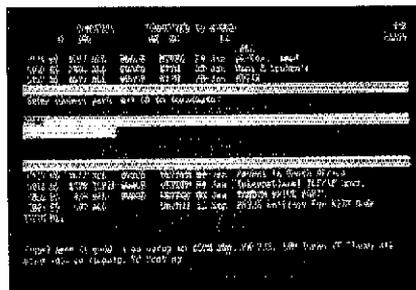
Amateur Net Price \$319.95

It's a lesson you learn very early in life. Many can be good, some may be better, but only one can be the best. The PK-232 is the best multi-mode data controller you can buy.

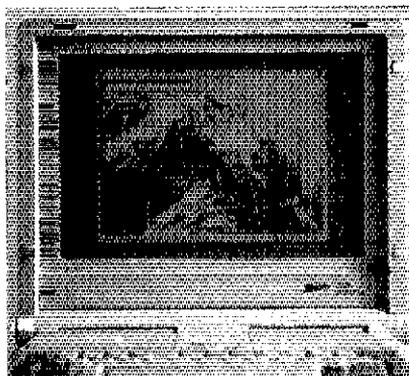
## 1 Versatility

The PK-232 should be listed in the amateur radio dictionary under the word Versatile. One data controller that can transmit and receive in six digital modes, and can be used with almost every computer or data terminal. You can even monitor Navtex, the new marine weather and navigational system. Don't forget two radio ports for both VHF and HF, and a no compromise VHF/HF/CW internal modem with an eight pole bandpass filter followed by a limiter discriminator with automatic threshold control.

The internal decoding program (SLAM<sup>tm</sup>) feature can even identify different types of signals for you, including some simple types of RTTY encryption. The only software your computer needs is a terminal program.



PC Pakratt Packet TX/RX Display



Facsimile Screen Display

## 2 Software Support

While you can use most modem or communications programs with the PK-232, AEA has two very special packages available exclusively for the PK-232...PC Pakratt with Fax for IBM PC and compatible computers, and Com Pakratt with Fax for the Commodore 64 and 128.

Each package includes a terminal program with split screen display, QSO buffer, disk storage of received data, and printer operation, and a second program for transmission/reception and screen display of facsimile signals. The IBM programs are on 5-1/4" disk and the Commodore programs are plug-in ROM cartridges.

## 3 Proven Winner

No matter what computer or terminal you plan to use, the PK-232 is the best choice for a multi-mode data controller. Over 20,000 amateurs around the world have on-air tested the PK-232 for you. They, along with most major U.S. amateur magazines, have reviewed the PK-232 and found it to be a good value and excellent addition to the ham station.

No other multi-mode controller offers the features and performance of the PK-232. Don't be fooled by imitations. Ask your friends, or call the local amateur radio store. We're confident the PK-232 reputation will convince you that it's time to order your very own PK-232.

Call an authorized AEA dealer today. You deserve the best you can buy, you deserve the PK-232.

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NEW!

## Affordable DX-ing!

### TS-140S

HF transceiver with general coverage receiver.

Compact, easy-to-use, full of operating enhancements, and feature packed. These words describe the new TS-140S HF transceiver. Setting the pace once again, Kenwood introduces new innovations in the world of "look-alike" transceivers!

- **Covers all HF Amateur bands with 100 W output.** General coverage receiver tunes from 50 kHz to 35 MHz. (Receiver specifications guaranteed from 500 kHz to 30 MHz.) Modifiable for HF MARS operation. (Permit required).
- **All modes built-in.** LSB, USB, CW, FM and AM.
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.



- **New Feature! Programmable band marker.** Useful for staying within the limits of your ham license. For contesters, program in the suggested frequencies to prevent QRM to non-participants.
- **Famous Kenwood interference reducing circuits.** IF shift, dual noise blankers, RIT, RF attenuator, selectable AGC, and FM squelch.

- **M. CH/VFO CH sub-dial.** 10 kHz step tuning for quick QSY at VFO mode, and UP/DOWN memory channel for easy operation.
- **Selectable full (QSK) or semi break-in CW.**
- **31 memory channels.** Store frequency, mode and CW wide/narrow selection. Split frequencies may be stored in 10 channels for repeater operation.
- **RF power output control.**
- **AMTOR/PACKET compatible!**
- **Built-in VOX circuit.**
- **MC-43S UP/DOWN mic. included.**

#### Optional Accessories:

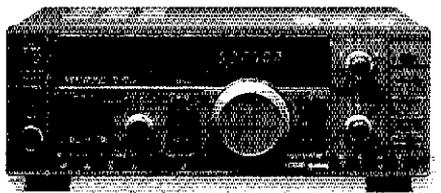
- **AT-130** compact antenna tuner • **AT-250** automatic antenna tuner • **HS-5/HS-6/HS-7** headphones • **IF-232C/IF-10C** computer interface
- **MA-5/VP-1** HF mobile antenna (5 bands) • **MB-430** mobile bracket • **MC-43S** extra UP/DOWN hand mic. • **MC-55** (8-pin) goose neck mobile mic. • **MC-60A/MC-80/MC-85** desk mics.
- **PG-2S** extra DC cable • **PS-430** power supply
- **SP-40/SP-50B** mobile speakers • **SP-430** external speaker • **SW-100A/SW-200A/SW-2000** SWR/power meters • **TL-922A** 2 kW PEP linear amplifier (not for CW QSK) • **TU-8** CTCSS tone unit
- **YG-455C-1** 500 Hz deluxe CW filter, **YK-455C-1** New 500 Hz CW filter.



### TS-680S

All-mode multi-bander

- 6m (50-54 MHz) 10 W output plus all HF Amateur bands (100 W output).
- Extended 6m receiver frequency range 45 MHz to 60 MHz. Specs. guaranteed from 50 to 54 MHz.
- Same functions of the TS-140S except optional VOX (VOX-4 required for VOX operation).
- Pre-amplifier for 6 and 10 meter band.



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

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THE FIRST  
144/220 MHz  
Dual Bander!

## Double Take!



ACTUAL SIZE FRONT PANEL

### TM-621A/721A 144/220 and 144/450 MHz FM Dual Banders

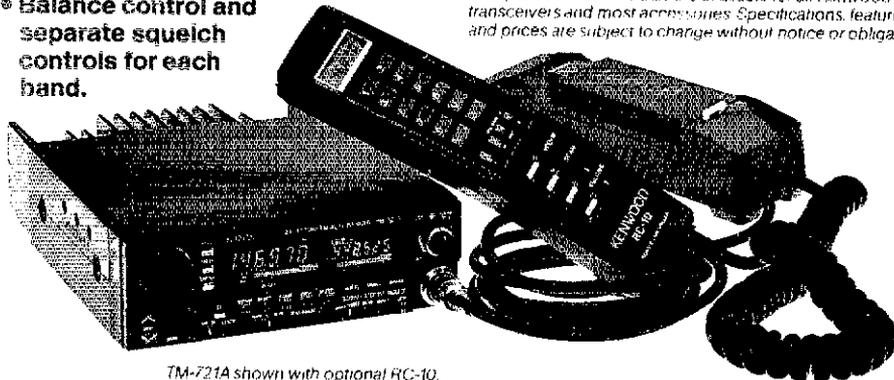
Once again, Kenwood brings you another Dual Bander First! The TM-621A is the first 144/220 MHz FM Dual Bander. The Kenwood TM-621A and TM-721A (144/450 MHz) re-defines the original Kenwood "Dual Bander" concept. The wide range of innovative features includes a dual channel watch function, selectable full duplex operation, 30 memory channels, extended frequency coverage, large multi-color dual digital LCD displays, programmable scanning, and more!

- **Extended receiver range** (138.000-173.995 MHz) on 2 m; 70 cm coverage is 438.000-449.995 MHz; 1-1/4 m coverage is 215-229.995 MHz. (Specifications guaranteed on Amateur bands only. Two meter transmit range is 144-148 MHz. Modifiable for MARS/CAP. Permits required.)
- **Separate frequency display for "main" and "sub-band."**
- **Call channel function.** A special memory channel for each band stores frequency, offset, and sub-tone of your favorite channel. Simply press the CALL key, and your favorite channel is selected!

- **30 multi-function memory channels.** 14 memory channels and one call channel for each band store frequency, repeater offset, CTCSS, and reverse. Channels "A" and "b" establish upper and lower limits for programmable band scan. Channels "C" and "d" store transmit and receive frequencies independently for "odd splits."
- **45 Watts on 2 m, 35 watts on 70 cm, 25 watts on 1-1/4 m.** Approx. 5 watts low power.
- **Automatic Band Change (A.B.C.)** Automatically changes between main and sub-band when a signal is present.
- **Dual watch function allows VHF and UHF receive simultaneously.**
- **Programmable memory and band scanning, with memory channel lock-out and priority watch function.**
- **Balance control and separate squelch controls for each band.**

- **Dual antenna ports.**
- **TM-621A has auto offset.**
- **Full duplex operation.**
- **CTCSS encode/decode selectable from front panel or UP/DWN keys on microphone.** (Encode built-in, optional TSU-6 needed for decode.)
- **Each function key has a unique tone for positive feedback.**
- **Illuminated front panel controls and keys.**
- **16 key DTMF mic. included.**
- **Handset/remote control option (RC-10).**
- **Frequency (dial) lock.**
- **Supplied accessories:** 16-key DTMF hand mic., mounting bracket, DC cable.

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



TM-721A shown with optional RC-10.

#### Optional Accessories:

• **RC-10** Multi-function handset/remote controller • **PS-430** Power supply • **TSU-6** CTCSS decode unit • **SW-100B** Compact SWR/power/volt meter • **SW-200B** Deluxe SWR/power meter • **SWT-1** 2 m antenna tuner • **SWT-2** 70 cm antenna tuner • **SP-40** Compact mobile speaker • **SP-50B** Deluxe

mobile speaker • **PG-2N** DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MA-4000** Dual band 2 m/70 cm mobile antenna (mount not supplied) • **MB-11** Mobile bracket • **MC-43S** UP/DWN hand mic. • **MC-48B** 16-key DTMF hand mic.

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**Reports Invited:** The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 15 divisions of the League are further arranged into 67 administrative "sections," each headed by an elected Section Manager. Your SM welcomes reports of club and individual activity. ARRL Field Organization appointments are available covering a wide range of Amateur Radio volunteer interests. Whatever your license class, your SM has an appointment available. Check with your SM (below) for further information.

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The American Radio Relay League, Inc. is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

"Of, by, and for the radio amateur," ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A bona fide interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US.

Membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA

Telephone: 203-666-1541 Telex: 650215-5052 MCI, MCI MAIL (electronic mail system) ID: 215-5052 FAX: 203-665-7531 (24-hour direct line)

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## "It Seems to Us ..."

### Due Process, and RFI

No person shall be deprived "of life, liberty, or property without due process of law." One need not be a legal scholar to appreciate the beauty of these words from the Fifth and Fourteenth Amendments to the Constitution of the United States. This simple yet powerful doctrine is embodied in countless governmental actions, and is as sound today as when its denial by a distant monarch inspired the American Revolution.

Few of us think of our Constitutional protections as we go about our daily lives. But recent FCC actions, which on their face appear to be flagrant violations of the fundamental principle of due process, remind us that we can take nothing for granted. In observing the Bicentennial of the Constitution we are not marking a historic event; we are celebrating a living document that makes possible our way of life.

The authors of the Communications Act of 1934, which created the FCC, had due process firmly in mind when they defined the responsibilities and the powers of the new agency. Subsequent amendments of the Communications Act, and the adoption of the Administrative Procedure Act of 1946, have maintained that spirit. The FCC Rules themselves are consistent with the Fifth and Fourteenth Amendments, as they must be if they are to be enforceable. But in a number of recent RFI cases, we believe the FCC has stepped over the line—not only of Constitutionality, but of the declared will of Congress and of its own rules as well. And we've taken the first step toward putting the Commission back on track.

Section 316 of the Communications Act of 1934, as amended, says that the Commission shall modify a license, either for a limited time or for its duration, only after "... the holder of the license... shall have been notified in writing of the proposed action and the grounds and reasons therefor, and shall be given reasonable opportunity, of at least thirty days, to protest such proposed order of modification." The notice period may be shorter if the safety of life or property is involved. It goes on to say, "In any case where a hearing is conducted pursuant to the provisions of this section, both the burden of proceeding with the introduction of evidence and the burden of proof shall be upon the Commission." (Emphasis added.) Section 303(f) says the licensee may insist on a hearing.

In enacting Public Law 97-259 in 1982, Congress gave the FCC authority to regulate the interference susceptibility of home electronic equipment in part because, in the

words of the joint House-Senate Conference Report, "efforts [by manufacturers] to voluntarily address the root problem by incorporating such RFI suppression techniques in the design and assembly-line stage have been less than adequate." Congress did not require that the FCC use its new authority, but clearly understood where the burden should lie in resolving RFI problems; quoting again from the Conference Report, "In the market for home devices, ... good faith industry attempts to solve this interference problem have not always been as successful [as in the commercial market]. Thus, in view of complaints regarding home devices, the Conferees believe that Commission authority to impose appropriate regulations on home electronic equipment and systems is now necessary to insure that consumers' home electronic equipment and systems will not be subject to malfunction due to RFI."

The Congressional Conferees suggested some alternatives to the Commission: direction to manufacturers to meet minimal standards, or a requirement of a warning label on equipment not possessing adequate shielding and filtering. While some segments of the industry have made some voluntary moves along these lines, an inspection of retail displays of home electronic equipment today, more than five years after the enactment of Public Law 97-259, will show that the results have been spotty at best.

So, the law is clear. Radio licensees are entitled to operate to the full extent permitted by their licenses. Before a license can be modified, due process must be observed and the burden of proof is on the Commission to show why such action should be taken. Congress believes that interference resulting from inadequate RFI suppression in home electronic equipment should be resolved by the manufacturers of that equipment, and has armed the FCC with authority to regulate such equipment if in its technical judgment the problem warrants such action.

And what has been the Commission's response? In some cases which recently have come to our attention, FCC engineers have imposed restrictions on amateur station operations even after tests have shown it is not at fault! In some cases, even telephone interference—something that could not possibly be the fault of the transmitter—has been cited as a basis for such restrictions! No hearing has been offered to the amateur; not even the

(continued on page 86)

# HF performance you can have a real field day with.

With Yaesu's FT-757GX/II, you can enjoy full-featured HF performance just about anywhere.

On vacation. During field day. On the road. Or in your shack.

Because the FT-757GX/II packs all its HF performance into one highly compact, action-ready case. A case so small, it even fits under airplane seats.

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### Public awareness:

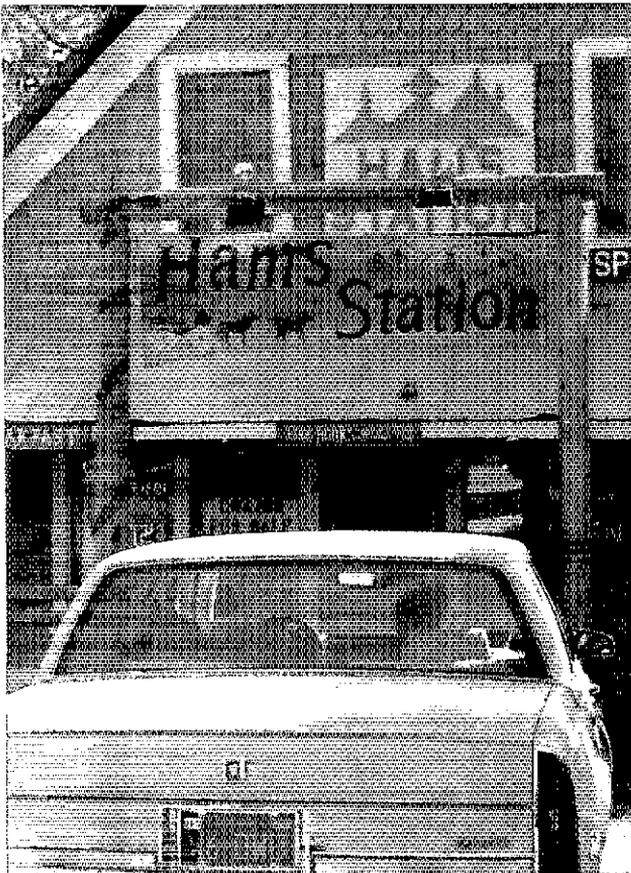
Amateur Radio was there as federal departments and agencies set up exhibits on the National Mall to highlight Public Sector Awareness Week, which demonstrates the many government services that directly affect the lives of all US citizens. Alford Taylor, KN3J, of Rockville, Maryland, arranged for the Montgomery County RACES/ARES van to be deployed, staffed by local amateurs who explained Amateur Radio's role in SKYWARN to tourists and the press. (photos courtesy KN3J)

### Microwave Attenuators

Need an attenuator for microwave frequencies, or just want to learn more about them? Check out KA1GT's New Frontier column on page 72 of this issue for the scoop on microwave attenuators and their uses.



**A new affiliate:** Florida Section Manager Roy Mackey, N4ADI (right), presents an ARRL certificate of affiliation to Suncoast Amateur Radio Club (Hudson, Florida) outgoing president Marvin Borngraber, WC2G. For information on how your club can enjoy the benefits of ARRL affiliation, contact ARRL HQ, Club Services Dept, 225 Main St, Newington, CT 06111 or call 203-666-1541. (photo courtesy KB4WES)



**All hams welcome:** Robert Haven, W6DWU, of Fresno, California, took this picture of a restaurant on Hwy 89 near Quincy, California, northwest of Tahoe. Robert didn't tell us if there were any guest operator positions available!

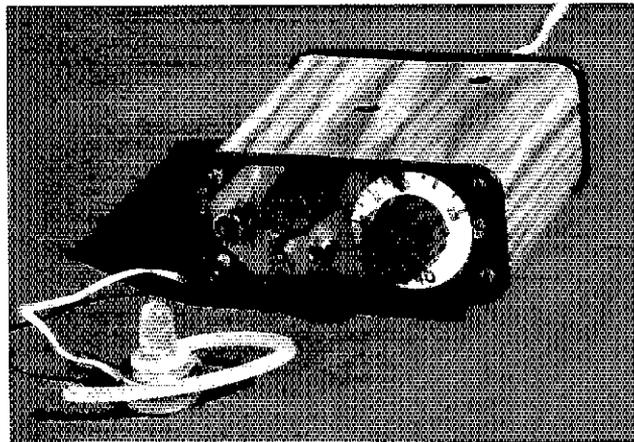
### Heading West?

Planning on attending the 1988 ARRL National Convention Sept 9-11 in Portland, Oregon? Then you'll want to check out KC7YN's article on page 55 of this issue. If

you aren't planning on attending, read it anyway—you'll at least know what you'll be missing; you might even change your mind and join in the fun.



**Worked the USSR recently?** These packages represent over 500 pounds of QSL cards received from the USSR at the ARRL Outgoing QSL Service on May 20. Pictured here is QSL Service Assistant Joseph Garcia, NJ1Q. (photo courtesy N1EOZ)

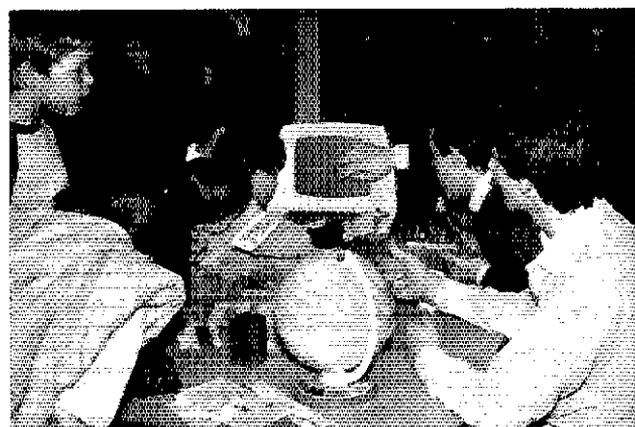


**If the shoe doesn't quite fit:** Gary Morris, N6QAF, of Auburn, California, liked the simplicity of the Neophyte Receiver, which appeared in the February issue of QST, but wanted to put it in a smaller package to use with a 40-meter QRP transmitter he had built. Among his modifications to the original design were an LM318 voltage regulator so that he could use it with the transmitter's 12-V supply. Gary's handiwork is a fine example of using construction articles as a basis for equipment that fits individual needs. (photo courtesy Brian Morris)

### Losing Ham Identified?

Dick Martin, N6ZQ, of Northridge, California, says he is not sure of the prefix, but he has identi-

fied the call area and suffix of "The Ham Who Lost" (June 1988 QST, p 13) as 0INK.



**International Night:** Ted Rappaport, N9NB, and Tom Poland, N9NC, gave an Amateur Radio demonstration recently at the Happy Hollow Elementary School (West Lafayette, Indiana) International Night. The display included a packet-radio station, QSLs from around the world and an antique key and buzzer. According to Ted and Tom, there were as many interested adults as there were children. Perhaps your club can arrange to demonstrate Amateur Radio at a school function—you never know how many potential hams might be there! (photos courtesy N9NB)



**The first of many:** Members of the First State ARC (Wilmington, Delaware) erect an antenna at the Old Court House Museum in New Castle for the K200QBD special-event operation. Delaware was the first state on the air with "200" call signs commemorating the Bicentennial of the US Constitution. For more on this and other "200" operations, see page 49 of May QST and page 82, this issue. (photo courtesy KC3TI)



**All help appreciated:** Even hams are not too proud to accept help where they can find it. George Singleback, K4HXM, of Chesapeake, Virginia, gets an assist from his granddaughter Allison as he works on his car. Next thing you know he'll have her helping out with the radio—another ham in the making? (photo courtesy K4HXM)



**Amateur Radio Day:** June 25, 1988 has been declared "Amateur Radio Day" in the state of Washington. Washington Section State Government Liaison Frank Price, KD7AC, and Public Information Officer John Teale, N7FKV, helped Amateur Radio receive official recognition in conjunction with Field Day 1988. Copies of the proclamation were made available to all clubs for use in their Field Day activities. Shown here are (l-r) Frank Price, KD7AC; Brad Wells, KR7L, Washington SM; Governor Booth Gardner; Catherine Wells, N7KOV; and John Teale, N7FKV. (photo courtesy KR7L)

### Tune In

Need a tuning indicator to make digital communications a snap? NK1P and KA1CV may have just the

circuit you're looking for. Details on this inexpensive tuning indicator begin on page 28 of this issue.



**Storm watch:** Bob Taylor, NA1Q (left), of Hubbardston, Massachusetts, was recently featured in an article on Amateur Radio and the SKYWARN system in the Worcester (Massachusetts) Telegram and Gazette. Bob, seen here with Thomas J. Holmes, head of the Worcester weather service office, is net control for the local SKYWARN system. (photo courtesy Worcester Telegram and Gazette, Inc)

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# League Lines

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The 1989 ARRL National Convention is *September 9-11* in Portland, Oregon! For more details see page 55.

**PRB-1 Seminar at ARRL National Convention:** A seminar entitled "Land Use Regulation of Federally Licensed Communications Facilities and the Doctrine of Federal Preemption" will be offered at the ARRL National Convention in Portland on Saturday, September 10, beginning at 9 AM. Open to all convention attendees, the four-hour seminar is primarily intended for ARRL Volunteer Counsel, attorneys and municipal officials. The panelists include ARRL Counsel Chris Imlay, N3AKD, and members of the League's Legal Strategy Committee.

Registration for Continuing Legal Education (CLE) credit for attorneys will be handled at the door. The cost to participants and anyone else who wants a copy of the course materials is \$50, which covers reproduction of course materials. There is no charge to anyone not wanting course materials.

Topics include: Negotiation of zoning ordinances and building code provisions; Obtaining special exceptions, special and conditional use permits, and variances for communications facilities; Limitations on private land use regulation of communications facilities; Litigation strategies in representing the communications user; Engineering consideration in land use planning relative to communications and the use of expert testimony in antenna cases; and discussion of recent cases and the future of individual, municipal and state land use regulation of communications facilities.

While we're talking about national conventions, the *Radio Society of Great Britain (RSGB) is hosting its national convention July 15-17* at the National Exhibition Center near Birmingham, England, in celebration of RSGB's 75th anniversary. The Guest of Honor will be Prince Philip, Duke of Edinburgh, who will perform the opening ceremonies and attend the anniversary luncheon. Special event station GB75AC will be on the air to help celebrate July 9 through July 17. For further information, contact RSGB, Lambda House, Cranborne Rd, Potters Bar EN6 3JE, England, or call (011)-44-707-59015.

**Worked All States (WAS) applicants:** Remember that postage rates for the return of your QSLs has increased. Funds needed for the safe return of cards in the US are now \$1.25 for First Class, \$2.10 for certified and \$5.75 for registered delivery. For further information, including postage rates for the return of your 5BWAS and DXCC QSLs, ask for MCS Form 16 from the Special Requests desk at HQ. Please include an SASE.

Effective July 18, alien reciprocal operators in the US will *sign their US prefix and call area first*, instead of last, followed by their call sign. For example, "W4/DL6TJ" will be used instead of "DL6TJ/W4." This conforms with the IARU recommendation to standardize call-sign identification for reciprocal licensees.

The ARRL will hold its Seventh Amateur Radio Computer Networking Conference on Saturday, October 1, 1988 at Johns Hopkins University Applied Physics Laboratory in the Laurel-Columbia, Maryland area. The deadline for receipt of "camera-ready" papers is August 25, 1988. All papers should be mailed to Maty Weinberg at ARRL HQ. If you plan to present a paper, please request an *author's kit* and *identify the title of your paper immediately*. Proceedings will be sold at the conference and by mail from ARRL HQ.

Technical papers are invited on all aspects of Amateur Radio digital communication via ionospheric, tropospheric, meteor-scatter and satellite modes. Topics may include network development, architecture, protocols, standards, hardware, software, modulation and encoding schemes, applications, frequency planning and practical experience (such as traffic handling). Of particular interest are digital signal processing, digital speech and image transmission, and new space programs employing digital communication.

**The 1987 ARRL Annual Report** is now available for \$1 postpaid to members. The *Annual Report* is must reading for ARRL aficionados. It contains reports from the ARRL President, Directors and staff, as well as a detailed financial statement.

The Third International Amateur Radio Union (IARU) HF World Championship will be held 1200 UTC Saturday, July 9 through 1200 UTC Sunday, July 10. For more information on this popular contest, see page 96 of April *QST*.

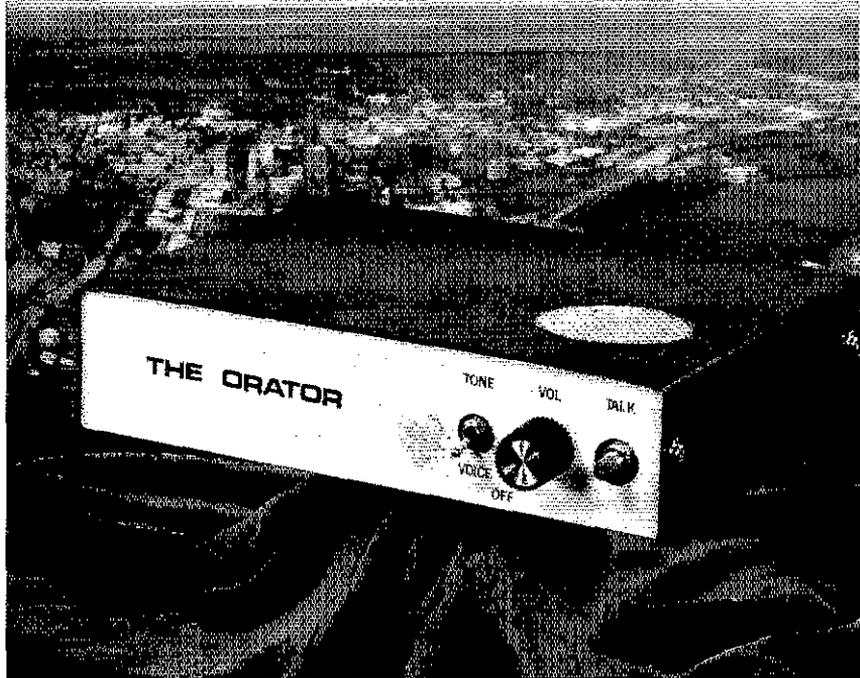
**The ARRL Board of Directors will meet July 21-22** in Hartford. Now is the time to contact your Director concerning your views on the many important issues facing Amateur Radio.

**Nominations are now open** for the offices of Director and Vice Director from the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions for the 1989-1990 term. For more information, see this month's Happenings column.

# A Talking Wattmeter

Listen! Your wattmeter's *talking* to you—if you've got the Orator hooked up to it, that is!

By Don Kirk, WD8DSB  
7821 Bryden Dr  
Noblesville, IN 46060



The seed for this project was planted a few years ago when, as part of a college course, I designed a talking voltmeter. Stan Briggs, K8SB, convinced me to design a circuit to attach to an analog wattmeter that would allow the wattmeter to talk to his blind friend, Lowell, W8QIY. With Stan's technical and financial support, my first version of the talking wattmeter was born. Now, two years later, aided by the use of a single-chip microcomputer and a compact analog-to-digital (A/D) converter, the talking wattmeter add-on is an economical project I'm sure many hams—not just the visually handicapped—can put to good use.

## General Description

One version of the unit is shown in the title photograph. Although this project was initially designed for visually impaired people (most of whom would have no need of labels for a device with so few controls), this project is certain to appeal to sighted radio amateurs as well; hence, labels. To aid the visually impaired, all the controls have been grouped at one end of the enclosure. From left to right, the three front-panel controls are: VOICE/TONE, ON/OFF/VOLUME and TALK. The ON/OFF switch is part of the VOLUME control. An inside view of the Orator is shown in Fig 1.

Fig 2 is a block diagram of the Orator, which is designed to be used in conjunction with an analog wattmeter. A voltage sample, derived from the wattmeter, drives the Orator. One of two modes of operation, VOICE or TONE, is selected by the toggle switch at the left of the control group.

In the VOICE mode, synthesized speech announces the power output in watts

measured by the wattmeter. The Orator range steps from 0 to 190 watts. As you can see from Table 1, there are 32 different output steps available. When the TALK button

is pushed, the Orator will voice the power level in digits followed by the word *watts*. If the power level is above 190 W, the Orator says *out of range*. This process is shown in the flow chart of Fig 3.

The word table for this project is designed for use with a 0-200 W meter scale. You can use the Orator with a meter having a 0-2000 W scale by mentally multiplying the voiced output by 10. If your wattmeter has a forward and reflected power-selection switch, you will know the SWR is low when the forward power is high and the reflected power is low.

In the TONE mode, the output of a function-generator IC is selected. The output of this IC is a clean audio-frequency sine wave, the pitch varying according to the amplitude of the voltage supplied by the wattmeter. As the voltage increases, the tone frequency increases. This feature is quite handy when tuning your transmitter or antenna tuner for best performance.

## Circuit Description

Refer to Fig 4 during the following discussion.

### Input Amplifier

The voltage produced by the wattmeter is fed to input amplifier U5, which is configured as a noninverting amplifier. U5 has a very high input impedance; this prevents loading the wattmeter circuit. The input amplifier allows the Orator to be used with almost any wattmeter. R15 controls the gain of U5, and is adjusted to present a voltage that the microcomputer associates with preset power levels. (Increasing the value of R15 increases the amplifier gain.) The output of U5 is fed to the A/D converter (U1) and also to the tone-generator

Table 1

### Talking Wattmeter Power Level Steps

Dc voltage at U5 pin 6	Step	Word Output
0.00	0	Zero
0.08	1	Zero
0.16	2	One
0.24	3	Two
0.32	4	Three
0.40	5	Five
0.48	6	Eight
0.56	7	Ten
0.64	8	Fifteen
0.72	9	Seventeen
0.80	10	Twenty
0.88	11	Twenty-five
0.96	12	Thirty
1.04	13	Thirty-five
1.12	14	Forty
1.20	15	Fifty
1.28	16	Fifty-five
1.36	17	Sixty
1.44	18	Seventy
1.52	19	Eighty
1.60	20	Eighty-five
1.68	21	Ninety-five
1.76	22	One hundred five
1.84	23	One hundred ten
1.92	24	One hundred twenty
2.00	25	One hundred thirty-five
2.08	26	One hundred forty-five
2.16	27	One hundred fifty-five
2.24	28	One hundred seventy
2.32	29	One hundred eighty
2.40	30	One hundred ninety
2.48	31	Out of range

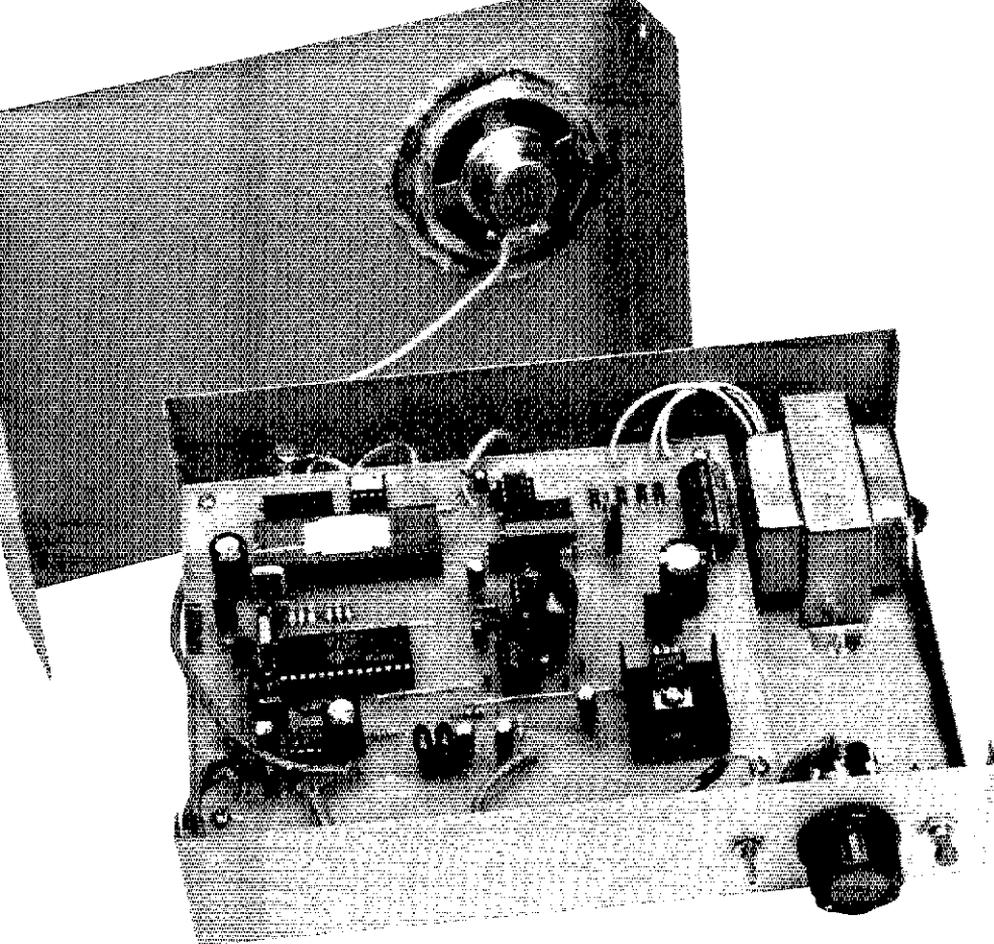


Fig 1—An inside view of the Orator. A Radio Shack enclosure (RS 270-272) houses the components. To avoid having machine-screw heads on the cabinet top, the speaker is held in place by a bead of silicone sealant. (If you follow this procedure, make sure the sealant you use does not contain acetic acid.) At the left foreground, you can see the speech processor chip. Immediately behind it is the 68701 microcomputer. The U8 and its heat sink are visible in the right foreground. Note that T1 fits snugly within the enclosure. If you use a power transformer other than the one specified in the parts list of Fig 5, make sure everything will fit within your chosen enclosure. This unit has no panel labels because it was built for use by a blind ham.

circuit (U6, U7). R16 allows setting the output of U5 to 0 V when the input to it is 0 V.

#### Analog-to-Digital Converter

U1, the analog-to-digital (A/D) converter, is manufactured by Texas Instruments and is available from Radio Shack®. This inexpensive, 8-pin IC requires few external components to perform its task. The amplified analog wattmeter voltage is converted by U1 to an 8-bit digital value which is transferred *serially* to the microcomputer.

#### Microcomputer

U2 is a Motorola MC68701 microcomputer. It contains 128 bytes of RAM, 2 kbytes of EPROM and 29 input/output (I/O) ports. The talking wattmeter program resides within the IC's internal EPROM. U2 is connected to the A/D chip and speech processor via its I/O ports.

#### Speech Processor

The speech processor, U3, is manufactured by General Instruments and is avail-

able from Radio Shack and other sources. This IC was chosen because of its availability and low cost. The speech processor has a table of sounds called *allophones*, which are selected by the microcomputer program. By joining the proper allophones, sounds resembling human speech can be created.

#### Tone Generator

An XR2206 function generator (U7) is used as a tone generator. This IC is capable of producing a sine-wave output signal. U6, a 741 op amp configured as an inverter, causes the audio-frequency output of U7 to increase in frequency with an increase of meter voltage (output power). Pin 8 of U7 is internally biased at +3 V, and the IC's frequency output varies linearly with the current drawn from this pin. Therefore, when the meter voltage increases, the output of U6 decreases, causing more current to be drawn from pin 8; this increases the output frequency of the tone.

D1 ensures that the voltage at the junction of R22 and R23 does not go more

negative than  $-0.6$ . Such a situation would cause a current drain from pin 8 of U7 that would exceed its 3 mA limit. R19 is used to adjust the tone frequency to a low growl when the wattmeter reads 0 W; this occurs when the voltage at pin 6 of U6 is approximately +2.7.

#### Audio Amplifier

U4, an LM386, acts as the audio amplifier. This amplifier is used for both the VOICE and TONE modes. Audio is routed to U4 through S1, the VOICE/TONE selection switch. R28, the VOLUME control, is used to adjust the audio-output level.

#### Power Supply

See Fig 5. Three voltage levels are needed for the Orator circuit: +12,  $-12$  and +5. U8, the 5-V regulator, requires a heat sink because of its heavy load. U9 and U10, the positive and negative 12-V regulators, respectively, supply little current and do not require heat sinks.

#### Construction

For those who want to make their own PC board, a PC-board template and parts overlay are shown in Figs 6 and 7. PC boards, parts kits and preprogrammed 68701s are available.<sup>1</sup>

Four jumpers are required on this single-sided board. I recommend using sockets for all ICs. There is sufficient room on the board to accommodate the heat sink for the +5 V regulator in a horizontal position (see Fig 1).

In the prototype shown, S3, the ON/OFF switch, mounts at the rear of R28. (You can, however, use a separate toggle switch if you desire.) Use shielded wire between the PC board and R28, S1 and the speaker, LS1. Also use shielded wire between the analog wattmeter and the Orator's input jack, J1.

The Orator should be enclosed in a metal cabinet to help shield the circuit from RFI. If a low-profile cabinet is used to house the Orator, you can place your wattmeter on top of it.

#### Checkout and Adjustments

Once you've completed stuffing the board, but *before installing the ICs*, it's a good idea to check the power supply voltages. Check for  $-12$  V at U5 pin 4, +12 V at U5 pin 7 and +5 V at U2 pin 7. If these voltages are present, turn off the power supply and install the ICs; *be careful to orient them correctly!*

<sup>1</sup>Contact Hal-Tronix Inc, 12671 Dix Toledo Hwy, Southgate, MI 48195, tel 313-281-7773. Orator kit, voice version (less case), \$79.95; CW version (less case), \$69.95. (Both kits include the PC board and programmed 68701 microprocessor.) Programmed 68701 only, \$14.95; PC board only, \$12.95. Please include \$5 for postage and handling on all orders. The ARRL and QST in no way warrant this offer.

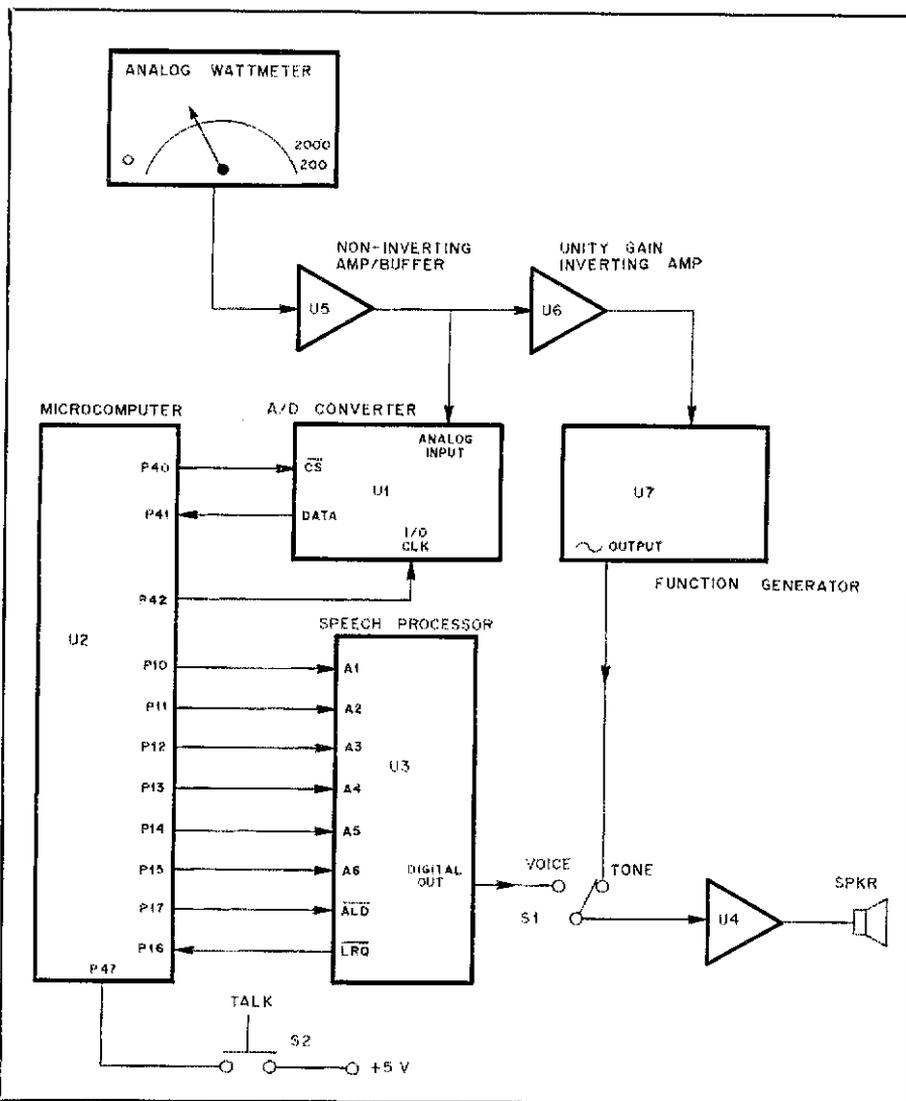


Fig 2—Block diagram of the talking wattmeter. Refer to text.

Use an accurate voltmeter when making the following adjustments; almost any accurate digital voltmeter should provide the required resolution.

- Turn on the Orator and set R28 to mid scale
- Adjust R13 to obtain +2.56 V at U1, pin 1.
- Ground pin 3 of U5, and adjust R16 until the voltage at U5, pin 6, reads 0.00.
- With pin 3 of U5 still grounded, move S1 to the TONE position and adjust R19 until the audio frequency output from the speaker is a low growl. The voltage at U6, pin 6, should be about +2.7 V when this adjustment is correctly made.
- Now, move S1 to the VOICE position and with pin 3 of U5 still grounded, push S2 (TALK); the Orator should say *zero watts*.

#### Connecting the Orator to Your Wattmeter

Find a point in your wattmeter that provides a level of less than +2.5 V when reading full scale. This point should deliver

a voltage level proportional to the meter scale in both forward and reverse directions. In most cases, if it's absolutely necessary, you can connect the Orator directly across the meter terminals, but the voltage at that point will likely require a lot of amplification.

Connect the center conductor of the interconnecting cable to the voltage source, and connect the cable shield to the wattmeter common point (usually ground). The other end of the cable connects to the Orator at J1. Turn on your transmitter. With a dummy load connected to the transmitter, set the transmitter output power at 55 W, as read on your wattmeter. Then, adjust R15 until the Orator says *55 watts*. (At this time, the voltage at U5 pin 6 should be +1.28.) When making this adjustment, you can use other output power levels in lieu of 55 W so long as you pick the corresponding voltage level and speech processor words from those given in Table 1. To ensure the Orator is not affecting the wattmeter circuit, disconnect the interconnecting cable and check to see that the

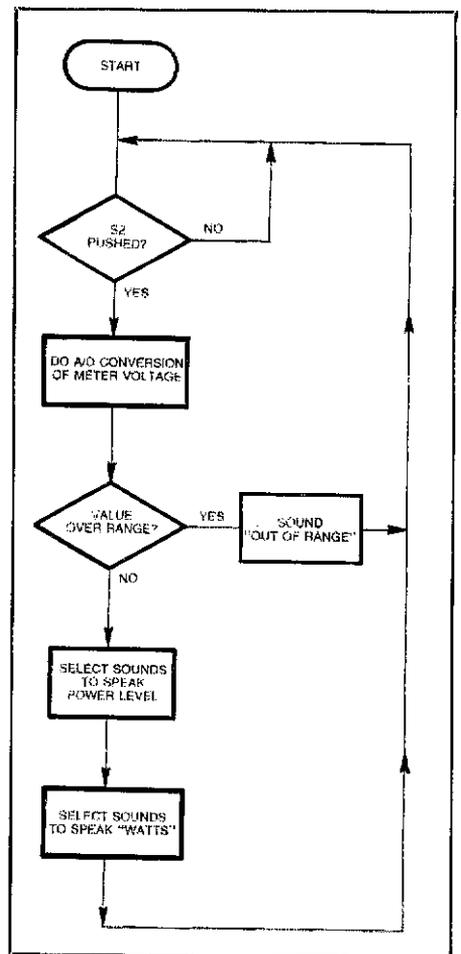


Fig 3—Flow chart of the microcomputer program used to drive the speech processor.

wattmeter reading remains the same.

From here on, the Orator should track the wattmeter. Also, the tone-generator output should generate a higher-frequency tone as the output power increases.

#### CW Option

I've written a program that will sound the power-output level in Morse code. The CW version has 98 steps, from 0 to 212 watts. With this option, you don't need U3, Y2, C4-C8 (inclusive), R7 and R8. C8 is replaced with a 220-Ω resistor, and a jumper is installed between R9 and U2, pin 13. The same calibration procedure given earlier is followed, but now, the voice output is replaced by Morse code at a tone frequency of 775 Hz. The CW speed is fixed at the time the microcomputer is programmed, so you must specify the code speed you prefer when you order the programmed IC.

#### Summary

The speech processor does not have a high-quality voice. For this application, however, it is adequate. Slightly better voice quality can be obtained by using a 3.12-MHz crystal (instead of the

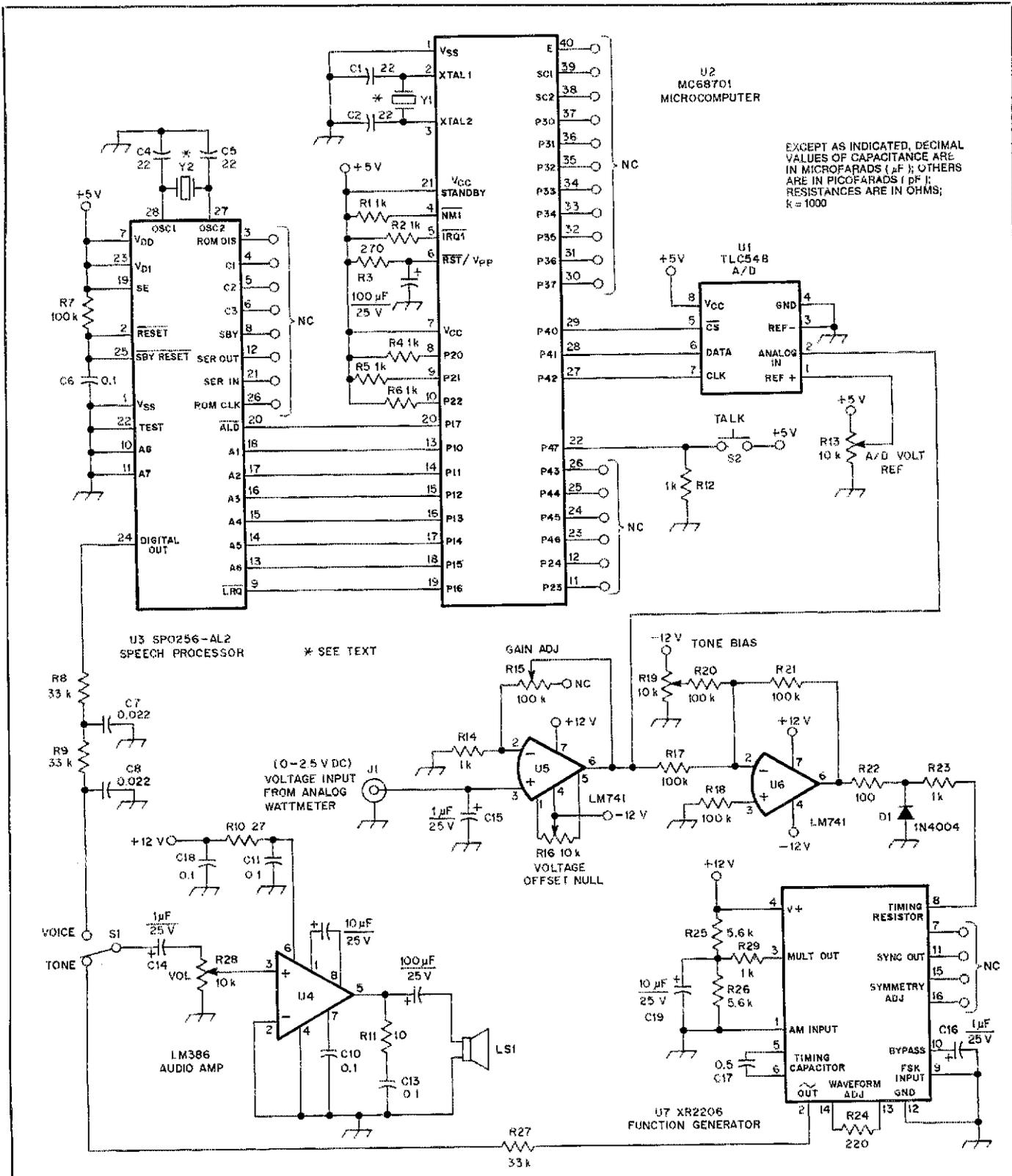


Fig 4—Schematic diagram of the Orator. PC boards, programmed EPROMs and kits are available from Hal-Tronix (see note 1). Many parts for this project can be obtained from your local Radio Shack store or Jameco Electronics, 1355 Shoreway Rd, Belmont, CA 94002, tel 415-592-8097. (RS numbers in parentheses are Radio Shack stock numbers.)

J1—Phono connector (RS 274-346).

LS1—8- $\Omega$  speaker (RS 40-245).

R13, R16, R19—10-k $\Omega$  trimmer (RS 271-1343).

R15—100-k $\Omega$  trimmer (Jameco).

R28—10-k $\Omega$  panel-mount (RS 271-1721).

Note: S3 of Fig 5 mounts on the rear of this control.

S1—SPDT toggle (RS 275-625).

S2—SPST push button (RS 275-1547).

U1—TLC548 serial A/D converter (RS 276-1796).

U2—MC68701 microprocessor (Jameco). (Programmed 68701s can be obtained from Hal-Tronix; see note 1.)

U3—SP0256AL2 speech processor (RS 276-1784).

U4—LM386 audio amplifier (RS 276-1731).

U5, U6—LM741 op amp (RS 276-007).

U7—XR2206 function generator (Jameco).

Y1, Y2—3.58-MHz color-burst crystal (see text).

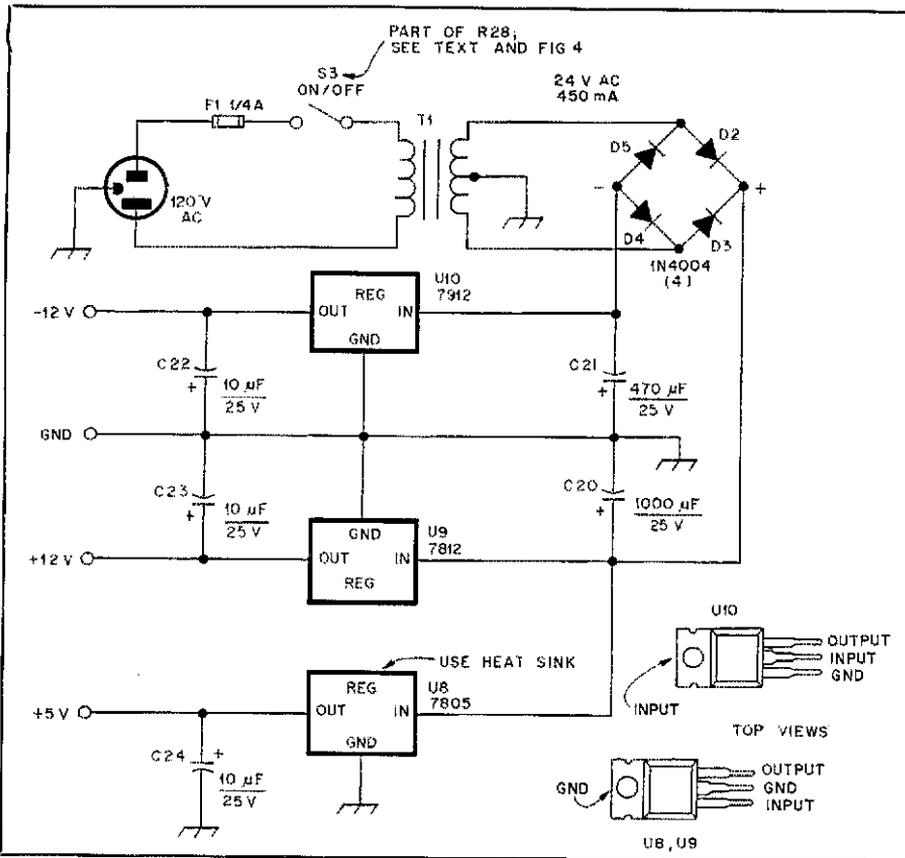


Fig 5—Schematic diagram of the power supply. (RS numbers in parentheses are Radio Shack stock numbers)  
 D2-D5, incl—1N4004.  
 F1— $\frac{1}{4}$ -A fuse (RS 270-1270).  
 S3—SPST (RS 271-1740) mounted on rear of R28; see text and Fig 4.  
 T1—120-V pri; 24-V CT, 450 mA sec (RS 273-1366).  
 U8—7805 positive 5-V, 1-A regulator (RS 276-1770; equip this IC with a heat sink such as an RS 276-1363).  
 U9—7812 positive 12-V, 1-A regulator (RS 276-1771).  
 U10—7912 negative 12-V, 1.5-A regulator (Jameco).

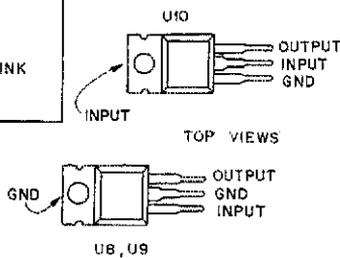
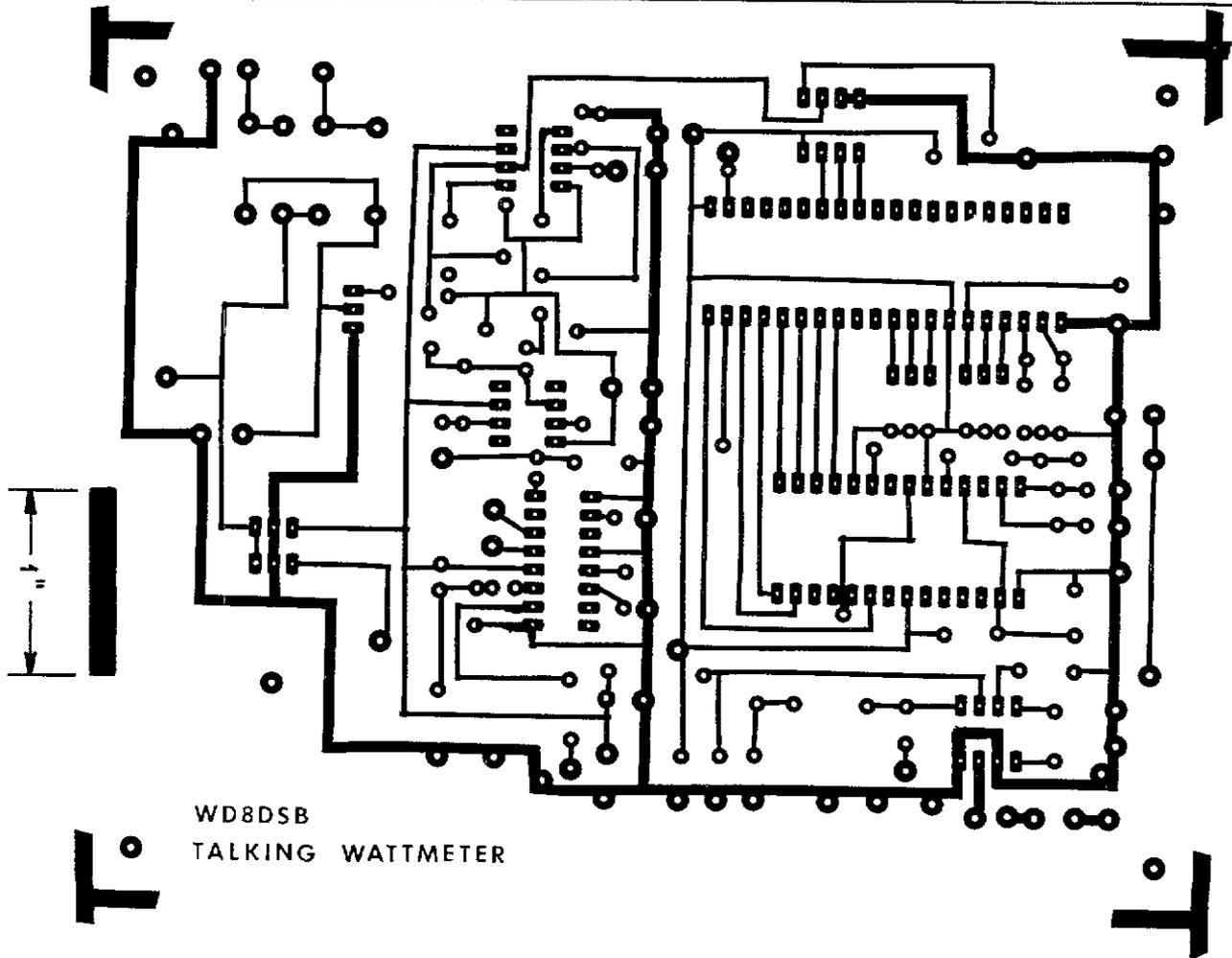


Fig 6—Circuit-board etching pattern for the Orator. The pattern is shown full-size from the foil side of the board. Black areas represent unetched copper foil.



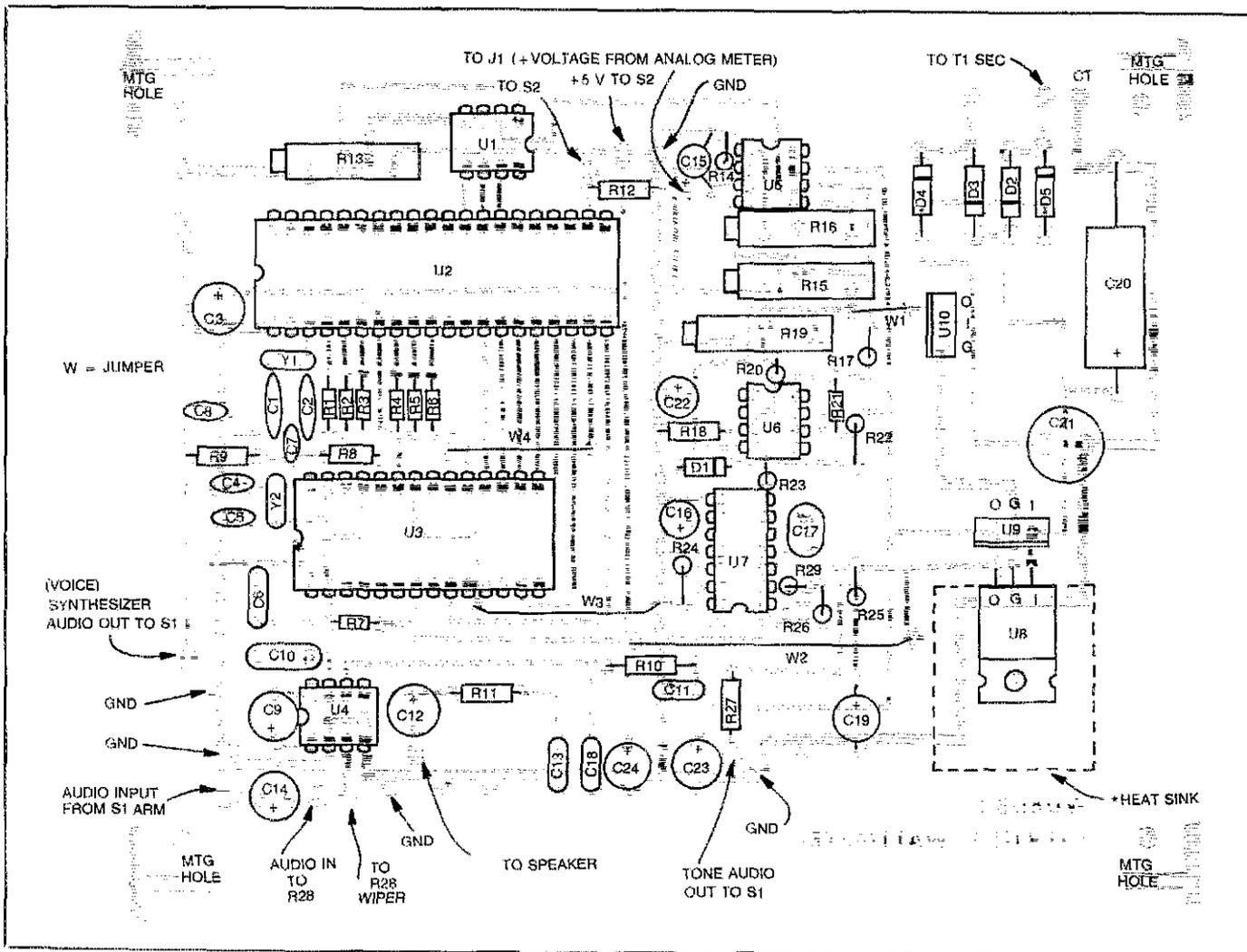


Fig 7—Parts-placement guide for the Orator. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern.

3.579-MHz crystal) at Y2 as recommended by the IC manufacturer. Whether or not the increase in speech quality is worth the additional cost (color-burst crystals are inexpensive—some free for the taking!) is something you'll have to decide.

Stan, K8SB, and I designed the circuit consisting of U4, U5, U6 and U7 as a stand-alone tuning aid that can be powered by two 9-V batteries. You can assemble that circuit by itself and place it across the meter movement of virtually any meter to provide an audio tuning aid.

The talking wattmeter circuit is nothing more than a voltage-measuring device connected to a speech processor through a microcomputer IC, and coupled to an audio-tone generator. Therefore, this circuit can be used in many other applications by changing the program that resides in the microcomputer's EPROM. Some ideas that come to mind include a talking voltmeter, talking rotator-position indicator and talking thermometer—the applications are practically endless. If you have a specific interest in using the Orator for another application, I welcome your ideas and will

consider writing the program for that application. Please include an SASE for replies.

#### Acknowledgments

I'd like to thank Stan Briggs, K8SB, for sharing a wealth of knowledge, reviewing this manuscript with his wife Ruth, WB8AFO, and for being such a great friend. Thanks also to Phillip Irish, who allowed me to use his design of an MC68701 EPROM burner for this project. Finally, thanks to Lowell Miller, W8QIY, for putting the original circuit through many hours of on-the-air testing.

#### APPENDIX

All the analog wattmeters I've tested have a meter voltage that is related to the power level by the following function:

$$P = V^2/K$$

where

- P = power
- V = meter voltage
- K = a constant

For the microcomputer reference table, I used

an arbitrary constant (K) equal to 0.03, then calculated the power level for steps of 0.08 V. When connected to a meter with a different K value, the voltage level at a particular power level is different. (After using the Orator with several different wattmeters, the chosen constant has proved to be satisfactory.)

The voltage level that the microcomputer associates with a particular power level, divided by the actual meter voltage for that same power level, is equal to the amount the actual meter voltage must be multiplied by to match the microcomputer reference voltages. This is done electronically by using R15 to adjust the amount of input amplifier gain.

Don Kirk was first licensed in 1976 at the age of 16. He currently holds an Amateur Extra Class license and a General Radiotelephone license. Don received an Associate of Applied Science degree from Henry Ford Community College (Dearborn, Michigan) in 1983. He followed this up by earning a Bachelor of Engineering Technology degree from Wayne State University in 1985.

For the past two years, Don has been employed by the Delco-Remy Division of General Motors. He is a controls engineer at Magnequench, a facility that manufactures high-energy-producing neodymium permanent magnets.

# New Products at Dayton

The new-product information on this page was largely gathered at the 1988 Dayton HamVention®. Although not all the products shown were actually announced at the HamVention, that's where many of them were presented to the public for the first time.

## KENWOOD TM-621A AND TH-55AT FM TRANSCEIVERS

Kenwood's TM-621A is the first VHF FM mobile transceiver on the amateur market that covers both the 144- and 220-MHz amateur bands. The rig is functionally identical to the TM-721A dual-band 144- and 440-MHz rig. Features of the '621A include 45 W output on 2 meters, 25 W output on the 220-MHz band, full-duplex cross-band communications capability, simultaneous dual-band receiving capability (including selectable balance between bands), automatic band changing—ABC (in which mode the rig automatically switches the sub-band information into the main VFO when a signal is present on the sub-band). Other features include 14 memory channels plus one CALL channel per band, memory storage of frequency, transmit offset and sub-audible tone, built-in transmit-offset selection based on the ARRL band plans, and extended receiver coverage (138 to 173.995 MHz and 215 to 229.995 MHz). The '621A provides three scanning functions on each band: full-band scan, memory-channel scan and programmable band scan (in which the upper and lower scanning limits are stored in memories A and B).

Kenwood has also added another transceiver to their line of FM hand-helds. The TH-55AT is similar in operation to the TH-25AT and -45AT 2-meter and 440-MHz rigs, except for frequency coverage and power output. The '55AT covers 1258 to 1300 MHz, and delivers 1 W of RF output (for any supply voltage between 7.2 and 13.8). Accessories for the TH-25AT and -45AT are compatible with the TH-55AT (except, of course, for antennas and other frequency-specific components). Features of the TH-25AT, -45AT and -55AT hand-held rigs include 14 memories (for storage of frequency, repeater offset, subaudible tone and CTCSS information), automatic shut-off after 59 minutes of unattended operation, a power-saving circuit, memory- and band-scanning functions, direct VFO loading from memory, 1-MHz step

capability and an on-demand illuminated, top-mounted liquid-crystal function display. Supplied accessories include the 600-mAh PB-6 NiCd battery pack, matching charger, a belt hook, a flexible antenna, a wrist strap and dust caps for the external speaker/mike connectors.

The TM-621A and TH-55AT are available through Kenwood dealers. For more information, contact Kenwood USA Corp, Communications and Test Equipment Group, PO Box 22745, 2201 E Dominguez St, Long Beach, CA 90801-5745.

## CMOS CADET KEYS

Lance Johnson Engineering, of Elizabeth, Colorado, introduced the CMOS-Cadet Keyer, model CC-1. The CC-1 is a gated-oscillator design that is battery operated and draws only 10  $\mu$ A when in standby mode. Iambic operation, fixed 3:1 dash-to-dot weighting, a speed range of 4 to 40 WPM, positive- and negative-polarity transmitter keying and a handy TUNE function are among the included features. No sidetone generator is included in the CC-1. The CMOS-Cadet Keyer comes with all necessary cables. Price: \$49.95 plus shipping. Available from Lance Johnson Engineering, PO Box 1047, Elizabeth, CO 80107.

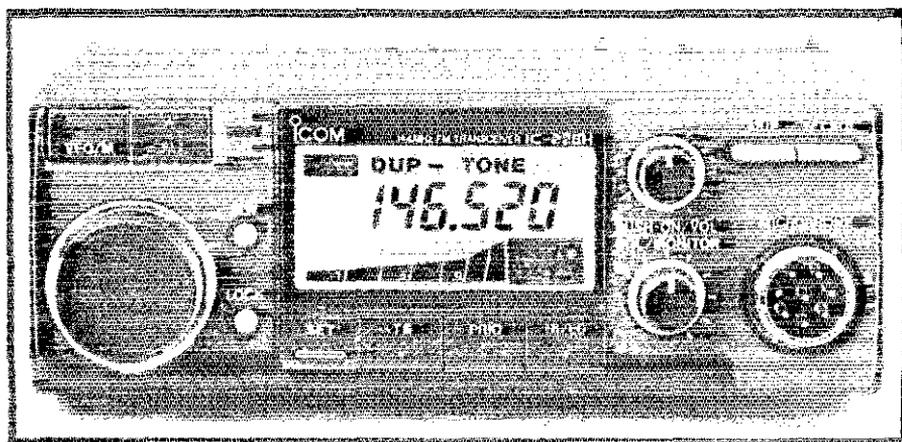
## ICOM 2-METER FM MOBILE TRANSCEIVERS

ICOM introduced the IC-228A and -228H FM mobile transceivers at Dayton. Both rigs are functionally identical except in power output: the 228A has a 25-W transmitter, and the 228H has a 45-W version. Common features include

receiving coverage from 138 to 174 MHz, a multi-color (orange, red and green) liquid-crystal display, 20 memory channels (with lock-out capability), programmable band scan and memory scan modes, and a priority watch function that alerts you to activity on a chosen frequency while you're operating elsewhere. An optional tone-squelch unit (the UT-40), which allows receiver operation like that of a pager, is available. ICOM's suggested retail prices for the IC-228A and -228H are \$509 and \$539, respectively. For more information, contact ICOM America, Inc, 2380 116th Ave, PO Box C-90029, Bellevue, WA, 98009-9029, tel 206-454-8155.

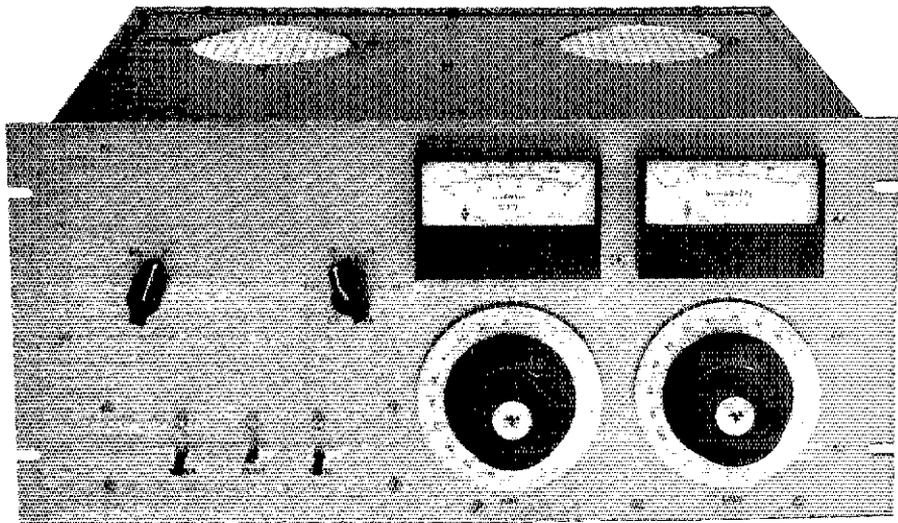
## CIRE ELECTRONICS VOICE KEYS

Eight-message storage capability and serial-port computer control are two of the features of the CIRE Electronics model TH-1V Voice-Keyer. Total message storage time is 22 seconds, and is soft sector for distribution among as many as eight messages. (Message-storage time can be upped to 27.5 seconds, if desired, with some decrease in audio quality.) Audio input to the TH-1V is via a high-impedance microphone connection. The manufacturer claims an output-audio bandwidth of 200 to 2800 Hz, and a 40-dB signal-to-noise ratio. Output is either microphone level or line level (switch selectable). Control interface to the TH-1V is via serial RS-232-C at 1200 bit/s, and supply requirements are 9 V dc at 60 mA. For more information, contact CIRE Electronics, 521 Leicester, Plymouth, MI 48170, tel 313-455-3202.—Rus Healy, NJ2L



# A Low-Drive, Grounded-Grid 3CX800A7 Amplifier

Here's an amplifier that many of you have been looking for! Break the "100-W exciter" barrier in style: one tube, six bands and 750 W output with less than 25 W of drive!



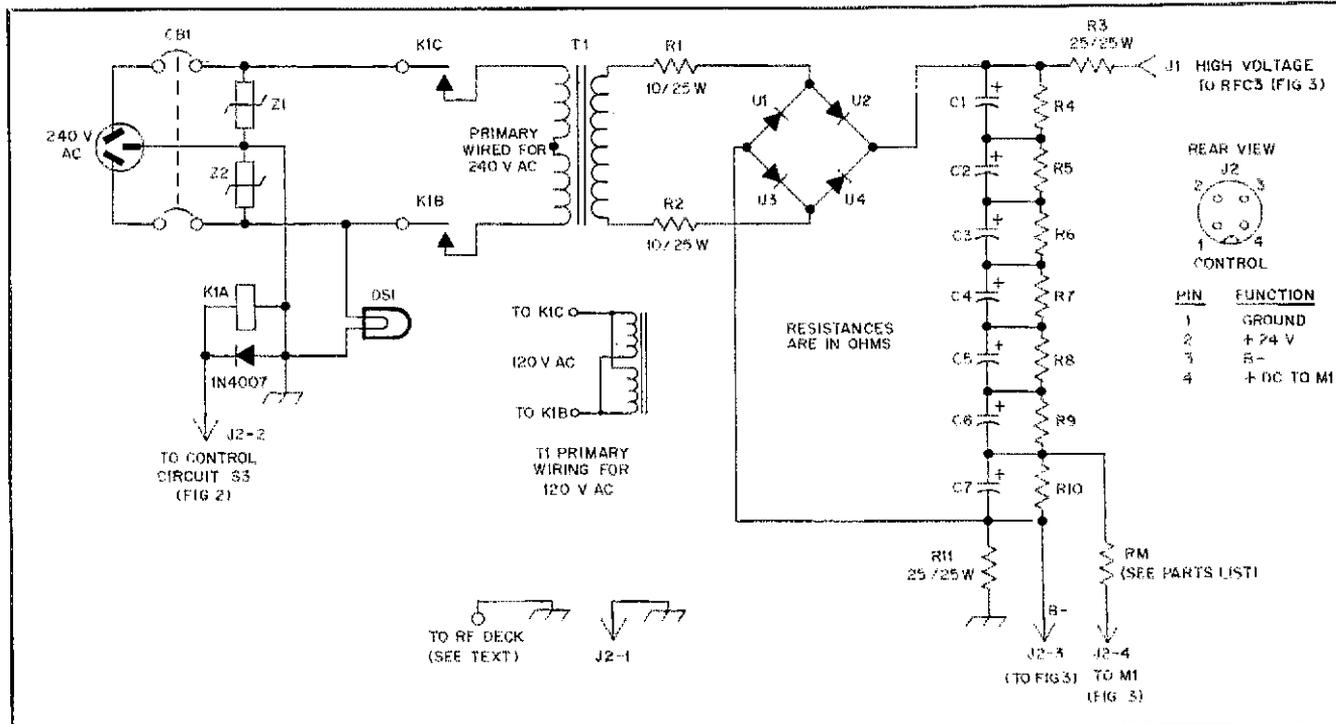
By Dick Stevens, W1QWJ  
Bolton Rd, PO Box 118  
Ashuelot, NH 03441

**W**ould you like to own an amplifier that you can drive easily with a low-power exciter? Do you operate RTTY and have to settle for low power output from your transceiver

(because of RTTY's 100% duty cycle) while wishing for more? Want to boost your CW or SSB signal power? Do you find QRP operation thrilling, but today you want to (or have to) QRO and can't do it? I see a lot of heads nodding *YES!* Okay, here's the amplifier you've been looking for!

FCC technical standard Section 97.77(d)(6)(i) put a clamp on the marketing of commercially made 1-kW-class amplifiers that could be driven by an exciter delivering less than 50 W. Commercial (and many homemade) amplifiers today are

designed to operate with 100-W output exciters. There are a few older, low-drive amplifiers available on the used-equipment market, but most of them are roughly 30 years old. Some of those older amplifiers use tubes that are hard—or darn near impossible—to obtain today. The tubes may be quite expensive, too, costing as much as their more modern counterparts. Also, some of these amplifiers have power supplies that can be used only on 120-V lines; no 240-V primary is provided. So, what do you do if you want a low-drive



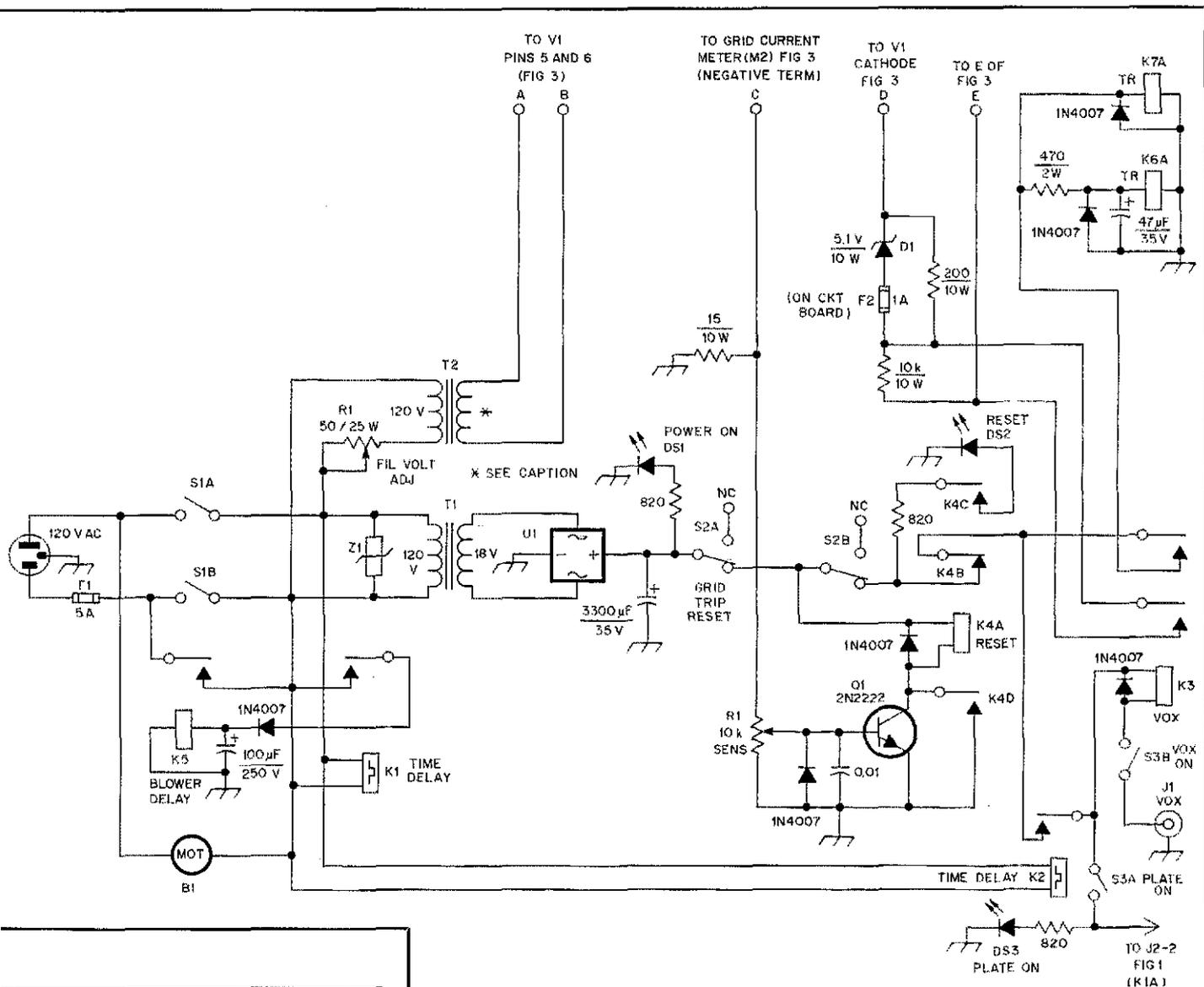


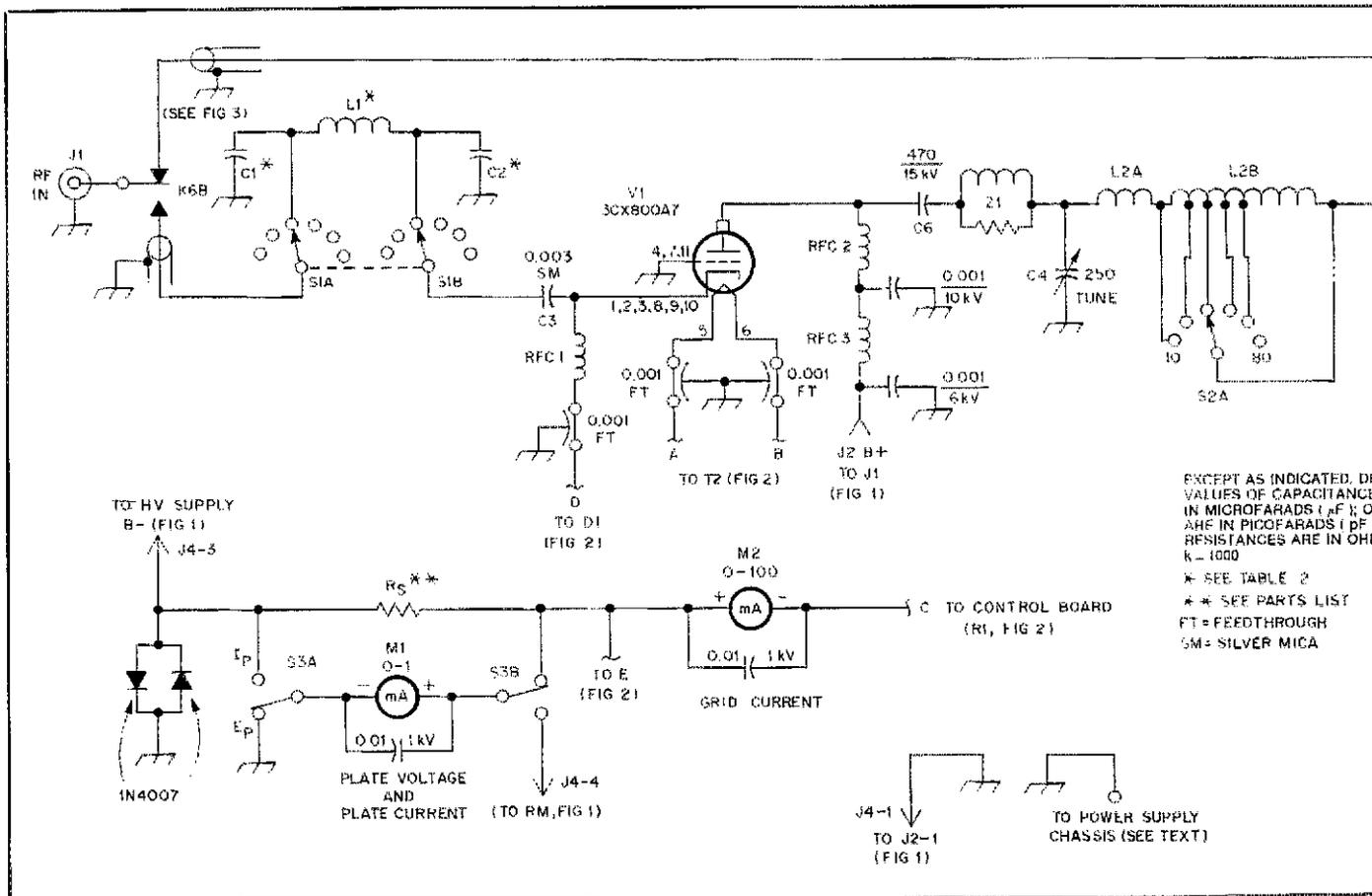
Fig 1—Schematic diagram of the high-voltage power supply. The inset shows how to wire T1's primary for operation from 120-V ac lines. (Equivalent parts can be substituted.)

- C1-C7—320  $\mu$ F, 450-V electrolytic (Mallory CGS321T 450 V3C or equiv).  
 CB1—DPST, 125-V, 15-A contacts (Airtax T21-8124).  
 DS1—Neon pilot lamp, 120 V (Radio Shack 272-704).  
 J1—High-voltage connector (Millen 37001 or equiv).  
 J2—4-pin male chassis mount socket (Radio Shack 274-002).  
 K1—DPST, 25-A contacts, 120-V coil (Potter & Brumfield PR7AYO). (See text.)  
 R1, R2—10  $\Omega$ , 25 W.  
 R3, R11—25  $\Omega$ , 25 W.  
 R4-R10—25 k $\Omega$ , 25 W.  
 RM—Shunt to allow M1 (Fig 3) to read 3 kV full scale; value depends on the resistance of the basic meter movement used at M1.  
 T1—High-voltage transformer; 120/240-V dual primary, 1700-V, 0.6-A secondary (Avator Magnetics AV-449).  
 U1-U4—K2AW HV 14-1 rectifier assembly.  
 Z1, Z2—MOV (Radio Shack 276-568 or SKMV130J).

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS ( $\mu$ F); OTHERS ARE IN PICOFARADS (pF); RESISTANCES ARE IN OHMS; K=1000

Fig 2—Schematic diagram of the control board, relay and heater voltage supplies. The heater transformer is mounted in the amplifier enclosure in the sub-chassis supporting the control board and input network/amplifier tube enclosure. Adjust R1 to provide the proper heater voltage (13.5 V) measured at the pins of V1. (Equivalent parts can be substituted.)

- B1—Blower (Dayton 4C012A).  
 D1—5.1-V, 10-W Zener.  
 DS1—Green LED (POWER).  
 DS2—Yellow LED (RESET).  
 DS3—Red LED (PLATE).  
 F1—5 A.  
 F2—1 A (mounted on circuit board).  
 J1—Phono jack.  
 J2—4-pin male chassis-mount socket (Radio Shack 274-002).  
 K1—Amperite 115NO69 time delay relay.  
 K2—Amperite 115NO180 time delay relay.  
 K3, K4—4PDT, 24 V dc coil (P & B KH4703-2 or equiv). (Only two poles of K3 and three poles of K4 used.)  
 K5—DPDT, 24 V dc coil.  
 K6, K7—Dow Key 60-2304, 26.5 V dc coil, UHF connectors.  
 R1—50- $\Omega$ , 25-W adjustable resistor, slider type.  
 S1—DPDT (ON/OFF).  
 S2—DPDT (GRID TRIP RESET).  
 S3—DPDT (PLATE ON/VOX ON).  
 T1—120-V primary; secondary 18 V, 2 A.  
 T2—120-V primary; secondary 14 V CT, 2 A.  
 U1—50-PIV, 4-A bridge rectifier.  
 Z1—MOV (Radio Shack 276-568 or SKMV130J).



EXCEPT AS INDICATED, ALL VALUES OF CAPACITANCE IN MICROFARADS (μF); OF RESISTANCES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.  
 \* SEE TABLE 2  
 \*\* SEE PARTS LIST  
 FT = FEEDTHROUGH  
 SM = SILVER MICA

Fig 3—Schematic diagram of the low-drive 3CX800A7 amplifier. (Equivalent parts can be substituted.)

- C1, C2—See Table 3.
- C4—250 pF, 3500-V air variable (Cardwell 154-9-1).
- C5—1000 pF, 1500-V air variable (Cardwell 154-30-1).
- C6—470 pF, 15-kV (Sprague 715C-Z or equiv).
- J1, J3—SO-239.
- J2—High-voltage connector (Millen 37001 or equiv).
- L1—See Table 3.
- L2A—7 turns of 1/8-inch diam copper tubing, 1 1/2 inch ID.
- L2B—15 turns of B & W 2406A coil stock. Tapped (from L2A end) at 1 turn for 12 m, 2 turns for 15 m, 4 turns for 20 m,

- 8 turns for 40 m, and 15 turns for 80 m.
- L3—11 turns B & W 1411A coil stock. Tapped (from L2B end) at 1 1/2 turns for 10 and 12 m, 1 3/4 turns for 15 m, 2 turns for 20 m, 6 turns for 40 m, and 11 turns for 80 m.
- M1—0-1 mA meter with suitable shunt resistor (RS).
- M2—0-100 mA meter with suitable multiplier resistor (RM).
- RFC1—100 μH (Radio Shack 273-102 or equiv).
- RFC2—85 μH; 37 turns no. 22 enam wire on a 1-in. diam Delrin® form.
- RFC3—Ohmite Z-50 or 14 turns no. 18 enam wire, 1/4-inch ID, air core.

- RFC4—2.5 mH, 100 mA.
- RS—Meter shunt to allow M1 to read 1 A full-scale. Value of RS depends on meter used for M1.
- S1—Centralab 2551.
- S2—Radio Switch Corp model RSC 86; 60-degree index, 2 sections, 6 positions per section.
- S3—DPDT toggle switch.
- V1—Eimac 3CX800A7 high-mu power triode.
- Z1—2 turns of no. 14 bare wire in parallel with two paralleled 91-Ω, 2-W resistors.
- Misc.—Eimac SK-1900 socket for V1, two Jackson 4-inch, 2-ball dial drives (4489/C).

amplifier, but can't buy a new one or don't want to take a chance with an older one? You *build* one, like I did.

### General Description

In this amplifier, a 3CX800A7 is employed in a grounded-grid circuit. This tube and circuit arrangement offer some advantages over others. The grounded-grid circuit is simple and stable. No screen-grid power supplies are needed. The tube has low drive-power requirements; a nominal drive power of only 20 W (depending on the frequency of operation) will easily produce 750 W of RF output. See Table 1.

Such a low drive-power requirement has many benefits. For instance, 100-W output transceivers operating at a 100% duty cycle

in the continuous-duty modes (such as RTTY) may be run at a low-power level, thus ensuring component longevity. (Remember, these transceivers were designed for use primarily on SSB and CW, which have shorter duty cycles than RTTY.) Also, the amplifier can be driven by a QRP rig when the need arises. Driving powers of as little as 5 W will produce a respectable amount of RF output from this amplifier. ARRL Lab measurements show this amplifier—operating at 14.2 MHz—will produce RF power output levels of 220, 440, 575 and 700 W for driving powers of 5, 10, 15 and 20 W, respectively. Like the sound of that?

### Circuit Description

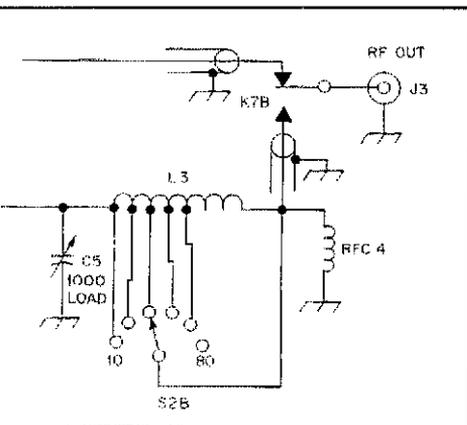
This amplifier is composed of two main

sections: the high-voltage power supply and the RF deck. The RF deck houses the control circuitry for overall control of the amplifier and high-voltage power supply.

The schematic diagram of the power supply is shown in Fig 1. Figs 2 and 3 are the schematic diagrams of the heater supply and control circuits, and RF section, respectively.

### Power Supply

The power supply (see Fig 1) uses a full-wave bridge circuit to develop the 2200 V at 500 mA the 3CX800A7 requires. With circuit breaker CB1 closed, DS1 illuminates when ac power is available at the power supply chassis. Z1 and Z2 are transient suppressors, used to lessen the possibility of



**Table 1**

**Typical 3CX800A7 Low-Drive Amplifier Operating Characteristics for 750 W Output**

Band	Driving Power (W)	Input SWR
80	22.6	1.46
40	18.7	1.68
20	23.1	1.3
15	20.2	1.0
12	20.2	1.78
10	22.4	1.6

**Table 2**

**Input Coil Data**

Band (Meters)	L1 ( $\mu$ H)	C1, C2 (pF)	J. W. Miller Part No. (L1)
80	2.07	820	4306
40	1.18	430	4305
20	0.59	210	4303
15	0.39	150	4302
12	0.35	120	4302
10	0.30	100	4302

**Table 3**

**Parts Suppliers**

Ronald C. Williams, W9JVF (aka Avatar Magnetics), 1408 W Edgewood Ave, Indianapolis, IN 46217-3618, tel 317-783-1211.

W. W. Grainger, Inc, 5959 West Howard St, Chicago, IL 60648, tel 800-323-0620; in Illinois, 800-225-7149.

K2AW's Silicon Alley, 175 Friends Ln, Westbury, NY 11590, tel 516-334-7024.

RadioKit, PO Box 973-C, Pelham, NH 03076, tel 603-635-2235.

damage to power-supply components from ac-line transients. Power-supply turn-on is controlled by K1, which receives its control voltage from the control-circuit chassis located in the RF deck. (Although the relay specified has a 120 V ac coil, it works without fault from the 24 V dc supply.)

To ensure good voltage regulation, the primary of T1 is operated from a 240 V ac

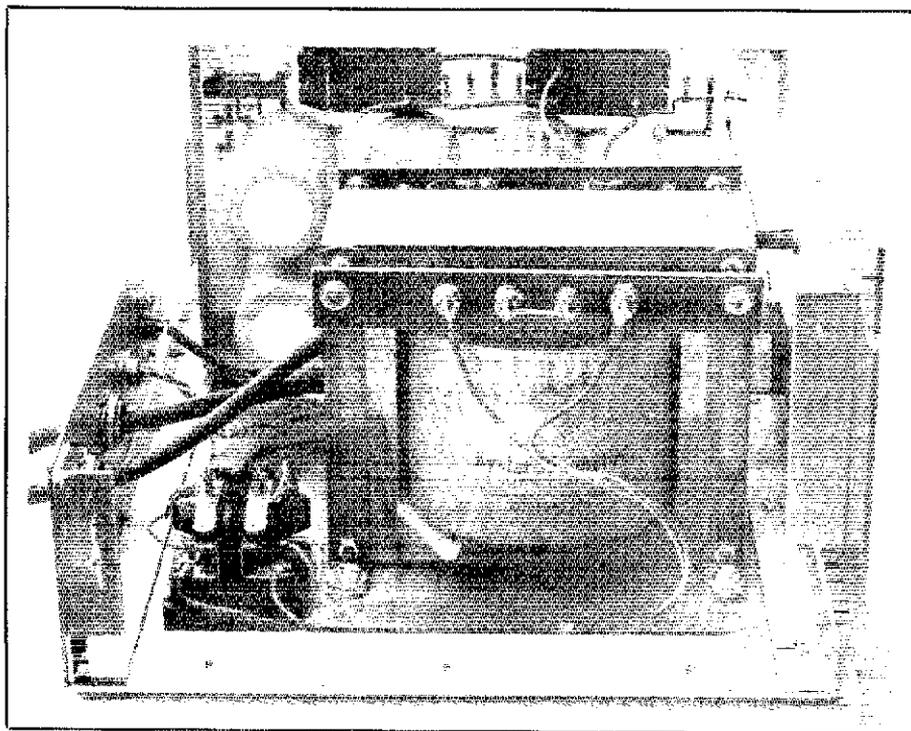


Fig 4—Inside view of the power supply. To the left is the heavy-duty relay in the high-voltage transformer primary. The circuit breaker (ON/OFF) switch is attached to the front panel (on the right in this photo) along with the power on indicator. Behind the power transformer, the filter capacitor string and rectifier assemblies (the two black modules at the top of the PC board) can be seen. The voltage-equalizing resistors across the filter capacitors are mounted on the back of the PC board. Both secondary-winding surge resistors are secured to a phenolic strip at the rear of the power transformer. This strip is similar to the one you can see mounted across the top of the power transformer primary side, to which the primary voltage lines from the relay are attached.

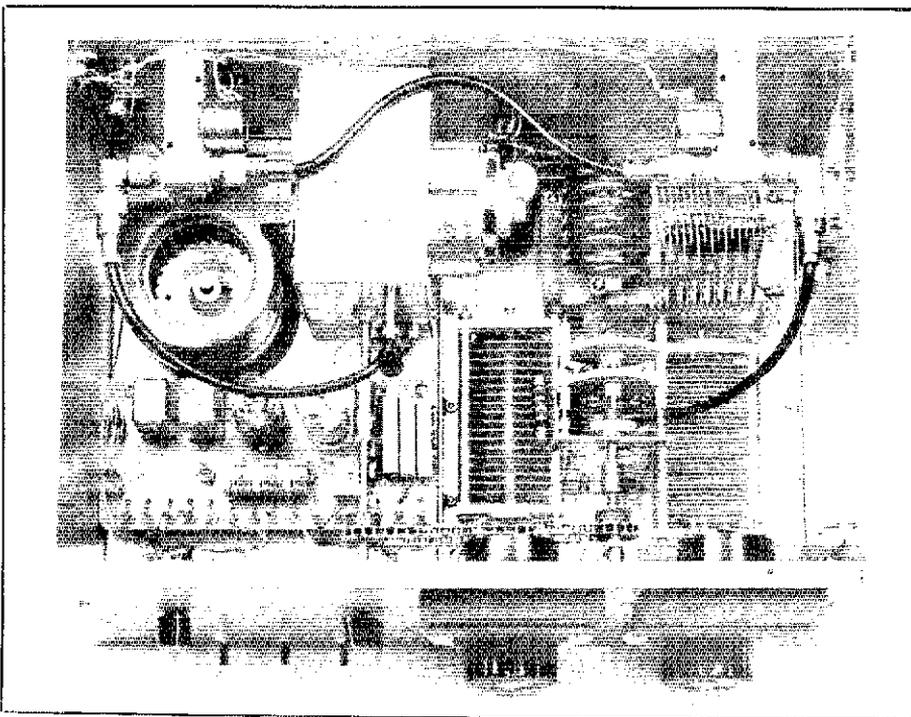


Fig 5—An inside view of the amplifier. On the chassis base, proceeding clockwise from the bottom left, are the bias and time-delay board, blower, input network enclosure and tube, pi-L output tank, LOAD capacitor, band switch and TUNE capacitor. Above the blower and output tank you can see the TR relays. The chain drive linking the band switch shaft (attached directly to the input-network switch shaft) to the output tank switch is immediately behind the left-hand (PLATE/HV) meter.

line. (The inset in Fig 1 shows how to connect T1's primary if operation from a 120-V line is necessary.) Two surge resistors (R1 and R2) are installed in T1's secondary leads. These resistors serve to protect the bridge rectifier assemblies (U1-U4) from the high initial current surge that results when ac voltage is applied to T1, and the filter capacitor string charges.

The high-voltage filter capacitor is made up of a series string of equal-value electrolytic capacitors shunted by voltage-equalizing resistors. The total filter capacitance is approximately 45  $\mu$ F. With a 3150-V dc rating for the string, there's a more-than-adequate safety margin.

Plate voltage is measured as the voltage drop across the bottommost electrolytic capacitor in the string. The value of RM, the high-voltage meter multiplier resistor, depends on the basic meter movement of M1 of Fig 3. R11 serves to keep the B-lead of the supply near ground potential and provide a means of safely monitoring the plate current.

High voltage from the power supply is made available to the RF deck at J1. J2 is a 4-pin microphone jack pressed into service as a control-cable connector. A duplicate connector exists on the RF deck. A ground connection, +24 V to operate K1 and the B- and high-voltage monitoring leads are run through a 4-conductor cable connected between the two jacks. An inside view of the high-voltage supply is shown in Fig 4.

### Control Circuits

The control-circuit components of Fig 2 are mounted on a piece of fiberglass board secured to the top of a small subchassis at the left-hand side of the RF deck (see Fig 5). A 120 V ac line enters the rear of the RF deck (see Fig 6) and enters the subchassis inside which T1 and T2 are mounted. This 120-V line feeds the control-circuit power supply and the heater transformer for the final amplifier tube.

Because the 3CX800A7 has an indirectly heated cathode, it must be protected from the application of RF drive before the cathode reaches operating temperature. The time-delay circuits in this amplifier provide this insurance and also ensure that the tube cooling fan remains running for some time after the amplifier is turned off. A grid-current sensing circuit is included to shut down the amplifier if V1's grid current exceeds a preset value (50 mA, maximum). These features protect the tube from an early demise. The cost of a few relays is cheap insurance for a 3CX800A7!

S2 (GRID TRIP RESET) is normally closed and K4 deactivated. When the amplifier ON/OFF switch (S1) is closed, the start-up cycle begins. The cooling fan (B1) moves air across the base and through the anode-cooling fins of the tube, the +24-V power supply comes to life, heater voltage is fed to the final amplifier tube (V1) and K1 and

K2 begin their timing cycles. Until K2 finishes its timing cycle, plate voltage cannot be applied to V1—even with S3 closed or the transmitter's VOX relay contacts closed. The plate supply ON/OFF switch (S3) provides a path in series with the VOX control lead to prevent keying the amplifier without plate voltage applied.

Once K1 and K2 have closed, closing the PLATE ON/VOX ON switch (S3) will supply +24 V to K1 in the high-voltage power supply. That allows plate voltage to be applied to V1.

When the transmitter's VOX relay contacts close, K3 is activated through J1. One set of K3's contacts activate K6 and K7, the input and output TR relays. The other contacts remove cutoff bias from V1 and allow operating bias (supplied by D1) to be applied to V1.

K5's sole purpose is to keep the cooling fan running for a while after S1 is opened. Initially, K1 was employed to control B1. During testing, I noticed considerable arcing between the contacts of K1 as they opened. The arcing was excessive and would have destroyed the relay in time. I revised the circuit by adding an auxiliary relay (K5) to operate on dc; that cleared up the problem.

At the beginning of the start-up cycle, when K1's contacts close, operating voltage is fed to K5. As long as K1's contacts remain closed, voltage is fed to K5's coil. When S1 is opened to shut off the amplifier, that voltage is removed. However, the capacitor across K5's coil retains sufficient charge to hold K5 closed for a short period; this keeps the cooling fan running until the capacitor across K5's coil discharges sufficiently to de-energize K5.

Q1, K4 and their associated components provide protection against excessive grid current in V1. When the grid current exceeds 50 mA, Q1 conducts and energizes K4. DS2 (RESET) is lit, plate voltage is removed from V1 and the VOX line is disabled. K4 is latched until drive is removed and S2 is operated.

### RF Circuits

Refer to Fig 3. RF input from the exciter is applied to J1. If K6 and K7 are de-energized, the RF is routed around the amplifier and passed directly to the amplifier output at J3. When the VOX circuit is activated, K6 and K7 are energized. K7 will close before K6 because of the capacitor connected across K6's coil (see Fig 2), which causes a short time delay. This delay ensures a load is connected to the amplifier tube before RF drive is applied. With K6 and K7 energized, RF drive is applied to V1's cathode through a pi-network input circuit tailored for each band. (See Table 2 for L and C data.) Input-network coil Q is approximately 2; this is broad enough to ensure coverage of each band without adjustment. The input and output networks

are switched simultaneously by the BAND switch.

A pi-L network is used in the output circuit of the amplifier. This network is slightly more difficult to build than a standard pi network, and requires the use of a two-section switch, but the additional 15 dB of harmonic suppression the pi-L network offers makes the effort worthwhile.

### Metering

M1 can be switched to read plate voltage or plate current. A 0-1 mA meter is used at M1. Resistive shunts RS and RM are chosen to provide full scale readings of 1 A and 3 kV, respectively. M2, a 0-100 mA meter, continually monitors grid current.

### Construction

Table 3 contains a list of suppliers for some of the parts used in this amplifier. Certainly, there are several ways of attacking the mechanical construction of this amplifier. There's no need to follow exactly the procedure I've chosen, but a brief description is in order.

A Bud AU-1029 utility cabinet houses the input circuit. This box also provides a mount for the tube and cooling fan. The 3CX800A7 is mounted horizontally on one of the 4  $\times$  5-inch box covers. The blower is attached to the other cover. Input network coils are mounted on a small piece of circuit board secured to the 3  $\times$  5-inch top surface of the box.

When wiring V1's socket, I strapped pins 4 and 7 together, then connected pin 11 to 7, finally grounding pin 7. Similarly, pins 1 and 8, 2 and 9 and 3 and 10 were joined. The RF drive is applied to the center of the three intersecting pin-pair connections.

A chain-driven band switch simultaneously switches the input and output networks. Therefore, the input and output band switches must have the same indexing. In this amplifier, switches with 60-degree indexing are used.

If you intend to use a chain-driven band-switching arrangement as I've done, be careful not to make the chain drive too tight. There must be a small amount of slack in the chain to allow the detents to operate. If the chain drive is too tight, it will be difficult to determine if the switches have sequenced properly.

Amplifier control circuits are wired "dead-bug" fashion on a piece of circuit board. An isolated-pad drill is used to make the required wiring points. This style of circuit-board construction has fallen out of favor with some constructors, but it is simple and effective.

### Tune-up and Operation

Check the power supply and RF deck carefully to ensure there are no short circuits. To avoid possible component damage, the dielectric of the high-voltage supply electrolytic capacitors should be "formed" the first time the power supply

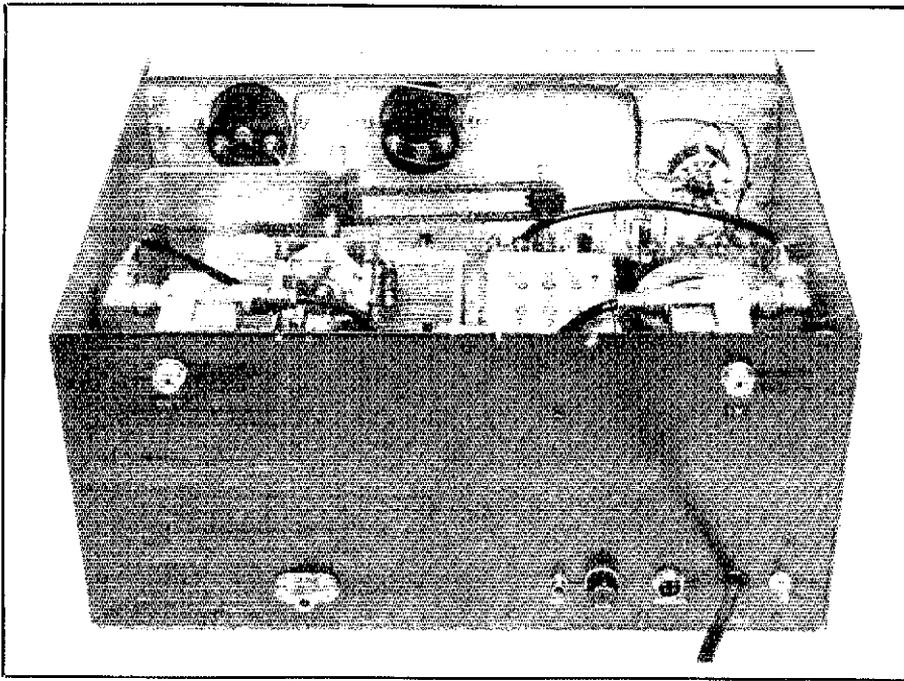


Fig 6—Rear panel of the low-drive amplifier. At the top are the two SO-239 input (IN) and output (OUT) connectors. The high voltage is connected to the amplifier through the jack at the lower-left of the panel. To the right of that jack is the vox phono jack, control/bias board fuse holder, 4-pin CONTROL jack (a commonly used microphone connector), the line cord and the ground lug. The bracket mounted to the left-hand panel behind the meter provides additional support for the output tank switch shaft and the chain drive.

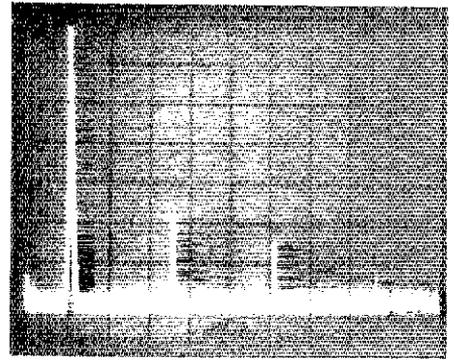


Fig 7—Worst-case spectral display of the 3CX800A7 amplifier. Horizontal divisions are each 10 MHz; vertical divisions are each 10 dB. Output power is 750 W at 24.9 MHz. All harmonics and spurious emissions are at least 47 dB below peak fundamental output.

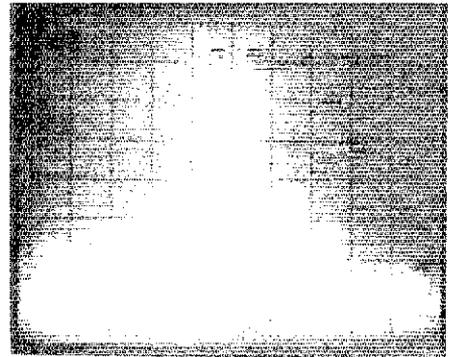


Fig 8—Spectral display of the 3CX800A7 amplifier during two-tone intermodulation distortion (IMD) testing. The amplifier is operating at 750 W PEP output at 14.2 MHz. Horizontal divisions are each 2 kHz; vertical divisions are each 10 dB. Third-order products are approximately 42 dB below PEP output, and fifth-order products are approximately 51 dB down.

is turned on. To do this, use a variable transformer (such as a Variac®) on the primary side of the power transformer. Slowly increase the voltage fed to the transformer primary. This gradual application of voltage forms the dielectric of the capacitors.

With the high voltage off and the amplifier tube out of its socket, ensure the control circuits function correctly. Next, with V1 in its socket, check for proper heater voltage at the tube socket pins, adjusting R1 as required. That done, remove power from the RF deck and connect the high-voltage supply to the RF deck. For safety, connect the chassis of the power supply and RF deck together with a length of braid or stranded wire.

Attach the output of a 40- to 50-W output exciter through a wattmeter to the amplifier input jack. (CAUTION! Don't attempt to drive this amplifier with the full output of your 100-W [or more] exciter. Maximum drive required should not exceed 40 W.) Place a second wattmeter in the line between the amplifier output and a suitable dummy load. Close the power-supply circuit breaker and the RF deck RESET switch and turn the POWER switch on. Heater power will be applied and the blower should start. After approximately three minutes, the high-voltage power supply will turn on. With S3 switched to allow M1 to read plate current, press the transceiver PTT switch. A resting plate current of

approximately 15 mA should be indicated by M1.

With 10 to 20 watts of drive applied, adjust the TUNE and LOAD controls until the grid-current meter indicates 50 mA. Adjust R1, the grid-trip SENSITIVITY control, until the circuit activates. Reset the circuit and check the grid current trip point.

Apply about 10 watts of drive and adjust the input-network coil slugs for lowest SWR at the center of each band. That done, gradually increase the drive while adjusting the TUNE and LOAD controls for maximum power output. ARRL Lab spectral analysis showed that tuning for maximum power output coincides with maximum spurious-signal attenuation. (You'll find the setting of the LOAD capacitor in the pi-L output circuit to be more critical than that of a conventional pi network.) Maximum power output depends on the amount of driving power available. The photos in Figs 7 and 8 show worst-case and two-tone IMD spectral displays.

### Summary

This amplifier has proved itself to be a good performer. Others, including avid contesters, who've used this amplifier have commented on how much they enjoyed it. If you're looking for an easy-to-drive amplifier—one with cruise control and power steering—this one'll make you smile!

## Strays

I would like to get in touch with...

anyone with a service manual/schematic for an AM-COMM S-225 2-meter transceiver. Cary Altman, WBØOIZ, 816-254-5926 (collect) or at 64050 via packet.

anyone having documentation on the Mountain Computer's A/D+D/A card and/or the Apple Clock (or "The Clock") peripheral cards for an Apple® II computer. Alex Vrenios, KX9I, 507 Pleasure Dr, Mundelein, IL 60060.

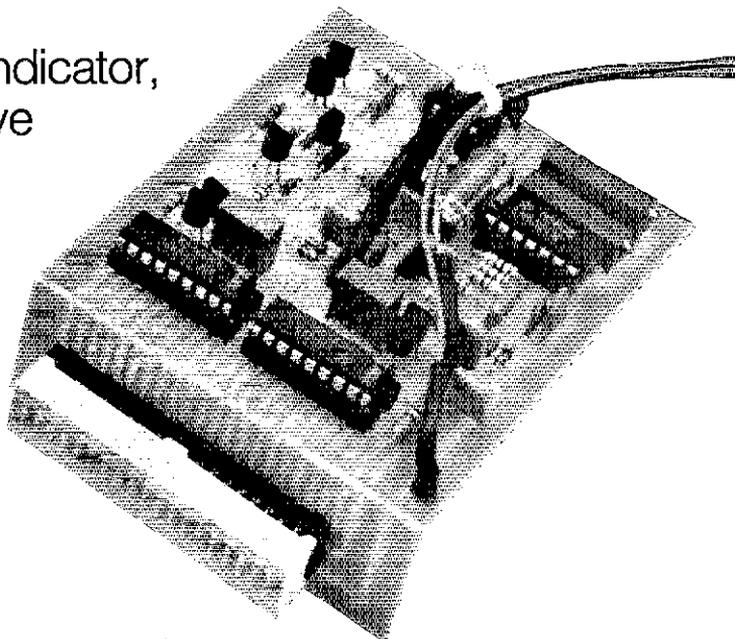
anyone who has connected a Commodore 64 to a Radio Shack® monitor Model #1 using a Kantronics Interface and CW RTTY floppy disk program. Roland Gibson, 551 Charlemagne Blvd, Naples, FL 33926.

# A Simple Tuning Indicator

If your modem lacks a tuning indicator, this unit may be just what you've been looking for! It's the perfect mate to the Cheap n' Easy Modem.

By Tom Miller, NK1P  
ARRL Lab Technician

and Ed Hare, KA1CV  
ARRL Lab Engineer



Received RTTY signals must be tuned in correctly for a modem to function properly. Experienced operators can usually tune in a signal by ear, but those of us who are new to RTTY (or those who are tone deaf) often need some help to get the audio tones exactly right. A visual indication of proper tuning is a big help.

The tuning indicator we're about to describe is compact and inexpensive. Though designed to be part of the Cheap n' Easy Modem described last month,<sup>1</sup> it can be adapted to work with other modems, requiring only a source of audio and  $\pm 12$  V at 100 mA.

## Circuit Description

The schematic diagram of the tuning indicator is shown in Fig 1. Incoming audio is fed to U1, an LM565 PLL. This IC produces a square-wave output signal, which is locked to the input frequency. U1's output is applied to U2, an NE555 timer. At U2, R12 and C12 create a time window outside of which there is no output from U2. The output of U2 consists of variable-width negative-going pulses with widths proportional to the input frequency. These pulses are fed to Q7.

U1's output is also applied to Q6. C14 charges (through Q6 and R10) during the more negative part of the square-wave output cycle. The time that C14 is allowed to charge is inversely proportional to the frequency of the applied square wave, so the peak voltage across C14 is inversely proportional to the incoming frequency.

Q8 and Q9 form a sample-and-hold cir-

cuit that samples the voltage on C14 at the moment of peak charge and stores the sample in C15.

U3 and U4 are LM3914 dot/bar LED drivers. The threshold and range of the drivers are adjusted by means of R19 and R20. The voltage across C15 is fed to this circuit, which lights one of 20 LEDs contained in the combination of DS1 and DS2. Which LED is lit is determined by the frequency of the incoming signal; mark and space tones light specific LEDs. The receiver is properly tuned when the two illuminated LEDs are spaced equally from the center of the display.

Q1 through Q5 form a visual squelch circuit. Q1 is biased slightly below cutoff. When the voltage level of the incoming signal reaches 50 mV (typical), Q1 begins to conduct, amplifying the incoming signal. D1 and D2 rectify the signal voltage, and the dc output from these diodes is used to switch on the Darlington pairs, Q2-Q3 and Q4-Q5. These transistor pairs are connected to the REFERENCE OUTPUT control pins of the LM3914 drivers to control display brightness. The LEDs are off when there is no input signal present. R1's value can be tailored to change the sensitivity of the squelch circuit. Increasing the value of R1 will make Q1 less sensitive.

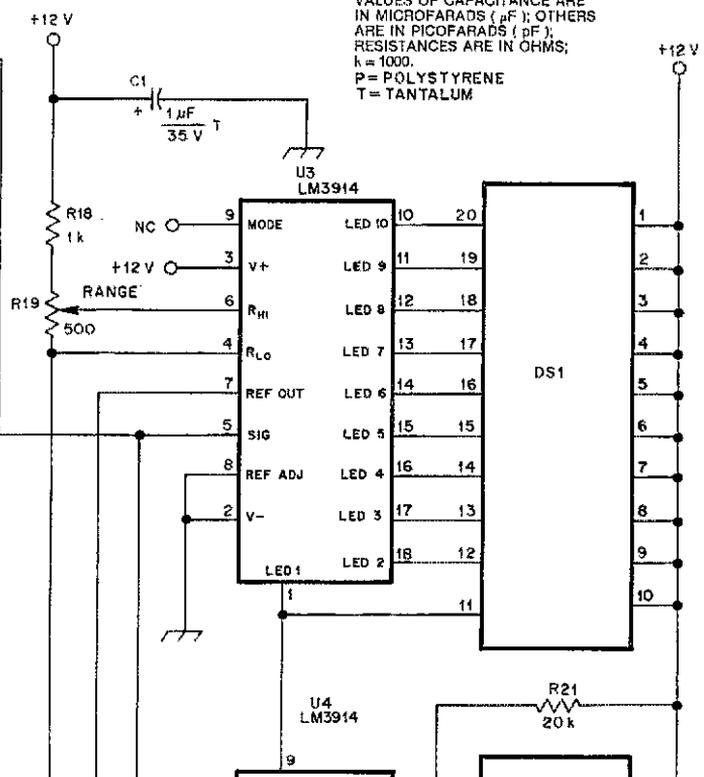
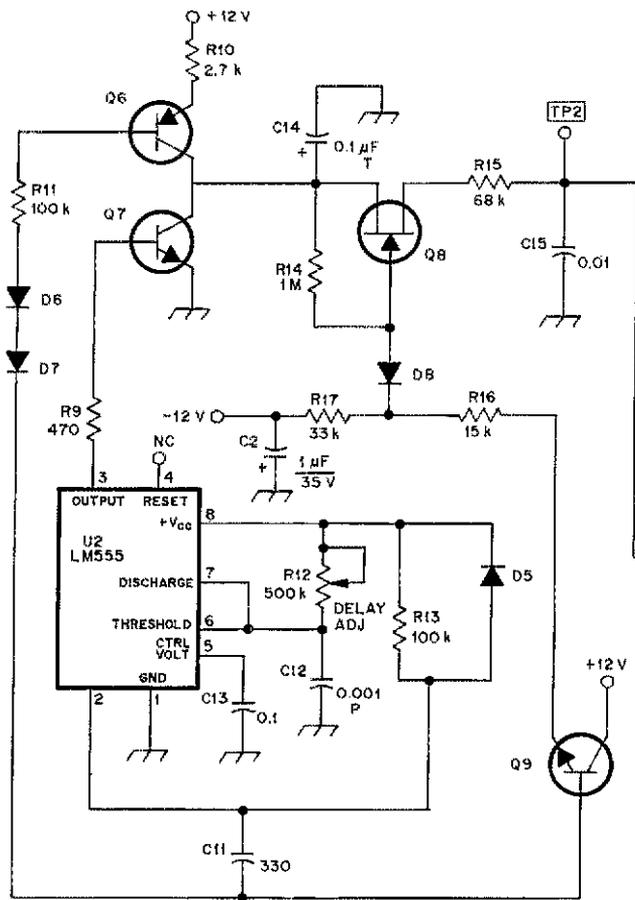
## Construction

Figs 2 and 3 show the PCB etching pattern and parts overlay, respectively. In Fig 4, you can see the tuning indicator mounted in the Cheap n' Easy modem

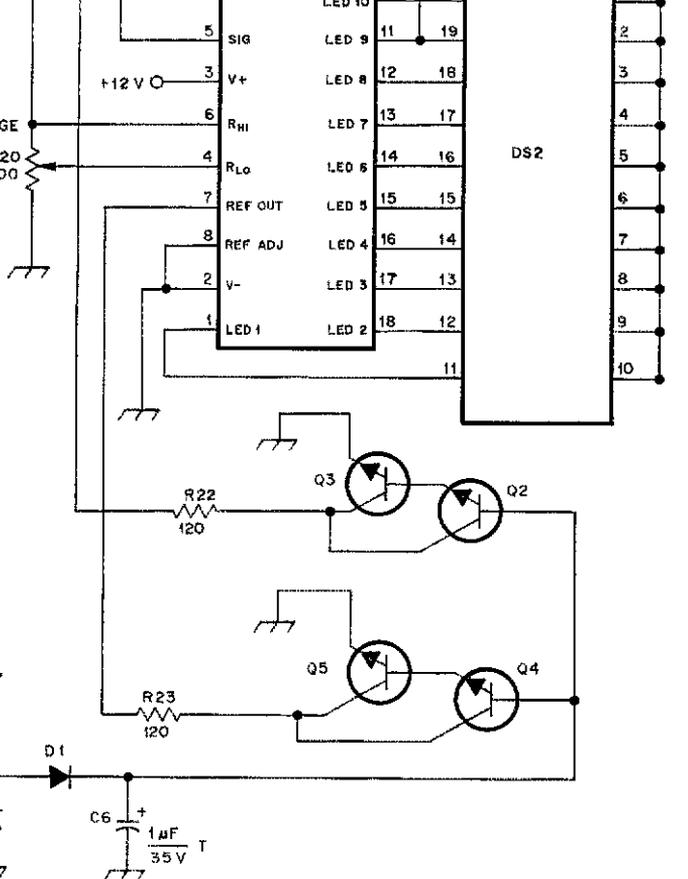
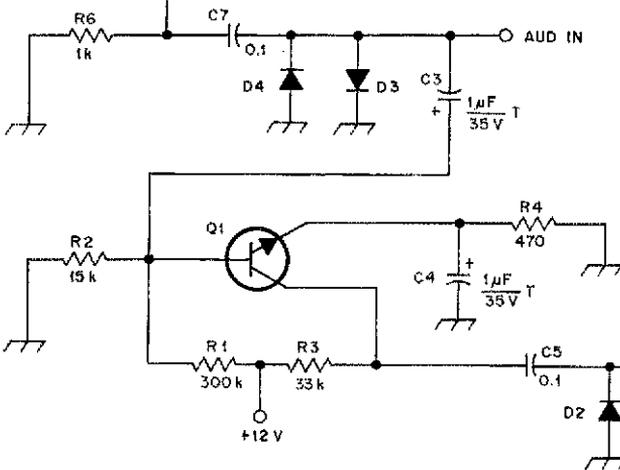
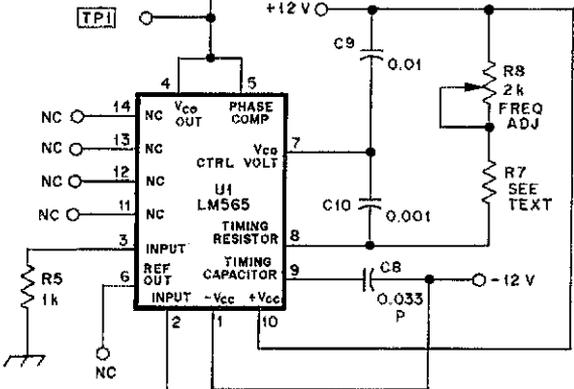
described last month. The PCB is designed to allow you to use several different methods to mount the LEDs. For instance, you may detach the LED section from the rest of the board (at the point marked by the arrow in Fig 3), then use ribbon cable for the interconnections. Or, the LED mounting area can also be soldered to the main board at a right angle; this method is shown in the title photo and in Fig 5. Remember to cut the LED section of the board from the main board

Fig 1—Schematic diagram of the LED tuning indicator. All resistors are 1/4-W, 5% tolerance unless otherwise noted. Capacitors can be ceramic or electrolytic types. If electrolytics are used, observe polarity as shown. (Note: Equivalent parts may be substituted.)  
C8—0.033  $\mu$ F polystyrene.  
C12—0.001  $\mu$ F polystyrene.  
C14—0.1  $\mu$ F tantalum.  
D1-D8—1N914 silicon diode.  
DS1, DS2—Dot/bar LED display (Radio Shack 276-081 or equiv).  
Q1-Q5, Q7, Q9—2N3904.  
Q6—2N3906.  
Q8—2N5484.  
R7—See text.  
R8—2-k $\Omega$ , 10-turn trimmer.  
R12—500-k $\Omega$  10-turn trimmer.  
R19, R20—500- $\Omega$ , 1-turn trimmer.  
U1—LM565 PLL.  
U2—NE555 or LM555 timer.  
U3, U4—LM3914 dot/bar driver.

<sup>1</sup>T. Miller, "Cheap n' Easy Modem," QST, Jun 1988, pp 15-21.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µF); OTHERS ARE IN PICOFARADS (pF); RESISTANCES ARE IN OHMS; k = 1000; P = POLYSTYRENE T = TANTALUM



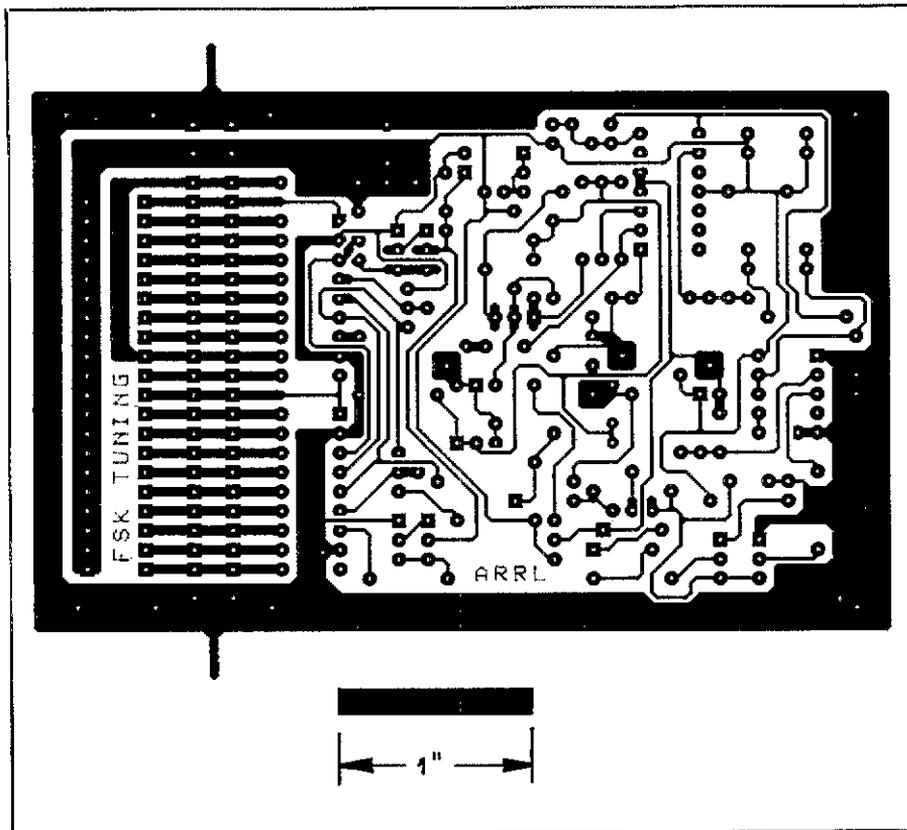


Fig 2—Circuit-board etching pattern for the tuning indicator. The pattern is shown full-size from the foil side of the board. Black areas represent unetched copper foil.

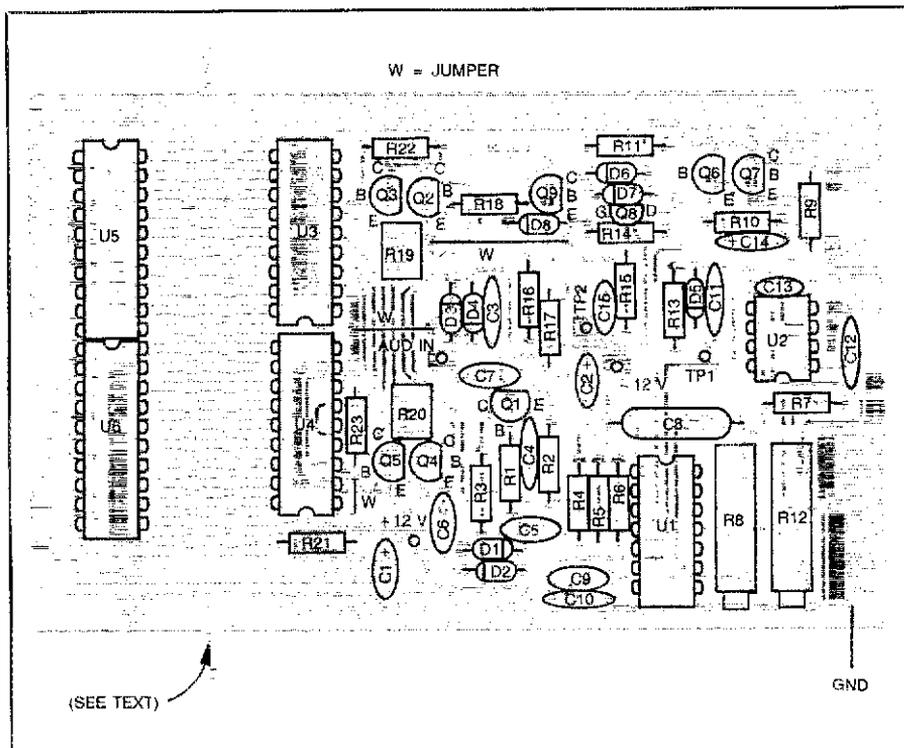


Fig 3—Parts-placement guide for the tuning indicator. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. Note the jumpers (W) required; these should be installed first. The arrow points to the junction at which the board may be separated (see text).

before mounting any components!

In the Cheap n' Easy Modem, the front edge of the tuning display is supported by two screws that pass through the front panel. The bottom edge of the LED panel is secured by these two screws and two spacers. This hardware (use no. 4-40 or 2-56) must be secured to the ground foil that runs around the outer edge of the PC board (see the marked area on the parts overlay in Fig 3). Make sure the hardware does not short to any other trace.

The rear of the display is supported by a spacer soldered to the display circuit-board foil and attached to the modem's rectifier/filter board. (This is the reason for the "extra" hole in that board that we spoke of last month.) Another spacer between the bottom of the rectifier/filter board supports it from the bottom of the enclosure.

All of the capacitor and 10-turn potentiometer mounting areas have extra holes to accommodate components of different sizes and styles. The majority of the capacitors can be ceramic or electrolytic, but C8, C12 and C14 must be high-quality capacitors. We found that polystyrene capacitors worked well for C8 and C12; a tantalum capacitor is used at C14. We used 10-ohm, 1/4-W resistors for the test points, but these could be pieces of bare wire or PC-board pins. Don't forget to install the three wire jumpers (marked W in Fig 3).

### Calibration

The calibration procedures have been tried using the most common tone frequencies and shifts (see Table 1). Note that the value of R7 must be changed for each shift value. This dictates that the tuning indicator must be calibrated for one shift and used only for that shift. An audio-frequency counter, voltmeter and audio oscillator are required to calibrate the tuning indicator.

Adjust R8 and R12 fully counterclockwise. Adjust R19 and R20 to the center of their range. Ensure that the value of R7 is correct for the desired frequency and shift. Apply power to the tuning indicator. Connect the frequency counter to TP1. With no audio signal applied, adjust R8 until the counter reads  $F_0$  (see Table 1).

Connect the voltmeter to TP2. Apply a 1-V signal at  $F_0$  to the input. (Use the frequency counter to aid in adjusting the oscillator to the proper input frequency.) Adjust R12 until the voltmeter reads 2.5 V, then disconnect the voltmeter. One of the LEDs should be lit. If not, try adjusting R19 and R20 until any segment is lit. Once a segment lights, adjust R12 until the segments on DS1 and DS2 either side of center flicker. If none of the segments light, be sure that the displays are installed correctly. We found some discrepancies in the way pin 1 of the LED displays is identified

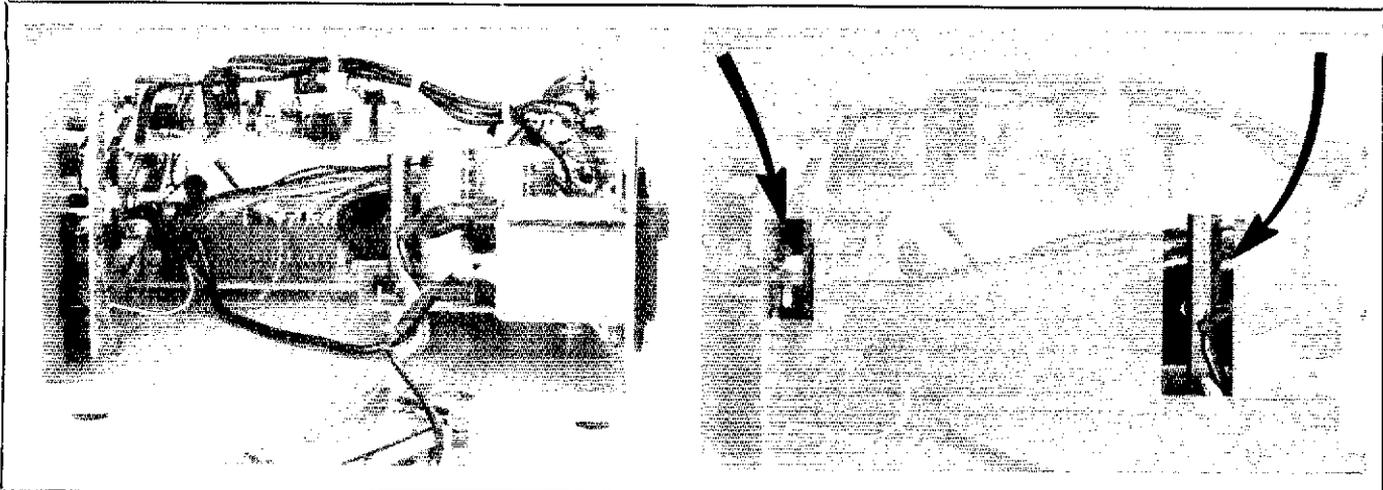


Fig 4—The power transformer of the Cheap n' Easy Modem has been removed to show how the LED tuning indicator is mounted. The arrows indicate the positions of two of the three supporting spacers. A metal spacer attached to the power-supply board supports the rear of the tuning indicator board. Two spacers (only a portion of one is visible here) and mounting hardware secure each side of the board to the front panel.

Table 1  
Tuning Indicator Reference Data

Lo Tone (Hz)	Hi Tone (Hz)	F <sub>o</sub> (Hz)	F <sub>shift</sub> (Hz)	Data Rate (Bauds)	R7 (kilohms)
2125	2295	2210	170	110	3.3
2125	2550	2337.5	425	300	3.3
2125	2975	2550	250	300	2.7
1615	1785	1700	170	110	4.7
1275	1445	1350	170	110	5.6



**QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL**

This month's *QEX* offers you two articles telling you how to generate RF at 902/903 MHz. Also, you'll learn how building audio-frequency LC filters is made even simpler by using standard-value capacitors and inductors! And, if your interests lie in portable operation, you'll want to see how one ham answered his needs with a portable package.

- The June issue of *QEX* includes:
- "A 0.5-W, 903-MHz Amplifier," by Zack Lau, KH6CP
  - "Solid-State Linear Amplifiers for 33 cm," by David Hallidy, KD5RO
  - "Designing LC Filters Using SVC Filter Tables," by Ed Wetherhold, W3NQN
  - "Notes on a Lightweight, Portable CW Transmitter With A Transformerless Power Supply," by Robert Vreeland, W6YBT
  - "Components," by Mark Forbes, KC9C
  - "> 50," by Bill Olson, W3HQT

*QEX* is edited by Paul Rinaldo, W4RI, and is published monthly. The special subscription rate for ARRL/AMSAT members is \$8 for 12 issues; for nonmembers, \$16. There are additional postage surcharges for mailing outside the US; write to Headquarters for details.

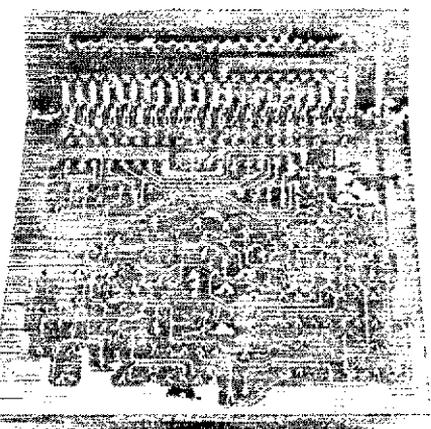


Fig 5—A foil-side view of the tuning indicator board showing how the right-angle joint is made.

by different manufacturers.

Set the audio oscillator frequency to Lo Tone. Adjust R20 until the fifth segment of DS1 is lit. Tune the oscillator to the Hi Tone frequency. Adjust R20 until the fifth segment of DS2 is illuminated. The adjustments of R12, R19 and R20 interact, so it is necessary to repeat the sequence of adjustments until no further improvement can be obtained.

**Summary**

The PC board is designed to be mounted a variety of ways. This should make it easy for you to adapt the tuning indicator for your use. Whether you use this tuning indicator with the Cheap n' Easy Modem, or one of your own design, you'll find it an invaluable aid in correctly tuning RTTY signals.

**Strays** 

**ARE YOU QRV FOR PHASE 3C?**

The newest OSCAR, scheduled to be launched in early June, has communications capability that was unheard of just a few years

ago. Phase 3C features long windows of accessibility and an orbit that reaches nearly 22,000 miles at its highest point (apogee) with the resulting DX potential. This bird has two modes of operation not available to amateurs in the past: Mode S, with 436-MHz uplink and 2401-MHz downlink frequencies; and Mode JL, with 145-MHz and 1290-MHz uplink, and a 435-MHz downlink.

Are you ready for communications on these modes? Why not share your station design with other *QST* readers? We need your technical articles on OSCAR! *QST* pays for feature articles. Please write or call the Technical Department for an author's guide, or send your article to: Technical Editor, *QST*, American Radio Relay League, 225 Main St, Newington, CT 06111, tel 203-666-1541.

# A Multipurpose DTMF Encoder

This encoder uses readily available parts, fits into a handy audio console and is perfect for mobile installations.

By Walter Boller, W9OBG/7  
PO Box 604  
Cheyenne, WY 82003

Having four FM transceivers in one vehicle presents some interesting challenges. I had to find a way to keep track of each microphone; Each has different dual-tone multi-frequency (DTMF) capabilities to access the local repeaters. Rather than use four encoders, I searched the literature for an easier way. I came across the CD22859E, a DTMF tone generator IC manufactured by RCA. Two versions are available: the CD22859E and the SK22859E. I learned that the CD version is the less expensive, selling for \$5 in small quantities, but there is no readily available application information. With

over-the-phone assistance from the technical staff at RCA, the encoder circuit shown in Fig 1 was developed.

## The Encoder Circuit

The CD22859E is easy to work with. It delivers a constant output, supplying voltages from 4 to 13. A simple voltage divider reduces the supply voltage and regulates it. A small capacitor filters the supply for reliable operation.

Parts layout of the encoder circuit is not critical. My DTMF encoder is built on the PC board of a DigiTel™ keypad from a discarded ITT® telephone, but the circuit

can also be fabricated on perfboard. All the original components, except the 3.579-MHz crystal and most circuit traces, were removed from the board. There were ample holes in the board to mount the components, and I made the electrical connections using point-to-point wiring. The board also contained a socket that mated with the DTMF pad. This was left intact. A 16-pin socket was added to accommodate the CD22859E. The CD22859E has the same pinout as the 18-pin chip on the keypad, but because it is a 16-pin device, pins 1 and 18 are not used.

Fig 1 shows two circuits. The left half is

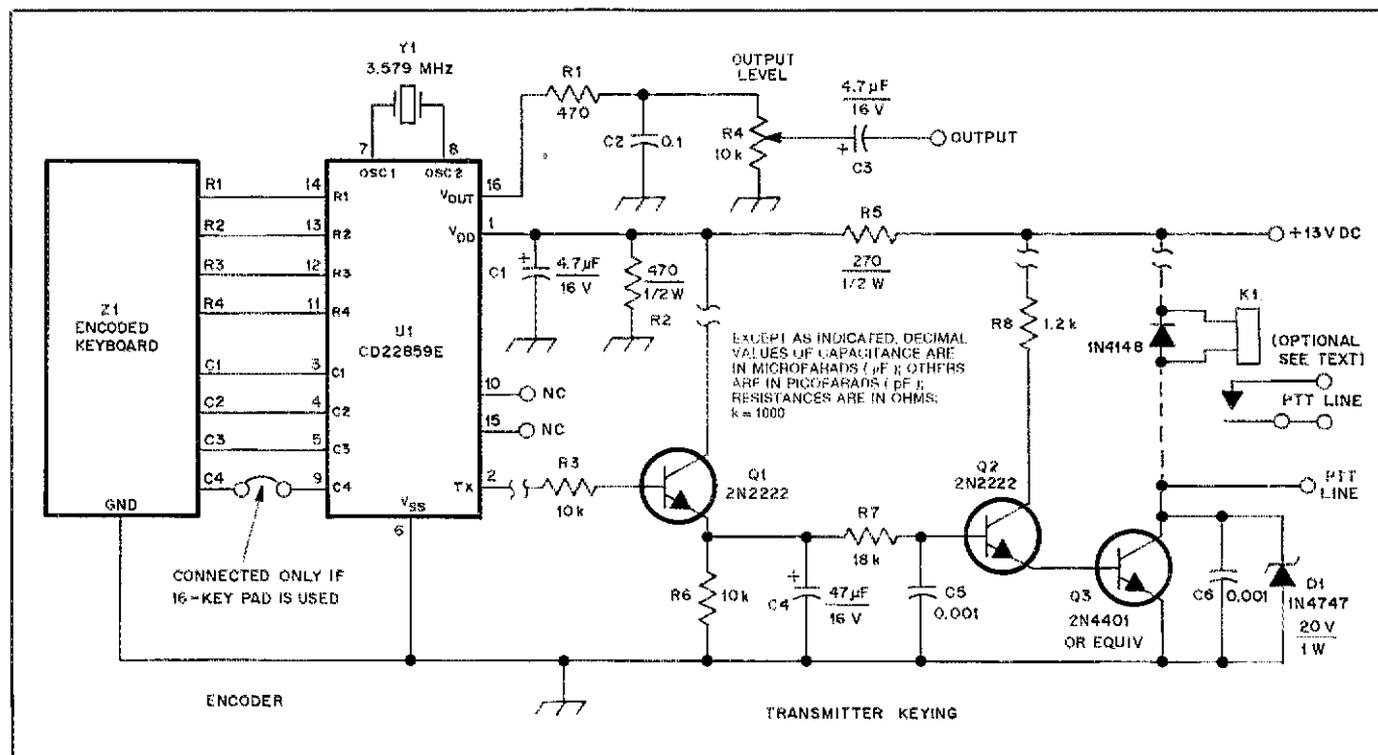


Fig 1—Schematic of the DTMF encoder with transmitter keying. Resistors are ¼-W, carbon-film units unless otherwise noted. If direct control of the PTT line is desired, connect the PTT line to the collector of Q3. If relay control is needed, add a relay and tie the top end to the collector of Q3. Do not use both options at the same time.

D1—20-V, 1-W Zener (1N4747 or equiv).  
K1—Relay, 12-V solenoid.  
Q1, Q2—General-purpose NPN transistor (2N2222 NPN or equiv).

Q3—General-purpose NPN transistor (2N4401 NPN or equiv).

Z1—DTMF encoder keyboard. The keypad used in this project was made by DigiTel, but the circuit can be built on any type of circuit board.

## The Audio Console

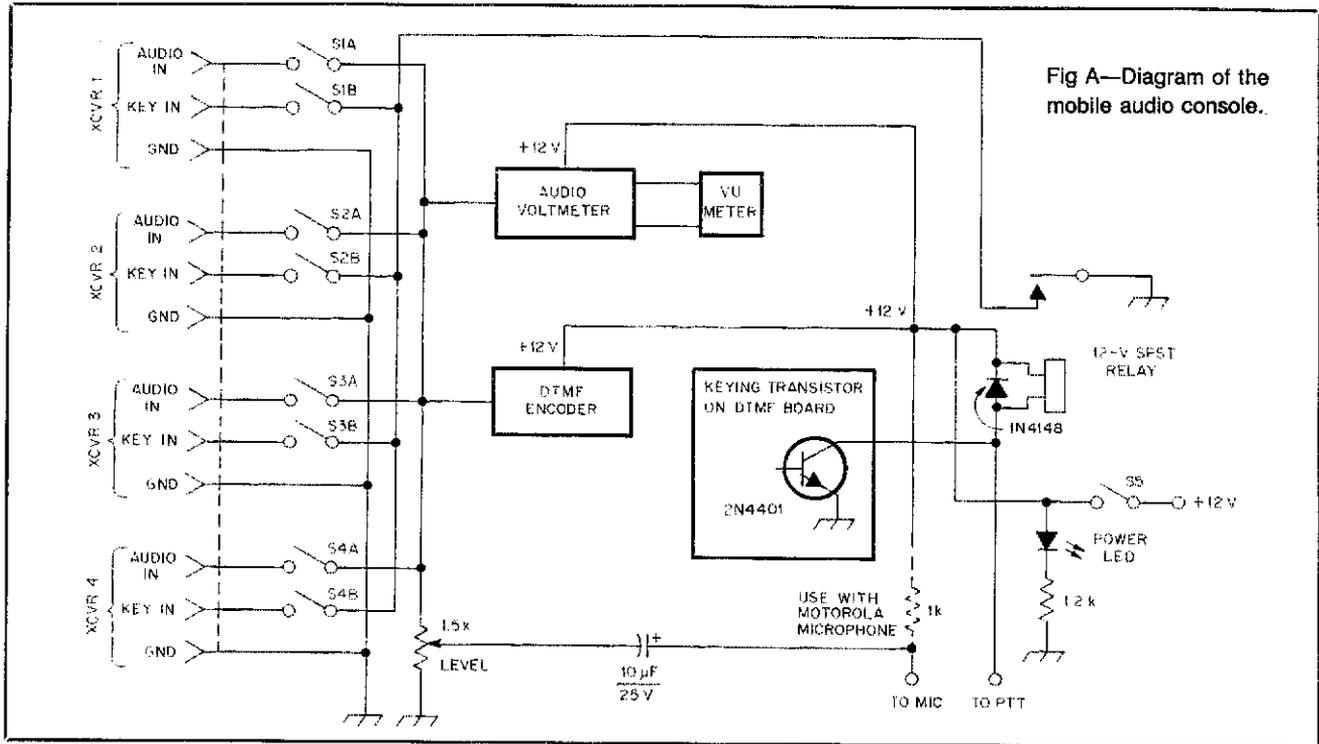


Fig A—Diagram of the mobile audio console.

The DTMF encoder is the central building block for an audio console that has been in operation in my vehicle for almost one year. The console helps prevent extra microphones from getting in the way. The console provides a handy way to run

multiple rigs at the same time.

Fig A shows a diagram of the console; it can be tailored to satisfy any need. Fig B shows the front panel of the finished unit. My console consists of a single Motorola microphone, an audio bus and a key-line bus that can be easily switched into the circuit. The audio voltmeter circuit came from *Solid State Design for the Radio Amateur*.<sup>†</sup> It serves as an extra "bell" that comes in handy. The VU meter is from an old audio cassette player, and allows me to monitor the audio output visually. To use the console, I flip the switch to channel microphone audio, keypad capabilities or keying to the rig I choose to operate. It is possible to key all four rigs simultaneously, but I do not

recommend this.

All microphone and keying-line connections from the toggle switches are brought to an 11-pin chassis-mounted plug on the bottom of the console case. The case is homemade from a single piece of aluminum, and the dimensions will vary, depending on its contents.

My audio console case is mounted to the left of my vehicle's steering wheel. The console is mounted between the dash panel instrument section and the dash padding. A couple of ears mounted on the back of the case slip into the cracks in the dash panel above the speedometer assembly. Any mounting system can be used.

The ease of operation afforded by the audio console made its construction worthwhile. The capability of your console is limited only by your junk box and imagination.

†W. Hayward, and D. DeMaw, eds, *Solid State Design for the Radio Amateur* (Newington: ARRL, 1986), p 167.

the encoder circuit. The right half shows a transmitter-keying circuit that uses one of two keying control voltages. Any key-stroke causes one of these voltages to actuate the keying circuit. The key-up circuit was patterned after one in *The 1988 ARRL Handbook*.<sup>1</sup> It has a two-second hold time that can be increased by in-

creasing the value of C4. A keying relay is included, although the transistor is capable of keying most any solid-state or relay-type circuit. The keying relay provides the ground for the key line.

My encoder is one of several circuits inside an audio console that handles all mic, DTMF and keying functions for the four rigs in my vehicle. The two-second hold time allows entry of a DTMF code

<sup>1</sup>M. Wilson, ed., *The 1988 ARRL Handbook* (Newington: ARRL, 1987), p 34-1.

(continued on page 36)

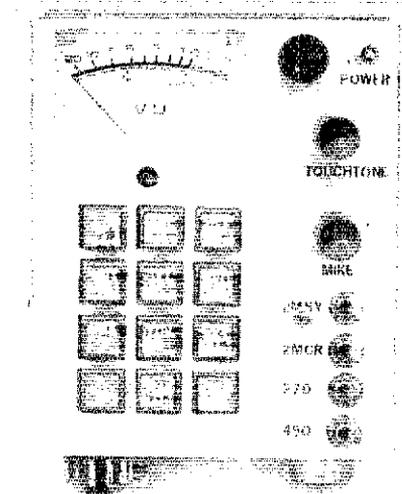


Fig B—The finished mobile audio console. The unit feeds audio and control signals to four rigs, which can be selected by miniature toggle switches. The 11-pin plug on the bottom left feeds audio and control voltages to each rig. The jack on the right accommodates a microphone. The meter is from a junked stereo tape deck. Front-panel gain controls make fine tuning of the audio easy.

# Joe Ham Versus VCR RFI

There may be no greater RFI adversary today than the home VCR. Battles have been won and lost with this foe. These tips may help you to win the fight.

By Doug DeMaw, W1FB  
ARRL Contributing Editor  
PO Box 250  
Luther, MI 49656

Things were peaceful at the W1FB hostel until a VCR became a family member! There had been no TVI or RFI of consequence, even at maximum Amateur Radio power levels. Suddenly, the tranquility of our living room was transformed to a scene of mayhem each time I went on the air. Does this scenario strike a responsive chord? If so, you are probably among thousands of amateurs (and their neighbors) who face the annoyance of VCR RFI. It is not a simple challenge to meet. Cures for RFI can be effected, but it takes patience and a collection of suppression techniques.

We amateurs found it necessary to "square off" against the TV receivers of the late '40s and early '50s. Many TV sets of that era had no RF-rejection circuits, and going on the air varied from iffy to complete disaster in those days. Various TVI-prevention methods were developed and applied. Finally, we hams had a grip on the problem, and with now-standard cleanup measures, we were able to enjoy Amateur Radio without expecting an irate neighbor to knock on the door or jangle our telephones. We are up against a similar contender today—the wide-open VCR. Fortunately, many TVI-suppression techniques are applicable to VCRs. Let's examine the problem and some cures.

## The Symptoms

VCR RFI manifests itself in a manner similar to TVI, since it is a part of the family-TV setup. Interference from amateur signals may appear as total blanking of the TV picture, or it may show up as bars and lines across the screen. The interference comes and goes as we speak into the mic or key our transmitters. A family member may shriek from some other part of the house, protesting the

presence of RFI/TVI! If you own a VCR, I'm sure you've heard something like, "Hey, you're wrecking the TV!" If you have not experienced this kind of TV-viewer anguish, you may be among the lucky few who own VCRs that operate cleanly when RF energy is present; I have heard reports about VCRs that appear to be immune to RFI. I have not been so lucky with my Sharp VC-584UB VCR, nor have a number of ham radio friends who own different brands and models of VCRs.

The problem is complicated, in some instances, by TVI that occurs even when the VCR is turned off! How can this be? Apparently, a VCR that is connected to a TV receiver (VCR turned off) can generate sufficient harmonic energy within itself to cause the TV receiver to be severely afflicted with TVI. I must assume that the diode junctions in the VCR transistors and ICs still receive enough RF energy to cause rectification, and this generates harmonics. Bingo! TVI!

## Interference Suppression

We may enter the battle with some standard weapons in hand. First, we shall revert to the use of high-pass filters. One of these units needs to be located at the antenna input jack of the VCR (better still, inside the VCR where the 75- $\Omega$  cable connects to the PC board). You can use the same type of high-pass filter that is used for TV receivers. It will allow the TV



signals to reach the VCR front end with minimal attenuation, but will block the flow of HF-band signal energy. In severe cases of TVI/RFI, it may be necessary to use a second high-pass filter at the input (antenna) of the TV set. This was not necessary in my war against VCR RFI. In order for a high-pass filter to be effective, it must be connected (case and filter ground bus) to ground. A short, effective earth ground is best. However, I have had acceptable results when grounding the filter to the chassis of the TV receiver. Locating the ground for your VCR may necessitate removing the VCR case, so be prepared to do this if an external ground post is not found on the rear apron of your VCR. Figs 1 and 2 show high-pass filters that were designed by ARRL Technical Advisor Ed Wetherhold, W3NQN. They are easy to build, and the parts are inexpensive.

## AC Line Filter

The TV receiver and the VCR need to be decoupled from the ac line by means of a filter. RF energy can migrate to the VCR and TV set via the ac line. I use the brute-force line filter that I described in *QST* for December 1986.<sup>1,2</sup> Radio Shack sells an ac-line filter that works quite well, according to reports I have received from other hams.

<sup>1</sup>Notes appear on p 36.

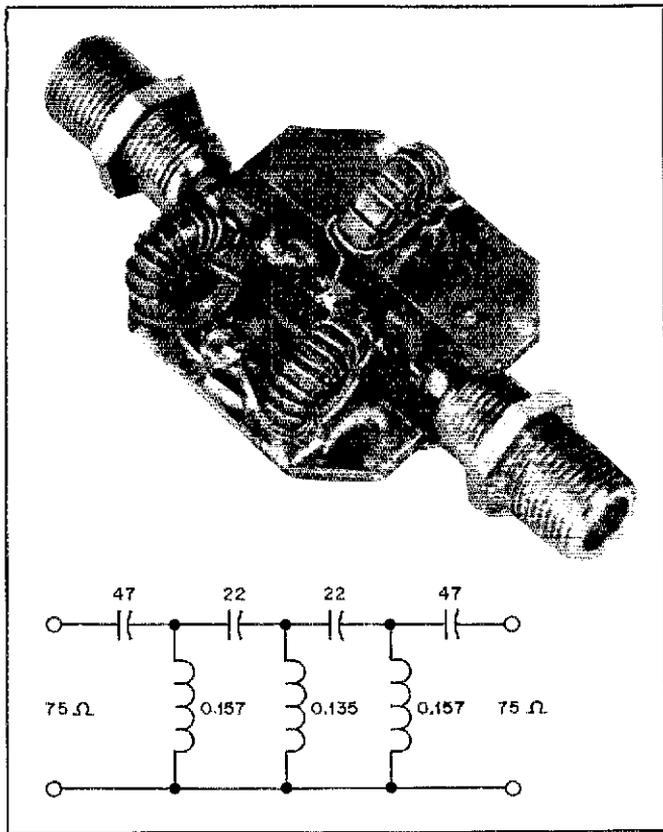


Fig 1—A 75- $\Omega$  high-pass filter assembly and circuit diagram. The toroidal inductors consist of 12 turns of no. 24 enameled wire on Amidon T-44-0 powdered-iron cores (0.157  $\mu$ H). The center coil uses 11 turns of no. 24 wire on a T-44-0 core.

In order for a line filter to be effective, it should be located as close to the equipment cabinet as practicable. Also, you will need an earth-ground connection to the case of the filter for maximum benefit.

An alternative suppressor for the ac line may be developed by winding a  $\frac{1}{2}$ - $\times$   $7\frac{1}{2}$ -inch ferrite rod (125  $\mu$ ) with the ac line cord to the VCR, as shown at A in Fig 3. This RF choke must be located as close to the VCR as possible. The choke prevents the passage of RF currents along the ac cord. The brute-force ac line filter may be more effective than the ferrite choke for curing stubborn cases of RFI. Ferrite rods are available by mail.<sup>3</sup> It is helpful to use an ac-line filter at the transmitter as well. This helps prevent RF energy from traveling to the VCR and TV set via the house wiring.

A toroid core may be used in lieu of the ferrite rod of Fig 3A for making an ac-line choke, using the idea shown in B of Fig 3. The rod will be easier to wind than is a toroid core. In either event, the winding can be taped in position when it is formed. I prefer to use packaging tape—the kind with threads in it—for this job. It is less likely to get loose and gummy with time, which often is the case with black vinyl electrical tape.

#### Patch-Cord Treatment

The 75- $\Omega$  coaxial cables that are used to

connect the VCR to the TV receiver, plus the coaxial antenna lead, may also act as pickup antennas for your HF-band RF signals. This is particularly true when the cables are a resonant length at your operating frequency ( $\frac{1}{4}$ ,  $\frac{1}{2}$  wavelength, etc). Resonant cables act as good pickup antennas! The unwanted RF energy follows the outer conductor (shield braid) of the coaxial line, then flows along the VCR chassis and internal ground leads. This can induce RF energy into the VCR circuits. The high-pass filters discussed earlier should resolve this problem to a greater extent. But in especially difficult suppression exercises, you may aid your cause substantially by adding decoupling chokes to the patch cord and antenna lead. Such chokes are shown at B and C in Fig 3. Adding these may be done in the same manner as we discussed for decoupling the ac cord of the VCR. You may use a ferrite rod or toroid. Wrap four or five turns of the 75- $\Omega$  cable around a  $\frac{1}{2}$ - $\times$  4-inch ferrite rod, or through a large toroid core. These magnetic cores should also have a permeability of 125.

#### What About 300-Ohm TV Ribbon Line?

Your TV antenna may use 300- $\Omega$  balanced feed line. If this is the situation, use the 300- $\Omega$  high-pass filter from Fig 2.

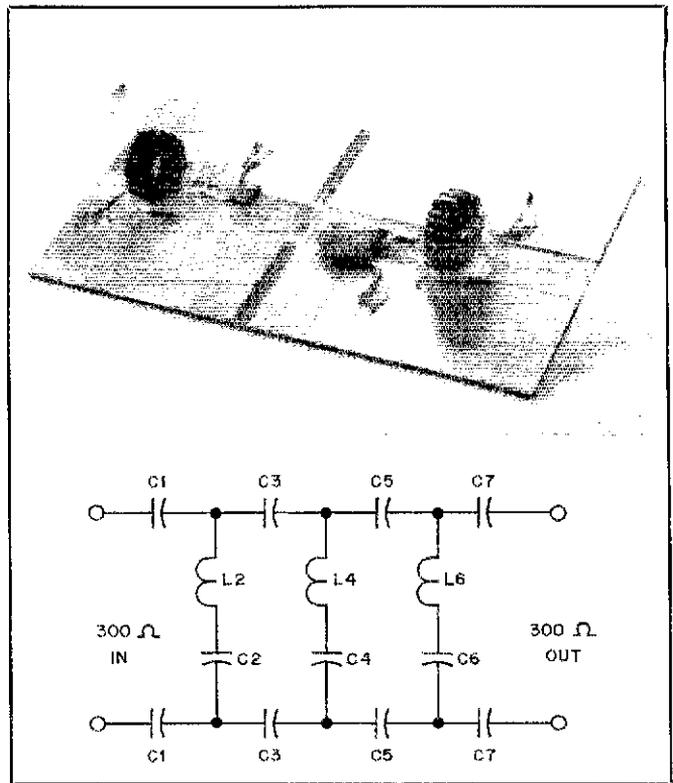


Fig 2—An assembled 300- $\Omega$  high-pass filter and diagram. The capacitors are formed by the rectangles on double-sided PC board material. Complete details are provided in recent editions of *The ARRL Handbook*, interference chapter. Note: L2 and L6 are placed on one side of the PC board; the center coil (L4) is on the opposite side of the board (not visible).

Do not wrap the 300- $\Omega$  line around or through a ferrite core.

Whether your installation has 75- $\Omega$  coaxial or 300- $\Omega$  ribbon TV feeders, try to locate the TV feed line as far away from your transmitting antenna and feed line as practicable. This procedure helps to minimize pickup of unwanted HF-band energy (and the harmonics thereof) by the TV-receiver feeder.

#### Harmonic Interference

Perhaps harmonics from your transmitter are causing the disruption of the TV picture. The cure must be effected at your transmitter, assuming the TV feed line and VCR are well removed from your ham station and antennas. Here we revert to the old standard method of cleaning up the amateur transmitter. This calls for installing a low-pass filter at the output of the transmitter or linear amplifier. This filter will roll off all energy above 40 or 45 MHz, depending upon the filter design. Your low-pass filter must be located as near the transmitter RF output connector as possible. The case of this filter, plus the chassis of your transmitter, require a good earth ground for best results. It is important to realize that the low-pass filter will not work correctly unless it is terminated at both ends in its characteristic impedance—usually 50  $\Omega$ . Therefore, you need to

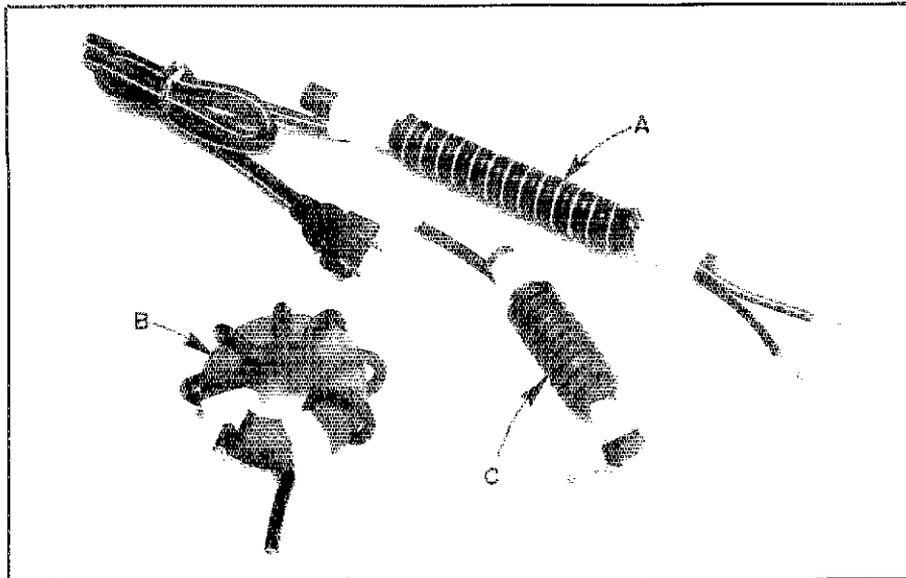


Fig 3—At A, an ac-line RF choke. It is formed by wrapping the VCR ac line cord around a 7½-inch ferrite rod (see text). The rod is an Amidon no. R-61-050-750. At B, an RF choke consisting of 75-Ω coaxial cable that is wound on a toroidal core. An equivalent RF choke on a 4-inch ferrite rod is shown at C. This short rod is an Amidon no. R-61-050-400. An Amidon FT-140-61 or FT-240-61 toroid is suitable for the toroidal choke.

pay attention to antenna matching. Alternatively, you may use a Transmatch between the filter and your antenna feed line to maintain an SWR of 1:1. High RF voltage through the filter, caused by high SWR, can ruin the filter (arcing and heating). This is another reason why a low SWR is important.

#### What if These Measures Fail?

Now we're down to the nitty-gritty. We've tried the foregoing suppression measures, but RFI/TVI remain. We may have cured 75% of the problem, but lines and audio blurps are still showing up in the TV set. This suggests strongly that RF energy is leaking into the VCR through the cabinet, from the field of the ham antenna. Most VCRs that I have seen are housed in plastic cabinets. This leaves them wide open for incidental absorption of unwanted RF energy. Your computer may, in fact, radiate sufficient RF crud to spoil TV reception, if it is close to the VCR and TV receiver.

A desperate last measure calls for placing the VCR in a metal enclosure that is grounded. In most instances you need not enclose the front of the VCR. Rather, it may be inserted in a cabinet with no front panel. A worst-case interference problem could call for a screen door on the front of the shield enclosure.

No doubt you're thinking about how ugly an enclosed VCR might look in your family room. True, an unfinished metal cabinet could be an eyesore. If you use smooth metal, such as aluminum or galvanized furnace ducting, it will be a simple chore to cover it with variety-store

adhesive-backed vinyl material. The wood-grain pattern lends itself well to improving the aesthetics of a shield box. You may apply this covering inside and outside the outer cabinet.

In order for your shield box to be effective, you will need to ground the box—preferably to an earth ground. The chassis of your TV set may not allow the box to be effective as an RF shield. It may be necessary to provide ventilation at the top rear of the shield box. This will allow heat from the VCR to exit. Small aluminum knock-out vent plugs are available at large lumber yards and hardware stores for a nominal cost. I have used 1-inch vent plugs of this type for a variety of amateur projects.

#### Some Final Comments

I was able to clean up my Sharp VCR by using the methods described here. I did not need the outer shield box around my VCR. I use the cold-water-pipe system in my house for the earth ground at the TV/VCR site. I suggest you add one suppression device at a time until you cure the RFI problem. It is pointless to over-engineer the suppression job by adding devices that aren't necessary. If all else fails, take the darned thing to the dealer and demand a refund.

#### Notes

<sup>1</sup>D. DeMaw, "A Ham-Shack AC-Outlet Strip with Filtering," *QST*, December 1986, pp 25-27.

<sup>2</sup>R. Beaudry, "AC-Outlet Positioning," Technical Correspondence, *QST*, Jul 1987, pp 40-41.

<sup>3</sup>Amidon Associates, Inc, 12033 Otsego St, North Hollywood, CA 91607 (catalog available). 

## DTMF Encoder

(continued from page 33)

sequence before the keying line drops out.

Parts for both circuits came from my junk box and electronic supply stores. I used 2N2222 and 2N4401 transistors, but you may substitute other NPNs that have enough current-carrying capability to handle a relay. The color-burst crystal was purchased from Radio Shack® (RS 272-1310). I recommend using a 16-pin socket for the CD22859E during construction to eliminate excessive handling of the IC, which can be damaged by static discharge.

The audio console rests on the dash of my vehicle and is in easy reach for control of each of the four transceivers. See the sidebar, "The Audio Console," for more information. I thank Pat Howard of the RCA technical staff for his help in reviewing the design of this DTMF encoder, and for his suggestions for refining the final product.

*Walter Boller is a self-taught electronics enthusiast. He received his first amateur call sign, W9UXW, in 1952. Later, he was W0EAI. Now, he's W9OBG/7. Walter's major interest is in broadcasting, which he has been in since 1955, having served as a TV sports and news anchorman from 1961 to 1981. He has held a commercial license since 1958, and is presently the Vice President and General Manager for KUUY and KKAZ in Cheyenne, Wyoming. Walter is in charge of six broadcast stations and serves as Director of Engineering for the parent corporation, Mesa Broadcasting.*

*Walter enjoys VHF and UHF, AM, CW, SSB and, largely, FM. He has a complete mobile station on fast-scan ATV and occasionally works the low bands on both CW and SSB. He holds an Extra Class license and is an accredited ARRL Volunteer Examiner. He has built all of his Amateur Radio equipment and is involved in converting a GE Master Pro repeater to 220 MHz to encourage Novice activity. His 11-year-old daughter recently received her Novice license—she's KB0BNJ.* 

## Strays



I would like to get in touch with...

□ personnel of the *USS Swearer DE186* for the purpose of having a reunion. Verdi Cook, W4NYP, 198 Park Lane Dr, Crestview, FL 32536.

*QST* congratulates...

□ Rear Admiral (Sel) John Scott Redd, US Navy, K0DQ, of Sidney, Iowa on his promotion and assumption of new duties as Commander, Standing Naval Force Atlantic of NATO.

## Kenwood TM-221A/321A/421A VHF/UHF FM Transceivers

Reviewed by Bruce Hale, KB1MW

Well, I did it this time. I've been writing Product Reviews on 220-MHz FM radios for about six months; 220 MHz is an interesting band and I've been having fun. When we got the Kenwood TM-321A 220-MHz transceiver, I really wanted to do the review. Then it happened. The column editor decided that it would be nice to review *all three* new Kenwood TM-series radios. There's one for 2 meters, one for 220 MHz and one for 440 MHz. As you can see from the photos, they look practically alike.

Since I got the 220-MHz radio first and used it most, this review focuses on the TM-321A. The other two radios are mentioned in places where their features diverge significantly, and a separate section of the review is devoted to similarities and differences among the radios.

### The First Look

Japanese radios are expensive these days. The dollar has been devalued against the yen so much that a full-featured FM-only transceiver costs upwards of \$400, and a base-station multi-mode rig can go for more than \$1000. The Kenwood TM-321A is a 25-watt FM-only transceiver with a list price of around \$450. You get a pretty sophisticated radio for your money, however, and like most of the new Japanese boxes, this one is *small*. It's so small, and there's so much heat sink on the back of the transceiver, that there's no room for a coax connector! The antenna connection is brought out on a six-inch piece of coaxial cable that terminates in a cable-mount SO-239.

The power cable also extends from the back panel and termi-

nates in a polarized connector. Kenwood supplies a matching connector attached to about 10 feet of red and black wire complete with inline fuses. Maximum current consumption is about 6 to 10 A, depending on the radio, so Kenwood recommends that you connect the power cable directly to the car battery in a mobile installation.

### Control and Display

This really is a full-featured FM transceiver. My only other experience with VHF FM has been with hand-held transceivers, and I very quickly got spoiled using the '321 in my car. There are 14 memory channels, each storing frequency, offset and continuous tone coded squelch system (CTCSS) information. Four of the memory channels do double duty; in addition to the regular

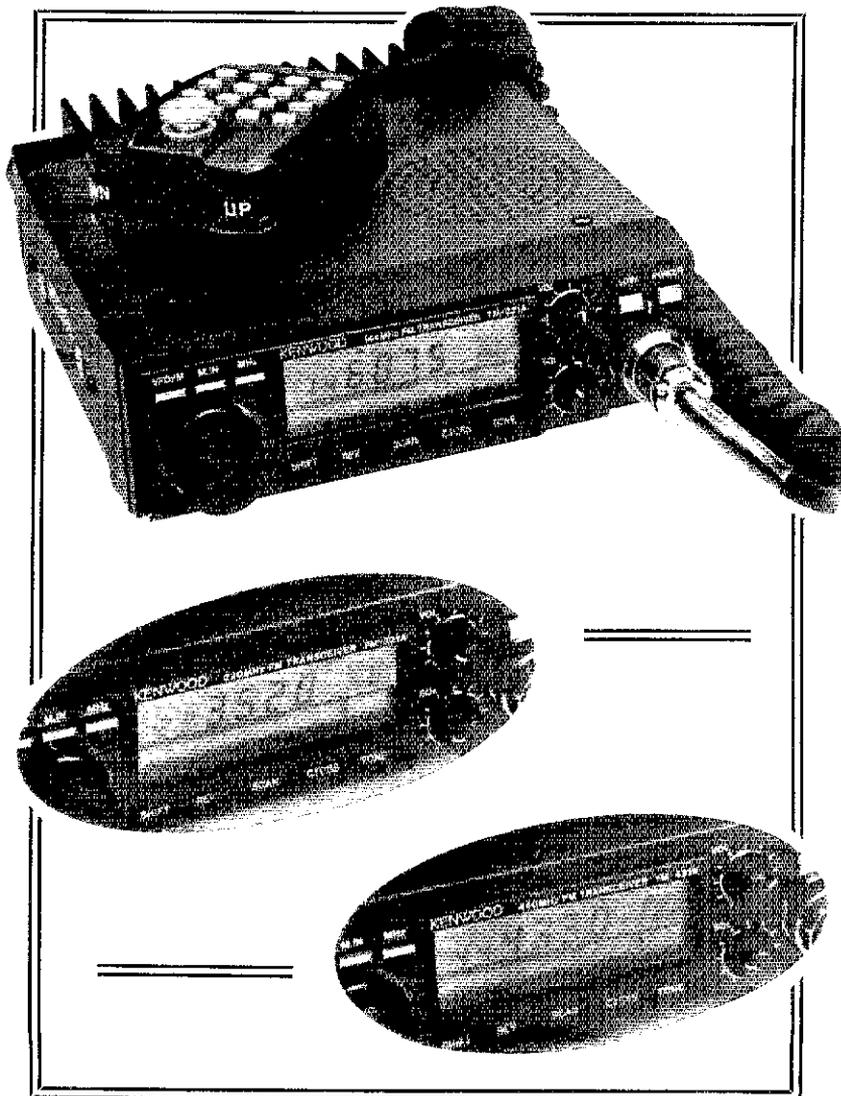
memory information, two of the memory channels can store odd repeater-split information, and two more memories are also used as the frequency scan upper and lower limits.

The CTCSS encoder is built in, and 38 CTCSS tones are available. A different tone can be selected and stored for each memory, if required. An optional CTCSS decoder is also available (TSU-5). This option keeps the radio quiet until the proper CTCSS tone is received. A full 16-key dual-tone multifrequency (DTMF, or Touch Tone®) pad is included on the back of the microphone for autopatch and control use. The microphone also has UP and DOWN buttons on it; these control the memory channel (if memory mode is selected) or transceiver tuning if the VFO mode is selected.

The TM-321A is programmed to conform with the ARRL 220-MHz band plan. As you tune through the band, the repeater offset is automatically programmed in the repeater portion of the band; the offset is disabled in the simplex subband. The offset can be changed, reversed or disabled manually as well.

A big, bright orange back-lit liquid-crystal display shows you everything you need to know about operating conditions at a glance. The display shows you operating frequency, offset (+ or -), scan mode, CTCSS or tone activity, memory channel and a bright bar-graph S meter and power-output indicator. The bar graph doubles as a modulation indicator during transmit.

Five switches directly under the display control the repeater SHIFT, REVERSE offset, SCAN mode, CTCSS and TONE activity. The CTCSS switch controls the optional CTCSS decoder, while the



**Table 1****Kenwood TM-221A 2-meter FM Transceiver, serial no. 9020515****Manufacturer's Claimed Specifications**

Frequency coverage: 144 to 148 MHz.

Mode of operation: FM.

Frequency display: Not specified.

Frequency resolution: 5 kHz.

Power requirements: 13.8 V dc ( $\pm 15\%$ ) at 9.5 A max on transmit and 400 mA on receive.**Transmitter**

Power output: Low, approx 5 W, adjustable to 30 W; high, 45 W.

Spurious signal and harmonic suppression: better than 60 dB.

**Receiver**Receiver sensitivity: Better than  $0.16 \mu\text{V}$  for 12-dB SINAD.Squelch sensitivity: Less than  $0.1 \mu\text{V}$ .Receiver audio output: More than 2 W at 5% distortion (8- $\Omega$  load).

Color: Black.

Size (height, width, depth): 1.7 x 5.6 x 7.6 inches.

Weight: 2.6 lbs.

**Measured in the ARRL Lab**

Transmitter: 144.0 to 147.995 MHz; receiver: 138.0 to 173.995 MHz.

As specified.

6-digit LCD, black digits with orange background.

As specified.

13.8 V dc at 7.7 A on transmit (high power) and 2.9 A (low power), and 300 mA on receive.

**Transmitter Dynamic Testing**

Low, 6 W; high, 50 W.

See Fig 1.

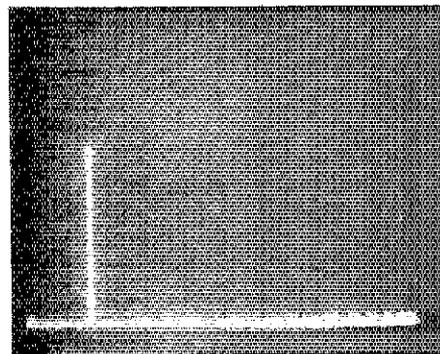
**Receiver Dynamic Testing**0.12  $\mu\text{V}$  for 12-dB SINAD.0.21  $\mu\text{V}$  for 20 dB quieting.0.048  $\mu\text{V}$  min, 0.34  $\mu\text{V}$  max.2.42 W at 5% total harmonic distortion (THD) with an 8- $\Omega$  load.

Fig 1—Worst-case spectral display of the Kenwood TM-221A. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. Output power is approximately 50 W at 146 MHz. The fundamental has been reduced in amplitude approximately 30 dB by means of notch cavities to prevent analyzer overload. All harmonics and spurious emissions are at least 74 dB below peak fundamental output. The TM-221A complies with current FCC specifications for spectral purity.

**Table 2****Kenwood TM-321A 220-MHz FM Transceiver, serial no. 8090113****Manufacturer's Claimed Specifications**

Frequency coverage: 220 to 225 MHz.

Mode of operation: FM.

Frequency display: Not specified.

Frequency resolution: 5 kHz.

Power requirements: 13.8 V dc ( $\pm 15\%$ ) at 6.5 A max on transmit and 400 mA on receive.**Transmitter**

Power output: Low, approx 5 W, adjustable to 20 W; high 25 W.

Spurious signal and harmonic suppression: better than 60 dB.

**Receiver**Receiver sensitivity: Better than  $0.16 \mu\text{V}$  for 12-dB SINAD.Squelch sensitivity: Less than  $0.1 \mu\text{V}$ .Receiver audio output: More than 2 W at 5% distortion (8- $\Omega$  load).

Color: Black.

Size (height, width, depth): 1.7 x 5.6 x 7.6 inches.

Weight: 2.6 lbs.

**Measured in the ARRL Lab**

Transmitter: 220.0 to 224.995 MHz; receiver: 215.0 to 229.995 MHz.

As specified.

6-digit LCD, black digits with orange background.

As specified.

13.8 V dc at 5.0 A on transmit (high power) and 2.5 A (low power), and 290 mA on receive.

**Transmitter Dynamic Testing**

Low, 5 W; high, 26 W.

See Fig 2.

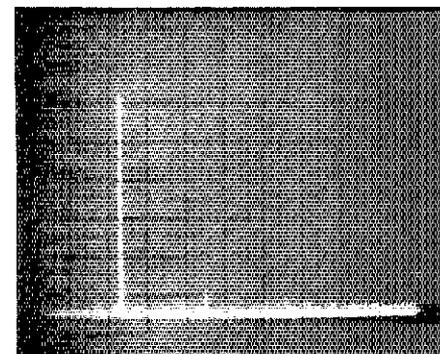
**Receiver Dynamic Testing**0.15  $\mu\text{V}$  for 12-dB SINAD.0.26  $\mu\text{V}$  for 20 dB quieting.0.08  $\mu\text{V}$  min, 0.37  $\mu\text{V}$  max.4.4 W at 5% total harmonic distortion (THD) with an 8- $\Omega$  load.

Fig 2—Worst-case spectral display of the Kenwood TM-321A. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. Output power is approximately 26 W at 222 MHz. The fundamental has been reduced in amplitude approximately 18 dB by means of notch cavities to prevent analyzer overload. All harmonics and spurious emissions are at least 68 dB below peak fundamental output. The TM-321A complies with current FCC specifications for spectral purity.

TONE switch activates the standard built-in CTCSS encoder. A large tuning knob is provided to the left of the display. In memory mode, this knob steps through the memory frequencies. In VFO mode, the radio tunes in user-selectable steps. The default step size is 5 kHz for the '221,

20 kHz for the '321 and 25 kHz for the '421. On all three rigs, pressing the MHz switch allows you to tune in 1-MHz steps.

Whenever one of the front-panel switches is pressed (or the microphone UP or DOWN switch is activated) the radio sounds a short beep. (Kenwood calls this

a "confirmation tone.") This tone can be disabled if you find it annoying.

**Scanning**

The new TM series radios are equipped with very versatile scanning modes. If the transceiver is in memory mode, pressing the SCAN button activates a memory scan. The transceiver stops on a busy frequency and stays there for five seconds. If you press the push-to-talk switch, press the UP or DOWN button on the microphone or rotate the tuning knob, the radio remains on the memory channel. Otherwise, scanning resumes after the five-second delay.

**Table 3****Kenwood TM-421A 440-MHz FM Transceiver, serial no. 8090067****Manufacturer's Claimed Specifications**

Frequency coverage: 440 to 450 MHz.

Mode of operation: FM.

Frequency display: Not specified.

Frequency resolution: 5 kHz.

Power requirements: 13.8 V dc ( $\pm 15\%$ ) at 8.5 A max on transmit and 400 mA on receive.**Transmitter**

Power output: Low, approx. 5 W, adjustable to 20 W; high, 35 W.

Spurious signal and harmonic suppression: better than 60 dB.

**Receiver**Receiver sensitivity: Better than 0.16  $\mu\text{V}$  for 12-dB SINAD.Squelch sensitivity: Less than 0.1  $\mu\text{V}$ .Receiver audio output: More than 2 W at 5% distortion (8- $\Omega$  load).

Color: Black.

Size (height, width, depth): 1.7 x 5.6 x 7.8 inches.

Weight: 2.6 lbs.

**Measured in the ARRL Lab**

Transmitter: 438.0 to 449.995 MHz; receiver: 438.0 to 449.995 MHz.

As specified.

6-digit LCD, black digits with orange background.

As specified.

13.8 V dc at 8.5 A on transmit (high power) and 3.0 A (low power), and 360 mA on receive.

**Transmitter Dynamic Testing**

Low, 6.5 W; high, 35 W.

See Fig 3.

**Receiver Dynamic Testing**0.13  $\mu\text{V}$  for 12-dB SINAD.0.24  $\mu\text{V}$  for 20 dB quieting.0.04  $\mu\text{V}$  min, 0.41  $\mu\text{V}$  max.2.2 W at 5% total harmonic distortion (THD) with an 8- $\Omega$  load.

power among the rigs. Only one operating manual has been written for the series; they're that similar.

The receiver in the TM-221A covers the full 138-MHz to 175-MHz range that has become familiar on commercial 2-meter rigs. This extended coverage is very handy; you can listen to police and public service transmissions in the 150-MHz range and tune in NOAA weather information on the 162-MHz frequencies. Similarly, the TM-321A's receiver tunes about 5 MHz either side of the amateur band.

**What About On the Air?**

What can I say? The radios all work great! The original microphone included with the TM-321A had an intermittent audio problem, but we returned it to the dealer and got a new microphone. I had no further problems. The UP/DOWN buttons on the microphone are handy, and the large display is easy to read, even in bright sunlight. Having the ARRL band plan built into the radio is a nice touch; it meant I didn't even have to program the offset for most of the repeaters I use. The scanning feature worked flawlessly, and I have decided that I prefer the "stop and resume" scan mode over the standard "stop and wait until the channel is clear" scanning mode familiar to users of public-service-band scanners.

I might have made the switches a bit larger, or farther apart, but the radio is so small that this would have been difficult. I sometimes found it hard to hit the correct switch in the dark. Having a "resume scan" switch on the microphone would be a nice feature, since that was the switch I was usually trying to find in the dark.

Lab testing indicated that the TR turnaround time—about 140 ms for all three radios—is unusually slow. This might present a problem when using the transceivers for packet-radio operation, but careful adjustment of the TXDelay parameter on your TNC should compensate for the long TR delay.

We also noticed that when any of the transceivers are in the low-power position, they put out a brief full-power pulse when the PTT line is keyed. This could potentially cause problems with external power amplifiers and preamplifiers that are not rated to handle the full power output of each transceiver.

**Summary**

All three of these radios performed well. We expect a lot from a modern VHF-FM transceiver (at \$450 we *should* expect a lot) and these radios will not disappoint you. These rigs are everything you really need in an FM transceiver in a box so small that it fits nearly anywhere.

Manufacturer: Kenwood USA Corporation, 2201 Dominguez St, Long Beach, CA 90801-5745, tel 213-639-4200. Price class: TM-221A, \$440; TM-321A, \$450; TM-421A, \$450.

It is possible to lock out memories to keep them from being scanned; the locked-out memories can still be accessed by manual memory tuning, however. You can set the scanning direction. The radio scans in the direction of the last manual tune. If you are tuning up the band when you press SCAN, the radio scans up; if you are tuning down, the radio scans down.

Memory channels A and B are used for frequency limits for the programmable band scan mode. In this mode, the rig scans between the lower-limit frequency set in memory A and the upper-limit frequency set in memory B. If the frequency in memory B is lower than (or equal to) the memory A frequency, the radio scans through its entire tuning range.

**They're Different but Equal**

As I mentioned, the TM-321A is part of a three-band series of radios. Kenwood's TM-221A (for 2 meters) and TM-421A (for 450 MHz) round out the trio. With the power turned off, it takes a close inspection to tell them apart. They are all the same size, color and weight.

It's obvious that Kenwood expects some people to buy at least two of the radios in the series. The TM-321A and '421A come with "stacking brackets" that allow the rig to be mounted underneath a TM-221A on your car's dashboard, using only a single mobile bracket (and only four holes under your dash!).

Like the TM-321A, the '221A is programmed for the ARRL band plan.

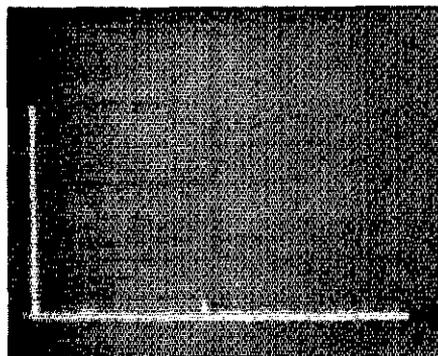


Fig 3—Worst-case spectral display of the Kenwood TM-421A. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. Output power is approximately 35 W at 445 MHz. The fundamental has been reduced in amplitude approximately 20 dB by means of notch cavities to prevent analyzer overload. All harmonics and spurious emissions are at least 70 dB below peak fundamental output. The TM-421A complies with current FCC specifications for spectral purity.

Repeater offset is set automatically as you tune through the band. The TM-421A is not programmed, so you must set the repeater offset manually. All three transceivers are supplied with built in CTCSS encoders and with DTMF pads on their microphones. Tables 1 through 3 show the differences in tuning range and output

## THE JAPAN RADIO COMPANY NRD-525 GENERAL-COVERAGE RECEIVER

Reviewed by David Newkirk, AK7M

The last Japan Radio Company (JRC) product reviewed in *QST* was the NRD-525's predecessor, the NRD-515.<sup>1</sup> What do *you* call a company that upgrades the lone consumer entry in its general-coverage-receiver line only once in seven years? I call it *careful*. The care paid off: The NRD-525 is far more than an upgraded '515. It's an entirely new receiver—and it's about as different from its competitive contemporaries as it is from the NRD-515.

### Unusual Construction

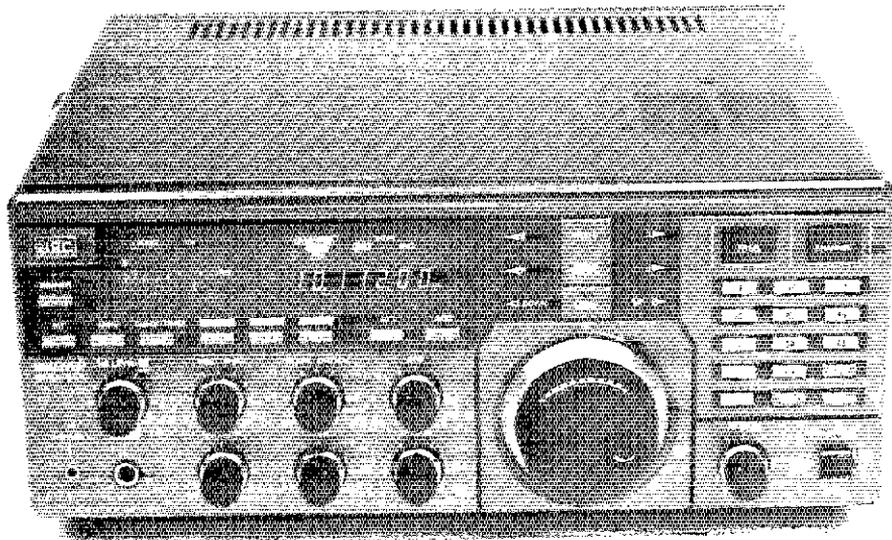
The NRD-525 consists mainly of a motherboard and a vertical card cage (see Fig 4). To borrow further from computer terminology, the '525 has four expansion slots: Two allocated to the boards necessary for installation of an optional VHF/UHF converter (CMK-165), one for an optional RTTY demodulator (CMH-530), and one for an optional RS-232-C interface (CMH-532). (None of these options were tested for this review.) The motherboard completes most of the module interconnections you've probably seen made by means of wiring harness(es) in other ham gear.

The '525's front panel—plastic—is coated on the inside with sprayed-on conductive paint. All but a few of the '525's front-panel controls are mounted on the circuit board that backs the panel; umbilical cables connect the panel to the rest of the receiver. The top, bottom and back panels of the receiver are made of thin steel. The '525's tiny internal speaker is mounted in the right-front corner of the top panel; power-supply components are mounted on the rear panel (behind the card cage). The NRD-525 is well-ventilated and runs only warm.

Liberal use is made of surface-mount devices on the '525's circuit boards. Despite this, component density is relatively—and reassuringly—low. An optional extender board—the CMH-365—can be used to lift a given card clear of the cage for tests, adjustment or service work.

### Conversion Scheme and Front-End Configuration

Electrically, the NRD-525 is a double-conversion superheterodyne receiver; its intermediate frequencies are 70.45399 to 70.45300 MHz and 455 kHz. All of the signals necessary for frequency conversion in the '525—including BFO and passband-tuning functions—are derived from a 12.8-MHz temperature-compensated crystal oscillator. The synthesizer is a two-loop design: loop 1 generates the first LO signal (1-kHz steps) and loop 2 generates



the second LO (10-Hz steps) and BFO signals.

Below 400 kHz, the '525 uses a low-pass network for front-end filtering. From 400 kHz to 34 MHz, the front-end filtering is unusual: Instead of the fixed band-pass filters common in most modern MF/HF gear, the '525 uses top-coupled circuits tuned by voltage-variable-capacitor diodes. The filters are diode switched. Relays are used to switch components *within* several

of these filters; this occurs at 400 kHz, and at 1.6, 2.65, 4.4, 7.4 and 12.3 MHz. A relay-switched 20-dB RF attenuator can be selected by means of a front-panel button. The NRD-525's two antenna inputs (50  $\Omega$  and 600  $\Omega$ ) are selectable by means of a rear-panel slide switch.

Technology-watchers, take note: As is reflected in Table 4, the NRD-525's front end is "strong" (resistant to overload). JRC achieves this performance without

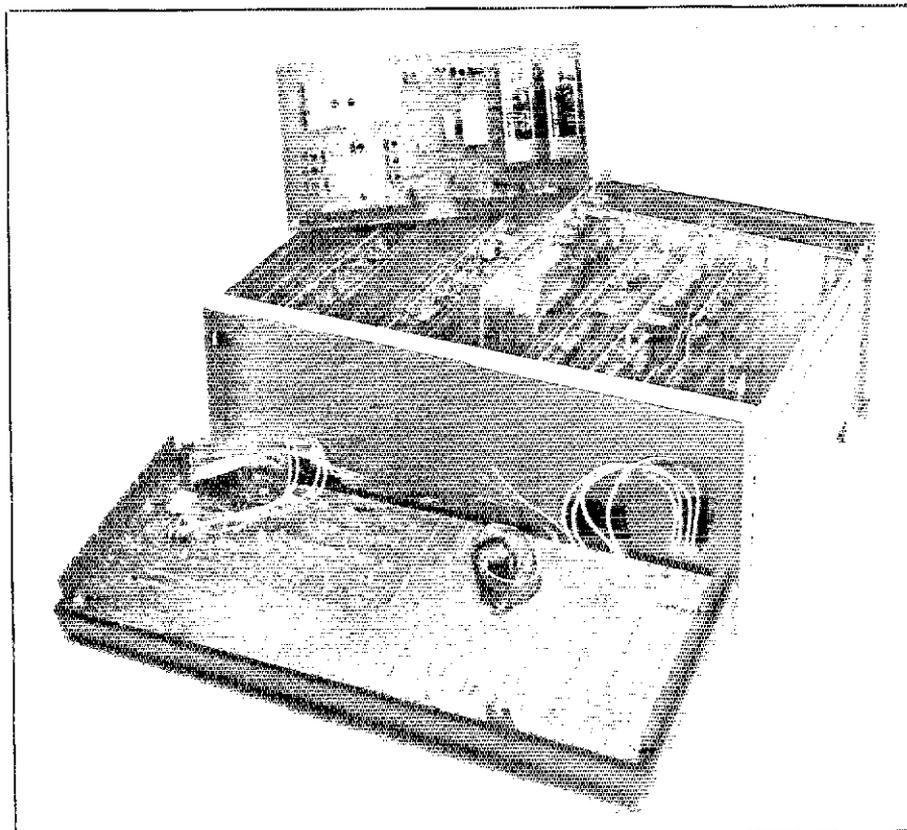


Fig 4—Construction of the NRD-525 receiver. Most of its circuitry is contained on boards mounted in a card cage; here, the IF-filter board has been removed for your inspection. The assembly in the foreground is the '525's plastic front panel—face down.

<sup>1</sup>Notes appear on page 43.

resorting to esoteric techniques: Each of the receiver's two mixers consists of a balanced pair of 2SK125 JFETs operating at a drain supply voltage of 10.8. The first mixer uses a grounded-gate configuration; the second mixer, grounded-source. The first mixer is preceded by an RF amplifier: two *paralleled* 2SK125s, in a grounded-gate configuration, operating at that 10.8-V drain supply.

### Selectivity

The NRD-525's adjacent-channel selectivity is provided by one of up to four 455-kHz filters. These choices are indicated on the '525 fluorescent display as NARROW, INTERMEDIATE, WIDE and AUXILIARY, in that order. The filters can be selected independently of mode by means of < and > BANDWIDTH buttons; the buttons allow stepping through the filter choices bidirectionally. Unfortunately, there's no provision for default or "auto" filter selection with mode. Thus, changing modes with the '525 often means pressing *two* buttons, one to select the mode of choice and the other to select an IF filter.

Out of the box, the NRD-525 comes equipped with three stock filters: the first is approximately 3 kHz wide at -6 dB (INTER); the second, WIDE, is about 6 kHz wide; the third, used for FM reception and the AUX default, is 12 kHz wide. JRC offers four optional filters, any two of which can be installed in the NRD-525's NAR and AUX filter positions. These are the CFL-231 (approx 250 Hz wide), the CFL-232 (approx 500 Hz), the CFL-233 (approx 1.2 kHz) and the CFL-218A (approx 1.8 kHz). In the test receiver, the CFL-232 is installed at NAR and the CFL-233 is installed at AUX.

### Tuning Range and Tuning Methods

The NRD-525 is specified as tuning from 90 kHz to 34 MHz. In fact, it can be tuned down to 0.00 kHz, although its sensitivity drops off below 90 kHz.<sup>2</sup> The '525's tuning knob tunes in 10- or 100-Hz steps (2 or 10 kHz per revolution, respectively); the < DOWN and UP > buttons shift the receiver tuning in 1- or 10-kHz steps. (Pressing the '525's front-panel RUN button toggles the '525's tuning control and < DOWN/UP > buttons between these step sizes. If this seems like an afterthought, it is: Soon after the '525's release, user feedback persuaded JRC that a tuning rate faster than 2 kHz/r was a necessity. Subsequent production included the RUN-button rate shift; owners of earlier units were offered the option of upgrading their receivers to the newer control program.)

The '525's frequency display can be toggled between 0.1- and 0.01-kHz resolution by a keypad command. The display indicates the suppressed-carrier frequency for a correctly tuned SSB signal; in the RTTY, CW, AM, and FAX modes, the display indicates correctly when the incoming signal (as converted to the 2nd IF)

**Table 4**

## Japan Radio Co NRD-525 Receiver, Serial No. BR 41235

### Manufacturer's Claimed Specifications

Frequency range: 90 kHz to 34 MHz.

Modes of operation: RTTY, CW, SSB (LSB, USB), AM, FM, FAX.

Receiver Sensitivity

RTTY/CW/SSB/FAX (for a 10-dB [signal + noise]/noise ratio, 3-kHz filter):  
90 kHz-1.6 MHz: 5.0  $\mu$ V (-93 dBm).  
1.6-34 MHz: 0.5  $\mu$ V (-113 dBm).

AM (for a 10-dB [signal + noise]/noise ratio, test signal modulated 30% with a 400-Hz tone, 90 kHz-1.6 MHz: 15  $\mu$ V  
1.6-34 MHz: 2  $\mu$ V

FM (for 20-dB quieting): 0.7  $\mu$ V from 1.6-34 MHz.

Receiver dynamic range: 100 dB or more (with 500-Hz IF filter).

Image rejection: 70 dB or more.

IF rejection: 70 dB or more.

Pass-band shift range:  $\pm$  1 kHz or more.

Notch filter attenuation: 30 dB or more.

Squelch sensitivity: Not specified.

S-meter calibration ( $\mu$ V for S9 reading):

Not specified.

BFO tuning range: 455 kHz  $\pm$  2 kHz or more.

RIT range:  $\pm$  5 kHz max.

Receiver audio output: 0.5 W or more at 10% distortion with 4- $\Omega$  load.

AGC characteristic: Audio output varies 10 dB or less with RF input variation from 3  $\mu$ V to 100 mV.

Color: Black and dark gray.

Size (height, width, depth): 5.1  $\times$  13  $\times$  11 inches (excludes projections).

Weight: 18.7 lbs.

<sup>†</sup>Tone spacing was the ARRL Lab standard of 20 kHz for blocking dynamic range test and two-tone, third-order IMD dynamic range test.

### Measured in the ARRL Lab

0 kHz to 34 MHz, with reduced sensitivity below 90 kHz.

As specified.

Minimum discernible signal (noise floor), with 500-Hz filter:

1 MHz: -140 dBm  
3.5 MHz: -137.5 dBm  
14 MHz: -137 dBm  
29 MHz: -134 dBm

Test signal modulated 30% with a 1-kHz tone, 3-kHz filter:

1 MHz: 0.72  $\mu$ V  
3.5 MHz: 1.0  $\mu$ V  
14 MHz: 0.63  $\mu$ V  
29 MHz: 1.0  $\mu$ V

0.38  $\mu$ V for 20 dB quieting;  
0.4  $\mu$ V for 12-dB SINAD at 29 MHz.

Blocking dynamic range (dB)<sup>†</sup>:

1 MHz: 135  
3.5 MHz: phase-noise limited  
14 MHz: 140  
29 MHz: 133.5

Two-tone, third-order intermodulation distortion dynamic range (dB)<sup>†</sup>:

1 MHz: 95  
3.5 MHz: 93.5  
14 MHz: 95  
29 MHz: 93

Third-order input intercept (dBm):

1 MHz: +2.50  
3.5 MHz: +2.75  
14 MHz: +5.50  
29 MHz: +5.50

Not measured.

1st-IF (70 MHz) rejection: 103 dB.

Not measured.

37 dB at 750 Hz.

29 MHz, FM mode: 0.13  $\mu$ V min.

44 at 1.02 MHz; 55 at 3.52 MHz; 62 at 14.02 MHz; 84 at 29.02 MHz.

+2.286/-2.193 kHz.

As specified.

2.9 W at 5% total harmonic distortion with 4- $\Omega$  load.

Varies 0.5 dB from 3  $\mu$ V to 100 mV.

is centered on 455 kHz. The NRD-525's frequency display is not counter-based; it indicates what it is commanded to indicate by the microprocessor.

### Modes and Detectors

Mode selection in the '525 is accomplished bidirectionally by means of < and > MODE buttons. Product detection is used in the RTTY, CW, LSB, USB and FAX modes. Receiver operation

during these modes differs only in how the '525's BFO is configured. During CW reception, the '525's BFO is tunable (in 10-Hz steps) about  $\pm$  2 kHz relative to IF center by means of the front-panel BFO control. Because adjustment of the BFO control does not alter the displayed frequency, this arrangement allows the operator to choose the pitch of properly tuned CW signals: You're not locked into the ear-splitting 800-Hz CW pitch so unfortunately

routine in modern factory-made ham gear. Further, the '525's tunable BFO allows the operator to choose the "sideband" in which CW signals will be received—in other words, how the pitch of received signals varies as the receiver is tuned in a given direction. In the RTTY, USB, LSB and FAX modes, the BFO control is inoperative and the BFO-to-IF relationship is fixed. The BFO offset is 2.21 kHz for RTTY; 1.5 kHz for USB and LSB; and 1.9 kHz for FAX.

The NRD-525's AM detector is unusual. The '525's SN16913P product-detector IC operates in all modes except FM. During RTTY, CW, LSB, USB and FAX reception, the '16913P's BFO port is driven by the NRD-525's BFO. During AM detection, the BFO is switched off, and the incoming signal—at IF—is fed to a limiter strip in addition to the normal IF amplifier. The limiter removes the AM sidebands and recovers the signal carrier. The recovered carrier is fed to the BFO port of the product-detector IC to demodulate the carrier-plus-sidebands signal at the product detector's IF port. Although some publications refer to this as "synchronous" detection—after the term used several years ago by the R. L. Drake company for a similar circuit—it is none other than true *exalted-carrier* detection. My subjective impression is that the NRD-525's exalted-carrier AM detection sounds equal to or worse than rectification detection achieved by means of a lowly point-contact diode! The NRD-525's narrow-band FM reception is adequate.

### AGC

The NRD-525's automatic-gain-control button steps *unidirectionally* through OFF, FAST and SLOW choices. Moving from SLOW to FAST, therefore, requires that you move through OFF. If you want to save your ears, this makes every SLOW-TO-FAST AGC adjustment a two-control operation: You must reduce the AF or RF gain first—or risk being blasted.

### S Meter

The NRD-525's S meter consists of a 40-segment horizontal "moving dot" display. The display scale is calibrated in half-S-unit increments from S1 to S9 (bluish white), and in 2.5-dB steps from S9 to S9 + 65 dB (red). Signal strengths are indicated by the apparent motion of a green "vertical hyphen" beneath the scale.

### Keypad, "VFOs" and Memories

In effect, the NRD-525 has two frequency-control modes, FREQUENCY and CHANNEL. Movement between these modes is toggled by buttons marked accordingly. In the frequency mode, the '525's tuning knob and < DOWN/UP > buttons adjust only the receiver tuning; the keypad enters frequencies directly. In this mode, the NRD-525 has one "VFO." Keypad frequency entry can be in kilohertz or mega-

hertz. Leading and trailing zeros need not be entered, and the keypad allows frequency entry down to the 10-Hz resolution of the synthesizer. Although the feel of the keys belies the expense of the receiver, they work well, are clearly labeled, and are laid out in the format common to calculator and telephone keypads.

Pressing CHANNEL puts the '525 into its memory mode. In this mode, the tuning knob adjusts frequencies, the < DOWN/UP > buttons step down or up through the '525's 200 memories, and the keypad allows direct entry of memory channels by channel number. Each memory stores frequency, mode, bandwidth, AGC and attenuator settings; a lithium cell backs up this information. Any of the data in a given memory channel can be altered at will, including frequency. In popular terminology, this gives the NRD-525 "200 VFOs." (Not 201 VFOs, I add. Switching from FREQ to CHANNEL and selecting a memory channel obliterates the frequency/mode/bandwidth/AGC/attenuator settings present in the FREQ mode. Such information must be written to memory if it will be needed again; returning to the FREQ mode does not restore it.)

What I miss in the 525's frequency-control scheme is a VFO A/B switch. Under some circumstances, the ability to toggle rapidly between two frequencies is useful. With the NRD-525, this can be achieved only by storing the desired two frequencies in adjacent memory channels and toggling between them with the < DOWN and UP > buttons.

### Scanning, Sweeping, Shifting, Notching

Each equipment manufacturer has its own idea of how these equipment-control frills should perform; JRC presents yet another approach in the NRD-525. The '525 can scan its memory channels and sweep frequencies between two preset limits. Three buttons (SCAN, SWEEP and RUN) and two dual-function controls (PBS/SPEED and P LEVEL/NOTCH) control these features. (For the remainder of this discussion, I'll refer to scan and sweep reception as *automatic reception*.)

During normal reception, the PBS/SPEED and P LEVEL/NOTCH controls adjust the passband-shift and IF-notch circuits, respectively. The '525's notch filter does a really—dare I say?—topnotch job in the receiver's product-detection *and* AM modes. The IF shift circuit works as expected; it functions in product-detection *and* AM modes.

During automatic reception, the PBS/SPEED control sets scanning/sweeping speed and P LEVEL/NOTCH sets the signal level at which automatic reception is interrupted. (On some receivers, the latter function is handled by a squelch-threshold control; the NRD-525's SQUELCH and P LEVEL controls operate *independently*.) During automatic reception, the notch circuit is inoperative and the IF-shift circuit

is set to the center of its tuning range. The front-panel SCAN, SWEEP and RUN buttons are used to select automatic reception, to set memory and frequency limits, and to start and stop automatic reception. (Pressing the FREQ or CHANNEL buttons also returns the '525 to normal reception.)

I don't like two things about the '525's automatic-reception features. First, no means are provided of locking a channel out during scanning—a major flaw in any scanning scheme. Second, the NRD-525's sweep function operates only in steps of 1 kHz. In my opinion, 1-kHz steps are too coarse for sweep operation during heterodyne detection: The tuning steps chop up signals too much for recognition unless the sweep rate is very slow. I can't get too excited about these "flaws," though: They're far removed from basic radio performance and do not seriously detract from the utility of the NRD-525.

### More Features

The DIMMER button steps the fluorescent display and front-panel indicator LEDs through four levels of brightness from off ("nearly off" for LEDs in the FREQ, CHANNEL and LOCK buttons) to sunlit-room level. The receiver defaults to the brightest dimmer setting when first turned on.

Pressing RIT turns the tuning knob into a fine-tuning control capable of tuning 5 kHz above and below the nominal tuned frequency. During RIT operation, the frequency display indicates only the RIT offset. The RIT circuit retains the last-tuned offset even when RIT operation is turned off or the receiver is powered down.

Several of the NRD-525's secondary features indicate that the Japan Radio Company has the radio amateur in mind, particularly the CW operator. The '525 can be muted for use with a transmitter, and sidetone can be injected into the receiver audio chain via a rear-panel connector. The sidetone level is adjustable by means of a trimmer potentiometer accessible through a hole in the receiver's bottom cover. Also accessible through a bottom-panel hole is the MONITOR LEVEL potentiometer—an auxiliary RF-gain control that comes into play only when the receiver is muted *and* the front-panel MONI button has been pressed. Result: Thanks to JRC, you can monitor your transmitted signal off-air with the NRD-525!

The NRD-525's CLOCK/TIMER button switches the receiver's display from frequency to time (HH:MM) and steps unidirectionally through four time-display options (clock 1, clock 2, timer on and timer off). Once CLOCK/TIMER has been pressed, the keypad can be used to set the clock and timer times. Like some other receivers billed as having two clocks, the NRD-525 seems to have *one* clock with two programmable displays: Clock 2 "rolls over" in synchronism with clock 1 no matter when clock 2 is reset. The timer can

be used to control an external device by means of normally-open and -closed relay contacts; these contacts, none of which is common to chassis, are accessible via a rear-panel barrier strip. Although the NRD-525's memory information is backed up by a lithium cell, the clocks *aren't*: If you unplug the receiver—or if ac power fails—you'll have to reset the clocks.

The NRD-525's noise blanker works *sometimes*—just like every noise blanker I've ever used. Its threshold can be adjusted by means of the NB LEVEL control; pulling this control out lengthens (“widens”) the blanking interval to combat the Soviet over-the-horizon radar and similar noises.

The NRD-525 provides fixed-level audio output at its front-panel RECORD and rear-panel LINE OUT jacks. The output level is adjustable.

The NRD-525's keypad has a few special functions in addition to allowing direct entry of frequencies and memory channels. These are: (1) selection of whether or not the receiver tuning and displayed frequency shift when moving between LSB and USB, and from these modes to RTTY, CW, AM and FAX; (2) selection of 0.1- or 0.01-kHz frequency-display resolution; (3) selection of blinking or static colon during time display; (4) whether or not pressing any (except DIMMER) of the set's push buttons results in the emission of a beep (mercifully, the factory default for this is *off*!); and (5) whether or not the front-end filters are used. (Yes! The front-end filters can be switched entirely out of the circuit to remove filter loss [during weak-signal reception, the instruction manual suggests]. ARRL lab tests reveal, however, that this feature gives mixed results. Switching out the filters *degrades* the noise floor by 33.5 dB at 1.02 MHz, and *improves* the noise floor at 3.52 MHz [5 dB], 14.02 MHz [0.5 dB] and 29.02 MHz [1.5 dB]. These figures were derived with the 3-kHz IF filter in use.)

### Power Supply and Rear-Panel Connections

The NRD-525 can be powered from dc at 12 to 16 (nominally 13.8) V (power consumption, 25 W max) or ac at 100, 120, 220 or 240 V (35 VA maximum, frequency range not stated). A fuse holder is integral with the ac voltage selector. Ac connection is made by means of a chassis-mounted CEE-22 connector; a two-terminal connector is included for dc operation. Other rear-panel connectors include: high-Z (spring-operated, wire) and low-Z (SO-239, coaxial) antenna terminals for 90 kHz to 34 MHz; LINE OUT, EXTERNAL SPEAKER, SIDE TONE, MUTE and DC OUT (10.8 V, 30 mA maximum)—all phono; TIMER OUT (24 V, 3 A maximum); PRINTER (Centronics; present only when the optional RTTY demodulator is installed); OSCILLO MARK and SPACE (phono; these allow connection of an oscilloscope for tuning indication when the optional RTTY demodulator is installed); VHF ANT and UHF ANT (present

only when the optional VHF/UHF converter is installed) and RS-232-C (present only when this optional interface is installed).

The NRD-525 comes with an instruction manual, a spare 1-A fuse, a three-wire ac cord, a dc power cord and a plug for every jack not associated with an option.

### Documentation

The 35-page *Instruction Manual for Model NRD-525* is succinct and complete. Although its English is occasionally substandard, it covers operation of the NRD-525 well. Good news, technology-watchers: Schematics and a block diagram *are included* in the instruction manual, as well as instructions on how to install optional IF filters and replace the lithium backup cell.

The typewritten appearance of the optional, 154-page *NRD-525 General Coverage Receiver Service Manual* belies the expense and quality of the '525, but it's safe to assume that everything necessary for service and alignment is there. Neither manual contains detail on the control features afforded by the '525's RS-232-C option.

### Performance Notes

This is one modern radio that has knobs you can *grab*. The tuning knob is free-wheeling and sufficiently heavy; the rest of the knobs are of uniform size (½ inch in diameter) and well spaced. There are *no* concentric controls! The push buttons are large and spaced for operation by real people! Wake me up—I must be dreaming.

Aside from a bit of IF-filter blowby, the NRD-525's basic radio performance is excellent, and this is reflected in the ARRL Lab test results in Table 4. In particular, the set's blocking dynamic range is outstanding, indicating (1) a strong front end and (2) a relatively phase-noise-quiet frequency synthesizer. (One exception to this: Mysteriously, the 3.52-MHz blocking-dynamic-range measurement was phase-noise limited.) As is *not* the case with some other “communications” receivers and general-coverage transceiver receivers, the '525's designers have chosen *not* to reduce intentionally the '525's medium-wave sensitivity. Because of this, the NRD-525 is a superb medium-wave DX receiver.

The '525's tuning range is practically free of internally-generated spurious signals. By *practically* I mean that most spurs disappear into the noise when an antenna is connected—and that what few remain are hardly a problem. The strongest spur appears at 12.8 MHz; that's the '525's microprocessor-clock frequency. Weak harmonics of signals associated with the '525's fluorescent display are evident below 400 kHz; these sound somewhat like TV-oscillator harmonics and can be identified by the fact that they shift frequency as the DIMMER button is pressed.

I'm a bit put off by the low-level 13-kHz whine apparent in the '525's audio output

during headphone operation. I suspect that this has to do with the dc-to-dc converter used with the fluorescent display. This whine is not present in the '525's RECORD and LINE audio outputs. If your hearing doesn't stretch to 13 kHz, you'll never know the whine is there!

The '525's synthesizer generates slight clicks every kilohertz at 0.1 kHz points, and overshoot (my term: fishtailing) because of long settling time is noticeable as CW signals and carriers are tuned. This is okay with me, because I know that this generally means a phase-noise-quieter synthesizer—and because the NRD-525's on-the-air performance indicates that its phase-noise characteristics are excellent.

The '525's slow AGC decay is overly long, and its fast AGC might be considered “medium” by hard-nosed CW addicts. The AGC seems a bit clicky on attack; this is especially noticeable with the AGC set to FAST, of course.

Although the NRD-525 does a fine job on AM and SSB, it isn't the smoothest-sounding receiver I've used for strong-signal reception on these modes: I can occasionally hear what sounds like detector overdrive on signal peaks during reception of *very strong* AM and SSB signals. It's possible that this is an AGC-overshoot effect. The NRD-525 *really* shines during weak-signal CW reception. Distortion in the audio chain is minimal, the TONE control is effective in cutting wide-band IF hiss, the BFO control allows me to set the receiving pitch (and “sideband”) of my choice, and the '525's 2 kHz/r slow tuning rate is smooth as velvet. Ahhh!

### Conclusion

The NRD-525 doesn't feel like *Amateur* Radio gear. That's not surprising: The Japan Radio Company has been manufacturing radio gear since 1915, and its principal business is satellite, marine and other professional communications equipment. If you're looking for a receiver capable of excellent SWL and two-way-communication performance, there may be an NRD-525 in your future!

Manufacturer: Japan Radio Co, Ltd, Akasaka Twin Tower, 17-22, Akasaka 2-chome, Minato-ku, Tokyo 107, Japan. Available from several US distributors. Price class: NRD-525, \$1365; CFL-232 500-Hz filter, \$150; CFL-233 1 kHz filter, \$150; NVA-88 external speaker, \$60.

### Notes

<sup>1</sup>Gerry Hull, “Japan Radio Company Model NRD-515 All-Wave Receiver,” *Product Review*, QST, Nov 1981, pp 42-43.

<sup>2</sup>The '525's ability to tune to 0.00 kHz—that is, to listen to its own LO—results in a hidden feature: The receiver can be used as an accurate source of audio test tones! The '525 must be in the CW mode, BFO tuning set at center, for correct display of the tone frequency. Example: For a 440-Hz tone, key in 0.44 kHz. This works from about 3.5 kHz (above which spurs and hiss spoil the purity of the tone) down to at least 200 Hz. This discovery was made by ARRL Lab Engineer Ed Hare, KA1CV.

## CURING RODENT-REPELLER INTERFERENCE

□ A strong pulsing signal across the entire 2-meter band made moonbounce and weak-signal tropospheric communications impossible at my location. Using a multi-mode transceiver, and the two-element feed from my dish as a direction-finding antenna, I tracked down the noise by driving around in my pickup truck. The noise emanated from a neighbor's house. The culprit was a device used to irritate rodents and insects to the point that they move out (probably to the neighbors!).

The repeller had a small pilot light that flashed in step with the interfering oscillator. Bypassing this indicator with a 0.01- $\mu$ F capacitor cured the problem. I'm happy, the neighbors are happy, and their mice are happy in my shop!—*Gary Gerber, KB0HH, Anthony, Kansas*

## ...AND STREET-LAMP INTERFERENCE

□ A defective sodium-vapor lamp can cause a great deal of interference to MF/HF reception. As the lamp [or perhaps its timer or photoelectric sensor—Ed.] ages, it may cycle on and off during periods when it would normally be lit continuously. Wideband "hash" interference may be the result. (The noise occurs as the lamp tries to switch on; when the lamp is fully off or on, there is no interference.)

I solved a case of street-lamp interference by watching the street lamp on the pole adjacent to the shack as I listened to 40 meters on the station receiver. I called the local utility company and reported the problem. Within 24 hours, they replaced the defective lamp and the interference disappeared.—*James E. Mackey, K3FN, West Hartford, Connecticut*

## BYPASS CAPACITORS CURE POWER-SUPPLY NOISE

□ I sometimes use the general-coverage capability of my HF transceiver for SWLing from locations where an outside antenna is unavailable. This isn't a problem because the transceiver's high sensitivity allows satisfactory reception with just a short whip antenna plugged into the rig's ANTENNA jack. General-coverage monitoring with the whip *did* reveal a problem, however: Reception was marred by strong, wide-band RF noise similar to that sometimes caused by fluorescent lights. The noise was strongest between 3 and 4 MHz. Tests indicated that the noise was coming from the rectifier diodes in the transceiver power supply (an Astron VS35M). Apparently, the switching characteristic of the diodes resulted in the generation of wideband noise.

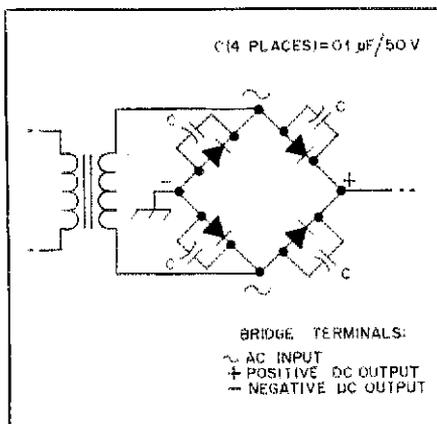


Fig 1—Bypassing means providing a low-impedance ac (in this case, RF) path around a component; here, 0.1- $\mu$ F disceramic capacitors do the trick across rectifier diodes in a low-voltage dc supply. This drawing shows a full-wave bridge rectifier circuit; in some applications, the bridge diodes are contained in a single unit, the leads of which are usually marked as shown in the drawing. When bypassing a diode, use a capacitor with a voltage rating equal to or greater than the PIV rating of the diode. Capacitors rated at 50 V should suffice for a 12 V dc supply with a bridge rectifier. See text.

Installing 0.01- $\mu$ F capacitors in parallel with each of the diodes significantly reduced the noise, but did not eliminate it. Bypassing each diode with a 0.1- $\mu$ F disceramic capacitor (with a voltage rating equal to or greater than the peak-inverse-voltage [PIV] rating of the bypassed diode) reduced the noise to inaudibility. The operation of the power supply was not affected by the addition of the capacitors.—*Michael Dees, N3EZD, Ellicott City, Maryland*

Editor's Note: Although there is some controversy connected with the practice of bypassing power-supply rectifiers (see Steven D. Katz, "Diode Failure," Technical Correspondence, QST, April 1988, pp 46-47), unbypassed power-supply diodes can produce an even more mysterious effect: Hum during AM (rectification) detection of strong AM signals. Hummy AM reception with two borrowed transceivers—an ICOM IC-735 and a Kenwood TS-430S—had me stumped until, on a hunch, I bypassed each arm of the bridge rectifier in my Kenwood PS-20 power supply (see Fig 1). Hum eliminated! (Bypass capacitors across the power supply's 120 V ac input from hot to neutral, and from hot and neutral to ground, had failed to improve the situation.)

Like Michael, I was using an indoor "random wire" antenna at the time. The hum was also audible on strong CW signals, but it was easiest to detect during rectification detection of strong AM signals. Another mystery: Further tests revealed that the hum was present only in transceivers that use step-tuned PLL VFOs; the hum was nonexistent when I used the PS-20 with a TS-130V transceiver! (The '130V has a mechanically tuned LC VFO.) Your theories on the why of these phenomena will be greatly appreciated!

## ELECTRIC-FENCE INSULATORS ALSO WORK FOR ANTENNAS

□ A good substitute for "egg" strain insulators can be found at almost any feed store that carries electric cattle fence supplies. Known as corner post insulators, they cost about \$2 for a package of 10. I've used several for over a year, and weather does not seem to bother them.—*Frank A. Reed, Jr, W6PWQ, Langlois, Oregon*

## A SOURCE OF BATTERY PACKS

□ Recent advances in instant photography have required the development of special power packs to run the camera electronics responsible for auto-focus, exposure control, film advance and warning lights, in addition to flash. The new Polaroid<sup>®</sup> Spectra™ cameras have film packs especially designed for this purpose, and the battery contained in each film pack may serve as a uniquely shaped power pack for Amateur Radio use. The Polaroid Polaplus™ battery measures about 2-3/4 × 3-1/8 × 1/8 inches, and has an output of 6 V at 60 mA. At my station, I've used the Polaplus battery to power an electronic keyer, clocks and light bulbs.—*Ivan Shulman, WC2S, Malibu, California*

Editor's Note: I recall that a "Radio Equipment Forum" contributor in a mid-1980s issue of *Review of International Broadcasting* reported getting several hours of shortwave reception out of a film-pack battery or two. Receiver: a Sony ICF-2002 portable.

## INEXPENSIVE CONNECTOR PROTECTION

□ I travel to some nasty environments when out on DXpeditions, Field Day and VHF/UHF mountaintopping trips, and my idea of fun *isn't* cleaning out the N connector on a cable end I've inadvertently dropped in the mud! With luck, designed-for-application protective caps can be located at fleamarkets. As a substitute, I protect connectors with plastic caps intended for use on metal furniture legs. These caps are available at many hardware stores in packages of four for under a dollar per package. Table 1 lists the caps I use for various connector types. Because of connector manufacturing tolerances, the

Table 1  
Furniture Leg Caps for RF Connectors

Cap ID, inches	Connector
3/8	female BNC
1/2	male BNC
5/8	female N and UHF
3/4	male N and UHF

caps listed as suitable for male N and UHF connectors may have to be held in place by means of tape—but protecting connectors against dirt, snow and insects is well worth the extra effort.—Roger Wagner, K6LMN, Los Angeles, California

### USE YOUR TRANSCEIVER'S NOTCH FILTER AS A ZERO-BEAT INDICATOR

□ In Hints and Hints for August 1985,<sup>1</sup> Dr Gerald N. Johnson, PE, K0CQ, describes a method of setting the controls of a Kenwood TS-830S transceiver so that the rig's transmitted CW frequency is very close to that of incoming signals received at a particular pitch. The accuracy of his method depends on an operator's ability to recognize a pitch of 800 Hz, the difference ("offset") between the TS-830's transmit carrier and receiver BFO frequencies.

I prefer the method found in the instruction manual (for the TS-430S, in my case). This method zero-beats the pitch of a signal tuned at IF center with the 800-Hz transmitter sidetone. I prefer this method because the transmitter offset is almost exactly 800 Hz [assuming that the rig's CW receive and transmit carrier-oscillator frequencies are within tolerance—Ed.]—and because the ear can match two audio tones to less than the maximum tuning error possible with the '430's 10-Hz-step tuning (5 Hz).

This zero-beating technique has a drawback: It's more difficult to zero-beat the sidetone with a fading CW signal than a steady carrier, particularly when the audio from the received signal is considerably weaker than the sidetone. To avoid this, and to mark the IF passband center more permanently, I modify the TS-430S *Instruction Manual* zero-beat procedure (§5.6.1, p 13) as follows (this technique requires that the TS-430S frequency display has been modified for 10-Hz-resolution):

1) Tune the transceiver as described in the *Manual* on a strong, steady carrier, such as a nearby beacon or WWV.

2) Switch on the transceiver's notch filter.

3) Adjust the notch filter for a null in the received signal. If the test signal is modulated with a continuous tone (often the case with WWV), be sure to null the carrier and not one of the tone sidebands.

4) Switch off the notch filter.

*Leave the notch tuning control at this setting while operating.* To zero-beat your transmitter with an incoming signal,

1) Tune the received signal close to IF-passband center by ear.

2) Switch on the notch filter.

3) Fine tune the transceiver to null the incoming signal.

4) Switch off the notch filter. Your

transmitter and the incoming signal are now as close to zero beat as can be achieved with the rig's 10-Hz tuning steps.

For the most part, this method "dedicates" the notch to the zero-beating function. You can use the notch against signals very close to the desired signal, however, by adjusting the transceiver's RIT control to put the interfering signal in the notch. Remember: Don't adjust the notch-filter tuning control to reject interference; you're using the notch filter for zero-beating now. Use the transceiver's IF shift circuit for interference rejection.

Because the TS-430's AF sidetone oscillator operates independently of the '430's RF circuitry, the sidetone frequency may not be exactly 800 Hz. You can get around this error by measuring the actual sidetone frequency and allowing for the error when setting your transmit frequency. Here's how to use the TS-430's frequency display and sidetone oscillator to measure the sidetone frequency: Set the rig for CW reception at its "wide" IF bandwidth. Turn the IF SHIFT control all the way to the left. Tuning from well below the test signal, zero beat the test signal with the sidetone. Note this frequency. Next, tune in the test signal from above, zero beat it with the sidetone, and note this frequency. Subtract the lower frequency from the higher, and divide the result by two. The resulting number is your sidetone frequency. Measured with this technique, the sidetone frequency in my TS-430S turns out to be about 770 Hz.—Brice Wightman, VE3EDR, Ottawa, Ontario

### IMPROVED MASTER-OSCILLATOR CALIBRATION FOR THE TS-430S

□ Here's the technique I use to improve the frequency calibration of my TS-430S transceiver. This method, which sets the TS-430's 36-MHz reference oscillator, assumes that the '430 to be calibrated has been modified for frequency display to 10 Hz.

1) Set the rig for USB or LSB operation, RIT off.

2) Tune the '430S to the highest active WWV frequency (20 MHz is best) so that the frequency display indicates WWV's frequency exactly.

3) While WWV is transmitting a continuous tone, adjust trimmer capacitor TC1 (on the '430's CONTROL board) until the demodulated tone is identical in the USB and LSB modes. Toggle between USB and LSB as necessary until the tone pitches match.—Robert L. Keplinger, N0RK, Kansas City, Missouri

Editor's Note: The TS-430S frequency-generation scheme depends on the accuracy of several oscillator frequencies for overall accuracy, and variation in the frequency of more than one of these oscillators can shift the pitch of received signals. I'm speaking of the '430's carrier oscillator in particular; the TS-430's audio response during SSB reception and transmission also depends on the proper alignment of this oscillator.

Although adjustment of the '430's reference oscillator can serve as a stopgap measure should the rig's frequency display be out of whack, the best way to ensure the overall accuracy of such multi-oscillator frequency-generation schemes is to realign all of the oscillators involved. The TS-430S *Service Manual* tells how to do this.

### HOW TO MEASURE FREQUENCIES WITH YOUR RIG'S 10-Hz-RESOLUTION FREQUENCY DISPLAY

□ As Brice Wightman and Robert Keplinger remind us (see the previous two items), maximally accurate use of the frequency display on a modern transceiver is not always as easy as just tuning in a signal and reading the frequency display. All of the modern, microprocessor-controlled transceivers I've seen indicate the *suppressed-carrier frequency* on SSB. Because it's rare that any two people will tune a given SSB signal for identical recovery of the baseband audio, it's hard to suggest a practical technique for getting better accuracy out of a rig's 10-Hz-resolution display during SSB reception.

Improving the accuracy of such a display during CW reception is a different story. The display on a modern, microprocessor-controlled transceiver correctly indicates the frequency of an incoming CW signal only when the rig is tuned to place the signal at a particular point in the IF passband. In practice, placement of the signal at this point is achieved with the help of the transceiver's CW sidetone oscillator. The sidetone-oscillator frequency is set such that the sidetone pitch is more or less identical to the pitch of an incoming signal correctly situated in the passband. To measure a frequency (or to set the transmitter on the frequency of the incoming signal), you just key the sidetone, zero-beat the incoming signal with the sidetone, and read the correct frequency from the rig's frequency display.

As Brice Wightman reminds us in "Use Your Transceiver's Notch Filter as a Zero-Beat Indicator," the drawback to this tuning procedure is that the sidetone oscillator may not really be where the rig's frequency-control and -display circuitry "expects" it to be. Brice suggests one way of getting around this: Use the rig's notch filter as a tunable audio marker.

But what if you don't want to tie up your rig's notch filter, or if the rig doesn't have a notch filter or sidetone oscillator? Several equipment manufacturers now offer excellent general-coverage receivers as adjuncts to their ham-transceiver lines. Generally, these receivers are more operationally flexible than the general-coverage-receiver portions of the transceivers that complement them; like transceivers, these receivers tend more and more to include frequency displays capable of 10-Hz resolution. There's only one rub: What do you use for a reference tone in determining the frequency of an incoming signal? Receivers don't have sidetone oscillators as trans-

<sup>1</sup>Gerald N. Johnson, "Transceiver Tuning," Hints and Kinks, QST, Aug 1985, pp 41-42.

ceivers do. Brice Wightman's notch-filter technique works with receivers *and* transceivers, but it ties up the notch filter—if the receiver has one. You can use an outboard audio oscillator, of course, but mixing its output with the receiver audio presents a problem, especially if you're wearing headphones. An outboard phase-locked-loop (PLL) tone decoder is another possibility,<sup>2</sup> but PLL decoders tend to be too drift-y and unselective to allow accurate resolution of tone frequencies to 10 Hz.

Here's a technique for measuring CW or carrier frequencies with any receiver or transceiver that:

- Has a frequency display capable of resolving frequencies to 10 Hz;
- Has "two VFOs" or at least two memories; and
- Receives a WWV or CHU frequency within a few megahertz of the signal you wish to measure.

Neither a notch filter nor a sidetone oscillator is necessary for measurements with this method, and you don't need to build or buy outboard gizmos. The following instructions refer to a receiver with "two VFOs" and a VFO A/B switch; use any adjacent pair of your receiver's memory channels if you can't toggle between "VFOs."

1) Set the receiver to CW (same mode on both VFOs).

2) Using VFO A, tune in the signal you wish to measure.

3) Using VFO B, tune to the active WWV or CHU frequency nearest to the frequency you wish to measure. Adjust the receiver tuning so that the frequency display indicates the carrier frequency of the standard station *exactly* (7.33500 MHz, for example). Make a mental note of the carrier pitch.

4) Switch back to VFO A. Retune the signal you wish to measure so that its pitch matches that of the standard-station carrier (VFO B). Toggle back and forth between VFOs A and B and adjust VFO B until the pitches match as closely as possible. (There will likely be *some* error because of the limited resolution afforded by the receiver's tuning steps.)

5) Once you've matched the pitches, the receiver's display indicates the frequency of the incoming signal to within 30 Hz or so.

I like this technique because it sets frequency-display error (if any) to *zero* at the standard frequency. What measurement errors you do encounter depend on your ability to match pitches, the error (in parts per million [ppm]) of your frequency display and the *frequency separation between the standard and measured signals*. If you don't know your receiver's display accuracy, assume that it's "on the edge of

spec." Example: For a display with a maximum error of  $\pm 10$  ppm (10 Hz per megahertz), a 17.1-MHz measurement based on the 15-MHz WWV signal would be off by 21 Hz ( $2.1 \times 10$ ), assuming a perfect match between the pitches of the standard and measured signals. (For this application, we can safely assume that any frequency error in the WWV and CHU carrier frequencies is so small as to be insignificant.) Note, however, that this measurement technique does not determine the *sign* of the measurement error (whether the error is positive or negative) because we don't know the sign of the display error. Another caution: Although this frequency-measurement technique works with transceivers as well as it works with receivers, it is not a substitute for a given manufacturer's instructions on how to set the transmitter in a transceiver to zero beat with an incoming signal.

A closing comment on "zero beating": Two signals are said to be "at zero beat" when they are perceived as being at exactly the same frequency. The only way to assure true zero beat is to compare the signal frequencies *directly*. This is most often done aurally (with a receiver) or by means of a frequency counter. A zero-beat technique that makes use of an intermediate ("transfer") oscillator—such as a transceiver sidetone—is an indirect technique. Show me a zero-beating technique that lets me hear *my signal in relation to the other signal*, and I'll show you a separate receiver and transmitter!—Ed.

### QUICK FORMS FOR SMALL, ADJUSTABLE COILS

□ Cut a short piece of heat-shrink tubing that is just large enough in diameter to pass a no. 4-40 or 6-32 screw. Coat the screw with silicone lubricant, slip the tubing over the screw and shrink the tubing. After the tubing has cooled and hardened, wind the coil on the tubing without removing the screw. Use quick-setting epoxy glue to secure the wire to the form.

Once the glue has set, you can adjust the inductance by varying the core material and the depth to which it is turned into the coil. Assuming the coil's inductance with an air core as standard, a ferris screw *reduces* the inductance and a ferrous screw *increases* the inductance. Steel (a very poor core material at RF) and brass lower the coil Q in addition to changing its inductance. Ferrous cores suitable for RF are available with threads of standard pitches.—Edwin B. Walker, DDS, WA4DFS, Mountain City, Tennessee

### USE AN END MILL TO REMOVE COPPER FROM PC BOARDS

□ In some cases, the stability of RF PC-board circuitry can be enhanced by using the component side of a double-sided board as a groundplane. This construction

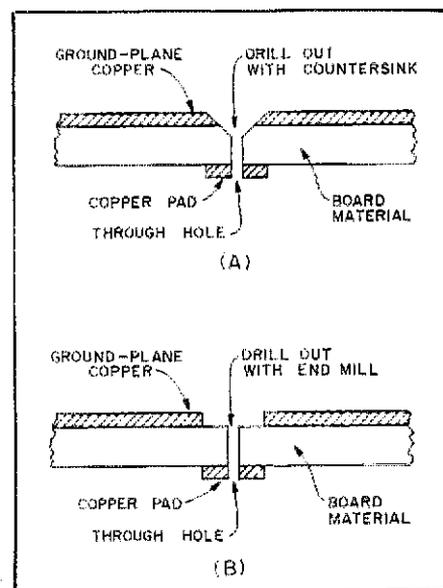


Fig 2—When you use one side of a double-sided PC board as a groundplane, the ground-plane copper must be removed around each through-hole. You can remove the foil with a drill or countersink (A), but overdrilling with these tools can easily ruin the board. An end mill allows removal of foil with little or no damage to the underlying board material (B). Dick Edwin suggests using a homemade end mill; see text.

method requires an extra step, however, because copper must be removed around component-lead holes to avoid short circuits to the groundplane. A drawing in a January 1985 *QST* article<sup>3</sup> shows how to do this with a drill or countersink (Fig 2A).

For me, the easiest method of doing this is to use a homemade end mill rather than a countersink. An end mill is fast, accurate and cheap. In addition, an end mill is less likely to damage a PC board by overdrilling (Fig 2B).

You can make an end mill simply by using a grinding wheel to grind off the point of a standard 1/8- or 3/16-inch-diameter drill bit. The result is a flat-ended bit. I suggest modifying an inexpensive dime- or hardware-store bit; these are easier to grind. (Don't even consider using a carbide bit, of course!)

When your homemade end mill shows signs of dulling (burrs instead of clean removal of PC-board foil), you can re-sharpen it easily: Just touch it up quickly with the grinding wheel.

I've used this method successfully for years to make test boards in a research lab—not because end mills aren't available, but because ground-down drill bits are much less likely to walk off in someone's pocket!—Dick Edwin, KD2FU, Northport, New York

<sup>2</sup>Rich Erhardt, "A Precise Tuning Indicator for General-Coverage Receivers," *QST*, Sep 1987, pp 22-24.

<sup>3</sup>Jonathan F. Towle, "A Simple 10-Meter FM Receiver," *QST*, Jan 1985, pp 19-21.

The publishers of *QST* assume no responsibility for statements made herein by correspondents.

## COMPUTER ASSISTANCE FOR THE DISABLED AMATEUR

Several readers wrote to express their thanks for the *QST* articles by Butch Bussen<sup>1,2</sup> and Fred Gissoni.<sup>3</sup> Here's some additional information. In Atlanta, Georgia, IBM® has a National Support Center for Persons With Disabilities. The support center keeps a database of more than 400 third-party computer-product companies that have an assortment of devices available to aid the disabled.

The package of information I received from IBM included information on modifying standard computer keyboards, alternatives to standard keyboards, electronic environmental control aids, switching devices for alternative input systems and a Guide to Resources for Persons with Disabilities. Also included in the package was information concerning the IBM Special Needs Exchange on CompuServe™, a brochure describing IBM's Personal System/2™ Screen Reader™ and brief descriptions of six text-to-speech synthesizers produced by other companies.

For additional information, contact the IBM center at PO Box 2150, Atlanta, GA 30055, tel 800-426-2133 (Continental US, voice/TDD); 404-988-2733 (Georgia, voice only); telephone device for the deaf, 404-988-2729 (Georgia TDD only).

Disabled radio amateurs may also be interested in another item called Screen Talker. Contact Andromida Inc, 326 E Mason Ave, Alexandria, VA 22301, tel 703-549-3214 for more information.—Paul K. Pagel, N1FB, ARRL HQ

## OVERPOWERED DIODE

Please refer to Bill Koch's item in Technical Correspondence for February 1988.<sup>4</sup> Running 1 or 2 watts of RF through a 6-dB pad into a 1N23 diode will meet or exceed the burnout rating of the diode. The 1N21/1N23 series of mixer diodes is rated at 250 mW maximum incident CW RF power. I've found that the X-band signal from a homemade diode mount driven with as little as 10 mW could be heard on a properly adjusted Gunnplexer™. Rarely was more than 100 mW needed.<sup>5</sup> Intrusion alarms are not designed

for this application and may well need the stronger signal generated using a power level near (but below) the diode burnout rating.—Steve J. Noll, WA6EJO, 1288 Winford Ave, Ventura, CA 93004-2504

## HEATH SB-1000 COMMENTS

I read with interest the Product Review of the Heath® SB-1000 linear amplifier.<sup>6</sup> Recently, I also completed the construction of the kit. The amplifier performs quite well.

I, too, experienced sparking in the amplifier during tune-up on 160 meters. In my case, I found the sparks were caused by arcing between the green and blue wires on the output tank toroid coil and the PLATE (C27) and LOAD (C31) variable capacitor lugs. (This toroid is identified in the illustration booklet on p 8 as item B7, part number 230-6800, and in the schematic diagram on p 70 as L9. The installation instructions are found on pp 31-32.) I pressed the green and blue wires of the toroid as far as possible away from these capacitor lugs and toward the input-filter box. This solved the problem.—Dick Hudson, KA4POG, Rte 2, Box 205A, Hermann, MO 65041

## ESTIMATING TOROIDAL CORE CHARACTERISTICS

I had many toroidal cores and ferrite beads in my "junk box" and didn't know enough about their characteristics to use them in RF circuits. Because I hate to throw anything away [A pack-rat syndrome experienced by many hams.—Ed.], I decided to spend a rainy day trying to characterize the cores and beads.

Two parameters of importance are the  $A_L$  value and the  $\mu$ , or permeability, of the material. The  $A_L$  value permits you to calculate the number of turns required for a given inductance. The  $\mu$  is required to estimate the type of core material, and the frequency range for which the core may be suitable. (The latter is done by comparing the  $\mu$  values obtained with those of cores described in published data.) Often, junk-box cores are not the same size as cores listed in published data. If the cores were the same dimensions, the  $\mu$  could be estimated simply by comparing the  $A_L$  value with those in the data sheets. Therefore, what I needed was a relationship between  $A_L$  and  $\mu$  as a function of core dimensions. For an accuracy of better than 10%, it turns out that the relationship is quite simple.

A plot of

$$\frac{(\text{outside diameter})^2 \times \text{height}}{(\text{inside diameter})^2} \quad (\text{Eq 1})$$

on the vertical axis v  $A_L$  values on the horizontal axis yields a fairly straight line for toroids. The slope of the line is inversely proportional to the permeability. For ferrite beads, the best straight line is obtained by plotting

$$\frac{(\text{outside diameter}) \times \text{height}}{\text{inside diameter}} \quad (\text{Eq 2})$$

Thus, the following equations apply:

$$\mu = \frac{1100 \times DI^2 \times A_L}{DO^2 \times H} \quad (\text{Eq 3})$$

for toroid cores, and

$$\mu = \frac{597 \times DI \times A_L}{DO \times H} \quad (\text{Eq 4})$$

for ferrite beads, where

- $\mu$  = permeability
- DI = inside diameter (in inches)
- DO = outside diameter (in inches)
- H = height (in inches)
- $A_L$  = microhenrys per (turn)<sup>2</sup>

A good caliper is needed to accurately measure the core or bead dimensions. Fairly good measurements can be made with a scale, calibrated in 64ths of an inch, and a magnifying glass. The hole diameter of ferrite beads can be estimated by inserting wires of known diameter or drill bits of known size into the bead hole.

To determine the  $A_L$  value for the core or bead, wrap a few turns of wire on the core and measure the inductance. (I have obtained good results using a Heath RCL bridge and a dip meter.) To use this method, a capacitor is soldered in parallel with the core winding and the resonant frequency of the circuit is determined by means of the dip meter. Be sure to use a well-calibrated dip meter; better yet, measure the frequency at the dip using a frequency meter or calibrated receiver. The inductance of the winding can be calculated from

$$L = \left( \frac{10^3}{2\pi \times f} \right)^2 \times \frac{1}{C} \quad (\text{Eq 5})$$

where

- L = inductance in microhenrys
- f = frequency in MHz
- C = capacitance in pF

The  $A_L$  value can be calculated from

$$A_L = \frac{L}{(\text{turns})^2} \quad (\text{Eq 6})$$

<sup>1</sup>B. Bussen, "The Squawker: A Light Detector," *QST*, Jul 1987, pp 35-37.

<sup>2</sup>B. Bussen, "Amateur Radio and the Blind," Parts 1-4, *QST*, Oct 1987-Jan 1988.

<sup>3</sup>F. Gissoni, "A Passport to Communications for the Blind," *QST*, Feb 1988, pp 26-29.

<sup>4</sup>B. Koch, "10-GHz Frequency Determination," *QST*, Feb 1988, p 41.

<sup>5</sup>S. Noll, "X-Band Calibrator," *ham radio*, Apr 1981, pp 44-50.

<sup>6</sup>P. Pagel, "Heath SB-1000 HF Linear Amplifier," *QST*, Feb 1988, pp 33-35.

For example, a medium-size ferrite bead I had measured 0.259 inch OD, 0.121 ID and 0.379 inch high. With 18 turns of wire on the bead, I measured an inductance of 400  $\mu$ H. Using Eq 6,

$$A_L = \frac{400}{(18)^2} = 1.23 \quad (\text{Eq 7})$$

The  $\mu$  was calculated using Eq 4

$$\mu = \frac{597 \times 0.121 \times 1.23}{0.259 \times 0.379} = 905 \quad (\text{Eq 8})$$

Thus, the bead appears to be similar to Amidon's material 43, which has a permeability of 850 and is recommended for use between 30 and 600 MHz. To find the number of wire turns required for a given value of inductance, use the following formula

$$N = \frac{L}{1.23} \quad (\text{Eq 9})$$

where

N = number of turns

L = required inductance in microhenrys

$A_L$  values are given in different forms in data sheets. To convert microhenrys/(turn)<sup>2</sup> to millihenrys/(1000 turns), multiply by 1000. To convert microhenrys/(100 turns), multiply by 10,000.—*Andrew S. Griffith, W4ULD, 203 Lord Granville Dr, Rte 2, Morehead City, NC 28557*

### WILLIAMS SYNTHESIZER USE

□ Here's one use an SWL found for Fred Williams' digital frequency synthesizer.<sup>7,8</sup> (The information may provide ideas for other applications of the synthesizer.) In the February 1988 issue of *The LOWDOWN*<sup>9,10</sup>, Max Carter describes how he uses the synthesizer as a substitute for a Yaesu FRG-7700 receiver VFO.

Max obtained some help from his friend, Mark Mallory, who rewrote the control program for the synthesizer.<sup>11</sup> This firmware allows: (1) Direct frequency entry from a keypad; (2) the ability to move the receiver frequency up or down at user-selected increments; (3) a 10-frequency memory for instant recall of often-used frequencies; (4) the use of a shaft encoder;

<sup>7</sup>F. Williams, "A Digital Frequency Synthesizer," *QST*, Apr 1984, pp 24-30. (See also *Feedback*, *QST*, Jun 1984, p 43.)

<sup>8</sup>F. Williams, "A Microprocessor Controller for the Digital Frequency Synthesizer," *QST*, Feb 1985, pp 14-20.

<sup>9</sup>M. Carter, "Synthesized Tuning Unit," *The LOWDOWN*, Feb 1988, pp 16-17. Max's address is: 46 14th St, Wheatland, WY 82201.

<sup>10</sup>*The LOWDOWN* is a publication of the Longwave Club of America. Contact the publisher, William E. Oliver, at 45 Wildflower Rd, Levittown, PA 19057, tel (evenings only) 215-945-0543.

<sup>11</sup>Information on the controller program (contained in a 2716 EPROM) may be obtained from Mark Mallory, 5196 Cobblecreek Rd #7K, Salt Lake City, UT 84117.

(5) selectable IF offset, permitting use of the synthesizer with virtually any superheterodyne receiver; (6) if equipped with A & A Engineering's optional non-volatile RAM, the controller remembers all programmed information even when powered down. This means the controller comes up in exactly the same state it was in when turned off—a feature the original program didn't have.

Max mated the synthesizer to the FRG-7700 by simply unplugging the internal VFO and substituting the synthesizer (after making a suitable adapter cable). The synthesizer, its controller, a 12-button keypad and a 7-digit display are available from A & A Engineering, 2521 W La Palma, Unit K, Anaheim, CA 92801, tel 714-952-2114.—*Paul K. Pagel, N1FB, ARRL HQ*

### MORSEMASTER II IS BACK

□ Stone Mountain Engineering is once

again making PC boards and hard-to-find parts available for builders of The MorseMaster II.<sup>12</sup> The PC board is \$12; a kit consisting of the PC board, microprocessor, EPROM IC and rotary switch is \$25. (Add \$2.50 for shipping.) Assembled units and complete kits are no longer available. Write or call Mike Huddleston (KJ4LN) at Stone Mountain Engineering, Box 1573, Stone Mountain, GA 30088; tel 404-879-0241.—*Paul K. Pagel, N1FB*

<sup>12</sup>M. Huddleston, "Build the MorseMaster II," *QST*, Feb 1987, pp 33-38; *Feedback*, *QST*, April 1987, p 59.

**Note:** All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include a daytime telephone number at which you may be reached if necessary. 

## New Books

### ELECTRONIC SYSTEMS AND TECHNIQUES

By K. F. Ibrahim. Published by Longman Scientific & Technical, co-published by John Wiley & Sons, Inc, New York, NY. First edition, 1987. Softcover 7½ × 9½ inches, 259 pages plus index. \$19.95.

Reviewed by Doug DeMaw, W1FB

*Electronic Systems and Techniques* is written in the precise manner common to most technical books that originate in the United Kingdom. The English is clear and to the point, without unnecessary adjectives and clichés. Ibrahim emphasizes in the preface that his approach is nonmathematical. He assigns component values in many of his schematic diagrams that are typical of those found in practical circuits.

This book contains 37 chapters and several appendices. Each chapter is, however, relatively terse. For example, the chapter that treats field-effect transistors (FETs) is only six pages long.

The list of chapter titles is long, so here is a brief sampling of chapter titles that indicate the scope of the volume: Direct Current, Alternating Current, Waveforms, Amplifiers and Oscillators, Resonance, Transformers, Matching, Power Supplies and Frequency Modulation. Other chapters include Television, Digital Gates and Systems, Microcomputers, Transistors, Measuring Instruments and Logical Fault Finding.

Essential mathematics are presented in basic form, where necessary, to explain a concept or to provide a solution to a question. Anyone who can handle high-

school algebra, or use a scientific calculator, will have no problem with the equations used in this book.

Pictorial illustrations of waveforms are used liberally throughout the book. This information can be helpful to those who want to supplement their studies by assembling test circuits and checking the waveforms with an oscilloscope. The various waveform illustrations depict clipping, clamping and distortion, along with examples of clean waveforms.

I read this book with care and found the text to be accurate. I did not test the practical circuit examples, but intuitive analysis shows that they are representative of the circuits under discussion.

*Electronic Systems and Techniques* is not a designer's handbook; it is not meant for that application. Rather, it is an expanded electronics dictionary. The limited discussion of the subjects covered in the volume disqualifies it as an in-depth textbook. However, there should be no doubt in any reader's mind about what each topic involves after reading the text. If you've wondered what damping and damped oscillations are, for example, you will find this information in the text. The book does not, on the other hand, tell you how to design a circuit that produces damped oscillations.

This publication, because of its plain language and expanded explanations of common subjects, can be an asset to those who want a better understanding of many of the questions found in the test for Amateur Radio licenses. Therefore, I recommend it for addition to your Amateur Radio library. 

# New Products

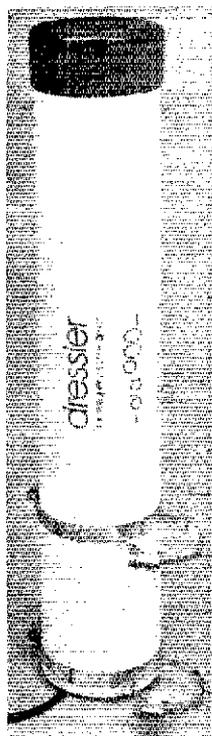
## DRESSLER ARA 900 ACTIVE ANTENNA

□ Probably the most-used omnidirectional broadband antenna at VHF/UHF is the discone. Discones cover wide frequency ranges with a relatively constant input impedance, but have little gain and are mechanically cumbersome. Dressler, a West German company, manufactures the ARA 900 active antenna as an alternative to the discone for wide-band VHF/UHF receiving needs. The ARA 900 covers the 50- to 900-MHz range, and has a built-in preamplifier with 11 to 15 dB of gain and a noise figure that varies from 1 to 5 dB over that range. According to the manufacturer, the third-order intercept of the preamp is +18 dBm. The antenna is housed in a rugged, weatherproof PVC tube, and is supplied with all hardware necessary to mount the antenna to a mast. Power for the preamplifier (which is mounted inside the antenna enclosure) is supplied through the coaxial feed line by a 12-V dc source in the shack.

The ARA 900 is supplied with documentation, a 12-V dc power supply and feed-line coupler, and a choice of PL-259 or N connectors. The ARA 900 is available from Gilfer Shortwave, 52 Park Ave, Park Ridge, NJ 07656, tel 201-391-7887. Price, \$189 plus \$8 shipping and handling.—*Rus Healy, NJ2L*

## INTERNATIONAL RADIO MEMORY BANK CONTROL FOR THE TS-940S

□ The IRI Bank Controller I allows TS-940S owners to step through the four available memory banks without using the bank switches under the access cover in the top of the radio. The Bank Controller I plugs directly into the voice synthesizer connector in the rig. The VOICE button, which usually activates the synthesizer (when installed), then operates the memory bank switching circuitry. One benefit of the Bank Controller I is the use of CMOS ICs, which keep current drain to a minimum. The Bank Controller I does not draw current



from the memory backup batteries in the TS-940S.

Priced at \$24.95 plus \$5 shipping and handling, and supplied fully assembled, with installation instructions and a six-month warranty, the Bank Controller I is available exclusively from International Radio, Inc, 751 S Macedo Blvd, Port St Lucie, FL 34983, tel 407-879-6868.—*Rus Healy, NJ2L*

## RF CONCEPTS 440-MHz POWER AMPLIFIERS

□ Two solid-state 440-MHz amplifiers are now available from RF Concepts. The model RFC 4-310 delivers 100 W RF output for 30 W input, and the RFC 4-110 provides 100 W output for 10 W input. Both models have built-in GaAsFET, 15-dB-gain, 1.75-dB NF preamplifiers for receive. Current drain for the power amps is 25 A at 13.8 V dc. Cabinet size for both amplifiers is 3 × 6 × 11.5 inches (HWD). Suggested list prices for the RFC 4-310 and RFC 4-110 are \$324 and \$349, respectively. More information is available from RF Concepts, 8911-A Murray Ave, Gilroy, CA 95020, tel 408-847-7373.—*Rus Healy, NJ2L*

## GGTE MORSE TUTOR FOR THE IBM® PC AND COMPATIBLES

□ Some of the measures of good Morse code software include user-friendliness, flexibility (value in both teaching and in helping you improve Morse proficiency), accuracy in code speed and character spacing and good teaching techniques. GGTE's Morse Tutor program provides all of these attributes. You select code speed and character spacing (separately, both in words per minute—WPM), lesson duration, tone frequency and display mode. The program remembers your choices for each of these variables—there is no need to reset them each time you restart the program.

Morse Tutor teaches all code characters in 11 lessons, using a "flash-card" technique (large block letters) for each character. When you begin each lesson, the program will teach you the characters in that lesson, or you can choose a random-character drill using all the characters in only that lesson, or a random-word drill using all the characters introduced up to and including that lesson. You select whether the Morse characters are displayed as they are sent, or at the end of that part of the lesson.

The last lesson is a random-QSO generator. In this lesson, QSOs are generated from a large pool of information on disk, creating a different QSO for each lesson. Depending on the code speed, the

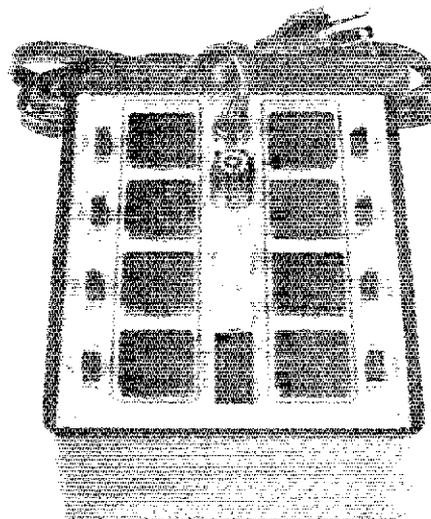
two "stations" in the QSO may make several exchanges during one lesson. The names and call signs of the stations will match throughout the QSO. You can interrupt a lesson at any time by pressing any key, and operation can then be resumed (or canceled) when you are ready.

If you want to verify the code speed, you can use lesson 0, which sends PARIS for two minutes. Counting the number of times PARIS is sent each minute will give you the code speed in WPM. The first time you run the program, Morse Tutor takes you through this computer-speed calibration automatically to compensate for variation in computer clock speeds. Comprehensive error trapping and menu-driven functions make Morse Tutor easy to use.

Morse Tutor sells for \$19.95 plus \$2 for shipping and handling. California residents add \$1.20 sales tax. Available from GGTE, 21881 Summer Circle, Dept MTQ, Huntington Beach, CA 92646, tel 714-968-1571.—*Rus Healy, NJ2L*

## KALGLO ELECTRONICS DPC + POWER CONSOLE

□ Kalglo Electronics manufactures an independently switchable, 8-outlet surge suppressor that clamps voltages greater than 131 in 1 picosecond. The outlets are arranged in two isolated, separately filtered banks of four outlets each. Line-noise filtering is handled by five-stage, series-parallel low-pass networks in each branch.



A master power switch and indicator, fuse protection and a 7-foot, heavy-duty 3-conductor power cord are included with the DPC+. For more information, contact Kalglo Electronics Co, Inc, Dept DPC+, 6584 Ruch Rd, East Allen Twp, Bethlehem, PA 18017-9359, tel 215-837-0700.—*Rus Healy, NJ2L*

# The ARRL/VEC—A New Era

The ARRL/VEC celebrates its fourth anniversary this month... You Can Teach an Old Dog New Tricks!

By Steve Place, WB1EYI

Manager, Volunteer Resources

This month marks four years of successful service for the thousands of volunteers who have toiled under the banner of the ARRL Volunteer Examiner Coordinator (VEC). Nearly 7000 sessions have been conducted by a force of more than 10,000 Volunteer Examiners. Roughly 145,000 exam elements have been administered to 92,000 candidates, resulting in more than 50,000 upgrades (not counting those who earned Novice licenses in an ARRL/VEC-coordinated session). It has been an exceptionally busy and exciting four years for everyone involved.

Nevertheless, we have suffered growing pains, and we have made mistakes. But we've also learned a few lessons along the way. Thanks to ARRL/VEC Volunteer Examiners' consistently high standards and tireless efforts, we're now entering an equally exciting era with great expectations.

How has the ARRL/VEC's program changed over the first four years? What will it look like in the years to come? The old dog has learned a few new tricks!

## ARRL/VEC Commitment to Service

Above all, the business of the ARRL/VEC is service. Our job is to help our Volunteer Examiners make your exam experience as pleasant and rewarding as possible. We're committed to doing that more effectively than ever before.

*ARRL/VEC VEs are trained VEs.* As always, the ARRL/VEC continues to train prospective VEs in the proper way to conduct test sessions before they're accredited. Every VE first learns the ropes by reviewing the ARRL/VEC's comprehensive *Volunteer Examiner Manual*, and then demonstrates his familiarity with the rules and procedures by successfully completing an open-book test. From the flood of grateful comments we get from successful—and even unsuccessful—candidates, we know our VEs are doing a remarkable job.

*"Walk-ins" are welcomed.* Though we originally required all candidates to preregister, in response to your requests (and with the confidence that comes with experience), our VE teams are now permitted to welcome walk-ins as a routine part of the ARRL/VEC program. The decision as to whether they are able to handle walk-ins is left completely to the discretion of each VE Team.

*Everything you need.* Another attractive aspect of the ARRL/VEC program is that

each VE Team is provided with all the testing materials it needs for each session: written element exam booklets, answer sheets, answer keys, code test cassette tapes, code quizzes, FCC Form 610s, candidate rosters, session summary and reporting aids, Certificates of Successful Completion of Examination and more. The VE Team is freed to focus on the matter at hand—putting you at ease and making your exam as painless as possible.

*New versions.* New versions of each written test and code test element are now introduced periodically. As a candidate, this may not mean much to you—you're still

responsible for studying the prescribed material and knowing the answers to the questions on the latest question pools. To a VE, however, frequently released new versions are important. With a number of fresh exams in circulation, the chances of giving the same version repeatedly are greatly diminished. And that enhances the integrity of the program.

*Master tapes.* Everyone welcomes the ARRL/VEC's recently improved code test tapes. They're cleaner-sounding than ever before. Specially mastered using computer-controlled timing and a unique audio filter designed in the ARRL lab to produce a crisp keying waveshape, our test tapes are engineered to be the best sounding, most easily copied code recordings we can produce.

## Making Life Easier For the VE

An essential part of our jobs at Headquarters is making life easier for ARRL/VEC Volunteer Examiners. We've recently made great strides in serving our VEs better. Most important have been improvements in getting exam materials to VE Team Liaisons reliably, in good shape and on time. Worries about late delivery and last-minute hassles with parcel delivery services are a thing of the past!

Early this year, more than a dozen of the ARRL/VEC's most active Teams took part in a trial program of field stocking. It was an unqualified success. Since then, more than 220 other experienced ARRL/VEC VE Teams who had consistently conducted accurate, problem-free exams, have also been stocked with enough materials to last for several sessions. When their stocks get low, it's a simple matter of replenishing them with the latest test versions available.

We've also made great strides in providing peace of mind to those VE teams who test infrequently or who do not yet have much experience with the ARRL/VEC. For several months now we've followed a policy of shipping materials to Teams as soon as we get the word—up to eight weeks before a session is to be held! The VE Team Liaison gets the package in plenty of time to check it out before the session. Not only is the service to our VEs better, it is also less costly.

*The "Paperwork Monster."* To a candidate, the work is over when he

(continued on page 52)

## VEC Organizations

The ARRL/VEC is by far the biggest, but it is not the only organization to enter an agreement with the FCC to coordinate the efforts of Volunteer Examiners, nor is it the first. Radio amateurs owe a debt of gratitude to all the VECs who helped get the program off the ground and who have provided reliable, convenient exam opportunities with integrity in the regions in which they have been certified. (Present VECs listed alphabetically.)

### Certified in all 13 Regions

ARRL/VEC  
DeVry Amateur Radio Society  
The W5YI Report

### Certified in 1 or more Regions

Anchorage Amateur Radio Club  
Boeing Employees Amateur Radio Society (recently ceased operations)  
Central Alabama VEC, Inc  
Charlotte VEC  
Golden Empire Amateur Radio Society  
Greater Los Angeles Amateur Radio Group  
Honolulu Amateur Radio Club  
Jefferson Amateur Radio Club  
Koolau Amateur Radio Club  
Laurel Amateur Radio Club, Inc  
Milwaukee Radio Amateurs Club, Inc  
Mountain Amateur Radio Club  
PHD Amateur Radio Association, Inc  
Sandarc-VEC  
Sunnyvale VEC  
Triad Emergency Radio Club  
Western Carolina Amateur Radio Society

# Many Scholarships Available

By Mary E. Schetgen, N7IAL

Assistant Secretary  
The ARRL Foundation

Message from Paul Grauer, W0FIR,  
ARRL Foundation President:

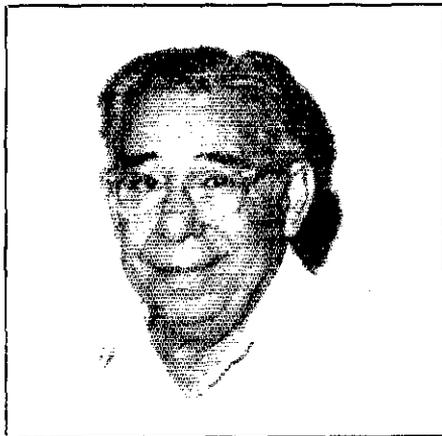
*On behalf of the Officers and Directors of the ARRL Foundation, I welcome all ARRL members to the debut of At the Foundation—news and features about your ARRL Foundation. We'll report the many projects and programs currently underway—but especially—we'll highlight the people who make these programs possible. As a Foundation contributor, your name and call sign will appear in our Contributors Corner (next page) and we welcome your letters, comments and items of interest.*

## The Jesse A. Bieberman Meritorious Membership Program

Last month in *QST*, you read about the reactivation of the Jesse A. Bieberman Meritorious Membership Program. Let's take a moment to look at the man for whom this fund was named. The late Jesse A. Bieberman spent his working career as a teacher with the Philadelphia school system. With an active Amateur Radio interest that spanned 60 years, Jesse was a well-loved member of the Frankford and Southern Chester County Radio Clubs and served as the W3 Call Area QSL Bureau Manager for 33 years. As an Atlantic Division Vice Director for 10 years, and the Atlantic Division Director from 1980 until his death in May of 1982, Jesse faithfully served his ARRL constituents and brought to the attention of the ARRL Board of Directors the concerns of the disabled and elderly. He advocated the creation of a reduced-cost membership for elderly and disabled long-term ARRL members who could no longer afford membership renewal.

Mr Bieberman's sensitivity and empathy touched many lives during his teaching and Amateur Radio careers and it is fitting that the Meritorious Membership Program exists to perpetuate Jesse's benevolent ideal on behalf of his fellow ham.

Recommendations for a one-time, one-year Meritorious Membership (extension) may be made only through your Division Director. See Jun *QST*, p 56, for guidelines to follow when submitting a Meritorious Membership recommendation. Contributions and bequests should be addressed to the Jesse A. Bieberman Meritorious



Jesse A. Bieberman, W3KT (SK), expressed compassion and appreciation for the needs of the elderly and disabled.

Membership Fund, The ARRL Foundation,  
225 Main St, Newington, CT 06111.

## Two New Scholarship Awards for 1988

The ARRL Foundation is happy to announce that *two* additional scholarships will be awarded during the 1988-89 scholarship season: The Edward D. Jaikins Memorial Scholarship (\$500) and The Dr. James L. Lawson Memorial Scholarship (\$500).

The Edward D. Jaikins Memorial Scholarship was established by a generous endowment from Virginia Jaikins, KA8CPS, Net Manager of D8RN, in honor of her late husband Edward, WD8LRT, a popular traffic handler who shared responsibilities for D8RN with Virginia and was a long-time ARRL booster.

The Dr James L. Lawson Memorial Scholarship has been established by Mrs James L. Lawson and funded by the generous assignment of royalties from the late Dr Lawson's ARRL book, *Yagi Antenna Design*. Dr Lawson, W2PV, retired in 1980 after a distinguished career as a physical scientist and researcher, and

he enjoyed contesting and antenna experimentation.

Listed here are the *terms of reference* or guidelines for the two new scholarships. The deadline to apply for 1989-90 academic year scholarships is **May 15, 1989**.

## The Edward D. Jaikins Memorial Scholarship

The award, primarily endowed through the generosity of Virginia Jaikins, KA8CPS, to honor the memory of her late husband, Edward D. Jaikins, WD8LRT, is intended exclusively for educational use, to provide assistance with costs of tuition, room, board, books and/or other fees essential to the advanced education of the recipient.

### Applicant Requirements

1) Applicant must be enrolled in an accredited institution beyond the high school level and hold a radio amateur operator General-class or higher license.

2) Preference will be given to candidates residing in the FCC Eighth Call District (Michigan, Ohio or West Virginia) and attending school within that call district.

3) Preference will be given to applicants with an academic grade point average of 3.0 or higher.

4) Application forms, as provided by the ARRL Foundation, must be submitted prior to May 1st for the academic year beginning in September of a calendar year.

5) Academic merit, financial need and a demonstrated interest in promoting the Amateur Radio Service will be considered highly important in selecting a recipient. Current academic transcripts should be attached to the application.

### Selection Procedures

The ARRL Foundation Scholarship Committee shall consider all applicants. The decision of the Committee, upon acceptance by the Foundation Board of Directors, is final.

### Award

The Edward D. Jaikins Memorial Scholarship as administered by the ARRL



**THE ARRL FOUNDATION, INC.**

*"for the advancement of amateur radio"*

Foundation shall be \$500.00 annually awarded at the start of the academic year (September). This award shall be granted annually until depletion of the initial endowment.

### *The Dr James L. Lawson Memorial Scholarship*

The award, primarily endowed through the generosity of Mrs. James L. Lawson, is intended exclusively for educational use, to provide assistance with costs of tuition, room, board, books and/or other fees essential to the advanced education of the recipient.

#### *Applicant requirements*

- 1) Applicant must be enrolled in an accredited institution beyond the high school level and hold a General class or higher Amateur Radio operator license.
- 2) Preference will be given to candidates residing in the ARRL New England Division (Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island and Vermont) or New York state, and attending school within that region.
- 3) Preference will be given to students of electronics, communications or related fields.
- 4) Preference will be given to baccalaureate or higher degree candidates.
- 5) Application forms, as provided by the ARRL Foundation, must be submitted prior to May 1st for the academic year beginning in September of that year.
- 6) Academic merit, financial need and a demonstrated interest in promoting the Amateur Radio Service will be considered highly important in selecting a recipient. Current academic transcripts should be attached to the application.

The ARRL Foundation Scholarship Committee shall consider all applicants. Upon the Committee's recommendation, the Board of Directors of the Foundation shall disburse funds for the award as described below.

The Dr James L. Lawson Memorial Scholarship is an annual award of \$500, given at the start of the academic year (September). The award may be presented by the New England, Atlantic or Hudson Division Director (whichever applicable) or his representative at an appropriate convention or club meeting convenient to the recipient.

### **Which Way To The Beach?**

Are you a student out soaking up the sun, enjoying your summer vacation, without a care in the world about financing fall tuition? Then you must have applied for an ARRL Foundation scholarship and are awaiting the announcement of recipients. We'll be prompt in notifying you if you've been selected and we'll be announcing all scholarship recipients in an upcoming *QST*. Why not shake the sand out of your shoes and get the jump on your buddies by sending for information and applications for the 1989-90 academic year scholarships? Send your request (even a picture postcard!) for information to The ARRL Foundation, 225 Main St, Newington, CT 06111.

### **Contributors Corner**

We wish to thank the following for their generous contributions to:

*The Bill Bennett, W7PHO Memorial Fund*  
Rod Linkous, W7OM  
Western Washington DX Club

Issaquah Amateur Radio Club  
Jim Barrows, W7BCT  
Mona Barrows, WA7UFS

### *The General Fund*

Sidney L. Chabus, N2DNY  
Walter E. Barnes, N5HXC  
Phillip Smith, WB1FGJ  
Philip H. Gimbel, N8BAA  
Robert C. Phelps, WB6WDO  
James J. Sullivan, WD9DPZ  
Thomas D. Canup, KJ4D  
Woodward H. Warrick, W8IPY  
George F. Beacham, N0BMK  
LeRoy E. Hendrickson, K6LQT  
Charles E. Askew, KA3KGQ  
Antonio Godinho, YV5FTH  
Ralph L. Ely, WB4AQI  
J. Wallace Millard, K4JVT  
Leo C. Carpenter, KA0GUN  
Leo C. Middendorf, WO8A  
Rodger V. Neidigh, W4RWS  
Francisco Ho, N5FMD  
Martin S. Ewing, AA6E  
Kenneth F. Wiggernhorn, WD8INK,  
in memory of Arnold Kincaid, W8CTN.  
Samuel J. Nicholson, W8KYG  
James D. Lindley, K5EWS  
Urs Jenzer, HB9AVQ  
Paul G. Catrou, WA4MXT  
Arthur E. Schuessler, W9UUL  
Ismael Colon, WP4CKX  
Allen Hart, N7FYU  
Stanley Kowalewski, WB2FSE  
Charles B. Hinds, Jr, N7BGW  
John Hlinka, W2QHY  
Edward J. Rambo

### *The Goldwater Scholarship Fund*

James M. Webster  
As received and acknowledged during the month of April.

## **ARRL/VEC**

(continued from page 50)

rechecks his answers for the final time and, resigned to his fate, hands the exam booklet back to the VE. To the VE, however, the work has just begun. Grading, summarizing and reporting are necessary "evils" that admittedly fall a few inches short of exciting. They can try a VE's patience and, for large sessions, eat up a lot of time. (The next time you get the chance, say "Thanks" to your local VEs—the job they do isn't the easiest in the world.)

In response to requests and very helpful suggestions from our VEs in the trenches across the country, we've recently consolidated and otherwise simplified the forms that are used in registering, summarizing and reporting exam sessions. The fewer and easier-to-use forms that proved their worth in field tests earlier in the year are now in use throughout the program.

### **Service is What We're All About**

An often unnoticed service provided by

the ARRL/VEC is post-session screening of the applications and summaries submitted by VE Teams before they are sent to the FCC in Gettysburg. The ARRL/VEC's professional staff carefully double-checks each individual FCC Form 610 and session report form. They catch oversights or errors that might lead the FCC to kick back an application or entire session and delay license actions. ARRL/VEC VEs are good—but they'd have a hard time matching the skill that comes from screening hundreds of applications day in and day out.

How do you find out where you can take a test? The ARRL/VEC maintains a national referral data base of Volunteer Examiner sessions that is updated whenever a session is registered with us. Printouts of upcoming session schedules are automatically sent each month to leaders in the field and to others on request. We also refer hundreds of people each year to the most convenient sessions being offered in their local areas.

Convenience has been the key to the success of the overall Volunteer Examiner Program since its inception. Exams are available

on evenings and weekends, in villages, towns and cities throughout the United States. The ARRL/VEC now supports more than 10,000 accredited Volunteer Examiners who stand ready to administer exams in every FCC-defined region, in every one of the 50 United States, in Puerto Rico, the Virgin Islands and Guam—and even in Japan, Iceland, Saudi Arabia, the Republic of Panama, the Federal Republic of Germany, New Zealand, Guantanamo Bay in Cuba, the Bahamas, Austria, South Korea and Australia. It's the rare situation where an exam can't be arranged.

The past four years have indeed been exciting. But beneath that excitement lies a sense of accomplishment and satisfaction. We tip our hats to all VECs and all Volunteer Examiners who have made the program work right out of the chute and who have worked hard to maintain the integrity of the program.

And those VEs who have so faithfully served with the ARRL/VEC? We're grateful for your dedication. We're proud of the job you've done. And we look forward to supporting your work in the years to come.

# The W1AW Fire

It wasn't exactly Mrs O'Leary's cow kicking over the lantern in Chicago, but it did create a hot time in the old town of Newington that October night.

By George Hart, W1NJM  
Communications Manager (retired), ARRL

Ever been awakened at 6 AM by the insistent ringing of your doorbell and pounding on your front door, to find a policeman impatiently waiting outside? It's *not* a comforting feeling! It happened to me on the morning of October 14, 1953, at my house in Newington, half a mile south of W1AW.

"Don't you have some connection with that radio station over on Main Street?" the police sergeant asked irritably.

"Yeah," I replied, somewhat stupidly. I was feeling a little irritated myself. "Why, what's the problem?"

"It's on fire!" He was clearly exasperated. They probably got him out of bed, too.

"Omigod!" I exclaimed. "I'll come right over."

When I got over there, there were fire trucks all over the place. A haze of smoke surrounded the building. The fire marshal told me that the fire had been reported at about 5 AM by an unidentified passerby. When the Volunteer Fire Department started arriving on the scene, smoke was escaping from whatever cracks and chinks it could find, mostly in the upper parts of the building.

"We could see no flames," he told me, "but the whole inside of the building was filled with smoke; we couldn't see anything inside. The building was shut up tight, and a good thing. But we had to be mighty careful when we started knocking in the doors, for fear of explosion. Smoke is unburned fuel, y'know."

By 7 AM the fire was under control, and the excitement was over. The building had been entered by forcing the locks on the front door. There was no explosion, but lots of smoke, which had to be let out slowly before the firemen could enter, smoke masks in place.

I had to wait a few minutes until the marshal felt it was safe for me to enter. Inside the building I was confronted by a gaping hole in the operating room floor, behind the operating position. The hole was

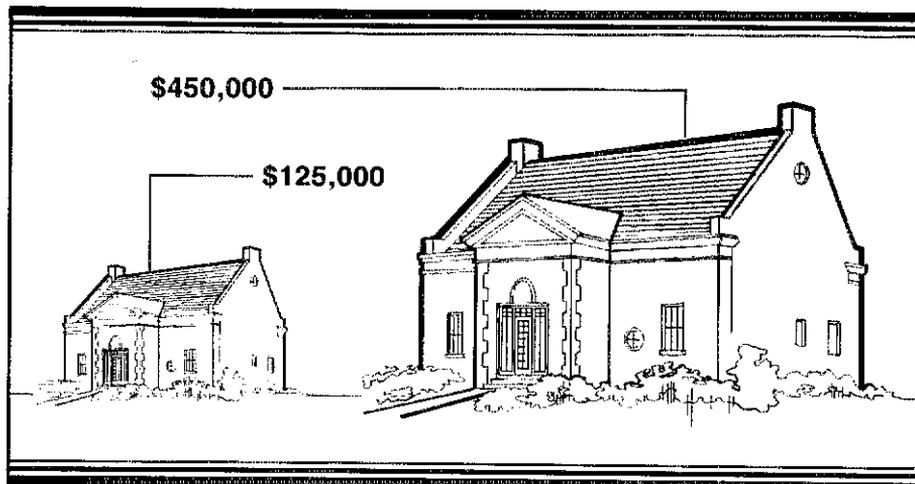
about 4 feet in diameter, charred and still steaming at its edges. Canvas covers had been thrown over the operating desk and the transmitter racks.

The Kleinschmidt tape perforator and the table on which it sat were nowhere to be seen. I had to walk around the front of the operating position and a couple of 6-foot racks to gain access to the stairway going into the basement. There, on the basement floor directly under the charred hole, was a heap of charcoal and a mass of twisted metal, the remains of our precious perforator and its table! All that was left on the table was one partially consumed leg. The perforator was a complete ruin.

In fact, the whole place was a mess. Obviously, the smoke had been thick enough to cut with a knife, and the heat intense, but the building construction had been such that once the fire had consumed the oxygen inside it had burned itself out, then smoldered—thus the heavy smoke.

We had the alertness of the early morning passerby to thank for putting in the alarm, otherwise damage might have been much greater, especially if the smoldering fire inside had burned a hole in the outside of the building and reached a fresh supply of oxygen. As it was, the walls and ceiling were blackened by smoke, and the partition between the operating room and the memorial lobby partially consumed. The metal racks in which the transmitting equipment was housed had apparently somewhat protected the gear inside from the intense heat and smoke, but the tuning coils on the high shelf behind the row of transmitters were afforded no such protection. The polystyrene coil forms had melted and the coils collapsed into themselves, and looked to be totally ruined.

Later that day, the insurance company was called and an adjuster arrived, and the electrician who had done the original station wiring was notified, with a mind to restoring W1AW to operation as soon as



The response of the amateur community to the W1AW Fund Drive has been heartening. This graphic shows the response as of May 31, with dozens of contributions arriving daily, for a total of over 1400 to date. Thank you for your generous support.

possible. The electrician arrived on the scene promptly and got right to work putting in temporary wiring and a new main junction box in the basement. It soon developed that this junction box, burned out of recognition, had probably been the source of the fire. The electrician allowed that sometimes the solderless connections get loose, start arcing and eventually develop enough heat to start a conflagration.

Murray Powell, W1QIS, then the W1AW chief operator, had closed the station at 3:30 AM, shortly after the end of his shift. The electrician thought the junction box had probably already been hot but unnoticed by either of the station attendants, and that this situation had been building up for quite some time.

Some planks were brought in and a temporary cover nailed over the hole. The debris was hauled out of the basement and dumped. The insurance adjuster made extensive notes and a number of suggestions and left. Murray and Chuck Bender, W1WPR (now the chief operator of the station), arrived, and John Huntoon, then W1LVQ (now W1RW), came over from the HQ office (then on LaSalle Road in West Hartford), to assist them in the restoration.

After installing a brand new main junction box near the electrical entrance in the basement, the electrician started stringing cables to replace those burned out, so that power could be available to the transmitters. It doesn't seem possible, in retrospect, but by twisting the antenna tuning coils back into working position and supporting them on their own wires, we found they were still serviceable—temporarily of course. The transmitting equipment seemed all intact, although there was some damage to wiring and meltable components that had to be located and tended to.

Work proceeded all day and into the early evening. Wonder of wonders, by bulletin time at 8 PM local, we had three transmitters—80, 40 and 20—in operation. The 8 o'clock bulletin went out on

## How to Contribute to the W1AW Renovation Drive

"The W1AW Fire" is part of the rich and colorful history of the Maxim Memorial Station, a station that has served the Amateur Radio public nonstop through daily code practice transmissions, amateur news bulletin service and general on-the-air operating. Back in 1953, W1AW was quickly renovated after the fire. Today, the W1AW installation needs to be completely refurbished, inside and out. As indicated in April QST and succeeding issues, we need your support to make it happen. Here's how to contribute to the W1AW Fund Drive:

• **By Mail:** Address all contributions to W1AW Fund Drive, 225 Main St., Newington CT 06111. Please make your check or money order payable to W1AW Renovation Fund.

• **By Phone:** For your convenience, credit-card contributions can be made by calling Jennifer at ARRL HQ, tel 203-666-1541, between 8 AM and 4 PM Eastern Time, weekdays.

All contributions are tax deductible to the extent allowed by law, as ARRL is a 501(c)(3) tax-exempt organization. Please be as generous as you can to help W1AW maintain its leadership on the frontlines of Amateur Radio technology. Thank you.

## Recognition

Contributors to the W1AW Fund Drive will be recognized as follows:

- *W1AW Kilowatt Club:* Those contributing \$1000 or more.
- *Hiram Percy Maxim Club:* Contributions of \$500-\$999
- *W1AW Century Club:* Contributions of \$100-\$499
- *W1AW Booster Club:* Contributions of up to \$100

All contributors will receive a handsome certificate, suitable for framing. Members of the *Hiram Percy Maxim* and *Kilowatt Clubs* will, in addition, have their name and call sign inscribed on a special plaque that will be on permanent display in the renovated W1AW Building. Members of the *Kilowatt Club* will receive a specially inscribed personalized plaque, which you'll be proud to display in your ham shack. In addition, special recognition will be given to those who donate substantially more than \$1000.

schedule, followed by the nightly code practice.

Our insurance covered the entire bill for the renovations necessary to restore the station to full operation in a very short time. W1AW was deodorized, walls and ceilings repainted, the damaged flooring and part of the partition replaced, new tuning coils purchased and installed, as well as failed transmitting components and furniture cleaned or replaced. The perforator was replaced by a brand-new McElroy-Creed motor-driven machine which was operated on 117 V ac. Nevertheless, the whole place

smelled of smoke for weeks thereafter. With the renovations and repairs underway, a temporary operating position was set up in the basement.

It is doubtful that many, if any, listeners knew of any irregularity—largely due to the dedication of those who worked so hard that day getting the station back on the air. It's amazing when you think about it, but no evenings of scheduled W1AW operation were missed in spite of the fire. Priority number one then (as it is now) was making sure that W1AW was operational in service to the League membership. □

## New Products

### HI-SPEC UHF LINEAR AMPLIFIERS

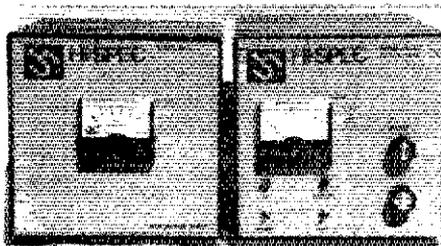
□ Hi-Spec of Jupiter, Florida, manufactures a line of UHF cavity amplifiers for the 903, 1296 and 2304-MHz amateur bands (model numbers 33D200, 23D200 and 13D100, respectively). The amplifiers each use a pair of air-cooled 2C39/7289 triodes. The 33D200 and 23D200 develop 200 W of output for 10 W of drive, and the 13D100 delivers 100 W output for 16 W of 2304-MHz drive. Features common to all three models include a built-in

wattmeter, plate-current metering, adjustable bias, a heavy duty blower, a built-in SWR bridge, an optional video detector and complete documentation.

Price: \$595 per amplifier, plus shipping and handling. Amplifier prices do not

include tubes, power supply or switching relays. A 1-kV, 1-A plate supply (model no. DPS-1) that matches the amplifier-cabinet design is also available. The supply can be used to power more than one amplifier, but only one amp can be keyed at any time. The power supply has built-in current metering. Price: \$189 when purchased with amplifier, \$239 alone.

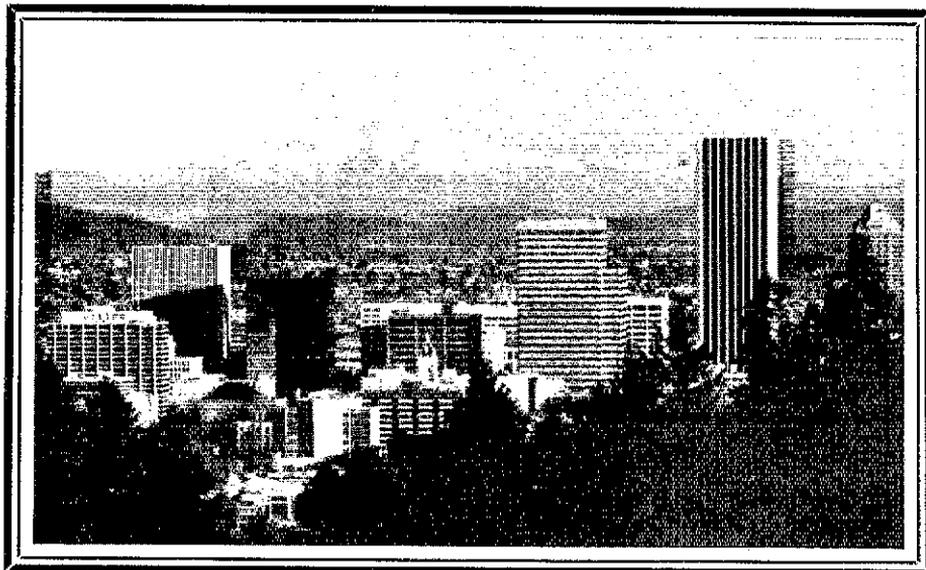
Other products available from Hi-Spec include amplifier cavities, repeater amplifiers, directional couplers, interdigital filters, power dividers, coaxial microwave components and microwave test fixtures. More information is available from Hi-Spec, PO Box 387, Jupiter, FL 33468, tel 407-746-5031.—*Rus Healy, NJ2L*



# The 1988 ARRL National Convention: Portland is Waiting for You

Portland, Oregon, once known simply as "The Clearing," is rolling out the welcome mat for the 1988 ARRL National Convention. See you there September 9-11!

By Bob Kuhn, KC7YN  
PO Box 433  
McMinnville, OR 97128



(photos courtesy Greater Portland Convention and Visitors Assn, Inc)

Portland or Vancouver, Washington, or drive the interstate... we're waiting to give you a most memorable convention!

## The Convention

Where were you in '62? If you had or still have your original "W" or "K" 1x3 call sign, you might remember visiting Portland that year for the 12th ARRL National Convention. Portland's amateurs banded together in an ambitious effort, just as they are doing again 26 years later to roll out the red carpet for Portland '88.

Convention headquarters is the Jantzen Beach Red Lion Inn, located right on the Columbia River. The hotel features plenty of room, with more at the Red Lion Columbia next door—all the comforts of home, with a great view of the river, Mount Hood and Mount St Helens. Red Lion offers shuttle service to and from Portland International Airport.

If you're driving to the Convention, you'll find no problems in locating the site from interstate 5 via the Jantzen Beach exits. Once you're there you'll appreciate the large parking lot, a portion of which will become a great tailgate fleamarket.

Plan to bring your camper? Call Oregon's Tourism office (see toll-free numbers, listed elsewhere) and ask for the Guide to Oregon State Parks and an official Oregon Road Map. There are also several RV parks located near the Convention (reservations are suggested—tel 503-289-7626).

The Jantzen Beach Shopping Center is within easy walking distance of the Red Lion, as are several large grocery stores and many restaurants serving a variety of fare.

The shopping center is located on the site of a once-famous amusement park and dance hall. The big bands and the giant roller coaster are gone, but the original historic merry-go-round has been faithfully restored and still gives rides. As most visitors are amazed to find out, Oregon has no sales tax.

## The Convention Program

What brings such a diverse bunch of people together in the same place for three days?

Is it the excitement of looking and touching the new products and talking to the experts behind them? The Portland '88 Convention's 112 commercial exhibit spaces sold out early, and feature the big guns in ham radio equipment and services. Having such a large commercial exhibit also provides the seminars and technical sessions with speakers who are the undisputed experts in their field.

Heading up this year's seminars are Yaesu's Chip Margelli, K7JA, who will talk about computer control of solid-state gear; Dr Phil Anderson of Kantronics, discussing the future of digital communication for the radio amateur; long-time designer and technical editor Lew McCoy, WIICP, will address RFI; Mark Forbes, KC9C, plans to talk about HF amplifiers and Dr Alan Chandler, K6RFK, of AEA has a presentation on grounding. Also on hand will be QST Editor Paul Rinaldo, W4RI, discussing the future of packet radio; Sandy Mikalow, K7OOZ, giving everyone an insight into radio astronomy and Oregon Circuit Court Judge Greg Milnes, W7AGQ, with his

## The Portland '88 ARRL National Convention at a Glance

**Where:** The Red Lion Motor Inn at Jantzen Beach

**When:** Fri-Sun, September 9-11

**Host:** Northwest Amateur Radio Council

**Official airline:** United Airlines, with special fares. Call 1-800-521-4041 and ask for ARRL account #8055N

**Saturday banquet:** Filet of salmon or top sirloin at \$20; ham-astronaut Tony England, WØORE, as speaker

**Registration:** \$7 in advance, with special early-bird incentives, \$9 at the door

**Special events:** Old West Casino Night, International Morse Code Speed Championship, DX Breakfast, QCWA events, Tailgate Flea Market, Wouff Hong, Portland, Mt St Helens and Columbia River tours

**Brochure available:** Portland '88 Convention, PO Box 25088, Portland, OR 97225, or call 503-640-5456

experiences in dealing with tower restrictions.

If you're not interested in technical matters, how about a forum? The ARES, contesters and DXers will all have their separate get-togethers. ARRL Northwestern Division Director Rush Drake, W7RM, built one of the northwest's superstations and will conduct tours.

Tony England, WØORE, who pioneered ham SSTV from space, teams with ham radio instructor-extraordinaire Gordon West, WB6NOA, in presenting the Youth Forum. Gordon's partner-in-code, Lorraine McCarthy, N6CIO, plans a session on the typical CW exams and how to learn the code so you're ready for them.

Tony is also the banquet speaker Saturday night, where we will hear about his experiences operating from space and also his ideas for ham radio's influence on future generations. This is one banquet where the food will receive equal billing. The commercial salmon season in the nearby Columbia River and Pacific Ocean comes at the right time to supply fresh fish for those who order it. Top sirloin is also on the menu.

Other special feasts include Saturday's ARRL Breakfast and Forum, followed by luncheons and programs for QCWA members and the ladies. The spouses' luncheon features a program by Victoriana Artists and Aprons. The DX Breakfast is Sunday morning.

### The Special Events

An ARRL National Convention holds initiations for The Royal Order of Wouff

Hong, the ARRL's secret society, always held at midnight.

But the really big news is that Portland's 1988 ARRL Convention is sponsoring an effort to establish a new world speed record for the international Morse code. Ted McElroy still holds the record, set more than 50 years ago.

Eliminations at the convention begin Friday afternoon with an official speed run at 50 w/min. "Participants are encouraged to bring their pet typewriters or computer keyboards," Lea Ball, AL7W, says. "Transmissions will be about five minutes long, plain text and we'll certify all participants as to the actual speed they attain during the championship run."

The exciting part is that there are several world-class CW operators in the northwest who have been planning to take a shot at this record for at least the last eight years.

### The City

Portland is the "City of Roses," and convention-goers will get to see why when they have the opportunity to visit the International Rose Test Gardens, where 10,000 rose bushes bloom every year until about November. It's part of a three-hour city bus tour, which will also take in the Pittock Mansion, a 22-room model of French Renaissance elegance with a sweeping view of the city and mountains beyond.

Also to see are the Japanese Gardens, designed and maintained meticulously, like their counterparts in the Orient; The World Forestry Center, featuring exhibits and simulations about forest management; the Washington Park Zoo where more elephants have been born in captivity than anywhere, and the Oregon Museum of Science and Industry.

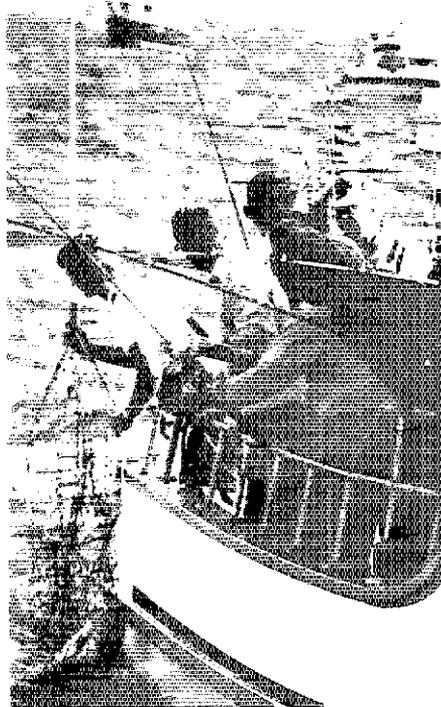
On the weekend, the city's open-air Saturday Market features handcrafted works of all kinds, displayed and sold by their makers, while smells of ethnic foods also abound.

### Travels To and From the Convention

If you plan your vacation around this year's Portland '88 Convention, there is certainly plenty to see and do along the way. South on Interstate 5 is Ashland, home of the renowned Oregon Shakespearean Festival, where you can see classics like "Henry IV, Part I," or "Twelfth Night" performed outside on the Elizabethan Stage any night of the week.

Or, if you head east on Interstate 84, you can just make it for the opening ceremonies of the 1988 Pendleton Roundup, complete with Indians in full regalia. It starts Wednesday after the convention ends, with rodeo events all weekend long.

If you come early, head for the Oregon coast and try your luck at salmon fishing in the Pacific Ocean; it looks like one of the best years yet. Ocean fishing should last through Labor Day, but you can still fish in the Columbia River estuary about convention time. There's also Dungeness crab, clams, sturgeon and all kinds of other



Salmon fishing in the Columbia River estuary peaks in early September every year.

seafood to enjoy. You may even get to see northwest Indians on rickety wooden platforms, using large nets to catch salmon the way their forefathers did.

### For the Family

Besides shopping and sightseeing, the non-electronic convention attendee (aka "ham widow" or whatever) can always find a friend in a special convention hospitality room at the Red Lion. Other activities confirmed at press time include presentations on color coordination and personal color analysis. Did you realize that your handwriting may be the key to whether you get hired for a job? Many corporations are using the services of our special guest Dave Uren to weed through applicants; he plans to analyze some of the audience members' handwriting to show how it works.

Ray Spooner, founder of Oregon Miniature Roses, will show his roses and talk about the art of growing them. Long-time radio producer and Hollywood actress Lenore Jensen, W6NAZ, will conduct a seminar Sunday morning on women involved in ham radio.

### Registration and Visitor Information

Well, we could go on and on... but, what are you waiting for? Get your request in the mail for more information on this year's place to be in September... the Portland '88 Convention. Just write 1988 ARRL National Convention, PO Box 25088, Portland, OR 97225.

Or, if you're so excited that you can't wait for the mail service, give our convention chairman, Al Berg, WB7SIC, a call at 503-640-5456 and leave a message that you need convention info. ☐☐☐

# Emergency Planners Take the Exam

## The 1987 Simulated Emergency Test Results

By Steven Ewald, WA4CMS  
Assistant Public Service Manager

The 1987 ARRL Simulated Emergency Test (SET) was an exercise of coordination and communication. This annual exercise, held around the third weekend of October, placed Amateur Radio in the spotlight of community, section-wide and statewide scenes. With the able assistance of National Traffic System (NTS) participants, SET messages were relayed throughout the country and within Canada.

The Amateur Radio Emergency Service (ARES) fine-tuned its emergency plans and constructed new working relationships with served agencies (such as the Red Cross, Salvation Army, local police and fire departments). As the familiar adage, "Experience is the best teacher," dictates, the SET participants showed how they could gain that essential experience before a real emergency arises. The following results and representative scenarios attest to the hard work and imagination of Amateur Radio operators in their effort to provide public service and emergency communications.

### Oklahoma ARES Tracks Fallen Satellite in SET

The ARES in Oklahoma was faced with an unusual SET scenario where the objective was to exercise communication support in a widespread emergency involving hazardous substances.

Oklahoma Section Emergency Coordinator Bennett Basore, W5ZTN, described the scenario: "Friday PM newscasts carried a story that an earth-orbiting satellite thought to be carrying a radioisotope power source was expected to decay from orbit sometime Saturday morning. It was estimated that there was a 50% chance that components of the nuclear source would survive reentry and land

on the earth's surface."

Saturday morning, 9:15: Authorities announced that an earth-orbiting satellite had re-entered the earth's atmosphere over southwest Texas along a northeasterly path that extends across Lubbock, Texas, to approximately Joplin, Missouri. Jurisdictions along, and 20 miles either side, of the path were advised to watch for possible debris reaching the earth from this satellite, and to be alert to the possibility of radioactive substances in such debris.

9:18 AM: The Federal Emergency Management Agency (FEMA) advised Oklahoma Civil Defense that nuclear components of the power unit in the satellite may have reached the earth somewhere between Lawton and Nowatta, Oklahoma. Any sightings of objects falling from the sky or unfamiliar and probably scorched objects on the ground were to be reported. Any such ground objects or any evidence of ground penetration should be monitored for the presence of radioactivity. Caution was advised.

9:20 AM: Oklahoma Civil Defense initiated a call for ARES stations to (simulate) contact with local CD officials to offer communication support if needed for radiological-monitoring personnel investigating reports of questionable objects, or in surveying for possible increases in radioactivity in their neighborhoods.

For the next two hours or so, ARES members worked with their local Emergency Coordinators to join the search for the "downed satellite." ARES members simulated various situations that could occur during this type of emergency. The radio amateurs originated reports to local Civil

Defense officials, who in turn would initiate an investigation of the "sighting." ARES worked closely with CD officials to complete and relay reports of each investigation via their SET nets.

The scenario called for a "positive sighting" on a residential lawn in the Stillwater area. CD officials, supported by ARES, simulated a test of their hazardous-substance emergency plan. The exercise continued until the local EC was satisfied that test objectives were achieved and necessary reports were delivered.

### Preparedness is the Aim in North Carolina

In Forsyth County, North Carolina, the SET script called for a simulated airplane crash near a football stadium while a game was in progress. Forsyth County Emergency Coordinator Richard Batte, N4MBI, described the scenario:

"On October 17, 1987, a simulated aircraft crash occurred in the Coliseum and Groves Stadium Area in Winston Salem. Big Plane Airlines, flight #13, carrying 152 passengers onboard, was en route to the Triad Regional Airport when mechanical failures occurred. An attempted landing at the Smith Reynolds Airport failed, and the aircraft crashed in the Groves Stadium area where a football game was in progress. When the crash occurred, telephone communications were disrupted in the area.

"Due to the large number of injuries, a serious need for a large volume of blood developed for the injured which were taken to two hospitals, the North Carolina Baptist Hospital and Forsyth Memorial Hospital. In this scenario, the American Red Cross Blood Center was without telephone communications due to telephone-line

### 1987 ARES Analysis

	1987	1986	%Change
Number of ARES members reported	15,635	15,404	+ 1.50
ARES members on CW	7,167	8,158	- 12.15
ARES members on VHF	13,854	13,923	- 0.5
Emergency-powered (HF)	4,138	3,363	+23.05
Emergency-powered (VHF)	10,405	10,346	+0.571
Members operational on HF mobile	2,484	3,835	-35.24
Members operational on VHF mobile	13,319	13,032	+ 2.21
Net sessions/drills per year	17,527	18,676	- 6.15
NTS liaison	273	273	0.00
RACES liaison	270	233	+ 15.90
ARES packet-radio participants	2,368	n/a	

### 1987 SET Top Fifteen

Section/Local Nets	Total Points	Local Activity	Total Points
1) Michigan	5608	1) Ohio	7308
2) Ohio	4700	2) Michigan	6629
3) Indiana	2777	3) Georgia	4739
4) Southern Florida	2058	4) Indiana	4572
5) Missouri	1689	5) Missouri	4058
6) Oregon	1479	6) Iowa	2164
7) Orange	987	7) Western New York	2046
8) Eastern Pennsylvania	914	8) Santa Clara Valley	2042
9) Kentucky	851	9) Southern New Jersey	1997
10) Alabama	761	10) Orange	1956
11) Western New York	698	11) North Carolina	1936
12) Illinois	663	12) Kentucky	1582
13) Iowa	656	13) Southern Florida	1419
14) North Carolina	601	14) Eastern New York	1399
15) Kansas	562	15) Eastern Pennsylvania	1249

problems resulting from the crash."

Forsyth County ARES established communications between the Red Cross Blood Center and the two hospitals. The Red Cross asked radio amateurs to help spread the word that there was a great demand for blood donors from the Winston-Salem and surrounding areas. An SET net on 2 meters was assisted by W4NC, the Forsyth Amateur Radio Club Station, which maintained liaison with the NTS on 75 meters.

N4MBI summarized the experience: "The simulated emergency proved that communications could be established between the Red

Cross Blood Center and the area hospitals, both by using the local repeaters and also on a simplex frequency. The VHF net on the repeater showed that a large number of amateurs could be reached quickly for assistance with communications and also to spread the word for the need for blood donors. The SET also put FARC station W4NC to the test on emergency power."

**The Results**

The 1987 Simulated Emergency Test results are organized in two main categories: National Traffic System and Local Activity.

The NTS includes Area and Region Nets as well as Section and Local nets. These results were reported by Net Managers. Local Activity reports activity by Emergency Coordinators and District Emergency Coordinators.

Each entrant's total score was based on a preannounced point system. Point values were assigned to several categories related to emergency communications and preparation. SET participation, traffic handling and digital-mode operations were encouraged as was interaction with community and served agencies.

**National Traffic System**

Net	Net Manager	Total Points	Section Total
<b>Area Nets reporting</b>			
Eastern Area, Cycle 2	WB4PNY	280	
Central Area, Cycle 2	W5KLV	150	
Pacific Area, Cycle 2	KF7R	98	
Pacific Area, Cycle 4	W7EP	184	
<b>Regional Nets reporting</b>			
Second Region, Cycle 2	W2MTA	86	
Fifth Region, Cycle 2	W5YDD	166	
Seventh Region, Cycle 2	W87WQW	171	
Eighth Region, Cycle 2	K8CPS	176	
Tenth Region, Cycle 2	NJBB	814	
Second Region, Cycle 3	W2MTA	62	
Second Region, Cycle 4	W2XD	59	
<b>Section/Local Nets</b>			
<b>Canada</b>			69
Ontario Niagara North ARES Net	VE3HNN	69	
<b>USA</b>			
<b>Alabama</b>		761	
Alabama Traffic Net-M	W04E	761	
<b>Arizona</b>			135
Verde Valley ARA	KQ7T	135	
<b>Colorado</b>			86
Snow Ball 87	K7UOM	86	
<b>Connecticut</b>			240
Western Connecticut Net	W81GXZ	122	
SCAN	K1SFC	118	
<b>East Bay</b>			293
Benicia ARES/RACES	KE6IA	176	
North Bay ARA/ARES Net	N6NII	117	
<b>Eastern Massachusetts</b>			53
Eastern MA/Rhode Island Phone Net	WA1FCD	53	
<b>Eastern Pennsylvania</b>			914
York Co ARES/RACES	W3AQN	457	
Lancaster Co ARES Net	WA3HLP	205	
Cumberland Co ARES/RACES	W3AQN	150	
Adams Co ARES/RACES	W32AQN	102	
<b>Eastern New York</b>			478
Albany Emergency Service Net	WB2ZCM	284	
Ronsselaer Co ARES Net	WA2ZYM	143	
Hudson Valley	N2FTR	51	
<b>Georgia</b>			240
Dairyland ARES Net	N4LGF	75	
Gwinnett Emergency Net	WA4URT	165	
<b>Hawaii</b>			44
Kauai ARC VHF net	KH6S	44	
<b>Idaho</b>			38
PARC ESN N8BBA		38	
<b>Illinois</b>			663
Madison Co ARES	NA9X	125	
Knox Co ARES	KASQMT	114	
Christian Co ARES Net	KA9TGF	95	
ARES SET	W9DUA	83	
ARES DuPage Co	W9CIB	78	
Chicago Traffic Net	KA9QXI	66	
Morgan Co	W9CES	65	
R.A.D.I.O.	WA9THM	37	
<b>Indiana</b>			2777
ITN (Phone)	KD8DU	1032	
Lake Co ARES	N9FXT	425	
Marion Co ARES	W9KGE	324	
Tri-State Emergency Net	N9FMO	265	
Dekalb Co Amateur Net	KA9RNY	149	
Huntington Co Emergency net	W9DRR	114	
Pike County ARC	WB9NCE	117	
Whitley Co ARES Net	WB9UNL	69	
South Central Area Net	W9SIO	60	
Gibson Co ARES Net	KB9NR	50	
RARA	KA9MNR	50	
Marshall Co	KB9DE	44	
Old Post Amateur Radio Emergency Net	WD9ELZ	46	
ARES/RACES of Elkhart	KA9VTL	32	
<b>Iowa</b>			656
Polk Co ARES Net	NA8R	201	
Henry Co Net	NO8G	172	
Lee Co Medical Net	WB9VYG	70	
Johnson Co Emergency Net	WB8MXX	66	
Story Co ARES	NS8X	61	
O'Brien Co ARES Net	WB8CON	48	
Muscataine Co ARES	KA8STB	38	
<b>Kansas</b>			582
Kansas Sideband	W8FRC	582	
<b>Kentucky</b>			851
Morning Kentucky Phone Net	WD4RWU	215	
7th District ARES	WD4PBF	145	
Kentucky Novice Traffic net	KB4OZ	142	
Southeast Kentucky Emerg Net	K4AVX	137	
Northern Kentucky Emergency Net	N4GNL	107	
KYN-E	K4AVX	77	
Woodford ARES	KA4ADF	28	
<b>Louisiana</b>			257
Caddo/Bossier Civil Defense	W4SPDX	234	
Louisiana Traffic Net	N5ANH	33	
<b>Maine</b>			424
Aroostook Emergency Net	WA1YNZ	161	
Sea Gull Net	K1GUP	133	
Hancock Co Emergency Net	WA2ERT	103	
Kennebec Co ARES	KA1LPW	27	
<b>Maryland</b>			302
Howard Co ARES Net	K3NNI	302	
<b>Michigan</b>			5808
Washtenaw ARES	N8DKM	1902	
Saginaw Co Emergency Net	NA8G	766	
LARK Net	N9AKZ	658	
Michigan Traffic Net	N8AHA	413	
Michigan Net-QMN	WD8KQC	332	
ICARES	KA8PTB	331	
Monroe Co ARES	KA8NCR	271	
Michigan Amateur Communications Net	K8COP	250	
Wayne Co ARES	KDBQK	215	
Michigan Thumb Net	W8BUH	198	
Jackson Co ARES/RACES	K8VNL	151	
Nich-A-Con	N8FDJ	74	
Kalkaska Co Emergency Traffic Net	NM8R	37	
Temporary Weather Net	WB8WIV	11	
<b>Minnesota</b>			451
Marshall Area Emergency Net	WB8BZU	188	
Paul Bunyon ARC	KA8KWM	125	
Rochester ARES	K8TS	105	
Northern St Louis County ARES	WD8GUF	53	
<b>Missouri</b>			1689
Missouri Emergency Op & Wx	WD8ELL	402	
SEMO Net	W8GMF	192	
Missouri Packet Net Number 1	WA8UFT	183	
ARES Net	K8UAA	168	
Zerobeaters ARES	NO8E	158	
JARC	KD8GU	149	
Randolph Co ARES	N8AUJ	38	
Jefferson Co ARC	K8WJ	118	
Central Missouri Emergency Net	K8PCK	80	
ARES	NJ8H	52	
SARC	WB8JU	41	
Ralls Co ARES	WB8TT	41	
Randolph Co ARES	N8AUJ	38	
Lutesville	KE8EB	30	
<b>Nebraska</b>			100
Midlands ARES	AJ8A	100	
<b>New Hampshire</b>			78
Northern Counties Emergency Net	K1QIQ	59	
Manchester Emergency Net	KB1KJ	19	
<b>New York City-Long Island</b>			49
NYC ARES Net	K2TWZ	49	
<b>North Carolina</b>			801
Forsyth Co ARES	N4MBI	313	
Ashe Co ARES Net	NA4JEW	99	
Macon Co ARES	AA4ZV	91	
Davidson Co ARES Net	K4SWN	65	
CCARS Two Meter Net	WR4E	33	
<b>North Texas</b>			538
Monday Nite Net	WB8VNJ	358	
McLennan Co ARES	Club/ARES	119	
Club/ARES	KA5FOX	51	
SVARA Net	WB5TNV	11	
<b>Northern Florida</b>			392
Northern Florida Phone Net	AA4QC	358	
QFN	WX4H	34	
<b>Northern New Jersey</b>			285
Monmouth Co	W2ZEE	138	
Hudson Co Area Traffic & Emergency Net	WA2FPO	97	
New Jersey Phone Net	W2CC	50	
<b>Ohio</b>			4700
Lucas Co ARES Net	W8ZOL	680	
Ohio Single Side Band	WB8JGW	594	
ARES	NT8N	354	
Columbiana Co Emergency Training Net	K8JDI	308	
Buckeye Net RTTY	WB8EK	288	
Central Ohio Traffic Net	N8EFB	192	
Tri-State Amateur Traffic Net	N8FWA	177	
Williams Co ARC	KD8IC	176	
Champaign/Logan ARES	KH6JCT	161	
Guarmsy/Noble Co ARES Net	WB8TRK	154	
Warren County	KA8YIT	146	
RACES	KA8YIT	146	
Lan & Fairfield Co ARES/RACES	K5JYF	140	
Jackson Co Traffic Net	KD8XL	123	
<b>Eastern Ohio Amateur</b>			121
Wireless Net	WB8YFD	121	
ARES	KA8HGU	106	
CCARA Emergency Net	WB8ZZR	103	
Van Wert Emergency 2 Meter	WD8MLV	98	
Union Co ARES Net	KE8DQ	77	
Jefferson Co ARES	KE8U	72	
FARA	WB8PHL	71	
Piqua Service Net	WD8NJO	68	
Buckeye SSB Net	KD8FW	65	
Ottawa Co ARES	WB8HGH	62	
RARA	K8LMN	58	
Reservoir ARA Net	WB8ON	57	
Ohio Slow Net	N8AEH	50	
<b>Washington Co ARES</b>			49
Net	N8CSM	49	
Burning River Traffic Net	N8AKS	46	
Green Co Traffic & Info Net	WD8PWG	44	
Switzerland of Ohio & Wetzel Tyler	KE8KR	44	
Ohio Novice Net	WD8KBW	38	
<b>Oklahoma</b>			173
Chisholm Trail ARC	WD5CLB	116	
Oklahoma Phone Emergency Net	W5ZTN	57	
<b>Orange</b>			987
Marcom RACES Nets	K8WX	403	
RACE/ARES	NR6P	167	
Southern California Net	WF6O	153	
Hemet RACES	N6FXM	102	
Leescom RACES	WA6ORA	86	
District 8			
Banning-Beaumont ARES/RACES/VIP Net	WA8HFE	51	
Corona/Norco ARC	WD6DGI	25	
<b>Oregon</b>			1479
Southern Oregon FM Net	KA7CZG	1334	
Hood River ARES	KA7JNU	82	
Tillamook Emergency ARES Net	N7ILB	63	
<b>Rhode Island</b>			131
Aquidneck Island "Comm" Net	W1JFF	76	
Eastern MA/Rhode Island Phone Net	WA1FCD	53	
<b>Sacramento Valley</b>			73
Yolo Co ARES/RACES	N6JGC	73	
<b>South Carolina</b>			452
Anderson Radio Club 2 Meter	WD4BUH	276	
York Co 2 Meter Emergency Net	KB4BZA	178	
<b>South Dakota</b>			372
South Dakota ARES	KA8KPY	280	
Black Hills ARES	WB8ZCS	92	
<b>South Texas</b>			167
Southeastern District Net	ND5F	167	
<b>Southern Florida</b>			2058
Florida Phone Traffic Net	W84WYG	468	
ARES/RACES	W4GPL	462	
Pinellas Co Florida Midday Traffic Net	WB4AID	453	
Manatee Co ARES Net	WA3TOX	218	
Tropical Phone Traffic Net	WD4KBW	188	
ENMC	K4ZK	108	
Collier Co Emergency Net	N4KNP	76	
FAST	WD4KBW	52	
PRVAN	WD4KBW	34	
<b>Tennessee</b>			315
Anderson Co ARES Net	AB4DC	166	
Campbell Co ARES Net	KA4OAK	112	
Rutherford Co ARES Net	N4BBB	37	
<b>Utah</b>			138
Beahive Utah Net	NA7G	84	
Utah Code Net	NS7K	54	
<b>Vermont</b>			187
W1KOO Simulated Emergency Net	NB1A	187	
<b>Virginia</b>			284
RAP ARES	AA4GL	134	
Smyth Co ARES Net	KM4X	74	
Shenandoah Valley Emergency Net	NT4S	72	
<b>Washington</b>			277
Yakima ARES Net	K3GPJ	214	
Kitsap Co ARES	KG7FA	63	
<b>West Texas</b>			313
Scurry Co	KE5ZW	113	

Cloud Chasers Net	KA5PTG	101		Knox Co	W9QBH	138	Nebraska		338	Pumas Co	KAGHYV	22
Windjammers Net	NG5T	99		Northwest Cook Co	WB9URA	133	Douglas Co	WD8EWH	138	San Diego		37
West Virginia		166		Madison Co	NA9X	130	Dakota Co	NFRN	109	East Co	N8NKJ	37
Ohio Co	KC8VR	74		Christian Co	WB9WDB	112	Cheyenne Co	WA8QOY	91	Santa Barbara		274
WCBAK ARES/				Wabash Co	A1GH	92	Nevada		225	Lompoc	N6LFJ	274
RACES	K8QEW	62		Central	WD9HQC	51	Western Nevada	WB6BPU	225	Santa Clara Valley		2042
Pleasants Co Em-				DuPage Co	N8CB	41	New Hampshire		365	Salinas Valley	WD6EKR	289
ergency Net	WB8ZMX	30		Indiana		4572	Coos Co	K1OIQ	119	Santa Clara	KA6TGE	284
Western New York		698		Lake Co	N9DTG	688	Stratford Co	W1OKU	108	Saratoga	WB6NJR	270
Western District Net	WB2OWO	276		Floyd Co	KA8FDF	626	SW NH District	WB1GXM	84	San Mateo	K6ITL	220
Onondaga Co Em-				Vanderburgh Co	NS9FMO	492	Manchester Co	KBU1U	54	San Jose	NG6A	191
ergency Net	WA2PUU	144		Marion Co	W8KGE	491	New York City/Long Island		270	Sunnyvale Co	WA6BAX	182
STAR	NE3B	101		Pike Co	WB9NCE	284	Babylon	WA2LJI	177	Cupertino	WB6VED	173
NYSM Cycle One	N2EIA	70		LaPorte Co	K9ET	282	New York City	K2TWZ	93	City of San Bruno	N8ITW	155
Corland Co	WA2TOL	64		DeKalb Co	W9QWI	237	North Carolina		1936	Palo Alto	WA6NIL	150
St Lawrence Co				Allen Co	N8ADS	189	Moore Co	K4CF	322	Los Altos	WA6PYM	112
ARES	WB2NAO	43		Central	WD9AVQ	187	Forsyth Co	N4MBI	298	Los Galos	WA6OCU	16
Western Pennsylvania		229		Knox Co	K9LMJ	185	Macon Co	WB4HRR	252	South Carolina		779
McKean Co ARC	NJ3K	81		Huntington Co	NS9HA	156	Nash Co	KF4R	228	Anderson Co	W4FVW	400
Huntingdon Co ARES				Whitley Co	WB9UNL	131	Ashe Co	N4JRE	189	Zone 3 York Co	KB4BZA	245
Net	WA3DBW	60		Elkhart Co	N89ZU	120	Wake Co	AA4YH	181	Sumter Co	W4DCX	133
WPA CW Net	WA3UNX	50		Gibson Co	KD9JB	113	Durham Co	KA4ELD	169	South Dakota		467
Keystone Phone Net	N3EMO	38		Marshall Co	K8DCE	100	Danston Co	K4SWN	133	South Dakota ARES	KA0KPY	369
Wisconsin		348		Bartholomew Co	W9SIO	98	Lee Co	WR4E	92	Pannington Co	WB6ZSC	98
Badger Emergency				Handolph Co	KA9MNR	89	Wayne Co	WD4HTE	72	South Texas		419
Net	KA9RII	177		Washington Co	N9DER	65	North Dakota		324	Southwest District	W5CKC	313
Calumet ARES	KN9P	127		Owen Co	WD9BKA	59	Trail Co	W6KZU	324	McGulloch Co	N5KAC	62
Brown Co ARES Net	WB9NRK	44		Iowa		2164	North Florida		438	Liberty Co	K85CJE	44
Local Activity				Polk Co	NA9R	473	Ocala Co	W4IPM	258	Southern Florida		1419
Area	Reporter	Total	Section Total	Henry Co	NO8G	275	Leon County	N4JEL	175	Pinellas Co	W4GPL	534
Canada				Cass Co	K8ZQ	212	Nassau Co	AA4TY	04	Martin Co	W4SS	303
Alberta		170		Lee Co	WB8VYG	149	North Texas		790	Manatee Co	WA3TCX	224
Calgary	VE6AFO	170		Dea Molnes Co	K8RW	144	Wichita Co	K7CMH	421	Henry Co	AA4BN	129
Ontario		413		St. Clair County	NJUG	141	McLennan Co	N8AJP	156	Collier Co	N4KNP	120
Niagara Region,				O'Brien Co	WB9CN	117	Nacogdoches Co	KA5FOX	94	Hardee Co	WD4KBW	109
North	VE3GV	189		Dickinson Co	WBFO	114	Mesquite	KA5EVF	93	Southern New Jersey		1997
Kingston Area	VE3SV	158		Hancock Co	WB8LY	98	Hunt Co	WB5IZL	26	Dade Co	W4JYT	1054
Bruce Co	VE3EFX	66		Muscatine Co	K8MTS	90	North New Jersey		777	Palm Beach Co	K4ZRP	399
USA		384		Johnson Co	WB8MCX	84	Morris Co	WB2VJF	189	Cumberland Co	WA2ELX	221
Alabama				Suchanan Co	N8FGI	75	Madison Co	W2KB	176	Highlands Co	WB4WOK	185
South/Central & South	KE8BP	239		Humboldt, Hancock			Monmouth Co	W2ZEE	151	North Brevard	WB4WYG	138
Tuscaloosa Co	N4JUB	145		Co	K8GP	74	Somerset Co	WA2UZT	123	Tennessee		708
Arizona		1070		Co	NSBX	62	Chatham Borough &			Anderson Co	AB4DC	242
Tucson Area	K7KYW	618		Osceola Co	WB8ENL	30	Township	W2UH	107	Campbell Co	KA4QAK	198
Yavapai Co	KQ7T	194		Louisiana	K8WKT	26	Englewood	W2CC	31	West Sullivan Co	AA4DC	109
Northern Arizona	N7FYK	172		Caddo/Bossier Parish	N5EYK	212	Ohio		7308	Rutherford Co	N4BBB	91
Pima Co	KX7P	86		Zone 24	WC8L	128	Montgomery	W8ILC	847	East Sullivan Co	WD4EKA	69
Colorado		678		Zone 16	KA8RNY	59	Franklin Co	WB8KO4	563	Utah		245
District 10	N8DZA	213		Kentucky		1582	Lucas Co	WB8HHZ	517	Davis Co	NS7K	245
Mesa Co	N8HPW	165		Davless, Henderson			Clermont Co	WA8TSX	385	Vermont		80
Clear Creek Co	WA8REX	100		Co	WB4NHO	342	Stark	WD8AYE	385	Bennington Co	KA1DLK	80
District 22	WB4ETT	104		Davless Co	WB4ANL	303	Columbiana Co	K8JDI	291	Virginia		981
District 14	N8CMW	96		Boone Co	WD4PBF	293	Marion Co	WB8NEE	275	Virginia Beach	WA4TCJ	170
Connecticut		392		District 10	K4AVX	167	Clinton Co	WB8ZZR	251	Smyth Co	KM4X	142
District 10/				5th District	WA4SLE	138	Fairfield Co	WD8PGO	251	York County/		
New London Co	W1FAI	189		Kenton Co	N4GNL	113	Knox Co	KCSWH	248	Poquoson	WA1VRL	135
District 1	KU1D	127		Mason Co	W4QYJ	90	Tuscarawas	KA8GLU	222	City of Newport News	W4MWC	133
Goshen	KA1JVN	76		Louis	WA5WF	67	Williams Co	KABOFE	216	Middlesex Co	AA4HQ	107
East Bay		737		Woodford Co	KA4ADF	69	Portage County	WA8GCF	199	Alexandria	N4HCP	108
Contra Costa,				Louisiana		212	Summit Co	WB8HFZ	175	Winchester/Fredrick		
Alameda	W6CPO	258		Caddo/Bossier Parish	N5EYK	212	Champaign Logan			Co	NC4B	105
Benicia	KE8IA	220		Maine		345	Co	K89NH	165	Gloucester Co	KB4OPR	80
Fairfield/Suisun	W06Y	126		Aroostook Co	WA1YNZ	235	Van Wert Co	WB8YIH	159	Washington		1068
Vallejo	N6NIJ	133		Hancock Co	WA2ERT	110	Guernsey/Noble Co	WB8TRK	155	King Co	KA7AEF	452
Eastern Pennsylvania		1249		Maryland DC		719	Franklin Co	WB8DJR	154	Yakima Co	N7HJH	225
York Co	K83YS	595		Carroll Co	KC3FK	171	Merced Co	W8ON	143	Skagit Co	NM7N	150
Cumberland Co	K83YS	256		Howard Co	WA1QAA	162	Belmont Co	N8IP	126	San Juan Co	WA7TWB	140
District 2/Lancaster	WB2OOB	300		Calvert Co	W32NW	88	Union Co	K8DR	121	Kitsap Co	KC7FA	64
Adams Co	K83YS	148		Prince George's Co			Allen Co	W8TY	114	Jefferson Co	K7RBT	35
Eastern New York		1389		(SRY/WARN drill)			Fayette Co	WB8PHL	116	West Texas		1068
Albany Co	WB2REJ	417		Prince George's Co	KA3DUE	91	Sandusky Co	WB8KW	109	Scurry Co	KE5ZW	226
Plenselaw Co	KA2AKN	398		Fredrick Co	KA3DUE	81	Auglaize Co	K8LMN	105	Howard Co	WD5EJ	141
Schenectady Co	N2AIG	530		St Mary's Co	KJ3E	73	Wayne & Holmes Co	WD8BVV	103	District	NSFHR	138
Northern District	WB2ZCM	254		Michigan		6629	Miami Co	K8SZ	100	Potter & Randall Co	KA5PTG	139
Eastern Massachusetts		375		Carroll Co	K8SFK	171	10th	KE8LU	98	District 5	NSFHR	130
Beverly	WA1YFZ	375		Howard Co	WA1QAA	162	Greene Co	N8CY5	87	District 1	NG5T	129
Georgia		4739		Calvert Co	W32NW	88	Warren Co	K8ZOW	85	Christress Co	N5CAN	90
Southeast District	KA4HHE	400		Prince George's Co			Butler Co	N7BN	72	Hutchinson Co	N25Q	77
Whitefield Co	N4JK	399		(SRY/WARN drill)			Ottawa Co	WB8HG	85	West Virginia		690
North West District	KJ4NK	362		Prince George's Co	KA3DUE	91	Monroe Co	KD8ZA	66	Marshall County	N9GHQ	205
Metro/Atlanta	N4LDU	386		Fredrick Co	N3RQ	73	Hancock Co	N8AEH	63	Hancock Co	K8QEW	123
Emergency Planning	KJ4MQ	314		Marquette Co	WD8AKE	109	Highland Co	K8CKY	57	Ohio Co	K8CBR	111
Gwinnett Co	KC4LU	319		Benzie Co	WB8ITI	62	Ashland Co	K8BSZ	56	Mineral & Grant Co	KQ8E	91
Metro Atlanta	WA4ONQ	283		Sauk Co	WB8CUP	61	Oklahoma	N8GIY	53	Kanawha Co	K8B2M	85
Chatham Co	KA4HHE	234		Grand Traverse Co	N8AYQ	57	Oklahoma City	KA5WYE	163	Pleasants Co	K8KKE	75
Red Cross	N4FBN	256		Kalkaska Co	NX8S	38	Payne Co	WS2TN	90	Western Massachusetts		320
Fulton Co	K84TSA	226		Manistee Co	WB8DRM	30	Orange		1956	South Worcester Co	K1ISW	320
East Central District	AA4UA	238		Minnesota		544	Riverside Co	K6WH	455	Monroe Co	N2EH	488
Cobb Co	N4DXX	200		Sioux District	WB8SZU	246	Riverside Co	N8HGT	326	Ondaga Co	KB2DP	236
Muscogee Co	W4RWB	160		Olmsted Co	K8TS	127	Area 2	K8BMOCO	325	Ontario Co	NN2H	200
Morgan Co	N4NZE	149		Northern St. Louis			VE8COM Dist River-			Onondaga Co	WA2PUU	192
South West District	W4FGH	146		Co	W8RUF	87	side Co	N6QDM	321	Cowago Co	KV2F	179
DeKalb	WB4PHF	138		Douglas Co	KBJY	64	Coachella Co	NRP	223	Corland Co	K83KW	154
Habersham Co	K84DTA	116		New Ulm	K8YST	20	Lescom/Area 8	KA6IXY	131	Chemung Co	WA2OVT	129
Air Force MARS	WB4BDP	110		Missouri		4058	Dist 3 Riverside Co	WA8HFE	110	St Lawrence Co	KA2GMQ	113
Liberty Co	NX7T	96		Missouri	K9OCU	2285	Corona/Norco	N8HGT	65	Lewis Co	WA2OEP	109
Glynn Co	WA4ONQ	82		Cole Co	K88SF	289	Oregon		667	Delaware Co	W2TFL	86
Thomas Co	N4IKL	40		District J	NO8E	234	Tillamook Co	WA6KLA	269	Jefferson Co	KA2OTS	66
Coweta Co	AA4VU	37		District U	N8BIV	227	Klamath Co	ND7V	154	Yates Co	WA2UKX	58
Fulton North	N4QHX	32		Jasper Co	KD8GU	215	Hood River Co	KU7M	132	Chenango Co	K1ZY	38
Catoosa Co	N4KFN	16		Sw Jackson Co	K8UAA	163	Clatsop Co	WA7PTM	62	Western Pennsylvania		270
Idaho		18		Boone Co	NU8T	162	Josephine Co	KA7DEF	50	Huntingdon Co	WA3DBW	82
District 5	N8BBA	18		Butler Co	WB9IU	97	Pacific		427	Washington Co	N3BKW	73
Illinois		875		Howell Co	K8CCU	93	Hawaii Co	WB8BDH	147	Centre Co	KA3NHF	52
Morgan Co	W8OES	178		Boilinger	KBEB	71	Mau Co	KH8H	141	McKean Co	NJ3K	63
				Jofferson Co	K8JL	64	Kauai Co	KH8S	99	Wisconsin		331
				Barry Co	N8FBW	46	Rhode Island		108	Calumet Co	KN9P	208

## League Members to Choose Board Representatives

Who steers the ship of Amateur Radio? Where do its policy decisions get made? HQ in Newington doesn't dictate what the League will and will not do—you, the Full member of ARRL, do!

There is just one national-level, general Amateur Radio organization in the United States. It goes without saying that its views on subjects relating to ham radio will be important. Thus, the members of its Board of Directors play a large role in Amateur Radio decision making. Where do these Directors come from? From you, the League members. The Directors and Vice Directors serve two-year terms, without salary—and you nominate and elect them as your "Senators" in a representative government.

This year, it is the turn of ARRL Full members (that is, licensed amateur members of all categories—I life, Youth, Senior, Family or Annual—in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions) to pick a Director and Vice Director for the 1989-90 term.

If you are in any of these eight divisions, read on—this blurb's for you!

### ARRL Divisions

The policies of the League are established by 15 Directors, who are elected to the Board on a geographical basis to represent their Divisions and constituents (see page 8 of any *QST* for a list of the Divisions, Directors and Vice-Directors). These 15 Directors serve for two-year terms, with seven or eight standing for election in alternate years. Just as in national or state politics, ARRL voters/members have the privilege and responsibility either to decide they like the actions of their incumbent representatives and support them actively for re-election or to decide that other representatives could do a better job and work for the election of those persons. Vice Directors, who succeed to Director in the event of a midterm vacancy and serve as Director at any Board meeting which the Director is unable to attend, are also elected at the same time.

### Call for Nominations

Nominations are now open for Director and Vice Director in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions for the two-year term beginning January 1, 1989. From now until August 20 at noon, League Headquarters will accept nominating petitions signed by 10 or more Full members of a division, naming a Full member of that division as a candidate for director or vice director.

Headquarters will provide each candidate with election procedures information and a questionnaire that will allow the Executive Committee (EC) to determine the eligibility of a candidate in accordance with the Articles of Association and Bylaws. The questionnaire will require each candidate to furnish information as to his/her occupation and other business activity, age, license class and membership

status, under affirmation. A statement of not more than 300 words setting forth the candidate's qualifications and a recent photo may also be sent. This statement and photo will be included with the ballot mailed to members and will be reprinted without content editing; if the statement as submitted exceeds 300 words, the first 300 words will be used. The statement must not contain any derogatory reference to any person or entity. The candidate must also submit an accompanying signed statement certifying that the information is true to the best of the candidate's knowledge and belief. Any willful violation of this statement will be grounds for disqualification by the Executive Committee. The EC is scheduled to meet on August 27 to complete its examination of nomination papers, affidavits and 300-word statements, so candidates should make sure their information form arrives at Headquarters as early as possible and in any event no later than August 20. (It is in the candidate's best interest, obviously, to get the nomination in early. If there is to be a mid-August nomination for some unavoidable reason, the candidate information, 300-word statement and photo should accompany the nominating petition.)

The nominee must hold at least a Technician-class amateur license, must be at least 21 years of age and must have been licensed and a Full member of the League for a continuous term of at least four years immediately prior to the election. No person is eligible whose business connections are of such nature that he or she could gain financially through the shaping of the affairs of the League by the Board or by the improper exploitation of his or her office for the furtherance of his or her own aims or those of his or her employer. The primary test of eligibility is the candidate's freedom from commercial or governmental connections of such nature that his or her influence in the affairs of the League could be used for his or her private benefit. The idea behind these rules is to ensure that candidates: (1) possess a lasting interest in Amateur Radio and the League, (2) have the legal capacity to make decisions for ARRL and (3) are free from conflicts of interest.

### Balloting Will Follow

Whenever there is more than one candidate for either office, ballots will be sent to all Full members of the League in that Division who were in good standing as of September 10. (You must be a licensed radio amateur to be a Full member.) The ballots will be mailed not later than October 1, and, to be valid, must be received at HQ by noon on Sunday, November 20. A group of nominators can name a candidate for Director or Vice Director, or both, but there are no "slates" as such—each candidate appears on the ballot in alphabetical order. If a person is nominated for both Director and Vice Director, the nomination for Director will stand and that for Vice Director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and run-

ning for Vice Director if he or she wishes. Since all the powers of the Director are transferred to the Vice Director in the event of the Director's death, resignation, recall, removal outside the division or inability to serve, careful selection of candidates for Vice Director is just as important as for Director.

### Nominating Form

The following form for nomination is suggested; it may be copied onto any paper, or a form may be obtained from Headquarters upon request:

Executive Committee  
The American Radio Relay League  
225 Main St, Newington, CT 06111

We, the undersigned, Full members of ARRL residing in the ... Division, hereby nominate ... of ... as a candidate for Director; and we also nominate ... of ... as a candidate for Vice Director from this division for the 1989-1990 term.  
(Signature ... Call ... City ... ZIP ... Date ...)

Nominees, or indeed any member, may obtain a copy of the Articles of Association and By-Laws, along with a pamphlet outlining the duties and responsibilities of elected League officials.

### Absentee Ballots

All ARRL members who are licensed by FCC but are temporarily residing outside the US are eligible for Full membership. Those members overseas who arrange to be listed as Full members in an appropriate division prior to September 10 will be able to vote this year where elections are being held. Members with APO and FPO addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal address.

Even within the US, Full members temporarily living outside the ARRL Division they consider home may have voting privileges by notifying the Secretary prior to September 10 giving their current *QST* address and the reason that another division is considered home. If your home is in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf Divisions, but your *QST* goes elsewhere, please let the ARRL Secretary know, as soon as possible, but no later than September 10, so you can receive a ballot from your home division.

### The Incumbents

These persons presently hold the offices of Director and Vice Director, respectively, in the divisions conducting elections this year;

Central—Edmond A. Metzger, W9PRN, and Howard S. Huntington, K9KM.

Hudson—Stephen A. Mendelsohn, WA2DHF, and Paul Vydareny, WB2VUK.

New England—Tom Frenay, K1KI, and Robert Weinstock, KNIK.

Northwestern—Rush S. Drake, W7RM, and William R. Shrader, W7QMU.

Roanoke—Gay E. Milius Jr, W4UG, and John C. Kanode, N4MM.

Rocky Mountain—Marshall Quiat, AG0X, and Hugh Winter, W5HD.

Southwestern—Fried Heyn, WA6WZO, and Wayne Overbeck, N6NB.

West Gulf—Jim Haynie, WB5JBP, and Thomas W. Comstock, N5TC.

Petitions need 10 or more signatures of Full members and are due at Headquarters by noon August 20. If there is only one eligible candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to Full members of record September 10. To be valid, ballots must reach Headquarters before noon November 20. The new term will begin at noon January 1, 1989.

For the Board of Directors:  
May 15, 1988

Perry Williams, W1UED  
Secretary

role as sponsor of the "Night Tango" drills in the amateur bands a few years ago.

The NCS portion of the Reply Comments voiced themes familiar to us:

"...the Amateur Radio Service has a variety of critical operations at 220-222 MHz, including fixed, auxiliary and control links for repeaters, beacons, weak-signal propagation, research and experimentation and, most recently, an increasing number of high-speed data links for amateur packet radio operations. These links must be situated at 220-222 MHz due to the bandwidth and path lengths required, the occupancy of the 144-148 MHz band and the likely full utilization of 222-225 MHz by repeaters in major metropolitan areas in the future." The DoD/NCS paper continued on, to detail the unique qualities of the 220-MHz band and to explain why, because of propagation characteristics and shared use with other services, the Amateur Service couldn't simply relocate its 220-222 MHz activities to higher-frequency amateur bands. In short, the Department of Defense and National Communications System have made a strong showing for the continued use by amateurs of the whole 220-225 MHz band—our warm thanks to all those involved!

#### ARRL SUBMITS EX PARTE PRESENTATION ON 87-14

The ARRL has submitted a written ex parte presentation to the FCC on General Docket 87-14. (An ex parte presentation is usually a discussion between FCC personnel and the other parties affected by a Commission proposal and must be documented with a letter placed in the formal record of a proceeding).

The detailed engineering report, *Potential for Vehicular Nationwide Network Use of 30-50 MHz*, was written by QST Editor Paul Rinaldo, W4RI, and the League technical staff. The ARRL report demonstrates that UPS could use the 30-50 MHz VHF range in lieu of the 220-MHz band. The League recommended that other modulation methods be considered, as well as the requested Amplitude Companded Single Sideband (ACSSB).

The report cites the following:

1) 30-50 MHz provides the best propagation in rural and suburban areas of any frequencies in the 30-1000 MHz range—thus, fewer base stations and repeaters are needed.

2) Aperture of a ¼-wavelength whip antenna at 30 MHz is approximately 54 times that of a ¼-wavelength 220-MHz whip—giving greater pickup efficiency for low-band antennas.

3) 30-50 MHz is less crowded than other commercial land mobile bands. ARRL believes that with relatively minor rechanneling, nationwide exclusive channels might be made available there for national entities such as UPS. The report lists 17 channels in the 30-32 MHz band as possibilities.

On May 2, ARRL Executive Vice President Sumner met with UPS officials at their corporate headquarters in Greenwich, Connecticut, to present the report and recommendations. The UPS representatives agreed to have the report considered and analyzed by their technical personnel.

#### PART 97 REWRITE WORTH A CAREFUL LOOK

In the weeks since its release, the FCC Part 97 rewrite proposal, PR Docket 88-139, has been given careful study by League

members, officers, directors and staff. Quite a list of potential problems, both typographical and substantive, already has been accumulated, and more are bound to be noticed as the document is given further scrutiny.

The ARRL Executive Committee discussed the proposed rewrite at its meeting on May 14 and authorized the President to appoint a Working Group of not more than four persons to review the Part 97 rewrite proposals, with the objective of presenting to the Board prior to its July 21-22 meeting a recommended detailed ARRL position. Members of the HQ staff are analyzing each line of the proposal, determining which rules have been added, dropped or in any way changed.

The FCC NPRM is too long to be reproduced here, or elsewhere in QST, in its entirety. June QST, page 53, gives the table of contents for the proposed new Part 97; this will at least give you an idea of how the rewrite is organized.

If you have any special concerns regarding the FCC rules, or if you simply want to be well informed on a matter of great importance to Amateur Radio, you should obtain your own copy of the NPRM. A large self-addressed envelope with 85 cents postage, sent to ARRL HQ and marked "Docket 88-139," will speed a copy back to you.

#### RECIPIS NOW SIGN US PREFIX FIRST

The FCC has granted a petition by ARRL to amend section 97.313, which governs station identification by foreign operators using reciprocal permits.

Under the new rule, alien amateurs operating in the US with reciprocal permits must now place their US prefix *first*, followed by their call sign. For example, "W4/DL6TJ," instead of "DL6TJ/W4."

The ARRL's request was based on an International Amateur Radio Union (IARU) resolution (July 1987 QST, p 52) to standardize identification. Other countries, such as the UK, France, West Germany and Switzerland, have already implemented the proposal.

#### FCC INVALIDATES LICENSES

The ARRL/VEC has received notification that the FCC has voided the upgrades of 23 amateurs in the New York City area.

The session in question was administered by the ARRL/VEC in January 1986, and has been under investigation by both the FCC and the ARRL/VEC for irregularities. The VE Team Liaison was discredited in November 1986 for irregularities detected in several sessions that year. (Liaisons are responsible for test material security while it is in the possession of the VE team.)

Each individual's license class (if any) reverts to the class that he or she held prior to the test. The individuals *are* still eligible to apply for upgrades.

#### PETITIONS DENIED BY THE FCC

The Commission has denied a petition for reconsideration by George Bednekoff, KA0OCN, seeking amateur auxiliary operation on the 52-54 MHz segment of the 6-meter band. In his petition for reconsideration, Bednekoff cited PR Docket 85-215 (1986), in which the FCC declined to expand the frequencies for auxiliary operation. Bednekoff said the Commission failed to address the question of adding 52-54 MHz for auxiliary operation.

In denying the petition, the Commission said that Bednekoff did not raise any new issues. The comments in the cited 1986 proceeding did refer unmistakably to the 52-54 MHz segment question. At that time, the Commission decided not to expand auxiliary operation in the Amateur Service because the "rules presently reflect a good match between the frequencies authorized for auxiliary operation and auxiliary link functions."

Also denied was a petition filed by Marvin Fricklas, W2FGD, which sought to upgrade, without examination, long-term Advanced class licensees to Amateur Extra Class. The requirements for this upgrade would be 25 years of continuous activity as a US amateur, evidence of rendering continuous public service and possession of an honorable discharge from the US armed forces.

The FCC denied the petition saying: "Amateur Radio licenses are issued only to persons who demonstrate certain operational and technical skills and the Commission's policy is not to waive the examination requirements for any applicant. In fairness to all, no individual or group is given preferential treatment, and though service in the armed forces and public service activity are commendable, they are not sufficient reason to revise Commission policy regarding preferential treatment to any group or individual."

The FCC has denied a petition by Larry Ballentine, N5BZB, to reduce the number of amateur operator license classes from five to four by merging the Technician- and General-class licenses. Ballentine also petitioned that the Morse code requirement for the four remaining license classes be reduced to 5 words per minute, alphanumeric only. The petitioner stated that license privileges should be based on technical knowledge, not code proficiency, and argued that the Amateur Service must be "modernized and deregulated so its ranks will continue to grow."

The FCC, in denying the petition, stated that "incentive licensing based on both technical and telegraphy skills should continue. The existing operator classes were originally adopted to provide motivation for amateur operators to advance their skills in both communication and technical areas of radio, and nothing in Ballentine's petition indicates that the existing structure is not achieving these goals."

The FCC also denied a petition by Shannon Cisco, WB4AZT, seeking to upgrade by one license class the licenses of senior citizens who have held Amateur Radio licenses for 20 years or more. Cisco's reasoning in the petition was the upgrade would be beneficial to senior citizens who cannot travel to examination sites due to physical constraints.

In denying this petition, the FCC stated that the requirement that only qualified persons may hold an Amateur Radio license is based upon provisions in the International Radio Regulations, as well as the Communications Act of 1934. The telegraphy requirement is not waived for any applicant. Difficulty in traveling to an examination site is no longer a problem since, under the present examination program, the Volunteer Examiners are capable of accommodating examinees with physical disabilities. "The petition presents no new facts or new arguments that would justify a policy change."

Also denied was the petition by Angelo J. Polvere, KA9CSO, requesting immediate operating privileges for Novice examinees by

## FCC-Issued Call Sign Update

The following is the FCC listing of "just-issued" amateur call signs as of May 1.

District	"A" Extra	"B" Advanced	"C" Tech/Gen	"D" Novice
0	WG0Z	KE0UT	N0JEU	KB0CMY
1	NR1C	KC1JH	N1FRJ	KA1RXU
2	WF2V	KE2GL	N2IDN	KB2FPT
3	NO3L	KD3HT	N3GEG	KA3TAW
4	AB4HW	KM4AZ	N4SRY	KC4EZD
5	AA5FO	KG5JR	N5MNB	KB5GCC
6	AA6IG	KJ6GH	N6SAL	KB6YAQ
7	WN7I	KF7JK	N7KXS	KB7EVP
8	WF8A	KE8RH	N8JLV	KB8EQB
9	NY9R	KE9KJ	N9HKW	KB9ASO
Guam	KH2I	AH2BY	KH2DG	WH2ALL
Hawaii	**	AH6IY	NH6PB	WH6BXX
Alaska	**	AL7JV	NL7NH	WL7BRF
USVI	KP2Y	KP2BN	NP2CN	WP2AFZ
PR	**	KP4OY	WP4OB	WP4HYO

\*\*All 2 x 1 calls have been issued in the district.

using a General-class-or-higher sponsor. The successful examinee would be issued a temporary station call sign by the sponsor, consisting of the sponsor's call sign and a unique designator. The sponsor would be required to keep records of the temporary Novices and their operations. Polvere states that it is important for Novice operators to use their new operating privileges immediately once the exam has been successfully passed.

In denying the Polvere petition, the FCC cited the Hambrecht petition (see March 1988 Happenings column), which was very similar to that of Polvere and had already been denied by the Commission. The more recent petition submitted by Polvere produced no new arguments to change the present rule.

## ARRL ASKS TAI REPLY COMMENTS BE STRICKEN

The ARRL has filed a formal motion before the FCC to strike three attachments from the reply comments filed by TV Answer Inc (TAI) in RM-6196. In this petition, TAI requested the reallocation of 500 kHz in the 216-222 MHz band to market an interactive viewer response system, and suggested that 220.5 MHz would be a good candidate for this reallocation since "it was underutilized by amateurs."

As reported last month, the ARRL had filed strong comments and reply comments to the TAI petition, which noted its many defects, including the lack of specific technical data.

TAI has now filed reply comments in its own petition which contains three attachments of new engineering technical data. Why does the ARRL want this data removed? For the simple reason that the introduction of new data in one's reply comments is forbidden by the Commission. The ARRL, or anyone else, does not have an opportunity to reply to this new information.

This new technical data should have been included in TAI's original petition, or included in its comments. (Interestingly, TAI did not file comments supporting its own petition!) All this simply goes to show that the ARRL was correct in its comments that the TAI petition was premature and the company had failed to conduct any substantial research prior to its submission to the Commission.

## SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Eastern

Massachusetts, Missouri, Nebraska, New York City-LI, South Carolina, Southern New Jersey and Western Pennsylvania sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more Full ARRL members residing in the Section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures on that petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (PSD-129) are available on request from ARRL Headquarters but are not required. The following is suggested:

(Place and date)

Field Services Manager, ARRL  
225 Main Street, Newington, CT 06111

We, the undersigned Full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Manager for this Section for the next two-year term of office.

(Signature . . . Call . . . City . . . ZIP).

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher, and a Full Member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination.

Petitions must be received at Headquarters on or before 4 PM Eastern Local Time September 9, 1988. Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before October 1, 1988. Returns will be counted November 22, 1988. SMs elected as a result of the above procedure will take office January 1, 1989.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 1989.

If no petitions are received for a Section by the specified closing date, such Section will be resolicited in January 1989 QST. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by the Field Services Manager.

You are urged to take the initiative and file a nomination petition immediately.

Richard K. Palm, KICE  
Field Services Manager

# Moved and Seconded . . .

## MINUTES OF EXECUTIVE COMMITTEE

Meeting No. 430  
St. Louis, Missouri  
May 14, 1988

### AGENDA

1. Approval of Minutes of March 19, 1988 Executive Committee meeting.

#### 2. FCC Matters:

2.1. Review of the ARRL's continuing response to FCC proposals in General Docket 87-14, Amendment of Part 2 of the Commission's Rules Regarding the Allocation of the 216-225 MHz band.

2.2. Review of the status of the petition filed by TV Answer, Inc. for 500 kHz in the 216-225 MHz band (RM-6196).

2.3. Review of the status of FCC General Docket 87-389, the proposed rewrite of Part 15 Rules governing incidental and restricted radiation devices.

2.4. Discussion of FCC PR Docket 88-139, Rewrite of Part 97.

2.5. Other FCC matters.

#### 3. International affairs:

3.1. Progress report on planning for the Region 2 Conference, Orlando, Florida (1989).

3.2. Planning for ARRL representation at the Region 3 Conference, Seoul, Korea (October 1988).

3.3. Report on ARRL participation in the CCIR Interim Meeting, Geneva, April-May, 1988.

4. Discussion of Repeater Coordination Matters.

5. Report on Biological Effects of RF Energy.

6. Local antenna/RFI matters.

7. Review of progress on Board directives:

7.1. By the vice presidents or chairmen for the committees.

7.2. By the Executive Vice President, on Board directives affecting Headquarters.

7.3. By the Executive Vice President, on W1AW fund-raising and renovations.

7.4. Other action items.

8. Director/Vice Director Election Matters.

9. Recognition of new Life Members.

10. Affiliation of clubs.

11. Approval of division, state, section and/or operating-specialty conventions.

12. Date and place of next meeting.

13. Other business.

Pursuant to due notice, the Executive Committee of the American Radio Relay League met at 8:30 AM, Central Daylight Time, May 14, 1988, at the St. Louis Airport Marriott Hotel. Present were President Larry E. Price, W4RA, in the Chair; First Vice President Jay A. Holladay, W6EJJ; Executive Vice President David Sumner, K1ZZ; and Directors Tom Frenaye, K1KI, Paul Grauer, W0FIR, Leonard M. Nathanson, W8RC, and Rodney J. Stafford, KB6ZV. Also present were International Affairs Vice President Tod Olson, K0TO; Secretary Perry Williams, W1UED; Director Edmond A. Metzger, W9PRN and Counsel Christopher D. Imlay, N3AKD.

1. On motion of Mr. Stafford, the Minutes of the March 19, 1988, meeting were adopted as amended.

2. FCC Matters:

2.1. The officers reported on the ARRL's continuing response to FCC proposals in General Docket 87-14, Amendment of Part 2 of the Commission's Rules Regarding the Allocation of the 216-225 MHz band, including the DoD/NCS Reply Comments, the ARRL/UPS meeting, and Capitol Hill activities planned for the next few weeks.

2.2. Counsel Imlay reported that, since the March meeting, the League had filed a Motion to Strike portions of the Reply Comments filed by TV Answer, Inc. in respect to its petition, RM-6196, seeking 500 kHz in the 216-225 MHz band; this paper was in addition to the filing of ARRL's own Reply Comments. The TV Answer, Inc. comments in question introduced engineering data which had been noticeably absent from its original petition, and which was not supplied in comments on the petition, thus denying other interested parties the opportunity to analyze and refute the data. Ample precedent exists to prohibit this practice.

2.3. Mr. Imlay also reported briefly on the status

of FCC General Docket 87-389, the proposed rewrite of Part 15 Rules governing incidental and restricted radiation devices. The deadline for Reply Comments has been extended until June 8, 1988.

2.4. On motion of Mr. Nathanson, the following resolution was unanimously adopted:

WHEREAS, in the four weeks since its release, the FCC Part 97 rewrite proposal, PR Docket 88-139, has been studied by League members, officers, directors and staff, and

WHEREAS, a list of potential problems, both typographical and substantive, already has been accumulated, and

WHEREAS, further careful study must be given to determine the potential impact of the proposed rewrite on the Amateur Radio Service, now therefore,

BE IT RESOLVED, that the Executive Committee authorizes the President to establish a Working Group of not more than four persons, to review the FCC Part 97 rewrite proposals in PR Docket 88-139, with the objective of presenting to the Board prior to its July meeting a recommended detailed ARRL position on the proposals.

2.5. Other FCC matters:

2.5.1. On motion of Mr. Grauer, the Counsel was directed, by unanimous vote, to file comments by June 13, 1988, in opposition to the Request for Rulemaking, RM-6363, filed by Anthony J. Sivo, W2F1, seeking SSB privileges in the 10.1-10.15 MHz band.

2.5.2. Mr. Sumner reviewed briefly the status of the 18.068-18.168 MHz band, authorized at WARC-79 to become an exclusive worldwide amateur band on July 1, 1989, and reported on actions taken in response to Minute 2.3.1 of the Executive Committee's meeting on September 5, 1987.

2.5.3. Counsel Imlay reported that the FCC had just issued a news release announcing it had granted ARRL's request for a change in identification procedures for reciprocal operators. The order, not available at the time of the meeting, is expected to require the transmission of the US regional symbol before the operator's home call sign (e.g., W1/G6CL), except for Canadian stations, where language in the existing treaty takes precedence. The Committee was in recess from 10:46 to 11:00 AM.

#### 3. International Affairs:

3.1. Mr. Sumner presented a progress report on planning for the Region 2 Conference, Orlando, Florida, October 16-20, 1989. On motion of Mr. Nathanson, the alternative plans for special philatelic covers, cachets and cancellations in celebration of the League's 75th Anniversary year (in lieu of a Commemorative Stamp deemed impractical if not impossible to obtain) were approved, and will include a version for release at Orlando on October 16 in observance of the Region 2 meeting.

3.2. Mr. Price reported on planning for ARRL representation at the Region 3 Conference, Seoul, Korea October 10-14, 1988, at the Seoul Plaza Hotel. Present plans include attendance by First Vice President Holladay, International Affairs Vice President Olson, Executive Vice President Sumner and International Programs Manager Naoki Akiyama.

3.3. A written report by Publications Manager Paul Rinaldo on ARRL participation in the CCIR Interim Meeting, held in Geneva, April-May, 1988, was presented. Mr. Rinaldo was a member of the US delegation; his report showed that the ARRL goals for the meeting had been achieved. Papers setting forth the technical achievements of amateurs have been accepted for CCIR's "Green Book." (CCIR is the abbreviation in French for the International Radio Consultative Committee of the International Telecommunication Union.) The Committee was in recess for lunch from 12:05 to 1:01 PM.

4. There followed an extensive general discussion of repeater coordination matters, particularly with regard to problems which had developed since FCC staff had suggested there could be multiple coordinators in a given geographic area. Without taking formal action, the Committee noted that proposals for ARRL action were being developed for possible Board consideration at its July meeting.

5. Mr. Olson presented a report for the Committee

on Biological Effects of RF Energy prepared by its Chairman, Dr. James M. Mozley, W2BCH, and minutes of its meeting in Dayton, OH on April 30, 1988. Committee recommendations include placing constructive engineering advice on RF safety in *QST* and other publications when appropriate; establish a bio-effects database at League HQ; continue contributing RF safety items to examination syllabi and question pools; continue to encourage research into RF safety and actively promote future articles in *QST* on this topic.

#### 6. Local antenna/RFI matters:

6.1. Counsel Imlay reported on recent antennacase "victories" which further establish the limited federal preemption of local zoning rules declared in PRB-1 as the law of the land. Pending cases were reviewed briefly.

6.2. Mr. Imlay also reported on current cases of radio frequency interference. On motion of Mr. Nathanson, the counsel was instructed to inquire of the General Counsel of the Federal Communications Commission as to the legal basis for imposition of post-inspection operating restrictions on amateurs, when such amateurs have been found to be in full compliance with all technical regulations, without having been afforded a hearing in accordance with Section 316 of the Communications Act of 1934 as amended.

#### 7. Review of progress on Board directives:

7.1. By the vice presidents and/or chairmen for the committees:

7.1.1. Mr. Holladay reported for the Membership Services Committee, concerning the proposals for beacon frequencies discussed in the May and June issues of *QST*. A final proposal is to be presented at the Board meeting in July.

7.1.2. Mr. Frenaye, as chairman, reported for the Education Task Force which has been focusing on innovative ways to get clubs into schools. A report is scheduled for July.

7.1.3. Mr. Metzger, as chairman, reported for the Administration and Finance Committee. The Committee will meet in St. Louis on June 17. Meanwhile, though expenses were heavy in the first quarter, revenues are sufficiently ahead of budget that the net income for the period was better than scheduled.

7.1.4. Mr. Nathanson, as chairman, reported for the Legal Strategy Committee. Planning for the Continuing Legal Education seminar at the National Convention in Portland will be one of the subjects for the committee's meeting to be held shortly.

7.1.5. Mr. Olson reported briefly for the Publications Committee. One of the subjects it is considering is a new version of *Operating an Amateur Radio Station* or an equivalent new work.

7.1.6. Mr. Stafford, as Board Liaison, reported for ANERCOM. The group is working its way down an agenda of questions posed by mail by its Chairman, Jerry Boyd, KG6LF.

7.1.7. Mr. Frenaye reported briefly for the Elections Committee which will hold a meeting on July 20 in the Hartford area. Meanwhile the Committee continues working by correspondence.

7.2. A chart was presented by the Executive Vice President, reporting the status of Board directives affecting Headquarters. Special reports were also presented on the ARRL New-Ham Pilot Recruitment Project, and on a recent survey of Section Managers. The Committee was in recess from 3:35 to 3:51 PM.

7.3. Mr. Sumner reported that the fund-raising drive for W1AW renovation stood at \$73,000 on May 12 based on 661 contributions and pledges averaging \$120 each, before any substantial input from the special Life Membership mailing. There was also an update on plans for acquisition of new equipment for the station. During the course of the above, Mr. Metzger departed from the meeting at 4:13 PM.

#### 7.4. Other action items:

7.4.1. On motion of Mr. Frenaye, the special progress report in re Minute 34, 1988 Annual meeting, regarding participation of the ARRL in the Manned Space Program, was accepted and the Committee established a Working Group in accordance with the recommendations contained in Mr. Sumner's special report.

(continued on page 73)

All letters will be considered carefully. We reserve the right to shorten letters selected in order to have more members' views represented. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

## ARRL COMMUNICATIONS MANUAL —WELL RECEIVED

□ I received my copy of the ARRL Special Events Communications Manual today. I am most pleased with its perspective and treatment of the various areas addressed in this publication. I feel that this is one of the finest pieces of work to come out of HQ in some time. It is fresh, up to date and appears to be a source of accurate information. It is going to be really easy to recommend this publication to all ARRL appointees. I also think that this publication will be an invaluable reference to all active clubs as well.—*George Race, W8BGY (Section Manager, Michigan), Albion, Michigan*

## RFI—THE DEMISE OF HAM RADIO?

□ I recently purchased an expensive stereo/television console and also a small 13-inch portable television. To my dismay, the stereo/TV console picks up and amplifies like a bullhorn when I transmit voice in the 10-meter band. It also shows visual sound bars. The portable television set does not amplify the 10-meter transmissions, but does show the sound bars. Both sets are equipped with good-quality high-pass filters installed on the cable service antenna cable. My neighbor downstairs also has a similar stereo/TV console and has experienced some interference problems, even though I have supplied a high-pass filter.

My Amateur Radio station is properly grounded, and I use high-grade coax to a properly tuned 10-meter vertical. I cannot use my Amateur Radio station when my neighbor is home or when my family wants to watch TV. I have written letters of complaint to the manufacturers of the equipment without so much as a letter of acknowledgment.

It is my intention to tell everyone that we are facing the demise of Amateur Radio through the continued poor design and construction of TV sets, stereo sets and other home electronic devices. It need not be that way. Owners of these sets often do not listen to the Amateur Radio operator who comes to their door to explain that he is operating a proper station, and that he is licensed to do so by the FCC, and that it is their own stereo or TV which is at fault.—*Vincent Policani, KA7WAR, Tacoma, Washington*

[The ARRL has continually urged the FCC to require that a label be put on home electronic devices stating that they may be susceptible to RFI, but no rule-making action has been taken. The FCC, in conjunction with the Electronic Industries Association (EIA) has produced a pamphlet entitled *Consumers Should Know Something*

*About Interference.* The purpose of this document is to assist the consumer in identifying and resolving common problems of interference to home electronic devices and it provides an excellent overview of the problem of interference. These pamphlets are available from your local FCC field office or from the EIA. Single copies are available from ARRL HQ for an SASE.—Ed.]

□ It is with mixed feelings that I read the announcement in the February 29th *ARRL Letter* concerning the Jack Ravenscroft case. On the one hand, it would appear that Jack received a favorable ruling from the Court of Appeals, but it would seem that the court is being too protective of the plethora of "electronic junk" that is being foisted on the consumer. I have no quarrel with the ruling which protects the public's right to adequate reception of radio and TV signals without undue interference from radio transmitters or other sources of RFI, but the protection should stop there and not encompass the myriad of electronic gadgets and playthings that are flooding the marketplace.

May I suggest that there are only three things needed to satisfy these consumers' complaints: A high-pass filter, a ferrite choke and a sledge hammer.

This influx of electronic gadgetry has given rise to a new acronym that I call HRI for "Interference to Ham Radio." In my neighborhood, we are besieged by second harmonics from cordless telephones designed to operate in the 1750 to 1775 kHz region, notably on 3502 and 3542 kHz. I am also finding the "touch lamps" to be a problem with generated line noise. I won't get into light dimmers, computers and so on. What we need is a court ruling protecting the amateur from the crazy world around him.—*John McKinney, W0AP, Grand Island, Nebraska*

## ADVICE FOR YOUNG HAMS

□ As a young person, I know that the problems I faced in becoming a ham are the same ones that other young people might have gone through.

One of the best things a young person can do is to find another ham who lives in the area. Even if you live in a rural area, as I do, it is easy to find an Elmer. If you write the ARRL, they will send you information on local clubs, and often the club will be able to help you get started.

With the help of your Elmer, you should be able to set and meet your own goals. One of the first should be to get a radio. This is where the Elmer really helps since he may have, or know someone who has, a radio that you can buy or borrow. As a Novice, my goal was to buy a CW rig.

When I upgraded to Technician, I wanted a 2-meter hand-held and when I finally upgraded to General, I wanted an SSB rig. To earn the money, I've done everything possible. I've mowed lawns, shoveled snow, and worked as a counselor at a summer camp.

After you're on the air, try and find a facet in our hobby which you enjoy, and work to be good at it. I personally enjoy rag chewing and traffic handling. Once you've found your niche, make friends on the air. You'll find that hams are eager to help anyone, especially the younger ham. Friends I've made from handling traffic willingly and eagerly give me advice, operating tips, and rides to hamfests! Don't be afraid to ask anyone for help. Also, be a good amateur yourself. Go out of your way to help other hams, and they will do the same to help you.

One thing that will make your operating time more valuable is upgrading. If you like 10-meter phone DX, just imagine how much you would like working DX on 20 meters! So far, at 15 years of age, I've had a fantastic 6 years as a ham and I hope that everyone who reads this will also enjoy a lifetime of our fantastic hobby.—*Matt Penrod, KA2TVX, Moravia, New York*

## RUSS FARNSWORTH: A CODE LEGACY

□ The April *QST* correspondence item on Russ Farnsworth left out a very important fact about Russ—he was blind. One could talk with him on CW or SSB and never suspect that he was sightless. He used to come into my store in Berkeley, California "looking for new items." It has been Amateur Radio's loss since his passing—always a gentleman, his method of code instruction is his legacy.—*Fred N. Carlisle, W8MAW, Constantine, Michigan*

[This fact was mentioned in the original letter as received, but was cut when the letter was shortened for publication.—Ed.]

## DOES THIS MEAN I HAVE TO START OVER?

□ The quiz entitled "Do You Remember These?" in April 1988 *QST* was great fun, but my results were a bit disappointing. I was first licensed in April of 1970, which is in the middle of the time frame covered by the quiz. As a junior high school student, I had no funds to even look at new equipment. The remainder of the '70s found me working my way through college, again with no interest in new equipment.

The bottom line? I scored 36 points and have been accordingly welcomed into ham radio!—*Don Gagnon, WB8HQS, Fort Wayne, Indiana*

## A Joint US/USSR DXpedition\*

*The Americans are going!  
The Russians are coming!*

Three years ago, Jack Bock, K7ZR, of the Western Washington DX Club, introduced this idea, initially planned for the Diomed Islands to commemorate the 50th anniversary of the first over-the-pole flight by Chkalov. The ARRL Executive Committee endorsed the idea. The Radio Sports Federation of the USSR was not able to make suitable arrangements at that time, but they did suggest an on-the-air special event.

In November of last year Randall Brink,

KD7IK, wrote four Russian clubs and met with good responses, indicating that official approval would be necessary to pave the way. Viktor, UB5WE, president of the Lvov Radio Club, maintained schedules with the WWDXC in "hopeful planning." (KD7IK schedules UB5WE 0330Z Saturday on 14,275—Friday local time.)

In early May, your column editor got the happy phone call from KD7IK that he had received word that the Radio Sports Federation approved the May 1989 operation, to coincide with the 1989 CQM Contest. Ten operators are already lined up to go to Russia, but a backup group is required. Interested in becoming a part of the

effort? Contact Randall Brink, KD7IK, 10701 Rosewood, Everett, WA 98204, 206-743-0094.

As a follow-up to the American team going to Russia, the possibility is being explored of having a Russian team in the US to operate (probably from Wyoming). There will be licensing and financial hardships to overcome (the UAs do not have the travel funds), and fund raising undoubtedly will have to be accomplished. But what better opportunity for our ham fraternity to celebrate the increased openness of the Soviet society than to assist in bringing this about? Check with Randall to see what you can do to help.

\*The name of the game is *mir*—peace.

### W6ISQ IN DX HALL OF FAME

The April International DX Convention in Visalia (week before Dayton) was memorable in so many ways, not the least of which was Jack Troster, W6ISQ, being inducted into the CQ DX Hall of Fame. (See photo.) Jack has been a vital part of the DX scene for many years, as an active operator, popular writer, and a mover and shaker within the Northern California DX Foundation. This very special nice guy says that "this award must be shared completely with the dedicated members of the Board of Directors of NCDXF, and the hard-working volunteer operators... both past and present. Over the years, these individuals have contributed their time and talent to make things happen at NCDXF and to ensure that it continues to support worthy DX-related operations of all kind. Recognition must be shared with the designers, builders and station managers of the NCDXF 14.1-MHz Beacon Net. Without their help and continued support, the International Beacon Net would not exist for the benefit of all amateurs." A special congratulations to W6ISQ from all "How's" readers!

### GOODWILL GAMES?

The March issue of the Western Washington DX Club's *Totem Tabloid* contains an intriguing discussion about the possibility of contesting becoming an Olympic Sport. "I think we have all been aware for some time for the need for a World Amateur Radio Contest. If all countries which engage in this sport were at one location using the same equipment and antennas, we could present the whole world with a champion. If this flies, next the Olympics!"

### CYCLE 22

If your DXing is still vicarious, through *QST* and bulletins, get back on! Sunspot numbers are rising more rapidly than ever before documented, and active DXers are having fun again. (Just when you thought you could get a good night's sleep, both short- and long-path high-frequency openings are conspiring to relegate those routine domestic chores till "later.")

### XUISS

W1RAN and others report that XUISS (see photo) continues skeds with YB3CN, DU9RB,

and W2MIG (14,165, 1200-1300Z weekdays, CW/sideband). Seth is 25, orphaned by war and runs 80 watts to an IC735 and dipole from a 12-volt battery in a refugee camp on the Thai border. In camp with 200k others, he has malaria and no income. The 12-member Khmer ARA of mid-1983 has declined to just Seth and a YL. He charges one 12-volt battery in the camp truck and is QRV after dark with an oil lamp. Discontinue QSLs to Box 19-74 Nonthabury, due to pilferage. QSL via YB3CN or JA4KFA, or to Keo Piseth, PO Box 17, Aranyaprathet, Prachinburi, 25120 Thailand.

### ANNIVERSARIES

This year marks special anniversaries of the following IARU societies. Congratulations all! RSGB (United Kingdom, 1913), NRRL (Norway, 1928), VERONA (Netherland Antilles, founded 1948), RCH (Haiti, 1948), CRAS (El Salvador, 1958), EEP (Greece, 1958), WSARC (Western Samoa, 1968).

### THE CIRCUIT

□ **4W1:** The Lynx Group of SØRASD fame hopes to activate 4W7EA for close to a week about now!

□ **N Cook:** ZK1QC, Manahiki, should be on the air right now, operated by AG9Q and ZK1CP. Watch 14185/21285, 0200-0600Z. QSL via K9QVB.

□ **SX1RAAG:** Through June 30 this special call will celebrate the 30th anniversary of the Greek society.

□ **VK2BCH:** Bing left for 5W1, ZK3 and ZK1 early May. Cards direct to VK2BCH.

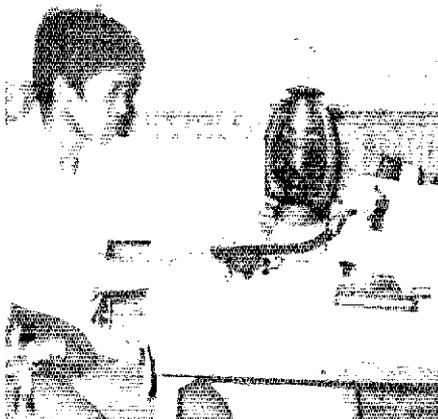
□ **P29FG:** Don returned to the US permanently early June. Cards still go to WAØGUD.

□ **AB4Y:** Chuck needs a manager for his DX operation. Contact Chuck Martin, 1605 Single Tree Ln, Bowling Green, KY 42101.

□ **NW DX Convention:** July 22-24 at The Richmond Inn, Richmond, BC (604-273-7878). Before July 1 registration is \$40 US, after \$48 (includes banquet and breakfast). US hams write Ken Thompson, Box 3048, Blaine, WA 98230 (make checks payable to BC DX Club).



W6ISQ, newly inducted in the CQ DX Hall of Fame, see text. W1YL photo

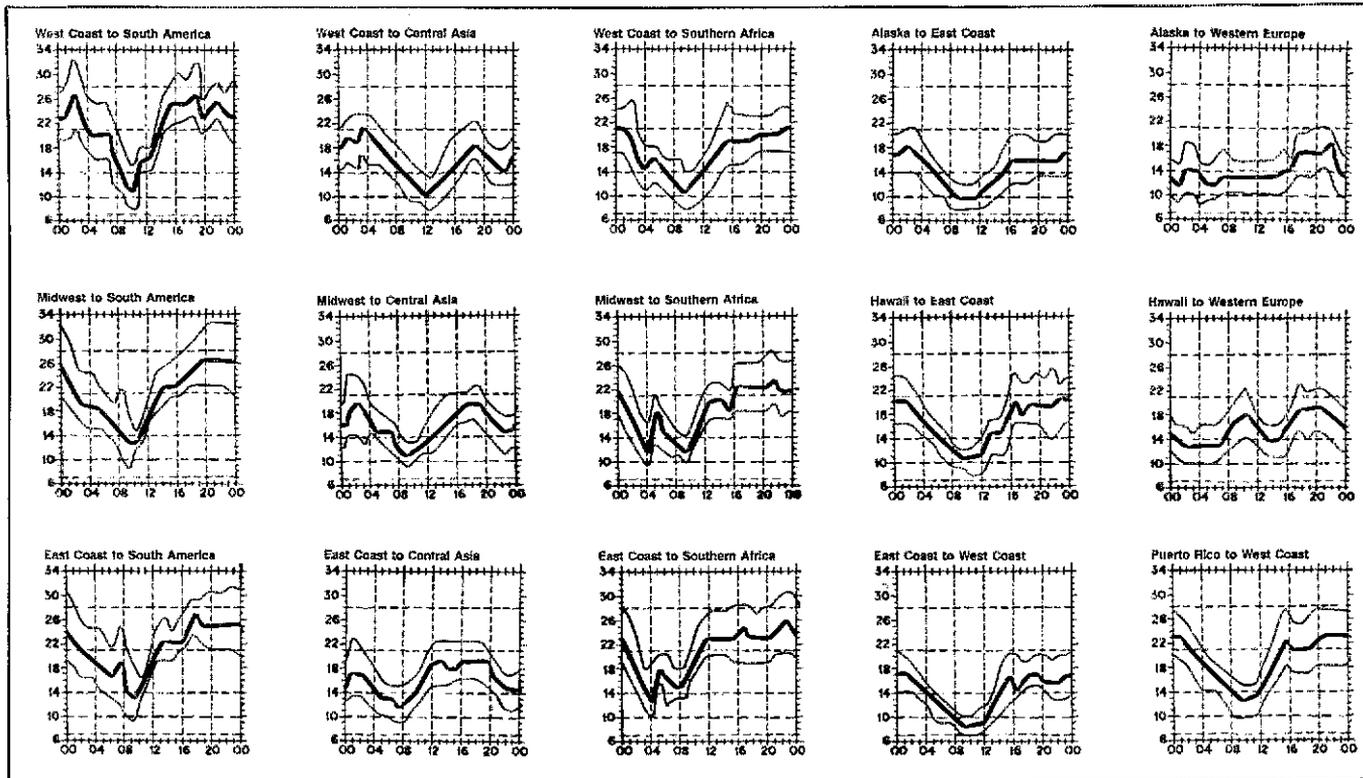


XUISS, Seth (photo via W1RAN). See text.

## Domestic DX Repeaters

For some time now, WB5SSD, Vice President of the Delta DX Association, has been compiling a list of DX repeaters (usually sponsored by prominent DX clubs). If you're touring this summer-fall, you're sure to find a congenial group of like-minded DXers to let you know about all the good DX you've missed while you've been on the road! (If your DX Club isn't "on the list" please contact WB5SSD.)

State/Prov	Area	Input/Output	Sponsoring Club	State/Prov	Area	Input/Output	Sponsoring Club
Alabama	Birmingham	144.81/145.41	VICN DXC	Kentucky	Hawesville	147.705/147.105	NKYDX
	Huntsville	147.70/147.10	N AI DX Club	Louisiana	Baton Rouge	147.795/147.195	Red Stick DX Assn
		147.90/147.30	N AI DX Club		Lafayette	144.82/145.42	Acadiana DX Assn
Arizona	Phoenix Metro	147.93/147.33	CADXA	Metairie	147.96/147.36	Delta DX Assn (PL-67)	
Arkansas	Little Rock	144.89/145.49	Cent Ark DX Club	St Amant	146.385/146.985	ASCE DXA	
California	Black Mt	147.96/147.36	N Ca DX Club	Maryland	Jessup	147.42 simplex	Nat'l Cap DX Assn
	Mt Lukens	144.88/145.48	S Ca DX Club	Michigan	Troy	144.53/145.13	SE MI DXA
	San Diego	146.885/146.085	La Jolla DX Assn	Missouri	St Louis	147.60 simplex	None
	Santa Clara	147.96/147.36	NCA DX Club (PL-110.9-2Z)	New Jersey	Cedar Grove	147.78/147.18	N Jersey DX Assn
Canada	Manitoba	147.78/147.18	Winnipeg DX Club	Cherryville	147.735/147.135	W Jersey DX Assn	
	Ontario	144.51/145.11	DX Info	New York	Attica	147.96/147.36	WNYDX
	Ontario	147.93/147.33	TDXA	Huntington	441.125/446.125	LI DX Assn (PL-136.5)	
Florida	Jacksonville	147.795/147.195	FL Crown DX & Cont	Huntington	147.90/147.30	LI DX Assn	
	Miami	147.93/147.33	S FI DX Assn	NC Boone	147.96/147.36	Carolina DX Assn	
	Orlando	147.69/147.09	Cent FI DX Assn	Ohio	Centerville	146.085/146.685	SW Ohio DX Assn
	Tampa/St Pete	146.25/146.85	West Coast DX Ring		Louisville	144.81/145.41	Stark DX Assn
Georgia	Atlanta	147.50 simplex	SE DX Assn	Parma	147.96/147.36	N Ohio DX Assn	
	Atlanta	147.795/147.195	Dixie DX assn	Stow	144.83/145.43	Stow DXers	
Hawaii	Makakilo	147.96/147.36	Honolulu DX Club	Oregon	Portland	147.74/147.14	Willamette Valley DXC
	Makakilo	146.37/146.97	DX Club	Pennsylvania	Dauberville	144.55/145.15	Dauberville DX Assn
Illinois	Chicago	147.96/147.36	IDXA (PL-136.5-4Z)		Dauberville	144.89/145.49	Dauberville DX Assn
	Chicago	146.46 simplex	Metro DX Club		Dauberville	449.35/444.35	Dauberville DX Assn
	Chicago	145.58 simplex	DX Inc	Tennessee	Hendersonville	147.945/147.345	Middle Tenn DX ARC
	Elk Grove	147.615/147.015	EGDXA	Texas	Arlington	147.74/147.14	Arlington DX Assn
	Elk Grove	221.98/223.58	EGDXA		Dallas	147.72/147.12	Dallas DX Assn
Indiana	Schaumburg	221.84/223.44	K9EL	Houston	147.96/147.36	Texas DX Society	
	Connerville	144.75/145.35	DX Spotting	Pampa	147.87/147.27	Pampa DX Club	
	Ft Wayne	147.515 simplex	None	San Antonio	146.30/146.90	Alamos DX Amigos	
	Kokomo	147.51 simplex	None	Seattle	146.40/147.00	W Wash DX Club	
	Lafayette	147.645/147.045	K9FN	Washington	Seattle	146.40/147.00	W Wash DX Club
Iowa	Lafayette	147.51 simplex	None	W Virginia	New Martinsville	147.54/146.94	MSNDXN
	Cedar Rapids	144.59/145.19	NE IA DX Assn	Wisconsin	Burlington	222.46/224.06	None
	Chariton	144.61/145.21	EIDXA	Madison	146.205 simplex	None	
				Sheboygan	144.51/145.11	SC DX	



**When are the bands open?** These charts predict this month's average propagation predictions for high-frequency circuits between the US and various overseas points. One chart showing East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as the lowest curve (optimum traffic frequency, or FOT). The horizontal axis shows Coordinated

☐ **SK:** Pitcairn follower W6YO sadly notes that Andrew Young, VR6AY, became a Silent Key on March 19. VR6AY began operating in 1938 using donated equipment, storage batteries and a wind charger (see "How's DX?," Nov 1983, p 75). KL7MF, another DX old pro, has gone to rest. Hal was a long-time member of the First Class CW Operators' Club and was Engineer-in-Charge of the FCC Alaska office (and years ago of the San Diego FCC). W9WHM relates the sad news of the passing of that fine contest pro HK0AI. Later than most news is the report that the outstanding signal of OT VK2EO has been silent since year-end 1986 (noted by K6DR).

☐ **4X4VV:** WA7WOC is managing the cards, as of April 1988.

☐ **HI500RCD:** Celebrates the 500th anniversary of the discovery of the Americas. QSL via Radio Club Dominicano, Inc, Box 1157, Santo Domingo, Dominican Republic.

☐ **4Z5UX:** Cards for Danny's WPX phone operation go via his regular call, 4Z4UX.

☐ **Marconi:** International Marconi Day '88 took place April 23, featuring GB4IMD, IY4FGM, VE11MD, EI2IMD, VO11MD, K1VV/IMD. Cards for awards (for working 5 out of the 6 stations) or card requests go to CRAC, Box 100, Truro, TR1 IXP, Cornwall, UK.

☐ **VP5CPU:** VE3CPU concluded his 3rd little expedition to Turks & Caicos (1986 to VE3CPU/VP2M, 1987 to 8P9CW). Look for Joe at 8Q7 in October (or KH5, Palmyra), depending on arrangements.

☐ **Curacao:** N5RM operated /PJ2 May 24-31 (and PJ0R during WPX CW). Next year's

plans are for continent number 6 (Jordan or Cyprus).

☐ **N4RP/C6A:** Dick reports some cards mailed before January 21 were lost in the mail. Try again at Box 3073, Annapolis, MD 21403. (He'll be /C6A again in time for CQWW CW in November.)

☐ **6 Meters:** Watch for the hot 50-MHz period. 6 Meter DX Society members will operate PJ0M July 7-14, 80 through 6. Particular attention will be paid to 6-meter multihop paths to the UK and Europe. Cards with SASE via K2MUB.

OX3KD	D. S. Nielson, Soender Alle 33, DK-9460 Broust, Denmark (F6FNU) after 2/21/88	ZK1QC ZL0AAC J56AS J50AS 4K0D	(K9QVB) (DL1MAM) (IT9AZS) (IT9AZS) (RA3YA) Valad, PO Box 73, Bryansk, USSR. (UA1DJ) Boris V. Gnusov, PO Box 1, Leningrad, 19070 USSR. (4X6TT) 1988 Call-book (IK8DYD) (5B4MF) (5B4MF) (HK7II) (VE2XB) (WD0HHM) (VE3MMB)
TI2TEB		4K1A	
TZ6PS	BP 428, Bamako, Mali (N0BLD) (4X6TT) (4X6TT) (JH9GRM) (VE3MMB) 1987		
TZ6VV T25TT T27DX VK9LC VK9YE		4X6TT/ KH8	
VP2ML VP8BRE XE2GCK XX9KA	(K1RH) (G0ACJ) (AA6EE) Peter, PO Box 768, Macau. (N4JR)	5B25MF 5B4PG 5B4XX 5K7U 8P9EQ 9J2AL 9V1WZ	
YB0ATA			

## QSL Corner

Administered By Joanna Hushin, KA1IFO

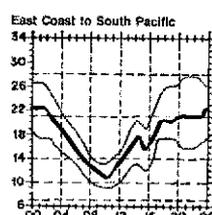
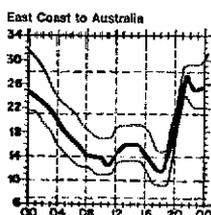
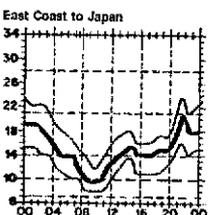
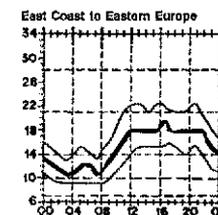
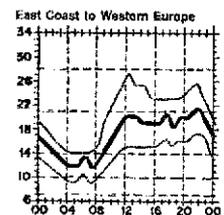
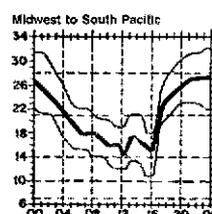
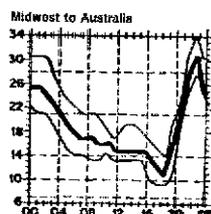
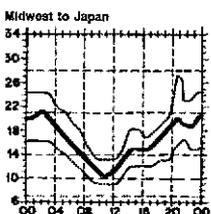
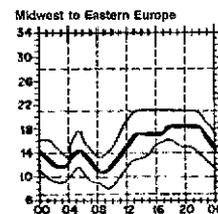
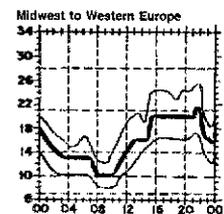
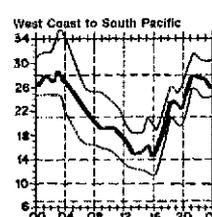
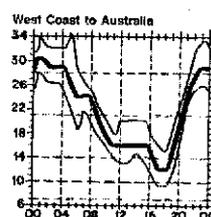
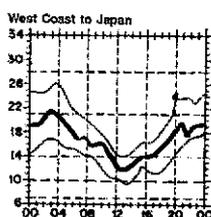
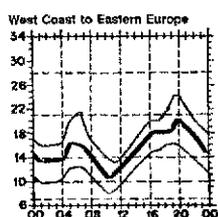
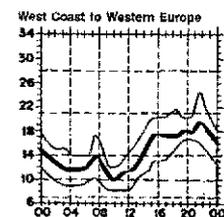
Here is some information for those of you who would like to QSL a QSL manager or direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

A35WJ (W9GW)	HC5K (KT1N)
BT4YL (JA3UB)	H25MF (5B4MF)
CR3EU (G3PFS)	457/
CY0SAB (VE1CBK)	JA8DOK (JA8RUZ)
EL2MS (KD8IW)	JT0NP (HA5NP)
FJ0A (F6CYV)	J47JG (SV1JG)
FT0ZB (F6EYS)	KX6LJ (N4LZJ)

## QSL MANAGER VOLUNTEERS

K1FJ	W1PEA
KA4JMZ	WD4HRO
KK4DJ	N4PKL
NQ9E	WB0YEA

☐ QSL Corner, June 1988, *QST*, page 72, contains information and addresses for the ARRL Incoming Bureau. QSL Corner, March 1988 *QST*, page 59, contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.



Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 *QST*, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for July 16 to August 15, 1988, assume a sunspot number of 115, which corresponds to a 2800-MHz solar flux of 159.

# DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and 5-country increments above 300. The totals shown below are exact credits given to DXCC members from April 1 through April 21, 1988. An SASE will bring you the rules and application forms for participation in the DXCC program.

## New Members

### Mixed

CO7GC/100 DL7ALD/106 DJ0SP/100 EA7DRR/153	FD1JAD/193 HB9ARF/108 IN3DEI/311 IØRUM/112	JG1OUT/210 J1JGI/108 JF3NFI/204 JF3TOE/107	JA6HBB/110 JA8BAX/109 OK3CSC/102 PA3AKF/100	SV1DO/316 VE3JAC/100 VE5RC/104 YT3YL/108	ZS4NS/102 AJ1JN/101 W1MEG/100 K3WUW/118	KC3NG/143 NE3P/107 W3TFA/107 AA4IP/110	K4FOM/105 K4TX/120 KB4FAS/106 W5KI/260	K4KZOS/107 NQ6Q/247 KE8LM/113	W4BSEG/100 K4MVF/101 WØHV/105
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### Radiotelephone

CE4EBL/109 EA5FCO/229 EA7AZA/117 FD1JAD/174	HKSJPS/171 IK1GKH/105 IK5EG/119 IK5QA/117	JE1GZB/104 J1JGI/105 JF3NFI/191 JF3TOE/107	JA6HBB/110 LA3BFA/105 OZ1LDN/123 SV1DO/178	XE1IL/107 XE1XY/109 ZS4NS/102 KB1CQ/109	KA2CHX/117 K3YGU/138 KD4KS/105 KF4GW/101	K5HAA/109 WB5FXT/130 W5KI/246 K6JGV/263	K8TS/107 K4KZOS/107 NQ6Q/247 W6BCZ/100	N7ACB/278 WC7R/105 KE8OW/116 N8EIH/112	N8IMZ/103 WB8COQ/100 KB9YK/112 NT9H/233
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### CW

EA7DRR/147 G5LFP/104	JE1VPC/115 JG1OUT/159	K1DCI/122 N1CX/103	N2IN/103 W3TFA/101	AA4NG/103 N4LJS/105	W5SI/110	KM7B/100	N7DDX/103	KA9OTD/103	KØPP/157
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### RTTY

I8AA/254	ON4UN/159	VE3EJ/102	WB2IVO/107	K6EID/100	KN6J/105				
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### 5BDXCC

SM5FQQ A5C	K3QX KØTEM	F8HMJ DU1ND	JA1GO NX8J	FMSCL EA7AZA	KS3L W4FLA	W4FRU	N4AVV	ISØQDV	JJ1DWT
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## New Honor Roll Members

### Mixed

314	309								
OH2XF/346	SV1DO/316 KA1DE/312 N6HL/312	W5HTY/332 W7OEV/332							

### Radiotelephone

309									
PY4VX/327 W5HTY/332 W5LQN/315									

### CW

305									
JA6BSM/311 WØBW/309									

## Endorsements

### Mixed

CE3GN/316 DK2PS/228 DL1BO/360 DL3RK/361 DL7ABK/178 DL9OH/355 EA7AZA/216 F3CY/203 F5LQ/332 F6DHB/315 F8DJU/313 F8HMJ/233 F9RM/353 G2QM/315 G3AAE/363 G3FPX/361 G3FCA/319 G3JML/340 G4CP/365 G5LP/194 GW3AHN/363 HB9AHA/339 HB9AWS/152 HB9BZA/300 HB9DX/350 HK3YH/305 IN3RZY/304 I8AA/341 IT9JLA/317 IT9ZGY/359 ISØMVE/218 JE1VPC/273 JA2BL/333 JE2ARR/150 JA3CMD/323	JE3LWB/314 JA4FHE/323 JA4ZA/345 JA6BSM/330 JA7OFU/198 JH7BDS/303 JA8ADQ/341 JA8CFR/305 JH8ACW/143 KP4L/300 LA1PBA/174 LA8XM/228 LU6DJ/368 OE1ER/366 OH2BZ/345 OH2KI/328 ON5S/319 QZ2X/203 QZ5EV/323 PA6RLF/290 PAØTAL/342 SM5BB/338 SM5CZY/346 SM6AVM/294 SM6CVX/336 SM6VR/340 SM7LOX/201 SM7MPM/159 TØRCH/157 UB5UAT/311 W2DPJ/265 VE2GZ/200 VE3BHZ/312 VE3JGC/W/250 VE4IU/272	VE4SN/283 VE5RA/316 VE6EO/260 VE7BD/329 VK3YL/351 YY1CW/252 YU2OM/307 YU2YM/324 YU3AN/306 ZL1AH/342 ZL1AV/344 ZL1HY/367 3D6BW/127 K1BW/331 K1ZLA/201 KA1A/292 KB1W/255 N1CIX/190 NE1T/153 W1AXA/360 W1DK/361 W1ELR/347 W1ENE/327 W1ESN/318 W1GKK/370 W1GVZ/293 W1HZ/362 W1MJI/350 W1NHJ/343 W1OO/343 W1PEA/315 W1UU/350 W1WAI/306 W1WWW/320 K2HVN/324	K2MUB/342 K2COL/G/298 K2QIL/305 KA2CKS/179 KB2XJ/252 KD2BW/176 KM2P/332 KM2V/331 N2CJC/285 N2CS/204 W3GH/359 W3GGO/315 W3ADVO/318 WA3IIA/175 WB3CON/308 WA2G/364 WA2GW/352 W2BAI/328 W2BTG/277 W2BXA/368 W2HG/300 W2HI/341 W2IQB/318 W2JVV/365 W2LL/346 W2LV/363 W2MPI/311 W2OHH/363 W2UI/330 W2VJN/347 WA2DIJ/353 WA2ICE/204 AE3T/325 A13N/302 K3AV/347	K3GQJ/200 K3JGJ/307 K3ND/324 K3RV/310 KA3LHP/152 KN3P/287 KZ3H/228 N3COB/179 NM3C/164 W3GQ/334 W3GH/359 W3GGO/315 W4CZU/321 W4DHz/348 W4DRK/349 W4EEF/359 W4FX/353 W4IQ/309 K4CIA/343 K4DJ/341 K4DY/339 K4EZ/350 K4FCT/325 W4XQ/332 W4YN/342 WA4WIP/342 W4BKH/293 W4WV/311 K4LQ/342 W4XQ/332 W4YN/342 WA4WIP/342 W4BKH/293 K6RN/352 K6RQ/355 K6ZQ/367 N6FX/350 N6IV/KL7/204 K5YY/342 K6SAS/306 K5CV/213 N6SP/306 W5BOS/319	N4JJ/324 N4LZL/177 N4QAJ/150 N4TX/314 N4UH/338 N4YR/327 NE4A/320 NF4U/318 W4AIT/367 W4BFR/352 W4BKP/315 W4BQY/368 W4CZU/321 W4DHz/348 W4DRK/349 W4EEF/359 W4FX/353 W4IQ/309 W4OMY/305 W4QM/351 W4VN/311 W4XQ/332 W4YN/342 WA4WIP/342 W4BKH/293 W4WV/311 K4LQ/342 AG5H/290 K5AAD/340 K4LR/314 K5TSQ/311 K5YV/342 K6SAS/306 K5CV/213 N6SP/306 W5BOS/319	W5FIX/175 W5GEL/354 W5GJ/349 W5IO/362 W5MCH/282 W5QK/355 W5QKR/327 W5TO/341 W5TZN/250 W5UC/220 W5VJW/208 W5YU/338 WASIEV/337 WASNOM/250 WB5BIR/282 WB5ZKR/300 W5FX/353 K6GAK/325 K6IR/330 K6JG/344 K6KII/355 K6LQA/332 K6OJ/330 K6ABV/309 K6QH/343 K6RF/352 K6RN/352 K6RQ/355 K6ZQ/367 N6FX/350 N6IV/KL7/204 W5YV/342 N6UC/335 W6BS/360 W6BSY/359 W6BVM/355	W6EE/365 W6EJF/343 W6FSJ/359 W6GMF/351 W6GYM/290 W6HYG/355 W6ISQ/351 W6KNH/339 W6LTI/278 W6MNR/332 W6QNM/353 W6RFH/350 W6RFF/285 W6SBI/250 W6YJ/349 W6YK/360 WA6GFE/342 WA6ET/343 WB6FZ/250 K6KII/355 W6ABV/309 K7SP/321 W6RN/296 KE7PB/156 N7EB/355 NJ7H/150 NN7T/175 NX7K/297 W7BGH/320 N6UC/335 W7CM/354 W6BS/360 W7FPT/281 W7IR/363	W7MI/330 W7OF/361 W7ORH/333 WA7GOA/249 WB7EWC/227 AC8K/327 K8OHG/348 K9ONV/352 K8RNL/331 K8SUS/153 W9MA/351 K8DBW/286 KNBZ/333 N8FGD/162 W8AH/360 W8BKP/357 W8CFG/335 W8DA/351 W8DAU/275 W8KPL/360 W8QNM/338 W8OK/355 W8PHZ/359 W8QFR/337 W8RCM/226 W8YMB/280 W8ZCK/340 W8ZCQ/357 W8ZU/349 W8AQSE/316 K9BWD/323 K9C/204 K9JF/208 K9RN/313 K9ZYG/270	KØBCQ/297 KØBOT/207 N9AF/339 NF9E/166 W9CH/351 W9DH/342 K8OHG/348 K9ONV/352 W9GIL/361 W9MY/305 W9RC/336 W9RF/333 W9ROK/255 W9SS/329 W9BKP/357 WA9YY/115 KØAP/252 AØAV/308 KØBUR/308 KØCVD/338 W8OK/355 W8PHZ/359 KØJGJ/214 KØJX/213 KØQJ/300 KØRCM/226 W8YMB/280 NØCA/331 NØXI/271 WØBW/355 WØJL/362 WØML/365 WØPAH/337 WØR/337 WØMVL/325 K9RN/313 WØYYA/267 WØZAH/333
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### Radiotelephone

CE3GN/316 CP5LE/180 DJ2ZB/313 DL3RK/335 DL9OH/355 EA5BCX/272 EA5BD/253 EA5BY/261 EA7CEO/282 F8JA/327 F8ZU/313 F9RM/353 G3NLY/340 G3RCA/318 G3JML/340 G3ZBA/332 GW3AHN/360 G8AHC/176 HB9AHA/334 HK3YH/294 IK2ANI/213	I8AA/341 IT9CUE/247 IT9ZGY/345 JA1DOO/228 JA1RWE/318 JE1VPC/270 JA3CMD/321 JA4ZA/344 JA6BSM/328 JA8ADQ/341 QA4OS/336 OH2BZ/309 OZ3PZ/330 QZ5EV/323 SM5CZY/346 SM5VS/321 SM6AVM/294 SM6CVX/332 SM6VR/330 SM7LOX/195 SM7MPM/143 VE2DPJ/250	VE3BI/274 VE3EJ/318 VE4AT/308 VK1ZL/250 VK6LK/330 YY1CW/251 YU2OM/294 ZL1AV/332 ZL1HY/366 ZL3N/332 3D6BW/127 K1RHW/325 K1YDQ/204 K1ZLA/201 KA1DE/302 KA1UJ/128 N1CIX/169 W1ENE/307 W1ESN/284	W1GKK/353 W1HX/356 W1MGP/236 W1PEA/311 K2QLG/237 K2SHE/323 KC2Q/232 KM2P/330 KM2V/330 KZ2P/310 N2CJC/285 N2QI/123 W2BXA/366 W2HFX/311 W2IQB/318 W2LV/363 W2MPI/311 W2RGL/320 W2YU/348 WA2ICE/204 WA2MIS/152	WB2DND/310 K3RV/276 KN3P/279 KZ3H/181 N3EHD/237 W3AZD/346 W3GQ/332 W3GH/353 WB3KBZ/VP9/177 K4DJ/326 K4JI/300 K4JLD/288 K4KAK/300 K4LR/310 K4POV/332 K4SM/348 K5VF/311 NE4A/297 NF4U/312 W4BFR/328 W4BKP/315	W4DPS/336 W4EEE/359 W4JHE/305 W4LHX/353 W4YN/340 W4OMY/293 WA4GZA/235 WA4MMO/327 WA4MXD/122 WA4OPW/326 WA4SMU/125 WA4WIP/342 WB4BBH/226 WB4DAH/152 K5GQ/286 K5MZ/308 K5IH/288 K5OCV/333 K5TSQ/300 K5YV/340 K5SWC/177	N5FTR/138 N6UC/335 W6ARJ/335 W6AXH/326 W6BQ/326 W5TZN/205 W5UAW/339 W5YU/338 WA5BBR/281 WA5IEV/336 WA5NOM/138 WA5PIE/200 WB5ZKR/279 AH6H/150 K6FNS/150 K6IR/330 K6JG/344 K6KII/355 K6LQA/332 K6OJ/330 K6ABV/309 K7SP/321 W6RN/296 KE7PB/156 N7EB/355 NJ7H/150 NN7T/175 NX7K/297 W7BGH/320 N6UC/335 W7CM/354 W6BS/360 W7FPT/281 W7IR/363	N6UC/335 W6AED/326 W6ARJ/335 W6AXH/326 W6BQ/326 W5TZN/205 W5UAW/339 W6YU/338 WA5BBR/281 WA5IEV/336 WA5NOM/138 WA5PIE/200 WB5ZKR/279 AH6H/150 K6FNS/150 K6IR/330 K6JG/344 K6KII/355 K6LQA/332 K6OJ/330 K6ABV/309 W6RFT/329 WB6FZ/250 K7ABV/316	K7SP/317 K8BTQ/265 K8YU/260 K9WQ/250 KE7PB/154 NX7K/291 W7CMO/346 W6BSY/353 W6YU/338 W6GYM/290 W6HYG/355 W6IH/306 W6ISQ/341 W6KNH/339 W6OMR/318 W6ORD/312 W6RDK/312 W6RF/301 W6RHE/346 WA6EHT/331 W6FRT/329 WB6FZ/250 K7ABV/316	K9ZO/305 K9OT/207 K9RF/269 K9SR/266 K9JF/319 N9AF/336 N9EL/155 NF9E/166 W9BEK/334 W9DH/342 W9JT/342 W9LJ/179 W9NZ/347 W9M/329 W9X/329 W9TKD/352 W9WML/365 W9PAH/337 W9R/337 W9MVL/325 K9RN/313 W9YYA/267 W9ZAH/263
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### CW

EA7AZA/215 F6HMJ/181 IT9ZGY/255 ISØMVE/182 J11XTZ/185	JA3CMD/285 JE3LWB/287 JA7ASD/135 JH7BDS/289 JA8CFR/285	LA1PBA/150 PY2RRG/227 SM6CVX/300 AK1E/177 KA2AOT/182	W2EJG/134 WA2MUA/152 K3YGU/153 W3GG/283 K4CEB/308	K4JLD/263 KV4F/281 NE4A/234 W4BFR/296 WB4BBH/205	WB4ZBI/175 K5YV/304 NE5P/262 WB5ZKR/250	WG5G/126 K7SP/258 KA7NNJ/150 K8WP/153	KN8Z/270 W8AH/319 W8DA/287 W8RT/312	W8ZCQ/305 K9BWC/294 KØQ/290 KA9TSW/136	W9DH/283 WA9YY/115 NXØI/160 WØJL/277
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### RTTY

WA4WIP/180		IT9ZGY/125	W1JR/156	W3GH/141	KJ9I/125				
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# Make a Commitment: Support Your Local Frequency Coordinator

*The success of any organization depends on the active support of the organization's membership. Louis Brydon, WA6OCZ, secretary of the Northern Amateur Relay Council of California (NARCC), describes how such support, or lack thereof, affects the day-to-day operation of a frequency coordinating body, in this article which appeared in the NARCC Newsletter.*

## It's Only A Hobby, But...

We as amateurs like to use the philosophy "it's only a hobby" as an excuse for the mess we have allowed to occur in repeater coordination. "We are not professionals and can not be expected to spend our full time worrying about ham radio" does not address the issues and only aggravates those who are spending a lot of time trying to solve the problem. The Amateur Radio Service is supposed to be open to all who qualify for the license, but how do we deal with overcrowded repeater bands and people who do not see the macroscopic picture when they are focused on their own microscopic efforts?

What is a better use of an amateur repeater: emergency service, walk-a-thons, Red Cross training, search-and-rescue, calling home to tell them you are okay and will be late for dinner or talking to your buddy about the weather?

One reason we consider our society civilized is because might does not make right. We line up for limited resources and wait our turn. The conflict between the rights of the many over the rights of the few are judged carefully in an attempt to be fair, following specific rules and doctrines which are designed to protect everyone. We become outraged when blatant unfairness appears and, sometimes, paralyze ourselves with unbending regulations which were supposed to protect us from the very crime we are now perpetrating on ourselves.

The issues that brought about the formation of the original California Amateur Relay Council are still with us. However, new issues striking at more basic doctrines of fairness and what is best for the many are now before us. The excuse of a "hobby" does not make the issues any less important or less difficult to resolve.

## Who's On First?

Where does it say that a repeater that has been on the air since creation has any more right to occupy a frequency than one put up yesterday? Who says four hams on a UHF pair have more rights to a frequency than a club of 100? What if both are involved in "emergency" service? One of the charters of the Amateur Radio Service

is to provide emergency communications for the benefit of the community. This is a small return for the valuable resource we keep from use by the commercial radio service.

Under the concept of "harmful interference," what protects repeater *A* from repeater *B*? When repeater *A* is not in use (quiet transmitter), cannot repeater *B* now be used? If the repeater *A* transmitter was to come up while repeater *B* was in use, is this not harmful interference to repeater *B*? Repeater *A* is now in violation.

Is the ability to receive another distant repeater when the repeater *A* transmitter is off harmful interference? Does repeater *B* prevent you from using repeater *A*? How do you document this? Where does it say you have to, and to whom do you complain?

If the goal of local coordination is only to issue "who's on first" documentation based on harmful interference, is it not obvious what the next interpretation of the rule is? NARCC's pitfall is that our expectations are much higher than what the rules protect.

This is not to say that what is needed is an all-powerful entity that orchestrates all amateur repeater activity and has the right to say who repeats or does not repeat. What is needed is an organization that listens, discusses and defines a set of rules by which to play the game. However, this only works if everyone agrees to play by the same rules and that some method of enforcement exists to punish those who go against the rules.

## Catch 22-82

It is a circular problem. Poor support by the players, leading to minimal effort on the part of the all-volunteer staff, creating an even more unresponsive organization that cannot get out of its own way. You get what you put in. People only come to NARCC when they have a problem and it is always NARCC's fault, but what is NARCC?

An organization is dependent on its members for support, but is run by its staff. With a diverse and motivated staff and the resources needed to do the job, NARCC should be able to survive. But like any effort in the "real world," if your constituents do not support you and the staff members do not get their jobs done on time, the organization effort is going to fail. The problem here is that the only incentive the staff has to do a great job (and just a satisfactory attempt) is either their own internal drive to make the world a better and more organized place to live or they get a kick out of telling people what to do. As a reward for our

efforts, we listen to our brethren bad-mouth us and the organization we have devoted so much precious time to help. Enthusiasm quickly wanes.

It is unfortunate that many of the members do not even seem to understand or appreciate the complexity of the issues that are involved. The staff members, elected in a 30-second popularity contest by the few people who bother to show up for a general meeting, seldom have any idea of what they have volunteered for. Those staff members (directors, coordinators, officers, committee members, etc) who have taken the bull by the horns and tried to do something should be applauded. Those who only show up at meetings every once in a while and volunteer to do something that will never get done, should either remove themselves or be removed.

## Put Your Weekend Where Your Mouth Is

This effort requires motivated, intelligent, organized and technically competent people who will do the job, as well as an understanding constituency who are willing to put their weekends where their mouths are. There are over a dozen positions desperately in need of good people to fill them.

Amateur Radio is a hobby, but when you make a commitment to do something, do it right.

## WR CALL SIGNS REDUX

In the May installment of this column, I wrote that "some repeaters are still using the old repeater call signs with a 'WR' prefix" and that they are "doing so illegally." This statement requires clarification. WR-prefix call signs (eg, WR1AEP) that were issued by the FCC for amateur repeater stations are illegal. However, all other WR-prefix call signs (eg, WR4S) that were issued by the FCC for plain vanilla Amateur Radio stations (that is, not strictly for repeater operation) are legal and may be used to identify a repeater.

## REPEATER LOG

According to March 1988 reports received, repeaters were involved in the following public-service events: 252 vehicular emergencies, 31 drills/alerts, 24 medical emergencies, 22 public-safety events, 17 fire emergencies, 10 weather emergencies, 1 power failure, 1 search and rescue and 1 criminal activity.

The following repeaters were involved (followed by the number of events): K1UN/K1IR/WA1UCO 9, W2VL 46, WA2ZWP 5, W3LIF 6, W3JVV 42, W5FC 40, WA6BJY 9, WD6DIH 88, N6ME 107, K8DDG 7. 

## FM and VHF DXing

Questions continue to be raised as to the role of FM in extended-range VHF work. "Why not FM?" in *The World Above 50 MHz* for July 1987 provided some of the technical background for FM not being as suitable a mode for DX as are narrower-band modes such as CW or SSB. Nevertheless, there are those who contend that it is a viable means of working distant stations. Among these is KDØHG Lyons, CO, about 50 miles from Denver, who operates a sophisticated remote base system. Bill says that it affords him the opportunity to work out of his deep valley location and cites instances in which he and others using it were able to complete DX contacts, including sporadic-E QSOs, with East Coast stations during the openings last summer.

In referring to it as "everyman's mode," KDØHG brings out probably FM's greatest attributes with respect to other modes. FM certainly boasts a lot of activity and that activity is widespread geographically. Hence, there are many instances in which an opening may be detected only by FM operators. Those encountering unusual conditions, no matter the mode, are always encouraged to report them to *The World*

Above 50 MHz. It makes no difference whether the conditions are exploited using CW, SSB, AM, FM or ATV. However, most reports I receive involve CW or SSB operation. This may be due to a combination of factors, one possibly being the technical superiority of these modes for weak-signal operation. Another may be that this column appeals more to people who operate these modes. Obviously, I can report only that information which is submitted.

Perhaps the cause of FM DXing would be helped by an agreed-upon range of frequencies on each band in which DXing is customarily practiced. The band on which finding and agreeing on such a slot presents the greatest challenge is two meters. In the June 1982 column, I suggested the use of 144.9 to 145.1 for nonchannelized FM for DXing and other "traditional ham" activities. This never caught on and these frequencies are now well occupied by packet and similar modes. It is possible that some other slice of the band can be found that is not already pretty much spoken for. I am open to suggestions. For the other VHF and UHF

bands, it should be a lot easier to carve out a place. For these also, suggestions are welcomed.

In summary, FM does offer a lot for VHF/UHF DXing because so many people are equipped for it. However, in addition to its disadvantage resulting from the higher signal levels needed for readability, its effectiveness has been hampered because DXing and channelization do not generally go well together. The first is a technical problem and can only be addressed by using more power, higher gain antennas and/or improved receivers. There certainly are times however, when far-away signals are quite strong indeed—certainly strong enough for good copy on FM and even ATV. Many instances of DX worked by these modes have been reported in this column over the years. The second problem, finding a place for FM DXing without disrupting local communication, represents more of a social problem. These are often harder to solve. But, that doesn't mean that we shouldn't try.

I would be interested in hearing what the readers of *The World Above 50 MHz* have to say on the subject.

### CENTRAL STATES VHF SOCIETY CONFERENCE

This year's Central States VHF Conference will be held July 21-24 at the Villager Motor Inn in Lincoln, Nebraska. The upcoming event, the 22nd annual, promises to be no exception to the superb quality and great fellowship for which these affairs are famous. The Society's president, Roger Cox, WBØDGF, and his crew plan a fine and varied series of activities. The technical program, under the stewardship of Norm Smith, KAØABA, will get underway Friday afternoon and will feature topics such as "The Challenge of Microwave EME" by Kent Britain, WA5VJB. In a second talk, Kent will provide some insights into the construction of VHF/UHF preamps. Joe Eisenberg, WAØWRI, in a paper entitled "How to Predict 144-MHz Sporadic-E Openings," will impart his wisdom on that much discussed and controversial topic. "Some Thoughts on PUFF," a public-domain microwave circuit analysis and layout computer program will be the subject of a talk by Jerry Hinshaw, N6JH, who will also furnish some continuing ideas on developments for our new 33-cm band. Al Ward, WB5LUA, will share a little of his extensive knowledge of RF circuit design in a paper entitled "Match vs Noise Figure Trade-offs in VHF Preamps." And, the society president will present "The Latest Advances in Computer-Aided Antenna Design."

One of the conference's most popular events, the antenna-gain competition, will feature a new wrinkle this year. Measurements

will take place on the commercial antenna range belonging to Telex/Hy-Gain. Antennas from 144 MHz through 24 GHz will be accommodated, with a certificate awarded to the best performing home-brew antenna for each band. All of this will take place Friday morning. Also scheduled Friday morning are tours of the Telex/Hy-Gain facilities.

Friday evening will feature noise-figure measurements and the now-traditional flea market.

While the more technically inclined measure antenna gains and soak up VHF/UHF knowledge, others in the family may take a trip to Lincoln Folsom Children's Zoo, tour the state capitol and surrounding historic homes and/or partake of lunch at the Governor's Mansion. A teen room will be provided, and with the hotel pool, a movie theater next door, fast food restaurants across the street and a nearby shopping mall, young people should have no difficulty whiling away the time. Free baby-sitting will be available during the scheduled family events and the Saturday evening banquet. These are but a sample of the family activities being planned by Gayle Cox, KAØDWH, and Lois Eisenberg, NØFUF.

As usual, the Saturday evening banquet will be one of the high spots of the conference, with a raft of radio and nonradio prizes. The radio prizes are being corralled by Mike Watson, W5UC.

For details on conference registration and hotel information, drop an SASE to Roger Cox, WBØDGF, 3451 Dudley, Lincoln, NE

68503 or call 402-464-3235.

### ON THE BANDS

As this month's installment was being sent to HQ on May 10, a sporadic-E session on 6 meters and a tropospheric duct on 2 meters (and above) allowed several amateurs in the Northeastern US to contact Florida and then later in the evening (Turks & Caicos Is) VP5. Preliminary reports indicate that several stations in the Washington, DC area, plus the New Jersey and New York City area, were working Florida and parts of the Caribbean on 6-meter E-skip. Later in the evening, 2 meters and 70 cm came alive with several contacting VP5D via a narrow tropo duct. Reports indicate that VP5D worked the following over the 1300-plus mile path: (2 meters) about 0250Z, WA1VRH with 59+ signals; 0256Z AA2Z 56/57; 0309Z W1RIL 52/44; 0503Z W1RIL again, this time 10 dB over S9. On 70 cm: about 0334Z K1FO 53/56; 0343Z AA2Z 56/44; and 0504Z W1RIL 52/33. Many other contacts took place and will be included in *The World Above 50 MHz* as details become available.

The 6-meter band continues to put on a north-south show for some parts of the country and even a few formerly black holes are beginning to partake of a ration of goodies. And, the first blushes of Sporadic E are putting in an appearance. Not to be completely eclipsed, 2 meters and 70 cm displayed a few pyrotechnics of their own by virtue of an outstanding trans-Gulf tropo opening. In our part

## 2 Meter Standings

For WAS holders, listing is WAS number, call, state, call areas worked and grids worked. For others, call, state, states worked, call areas worked and grids worked. Call areas are the 10 US continental call areas plus KH6 and KL7 plus each VE and XE call area plus DXCC countries not located within the continental limits of the US, Canada or Mexico. Grids are the Maidenhead designators worked since the VUCC Award was instituted January 1983. In order to make the standings a true reflection of current 2-meter activity, those not reporting within the past two years are subject to being dropped. They will be reinstated upon presentation, in writing, of continued activity. It is not necessary to show additional states, call areas or grids worked to be reinstated. WAS holders are listed in any case. Compiled May 9, 1988. Updates for next listing must be received by November 5, 1988.

### WAS Holders

1 K0MQS*	IA	--	48	WSHM*	NM	--	95	W0RT*	KS	27	150	KB3QM	DE	32	--	68	W7JF*	MT	45	--	--			
2 K5CM*	OK	--	49	W7CI*	AZ	26	--	96	W2PGC*	NY	23	90	W3LNA	PA	30	8	73	KB7WW*	OR	32	10	--		
3 N0JA*	MO	--	50	N5KW*	OK	13	--	97	DL8DAT*		--	--	W4ZD*	FL	49	56	258	AA7A*	AZ	28	10	109		
4 K9HMB*	IL	--	51	W0TEM*	IA	23	--	98	WD9ACA**	IL	50	--	W44PCS	KY	41	11	--	WA7ADK	UT	25	7	--		
5 K1WH5*	ME	--	52	W0FOY*	IA	23	--	99	W5SUS**	AR	--	--	WB4NXY	KY	41	9	125	K7ICV*	NV	23	9	60		
6 WA4MVI**	NC	--	53	W0RWG*	MO	16	--	100	AF1T*	NH	--	--	WS4F	GA	40	14	135	W7IDZ	WA	9	4	30		
7 K5JL*	OK	--	54	W5SERD*	TX	--	--	101	W0YSG**	KS	--	--	W4CPZ	SC	40	11	145	KB6UR*	OH	41	11	--		
8 WA9DOT*	WI	--	55	W4WD7**	UT	--	--					W4HHK	TN	39	9	--	N180	OH	40	12	145			
9 WB0ZXU*	IA	--	56	KE5C**	TX	--	--	WA1OUB*	NH	41	24	155	K4KAE	SC	38	13	110	KBWVZ	MI	39	14	--		
10 K9CA*	IN	--	57	W44CQG*	AL	--	--	W1AIM*	VT	38	12	98	WA4OWC	FL	38	13	--	K8RZB	OH	39	10	142		
11 W0SD*	SD	--	58	WB8CAS*	IL	--	--	K1KA*	MA	34	12	74	NY4T	TN	38	12	175	W8NJR	OH	36	12	145		
12 K5BMG*	LA	--	59	W2CNS*	NY	28	--	N1AIS	MA	34	12	--	K4QIF	VA	38	11	--	W8NPX	OH	35	9	120		
13 K5GW*	TX	--	60	K0ALL*	ND	26	--	W1EJ	NH	31	13	--	K14CI	FL	37	11	151	W8GAP	MI	30	11	75		
14 WB5LUA*	TX	23	--	61	K9XY*	WI	29	--	W1RIL	MA	30	12	--	W4ISS	GA	37	8	--	KB8SG	MI	30	8	--	
15 K4GL*	SC	23	--	62	K1FO*	CT	18	98	KA1DHO	MA	29	11	46	K4CKS	GA	36	13	139	W8WVM*	WV	15	23	--	
16 W0VB*	MN	14	--	63	W4DFK*	VA	--	--	W2SZ/H	MA	28	19	154	W5HUQ/4*	FL	36	13	--	W9BOZ	IL	47	21	--	
17 WB5LBT**	LA	50	--	64	W05CRK*	OK	--	--	KA1DHO	MA	28	11	33	W8QXO/4	GA	36	11	125	W9UD	IL	46	14	164	
18 K4PKV*	NC	--	65	WB8PAT*	OH	39	97	K1SF	MA	28	11	--	W4LNG	GA	36	8	30	WB9MSV*	IL	45	14	210		
19 W0RWH*	MO	23	--	66	K0X0**	CO	30	103	K5MA/1	MA	27	11	106	W4ASBC	VA	35	13	107	NN9K	IL	45	11	184	
20 W8IDU**	MI	23	--	67	W7HAA**	MT	55	206	WA1AYS	MA	27	10	--	N4VC	TN	35	9	126	KB9NM	WI	43	14	--	
21 K1MNS**	NH	48	--	68	K1BKK	VT	--	--	N1BUG*	ME	26	15	92	N4Z	FL	32	9	28	N9AQ	IL	42	13	189	
22 W9AVEN*	IL	--	69	K7KOT*	WA	--	--	WA1LOU	CT	25	11	--	N4I	GA	31	12	55	W3EP/9	IN	41	13	105		
23 K5FF**	NM	18	--	70	K8RQ*	OH	--	--	WA1TRE	ME	24	10	58	WD4AHZ	FL	31	10	134	W9YCV	WI	34	10	125	
24 W5FF**	NM	22	149	71	WA7BBM*	AZ	--	--	K1LPS	VT	24	8	50	WA4MJD	TN	31	9	100	W9HAD	IL	33	9	112	
25 W7FN*	WA	--	72	SM2GGF*		--	--	K2TXB*	NJ	39	--	117	K1FJM/4	FL	30	10	72	WB0SIL	MO	46	13	--		
26 W1JR**	MA	34	164	73	KD8SI*	OH	--	--	W2RS	NJ	38	13	129	WA4OFS	FL	29	9	82	N0LL	KS	46	11	180	
27 WB0QMN*	CO	--	74	K2OS**	NY	17	--	--	W2UAD	NY	37	13	108	N4EJW	FL	28	12	76	KC0QR	NE	45	11	173	
28 WB4EXW*	NC	18	--	75	K1GVM*	MA	34	--	KE2N	NY	36	13	122	WB4RUA	GA	24	8	86	KM0A	MO	44	14	229	
29 K9KFR*	IN	--	76	WA9OZ**	IL	--	--	N2BJ	NY	36	13	114	WB7ECS/4	AL	24	7	64	K0TLM	MO	44	11	180		
30 K3VG*	PA	--	77	WA6MGZ**	CA	59	232	K2OV5	NY	36	12	70	WD4AFY	GA	22	7	72	WB0YZN*	NE	43	18	107		
31 SM7BAE*	21	--	78	WD4AGF*	OK	36	--	--	NB2T	NY	36	12	40	WD4FAB	FL	22	--	71	W0PN	MN	43	11	52	
32 WA7BJU*	OR	--	79	WD5DGO*	TN	36	174	K2GK	NY	35	11	124	W5UWB*	TX	49	39	--	W0FY	MO	43	10	124		
33 VE7BQH**	57	--	80	VE1UT*	NS	42	--	--	K2LME	NJ	32	--	102	K5UR	AR	48	16	331	WB0DGF	NE	43	10	85	
34 W6PO*	CA	--	81	W0RRY/5*	OK	30	--	--	W2MZX	NY	31	8	--	K5SW	OK	47	13	222	W0JZ	IA	41	12	150	
35 WA3VJS*	PA	27	--	82	WB0VY**	IA	--	--	W2HRW	NJ	29	--	--	W5UGO	OK	44	12	35	W0RAP	IA	40	10	114	
36 AL7FS*	AK	20	--	83	W5RC*	MS	12	--	WB2ZSY	NY	25	10	69	W5HN	TX	43	12	--	W0DRL*	KS	39	34	116	
37 WB0YSG**	NE	--	84	WA2GSX**	NY	27	--	--	K2CKK	NY	17	7	34	W5NZS	OK	41	13	162	K0US	NE	39	11	125	
38 N7NW*	WA	--	85	WA0TKJ*	KS	25	171	KB3PD*	DE	49	20	135	W5SXO	TX	40	11	97	W0PW	CO	38	9	--		
39 W5LUU*	TX	--	86	KB7Q*	MT	--	--	WA3USC*	MD	47	25	--	K5AJH	TX	38	11	167	W0JRP	MO	35	11	140		
40 W4HJQ*	KY	--	87	AB3D*	DE	26	32	K3MD*	PA	42	26	112	W5FYZ	LA	38	11	156	KB0HH*	KS	30	9	116		
41 K5UJG*	TX	--	88	KF0M*	KS	28	173	W3CWG	PA	38	12	170	WA5HNK	TX	36	10	--	W0KEA	CO	29	8	87		
42 W5UN*	TX	--	89	WB2NPE*	NJ	37	219	W3ZJZ	MD	37	12	135	AASV	OK	36	9	--	N0BTN	NE	28	10	104		
43 WA4LYS**	FL	49	--	90	N5BLZ*	TX	--	--	WA3HMK*	PA	38	14	162	NJ5F	LA	35	11	135	W0RJR	MO	27	8	--	
44 WA1JXN7**	MT	58	--	91	K0AOD*	MO	--	--	W3RWG	PA	38	12	170	N5BBO	TX	32	10	50	K0KUY	KS	23	7	94	
45 W5JTL*	MS	14	--	92	WB4KNE*	TN	--	--	W3RUE	PA	38	11	104	WA5IYX	TX	30	9	--	VE1AHM	NB	21	10	--	
46 WA6ANH*	MN	--	93	WB8SWD*	IA	--	--	--	W3ZZZ	MD	37	12	135	KESEP	TX	28	--	74	VE3DSS*		38	12	--	
47 WA4NJU*	GA	--	94	W7IUV*	AZ	47	129	W3XO	MD	37	12	52	W5DFU	OK	26	7	--	VE3FKX*		36	10	--		
								AE3T	PA	37	12	--	N6AMG*		32	37	--	VE3LNX		26	11	69		
								WA3FYJ	PA	37	11	149	K6QXY*		20	14	--	VE4AQ		13	7	18		
								K3RX	PA	37	10	130	WA6LHD		13	5	67	VE5LY*		26	10	66		
								W3OTC	MD	34	11	71	WA8LLY/6		13	5	19	PA2VST*		28	--	--		
								W3JWC	PA	32	11	66	K6HXW*		13	--	--	KG6DX*		22	--	67		
								K3KEL	PA	32	11	64	W6PFE		5	4	21							
								WA3DMF	MD	32	11	57												

\*WAS completed in NC, now in SC.

\*\*WAS completed in both NE and KS

\*Some contacts made via EME.

†WAC.

—Information not supplied.

of the world, the 6-meter story continues to be those openings from the southern part of the country to South America. As a sample of these, KN5S Las Cruces, NM says that on April 3 between 1930 and 2120Z, he worked 10 LUs and four CXs plus one HC. Three days later, on the 6th, Mark hooked up with another three LUs, two of them different from those worked on the 3rd. There seems to be no lack of 6-meter activity in Argentina. April 13 brought WA4LDU Lexington, SC a contact with OA8ABT at 0300Z. The time of this QSO would indicate true TE, probably linked up with E<sub>g</sub>. Many of the other contacts, coming as they do in the late afternoon, may be more of a pure F2 propagation. Classic transequatorial propagation, or TEP, is generally considered an early evening affair and usually produces wavy, fluttery signals. Back to the mid-afternoon openings. W5UWB Kingsville, in south Texas, reports working LUs 5EMM, 9EHF, 7DZ, 6DLB, 3EX, 8AHW plus CX8BE and CX1DDO along with WA5UFH on backscatter. N0LL Smith Center, KS writes that, after no E<sub>g</sub> openings since December, April 27 brought one to

California and Nevada. But four days later, on May 1, the real payoff broke loose in the form of a five-hour opening to the Gulf Coast which also produced contacts with CX9BE, plus LU9AEA and LU7DZ between 2115 and 2210Z. The latter reported hearing Larry's beacon for over an hour but was able to complete only three QSOs. The East Coast finally got a taste of DX on April 30, with N3BBI in northeastern Pennsylvania reporting working VP5D at 2224, LU6DLB at 2238, CX4HS at 2240, LU9AEA at 2246 and CX8BE at 2248, all Zulu time. Signals ran S3 to S7 for the South Americans to S9-plus for VP5D. Mike says that although several Philadelphia stations were heard in South America, they were not able to make any contacts due to a combination of low signal level and high noise level. Another report, apparently on the same opening, comes from W8NJR Troy, OH who worked LU8YYO at 2154Z with S9-plus signals at the same time that Florida stations were in. It seems clear that these northern openings result from an E<sub>g</sub> link-up with F2 or whatever propagation is responsible for the openings to South America from the southern latitudes.

The last report received is from K5ZXE Paul Valley, OK who says that LUs 8YYO, 7DZ, 1DVT and 9AEA were worked beginning about 2000Z May 7. Tom says that, despite the fact that some of the LUs were S9 plus at his location, they were inaudible in the Oklahoma City area, 50 miles to the north.

An extended and far-reaching tropo opening across the Gulf, apparently caused by a stagnant high pressure area stalled over the southeastern part of the country, was reported by K1FJM/4 near Miami. Pete says that, between April 20 and 22, he worked 175 2-meter and 70-cm stations in eight states and 50 grids, including XE2M. The best DX was represented by WS5C and W8CM/5 in San Angelo, TX, a distance of 1286 miles. Working these stations on 70 cm is especially notable since K1FJM runs just 20 W output on that band. Pete also says that, on the morning of the 21st, he worked several San Antonio and Dallas area 2-meter SSB mobiles. WA5IYX, of the Alamo City, also comments on this notable opening, observing that it was one of the few in which trans-Gulf propagation persisted through noon.

## Attenuators

Microwave experimenters have a wide range of applications for attenuators. Attenuators can be used in determining amplifier gain and noise performance, and they can be used to "force" an impedance match to interacting components such as diode multipliers, noise sources and load-sensitive oscillators. Attenuators can also be used in conjunction with small amplifiers to simulate isolators.

Although it is quite easy to make accurate, low-SWR attenuators for use at HF, it is considerably more difficult to do this for VHF and microwave frequencies. There are two reasons for this difficulty. First, the physical layout of the attenuator components is unlikely to provide a constant impedance through the attenuator. This causes a high SWR to exist on the transmission line to the attenuator. The magnitude of the SWR is a function of the impedance and electrical length of the mismatched section. The SWR

is minimum at zero electrical length, rises to a maximum at  $\frac{1}{4} \lambda$ , and falls again to a minimum at  $\frac{1}{2} \lambda$ . Thus if the length of the mismatched attenuator is a very small fraction of the wavelength of operation (less than 0.1%), as will be the case at low frequencies, then the resultant SWR increase will be negligible.

The second reason for the difficulty in building attenuators for use at microwave frequencies is the presence of reactive components in addition to the desired resistance in resistors. Component leads have inductance whose reactance rises with frequency. Also, inter-resistor stray capacitance causes reactance that decreases with frequency. This can result in unwanted coupling. Despite these problems, it is possible to construct attenuators with reasonable performance up to the lower microwave bands. In addition, many of the measurement applications use attenuators in the IF section of a receiving system where the frequency is much lower, and attenuator performance is more predictable.

Two resistor configurations are commonly used to form attenuators, as shown in Fig 1: the T arrangement and the pi arrangement. A list of resistor values for given attenuation values can be found on p 25-44 of *The 1988 ARRL Handbook*. The resistors should be of carbon composition. (Don't use wire-wound resistors—they make great inductors at RF!) To provide the best impedance match a microstrip circuit, use the technique shown in Fig 2 to connect an attenuator to a source. This arrangement uses the pi configuration of Fig 1, with the single resistors to ground replaced by pairs of paralleled resistors to minimize inductance, increase power-handling capability and create a symmetrical structure. A binary sequence of attenuation values (1 dB, 2 dB, 4 dB, 8 dB and 16 dB) will yield the largest range of possible attenuation levels with the minimum number of attenuators. To minimize stray coupling problems, no single attenuator should provide

more than about 20 dB of attenuation.

Resistor values for various attenuation levels are given in Table 1. Note that the values for  $R_B$  are for two resistors in parallel at each  $R_B$  location, as shown in Fig 2. The values in Table 1 do not correspond exactly to commonly obtainable resistor values. One way to deal with this problem is to connect resistors in series and/or parallel to approximate the desired resistance. This approach is not desirable if the attenuator is to be used above VHF, because increased physical attenuator size and reactances can cause problems. A second alternative is to select resistors that have slightly lower resistance than that required. A small round file can then be used to remove a small amount of the resistor, as shown in Fig 3. This will increase its resistance. After the resistor has been adjusted to the required value, a small dab of paint should be applied to cover the exposed carbon. If high power-handling capacity is not required, 1/8-W resistors may be used. The smaller the physical size of the resistors used, the larger the frequency range over which the attenuator will function as designed. Chip resistors are ideal for use in UHF attenuators, if the correct values are available.

Resistive attenuators built as described should work from dc up to the frequency at which impedance mismatch and/or reactances become significant. It follows that attenuators can be characterized at dc, and their RF performance can be inferred from this. To check the impedance match, the input and

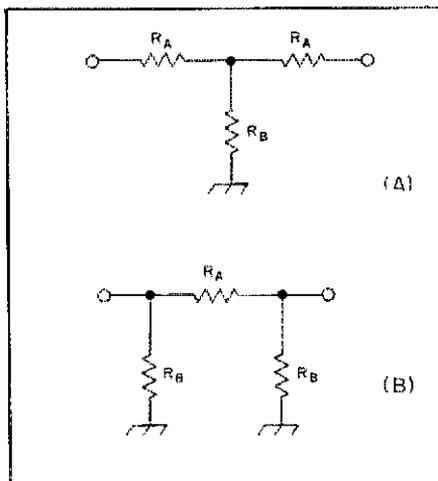


Fig 1—T (A) and pi (B) attenuator configurations.

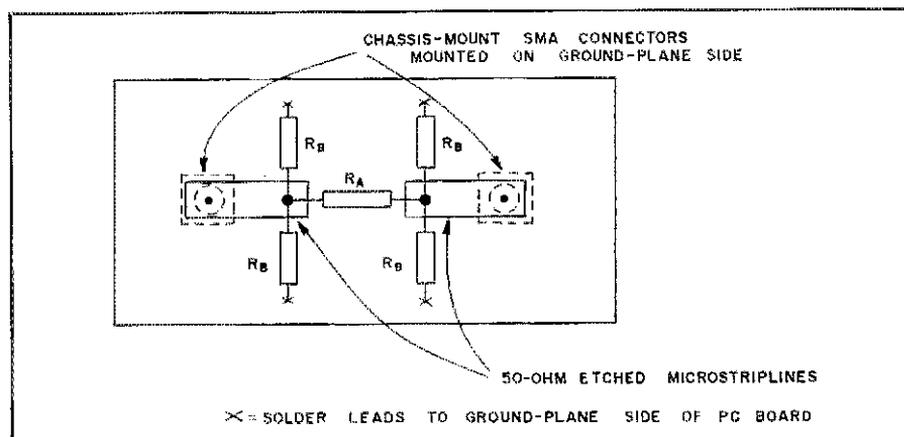


Fig 2—Circuit-board layout for a 50-ohm, pi-configuration microstrip attenuator for VHF use. Microstrip line width should be 0.1 inch if double-sided, 1/16-inch-thick glass-epoxy PC-board material is used. Keep all resistor lead lengths as short as possible to minimize reactances at high frequencies.

Table 1  
Pi-network Attenuator Resistor Values

Attenuation (dB)	$R_A$ (ohms)	$R_B$ (ohms)
1	5.8	1739
2	11.6	872.4
4	23.8	441.9
8	52.8	232.3
16	153.8	137.7

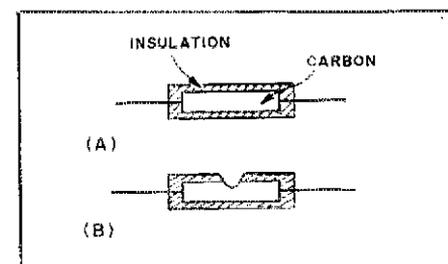


Fig 3—Cross-section of a carbon-composition resistor before (A) and after (B) filing to increase resistance. Be sure to seal the body of the resistor after filing (use a few drops of paint or nail polish) to prevent contamination and subsequent resistance-value drifting.

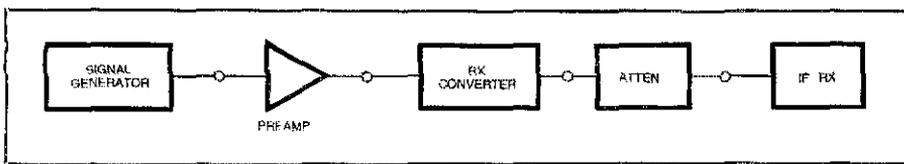


Fig 4—Preamplifier-gain measurement setup. See text.

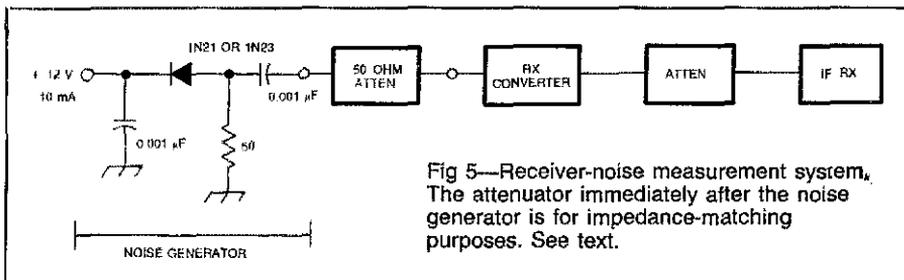


Fig 5—Receiver-noise measurement system. The attenuator immediately after the noise generator is for impedance-matching purposes. See text.

output dc resistance to ground should be 50 Ω. Attenuation can be calculated as follows: Terminate one port of the attenuator with a 50-Ω load. Apply a small dc voltage to the unterminated attenuator port, and measure the dc voltage at the terminated port. Attenuation is given by:

$$A \text{ (dB)} = 20 \log (V_{\text{out}} / V_{\text{in}}) \quad (\text{Eq 1})$$

Remember that this is only a dc check—how these values will change at RF depends on the factors described earlier. For accurate RF attenuation measurements, more complex testing is required. Alternatively, attenuators

can be calibrated by comparison with attenuators of known accuracy.

#### Attenuator Uses

A typical setup for measuring preamplifier gain using attenuators is shown in Fig 4. A signal source is fed into a converter and the output of the converter fed into an IF receiver, typically at 144 MHz or below. The signal level at the IF receiver (S-meter reading or audio output voltage) is then noted. The preamp is then put in line between the signal source and the converter and an attenuator is placed between the converter and IF receiver. The attenuator is then adjusted until

the IF signal level duplicates that measured previously. At this point, the attenuator is canceling the preamplifier gain (assuming the converter is operating in its linear region). The preamp gain (in decibels) is then given by the total attenuation in decibels. Since the signal level at the IF receiver is the same in both cases, nonlinearities (such as AGC action) do not affect the result. An attenuator can also be placed ahead of a converter, if the attenuator is known to be accurate at a higher frequency.

Noise-figure (NF) comparisons can be made with the arrangement shown in Fig 5. A noise source is connected to a converter via an attenuator. The attenuator provides a 50-Ω match between the noise source and converter. The output of the converter is then fed to the IF receiver via a variable attenuator. The receiver output (S-meter reading or audio voltage) is noted with the generator off and the IF attenuator set to 0 dB. The noise generator is then turned on and the IF attenuator adjusted for the same reading as previously noted. The amount of attenuation required is related to the converter noise figure—the more attenuation required, the better the NF. The front end of the converter may then be tuned to yield the best noise figure, or two different converters may be compared.

Simple diode noise generators are useful for NF comparison tests, but are not reproducible enough to make accurate measurements. If a stable, calibrated noise source is available, this method may be used to determine actual NF (see *The 1988 ARRL Handbook*, p 12-3). □

## Moved & Seconded

(continued from page 63)

7.4.2. On motion of Mr. Grauer, the Executive Vice President was authorized to reimburse \$432.96 in expenses of the Ad Hoc Committee on the Strengthening of the CRRL. The expenses were incurred during the Committee's final year of operation, 1987, but claims were not submitted until 1988.

7.4.3. On motion of Mr. Nathanson, the Committee formally expressed its warm thanks to Evelyn Garrison, KA7LPK, and to the Amateur Radio Industry Group on whose behalf she spoke, for taking part in the 429th Executive Committee meeting, Arlington, VA, March 19, 1988; the issue of new amateur recruitment is a vital one of concern to the ARRL, and the Committee was pleased to have had the industry's input on the subject.

8. Turning to Director/Vice Director election matters, on motion of Mr. Nathanson the Committee ruled that Clevis O. Laverty, W1RWG, is lawfully nominated and eligible for the office of Vice Director, New England Division, in the 1988 elections.

9. On motion of Mr. Stafford, the names of the 42 newly elected Life Members were recognized, and the Executive Vice President was directed to list their names in Q87 (Applause). At this point, 5:05 PM, Mr. Nathanson departed from the meeting.

10. On motion of Mr. Grauer, the following clubs were declared affiliated:

#### Category I

- Adams County ARC, Decatur, IL
- Ashe County ARC, Jefferson, NC
- Coast Guard ARC of Kodiak, Kodiak, AK
- Elko Amateur Radio Club, Elko NV
- Hilltop Repeater Association, Johnstown, PA
- North Myrtle Beach VHF Club, Inc., N. Myrtle Beach, SC
- Seattle Amateur Radio Society, Bellevue, WA
- Susquehanna Valley ARC, Selinsgrove, PA
- VACA Valley Radio Club, Vacaville, CA

#### Category II

- Exxon Amateur Radio Society, Linden, NJ
- Mississippi Amateur Radio Digital Assn. Inc., Gulfport MS
- Packet Radio Organization of Montana, Helena, MT

#### Category III

- San Gabriel High School Electronics Club, San Gabriel, CA
  - Union County College ARC, Scotch Plains, NJ
- Secretary Williams reported that the following clubs had been affiliated as of April 28, 1988, by mail vote of the Executive Committee:

#### Category I

- Calumet Amateur Radio Enthusiasts, Lake Station, IN
- STARC, Endicott, NY
- Sun Country Amateur Radio Society, Ocala, FL
- Western Kansas Wireless Assn, WaKeeney, KS

#### Category III

- Clemson University ARC, Clemson, SC
- With the affiliation of these clubs, the League has 1725 clubs in Category I, 21 in Category II, and 131 in Category III.

11. On motion of Mr. Grauer, the following conventions were approved:

- Indiana State, July 9-10, 1988, Indianapolis, IN
- Northern Florida Section, August 6-7, 1988, Jacksonville, FL
- Illinois State, October 2, 1988, Rockford, IL
- South Texas Section, October 14-16, 1988, Houston, TX
- Ohio State, February 25-26, 1989, Cincinnati, OH

12. The next meeting of the Executive Committee is planned for August 27, at a place to be determined later.

13. Other Business:

13.1. Mr. Williams reported that a hearing on S.929, the Volunteer Protection Act of 1988, is to be held on May 20. Anecdotal information on problems volunteers have had is sought to be part of the ARRL testimony in favor of the bill. S.929 and its companion, H.R.911, would encourage the

states to enact laws reducing the possibility of volunteers being sued for activities undertaken in good faith.

13.2. The President reported that experts from the League's accounting firm, Price-Waterhouse, will meet with the Administration and Finance Committee at St. Louis on June 17, 1988, to discuss possible legislation being studied by the Congress which would sharply extend the Unrelated Business Income Tax of corporations not-for-profit, such as the ARRL.

There being no further business, on motion of Mr. Grauer the meeting was adjourned sine die at 6:20 PM.

Respectfully Submitted:

Perry Williams, W1UED  
Secretary

#### Life Members Elected

Stanley B. Adams, WD4AJR; L. David Angel, KA6OMV; Sue S. Baker, N4RVC; Christopher E. Bille, WD6BTM; David H. Bode, KE6EK; Carl H. Bohman, Jr, N8AFD; Thomas J. Brooks, KA5WJF; William T. Chapman, N6ROC; Larry A. Cornwell, N0GSL; Arlene De Beverly, KB0BCZ; Calvin John De Beverly, WC0S; Ronald E. Downing, KB0ADI; George S. Gadbois, W3FEY; Newell Dewayne Gentry, AA4BL; Gerry Heine, K5PG; George W. Henry, Jr, K9GWT; Harry G. Hess, K9MDK; Kenneth A. Hirschberg, K6HPX; George E. Hopkins, W4WPI; James J. Hurry, W2DHR; Chris Hux, N4PNO; Robert U. Krukowski, WA2UDO; Shannon M. Latham, N8DMB; Steven H. Lieber, KA5WLW; Gary L. Martin, WA5USA; Mark McMahon, N0HFT; Dale E. Mecomber, N2DM; Thomas N. Mitchell, WD4KXM; Kenneth H. Reinholdt, KA1EHO; Herb Rode, KE7PB; Gimmie L. Rosser, NL7NB; Victor J. Rohrer, KA7SON; Peter A. Russo, Jr, KD2EL; John A. Sainz, K2GBF; William H. Sanford, KB5ECP; Michael C. Schoepf, WB0VJX; Gail A. Stamps, KA0ZMF; Clair E. Sturgeon, W9MUL; Vaclay G. Ujick, WD9HBC; Marie R. Welsh, W6JEP; John F. Werner, III, WB8IPG; Edward A. Wray, KA9WFS. □

## New Commercial Software for the C64 and IBM PC

Last time, I previewed free and almost-free software for the two most popular computers in Amateur Radio today, the Commodore 64™ and the IBM® PC. This time, we'll take a look at some commercial offerings for your favorite machines.

### Commodore 64/128 Pair

#### • Satellite Tracking

SATCOMM-64 is a satellite tracking program that provides some very useful features for the Commodore 64 or 128 owner. The program has a master menu of 12 activity options; it can store information for up to 15 different satellites; it can quickly confirm WIAW reference orbits; a single entry of a time bracket during which you are available allows the printing of a report of up to 31 days of access times (during the specified time bracket) for any satellite; the same one-time entry can also produce a report of the access times for up to three different satellites of interest on any given day.

Other features include a modifiable satellite menu (together with associated frequency and Keplerian-element data); choice of screen plus printed report or screen alone; modifiable user defaults (start time, time increment, etc); and the ability to override defaults by simply making an entry.

The program is compatible with the Commodore 64 and 128, Commodore 1541 disk drive and 1525-emulating printer. It is available for \$15.95 from Strategic Marketing Resources Inc, PO Box 2183, Ellisville, MO 63011.

#### • DX Assistant

N7CTY Ham Program is for the DXer who needs direct access to prefix, beam heading and QSL information while on the air. The program provides the following functions: enter a prefix and obtain beam heading, distance, country, continent and ITU/CQ zones; obtain a list of all prefix allocations; obtain a list of countries by continent or ITU/CQ zones; obtain beam headings for any state or location; and obtain, add, change or read all QSL manager information. The program is available for \$19.95 in three versions (C64 with one 1541 disk drive, C64 with two 1541 drives, C128 with one 1571 drive) from N7CTY Ham Program, PO Box 738, Cornelius, OR 97113.

### IBM PC Trio

#### • CAT For The Yaesu FT-757

CAT757 runs on an IBM PC or compatible with a color or monochrome display and a minimum of 128 kbytes of RAM. This program allows the user to use a PC to remotely control a Yaesu FT-757 GX or FT-757 GX Mark II transceiver that is equipped with the optional CAT system. CAT757 has a 120-entry "Stations Directory" which stores 120 preprogrammed frequencies that can be recalled with one keystroke. The program will also sequentially scan all 120 frequencies. In addition to these functions, the FT-757 GX Mark II version of the software reads the status from the radio and displays it on the

"Status Display." The program is available for \$15 in FT-757 GX and FT-757 GX Mark II versions from Dick Roux, N1AED, 25 Greenfield Dr, Merrimack, NH 03054.

#### • CW Keyer

Jersey City Keyer is a multifunctional CW keyer for the IBM PC and compatibles. The program is designed to help you learn Morse code or improve your copy speed. The program also provides automated aids for Volunteer Examiners or teachers administering code exams or in creating special teaching sessions. In addition to learning and teaching the code, the program will key a transmitter to allow you to use the keyer on the air. Keyer speed is adjustable from 5 to 40 WPM, and weight may be adjusted between 50% and 100%. Keyer tone and volume are also adjustable. Ten memory banks that are selected via 10 programmable function keys permit storage in 100 memory locations, and the Jersey City Keyer Macro Language provides additional power and versatility to permit the keyer to do almost anything you want it to do. This

program is available for \$49.95 from ACA Inc, 103 Godwin Ave #129, Midland Park, NJ 07432.

#### • Contest Logger

The KT5X Contest Logger is a contest logging program for the IBM PC, AT and compatibles that features instant dupe checking, smooth data entry without function key memorization, display of the last four contacts on the entry screen to check for their accuracy, the ability to amend any entry in the log, duping by contest or band, running QSO rate, running QSO total per band and mode. You may enter your own set of multipliers for any contest and store them on disk. The multipliers will be counted once per contest, per band or per band and mode, and you may view remaining multipliers left to be worked. Also, you may obtain antenna bearing and distance to target station and print the log and dupe sheet in a variety of formats. This program is available for \$35 from Frederick H. Maas, KT5X, Rte 9, Box 86-H, Santa Fe, NM 87505.

### PX: Commodore 64 and IBM PC Software

This installment of PX offers three listings of new software for the IBM PC and one listing for a new Commodore 64 program. Before I list the new programs, I would like to mention that each month I receive inquiries concerning the availability of a list of all of the programs in the PX Library. Well, a list consisting of all 173 programs in the library (sorted alphabetically according to computer or computer language) may be obtained by sending a business-size SASE with one unit of First Class postage to ARRL, Dept PX, 225 Main St, Newington, CT 06111. Now, on to the new stuff!

PX Number 170: Commodore 64 SWR calculator written in BASIC by Bob Mandeville, N1EDM.

PX Number 171: IBM PC intermodulation-interference templates for Lotus 1-2-3 by Carl Fisher, W0HIX (three units of First Class postage required). (As an alternative to typing the templates into your computer, a 5¼-inch disk containing templates and instructions is available for \$10 from W0HIX at #5 Angelina Dr, Augusta, KS 67010.)

PX Number 172: IBM PC great-circle-bearing calculator written in BASIC by James Young, WB6FNI.

PX Number 173: IBM PC ham-band display generator written in BASIC by Joseph J. Wavra, Jr, WQ5M. (The program is color enhanced for use with computers having color graphic adapters. The color commands may be deleted or changed for monochrome display.)

To obtain a listing of any PX program, send a business-size SASE with two units of first class postage (unless noted otherwise) to ARRL, Dept PX, 225 Main St, Newington, CT 06111 (CRRL members can send their SASEs to CRRL, PO Box 7009, Stn E, London, ON N5Y 4J9). Use a separate SASE for each program request and write the PX program number of the desired program at the lower left-hand corner of the SASE. Please do not send correspondence other than PX requests to Dept PX (for questions concerning a program, contact the author of the program).

### PX Corrections

PX Number 68 (Morse Code trainer for the Commodore 64): line 9 of its listing must be deleted in order for it to run properly.

PX Number 91 (CW sending program for the TI-99/4A): Change all of the greater-than signs in lines 560 through 690 to less-than signs.

PX Number 136 (designs loaded vertical antennas with the Commodore 64): Line 1460 of its listing should be changed to read:

1460 PRINT "[SC]": GOTO 1910

PX Number 168: Calculates transmission line and load matching with the TI-99/4A, not the Commodore 64.

## NJ/PA Amateurs and 63 Hospitals Participate in Six Day National Disaster Medical System Exercise

by Bob Josuweit, WA3PZO (Assistant Section Manager, EPA) and George Ford, K2QIJ (Section Emergency Coordinator, SNJ)

*An explosion at a Cumberland County Boom Kapow Plant resulted in approximately 2000 casualties in the immediate area and an estimated 1000 additional casualties in the surrounding communities. Medical treatment facilities within the area are expected to experience an influx of casualties which will be beyond their capability. The Governor of New Jersey has declared Southern New Jersey a "Disaster Area" and has requested the Federal Government and the Department of activate the National Disaster Medical System (NDMS).*

With this scenario, the largest NDMS Drill involving Amateur Radio began. Amateur Radio's role was to track patients from the disaster site and reception centers located at Fort Dix, New Jersey, and Willow Grove Naval Air Station, Pennsylvania, to 63 hospitals. Information being passed included patient's triage tag number, medical condition, type of transportation and departure time.

Having been invited to participate in NJ NDMS less than 3 weeks prior to the drill, Southern New Jersey ARES, under the leadership of SEC George Ford, K2QIJ, was able to provide communication support for up to 10 hospitals per day, Monday through Friday, 9 AM to 5 PM. Philadelphia NDMS Liaison and Eastern PA Assistant SM Bob Josuweit, WA3PZO, acted as a consultant to SNJ ARES. By midweek, it was realized that New Jersey hospitals would be filled to capacity and the Philadelphia NDMS Region would be activated to receive casualties on Saturday. The northern part of the Philadelphia NDMS Region was activated, involving 23 hospitals in 5 counties. The entire region includes over 80 hospitals in 7 counties surrounding Philadelphia. Approximately 150 amateurs in the two sections participated in the drill, with 1000 casualties actually being moved.

NDMS is a federally coordinated initiative which augments the Nation's emergency medical response capability. The overall purpose of NDMS is to establish a single national medical response capability for:

1) Assisting State and local authorities in dealing with the medical and public health effects of major peacetime disasters;

2) Providing support to the military medical system in caring for casualties resulting from overseas armed conflicts.

There are two primary reasons for using Amateur Radio communications in the receiving (non-disaster) area. First, Amateur Radio can provide a single communications resource capable of different radio practices and crossing political boundaries. Second, since amateurs are not involved in the routine communications which take place on public safety frequencies, they are able to provide complete support to the NDMS program.

Both Army and Navy NDMS coordinating centers had high praise for the work done by ARES. A greater awareness of Amateur Radio by emergency personnel and the public was an additional benefit gained during the drill. Many hospitals requested information about having antennas placed on their roofs for amateurs providing the communication support. Several organizations have expressed

interest in ARES participation in local events. SNJ, for example, has had a request for assistance in locating ELTs. Also, interest has been expressed in establishing a non-amateur frequency to communicate between aircraft and various hospitals in the program.

The Philadelphia NDMS Region continues to be a leader in the development of the NDMS program. EPA ARES has been an integral part of the program for the past four years. A presentation on Philadelphia's use of Amateur Radio was given at the Pentagon in 1986.

Besides EPA and SNJ, amateurs are participating in NDMS programs in Newburgh, NY, San Diego, CA, and the Baltimore, MD-Washington, DC area. For further information on Amateur Radio and the NDMS program contact Bob Josuweit, WA3PZO, 9 Derwen Dr, Havertown, PA 19083. For information on SNJ's participation in NDMS contact George Ford, K2QIJ, PO Box 73, Burlington, NJ 08016.

### IN SERVICE

Amateurs from the Middletown, Connecticut area provided volunteer communications assistance for the Middletown March of Dimes "Walk America" on April 24, 1988. Duties included monitoring

the safety of 265 walkers, acting as a link to Civil Defense communications in the event that police or ambulance assistance was required and coordinating communications via repeater to provide updates on other walks occurring concurrently in



Middletown, Connecticut, March of Dimes walkathon communications volunteers (l-r) KA1DXP, K1PL, WA1NLD, N1FGB, NK1J, W1ECH, WB1EOS, KA1RDX, WA3VIL, WB3IOS. (photo courtesy of W1ECH)

Hartford, New Britain, Waterbury and Middletown.

This was the second year in which Amateur Radio's presence showed the many ways that we can provide a service to the public at large. The March of Dimes coordinator for the Middletown walk was very pleased with our response and efforts.—*Andy Emars, WAINLD*

## SPOTLIGHT ON SERVICE

### California Train Derailment

By Michael Siegel, KI6PR,  
Merced County RACES

Two Southern Pacific trains derailed at Legrand, California (about 15 miles southeast of Merced) at approximately 2200 hours, April 7, 1988. One train was 17 cars in length, while the other was 5 cars long. One train was passing the other at a low rate of speed, when one of the cars derailed, causing a derailment of a total of 12 cars. Several of the cars displayed placards indicating contents of an industrial solvent.

The Merced County Radio Amateur Civil Emergency Services was called out to assist with assessment and information disbursement at approximately 2230. Responding units were K6LWO, K6RAU, KI6PR, KA6GSK, KB6SBH and WB7UGZ. A RACES operator was stationed at the staging area adjacent to the incident commander; additional units were stationed in the emergency operations center and at a remote site for external net control.

The RACES primary function at that point was to assist with the flow of information from the scene to the information officer. The possible hazardous materials spill was soon dismissed as the tanks in question were in fact empty, but improperly labeled. After conferring with on-scene officials and ensuring that no immediate danger existed, RACES was secured from the operation at approximately 2215, with commendations from the county Fire Chief and county emergency services for a quick response.



The following words of wisdom appeared over 27 years ago in QST. I believe you'll all agree with me that they are as applicable today (if not more so!) than in 1961.—KY1T

Some of us traffic men take quite a lot upon ourselves. Recently, we received a

letter telling us that a traffic man notified an originator of cancellation of a message because he "failed to see any reason why he should mail a message of such content."

Well, we can think of one very good reason—he accepted the message and receipted for it, and thereby assumed responsibility for its delivery or relay. The fact that he informed the originating station that he was cancelling it is in his favor. The fact that he did cancel it after having accepted it, thereby making it impossible for anyone to deliver it (could be others aren't quite so fussy, you know) indicated that this traffic man not only refused to deliver it himself, but by cancelling it took it upon himself to judge that it should not be handled at all.

We have been over this before, but let's have another go at it. First of all we have scant sympathy for operators, stations or nets which read the texts of messages

received (which are none of their business) and pass judgment on whether they are important enough to handle. Our job is to copy the message, not read it and interpret it. However, this is still a free country and no amateur has to handle a message he doesn't want for whatever screwy reason—even personal dislike for the originator. It's kind of a dirty trick, though, to let another station send you the whole thing, then tell him you won't accept it. Almost as dirty as peremptorily cancelling the message because in your judgment it's not important enough. If you're going to be choosy, better make sure the message suits your fastidious taste before you agree to handle it—that is, make sure it's not too long, too unimportant, too old, too commercial-sounding, too garbled, that it has a complete address and that it doesn't say anything you disagree with or don't understand...—*WINJM*

## Reducing Message Errors

It is true that the primary responsibility for the accurate passing of traffic is with the receiving station; he must not QSL a message until he is sure he has received it correctly. Unless he uses full break-in continuously to fill any misses in his reception, he should devise some means to make sure he doesn't forget to get all the fills he needs.

I have found it is not unusual for me to overlook a fill I realize I need as I copy the original transmission. That entails asking for "words" with the sender when returning to net frequency. Worse, if the error is discovered at a later point, a choice of a hopefully well-inspired guess, an embarrassing service message or a relay with an operator's note "ADDRESSEE'S NAME MIGHT BE..." is in order. If I am going to wait until the message is completely sent before I ask for fills, I try to mark the questionable parts as I receive them (or don't receive them) by drawing a quick wavy squiggle under the doubtful parts or leaving a very wide space for missed groups.

Even if you think you have received the message correctly, take just a moment to look to see if it all makes sense. Even as you receive it you may wish to question certain items that you think you have received correctly. Is that old date on the message really correct? Is the name of the addressee almost like a common name but with one odd letter? How about the street name? Is there a word in the text that just doesn't make sense? Is the call in the signature almost but not quite like that of the originating station? You may indeed have received the message correctly but you will want to "CFM" these and similar discrepancies.

If you don't use a mill and your handwriting is anything like mine (I know, I know, nobody's is that bad) you will want to take an extra moment to make sure that non-obvious groups—names, calls, telephone numbers are still legible and unambiguous (or doesn't anyone else have sevens that sometimes look like twos or Us that are indistinguishable from Vs?)

In theory, the sending station should be able to send his message straight through, pausing only when broken by the receiver, and should be able to rely on the receiving station to ask for all necessary fills. But the considerate sender who is really interested in getting the message through correctly will go beyond this minimum. I don't know whether it is subconscious pride on the part of the receiving station, or the human desire to think that "everything's okay", but I do know that the sending station cannot absolutely count on the receiving station to question all items he may not have received correctly. Perhaps, as I have already mentioned, he just doesn't remember them all. Repeat any groups that you think might cause difficulty or misunderstanding for the receiver like unusual or long names. I particularly stress long names because many of us who copy about a word behind will lose track of PASSAMAQUODDY. Also, repeat abbreviations, call signs and unusual words in the text. In addition, it is a good idea to report key figures in the text—for instance, the frequency and time of proposed schedules.

Only close attention by both stations, teamwork and an imaginative eye for what can go wrong will ensure complete accuracy in the passing of messages.

—Pete Gellert, W2WSS

# Field Organization Reports April 1988

## Cycle Four

Area Nets						
EAN	30	1172	39.07	1,243	98.5	
CAN	30	788	26.27	1,152	100.0	
PAN*	25	736	29.44	.978	82.2	
Region Nets						
1RN	40	192	4.80	.380	90.0	100.0
2RN	48	136	2.83	.375	70.0	100.0
3RN	61	226	3.71	.364	97.3	100.0
4RN	60	561	9.35	.402	100.0	100.0
RN5	60	535	8.92	.620	100.0	100.0
RN6	60	408	6.90	.700	98.0	100.0
RN7	60	325	5.41	.640	91.7	100.0
8RN	57	261	4.58	.349	83.0	100.0
9RN	60	340	5.66	.417	95.4	100.0
TEN	60	513	8.55	.633	75.8	100.0
TWN	57	242	4.25	.333	84.2	100.0
ECN						100.0
ARN	30	85	2.83	.081	100.0	90.0

\*PAN operates both cycles one and two.  
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AL, AR, CT, DE, ENY, EPA, GA, IA, ID, IL, IN, KS, MDC, ME, MI, MN, NC, NFL, NH, NJ, NTX, OH, ONT, OR, ORG, SB, SD, SDG, SF, SFL, STX, SV, TN, UT, VA, WA, WIN, WNY, WPA, WTX.

## ARRL Section Emergency Coordinator Reports

Thirty-four SEC reports were received, denoting a total ARES membership of 22,022. Sections reporting were: AK, AR, EPA, CO, GA, IA, LAX, MDC, MI, MN, MO, MS, NFL, NH, NM, NTX, NV, OH, OK, ORG, SD, SDG, SFL, SVJ, STX, UT, VA, VT, WA, WNY, WPA, WTX, WVA, WY.

## Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
<b>Cycle Two</b>				
TCC Eastern	104	90.00	586	1206
TCC Central				
TCC Pacific	92	90.32	344	630
Summary	196	90.16	930	1836
<b>Cycle Three</b>				
TCC Eastern	56	93.33	21	42
<b>Cycle Four</b>				
TCC Eastern	95	79.17	437	875
TCC Central	66	79.50	471	1027
TCC Pacific	106	88.33	594	1184
Summary	267	82.33	1502	3086

## TCC Roster

KB1AF W1CE K1EIC W1EFW WA1FCD WB1GXZ KA1MDM KN1K W1NJM KT1Q W1QYY W1TN KW1U WA2FJJ W2FR W2GKZ NN2H NQ2H KB2HM N2IC W2LWB WB2QIC W2RQ KA2UBD N2XJ N3COY N3EMD K3KF N3FM W3GL WB3GZU W3OKN W3PQ KQ3T NJ3V AA4AT WD4FTK N4GHI K4MTX KB4N WB4PNY K4SCL N4SS K4ZK W5GHP K4GM W5J W5JOV AJ5K K5MXQ W5ZN K4SNG W5QVY N5TC N5TL W5TNT KB5W N6LHE ND5T K6UYK W6O KU6O KN7B KA7CPT NR7E NN7H W7IGC KF7R W7TGU W7VSE WB8O N8GJO W8PMJ K8TFP K8WNO N8XX W8YDZ W9CBE WB9UYU AD8A K00D K0DJ K0EPY K0EZ KJ0G N0HFZ N0IA A100 KS0U VE3FAS VE3ORN VE6CHK VE7EIL

## National Traffic System

Net	Sess	Tic	Avg	Rate	% Rep	% Area
<b>Cycle Two</b>						
<b>Area Nets</b>						
EAN	30	943	31.43	.745	94.0	
CAN	30	497	16.57	.429	100.0	
PAN*	57	445	7.80	.383	93.3	
<b>Region Nets</b>						
1RN	60	357	5.95	.421	90.0	100.0
2RN	58	255	4.40	.343	92.4	100.0
3RN	30	129	4.30	.400	94.0	96.7
4RN	60	554	9.23	.360	74.0	93.3
RN5	60	688	11.46	.495	79.0	100.0
RN6	49	142	2.89	.307	—	100.0
RN7	60	411	6.85	.627	93.1	100.0
8RN	60	333	5.55	.337	97.2	100.0
9RN	60	256	4.26	.374	85.0	100.0
TEN	70	534	7.52	.302	82.0	100.0
TWN	57	242	4.25	.333	84.2	94.7
ECN						76.7
<b>Cycle Three</b>						
<b>Area Net</b>						
EAN	30	151	5.03	.346	75.2	
<b>Region Net</b>						
1RN	30	80	2.67	.280	78.1	96.6
2RN	30	110	3.67	.321	98.7	66.6
3RN	27	22	.81	.113	92.8	86.6
4RN						63.3
8RN						86.6
ECN						76.6

## Public Service Honor Roll

This listing is available to amateurs whose public-service performance, during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public-service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, upon sending notification of qualifying months to ARRL Public Service Branch, will be awarded a special PSHR certificate from HQ.

188	K4NLC	95	82
WA4QXT	107	AA4HT	N8AEH
165	W9JUU	94	K2VX
WA4RLV	106	WD8QXT	KA2INE
153	W6FO	KJ4VT	K2ZVI
N4GHI	KA2F	K8UQY	81
151	K2YQK	K4GRNY	W2RRX
W7LRB	WA2VJL	N3EGF	W7LBK
148	105	NJ3V	KF5RD
WDBV	KB5ADE	93	WD4KBW
145	W7VSE	80	K6UYK
N0DPF	WB2VJK	VE3GT	W00YH
144	KA2UBD	KB2BKE	WB4WQL
KA9FFO	AA4TE	W3FA	KA4TLC
134	104	WA1JVV	79
WD4COL	W9CBE	WB4ZTR	KJ9J
133	WB4DVZ	WB2RBA	KC3Y
WB2OWO	WA2FJJ	AA4ZV	WB1BTJ
128	103	91	KB4JPN
W2MTA	KI4YV	KA8KPY	KA9RII
127	102	90	78
WA2SPL	N9BDL	K0ERM	VE3CYR
125	K8TVG	N2AKZ	KF5BL
124	101	WA4EIC	K5CXP
N2EJA	AG9G	N2HLZ	KA8WNO
123	N4EXQ	89	77
WD5EEH	WA2ERT	VE3DPO	KA9RII
WB1HIH	W67H	WA1TZC	N4RT
119	W4RWB	N7ELF	N6EQZ
KA9VII	WD5GKH	W0KK	KD8WX
117	100	W5CTZ	W1RWG
KB4WT	K5UPN	88	N7BGW
KW1U	WA0HTN	K5MXQ	W3YVQ
116	WB7WOW	W6INH	76
KD7ME	N0FOO	NB1A	ND0N
115	WE2G	WB2GMP	AA4AT
WB6DOB	N2HIF	KF4FG	WA0TFC
114	99	87	N4JRE
NM1K	WB6QBX	W5J	WB5O
112	N1CPX	75	75
K9CNP	WA4RUE	KA8GZ	WB7EMO
111	NC9T	86	K4ZQO
VE3ORN	N3COY	74	74
KA9VI	N6NLW	W5AS	WB8SYA
KT1Q	N5AMK	85	K9ZBM
WA9VND	W2QNL	K4MTX	73
110	K4ZK	N3DRM	84
WX4H	KA7EEE	W5VPI	N8EFB
KA3DLY	N3DRM	97	NG1A
WA9VLC	97	KB1AF	KA1QFV
109	W4PIM	KA1IFC	W2GJ
WA4PFK	N2XJ	83	ACSZ
108	96	WB8R	WB5EPA
W9YCV	WB6JGW	NJ9S	72
WA4JDH	W4CKS	WD0GUF	N4SMB
WB1GXZ	KA1GWE	AJ5F	K2YAJ

71	NV5L	N2DXP	54
WB4TZR	67	N8FXH	KB2BNWIN
KB9LT	NS9O	N2ETO	48
A100	KM5L	KJ3E	KA1HPO/T
NQ1P	WB2FTX	WA1TBY	47
W6VOM	KB4BZA	62	N2FOP/T
70	KC2JW	W8OUD	46
W7GHT	WB5YDD	W1PEX	W1YOL/T
N7GGJ	66	W3AYLO	45
WJ7E	KFBJ	WD9DZV	N2EVC/T
KA4HHE	NZ5J	N4PL	W4HON
69	KA8CPS	KA8FZI	W80WVJ
AA8BS	KA4FZI	65	61
K8JDI	WB0WVJ	64	AE1T
WA8QCA	65	61	KA2JMA/T
KA8QHC	KD8KU	WA8DHB	KA9CTW/T
NO8A	KA5ZWY	K3GGH	41
KN1K	KD4RL	KD0NH	KA1BBU/T
KJ4NK	K41KP	K0QBE	40
68	KBZ	60	KA6HJK/T
N8CEI	KB9PFZ	KB4OPR	N6FWG/T
KA9FVX	KB8APR	K2TWZ	KA1NOI/T
WB4KSG	N2ABA/T	KA2ZYX	
WB4PNY	NW2H	57	
W7LNE	W2FR	57	
WB7WVJ	63	KA8BCB/T	
KA2ZKM	63		
KJ4NK	WB8KWC		

The following stations qualified for PSHR during the month of March 1988, but were not listed in last month's column: N2AKZ, KB2BKE, N2HLZ, N2HPT, N2HSP/T, KA2JUI/T, KA2JAM/T, K2TWZ/T, WA2VJL, K2YQK, KA2ZYX, KP4DJ, KJ4NK, W5AS, W5CTZ, WD5GKH, WB5J, NZ5J, NV5L, WR5O, WB5YDD, ACSZ, N7ELF, NO8A, KA8BCB, W0KK, WC0O, VE4IX, VE4JA, VE4JR, VE4LB, VE4RO, VE4STW, VE7BNI, VE7EJU, VE7EJW.

## Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

The Brass Pounders League Medallion is available to individual operators who achieve BPL and are listed in the BPL column for the third time. This medallion is a one-time-only award, i.e., it is not issued more than once. It is not necessary that the three months involved be consecutive. Any three months will qualify an operator. Stations that qualify for the BPL medallion, upon written notification of the qualifying months to the ARRL Public Service Branch, will be awarded the call-sign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Divd	Total
W3CUL	762	876	1349	71	3058
W3VR	320	297	401	61	1079
W1PEX	15	283	1336	4	1688
WA4JDH	0	501	516	7	1024
N0DPF	256	160	339	91	846
WX4H	0	393	336	5	734
N4GHI	48	315	268	52	683
KT1Q	52	296	313	5	666
N1BGG	—	—	—	—	655
WA4QXT	15	268	241	62	586
KA1IFC	0	288	278	10	576
W1CE	0	551	8	0	559
N3AZW	33	228	245	33	539
NJ3V	75	200	253	10	538
WD4KBW	0	230	282	5	517
WF6O	0	248	259	10	517
K4DOR	12	240	252	12	516
WA9VND	7	257	221	27	512
WA2SPL	4	185	271	49	509
W4DUG	252	4	252	0	508
N6LHE	9	248	245	5	505
W9JUU	0	271	232	1	504

BPL for 100 or more originations plus deliveries:

WA4QXT	213
W5AS	113
KF5RD	108
W8FIR	104

## Independent Nets

Net Name	Sess	Tic	Check-ins
Central Gulf Coast Hurricane Net	30	96	3577
Clearing House Net	30	407	413
Early Bird Net	30	721	302
Empire Slow Speed Net	30	67	343
Great Lakes Emergency and Traffic Net	30	52	848
Hit and Bounce Net	30	203	551
IMRA	26	1018	1583
Mission Trail Net	30	78	843
Northern California Net	90	325	1148
NYSPIEN	30	77	497
Southwest Traffic Net	30	219	1737
West Coast Slow Speed Net	30	90	558
20 Meter ISSBN	25	652	319
75 Meter ISSBN	30	311	1286
7290 Traffic Net	47	501	2963

## KA1LDS Recommends the Novice Roundup

For many Amateur Radio operators the mention of "contest" conjures up images of endless QRM, monotonous QRZs and 599s. Not so for KA1LDS. "It is more, much more," exclaims Dot Burden of Nashua, New Hampshire. "The Novice Roundup has been a contest of special interest to me. I first entered it in 1985 just to get the experience. In 1986 and 1987, I operated from Vermont and was section leader for the Technician class each year. The higher-class license operators have been very patient and understanding of us beginners, and because of their attitude the Novice Roundup is both a learning and enjoyable experience."

"When I entered the 1988 Novice Roundup, I set some personal goals. I planned to finish my WAS and 'We the People' certificates, increase my code speed to 15 WPM, operate for 30 hours without completely disrupting the household and, most importantly, have fun."

Dot's serious intentions about the Novice Roundup included careful planning of bands and the times she would work in order to realize optimum results. "I discovered that 40 meters would be next to impossible because it was covered with QRM; 80 meters is a joy at 4:30 AM because there is much less QRM late at night, and I could find the Midwestern states. By mid-morning, I could look for Europe on 15, and yet later in the day, that band could be good for stateside contacts. Also, 15 meters was my best bet for contacting KL7 stations between 4:30 and 6 PM."

"My basic plan was to work for multipliers by scanning the band until I gained confidence to pick a frequency and send a CQ. Using a straight key and manually recording and duping the QSOs was time consuming and required undivided attention, but that is part of the hobby." Should anyone doubt the rewards of operating in a contest, Dot confirms that many of the amateurs she worked were eager to help her in any way they could. "When I asked someone to repeat a report, immediately the code speed way lowered so that I could copy accurately." There were many treasured moments for KA1LDS, such as the amateur who signed his QSO with TNX 73 ES 88. Dot didn't have time to think about that response for long, but when she received W2QHH's QSL card, Howie mentioned that he had received cards from 3,892 YLs... all QRP/CW!

In the Novice Roundup stations can be worked both on SSB and CW. Dot



Dot Burden, of Nashua, New Hampshire, beckons newcomers and seasoned amateurs to check out the rewards of participating in the Novice Roundup.

remembers KB1KX who gave the usual UR 599 NH then added DO YOU WANT TO GO TO SSB FER VOICE CONTACT? "There were many exchanges like that with people who were not in the contest but who took their time to make two contacts," recalls Dot. Another memorable moment was offered by W2PKY who apologized for the delay during his transmission because his computer crashed and he had to switch to a keyboard. "I was thrilled when KA7YWE asked me what type of keyer I was using because he commented that my letters were coming out nicely on his computer screen."

The last weekend of the Novice Roundup coincided with the New Hampshire QSO Party as well as the 10-10 Winter Phone QSO Party. All that contest activity didn't worry Dot; instead she worked all three contests simultaneously! That meant a lot of switching between bands and modes but Dot enjoyed every minute of it. "When I was on CW I would send KA1LDS/TNH and one station responded with R U IN NR ES NH CONTEST!" Dot will confess, however, that those herculean efforts did produce fatigue and an occasional red face such as when she copied TNX DOROTHY UR 599 WIS. "I didn't find 'WIS' on my state listing so returned by asking the operator where his state was. Back came WISCONSIN IS NORTH OF ILLINOIS. That was so embarrassing I finished the contact and shut the radio and myself down for the night."

### 1987 YL Anniversary Party Results

Phone		DX YL
NA YL		I1IEP
WD5FQX	Gold Cup	CR6YH
WD8MEV	2nd Place	4X6DW
KM8E	3rd Place	

CW		DX YL
NA YL		I2KYM
N2EVZ	Gold Cup	I5UNA
VE7YL	2nd Place	VK3KS
KM8E	3rd Place	

### Combined SSB and CW Scores

WD8MEV	Corcoran Award
CT1YH	DX World Wide Hager Award

### CW Scores

N2EVZ	1551*	DF26L	315*
VE7YL	1539*	NY4H	300*
KM8E	1353*	JA1YL	276*
WD8MEV	1188*	DF6UJ	257*
KA6SOC	1071*	KA5GIS/1	180*
WD5FQX	984*	JA1AEQ	144*
I2KYM	791*	K6DLL	132*
I5UNA	768*	DJ6US	98*
KA0OMX	638*	SM5EUU	81*
VK3KS	558*	KG5CU	41*
CT1YH	512*	SM5CXC	20*
WA2NFY	495*	JA7PCH	12*
WD8IKC	324*	K0EPE	2*

### SSB Scores

WD5FQX	8856*	JF7TYA	1508*
WD8MEV	8820*	E17CW	1350*
KM8E	8180*	K6INK	1188*
K6KCI	7850*	VK3KS	1156*
VE7YL	6983*	N1DJU	1152*
W2GLB/7	6510*	KB8RT/7	969*
K6DLL	6383*	KA8OMX	936*
KA6SOC	5813*	ZL1ALK	882*
WA1UVJ	5670*	WB1EHS	842*
I1IEP	4620*	DL0YL	774*
W6QGX/5	4572*	WA7TLL	743*
CR6YH	4418*	GM4YMM	675*
4X6DW	4340*	WD8IKC	672*
WA2NFY	4320*	JA1AEQ	588*
I2KYM	3614*	G4E2I	528*
NY4H	2982*	JA1YL	432*
KA4EED	2838*	WA2LURE	363*
K0EPE	2795*	DF4ZX	347*
NSGAP	2550*	G4KYR	189*
KD8SC	2478*	SM5CXC	187*
KA5ONE	2448*	LA2PFA	180*
HB9ACO	2320*	SM0HNV	168*
KG5CU	2145*	SM5EUU	83*
ZL1ALE	1643*	SM3LIV	18*
G0EIX	1518*	KG5CS	12*

\*Denotes low power multiplier.

Check logs: K1QFD, W4DEV, W3CDQ, NM7N.

This enthusiastic contester started her Amateur Radio career as the XYL of WBIBRE. "Until I got my license, Bill and I 'co-existed' as amateur operator and wife. For a while I had reasons for not getting my license, but as time went on those reasons disappeared." By December 1983, there was no reason not to be licensed so Dot attended local Novice classes and by January 1984 "mustered enough courage to make my first QSO. I had listened for countless hours but didn't make that first

contact until K1CII agreed to help me. One night, I called him on the telephone and we gave it a try. With the phone in my left hand and my right hand on the key, I made my first contact in neighboring Hollis, New Hampshire." In the past five years, KAILDS has "extended" her signal to DXing and traffic handling. Dot is a member of ARRL, WRONE, 10-10 and YLRL. She is also affiliated with the Vicksburg (MS) Amateur Radio Club where her son, N5IEP, is a member.

After three years of Novice Roundup participation, Dot would like those amateurs who use computer generated CW to consider slowing down a bit. "Some of the CW sent by machine is so fast that

many new Novices and other operators who cannot copy at such a high speed are unable to make these contacts. It's difficult to encourage new people to become active in contesting when they are blown away on their first try. There are many other contests that welcome high speed operation."

Dot has advice for those who are new to Amateur Radio and contesting. She suggests, "First find a station you can copy and listen to what he or she is sending for contest information. Copy the call sign, state and any other information necessary. Then answer the call for your contact. All you will need is the station's RST. After a few contacts like this, you'll be hunting for a clear frequency and sending your own CQ."

For KAILDS, the 1988 Novice Roundup was a real success. The Novice Roundup was fun and she reached some of her goals. She completed the requirements for both WAS and "We the People" awards and now claims her code speed is close to 15 WPM. Her total operating time was 25 hours instead of the intended 30 because she admits, "it was necessary to share the radio with my OM. During the contest I made 149 contacts with 55 multipliers —70% were CW, 27% Novices, 15% Technicians, 13% Generals, 15% Advanced, 23% Extra. Only 5% were YL operators." Will she be in the Novice Roundup next year? "You bet," says KAILDS. [E-1]

## Strays



### QRP MOTORCYCLE DXPEDITION

Dennis Blanchard, K1YPP, of Hampstead, New Hampshire reports he and KAIRED will begin a motorcycle DXpedition to Inuvik, Northwest Territories, Canada on June 20, 1988. The days the two will be active depend on environmental circumstances, such as caribou crossings and road conditions. They hope to be active during Field Day weekend, and again upon their arrival in Inuvik, which may be as late as July 2-3. They begin their return trip on July 4. They will operate near the QRP calling frequencies, 60 kHz from the low end of the CW bands, and in the 15-meter Novice band around 21.140 MHz. Their equipment consists of a Heathkit HW-9 powered by the motorcycle battery, a Curtis keyer and a collapsible vertical antenna for 40, 30, 20 and 15 meters. They are investigating a VES call sign, or may use their own calls. In either case, they believe they will be easy to find and look forward to working as many stations as possible.

### COMMON SCHOOLHOUSE

Recently, Tom Freedom, W3HUE, of Harrisburg, Pennsylvania overheard N2ZF give his location as Saugerties, New York. Tom, who had spent his childhood in Saugerties and attended elementary school there from 1920 to 1928, broke in. When Tom mentioned the Pine Grove one-room schoolhouse, N2ZF responded, "I now own it, and for a while I lived in it." Although Tom reports that they are "years apart," they have much in common and have enjoyed many pleasant QSOs.

### QST congratulates...

Steven Sellers, N5GZP, of Oceanside, California on receiving an award for "Best Investigative Documentary" from United Press International for his production of "Earthquake Country." Sellers is News Director at KGMG-FM.

the following radio amateur on 60 years as an ARRL member:

• Leo I. Meyerson, W0GFQ, of Omaha, Nebraska

the following radio amateurs on 50 years as ARRL members:

• Morton Eisenberg, K3DG, of Delray Beach, Florida

• Ernest Witkin, W3DLQ, of Philadelphia, Pennsylvania

• Wilbur F. Tipton, W2UBS, of Elmer, New Jersey

• Harry J. Campbell, W9KSO, of River Grove, Illinois

• George R. Caron, WIEQ, of Danielson, Connecticut

• Herbert Becker, W6QD, of Los Alamitos, California

• Robert S. Reynolds, W0RFP, of Waterloo, Iowa (his state was previously listed incorrectly).

David S. Detchemendy, KA0PRW, of Florissant, Missouri on receiving a gold medal for the highest score in Missouri on the November 1987 uniform CPA examination.

Harry Bradshaw, W4TPB, of Lexington, Kentucky for being honored for 25 years of service with the Lexington Chapter of The American Society for Quality Control.

Jose Cijntje, PJ2MI, on being Knighted by her Majesty Queen Beatrix, Queen of the Netherlands. Sir Cijntje, who was involved in amateur licensing matters, recently retired from his post as chief of radiotelecommunications after 27 years of service in government communications in the Netherlands Antilles.

Capt Thomas P. Traughber, USN, W0ZX, who has been selected for promotion to Captain and named as prospective Commanding Officer of the Naval Security Group Activity, Adak Island, Alaska, a communications research facility. Capt Traughber, a career Navy cryptologist, is a fellow of the National Security Agency. He is a life member of ARRL and QCWA and has operated overseas as GMSASJ and CT2DP.

Hugh Archer, W8JA, of Dearborn, Michigan on being elected to serve as president of Rotary International in 1989-90.

### I would like to get in touch with...

anyone with instructions on programming the frequencies on a JIL 80332046, Model SX-100, police scanner. Glenn Lund, W9QOM, 526 S LaLonde, Lombard, IL 60148.

anyone having operation and service info for a KLM 2000 2-meter transceiver. Bill Burnette, W7UNE, PO Box 451, Lakeside, OR 97449.

anyone with a schematic for a power supply for a BC-348. Marion Hall, W6FJY, 19329 Hillsdale Dr, Sonora, CA 95370.

anyone with a manual/schematic for Icom 230 2-meter transceiver. R. Cosma, KA1NRW, 147 Temple St, #308, Framingham, MA 01701.

anyone with a schematic for a Clegg 22er AM transceiver. William Freas, K3YKM, Aberwyck, 435 E Lancaster Ave, Apt 307, St Davids, PA 19087.

anyone with a schematic and/or service manual for a Tequipment model S51B oscilloscope. Jim Arcaro, WD8PFK, 29461 Valley View, Wickliffe, OH 44092.

anyone who has info and ideas on how to obtain a backlash assembly and gear on band-switch (C90) for a SB-34 SSB transceiver. Gene Bergman, WB6IBU, 1514 Virginia St, Berkeley, CA 94703.

anyone with manuals for Knight T-60 transmitter or Hallicrafters SR-42A transceiver. Steve Brown, N6OE, 1964 Wagner St, Pasadena, CA 91107.

anyone with a manual for Realistic DX-150A receiver. Don Hallett, N9ECD, Christian League for the Handicapped, Watworth, WI 53184.

anyone with a manual for a Gonset GSB-101 linear amplifier, Model 3262 or a Johnson Viking 2 transmitter. David Fentem, KW4M, 704 Emerald Forest Circle, Lawrenceville, GA 30245.

anyone using, repairing and/or reconditioning the Robyn SSB transceiver Digital 500A. David Odor, P43DO, General Mayor de Bruynewijk 22, Savaneta, Aruba.

anyone with a schematic and manual for the Drake TR-22 2-meter mobile transceiver, Drake DC-3 power supply, Hallicrafters TO Keyer and National HRO-7 receiver. Clyde Sakir, N71OK, 4243 E 1st St, Tucson, AZ 85711.

## RUDAK—What Is It?

[Phase 3C operating frequencies: In the May column, I offered the tentative operating frequencies for Phase 3C. My June QST feature article, "Introducing Phase 3C: A New, More Versatile OSCAR,"<sup>1</sup> contains the updated, current assignments.]

In recent months, I've mentioned the Phase 3C RUDAK transponder in this column. Now it's time to explain what it is and the basics of what it does. In this month's column, we're privileged to get a close-up look at RUDAK from information supplied by Hanspeter Kuhlen (DK1YQ), the AMSAT-DL RUDAK Project Manager, and translated by Don Moe (KE6MN/DJ0HC). Next month, I'll have the concluding installment.

### RUDAK—Its Beginning

The first RUDAK system design

meetings took place early in 1985. This was the time when the packet-radio revolution began spreading around the world, following the acceptance of AX.25 as an international Amateur Radio protocol for digital-link control. It was at these first RUDAK meetings that the payload capabilities of the new AMSAT OSCAR satellite were discussed.

In order to increase the technological challenge for the new satellite project, we decided that a digital packet-radio transponder had to be included. This particular part of the satellite package was named RUDAK, an acronym for *Regenerativer Umsetzer für Digitale Amateurfunk Kommunikation*. In English, this means *Regenerative Transponder for Digital Amateur Communications*. Following another successful ARIANE launch early in March 1988, it was time to get ready for

the launch of ARIANE 4 scheduled for June 1988.

### RUDAK Experiment Objectives

Providing a reliable digital-communications link for individuals is the main objective of the experiment. Because of the long visibility of the spacecraft in its elliptical (11-plus-hours) orbit, the spacecraft provides capabilities for direct contact among radio amateurs within the global footprint of its antenna. The wide range of other objectives can be summarized as follows:

- Real-time digital communications facility with ALOHA<sup>2</sup> (uncoordinated) time-division multiple access (TDMA) and continuous time-division multiplex (TDM) on the downlink. Digipeating with full end-to-end or partial uplink/downlink confirmation. Because of the space-

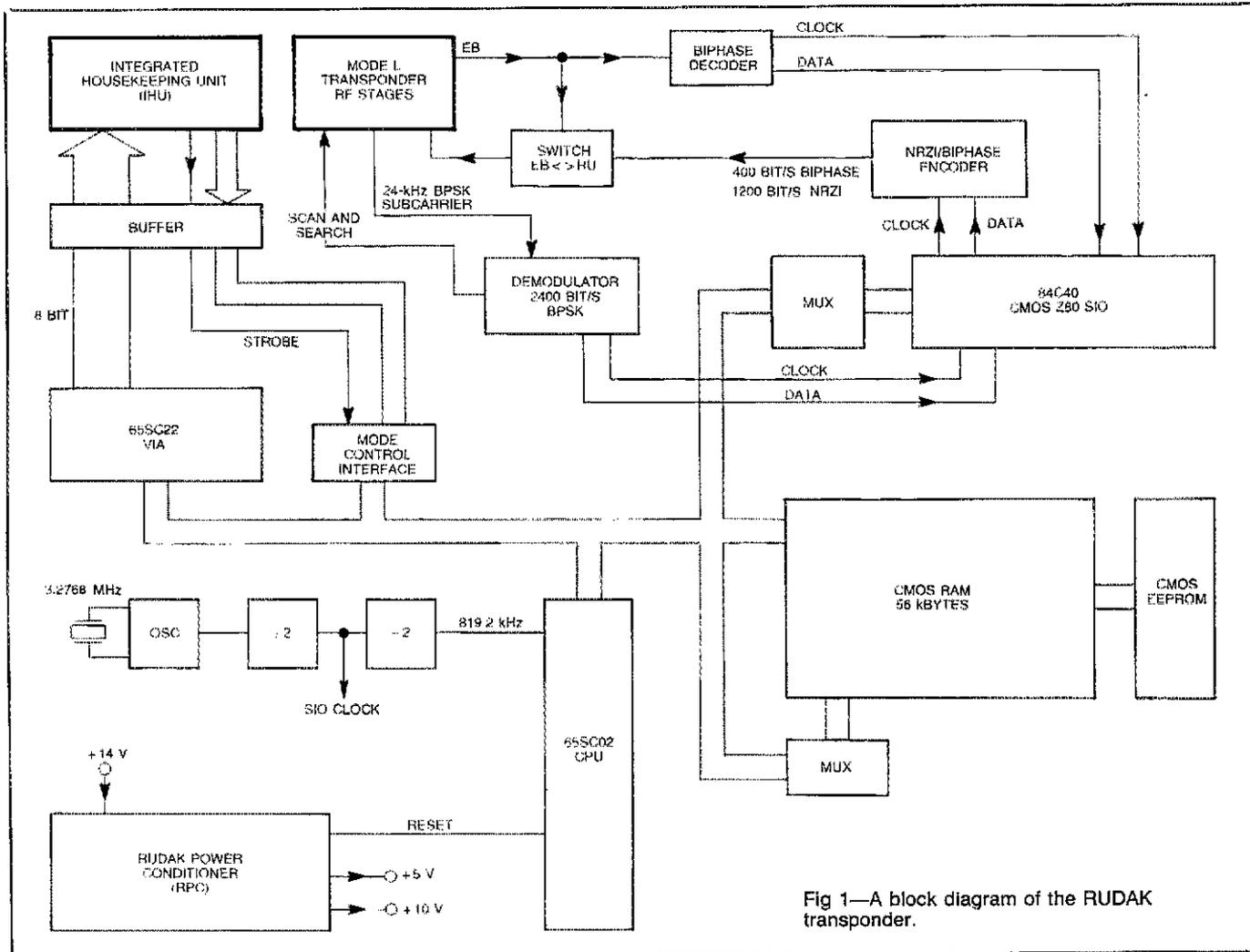


Fig 1—A block diagram of the RUDAK transponder.

craft's extended visibility, a mailbox feature (similar to that provided on Fuji OSCAR 12) was not considered necessary.

- Operational use of binary phase-shift keying (BPSK) with differential coding for the purpose of individual communication, education and experimentation.

- General information broadcast in AX.25 (UI frames) or AMSAT format (ie, 512-byte ASCII).

- Computer-controlled mode switching (autonomous operation).

- An in-orbit facility using a fully programmable computer with intelligent hardware interfaces. This would provide a testbed for communications experiments such as testing alternative access procedures, different bit rates and so forth.

- Keep the size and complexity of ground-station equipment as low as possible to motivate "home-brewing" station equipment.

- Information dissemination through a ROBOT mode to a RUDAK processor. In this mode, ground station connects to RUDAK with the format *call sign and SSID* (secondary-station identifier) are responded to by a transmission of up to 15 different messages. These messages include a valid set of Keplerian elements, present orbit position, general telemetry, an optimum set of AX.25 parameters and so on, followed by a RUDAK disconnect. This feature, in addition to the particular message information, provides a positive confirmation of an established contact with RUDAK.

- Testing of CMOS components (CPU, memory, and so forth) under extreme radiation conditions.

### The RUDAK Transponder

A block diagram of the RUDAK transponder is shown in Fig 1. With a regenerative transponder, the uplink signals are first demodulated in a burst demodulator, then processed in a general-purpose communications computer, and eventually modulate a downlink beacon signal (the engineering beacon). The AX.25 protocol handling of the computer is supported by a dedicated interface controller (Z80<sup>®</sup> SIO) to relieve the computer of unnecessary low-level bit manipulations.

The RUDAK mode is available during mode L operation only. Because the RUDAK transponder is completely independent of the normal passband, however, it will be operative even when the mode L passband is switched off. The frequency plan assigns 1269.710 MHz for the uplink, and 435.677 MHz for the downlink.

Transmissions from ground stations will be of short packets (or bursts) to allow time-sharing of the frequency among several users. A specially developed burst demodulator on board the satellite scans around the center frequency to cope with uncertainties (such as ground-station fre-

quency inaccuracies and Doppler shift) of the uplink signals. A range of  $\pm 7.5$  kHz is scanned at 120-ms intervals.

The measured performance of the flight unit is about 100 ms for signal acquisition, (ie, the time span between detection of an input signal and its demodulation). The demodulated signal contains two components (recovered data and clock), both of which are available for further processing in the RUDAK computer.

This unavoidable 100-ms overhead has to be considered in setting the appropriate TNC parameter. For instance, the AXDELAY in TNC 1s is set so that a sufficient number of flags (\$7E)<sup>3</sup> are transmitted prior to each packet; this allows the demodulator to lock onto the signal. The optimum values for RUDAK communication will be provided via the satellite's beacons. Field tests indicate that the values will probably be not much different from those presently used for the standard FM links.

Because of the inherent collision problem for uplink packets, the theoretically maximum achievable throughput is limited to 18% (ALOHA). In other words, even under optimum channel conditions, only 18% of the packets offered to the channel will survive the competition. This effect is also observable when a mountaintop packet-radio digipeater is within reach of many local stations, but the local stations cannot hear each other. In this case, the carrier-sensing multiple access (CSMA) feature, which normally avoids collisions by inhibiting transmissions on a busy frequency, is useless. If the satellite link did not exhibit a propagation delay of about 300 ms, this problem could be solved with a digipeater operating in the duplex mode. Therefore, for RUDAK, an uplink bit rate of 2400 bit/s has been selected to provide optimum loading of the 400-bit/s downlink. A 1200-bit/s mode is also included on the downlink where NRZI coding is used so as to be fully compatible with the Fuji OSCAR 12 downlink.

The flight model of the RUDAK processor consists solely of CMOS components and requires a total power consumption of 400 mW for 56 kbytes of RAM and 2 kbytes of EEPROM. This allows the software to be RAM resident. Mode L is expected to be the dominating mode throughout the entire Phase 3C mission.

*(Stay tuned for more on RUDAK in next month's column.)*

### Notes

<sup>1</sup>V. Riportella, "Introducing Phase 3C: A New, More Versatile OSCAR," *QST*, Jun 1988, pp 22-30.

<sup>2</sup>For an explanation of ALOHA, see *The 1988 ARRL Handbook*, p 19-40, under the heading "Channel Access."

<sup>3</sup>The dollar sign indicates hexadecimal notation.

# Strays



## NTS LOGO CONTEST!

ARRL has a logo. Special Service Clubs have a logo. ARES has a logo. Why not NTS? Well, now it will! It's about time considering NTS has been serving Amateur Radio and the public since 1947!

Are you an artist? Spread the word—on traffic nets, packet bulletin boards, on street corners—we're looking for an NTS logo design. Not just any will do. It must be a design that depicts the true spirit of NTS: pride, service, tradition and innovation!

Entries will be judged on how well it symbolizes the NTS spirit, and aesthetics. The design must include some specific details: the ARRL diamond must be prominently featured, the words "National Traffic System" must be incorporated, and the design must be legible when reduced and embroidered in a size of roughly 4-6 inches.

All original designs must be submitted on 8½ x 11 inch white paper to Richard Palm, K1CE, Field Services Manager, ARRL HQ, 225 Main St, Newington, CT 06111, by *October 1, 1988*. Don't forget to include your name, address, phone number and call sign with your submission. All entries will be presented to the Volunteer Resources Committee for initial screening. VRC will select three best designs for presentation to the full ARRL Board of Directors at its 1989 Annual Meeting. The Board will then select the winning design. The decision of the Board will be final.

The winner will receive an engraved plaque, an *ARRL Operating Manual* and recognition in *QST*, *FIELD FORUM* and *Section Leader*. Enter today!

## IMRA 25th ANNIVERSARY

The International Mission Radio Association is celebrating its 25th anniversary. Fifty priests and brothers in Hudson, New Hampshire formed the Catholic Mission Radio Association in 1963 to run a traffic net for missionaries. One year later, they opened the organization up to the laity and missionaries of all denominations and it was incorporated as IMRA. Today, IMRA has 1000 members in 40 countries and handles about 12,000 pieces of traffic a year. The organization loans radios (most of which are donated by hams) to licensed missionaries. The IMRA net meets daily except Sunday from 1800 to 2000 UTC on 14.280 MHz. All amateurs are invited to join the net and help work traffic between missionaries and their families. For more information on IMRA, see *QST*, July 1986, page 51.

## I would like to get in touch with...

anyone with a technical/operating manual for a Kay Electric Co, Pine Brook, New Jersey, Model II, 1500 A1 Marka-Sweep. Rob Pleak, N6OOD, PO Box 4172, Salinas, CA 93912.

anyone with a schematic of a VHF Engineering Co Model PS25C power supply. Vaughn Nogle, W5TJT, RT Box 35, Vadito, NM 87579.

## "200" Stations Emit a Clear Message: We Love to Communicate!

Thanks to Albany (NY) ARA and L'Anse Creuse ARC (MI) for submitting the photographs used in this article.

It started out as an idea a two years ago. At their July 24-25, 1986 meeting, the ARRL Board of Directors decided to explore ways Amateur Radio operators could join in the Bicentennial of the US Constitution. We did not know what limits the FCC would place on this type of special-event operation—there was no guarantee that a blanket approval would be forthcoming—or the number of hams who would enthusiastically embrace the idea and take the opportunity to increase public visibility of Amateur Radio.

On October 20, 1987, we submitted a list of 199 clubs that had registered to operate with a special-event "200" call-sign prefix.

Perry Williams, WIUED, ARRL Washington Area Coordinator, received a letter dated November 17, 1987, from the FCC Private Radio Bureau authorizing all 199 clubs to use the special-event "200" call-sign prefix. Additional club stations were authorized to use the special-event call sign if they met the basic criteria, as written in the FCC Order of July 9, 1987.

### Enthusiasm Grows

Interest in the Bicentennial celebration has grown with time. We currently have 299 clubs that have received FCC authorization to use the special event "200" call-sign prefix. The determining criteria for authorization depend on the number of clubs that have registered for a "200" call-sign in your state and your club's operation location. If six or more clubs have already registered, then FCC authorization is possible only if you plan to operate in a state capitol or capital. The following states are still open for operation locations outside of their state capitols or capitals: WY, CO, HI, NV, ND, OK, NC and IA.



(l to r) Alan Koch, KA8JUN; Art Ellis, W8PBO; Mike Williams, KB8DSE; and Vince Cucker, WA8BJJ, enjoy operating L'Anse Creuse ARC's Bicentennial station, NS200N, from a local high school.

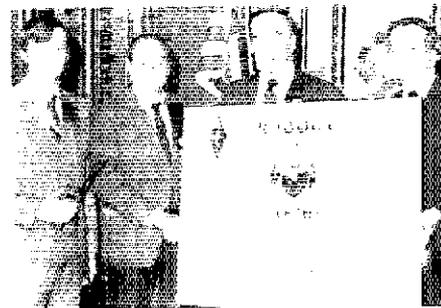
### Lessons Learned

Bob Nygren, WA3YON, from the Murgas ARC (Wilkes-Barre, Pennsylvania), passed along several observations from his club's participation in the Bicentennial celebration. Bob noted that knowing what stations are authorized to operate during a specific time period would make "200" call sign hunting easier. This information is disseminated via WIAW bulletins (updated weekly) and published in the *ARRL Letter*.

Members from other clubs have commented that it is tough finding a Bicentennial station when the time and frequency of operation is unknown—especially in states where only a few clubs have registered to use the special-event prefix. On the whole, however, most Bicentennial stations have been found easily, and clubs have made an honest effort to cover all bands and modes of operation.

Some clubs have gotten newspaper coverage for their Bicentennial operation. The Susquehanna County ARC sent in a newspaper article of their Bicentennial operation, with plenty of column inches devoted to the topic, as published in the January 28, 1988 edition of *The Independent*. The local tie-in between Amateur Radio and celebrating the state's ratification of the US Constitution makes for great copy, and other clubs are reading about their Bicentennial operations on the front pages of newspapers, too.

We can provide you with a publicity packet of information about Amateur Radio, which will answer many general-information ques-



Listen for K200CT, Albany ARA's Bicentennial Station operating from The New York State Museum July 23-29. (l to r) Ernie Popp, KA2HTU, AARA President; Jack Donnelly, WA2YBM, AARA Public Events Coordinator; the Honorable Thomas Whalen, mayor of Albany; and Martin Sullivan, Director, New York State Museum, proudly display one tangible result of the interaction between the club and city officials.

tions that newspaper reporters might have. Just drop a line to the ARRL Club Services Department, 225 Main St, Newington, CT 06111, and request your free publicity packet.

### Don't Miss The Fun

There are still six months left to work "200" stations. The schedule of "200" operations for each state can be found on page 14 of the September 1987 issue of *QST*.

### Welcome Special Service Clubs!

The following clubs have demonstrated their zeal for enhancing enjoyment of Amateur Radio and going the extra mile in serving their local communities. These clubs were granted Special Service Club status after demonstrating effective programs in six areas: (1) Public Relations, (2) Emergency Communications, (3) Training, (4) Technical Advancement, (5) Operating Activities, and (6) ARRL Membership Recruitment. The number in parentheses is the number of club members. Welcome aboard!

Associated Radio Amateurs of Long Beach, Inc, Huntington Beach, CA (202); Humboldt Amateur Radio Klub, Humboldt, IA (21); River City Radio Communications Society, Sacramento, CA (100).

The following renewing Special Service Clubs have reaffirmed their commitment: Amador County ARC, Pine Grove, CA (121); Amateur Radio Caravan Club, Albuquerque, NM (262); Brazos Valley ARC, Houston, TX (77); Butler County ARA, Butler, PA (80); Coastal Area Repeater Society, Savannah, GA (91); El Paso ARC, El Paso, TX (180); Fayette ARA, Bloomingburg, OH (30); Fox Cities ARC, Appleton, WI (120); Frontier ARS, Las Vegas, NV (13); Gloucester County ARC, Inc, Pitman, NJ (192); Great Falls Area ARC, Great Falls, MT (41); Hollywood ARC, Hollywood, FL (56); Lincoln ARC, Lincoln, NE (180); Peninsula Radio Operators Society, Inc, Salisbury, MD (72); Radio Central ARC, Miller Place, NY (130); Radio Club of Tacoma, Inc, Puyallup, WA (371); Ramapo Mountain ARC, Oakland, NJ (107); Relay Repeater Club, Arcadia, CA (32); San Fernando Valley ARC, Inc, Van Nuys, CA (204); Sonoma County Radio Amateurs, Inc, Santa Rosa, CA (199); Triple "A" ARA, Inc, Freedom, PA (151); University of Texas ARC, Austin, TX (30); West Alabama ARS, Tuscaloosa, AL (15).

# Coming Conventions

## GEORGIA STATE CONVENTION

July 9-10, 1988, Atlanta

The Atlanta Radio Club is sponsoring the 60th Georgia State Convention at the Georgia World Congress Center in Hall C from 9 AM to 5 PM Saturday and 9 AM to 3 PM Sunday. Talk-in is on 146.22/82. Celebrity guests will include Wayne Green, W2NSD, Lew McCoy, W1ICP, Don Search, W3AZD, Glenn Baxter, K1MAN, and many others. There will be a large exhibit area and flea market. Forums which cover AMSAT, Packet Radio, DX, Contesting, Emergency Communications and many other operating and technical themes. License exams for all classes are given both mornings. For more information write Atlanta Hamfestival, PO Box 77171, Atlanta, GA 30357, or call Roy Epps, K4UWO, tel 404-457-2916 or Al Smarr, W4BTZ, tel 404-237-1418 or 404-237-1419.

## INDIANA STATE CONVENTION

July 9-10, 1988, Indianapolis

The Indianapolis Amateur Radio Association is sponsoring the Indiana State Convention, which will be held at the Marion County Fairgrounds. Doors will open 6 AM both days. Admission is \$5, children under 12 free. Features include equipment dealers, flea market, technical forums which will be held all day Saturday, ARRL forums all day Sunday, non-

July 2-3  
West Virginia State, Jacksons Mill

July 9-10  
Georgia State, Atlanta

July 9-10  
Indiana State, Indianapolis

August 5-7  
Texas State, Austin

August 6-7  
Northern Florida Section, Jacksonville

## ARRL NATIONAL CONVENTIONS

Sept 9-11, 1988—Portland, Oregon  
June 2-4, 1989—Dallas/Forth Worth, Texas

ham activities, camping on the grounds with free hookup and refreshments. There are also many motels and restaurants close by on the 465 loop. Talk-in will be on 146.10/146.70, 146.16/146.76 and 443.025/448.025. For table buildings call 317-356-4451, for commercial building space and general information contact William J. Evans, 348 Heritage Dr, Danville, IN 46122, tel 317-745-6389.

## NORTHERN FLORIDA SECTION CONVENTION

August 6-7, 1988, Jacksonville

The Greater Jacksonville Hamfest Association is sponsoring the Northern Florida Section Con-

vention, to be held at the Prière Osborn Convention Center in downtown Jacksonville. The center can be reached by traveling 1 mile north of I-95 from the I-95/I-10 junction. Doors open from 9 AM-5 PM on Saturday, and 9 AM-3 PM on Sunday, exhibitor and swap table setup is from 2 PM-6 PM Friday. Admission is \$5. The headquarters hotel is the Jacksonville Hotel, located on the riverfront boardwalk. Special rates for Convention attendees. Features include forums, indoor swap area, over 30 exhibitors, "boat anchor" auction 1 PM Sunday, FCC exams Saturday (\$4 for Technician through Extra Class, with free Novice exams.) For more information contact Greater Jacksonville Hamfest, PO Box 10623, Jacksonville, FL 32207, tel 904-350-9193.

# Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ  
Convention Program Manager

**Attention:** The deadline for receipt of items for this column is the 5th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in QST of prizes of any kind and games of chance such as bingo.

**Arizona (Flagstaff)—July 28-30.** Sponsor: Amateur Radio Council of Arizona. Time: Friday 12 PM-6 PM, Saturday 8 AM-6 PM, Sunday 8 AM-3 PM. Place: Fort Tuthill Fairgrounds, off I-17, south of Flagstaff. Features: ARRL forum, commercial exhibits, VE exams, refreshments, camping (self-contained RVs). Talk-in: 442.150/447.150 and 146.22/82. Contact: Larry Randall, KA7UIH, 22 W Mariposa, Phoenix, AZ 85013, tel 602-274-7259.

**Colorado (Glenwood Springs)—July 30.** Sponsor: Ski Country ARC. Time: 9 AM-1 PM. Place: Colorado Mountain College, Community Education Cir. 1402 Blake Ave. Features: VE exams, swap tables, AMSAT and contest meetings, snack bar. Admission: free. Contact: SCARC, PO Box 302, Carbondale, CO 81623, tel 303-945-9342.

**Colorado (Woodland Park)—July 23-24.** Sponsor: Mountain ARC. Time: 9 AM. Place: Red Rocks Campground in Pike National Forest, 4 miles north of Woodland Park on Hwy 67. Features: dealers, flea market, swap shop, refreshments, \$5 per space for tailgaters, camping (entry permitted late afternoon Friday, \$5 advanced reservations required). Talk-in: MARC repeater 144.56/145.16 and 443.65/448.65. Admission: free. Contact: MARC, Box 1012, Woodland Park, CO 80866, or Joe Tafoya, N8CMD, tel 719-687-3641.

**Illinois (Chicago)—July 23-24.** Sponsor: Amateur Cross Link Repeater Club. Time: setup 7 AM, doors open to public 8 AM. Place: DeVry Institute of Technology, 3300 N Campbell Ave. Features: VEC testing for all levels, flea market, Saturday night banquet at the Quality Inn (\$15 per person), guest speaker Gordon West, WB6NOA. Talk-in: 147.825/225 222.88/224.48 and 443.70/448.70. Admission: advance \$3, door \$4. Tables: flea market sellers must provide tables for outdoors, dealers inside tables provided. Contact: for tickets, send SASE to Peter Hughes WB9EYR, 3315 N Oakley, Chicago, IL 60618, for more info call 312-712-5100.

**Illinois (Downers Grove)—July 10.** Sponsor: DuPage ARC. Time: doors open 8 AM. Place: American Legion Post 80, 4000 Saratoga. Features: outdoor flea market, swappers row, VEC exams for all classes (please bring copy of license), free parking, refreshments. Talk-in: 146.52, 144.65/145.25, 222.96/224.56 and 442.55/447.55. Admission: advance \$2, door \$3. Tables: indoor tables available. Contact: for tickets or reserved tables send SASE to Hamfest Chairman, W9DUP, PO Box 71, Clarendon Hills, IL 60514, tel 312-985-0527 evenings or weekends.

**Illinois (Garden Prairie)—July 31.** Sponsor: Big Thunder ARC. Time: 7 AM-2:30 PM. Place: Garden Prairie Park, Rte 20, 5 miles east of Belvidere. Features: flea market. Talk-in: 146.52, 147.975/375. Admission: advance \$2.50, door \$3. Contact: Jim Grimsby, W9HRF, 210 Oak Lawn Ln, Poplar Grove, IL 61605, tel 815-765-2573.

**Illinois (Peotone)—July 31.** Sponsor: Hamfesters RC. Time: 5 AM-3 PM. Place: Will County Fairgrounds, easy access from I-57, exit at 327, site is 1/2 mile east of I-57. Features: flea market, overnight parking, FCC exams (preregister by June 30, call NF9N, 312-448-9432, for information.) Talk-in: 146.16/76 and 146.52 simplex. Admission: advance \$3, door \$4, for advance tickets send check or money order and #10 SASE to Hamfesters RC,

13058 Finch Ct, Lockport, IL 60441. Contact: for general information, John Schiptsch, W9BNR, 13058 Finch Ct, Lockport, IL 60441, tel 312-403-1043.

**Illinois (St Charles)—July 17.** Sponsor: Fox River Radio League. Time: setup after 7 PM Saturday, and 6-8 AM Sunday, doors open to public at 8 AM (outside flea market opens Sunday 6 AM). Place: Pheasant Run Lodge, located 3 miles west of Rte 59 on Rte 64 (North Ave). Features: indoor and outdoor flea market, free parking, VEC exams. Talk-in: 144.87/145.47 and 144.61/145.21. Admission: advance tickets send \$4 and SASE to Phil Fors, N9FXQ, 104 May St, West Chicago, IL 60185. Tables: Commercial and inside tables contact Kermit Carlson, W9XA, 36W345 McKee Rd, Batavia, IL 60510.

**Iowa (Altoona)—July 9.** Sponsor: Des Moines ARA. Time: 8 AM-4 PM. Place: Adventureland Inn, located at I-80 & US 65 (just off I-80 at exit 142). Features: exhibit area, VE testing, seminars all day, free tailgaters flea market, camping, hotel rooms, and amusement park tickets are available. Talk-in: 146.34/94 and 440.5/445.5. Admission: advance \$4, door \$5. Tables: \$40 for the first table, and \$35 for additional tables, indoor flea market tables are \$5. Contact: write to HAMFEST 88, PO Box 88, Des Moines, IA 50301, or contact Jim Zellmer, KA0VSL, tel 515-276-8949.

**Maine (Union)—July 16.** Sponsor: Mid-Coast Amateur Radio Repeater Club and Yankee ARC. Time: 8 AM. Place: Union Fairgrounds. Features: commercial dealers, tailgating, swap tables, lobster dinner, forums, packet, refreshments, camping. Talk-in: 146.385/146.985. Admission: \$2. Contact: Carl Ingerson, N1DXM, PO Box 929, Union, ME 04862, tel 207-785-4948.

**Maryland (West Friendship)—July 31.** Sponsor: Baltimore RA Television Society. Time: Dealer setup July 30 at 2 PM, also July 31 at 6 AM. Place: Howard County Fairgrounds, Rte 144 at Rte 32, adjacent to Interstate I-70. Features: free VE exams

9 AM Sunday. *Admission:* \$4, children under 12 free; no advance tickets. *Tables:* with power \$20 each, or 4 for \$75, with no power \$10, 500 tailgating spaces Sunday morning only \$5 per space, advanced reservations for tables a must, no tables sold after July 20. *Contact:* Mayer Zimmerman, W3GXX, PO Box 5915, Baltimore, MD 21208.

**Mexico (Colima)—July 14-16.** *Sponsor:* The Asociacion de Radio Aficionados de la Republica Mexicana. *Place:* Hotel Maria Isabel. *Features:* Americans are cordially invited and temporary permits for operating in Mexico can be obtained at most border cities. *Contact:* Radio Club Colima, A C, Calle Colon #143, 28950 Villa de Alvarez, Col, Mexico, tel (331) 2-07-05.

**Michigan (Mio)—July 16.** *Sponsor:* Ausable Valley ARC. *Time:* vendors 7 AM, public 8 AM-2 PM. *Place:* Mio-Ausable School, M-72. *Features:* flea market, exams, also The Great Lakes Forestry Expo (July 14-16) within walking distance. *Talk-in:* 144.75/145.35 and 146.52. *Admission:* advance \$2, door \$3. *Tables:* \$2. *Contact:* Gerry, N8GWP, tel 517-848-5996 or Tim, KA8YVW, 517-826-5549.

**Michigan (Petoskey)—July 16.** *Sponsor:* Straits Area Amateur Radio Club. *Time:* 9 AM-1 PM. *Place:* 4H Building on the fairgrounds, 2 blocks west of US 31 and US 131 intersection. *Features:* restaurant, self-contained RV parking on grounds. *Talk-in:* 146.085/685 or 146.52. *Admission:* \$2.50. *Tables* \$3 for 8 ft; splits allowed. *Contact:* Irene, 616-539-8986, or Clark, 616-582-6455.

**Missouri (Washington)—July 17.** *Sponsor:* Zero-Beaters ARC. *Time:* 7 AM-3 PM. *Place:* Bernie H. Hillermann Park (Washington Fairgrounds). *Features:* refreshments, flea market, FCC exams (bring original license and a photocopy), parking \$2. *Talk-in:* 147.84/147.24 and 146.52 simplex. *Admission:* free. *Contact:* Al Lanwermeyer, WB0QBS, 909 Nora St, Washington, MO 63090, tel 239-2972.

**Montana (Essex)—July 15-17.** *Sponsor:* Flathead Valley ARC. *Time:* begins afternoon of the 15th. *Place:* Three Forks Camp Ground—16 miles west of East Glacier on Hwy 2, 10 miles east of Essex. *Features:* QLF contest, QCWA Meeting, swap tables, VE exams, seminars, Sunday breakfast, dealer displays, campground—\$8 full hookup, \$7 no hookup, 50 cents per day if you camp elsewhere. *Talk-in:* 146.10/70 and 146.52. *Admission:* advance \$8, door \$10. *Contact:* Three Forks Camp Ground for camping reservations at PO Box 124, East Glacier, MT 59434, for any further information contact Harry Lovering, WA7PHB, 1370-3 Mile Dr, Kalispell, MT 59901, tel 406-752-8388.

**Nebraska (Anselmo)—July 30-31.** *Sponsor:* Central Nebraska ARC. *Time:* Saturday 9 AM-8:30 PM, Sunday 7 AM-12 noon. *Place:* Victoria Springs State Recreation Area. *Features:* Weiner roast on Saturday, steaks and burgers at noon on Sunday, church services offered on the grounds. *Talk-in:* 146.40/147.00, 147.66/06 and 147.69/09. *Admission:* \$5, children 6-11 \$3. *Contact:* L. D. Dunbar, WA0LWK, HC 69, Box 34, Milburn, NE 68813.

**New Jersey (Augusta)—July 17.** *Sponsor:* Sussex County ARC. *Time:* 8 AM. *Place:* Sussex County Fairgrounds, Plains Rd, off Rte 206. *Features:* refreshments, free parking. *Admission:* \$3. *Tables:* \$7, tailgate space \$5. *Contact:* Don Stickle, K2OX, Weldon Rd, RD 4, Lake Hopatcong, NJ 07849, tel 201-663-0677.

**New Jersey (Ewing)—July 31.** *Sponsor:* East Coast VHF Society. *Time:* 8 AM (flea market, handicap and wheelchair access), 10 AM (antenna measurements 144, 432, 903, 1296 and 2304 MHz). *Place:* Trenton State College. *Features:* free registration and parking. *Talk-in:* 146.07/67 (W2ZQ/R). *Contact:* Russ Pillsbury, K2TXB, RR #7 Oakshade Rd, Tabernacle, NJ 08088 (SASE), tel 609-268-9586.

**New York (Alexander)—July 10.** *Sponsor:* Genesee Radio Amateurs. *Time:* 6 AM-5 PM. *Place:* On Rte 98, 8 miles south of exit 48 (Batavia). *Features:* flea market, nonham programs, exams, \$2 check-in contest, Rag Chewers Area. *Talk-in:* 146.52 simplex, 144.71/145.31. *Admission:* advance \$3, door \$4. *Contact:* David W. Harms, KC2RF, 3378 Pearl St, Batavia, NY 14020, tel 716-343-6770.

**North Carolina (Asheville)—July 31.** *Sponsor:* Western Carolina ARC. *Time:* Setup Saturday 2 PM-7 PM, Sunday 9 AM-4 PM. *Place:* Fireman's Training Center—US 19-23 to NC 63, approx 2

miles, turn right on Old County Home Rd, right on Lees Creek Rd, then right on Erwin Hills Rd. Hamfest will be on the left. *Features:* dealers, flea market, refreshment, fellowship, walk-in exams. *Talk-in:* Mt Pisgah 146.16/76, Mt Spivey 146.31/91. *Admission:* advance \$3.50, door \$4. *Contact:* Phil Haga, KA4CAC, Rte 5, Box 438, Candler, NC 28715, tel (D) 704-258-0190, (E) 704-667-3212.

**North Carolina (Cary)—July 16.** *Sponsor:* Cary ARC. *Time:* 9 AM-3 PM. *Place:* VFW Building, take I-40 exit at #287 (State Park and Cary), go south 1 mile to Reedy Creek Rd, turn left, go 1.7 mile to VFW Building on the left. *Features:* refreshments, tailgating, auction. *Talk-in:* 146.28/88 MHz. *Admission:* free. *Tables:* \$10. *Contact:* Herb Lacey, N4UE, 1022 Medlin Dr, Cary, NC 27511.

**North Dakota (Dunseith)—July 8-10.** *Sponsor:* 25th International Hamfest Committee. *Place:* Peace Garden, located on the International Boundary 13 miles north of Dunseith on Hwy 281. *Features:* VE exams, flea market, transmitter hunts, nonham activities. *Talk-in:* 146.52. *Admission:* \$12 for hams, \$6 for nonhams, children under 12 free. *Contact:* NTARC, Box 2002, Minot, ND 58702.

**Ohio (Bowling Green)—July 10.** *Sponsor:* Wood County ARC. *Time:* 8 AM-4 PM. *Place:* Wood County Fairgrounds. *Features:* refreshments. *Talk-in:* 147.78/18 and 146.52. *Admission:* \$2.50. *Tables:* \$7, trunk sales \$3 per vehicle width. *Contact:* Jim Davis, N8DWR, 10990 Newton Rd, Bowling Green, OH 43402, tel 419-352-1332.

**Ohio (Van Wert)—July 17.** *Sponsor:* Van Wert ARC. *Time:* vendors setup 6 AM, public 8 AM-4 PM. *Place:* Van Wert Country Fairgrounds, Take either US Routes 30, 224, or 127 to Van Wert and follow the signs. *Features:* flea market, technical forums, license exams (all classes need 610 form and fee of \$4.35 by June 17, make checks payable to ARRL/VEC and include SASE), nonham programs, free parking, refreshments. *Talk-in:* 146.25/85. *Admission:* \$3. *Tables:* \$6, trunk sale permits \$4. *Contact:* Van Wert ARC, Box 602, Van Wert, OH 45891 (SASE please), tel (D) 419-495-2209, (N) 419-238-1300 (leave message).

**Ohio (Wellington)—July 16.** *Sponsor:* Northern Ohio ARC. *Time:* 7 AM. *Place:* 23 miles southwest of Cleveland at the Lorain County Fairgrounds, Rtes 58 & 18 in Wellington, 100 miles from Columbus, 45 miles from Akron/Canton area, 90 miles from Toledo. Rte 250 exit from I-71 to Rte 58 N, turn left on Rte 18. *Features:* dealer setup Friday night, dealer exhibits, flea market, nonham activities, FCC exams, refreshments, overnight parking for self-contained campers. *Talk-in:* 146.10/70 and 444.80/449.80. *Admission:* advance \$3, door \$4. *Contact:* John Paul Jones, WA3CAE, 4612 Timberview Dr, Lorain, OH 44053, tel (D) 216-324-3181 or 277-7600, (N) 216-282-4256.

**Pennsylvania (Warrington)—August 7.** *Sponsor:* Mid-Atlantic ARC. *Time:* 8 AM-3 PM, tailgate setup 7 AM (tailgating space \$2). *Place:* Bucks County Drive-In Theatre, Rte 611, 5 miles north of Willow Grove exit #27 off Pennsylvania Tpke. *Features:* refreshments, AMSAT and ARES, exhibits on packet radio. *Talk-in:* 147.66/06 or 146.52. *Admission:* \$3. *Contact:* John Bartholomew, 215-356-7147, or MARC at 203 Second Ave, Broomall, PA 19008.

**Pennsylvania (Wilkes Barre)—July 3.** *Sponsor:* Murgas ARC. *Place:* Ice-A-Rama, Coal St Sports Complex. *Time:* setup 6 AM, public 8 AM. *Features:* free parking, VE exams, outdoor flea market (\$3 per space), refreshments. *Admission:* \$3. *Tables:* indoor table \$7.50 per space in advance, \$9 at door if available. *Contact:* Jim Post, KA3A, 15 Monarch Rd, Wilkes Barre, PA 18702, tel 717-825-3940.

**Texas (Texas City)—July 30.** *Sponsor:* Tidelands ARC. *Time:* 8:30 AM-6 PM. *Place:* Nessler Center, 2010-5th Ave N, 15 miles northeast of Galveston. *Features:* free parking, easy access, commercial dealers, forums, swap tables. *Admission:* advance \$3, door \$4. *Tables:* swap tables \$6. *Contact:* Bill Steeie, WA5WVP, 328 19th Ave N, Texas City, TX 77590, tel 409-948-0308.

**Virginia (Berryville)—August 7.** *Sponsor:* Shenandoah Valley ARC. *Time:* 7 AM-3 PM. *Place:* 2 miles west of Berryville at the Clarke County Ruritan Fairgrounds, Rte 7. *Features:* nonham activities, refreshments, VE exams. *Talk-in:* 146.22/82 and 146.52. *Admission:* \$4, children

under 12 free. *Contact:* SVARC, PO Box 139, Winchester, VA 22601, tel (D) 703-837-2100, (N) 703-869-4878.

**Wyoming (Laramie)—July 9-10.** *Sponsor:* University ARC. *Time:* 8 AM-noon Sunday. *Place:* Southeast corner of the intersection of Interstate 80 and US 287. *Features:* programs, swapfest, dinner & dance Saturday evening \$10, breakfast Sunday, VE exams. *Talk-in:* 146.01/61. *Admission:* advance \$2, door \$3. *Contact:* Holly Crowell, WB7I, 2166 N 17th St, Laramie, WY 82070, tel 307-742-2077.

## Strays

### PRINCIPLE PRINCIPAL

□ Dave Breski, N1EKY, of Osterville, Massachusetts reports his first exposure to Amateur Radio was when, as a sixth grade student in 1961, he went to his elementary school principal's ham shack. The seed was planted. Twenty-two years later, he was tuning around 15 meters when he heard a station from Maine. During the course of their ensuing QSO, they discovered that they were both originally from upstate New York. After more rag chewing, Dave learned that his contact was Neil Balding, now W1IBC, the principal whose shack he had visited as a sixth-grader.

### Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in QST.

Advisory Committee	
Members	May 1988, p 55
Club Contest Rules	Jan 1988, p 86
Considerate Operator's Frequency Guide	Jan 1988, p 13
Constitution Bicentennial WAS	Sep 1987, p 14
Element 2 Question Pool, New and Revised	
Questions, Answers	Apr 1987, p 23
Frequency/Mode	
Allocations	Jan 1988, p 77
Hamfest Calendar Rules	Apr 1988, p 73
Landline BBSs	Oct 1987, p 56
License-Renewal Information	Jan 1988, p 77
Major ARRL Operating Events and Conventions—1988	Jan 1988, p 78
Packet-Radio Frequency Recommendations:	
Below 225 MHz	Sep 1987, p 54
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QSL Bureaus	
Incoming	Jun 1988, p 72
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Reciprocal-Operating Agreements	Mar 1988, p 55
Tech and General Written Exams	Apr 1987, p 29
Third-Party-Traffic Agreements	Apr 1988, p 66
VUCC Annual Listing	Dec 1987, p 68
What is Amateur Radio?	Jun 1988, p 56
220-MHz Band NPRM	Apr 1987, p 16

It is with deep regret that we record the passing of these amateurs:

NIAAF, James A. Fife, Hopewell, NY  
 NIBGN, Leopold E. Caron, Topsham, ME  
 WIBOM, John F. Abt, Wethersfield, CT  
 WIBPY, William H. Conant, East Hartford, CT  
 KAIBXH, Storey M. Jones, Bangor, ME  
 WICCM, Elwood W. Brewster, Grafton, NH  
 N1CLO, Andrew Stefanek, Trumbull, CT  
 W1GAP, Joseph A. Cheffalo, Newport, ME  
 W1GNE, Leonard J. Carter, Arlington, MA  
 KA1HXX, Willard C. Scott, Pittsburg, NH  
 W1MVL, Walter Tedford, Bradford, RI  
 W1NKK, Albert R. Cameron, Jr., Raymond, ME  
 W1NLU, David F. Erickson, Chelmsford, MA  
 WA1TIJ, Harry Warendorf, Jr., Poway, CA  
 K1TVG, Henry J. Bobrowski, Berlin, CT  
 \*K1YPE, William J. Porter, Westport Point, MA  
 KB1ZR, Roland C. Marrotte, Taunton, MA  
 WB2BDH, Alton J. Brooks, Springfield, NJ  
 W2BHQ, Elmer J. Odién, Buffalo, NY  
 W2BMM, John S. Orłowski, Browns Mills, NJ  
 W2BNI, William T. Alexander, Hobe Sound, FL  
 KB2DBV, Leon Pavone, Toms River, NJ  
 KA2DXT, Ira Danzig, Old Bridge, NJ  
 KA2DZU, Frank Plazio, Grand Island, NY  
 \*W2EFM, Lloyd J. Hayney, Sheboygan Falls, WI  
 K2ERV, Gordon Jacobson, Brooklyn, NY  
 KA2GCV, Salvatore A. Cavallaro, Franklinville, NJ  
 W2GT, Andrew Edward Hopper, Rochelle Park, NJ  
 KA2HWB, Charles J. Cona, Rochester, NY  
 W2LPM, John W. Geils, Earlsville, VA  
 \*W2IQZ, Lyle O. Jevons, Sierra Vista, AZ  
 W2KPE, Mitchell Katz, Flushing, NY  
 K2KVC, Patrick J. Rega, Troy, NY  
 K2LEO, Sidney A. Jarvis, Fords, NJ  
 \*K2LH, John B. Yancho, Seaside Park, NJ  
 W2LPP, Frederick V. Sprick, Jr., Clifton, NJ  
 K2OGS, Fred W. Jarris, Yonkers, NY  
 K2ROI, Henry V. La Barba, Sr., Albany, NY  
 K2TCF, Cyril Williams, Brooklyn, NY  
 K2TJ, Erich Schmidt, Hammonton, NJ  
 WA2WRE, Frank M. Pelton, Clarence, NY  
 W2WZR, James V. O'Hern, Nedrow, NY  
 K2YIO, Stan Skawinski, Garfield, NJ  
 W2ZDF, John M. Carroll, Rochelle Park, NJ  
 W3AGK, Theodore V. Olszyski, Philadelphia, PA  
 K3APJ, Francis E. Williams, Temple, PA  
 W3AYO, LeRoy F. Gentner, Reading, PA  
 W3BL, Jerome W. De Walt, Vero Beach, FL  
 WA3IWN, Joseph Krem, Bethlehem, PA  
 W3JEZ, James W. Stratton, Williamsport, PA  
 W3JN, Harry W. Neff, King of Prussia, PA  
 KA3KYE, Charles A. Seesselberg, Shohola, PA  
 K3NVC, Nobuo Sawamura, Philadelphia, PA  
 W3SXD, Lowell W. Williams, York, PA  
 K3YLZ, John A. Soltesz, Kennett Square, PA  
 W4AAA, John M. Propst, Fort Myers, FL  
 K4AGU, Kenneth Matucha, Vero Beach, FL  
 W4AND, Ellis E. Royal, Jr., Jacksonville Beach, FL  
 N4AOS, Clinton A. Gould, Scottsboro, AL  
 W4BHM, Nolen H. Penland, Spartanburg, SC  
 WA4BNX, Robert G. Sweet, Charlotte, NC  
 W4BOH, Wilson Lamb, Winston-Salem, NC  
 \*WB4CGI, Wolcott M. Smith, Vienna, VA  
 K4DOL, A. Franklin Collier, Montgomery, AL  
 W4DYZ, Theron A. Wheelock, Hialeah, FL  
 KE4ED, Earle B. Brown, Lakeland, FL  
 AB4G, John I. Lyndon, Merritt Island, FL  
 K4GOS, Doug Lutz, Palm Harbor, FL  
 WD4HOT, G. C. Miller, Selma, AL  
 K4HPE, William C. Rosewarne, St Petersburg, FL  
 KB4IW, Hilton B. White, Jacksonville, AL  
 K4JBL, Stanley H. Kahn, St Petersburg, FL  
 W4JCK, Charles W. Light, Port Richey, FL  
 N4JKC, Allan H. Kline, Tamarac, FL  
 WD4JSL, Clyde Cates, Miami, FL  
 W4KBX, Harold Shinn, Arlington, VA  
 N4KM, Kingdon G. Widoff, Alexandria, VA  
 K4LPZ, Arthur Kunkel, Summerfield, FL  
 N4LLN, William U. Newby, Midlothian, VA  
 W4MKC, W. Earl Quay, Cape Coral, FL  
 W4NXI, Leo P. Friedman, Fort Lauderdale, FL  
 N4PIF, Douglas L. Deal, Warner Robins, GA  
 K4PVR, Russell D. Carroll, Raleigh, NC  
 \*W4PVW, Donald M. Dasher, Ashburn, GA  
 \*K4RX, Fred D. Armes, Dunnetton, FL  
 K4RZK, John F. Berryman, Hebron, KY  
 WB4SOJ, Edgar E. De Witt, Albany, GA  
 K4TNB, William C. McKinley, Gainesville, FL  
 W4TYC, R. S. White, Jr., Roanoke, VA  
 WA4UDC, James H. O'Brien, Murfreesboro, TN  
 \*K4US, Forest J. Pinkerton, Alexandria, VA

W4VPN, Wilbur L. DeCius, Cross, SC  
 KF4XI, Edwin Alford, Middletown, KY  
 WB4YGP, Albert J. Ross, Greensboro, NC  
 W4YWG, S. C. Stewart, Jr., Winchester, VA  
 KA4ZPB, Joseph Perrine, Winter Haven, FL  
 WB4ZRI, O. L. Woodbury, Virginia Beach, VA  
 K5BZ, Alexander R. Lawrie, Albuquerque, NM  
 WD5DMG, Jeanette L. Freeman, Copperas Cove, TX  
 W5DMQ, Shannar A. Whitsett, Carthage, TX  
 WA5EYZ, Leroy N. Schultz, Jr., Oklahoma City, OK  
 WD5FEO, Dominick J. DeSimone, Broken Arrow, OK  
 N5HDB, Clarence L. Hartzell, Bella Vista, AR  
 WD5IBN, Edward J. Czarnecki, Mountain Home, AR  
 \*N5JJ, David E. Busick, Houston, TX  
 W5JNO, Edward Preston, Dallas, TX  
 W5NV, Peter Szeman, Albuquerque, NM  
 WA5OYS, George R. Zinke, Arcadia, TX  
 WB5QDC, Walter E. Ratcliff, Winston Salem, NC  
 K5RAK, Jimmy T. Marco, Jr., Dallas, TX  
 \*N5UA, Dennis R. Peters, Farmersville, TX  
 K5VWV, Louis W. Seyler, Commerce, TX  
 WA5ZYH, Charles J. Kerbec, Westmont, IL  
 W6AYB, Keith K. Elford, Pacific Palisades, CA  
 W6CDQ, Gustave A. Hanson, Escondido, CA  
 W6OD, Frank J. DeBenedetto, Fresno, CA  
 KB6EAF, Robert L. Thornton, San Diego, CA  
 K6EEC, Chester L. Berg, Fallbrook, CA  
 WB6EHJ, John E. Collins, Jr., Fallbrook, CA  
 W6EXE, Floyd J. Bird, Bend, OR  
 K6EZV, Harold F. Connolly, Shingle Springs, CA  
 WB6FJZ, Samuel Le Bow, Long Beach, CA  
 N6IEC, Philip A. Vargas, San Jose, CA  
 NX6J, David W. Wood, Hemet, CA  
 \*WB6KAR, Donald W. Brinkman, San Jose, CA  
 N6KED, Woodrow H. Mason, Ventura, CA  
 W6KVT, Allen B. Lemmon, Sacramento, CA  
 W6MAB, John A. Stagnaro, La Crescenta, CA  
 W6MFM, Edward H. Thompson, Richmond, CA  
 W6MIV, Robert E. Stiles, Atherton, CA  
 K6MS, Melvin S. Baer, Englewood, CO  
 W6NVO, Edward T. Turner, San Mateo, CA  
 W6NWF, John W. Wentworth, Escondido, CA  
 WA6ROW, Joseph Anthony Sodaro, El Segundo, CA  
 K6TV, Stephen J. Kalder, Los Altos, CA  
 K6VZ, Gilbert G. Thommen, Vista, CA  
 W7AAK, Harold E. Gullstad, Marysville, WA  
 W7AJV, Verlon P. Dutton, Lyle, WA  
 NL7AQ, Gary R. Brown, Ketchikan, AK  
 KB7AXT, Wallace Bruce, Reno, NV  
 N7BQQ, James Martini, Sheridan, WY  
 K7GBZ, Wesley R. Neal, Boise, ID  
 \*W7IXF, Theodore C. Gray, Mount Vernon, WA  
 W7JRI, George Gallow, Springerville, AZ  
 W7KVH, Sylvester J. Murphy, Sun City, AZ  
 \*KL7LK, Lyman M. Klein, Minneapolis, MN  
 \*KL7MF, Harold D. DeVoe, La Mesa, CA  
 K7MMO, Clifford E. Sackerson, Moab, UT  
 W7PA, John F. Porter, Puyallup, WA  
 KC7RA, Robert L. Ward, Oak Harbor, WA  
 K7TWW, Robert L. Pohl, Spokane, WA  
 WB7VBX, William E. Ross, Tacoma, WA  
 WB7WGX, Joseph M. Goquen, Oak Harbor, WA  
 W7WVI, J. R. Stites, Spokane, WA  
 W7YOP, Milton S. Pierce, Wenatchee, WA  
 KB8AJB, Ronald E. Boyd, Steubenville, OH  
 WA8AYW, Frank S. Mayberry, Willow Wood, OH  
 K8CFI, Richard F. Haffey, Painesville, OH  
 W8DVT, Edward A. Beidler, Dublin, OH  
 N8EHB, John A. Vandervoort, Belle, WV  
 N8FCL, Eugene Plas, Elyria, OH  
 KA8FLL, Vernis J. Hasford, Perry, MI  
 W8FSY, Howard M. Laughrey, Ashtabula, OH  
 WD8LXJ, Richard L. Songy, Cincinnati, OH  
 W8MEL, Jerry T. Mersch, Cincinnati, OH  
 K8MKZ, Paul Noel, Steubenville, OH  
 W8NJF, George C. Riehl, Bedford, OH  
 W8SSW, Ralph L. Archbold, Largo, FL  
 KD8WN, Stanley Szed, Parma, OH  
 W9AAE, Edward W. Jacker, Lombard, IL  
 WD9AKN, William J. Koenig, Jr., Needham, IN  
 N9BLV, Henry Teal, Atlanta, IL  
 K9BTO, Charles E. Carder, Fairmount, IN  
 K9DXT, Orlando Pete Cates, Bellevue, IL  
 N9FKK, John Richard Kuntz, Springfield, IL  
 W9GBC, M. Robert Gosnell, Lawrenceville, IL  
 W9IPV, L. H. Sanstrom, Miami, FL  
 W9IQK, Ignatius G. Zender, Richmond, IN  
 KY9J, Tomeo T. Ito, Chicago, IL  
 W9IZV, Doyal J. McVicker, Indianapolis, IN  
 WB9KAB, Adrian J. Bloomberg, Germantown, WI

K9KGS, Fay H. Root, Normal, IL  
 WA9ODE, Thomas F. McCann, Chicago, IL  
 WA9OPT, Theodore A. Werling, Rolling Meadows, IL  
 K9QLB, Kearnie E. Smith, Evansville, IN  
 W9REW, Paul E. Miller, Fort Wayne, IN  
 W9TN, Theodore L. Carnes, Elgin, IL  
 WB9UAO, Robert T. McGregor, Fort Wayne, IN  
 WA9YIG, Carolyn S. Rasbury, Marquette Heights, IL  
 K0AGW, Raymond L. Blain, Atlanta, MI  
 N0APS, William A. Raspiller, Fort Wayne, IN  
 W0AYG, Bill Hudson, Trenton, MO  
 N0BGB, Warren B. Talbot, Minneapolis, MN  
 W0CMQ, William E. Fingland, Sr., Sedalia, MO  
 K0EGG, Sam Katsumoto, Pueblo, CO  
 K0GHD, Harris M. Golden, Des Moines, IA  
 W0GT, G. Lloyd Tucker, Waukegan, IL  
 KB0GZ, James O. White, Anacortes, WA  
 W0HZU, Blaine P. Olson, Minneapolis, MN  
 W0NBE, Joseph P. Eichinger, Lake Wales, FL  
 W0NWW, John A. Kenyon, St Louis, MO  
 WB0OQL, George A. Pearson, Hemphill, TX  
 W0OWP, Ramon S. Walker, Loveland, CO  
 KA0PLI, David Youngblood, Joplin, MO  
 W0PT, Dominic A. Bartol, Jr., Colorado Springs, CO  
 W0RAW, Bertha E. Bland, Independence, MO  
 WB0SNC, John G. O'Neill, Duluth, MN  
 W0SYK, William N. Brown, Jr., Maryland Heights, MO  
 KA0VYZ, Marion C. Ness, Wayzata, MN  
 A0Z, John R. Prosser, Kansas City, MO  
 K0ZFW, Samuel M. Brown, Kansas City, MO  
 OEILO, Walter Flor, Vienna, Austria  
 VK2ZQC, Geoff Campbell, Drummoyne, Australia

\*Life Member, ARRL

**Notes:** All Silent Key reports sent to HQ must include the name, address and call sign of the reporter as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in QST.

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from HQ. Canadian reports should be sent to the CRRL HQ address on page 9.

Many hams have remembered a Silent Key with a memorial contribution to the ARRL Foundation. Should you wish to make a contribution in a friend or relative's memory, you might designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund or for the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation, Inc, 225 Main St, Newington, CT 06111. 

## Strays



I would like to get in touch with...

anyone with a manual, schematic or source address for a Monsanto Model 8530 frequency counter. John Henderson, VE3HFT, 170 Thornton Ave, London, ON N5Y 2Y8, Canada.

anyone with knowledge of an existing net or group interested in playing chess by packet on 14 or 21 MHz. Stephan Mazzoni, F6GNM, 1 Alee de L'Ecureuil, 78180 Montigny Le Bretonneux, France.

# 50 Years Ago

July, 1938

□ Editor Ross Hull speculates on the future of amateur television, suggesting it may eventually be as common as today's voice activity.

□ League representatives K. B. Warner and Paul M. Segal report in detail on results of the Cairo international telecommunications conference. With splendid support from the U.S. delegation, in the face of strong European (and other) pressure for heavy cuts in our frequency privileges, amateur bands are unchanged throughout the Americas. However, outside our region, 7200-7300 kc. will be shared with broadcasting, and the 80-meter band in Europe has been badly mutilated.

□ Frequency drift is a problem in today's receivers—a decrease in frequency with an increase in temperature as the unit heats up. Charles Mayeda hit on the idea of using the expansion of a metal rod (from receiver heat) to change the capacity of a condenser and thus eliminate or reduce the drift problem.

□ League members are being asked their opinions on (1) should the 5-meter band be "stabilized" (by F.C.C. expansion to 60,000 kc. of pertinent rules) and (2) should the 160-meter voice band be expanded 50 kc. to 2050 kc. when the new segment becomes available under the Havana agreement?

□ The new Maxim Memorial Station—WIAW—is nearly completed and this month's cover shows a rear view of several 1-kw. rigs designed for bulletin transmissions. Chief op Hal Bubb is inspecting the units.

□ WIHDQ temporarily abandons v.h.f. pioneering to team with Glenn Browning and produce a simplified all-band all-frequency exciter unit covering everything below 30 Mc.

□ W6AM takes the extended double-zepp design

for his 10-meter beam, adds a reflector, and then mounts the whole thing vertically for ease in rotation.

□ Don was also one of the many amateurs active in supplying emergency communication during the California flood disasters last March, on which Southwestern Division assistant director W6EQM reports in detail.

□ W8QBW, often queried on whether his "QSL 40" design would work on 20 meters, took the basic amateur approach—he tried it! Though power output was (expectedly) a bit less, the unit performed well, especially with the addition of a home-made Faraday screen.

□ Ross Hull is encouraged by new lightweight gear suitable for model aircraft radio control—a gas-filled triode made by Raytheon with special sensitivity in a super-regenerative circuit, and a 2-ounce relay from Sigma, about one-fourth the weight of previous components.

# 25 Years Ago

July, 1963

□ Despite strong opposition from all radio interests, FCC has adopted a schedule of license fees effective the first of next year. For amateurs, the tab will be \$4.00 for new licenses and renewals, and \$2.00 for modifications. The Commission has also made minor changes in our 160-meter privileges to accommodate the needs of the Loran navigational service.

□ On July 1st, the Headquarters offices and laboratory move to Newington, Conn., in a new building constructed in the rear of the WIAW property. The Building Fund drive is nearly 80% complete

□ WIHDQ adopts the VXO principle for his design of a stable but variable frequency-control system for the v.h.f. bands.

□ K2ENN uses transistors in his two-tone test oscillator unit, a gadget which will permit us to adjust a linear for maximum output without flattening, plus an estimate of p.e.p. input.

□ The editor attempts to correct a number of misconceptions about the Board's "incentive licensing" proposal—e.g., that all amateurs will be re-examined, or that General and Conditional classes will be relegated to c.w. only; what capacity we hams have for spreading rumors, especially untrue ones!

□ To permit receiving a weak c.w. signal through the neighboring ham's kilowatt, W4YFA has come up with an "ear-saver" a.g.c. system that goes to work at a preset level below which the manual gain operates normally.

□ What the heck is a "traveling-wave tube"? W6PUB describes this wide-band microwave amplifier, whose principles of operation should be of interest even though the cost is well beyond most of our pocketbooks.

□ W6POP and buddies succeeded in establishing contact over a 118-mile distance on 6,328 Angstroms with 1/8 milliwatt input to a helium-neon laser. A 12-inch telescope was used at the receiving end to gather sufficient transmitted energy to operate the photomultiplier tube.

□ If you want to determine the characteristic impedance of a quarter-wave matching section, the nomograms provided by K1SAW will be mighty helpful.

□ The 4-1000A is one of the few tubes available in surplus at a reasonable price for us as amateurs and is unique in avoiding excessive control-grid dissipation when connected as a triode. K9KLA uses these advantages in his kilowatt grounded-grid linear amplifier.

□ HC1DC, W3GRF, YV5AGD and W4KFC have high claimed scores in the 1963 DX fray. —W/RW (98\*\*1)

# "It Seems to Us..."

(continued from page 9)

semblance of due process has been observed. The only recourse offered to the amateur has been that he "make a reasonable effort to assist all complainants" or that he submit "further information and test results" before the FCC engineer will even reconsider the matter. Well, we're all for cooperating with one's neighbors in helping them resolve RFI problems; but the fact of the matter is, if cooperation was in the cards the matter would never have come to the attention of the Commission in the first place. That usually happens when the neighbor has made up his mind—possibly reinforced by an FCC office having sent him a letter appropriate only for neighbors of illegal CBers—that the way to make the problem go away is for the ham to stop operating. The Commission owes its licensees at least the common courtesy of pointing out to complainants that that simply isn't the case, any more than the way to fix a leaky roof is to pray for a drought. ARRL Counsel Christopher

Inlay has written to the FCC General Counsel, requesting an explanation of the statutory and regulatory basis for the Commission's actions in these cases in view of the fact that its personnel appear to have exceeded their legitimate authority. What further action the League takes will depend upon what sort of answer is received.

If the story simply ended here, it would be bad enough. But there's another, even more disturbing chapter. Section 97.131 of the present FCC Rules describes what the FCC can do in the event of interference from an amateur station to adequately designed broadcast receivers, and to stations operating in other services. In the case of broadcast interference (including television broadcast), limited "quiet hours" may be imposed prohibiting operation on those frequencies where interference is caused. Without notice or fanfare, in the Part 97 Rewrite proposal (PR Docket No. 88-139) those provisions are to be deleted and the following is offered as a substitute: "The FCC may restrict operations as necessary to prevent harmful interference."

The author of the substitute sentence never read, or has forgotten, the Fifth and Fourteenth Amendments.—David Sumner, K1ZZ

# Exam Info

## USE THE RIGHT STUDY MATERIALS

In March, the Question Pool Committee (QPC)<sup>1</sup> released the final Extra Class (Element 4B) pool to all VECs and publishers of Amateur Radio training materials. The new pool goes into effect on November 1, 1988 and will remain in effect for three years.<sup>2</sup> Meanwhile, publishers are preparing their updated study guides for the Extra Class ticket so that the new books will be out in time for the transition.

Manuals that are currently available are intended for use only for Extra Class exams taken on or before October 31, 1988. If you are planning to take your shot at the Extra after the new pool is in use, be very careful that you use the appropriate study guides to help you along. Using outdated guides has cost many candidates their upgrades; don't be one of them!—Jim Clary, WB9IHH, Manager, ARRL/VEC

<sup>1</sup>The QPC is a group of VECs charged with revising and maintaining written element question pools on behalf of all VECs.

<sup>2</sup>The complete revision schedule for all written element pools can be found on page 44, October 1987 QST. (98\*\*1)

# Results, 1987 ARRL 10-Meter Contest

Wow! New rules, sunspots and Novices/Technicians on SSB make 10-meter contesting fun again!

By Billy Lunt, KR1R  
Contest Manager, ARRL

and Mark Gamble, N1FOZ  
Contest Assistant, ARRL

It is apparent that the 10-meter band is on its way back. While tuning across 10 meters during the contest, you were sure to notice a remarkable difference from last year. The band had sprung to life with great openings reported from all parts of the world. The best thing about it is that this is only the beginning of the sunspot cycle. Conditions are only going to improve!

Overall participation in the contest was up considerably. The Contest Branch received a total of 1164 logs for the 1987 10-Meter Contest. This represents an increase of 445 entries over the 1986 contest. Many Novices and Technicians joined in the contest for the first time on SSB for 1987. This great influx in SSB activity from the newcomers shifted the main area of activity to below 28.500 for the first time during any ARRL 10-Meter Contest. Also, there seemed to be more contesters looking for Novice/Technician QSOs on CW than before. In the 1987 contest, entrants were allowed to count multipliers separately on phone and CW for the first time. With this new rule, the overall scores were considerably higher in the 1987 contest. For instance L4D had the highest reported score in 1986 of

214k, and the highest reported score for 1987 was NR5M with 1.2 megs. What a difference in scores!

During this year's contest, the southeast corridor of North America enjoyed some of the most outstanding propagation reported. Many US stations indicated that all they could hear were Florida stations, via back scatter, working the midwest at frantic QSO rates. But Florida was not singled out as having the only propagation; most areas claimed good conditions. The boxes will confirm that good scores were turned in from all points of the compass.

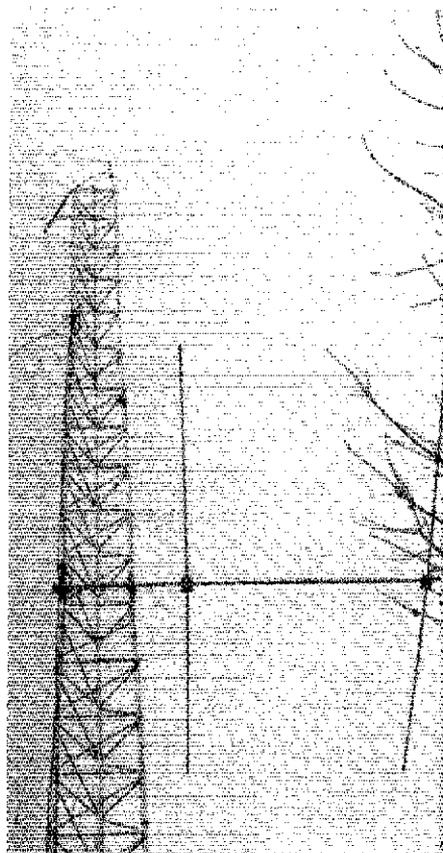
WC4E, leaving all others in the dust this year, operated from the Florida powerhouse station of K4XS. Jeff's mixed mode effort secured over 1-meg points. The top ten showed some new blood in its ranks this year. Mark, AA2Z, and Dave, NU9R (Dave operated at K4VX/Ø), battled it out for second and third place, respectively. Bob, N4BP, after finishing in tenth place on CW in the 1986 contest, tried his hand at mixed mode for this year's contest. His decision paid off with 2000 QSOs and a seventh-place finish. On the DX mixed mode front, HK3MAE finished with a first-place victory as well as coming away with the South America continental leader title. V31MZ (Bob, K1MZB,op) finished second, missing the top spot by only 40k points.

After losing his title to W3LPL in 1986, Chuck, KE5FI, rallied this year with over 2000 QSOs to regain his first place 10-meter phone finish. John, K3KG, just missed first place by 15k for the second-place spot. Reg, VE1BNN, finished with a strong third-place effort to gain six places from last year's standings. Reaching the pinnacle of DX phone operations this year is last year's second-place DX-phone operator, LU3AJW, operating from LU1E. Roberto topped HC2CG's second-place finish by well over 200k points. Roberto also earned the distinction of South American continental leader. Fourth-place finisher and North American continental leader was Dan, TI2OB, who put in a fine effort, amassing 211k points.

In last year's contest, KG5U placed fourth in the multiop category. This year Dale decided to go it alone in the single-op CW category squeaking out a victory over N2AA by 5k points for first place. Rex, K7QQ, moved up five places this year from last year,

for a solid third-place CW finish. In the DX category, in almost a repeat of last year's finale, OA4ZV and VK4XA finished first and second place, respectively. Both participants not only placed in the same order as last year, but they also regained their continental leader status.

The Texas multiop team of NR5M surpassed all others in QSOs and multipliers winning their category with over 1.2 meg points. The crew at WØAIH/9 resecured their second-place spot again this year with 912k points. The Wisconsin threesome are planning to be back next year with more sky aluminum



Oops! What's left of Bruce's, AA5B, antennas after 110 mi/h winds blew the top off!



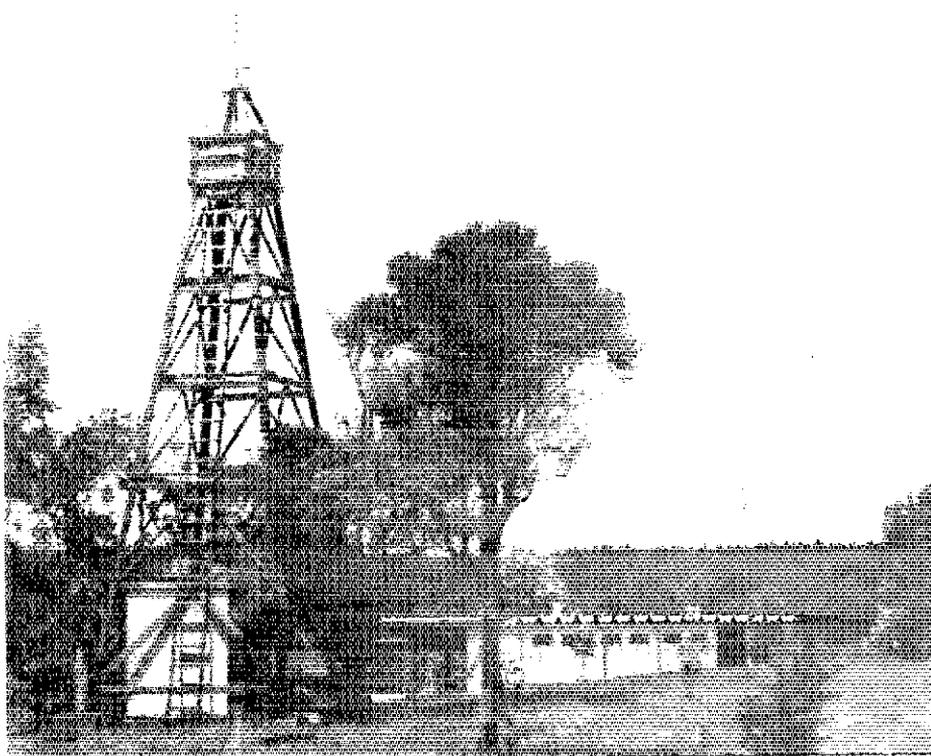
Eddy, KA9OXI, and Harry, N9CQX, operated multiop station VP2MU for a score of over 212k. They placed 4th in the DX Multiop category.

## Top Ten—W/VE

Mixed Mode		CW	
Call	Score	Call	Score
K4XS (WC4E,op)	1,171,296	KG5U	282,820
AA2Z	930,650	N2AA	277,560
K4VX/Ø (NU9R,op)	900,550	K7OQ	264,114
N4ZC (WA8MAZ,op)	828,008	K5WA	260,832
N8II	684,620	K1XA	243,936
K3ZO	649,356	K4MF	234,992
N4BP	598,818	W6HUQ	220,200
WØYK	582,860	N4VZ	211,152
WZ4F	580,742	KSNZ	202,704
K5NW	561,418	WD4AHZ	199,208

Phone		Multioperator	
Call	Score	Call	Score
KE5FI	460,650	NR5M	1,264,290
K3KG	445,784	WØAIH/9	912,632
VE1BNN	405,720	N4EJW	805,494
K3EST	333,776	K7IDX	786,352
N8RA	308,912	W5VX	769,798
N2BJ	295,260	W3USS	685,720
K8II	291,072	N2EOC	560,976
K6LL	282,240	AA8U	548,272
NK1F	278,304	W4WWW	542,360
N1ATO	277,200	KRØB	528,000
A18V	261,450		



The antennas for the winning DX multiop team of ZV9ZZ.

## Top Five—DX

Mixed Mode		CW	
Call	Score	Call	Score
HK3MAE	198,246	ØA4ZV	152,100
V31MZ (K1MZB,op)	156,952	VK4XA	112,344
ZF2KZ	151,272	P43GR	89,676
XE1XIV	107,562	LU1EWL	41,440
CE3BFZ	101,606	VK4TT	32,736

Phone		Multioperator	
Call	Score	Call	Score
LU1E (LU3AJW,op)	529,708	ZV9ZZ	396,720
HC2CG	306,348	LU1VZ	386,588
YW1A (YV1AVO,op)	282,656	KH2F	239,700
CX2AAL	252,284	VP2MU	212,256
TI2OB	211,854	ZF2AG/ZFB	155,260

and a winning strategy. N4EJW put in an excellent multiop effort of 805k points. This twosome from Florida made a dazzling return and finished third, five positions higher than last year's effort. The winner of the DX multiop category was the ZV9ZZ gang. They grappled with LU1VZ for both the win and South American continental leadership.

The advent of a new solar cycle is sure to make next year's contest even bigger and better with more openings to all corners of

the world. Get prepared for the next ARRL 10-Meter Contest, which will be held December 10-11, 1988. See you then!

## SOAPBOX

Very poor propagation for EA9 land (EA9NN). Conditions very poor Sunday morning, but managed to work all 50 states except Washington and Idaho (SL2T). I am 22 years old and have the most active contest station in JA. I hope an award is given to me (JH4UYB). Where there is a will, there is a way. Thank you (JF2KUU). I swear I tried to contact some US stations but the propagation was poor (9V1XE). Tough going in this part of Europe—always more stations to be heard on CW than on SSB (GW4BLE). Band conditions were very poor but nevertheless I still enjoyed the contest (PA3CAL). No condx to Europe on the first day, so I hoped for better condx on Sunday. So what happened Sunday—even worse condx HI HI!! (OX3KD). I heard quite good signals from the USA on the 12th, but they mainly were working each other (they weren't listening to the weaker signals) (VK5BWF). Band conditions were very poor throughout the weekend—but I had fun! (YB3ASQ). Where are the JAs? (KA1MIS). On Saturday the band was a wonderful bottomless

barrel of 9s and 0s (N8RA). It was an interesting, lively contest with the sunspots participating only very reluctantly (W1PL). Due to the new phone privileges there seemed to be a lack of Ns and Ts on CW (KBIU). Great to hear PAØGAM/ST2 for a new one and to hear P43GR (W2GD). High point of contest was working KJØH while running 43 microwatts for 19,965,425 miles/watt (AA2U). A great contest! But being a Murphy his law got me this year! C U in 88 test (NF2C). Amazing what 100 watts and a butterfly beam at 35 feet can do on 10 meters. It was also nice to hear Novice and Technicians get excited about contesting (N2ETJ). Conditions were fair the 12th but much worse on the 13th. Still it was a fun contest! By the way what was AZ8DQ using? What a sig! (N3IK). Twenty watts and a quarter wave vertical didn't do too badly for me. Nicest QSO—the OX3 for a new one on the band from my 3-land retirement QTH (NF3X). What a difference a year and some sunspots make (WA3VPL). Sunday was dead, dead, dead. Had to practically beg for contacts. Picked up just a bit in the last hour and I did hear some meteor pings working WB5DGR. Then at 1900 Sunday my neighbor tells me I'm getting into his stereo. Nice fellow, at least he let me finish the contest (AA4LR). I really had a wonderful time in the contest. I noticed that sometimes the band would be open and sometimes it wouldn't. DX came in great and I was able to work Nigeria; 10 meters is my favorite band (KB4SRR/T). I had fun!!!! (N4ODI). Where were all the Novice/Tech CW ops? (KK4EV). Seems as though the Novices brought out the sunspots—best conditions here in a long time! (AA4NC). Sure was a dead contest!!!! (W4JVN). Fun contest and high SWR. I was probably the weakest signal all weekend (KYSN). Great contest—but I couldn't beg, borrow

## Division Leaders

Division	Mixed Mode	Phone	CW	Multiop
Atlantic	K3ZO	WA3FYJ	W3GN	W3USS
Canada	VE5UF	VE1BNN	VE3KP	VE3UOW
Central	W9XT	KA9TNZ	KB9S	WØAIH/9
Dakota	K1LL	ACØW	KNØV	KRØB
Delta	K4LTA	WE4S	N4TG	N4POV
Great Lakes	KG7C	K8II	K8NZ	AA8U
Hudson	K3EW	N2BJ	N2AA	N2EOC
Midwest	K4VX/Ø (NU9R,op)	KBØPR	KJØH	KYØB
New England	AA2Z	N8RA	K1XA	KB1KA
Northwestern	K7SS	NK7L	K7QO	K7IDX
Pacific	N6NF	K3EST	N6ZB	K6YA
Rocky Mountain	WØYK	N2IC	NC5O	AA5B
Roanoke	N4ZC (WA8MAZ,op)	WD4BTF	K4PQL	K5CTG/4
Southeastern	K4XS (WC4E,op)	K3KG	K4MF	N4EJW
Southwestern	WØ8HEU	K6LL	W7FGT	W6UE
West Gulf	K5NW	KE5FI	KG5U	NR5M

## DX Continental Leaders

Continent	Mixed Mode	Phone	CW	Multiop
Africa	—	5L2T (EL2T,op)	—	—
Asia	JJ2KVV	UL7ACI	JE1CKA	JA1YXP
Europe	FF6KBF	EØ8VQ	DL1HBT	IBØLS
North America	V31MZ (K1MZB,op)	TI2OB	OX3KD	VP2MU
Oceania	K4YT/DU1	ZL1ANJ	VK4XA	KH2F
South America	HK3MAE	LU1E (LU3AJW,op)	ØA4ZV	ZV9ZZ

or steal a Novice or Technician CW QSO (KA5ZCW). This was our first 10-meter contest, hope we did everything right (K5CVD). As usual, some very strange but predictable propagation for this contest. Thanks to the JA opening as well as the many South Americans participating, there were some good mults to be had, but where were the W9s? (WB6HEU). Contest of doom?! Wind storm, lost ac, blew amp!!! (AA6T). We had some outstanding band conditions and I was hoping to cash in on a bunch of N/T contacts on CW but where were the Ns and Ts? They sure would have been popular between 28.100 and 28.200 MHz (WA7HQD). I only had two short openings from Alaska during the contest. At times I was able to hear them, yet they couldn't hear me. I hope for better conditions next year (NL7DU). Really enjoyed the new double multiplier rule for mixed mode. Can't wait till next year (KW8G). Enjoyed the contest tremendously, even though the conditions on Sunday were rotten. I gave four stations there last state! (N5KGY). Poof! Rig blew a fuse—off the air after 1400 GMT on Saturday. Bah!!! (K8KHU). There are quite a few big gun DX sta-



Seen here working a straight key, Steve, KA8VPL finished fourth place mixed mode from Ohio.

tions that make 4 Qs per minute but only give their call once every five minutes. This is very inconsiderate to expect others to wait! Make the call and number the exchange. Everyone gives 599 anyway (N9RD). The band was hot and cold but surprisingly active. It is a great event that keeps getting better every year (W9HE). I've never worked so many countries in this short of time (N0AJM). The Novices and Techs were as rare as DX stations; was it "Hotbeds" or "Cold feet"? Only about eight hours of good band conditions, plus skip, here in Colorado, over the entire weekend (N0FFZ). What happened to all the contacts you're supposed to work on scatter? I only worked one (VE1BNN)—how about the rest of you? (VO1QU). My QSO-per-hour chart tells the sad story of Sunday!! There's always next year (VE5UF).

## FEEDBACK

Please refer to July 1987 QST, page 70, for the following correction to the 1986 10-Meter Contest. In the Iowa section WA0QMV should have been WA0QMU.

## Scores

DX scores are listed by continent and country according to the ARRL DXCC list. US and Canadian scores are listed by call area and ARRL section. Each line score lists call sign, score, QSOs, multipliers and entry class (A = Mixed mode; B = Phone only; C = CW only; D = Multioperator). The /T after a call sign indicates a Technician entry and the /N indicates a Novice entry.

### DX

Continent/Country	Call Sign	Score	QSOs	Multipliers	Entry Class	
Africa	EA6AMT	60,372	387	78-B		
	EA6AMX	40,764	258	79-B		
	EA9NN	10,400	104	50-B		
	5L2T (EL2T,op)	192,024	889	108-B		
	9Q5NW (N4NW,op)	34,408	253	88-B		
	Asia	HL1ABR	120	12	5-B	
		J2KVVW	45,264	344	46-A	
		JR3BOT	21,720	289	30-A	
		JE1SLP	15,012	211	27-A	
		JH8FAJ7	13,988	175	27-A	
JABRWU		13,862	145	33-A		
JH4UYB		11,016	221	18-A		
JH5WHN		7,588	147	18-A		
JH7AJD1		3,048	77	12-A		
JH16YD		2,856	47	16-A		
JA1UGP	2,184	50	13-A			
JR1ZTT (JF7WED,op)	2,180	68	15-A			
JJ2VJJ	1,580	58	10-A			
JA3LWB	1,400	55	10-A			
JR1CLA	584	48	6-A			
JR2IGV	132	10	6-A			
JH2KKW	21,810	313	35-B			
JR1WHW	17,822	309	29-B			
JH5GHM/1	12,272	238	28-B			
JR8BOY	2,610	87	15-B			
JH1UUT	2,160	51	8-B			
JA8QDU	688	43	8-B			
JA1AAT	480	24	10-B			
JR1SRG	480	30	8-B			
JR2KUU	132	11	6-B			
JAYYAB (JJ1NNJ,op)	120	15	4-B			
JJ1CCKA	8	2	2-B			
JE1AER	15,744	164	24-C			
JR7XMD/2	8,560	128	17-C			
JH7XGN	8,480	108	20-C			
JF3KKE	5,040	84	15-C			
JE7BIZ	4,088	72	14-C			
JA1KJ	3,480	58	10-C			
JH1AQU	3,072	64	12-C			
JA6CWJ	2,808	78	9-C			
JQ1CZJ	1,280	64	5-C			
JQ1CZJ	432	27	4-C			
JK1REJ	20	5	1-C			
JJ1YXP (JJ2DLF, JH9CAU, JH0RRR, JH1JQZ,ops)	48,786	353	47-D			
JH1YDT (JK1PV, JH4UTP, JH6UUN,ops)	46,800	363	45-D			
JA1YCL (JH7XMO, JL1s LNC,QOC,ops)	43,710	342	47-D			
JAS3YC (JG3s CPF, WDN, JRSAPQ, JG6VTM,ops)	40,856	358	42-D			
JAB9QU (JE6s UWK, UUV, JF6MND, JG81ZL, JH8 DUE, EDY,ops)	39,800	325	45-D			
JA2YKA (JF2UTL, JG2s MTC, VTD, JI2s UHH, UNR, JK2CZL, JL2KR, JF4LJK,ops)	39,216	340	43-D			
EA7XC	4,320	54	20-C			
EA3MM (EA3CAC, EA3FJM,ops)	22,002	154	57-D			
EA6GP	1,638	29	21-A			
EA6VU	135,250	541	125-B			
EA6WV	5,952	62	48-B			
FF6KBF	65,554	342	73-A			
F6BBO	23,328	180	69-A			
FB1MNC	2,336	57	18-A			
FB1MLJ	924	29	14-A			
F1HWW	2,150	43	25-B			
F6A0J	1,176	42	14-B			
F6EQV	880	22	10-C			
G3VZT	14,732	128	58-B			
G3ESF	4,840	40	29-C			
GM4ELV	2,348	38	23-A			
GW4BLE	38,544	292	66-B			
GW8GT (GW3s KYA, NWS, GW4s JBO, TTU, G5N5F,ops)	45,144	233	76-D			
HA8XX	2,800	56	25-B			
IB8YG	25,010	205	61-B			
IK2ZMO	16,748	158	53-B			
IV3YK	9,592	109	44-A			
I4UFH	4,268	91	24-B			
I2LVN	320	16	10-B			
IQQLS (+18s CZW, MPO, UZA, IK8s DOI, DUB)	79,152	298	102-D			
I3KVV (+13s JSS, MAU, QJZ)	82,400	274	80-D			
LA1VL	468	13	9-C			
LZ1OT	1,044	29	18-B			
LZ2ES	836	22	19-B			
LZ2KTS (LZ2s DF, ILGR,ops)	30,576	170	78-D			
OF1AF	31,960	189	68-A			
OF3GD	180	10	5-A			
OH1NSJ	3,880	45	20-C			
OH6RC	120	6	5-C			
OK1ADS	31,824	175	51-A			
OK1TW	3,872	49	22-A			
OK1KZ	420	15	10-A			
OK3CFA	9,800	100	48-B			
OK1DFP/P	5,832	54	27-C			
ON6AB	7,822	103	37-B			
ON8WN	374	17	11-B			
OZ1DPW	1,088	25	17-A			
OZ5EV	4,410	63	35-B			
OZ1HUE	2,440	40	28-B			
OZ7FE/JDG	4,136	47	22-C			
OZ5UR	196	7	7-C			
OZ9E	120	6	5-C			
OZ3PE	4	1	1-C			
PA3E0B	2,592	36	24-A			
PA3AFF	324	20	6-A			
PA8DUO	10,750	125	43-B			
PA6ZH	5,220	87	30-B			
PASCOR	1,848	44	21-B			
PASCAL	56	7	2-C			
PA2AWU (+PA3s AZT, DVD, ESO, PBOAED)	47,716	215	79-D			
PIADEC (G4YSD, PA3s AWA, CUF, CQR, CZW, EKR, ENO, PA8s AAS, BOE, TUK,ops)	25,192	198	47-D			
PA3EPN (+PA3EBT)	17,664	149	46-D			
SM6CVT	3,220	42	23-A			
SM6LIF	1,536	32	24-B			
SM3EP	330	15	11-B			
SM6LWH	2,800	35	20-C			
SM6TW	1,064	19	14-C			
SP6PZV (SP6ANY,op)	624	15	12-A			
SP6OJ	1,344	32	21-B			
UA6ADC	14,538	158	48-B			
UA3ABT	18	2	2-C			
UB3WA	13,760	128	40-A			
UB4ZWW	912	19	12-C			
UP3BH	4,260	71	30-B			
UQ1GWW	19,780	182	46-A			
Y22EK	6,006	73	33-A			
Y36SG	210	11	7-B			
Y43XE	60	6	5-A			
Y07LD	4,026	61	33-B			
Y03CD	418	16	13-B			
YU3HR	50,480	301	58-A			
YU7SF	2,822	48	19-A			
YU7KM	224	8	7-C			
YU2W (+ops)	54,858	304	64-D			
YU3HR (+YU3BQ)	60,480	301	68-D			
YB2AT/3	1,776	37	12-C			
ZL1ANJ	182,344	991	92-B			
ZL1BWM	178,020	1035	88-B			
South America						
CE3BFZ	101,808	299	101-A			
CE4ETZ	57,448	334	88-B			
CX2AAL	252,284	1089	118-B			
HC2CG	306,348	1563	98-B			
HK3MAE	198,248	606	141-A			
HK7MB	5,888	46	32-C			
LU1E (LU3AJW,op)	529,708	1754	151-B			
LU6FN	84,212	533	79-B			
LU2FYU	76,198	443	86-B			
LU1EWL	41,440	185	56-C			
AY2FFV (LU2FFV,op)	18,252	117	39-C			
LU1VZ (LU1s VJR, VK, VPL, LU2VW, LU9s VAB, VV,ops)	386,588	1500	127-D			
OA4ZV	152,100	503	75-C			
P43GR	89,676	423	53-C			
PP2DD	77,952	464	84-B			
ZV6ZZ (PT9ZZ, PY5CC,ops)	396,720	1305	152-D			
YW1A (YV1AVO,op)	282,656	1606	88-B			
4M3B (YV3BKC,op)	60,298	413	73-B			
YV1CLM	5,698	77	37-B			
YV1C (YV1COP,op)	252	18	7-B			
WVE						
1						
Connecticut						
AA2Z	930,650	2164	175-A			
N1CC	119,800	456	104-A			
K1YRP	90,210	311	93-A			
W1TS	9,042	94	33-A			
KH6CP/T	4,580	67	27-A			
WA3VIL	2,800	48	25-A			
K1KI	484	15	11-A			
N8RA	308,912	1688	82-B			
W1WEF	88,184	711	62-B			
N1ENVT	56,578	416	68-B			
KC8PE	52,736	412	64-B			
N1E0S/T	18,792	174	54-B			
K1NYK	12,420	207	30-B			
W1GK	11,954	143	39-B			
N1ABY	9,128	146	34-B			
K1A0CZ	7,910	113	36-B			
K1M10S/T	5,120	80	32-B			
K1XA	243,936	723	84-C			
N4XR	113,400	348	81-C			
W1BHH	90,032	328	88-C			
W1WH	22,938	121	47-C			
KB1SL	9,178	72	31-C			
N1IL	6,372	58	27-C			
Eastern Massachusetts						
W1PL	143,592	407	93-A			
KA2DJI/N	39,896	197	68-A			
W1FJ	4,268	80	22-A			
W1TUM	2,862	46	27-A			
WA1PLK	1,672	37	22-A			



K6SVL	230,526	1423	81-B	<b>Idaho</b>				W2C/B	272	17	8-B	W900 (WB8RFJ,KAGZOM,N9GZE,ops)	42,568	217	68-D	W9RXJ/B	31,688	233	68-B				
K6BU	73,078	599	61-B	K7NOC	37,164	201	57-A	K8BAJ/Y/N	224	14	8-B					W8KKEK	7,499	104	36-B				
N6KN	30,240	360	42-B	W7QDM	4,144	73	26-A	K5MK	100,772	413	61-C	<b>Indiana</b>				KABTJA	6,666	101	33-B				
W6CN	29,008	259	56-B	W8DYU	19,448	221	44-B	K8MPF	36,120	268	60-C	W9OEH	329,866	1633	101-A	K8TOP/T	6,554	113	29-B				
K6DMN	19,368	192	52-B	K7NK	42,084	239	44-B	K8LJO	20,672	150	34-C	AJBC	91,808	529	76-A	K8VBF	131,736	499	66-C				
W6BND	15,552	102	48-B	W7GHT	18,088	133	34-C	K8BEE/N	20,016	126	36-C	NSACD	67,308	374	71-A	K8WBI (+AF0T,KAG8 YCO,YFN,K8WKF,KJBB,KR8B,N8BKJ)	25,092	151	41-C				
K6ICS	170	17	5-B	W8JCS	16,320	124	30-C	NEB	15,884	105	37-C	N8RD	63,336	259	84-A		528,000	1728	132-D	K8SR (+AB0P)	330,106	1106	119-D
N6GL	26,078	154	41-C	K7KA	5,376	64	21-C	W8WVU	3,808	54	17-C	K8PSG	9,100	79	35-A					N8LS (+N8OS)	84,624	401	86-D
K1EQA	3,686	42	2-C	<b>Montana</b>				K8KQKT	96	6	4-C	KE9FX	750	24	15-A	<b>Missouri</b>				K4VX/B (NU9R,op)	900,550	2059	178-A
W8UE (+AA6FX,N8s,DLU,TR,W8OTU)	357,512	1306	116-D	K8ST	59,040	329	80-A	AA8U (+K8MJZ,K8AEE,K8BUB,K8CEK,N8CC,W8s,BDK,MBB)	548,272	1791	137-D	W8YXZ	173,304	1044	83-B					N8CDH	178,524	1007	87-A
K6GAX (+K8BRCJ)	38,518	279	51-D	W7LR	17,168	129	53-A	W8B8U (+K8BJD,K8BQK,N8FME,W8BRUF)	393,178	1360	119-D	N8BW	117,936	728	81-B					NSBB	27,000	154	60-A
<b>Orange</b>				NV7Y	4,060	82	35-A	W8YU	43,960	266	70-D	K8BC	53,328	404	69-B					W8YZZ	15,936	125	48-A
K86RX/N	164,480	509	80-A	K8ZJ	22,246	267	49-B	NB1Q/T (+K8AZM)	27,568	217	52-D	N8FKQ/T	10,680	130	41-B					K8YNT	2,859	34	23-A
W8GFR	12,180	144	40-A	N7HAZ	4,060	85	48-B	WARQJR (+K8BAKI)	15,138	153	43-D	K9VQK	8,140	110	37-B					W8GPFV/T	14,688	153	48-B
W8GS	55,806	393	71-B	KA7HTC/T	440	22	10-B	<b>Ohio</b>				K8PSR/V	6,080	95	39-B					N8HDL/T	10,062	129	39-B
K86TVK/N	7,360	92	40-B	<b>Nevada</b>				WD8ISK	164,048	846	92-A	W8LUG	4,992	64	39-B					KE8E	6,020	70	43-B
<b>Pacific</b>				ND7M	239,112	1458	82-B	K8AZ	132,472	399	116-A	W8CZG	4,818	73	33-B					W8ZSS	13,736	101	34-C
AH6AZ	130,892	686	86-A	W7AKN	142,428	1003	71-B	N8FU	55,176	278	76-A	K8MNR/T	3,120	65	24-B					KM0L	4,312	49	22-C
AH6FL	50,582	316	48-A	W8RWNH	34,272	357	48-B	W8YGR	29,620	130	71-A	K8ZFG/T	2,448	51	24-B					YK0B (+K00Z,N8s,ACQ,GNH,HIL,ING,W8s,W8s,SCY,VK,W,YM,W85U)	131,040	755	84-D
KH6J	15,844	170	34-A	W7HO	10,496	72	32-C	K8WPL	15,930	166	45-A	K8VJR/T	2,968	19	7-B					NSQ	30,290	133	65-A
KH6JK/T	12,402	190	39-A	<b>Oregon</b>				W8GLF	15,840	135	36-A	N8SL	49,784	328	66-A					<b>Nebraska</b>			
NH6GQ (KH6CDO,op)	80,288	386	104-B	AG7M	394,272	1508	111-A	W8YXI	11,132	156	23-A	K8TJ/T	27,830	203	55-A					KV8I	265,224	786	129-A
K8GSS/KH8	7,306	173	21-B	W7GUR	45,122	217	77-A	W8BMP	10,082	151	26-A	K8SJM/T	22,920	177	60-A					W8OOW	118,448	452	88-A
<b>Santa Barbara</b>				K7KJM	25,536	151	57-A	K8I	261,072	1518	96-B	K8SRU/T	9,384	101	46-A					NZ7S	3,536	60	28-A
W86FV	177,424	575	104-A	K7VIT	29,094	373	39-B	W8YU	29,094	373	39-B	W8WVW	108,928	852	82-B					<b>South Dakota</b>			
K8BNET/T	23,002	168	51-A	K8YSS/N	18,990	211	45-B	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					KILL	400,780	1144	145-A
AA4Q/6	1,890	32	21-A	N7JUR/T	6,300	90	35-B	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					K8BEE	91,512	420	93-A
K06ZM	10,584	126	42-B	W7EMO	270	15	9-B	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					KF6BB	43,524	403	54-B
W86BCN/T	13,658	59	31-B	AD7T	33,284	150	53-C	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					W8BMW/J	35,400	300	59-B
N8QQA/T	2,392	46	26-B	KU7K	23,360	148	40-C	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					W8ACT	32,940	270	61-B
NV6L (+NV6B)	25,488	144	58-D	NZ7O	20,124	114	43-C	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					K8JYO (+K8VY,N8C,W8BQK)	471,852	1750	122-D
<b>Santa Clara Valley</b>				F7ARC	19,040	138	34-C	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					<b>VE</b>			
N6NF	286,330	1227	95-A	KA7FEF	8,760	73	30-C	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					<b>Maritime- Newfoundland</b>			
KI6CG	139,638	948	72-A	K87P	3,108	37	21-C	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VF1BNN	405,720	1610	126-B
N56V	90,812	408	73-A	W7YQA	2,116	31	17-C	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VO1QU	261,120	1536	85-B
W86AUE	29,526	156	57-A	KQ71 (+K7s,JF,RO,KD7LA,N7EPE,NB7W,ND7T)	287,168	748	121-D	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE1DX	36,904	306	52-C
W8RVY	14,816	138	33-A	NK7U (+N7IT)	259,168	1357	91-D	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VO1MP	82,368	312	66-B
W8BHRK	5,270	84	31-A	K7QIC (+K8LDM,K8LQY,K87CDA)	19,136	196	46-D	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					<b>Quebec</b>			
KI6CK	2,484	52	23-A	K87CDA	19,136	196	46-D	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE2RQ	35,836	302	59-B
K86PXP/T	60,732	482	63-B	K87CDA	19,136	196	46-D	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE2DRN	16,872	272	36-B
N8CGE/T	10,412	137	36-B	K87CDA	19,136	196	46-D	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE2EWF	11,088	132	42-B
W8LC	2,450	49	25-B	W7BU (N7XJ,N7JED,NM7Q,ops)	5,508	76	34-D	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE2GDZ	1,679	73	23-B
K86GV	2,420	55	22-B	<b>Utah</b>				W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE2TON	15,800	97	39-C
K6XC	1,368	38	18-B	WE7B	113,900	424	85-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE2CPB	680	16	10-C
N6ZB	69,360	268	60-C	KE7KF	40,174	364	53-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE2LRB	540	15	9-C
W6NA	50,544	240	52-C	N7JLC	4,800	57	32-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					<b>Ontario</b>			
AA8T	13,680	93	36-C	KE7QA	3,900	74	25-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3FGU	114,380	448	95-A
K86FPW	13,056	92	34-C	K7CJ	418	16	11-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3LGE	159,856	963	83-B
N6VT	9,792	72	34-C	WA7HQD	79,200	388	50-C	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3FWQ	113,064	673	84-B
W6VYK	5,720	60	22-C	<b>Washington</b>				W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3XN	107,406	663	81-B
N6VE	2,720	40	17-C	K7SS	492,778	1444	143-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3YU	33,072	318	52-B
K6YA (+K6MA,K6BSA,N6IU,W8s,LJ,ZB,W86W)	155,852	579	84-D	W7QN	24,096	168	48-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3BXY	21,728	194	56-B
<b>San Diego</b>				KY7K	10,560	108	48-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3VET	6,884	88	39-B
W6JOF	219,350	625	107-A	KD7H	5,992	72	26-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3MFL	5,440	85	32-B
K86P/UJ/N	71,280	584	60-B	K7TG	2,475	50	15-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3KPV	380	15	13-B
N8QJMT	6,400	100	32-B	NK7L	57,936	568	51-A	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3KP	118,800	450	56-C
W6JMT	39,304	169	56-C	KA2KRA	41,910	381	55-B	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3NBE	79,000	325	60-C
K6NA	27,180	147	45-C	W87CLU	17,544	172	51-B	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3LUG	48,480	200	60-C
AA6EE	1,456	26	14-C	W7QC	484	22	11-B	W8WVW	108,928	852	82-B	W8WVW	108,928	852	82-B					VE3HX	13,720	98	35-C
K8HA (K6s,OBs,PD,K8UCD,K86TPQ,K86V,W8s,EHR,JXA,QVO,ZBE,W8s,8DY,LLO,W8BQX,ops)	80,090	304	81-D	K7CQ	264,114	919	73-B	W8WVW	108,928</														

# Rules, 1988 ARRL UHF Contest

1) **Object:** To work as many amateur stations in as many  $1^{\circ} \times 2^{\circ}$  grid squares as possible using authorized amateur frequencies above 220 MHz and all authorized modes of emission.

2) **Contest Period:** Begins 1800 UTC Saturday, Aug 6, and ends at 1800 UTC Sunday, Aug 7. Entrants may use as much of this time as they wish.

## 3) Categories

(A) **Single operator:** One person performs all operating and logging functions, as well as equipment and antenna adjustments.

### (1) Multiband.

(2) **Single band:** Single-band entries on 220, 432, 902 and 1296 MHz, and 2.3-GHz-and-up categories will be recognized both in QST score listings and by awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 8 (Awards).

(B) **Multioperator:** Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1000 feet).

4) **Exchange:** Grid-square locator (see Jan 1983 QST, page 49). Example: W1AW in Newington, CT would send "FN31." Exchange of signal report is optional.

## 5) Scoring

(A) **QSO points:** Count three points for each complete 220- or 432-MHz QSO. Count six points for each complete 902- or 1296-MHz QSO. Count 12 points for each 2.3-GHz-or-higher QSO.

(B) **Multiplier:** The total number of different grid squares worked per band. Each  $2^{\circ} \times 1^{\circ}$  grid square counts as one multiplier on each band it is worked.

(C) **Final score:** Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score. Example: W1AW works W3CCX in FN20 on 220, 432 and 1296 MHz. This gives W1AW 12 QSO points (3 + 3 +

6) and also three grid-square multipliers. Final score is 12 QSO points  $\times$  3 multipliers, or 36.

## 6) Miscellaneous

(A) **Stations may be worked for credit only once per band from any given grid square, regardless of mode.** This does not prohibit working a station from more than one grid square with the same call sign. Such a roving station, however, must submit a separate entry for each grid square from which the operation takes place. In this situation, the entrant may opt to waive rule 6(C) and use a single different call sign from each different grid square. Crossband QSOs do not count. Aeronautical mobile contacts do not count.

(B) **Partial QSOs do not count.** Both calls, the full exchange and acknowledgment must be sent and received.

(C) **A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently during the contest period under any other call sign (with the exception of family stations where more than one call is assigned to one location by FCC/DOC).** The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(D) **All equipment and antennas used by entrants must be owned and operated by amateurs.** Use of non-amateur-owned gear is not prohibited, but use of such equipment places the entrant in a separate category, ineligible for awards.

(E) **While no minimum distance is specified for contacts, equipment should be capable of real communications (ie, able to communicate over at least 1 km).**

(F) **Contacts made by retransmitting either or both stations, whether by satellite or terrestrial means, are prohibited.** Frequencies regularly occupied by a repeater in a locality may not be used for contest work, even if the repeater is turned off.

(G) **A station located precisely on a dividing line between grid squares must select**

only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(H) **Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs using coherent radiation on transmission (eg, laser) and employing at least one stage of electronic detection on receive.**

(I) **Marine Mobile (and Maritime) entries will be listed separately as "Marine Mobile" in the score listings and compete separately for awards.**

7) **Reporting:** Entries must be postmarked no later than Sep 7, 1988. Official forms are available for an SASE from ARRL HQ, and all entrants are strongly urged to send early for a set.

## 8) Awards:

### (A) Single operator

(1) **Top single-operator score in each ARRL Division.**

(2) **Top single operator on each band (220, 432, 902, 1296 and 2304-and-up categories) in each ARRL Division where significant effort or competition is evidenced.** (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if K2SMN has the highest single-operator multi-band score in the Atlantic Division and his 432-MHz score is higher than any other Atlantic Division single-op's, he will earn both a certificate for being the single-operator Division leader and an endorsement sticker for 432 MHz.

(B) **Top multioperator score in each ARRL Division where significant effort or competition is evidenced.** Multioperator entries are not eligible for single-band awards.

(C) **Additional certificates, such as for Novices, may be awarded where significant effort or competition is evidenced.**

9) **Disqualifications** See January 1988 QST, page 86. 

## Special Events

(continued from page 94)

and 9-  $\times$  12-in SASE (2 units 1st class postage) to WB7RRZ, 930 Western Hills Blvd, Cheyenne, WY 82009-3323.

**Canton, Ohio:** The Canton ARC will operate W8AL July 25-29, 2200Z-0200Z each day, and July 30-31, 1700Z-2300Z each day, to celebrate the Pro Football Hall of Fame Greatest Weekend. Suggested frequencies: SSB—7.270 14.270; CW—7.060 14.060; RTTY and Novice operation possible. For certificate, send QSL and 9-  $\times$  12-in. SASE with 2 units of First Class postage to Randy Phelps, KD8JN, 1226 Delverne Ave SW, Canton, OH 44710.

**Sioux City, Iowa:** The Sooland ARA will operate N0HTZ July 27-31, 2200Z-0400Z each day, to celebrate River Cade 88. Suggested frequencies: phone—lower 25 kHz of the 40- through 15-meter General bands; CW—14.050. For special QSL, send QSL and SASE to SARA, N0HTZ, RR 1 Box 11, Hollysprings, IA 51026.

**Warren, Michigan:** The Detroit Arsenal US Army Tank-Automotive Command will operate 1400Z-2100Z July 30 during its annual Summer Outing. Suggested frequencies: 7.275 14.325 21.325 28.325 146.55. For certificate, send 8 1/2-  $\times$  11-in

SASE to US Army TACOM, Attn: AMSTA-CG CPT Ifflander, Warren MI 48397-5000.

**Oshkosh, Wisconsin:** The Fox Cities AC will operate W9ZL July 30 at the annual Experimental Aircraft Assn Fly-In and Convention. Suggested frequencies: 7.243 14.293. For certificate, send QSL and large SASE to K9DHR, 264 Evergreen Dr, Kaukauna, WI 54130.

**Reading, Pennsylvania:** The Reading RC will operate W3BN 1400Z-2400Z July 30 to commemorate the 150th anniversary of the first passenger train operated by the Reading Railroad. Suggested frequencies: phone—lower 25 kHz of the 40, 20 and 15-meter General bands; CW—7.035 7.120 14.035 21.035 21.130. For special certificate, send QSL and SASE to W3BN, PO Box 13777, Reading, PA 19612-1377.

**Flint, Michigan:** Amateur Radio and Youth will operate KB8S from 1600Z July 30 until 1600Z July 31 to celebrate the club's 1st anniversary. Suggested frequencies: lower 25 kHz of the General 80- through 15-meter phone bands; all Novice CW bands; 10-meter Novice SSB. For QSL, send QSL and SASE to ARAY, PO Box 512, Mt Morris, MI 48458.

**East Aurora, New York:** The Pioneer Radio Operators Society will operate W2QFC 1400Z-2100Z July 31 in celebration of the 15th Annual Racing Day festivities. Suggested frequencies: 3.935 7.235 14.235. For special QSL, send

SASE to W2QCF, 308 Parkdale Ave, East Aurora, NY 14052-1619.

**Deadline:** The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by Aug 1 to make the Oct issue. Please include the name of the sponsoring organization, the call sign of the special-event station, the city location, dates and times (Z), suggested frequencies and QSL information. Requests for donations will not be published.

**QSLing Special-Event Stations:** To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines.

(1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9-  $\times$  12-in envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order. 

## JULY

1  
Canada Day Contest, Jun QST, p 103.

2-3  
Activity Day Contest, Jun QST, p 103.  
Venezuelan Independence Day Contest, phone, Jun QST, p 103.

6  
West Coast Qualifying Run, 10-35 WPM, at 0400Z Jul 7 (9 PM PDT, Jul 6). W6QWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

9  
WIAW Qualifying Run, 35-10 WPM at 0200Z Jul 10 (10 PM EDT, Jul 9). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Jul 6 listing for more details.

9-10  
IARU HF World Championship, Apr QST, p 96.

10  
ARCI QRP Summer Homebrew Sprint, CW, Jun QST, p 103.

16-17  
CQ World-Wide VHF WPX Contest, Jun QST, p 103.  
AGCW-DL QRP Summer Contest, Jun QST, p 103.

FADCA Packet QSO Party, VHF, sponsored by the Florida Amateur Digital Communications Assn from 0000Z Jul 16 until 2400Z Jul 17 (HF contest, 0000Z Jul 30 until 2400Z Jul 31). Single operator only, except for club stations then only one operator at a time. Operate no more than 36 of the 48 hours. Work FL stations only (FL stations work everyone). Work stations once regardless of band. Exchange name and state/province/country (county for FL stations). Count one point per QSO. Multiply QSO points times total number of FL counties worked (states/provinces/countries for FL stations) for final score. Suggested frequencies: HF—10-80 meters; VHF—144.91-145.09. FL stations must limit first hop to 50 miles unless there is no network entry point closer (exception: DX and simplex on 145.01). No use of BBS or Robot stations. No more than 2 streams at once. Beacons must be limited to transmitting no more than once every 5 minutes. Awards. Send logs before Sep 1 to FADCA, 812 Childers Loop, Brandon, FL 33511.

23  
WIAW Qualifying Run, 10-35 WPM at 2300Z (7 PM EDT) Jul 23. See Jul 9 listing for more details.

30-31  
Venezuelan Independence Day Contest, CW, Jun QST, p 103.  
FADCA Packet QSO Party, HF, see Jul 16-17 listing.

Florida QSO Party, sponsored by the West Palm Beach ARC and the Florida Skip from 1400Z Jul 30 until 2100Z Jul 31. Phone and CW are separate contests. Work stations once per band and mode. No cross band, cross mode or repeater contacts. Work FL stations (FL stations work everyone). Entry Classes: Class A—FL stations operating portable, mobile or using emergency power and using less than 100 W; Class B—all other FL stations; Single operator; Multioperator. Exchange RST and

state/province/country (FL stations, RST and county). Non-FL stations count 2 points per QSO and multiply by the total number of FL counties (67 max) worked. FL stations count 1 point per QSO and multiply by the total of states (max 49), provinces (max 12) and countries (max 27). Class A stations multiply score by 1.5 for final score. Awards. Send separate logs for phone and CW before Sep 3 to Florida QSO Party Contest Committee, PO Box 8104, West Palm Beach, FL 33407.

County Hunters CW Contest, sponsored by the CW County Hunters Net, from 0000Z Jul 30 until 0200 Aug 1. Work stations once per band. Work portables/mobiles again as they change county. Stations on county lines count as one QSO, but multiple multipliers. Exchange serial number, category (P for portables, M for mobiles), signal report, county and state (for US stations), province or country. Suggested frequencies: 3.575 7.055 14.060 21.060 28.060 MHz. Portables and mobiles call CQ below 7.055 and 14.060 MHz, others spread out above those frequencies. Count 1 point for QSOs with fixed stations, 3 points for portables or mobiles. Multiply QSO points by total US counties worked for final score. Mobiles and portables calculate their scores both on a state by state basis and overall for awards. Mail logs by Sep 5 (include a large SASE for results) to Jerry Burkhead, N6QA, 7525 Baltic St, San Diego, CA 92111.

## AUGUST

2  
West Coast Qualifying Run, 10-35 WPM, at 0400Z Aug 3 (9 PM PDT, Aug 2). See Jul 6 listing for more details.

6  
YL/OM Summer SSB Sprint

6-7  
ARRL UHF Contest, p 92, this issue.  
YO DX Contest

Ten-Ten International Net Summer Phone QSO Party, sponsored by the Ten-Ten International Net, from 0000Z Aug 6 until 2400Z Aug 7. Open to all amateurs but only paid-up 10-10 members are eligible for awards. Single operator only. SSB, AM or FM only. Work stations once on 10 meters only. Contacts must be in the phone sub-band. Exchange call, name, state and 10-10 number (if member). Count 2 points for each QSO with a member, count 1 point for each QSO with nonmember. Final score is total QSO points. Awards. Send logs along with cover sheet and dupe sheet before Sep 1 to City of Lights Chapter, c/o Jerry Frieders, W9ZGP, 1501 Mohler Rd, Aurora, IL 60505.

13-14  
European DX Contest, CW, sponsored by the Deutscher ARC, from 1200Z Aug 13 until 2400Z Aug 14. (Phone contest, Sep 10-11; RTTY contest, Nov 12-13). Work stations once per band; 3.5, 7, 14, 21 and 28 MHz only. Entry Classes: Single operator, all band; Single operator, High band (14, 21, 28 MHz only); Multioperator, Single transmitter; SWL. Stations must remain on a band for at least 15 minutes, except for a quick QSY to work new multipliers. Single operators may operate a maximum of 30 hours. The 6 hours of off-time may be taken in one to three periods and must be noted in the log. Non-EU stations work EU only. Exchange signal report and serial number. W/K stations also give state. Count 1 point per QSO and 1 point per QTC (explained below). Multiply by number of EU countries worked per band. European Country list: C31 CT1 CU EA EA6 EI F G GD GI GJ GM GM-Shetland GU GW HA HB HB0 HV H I IS IT JW-Bear JW-Siberian JX LA LX LZ OE OH OH0 OJ0 OK ON OY OZ PA SM SP SV SV5-Rhodes SV9-Crete SY-Athos T7 TA1 TF TK UA-1346 UA2/UZZF UA1-Franz Josef Land UB UC UN/UA1N/UZZIN UO UP UQ UR Y2 YO YU ZA ZB2 1A0 3A 4U1-Geneva

4U1-Vienna 9H1. The multiplier on 3.5 MHz may be multiplied by 4, the multiplier on 7 MHz by 3, and the multiplier on 14-21-28 MHz by 2. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. QTCs may be sent only by non-EU stations to EU stations. A QTC contains the time, call sign and QSO number of the station being reported (eg, 1307/DAIAA/431). A QSO may be reported only once, and not back to the originating station. A maximum of 10 QTCs to the same station is permitted; the same station may be worked several times to complete this quota. Only the original QSO, however, has QSO point value. Keep a uniform list of QTCs sent. For example, QTC 3/7 would indicate that this is the third series of QTCs sent, and that seven QSOs are reported. Awards. List 40 QSOs or QTCs per sheet. Use separate logs for each band. Dupe sheets must be submitted for bands with more than 200 QSOs. Deadlines: CW—Sep 15 (Phone—Oct 15; RTTY—Dec 15). Mail to WAEDC-Committee, PO Box 1328, D-8950 Kaufbeuren, Fed Rep of Germany.

14  
WIAW Qualifying Run, 10-35 WPM, at 0200Z Aug 15 (10 PM EDT, Aug 14). See Jul 9 listing for more details.

QRP ARCI Summer Daze Sprint, sponsored by QRP ARC International, from 2000Z Aug 14 until 2400Z Aug 14. Phone only. Work stations once per band. Exchange signal report, state/province/country and QRP number if member. Non-members send power output. Suggested frequencies: 1.885 3.985 7.285 14.285 21.385 28.385 28.885 50.885. Count 5 points for QSO with ARCI member. Others count 2 points for same continent and 4 points for different continent. Multiply QSO points by states/provinces/countries worked per band by power multiplier (8-10 W output  $\times 2$ ; 6-8 W output  $\times 4$ ; 4-6 W output  $\times 6$ ; 2-4 W output  $\times 8$ ; 0-2 W output  $\times 10$ ). More than 10 W output counts as checklog. If 100% natural power, multiply final score by 2; if 100% battery, by 1.5. Include a description of equipment with entry. Awards. Mail entry before 30 days after end of contest to QRP ARCI Contest Chairman, Red Reynolds, K5VOL, 835 Surryse Rd, Lake Zurich, IL 60047.

20-21  
ARRL 10 GHz Cumulative Contest, Jun QST, p 102.

New Jersey QSO Party, sponsored by the Englewood ARA, from 2000Z Aug 20 until 0700Z Aug 21 and from 1300Z Aug 21 until 0200Z Aug 22. Phone and CW are considered the same contest. Work stations once per band and mode. CW QSOs in the CW subbands only. NJ-to-NJ QSOs allowed. Exchange signal report, serial number and QTH. (county for NJ station, ARRL Section or country for others). Suggested frequencies: CW—1.810 3.535 7.035 7.135 14.035 21.100 28.100 MHz; Phone—3.950 7.235 14.285 21.355 28.400 50-50.5 144-146 MHz. Suggested activity schedule: phone on the even hours; 15 and 10 meters on the odd hours, 1500-2100Z; 160 meters at 0500Z. NJ stations count 1 point per W/VE QSO and 3 points for DX (include KP4, KH6 and KL7). Multiply by the number of ARRL Sections worked (including NNJ and SNJ). Non-NJ stations count 1 point per NJ QSO, and multiply by number of NJ counties (max 21) worked. Awards. Include an SASE for results and mail logs to be received by Sep 17 to EARA, PO Box 528, Englewood, NJ 07631-0528.

27-28  
All Asian DX Contest, CW  
GARTG World-Wide RTTY Contest, part 3

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by August 1 to make the October issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

**Disneyland to Boston:** KX6B will operate mobile during the running of the 6th annual Great American Race from **June 20 until July 4, 1500Z-2300Z** each day, to commemorate the 80th year since the running of the original New York to Paris Great Race. Suggested frequencies: lower 25 kHz of the 40, 20, and 15-meter General phone bands; 10-meter Novice SSB band; some evening operation on the 75-meter phone band; packet—145.010; 2-meter FM repeaters. For QSL, send SASE to Dick Raley, KX6B, 2610 Camloop Dr, San Jose, CA 95130.

**London, Ontario:** The London ARC will operate VE3VRI July 1-3 to celebrate the 105th Anniversary and Reunion of the Royal Canadian Regiment. Operation will be 80- through 10-meter CW and SSB. For commemorative QSL, send SASE to London ARC, Box 82, London, ON N6A 4V3.

**Meriden, Connecticut:** The Meriden ARC will operate WINRG 1400Z-2100Z July 2 during the city's Flag Lighting and Plaque Dedication. Suggested frequencies: SSB—3.925 7.240 14.300 21.300 28.375; CW—3.540 7.040 14.040 21.040 28.040. For special QSL, send SASE to Meriden ARC, 66 Hourigan Dr, Meriden, CT 06450.

**Defiance, Ohio:** The Defiance Co ARC will operate K8VON July 2-3, 1600Z-2200Z each day, in celebration of the Defiance Flowing Rivers Festival. Operation will be 40- through 10-meter phone and CW. For certificate, send 9- × 12-in SASE to DCARC, Box 494, Defiance, OH 43512.

**Chatham, Ontario:** The Chatham Kent ARC will operate VE3CRC July 2-3 in celebration of Chatham's Festival of Nations. Suggested frequencies: phone—3.875 7.240 14.250 21.360 28.340; CW—3.545 3.725 7.045 7.125 14.030 21.090 21.125; FM (VE3KCR)—147.720/120. For certificate, send QSL to Chatham Kent ARC, PO Box 284, Chatham, ON Canada, N7M 5K4.

**Hannibal, Missouri:** The Hannibal ARC will operate W0KEM July 2-3, 1500Z-2100Z each day, in celebration of the National Tom Sawyer Days. Suggested frequencies: 7.240 14.255 21.340 28.400. For certificate, send QSL and 9- × 12-in SASE to Hannibal ARC, W0KEM, PO Box 1522, Hannibal, MO 63401-1522.

**Holyoke, Colorado:** KA0WKG will operate July 2-3, 1500Z-0400Z each day, to celebrate the Holyoke Centennial. Suggested frequencies: phone—3.900 7.250 14.260 21.325 28.350; CW—7.130 21.130; HF packet—14.101; 2-meter packet. For certificate, send QSL and no. 10 SASE to KA0WKG, 217 N Campbell, Holyoke, CO 80734.

**Hoquiam, Washington:** The Grays Harbor ARC will operate W7ZA from 1500Z July 2 until 2400Z July 4 to commemorate the 50th Anniversary of Olympic National Park. Suggested frequencies: lower 25 kHz of the 80- through 15-meter General phone bands; 28.435. For special QSL, send QSL and SASE to Joe Ledesma, KA7AIR, 516 6th St, Hoquiam, WA 98550.

**Moffett Field, California:** The Naval Air Station at Moffett Field in cooperation with NASA Ames Research Center ARC and the Navy Moffett Field ARC will operate K6MF July 2-4, 1600Z-0100Z each day, during the annual NAS Moffett Field Open House. Suggested frequencies: 14.280 21.380. For special QSL, send SASE to AACR, PO Box 73, Moffett Field, CA 94035.

**Lyons Falls, New York:** The Black River Valley ARC will operate under different call signs July 3-4, 1600Z-0200Z each day, at the Lyons Falls Fireman's Field Days. Operation will be the lower portions of the General 80- through 10-meter bands. For QSL, send QSL and SASE to Will Jaacks, NQ2W, RD 2, Box 22, Lowville, NY 13367.

**Cedar Bluffs, Nebraska:** The BSA Troop 155 will operate KA0VEU 1500Z-2300Z July 4 during Celebration Week at Camp Cedars. Suggested frequencies: CW—3.725 7.125 21.125 28.125; SSB—28.325. For colorful QSL, send SASE to Steve Wright, KA0VEU, 929 W Park St, Albion, NE 68620.

**Thompson, Ohio:** KD8FJ will operate July 4, from

1400Z, celebrating the Heritage of Our Country. Operation will be the lower portion of the 80- and 40-meter phone bands and at 28.450. For certificate, send QSL and 8 1/2- × 11-in SASE to KD8FJ, 386 Cedarbrook Dr, Painesville, OH 44077.

**Clarksburg, West Virginia:** The Stonewall Jackson ARA will operate WB8ZVS from 1400Z July 4 until 0100Z July 5 in conjunction with The 2nd Annual American Values Weekend. Operation will be the lower 20 kHz of the 40-meter General phone band. For certificate, send SASE to J. R. Chiado, KA8ZPQ, 289 Magnolia Ave, Clarksburg, WV 26330.

**Staunton, Virginia:** The Valley ARA will operate N4ICT from 1200Z July 4 until 0030Z July 5 in conjunction with the Statler Brothers Happy Birthday USA. Suggested frequencies: phone—3.855 7.280 14.250 28.375. For certificate, send QSL, contact number and 9- × 12-in SASE to Valley ARA, PO Box 666, Staunton, VA 24401.

**Fort Laramie, Wyoming:** The High Plains ARC will operate KB7KU from 0000Z July 4 until 0000Z July 5 at historic Fort Laramie. Suggested frequencies: phone—3.850 7.250 14.250 21.360 28.550; CW—50 kHz up from the lower band edges. For QSL send business-size SASE to KB7KU, 3642 Bighorn, Torrington, WY 82240.

**Peace Gardens, North Dakota and Manitoba:** VE4IHF will operate 1400Z-0200Z July 7-9 and 1400Z-1700Z July 10 to celebrate the 25th anniversary of the International Hamfest. Suggested frequencies: 1.900 3.885 7.230 14.230 21.330 28.330. For award, send QSL and SASE to Dave Snyder, VE4XN, 25 Queens Crescent, Brandon, MB, Canada, R7B 1G1. For QSL, send QSL and SASE to John Swanke, KA0SLI, PO Box 304, Lakota, ND 58344.

**Lake Canton, Oklahoma:** Oklahoma amateurs will conduct their annual "Field Day" exercises July 9-10 beginning 1900Z from the Canton Lake Recreational Area. Listen for WD5HPU, WASLTM and others in the General phone portions of the 40- through 10-meter bands. For commemorative certificate, send QSL and large SASE to Tim Mauldin, WASLTM, Box 19097, Oklahoma City, OK 73144.

**Lanark, Scotland:** The Mid Lanark ARS will operate GB2CVT July 9-10 from Lanark, known as the "Garden of Scotland." For certificate, send SASE to GM3MTH or GM4LDU via *Callbook* address.

**Waynesboro, Virginia:** The Waynesboro Dept of Parks and Recreation will operate K14BR July 9-10, from 1500Z each day. Operation will be in the General portions of all bands. For certificate, send QSL and SASE to K14BR, 2133 Pickett Rd, Waynesboro, VA 22980.

**Venezuela:** The Venezuelan Navy in collaboration with the Venezuelan Radio Club, Club DX and the Assn of Radioaficionados of Venezuela will operate YY5M from 0000Z July 14 until 2400 July 17 in honor of its 165th anniversary. Operation will be SSB, CW and RTTY on 160 through 10 meters. Ask operators about awards. For award, send QSL to Radio Club Venezolano, PO Box 2285, Caracas 1010-A, Venezuela.

**Spiceland, Indiana:** The Henry Co ARC will operate N9WB from 1800Z July 15 until 2300Z July 16 to celebrate Spiceland Freedom Days. Suggested frequencies: 25 kHz up from the bottom of the General 80- through 15-meter bands; 28.400. For commemorative QSL, send large SASE to Henry Co CD Office, 1131 Broad St, New Castle, IN 47362.

**Canisteo, New York:** The Allegany Highlanders ARC will operate W2SAM 1400Z-2200Z July 16 to celebrate the 12th anniversary of the Great Wellsville Balloon Rally. Operation will be in the lower portions of the General 80, 40 and 20-meter SSB bands. For special postcard, send 4 1/2- × 6-in. SASE to John S Babbitt, Square Woods Dr, Canisteo, NY 14823.

**Wapakoneta, Ohio:** The Reservoir ARA will operate K8QYL 1300Z-2000Z July 16 and 1600Z-2000Z July 17 to commemorate the 19th

anniversary of Neil Armstrong's walk on the moon. Operation will be on 40-meter phone, CW, and RTTY and 10-meter SSB. For certificate, send QSL and no. 10 SASE to K8QYL, 1005 Linden Ave, St Marys, OH 45885-1327.

**Port Huron, Michigan:** The Eastern Michigan ARC will operate K8EPV July 16-17, 1400Z-0200Z each day, to commemorate the 63rd Port Huron to Mackinac Island Yacht Race. Suggested frequencies: phone—3.910 7.235 14.235 21.235 28.335; CW—3.710 7.110 10.110 21.110. For beautiful certificate, send QSL and no. 10 SASE to K8EPV, 654 Georgia, Marysville, MI 48040.

**Fairbanks, Alaska:** The Arctic ARC will operate KL7KC July 16-24 to commemorate the discovery of gold near Fairbanks by Felix Pedro. Operation will be both phone and CW in the 40, 20, 15 and 10-meter bands. For commemorative QSL, send SASE to KL7KC, PO Box 81389, Fairbanks, AK 99708-1389.

**Fishers Island Sound, New York:** The Tri-City ARC will operate KA1IB 1300Z-2000Z July 17 from a unique, uninhabited island. Suggested frequencies: lower 20 kHz of the General phone and CW bands; 20 and 40 meters; center of the 40-meter Novice band; 2-meter SSB band. For QSL, send QSL and SASE to Tri-City ARC, Box 686, Groton, CT 06340.

**Paducah, Kentucky:** The Paducah ARA will operate W4NJA July 22 at the annual Paducah Summer Festival. Suggested frequencies: phone—7.250 14.325 21.400 24.950 28.400 50.110 144.200; CW—7.125 14.050. For commemorative certificate, send QSL and SASE to N4FFO, 229 Nickell Hts, Paducah, KY 42003.

**Dawson Springs, Kentucky:** The Dawson Springs ARC will operate KK4UC from 1800Z July 22 until 2400Z July 23 to commemorate the 40th Annual Bar-b-que and Picnic. Suggested frequencies: near the middle of the General phone and CW bands; 10-meter Novice band. For QSL, send SASE to Gabe Purdy, KA4GJK, Rte 3 Box 212, Dawson Springs, KY 42408.

**Davenport, Iowa:** The Davenport RAC will operate W0BXR July 22-30 during the Bix Biederbeck Memorial Jazz Festival. Operations will be 10 kHz up from lower end of the General 80- through 10-meter phone and CW bands. For certificate, send QSL and SASE to Davenport RAC, 2131 Myrtle, Davenport, IA 52804.

**Falls City, Nebraska:** The Falls City ARC will operate K0JKS 1300Z-2300Z July 23 to celebrate the 3rd Annual Hot Air Balloon Extravaganza. Suggested frequencies: 14.285 28.325. For certificate, send to KE0TA, PO Box 463, Falls City, NE 68355.

**Fulton, New York:** The Oswego Co ARES and the Fulton ARC will operate KY2F July 23-24, 1500Z-2300Z each day, from the Oswego County Air Show. Operation will be the lower third of the General 40, 20, 15, 10 and 2-meter bands and Novice portion of 10 meters. For certificate, send large SASE to Fred Swiatlowski, KY2F, PO Box 5227, Oswego, NY 13126.

**Chesapeake Bay, Maryland:** The Laurel ARC will operate W3GFS from 1800Z July 23 until 1800Z July 24 from a small uninhabited island. Suggested frequencies: lower 25 kHz of the 80- through 10-meter General bands; 147.54. For attractive certificate, send QSL and 8 1/2- × 11-in SASE to LARC, PO Box 1436, Laurel, MD 20707.

**Ohio:** W0ANZ and W0BRSW will operate July 24-29, 1700Z-0300Z each day, during the Register's Annual Great Bicycle Ride Across Iowa. Suggested frequencies: 3.916 7.216 14.316 21.316 28.416; local 2-meter repeaters. For special QSL, send SASE to W0BRSW, 3841 Amherst, Des Moines, IA 50313.

**Cheyenne, Wyoming:** The Shy-Wy ARC will operate WC7S July 24-31, 1400Z-0400Z each day, during the 92nd Annual Frontier Days Celebration. Suggested frequencies: 50 kHz from the lower 80- through 10-meter General bands; 10-meter Novice SSB. For certificate, send QSL, contact number,

(continued on page 92)

## The ARRL Field Organization Forum

### ATLANTIC DIVISION

**DELAWARE:** SM, Bob Fogritz, KC3TI—With the middle of the summer upon us, public service events abound in the First State. Delaware's answer to the Olympics will take place this month and the First State Games will involve many amateur radio volunteers. SKYWARN training is going full out thanks to our meteorologist, Marian Peleski. Check out the new Diamond State Net on 14.262 daily between 1500 and 1530 UTC. Say hi to all of your Delaware friends. Don't forget the gala Delaware Hamfest on Sunday August 21st in Georgetown. Be there or be square. Remember to have a safe and happy Field Day as well as July 4th. PSHR: WA3WVY 8K3JL. DTN DTN stns 382 tlc 46 in 21 sessns. DEPN stns 69 tlc 6 in 5 sessns. SEN stns 59 tlc 1 in 4 sessns. Traffic: W3QCQ, B3, KA3GRQ 23, WB3DUG 21, WA3WVY & K3YBW 20, W3FEG 18, K3JL 16, KC3TI 15, KC3FW 2.

**EASTERN PENNSYLVANIA:** SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO. STM, BM: KB3UD. POC: W3XVY. TC: W3FAF. Many thanks for all the Field Day messages. Bulletin Mgr KB3UD and our Official Bulletin Stations provide on-the-air information services covering the important stories of today's Amateur Radio. In addition to information sent from HQ, we distribute "Eastern PA News" bulletins to OBS's and produce a monthly license test calendar bulletin on packet. Here's our present OBS roster: W3PYF, W3AVJ, W3CL, K3EBZ, WA3ENE, WA3PZO (@ WB3JOE PBBS), W3VA, KC3LM, W3TI, KO3B, KO3M, K3CBP, WA3KFT, WA3T5W PBBS, KB3UD PBBS, K3JUJ, K3DSM PABS, KU3V, W3SMF. As you see, we have some packet BBS system operators in the group. On-the-air bulletin stations and PBBS system operators who handle ARRL bulletins can become an OBS by applying either to KB3UD or the SM. ARRL membership is required. We're pleased to add West Branch ARA to our Special Service Club roster. See you at the Murgas ARC hamfest on July 3. Reading RC will commemorate the 150th anniversary of the first passenger train service between Philly and Reading with a special event station on July 30. Warminster ARC plans a special event station Aug. 6-7, celebrating the 100th anniversary of the patenting of the revolving door by a Philadelphian. Some clubs don't realize there is no application fee and no annual dues to be affiliated with ARRL. Big clubs, small ones, specialty groups, general-interest groups—the welcome mat is out. Write to HQ for info about club affiliation. Red Rose Rptr Ass'n's Novice class produced 19 new hams. Great work! The 1987 ARNS newsletter competition ratings give high marks to entries from Reading RC's W3WJC, the Pack Rats' W3CL, and Penn Wireless' K3TX. Holmesburg's new officers are N2FOB, K3RBO, WA3IFY, and KA3DNJ. K3UEI reports that RF Hill ARC's SEPATN is growing as a traffic training net, thanks in large part to "teacher" ORS's W3BUR, W3KAG and N3AZW. ORS' N3CD was featured, with ham-shack photograph, in a Susquehanna Co. newspaper story on Volunteer Week last April. Tnx ORS KU3R for that clipping. The Philadelphia Inquirer reported that some guy claims shoes cause cancer. I knew there was some good reason why I run my station "barefoot." April Traffic: N3AZW 539, N3DWR 249, N3COY 195, N3CD 156, W3JHX 117, AA3B 76, KA3DLY 57, WB8KPE 52, K3WPI 50, W4UQ 45, W3KAG 40, N3EFW 36, KB3UD 36, KD3AO 34, WA3CCKA 22, KA3RGF 21, W3AQN 20, K3TX 18, KU3R 13, W3ADE 12, W3CL 12, W3G3J 12, W3BUR 9, W3HK 1, W3ZID 1. April NETS (QNI/QTC /Sessions): EPA/488/180/61; D8ARES/69/0/4; D3ARES/52/6/4; D6ARES/79/16/8; MARCTN/155/46/13; MARCAES/74/9/4; SEPATN/75/8/8. April PBBS: @ K3RL 191, @ WA7SSO 24, @ AG3F 65, @ WA3TSW 50, @ KB3UD 158.

**MARYLAND-DC:** SM, Philip E. Batty, W3FZY—Thanks to clubs who have submitted their 1988 Annual Club Reports; other clubs are urged to do the same. Many clubs are now active with various projects: e.g., RCARA has a net every Monday on 145.25 MHz at 11:00 AM, and members meet for lunch on Wed. at 11:15 at the Anchor Inn in Wheaton, MD. All are invited. The Columbia ARA has a new antenna for their 147.135 MHz repeater. The MEPN bulletin this month has a lot of good info for traffic handlers. The Foundation for Amateur Radio (FAR), a super-group of 50 Washington area clubs, awards 28 scholarships for the academic year. These are funded by clubs or other ham related organizations. Write to your Director for further information. Very good information about emergency preparedness, useful to everyone, is available in the EC's Handbook, available from ARRL. Also from the League you can buy the new Special Events Communications Manual for \$5.00. It's great for public service operations. And, the SM has information for you about incoming and outgoing QSL Bureaus. WA1QAA just issued an instruction guide for the MCD Model 42 RTTY equipment. Write to Mike for a copy. The VEC program will soon be streamlined; exam materials will be stocked in the field, and forms have been simplified and consolidated. The FAR's Auto-Call magazine and some club bulle give info about upcoming exams. FCC is considering an update of Amateur Radio Rules; e.g., it's proposed to specify only 9 emission types ranging from CW to phone image. The last complete update was in 1951! KN3U continues his masterful job as Sec. N3FKV knows a lot about satellite communications. K3GHH is a new ORS. Ross, K3JSD, runs a Ten Tec Paragon. Jim ex-KC3XS, has passed his Extra exam and is now KN3P. NF3X is the new Washington Co. EC. John, KA3DBN, had great fun working/BV in Taipei. K3INT has a new Kenwood TH-25AT. W3ZNN experiments with packet. WITH THE NETS: NET/MGR QND/QTC/QNI: MSN/KC3Y 30/3/370, PON/WB3BFF 26/21/227, MDD/W3FA 60/216/570 (TOP BRASS W3FA/105, W3QQ/100, K3GHH/70), MEPN/K2EB 31/153/619,

HOCARES/WA1QAA 2/0/19, BCN/N3EGF 4/0/22, MAVEN/W3YVQ 1/0/3, PSHR: N3EGF 94, W3FA 93, KC3Y 79, W3YVQ 77, KJ3E 63, WA3YLO 62, K3GHH 61. Traffic: W3WVI 865 (BPL), KJ3E 340, NB3P 235, N3EGF 119, W3FA 113, K3GHH 98, KC3Y 87, K3NNI 77, W3LDD 62, K3XU 53, NC3V 51, K3ORW 50, NC3Z 47, WA3YLO 47, W3YVQ 44, WA3UZI 42, KK3F 31, WB3BFF 25, K2EB 21, W3FZV 18, W3DOI 16, KT3T 13, N3RO 12, KC3DW 11, WA3GYW 10, WA1QAA 8, N3FUW 8, K3OMN 7, WA2WDT 3, W3ZNN 2. (Mar) NC3Z 20, WB3BJM 24.

**SOUTHERN NEW JERSEY:** SM, Richard Baier, WA2HEB-ASM: N2CER. SEC: K2QJL STM: WB2JVB. ACC: K2IXE. TC: N2BQT. POC: VACANT. SGL: VACANT. BM: WB2JVB. OOC: WA2HEB. ATCS: K2JF, KA2RJA, WB2MNF. VE testing this month: DVRA on July 16th at 12:30 PM. For particulars see May, 1988 QST Section News under SNJ. Thursday, July 21 in Bellmawr. See June, 1988 QST SNJ column for further info. Cape May County ARC on July 23 at 10:00 AM. See April, 1988 QST for all the particulars. I have been in touch with Senator Zimmer's office in the hope of getting the "Scanner Bill" reintroduced. The Senator will bring the bill up again, but only if the NJ Assn. of Police Chiefs doesn't lobby against it, as in the past. I'm in touch with the NJ Chiefs Assn., and it appears what they want is to have a background check done on any person that wants to have a radio capable of receiving the public service bands in their vehicles. This is the same procedure now in effect for police, fire or first aid personnel who want scanners. Getting this bill into law is now very important because some of the new dual bander radios have the capability of RECEIVING police frequencies and just having that capability in your vehicle in our state means you are breaking the law! As this progresses, I will keep you informed. Packeteers, watch for anything entitled, "NJLAW" on your local PBBS. Until next month, 73. Traffic: WA2CUW 84, WA2HEB 6.

**WESTERN NEW YORK:** SM, William W. Thompson, W2MTA—Congrats to ARATS and Explorer Post 204 for filing annual Club Reports. I presume others that I listed in the May QST as being delinquent in filing Affiliated Club Reports have also taken action. Also, there seems to be some confusion as to who writes this Section News for Western New York—it is still done by the Section Manager, W2MTA! Southern District ARES under DEC WA2UFQ held FB SKYWARN meeting in Vestal. Lots of good, solid planning was evident, with more to be done. SEC/N2H also held a planning meeting with four of the five DECs in attendance later in April, FBI!

Net/Name	Mode	QNI-QSP-QND	Net Name	Mode	QNI-QSP-QND
NY RACES	SSB	099-009-04	NYSR	CW	014-004-04
NYSM*	CW	338-228-30	NYSV*	CW	325-165-30
WDNM*	FM	429-120-30	WDNE*	FM	538-184-30
NYPON*	SSB	605-282-30	VHF THIN	FM	043-000-04
NYSPTEN	SSB	497-077-30	BRVSN	FM	325-005-30
Empire SS	CW	343-064-30	JCRACN	FM	248-007-29
Q Net	FM	457-001-30	BLUELINE	FM	—
OCTEN/E*	FM	666-073-30	OCTEN/L*	FM	243-029-30
STAR*	FM	312-077-30	LCARES	FM	038-001-04
TIGARDS	FM	049-004-04	WDNL*	FM	524-115-30
CNNTY*	FM	192-055-30	NYSL*	CW	293-207-30

\*NTS Net. Other ARES nets in Chemung, Cortland, Oneida, Onondaga, Ontario, Oswego, Otsego, Steuben and Tompkins counties, but no report data received. Public Service Honor Roll: N2ABA N2EIA N2EVG WA2FJJ N2FOP W2FR W2GJ NN2H KC2JW W2MTA WB2OWO KA2QOO WA2RBA KA2UBD NJ3V K2YAI KA2ZKM KA2ZNN. April BPL: NJ3V. Appointment: (OES) WB2CZC. Congrats: Syracuse RAGS REVIEW earned "superior" rating from ARNS for having "something for everyone!" BULLETIN SKED: KB2ECI sends info on Sundays 7 PM, 147.21 and 280 link and 440 link; 7:30 PM 147.00, 8 PM 146.91 in the greater Syracuse area. He also does Hints & Kinks Net on 146.91 at about 820 PM. HAMFEST CALENDAR: Batavia 7/10, Finger Lakes 8/20, HAM-O-RAMA Niagara Falls 9/10, Elmira 9/24, RAGS Syracuse 10/14. Traffic Handlers Picnic at Verona August 13 at K2KIR's QTH. Thanks for the earlier hamfests at Oswego, Rochester, Rome and Cortland! REMEMBER, "THE LEAGUE" IS ALL OF US, THE FIELD, THE ELECTED OFFICIALS AND THE STAFF AT NEWINGTON! April Traffic: NJ3V 538, KA2UBD 459, N2EIA 401, WB2OWO 377, WA2FJJ 349, W2MTA 276, N2ABA 163, W2FR 143, KC2JW 137, NN2H 133, KA2DBD 131, KA2ZKM 122, KA2JG 110, WB2LJH 108, KA2QOO 95, WB2QIX 93, WB2RBA 83, K2YAI 72, KA2ZNN 62, N2EVG 60, W2GJ 54, KC3BQ 49, N2FOP 47, W2LVE 32, KB2MB 31, NY2V 29, W2P2S 21, AF2K 16, KE2EA 8, K2BWK 2, KA2TWY 2. Have a great summer!

**WESTERN PENNSYLVANIA:** SM, Otto L. Schuler, K3SMB-SEC: WA3UFN. STM: N3EMD. BM: KC3ET. TC: N3EFN. OOC: K3XV. ACC: AK3J. SGL: KA3OEM. POC: N3DOK. ASM: N3DOK.

Net	QNI	QTC	Ses	kHz	T/D
WPACW	205	127	29	3585	7:00P/D
WPAPTN	340	90	30	3983	6:00P/D
KFN	154	65	21	3983	1:00P/D
PFN	184	30	30	3958	5:00P/D
WPA2MTN	318	66	30	146.28/88	8:00P/D
NWPA2MTN	579	46	28	44.53/45.13	9:00P/D
WPARTTYN	5	2	3	3640	9:00P/D

It is with sorrow I must report the Silent Keys as follows: W3PFD, N6SK (formerly W8PEZ in Pittsburgh). Also, K3HSE, who was our prime mover in the SKYWARN Nets in our area: We miss them, for they will be pounding brass somewhere. New officers for the Horse Shoe Radio Club for 88-89 are: Pres. KA3PHF, Vice Pres. WB3KGN, Treas. WA3VUP, Treas. WB3FYX. Amateur Radio has received many accolades for our ability to handle communications for the race. We had 125

operators at the start and finish lines and at the mile markers, 25 aid stations with an operator at each one. We had operators at the medical tents, at the finish lines and our ops kept track of the patients who families lost track with them. Each one's name and number was put on packet and sent to the main control where the list was open to check. I must congratulate the amateurs who worked for almost a year of meetings to plan our participation. The main part of the marathon was to pick the three who will represent the U.S. in Seoul, Korea in the summer Olympics. I hope this report makes sense. Our mayor just passed away suddenly and our hearts are not too happy. He, through his Public Safety Director, had our assistance offered, and I hope his successor will be helpful. April Traffic: KQ3T 328, N3EMD 318, W3OKN 158, N3FM 118, KC3ET 68, W3NGO 59, KA3OEM 50, KC3YE 44, W3JUL 41, KC3TO 40, WA3DWB 38, W3KUN 32, KD3AC 24, WB3DWL 18, WA3QNT 17, N3CQR 11, KA3ANU 11, W3VI 10, KA3NVZ 7, KA3EGE 6, W3SN 5, W3AHH 4, WA3TFD 4. (Mar.) KQ3T 355, W3OKN 168, W3NGO 55.

### CENTRAL DIVISION

**ILLINOIS:** SM, David E. Lattan, WD9EBQ—SEC: W9QBH. STM: K9CNF. OOC: W9TT. BM: K9EUI. SGL: K9IDQ. POC: N9EWA. ACC: WB9SFT. TC: N9RF. ASM: AA9D. ILLINOIS SECTION NETS.

Net	Freq	Times (Local Illinois)
ISN	3905	1800 Daily
ILN	3690	1830 & 2200 Daily
ITN	3705	1900 Daily
CTN	147.69/09	2100 Daily
ILARES	3905	1630 1ST & 3RD Sundays

Illinois Independent Nets

IEN	3940	0900 Sundays
ILPN	3855	1645 M-F; 0830 Sunday
NCPN	3915	0700 Monday-Saturday
NCPN	7270	1215 Monday-Saturday

Congratulations to Bob, W9LNO, who has just celebrated 50 years in ham radio and reports that he is ready for 50 more! Bob also reports that the Hamfesters RC has a new date and

(continued on page 100)

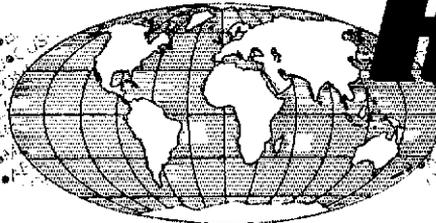
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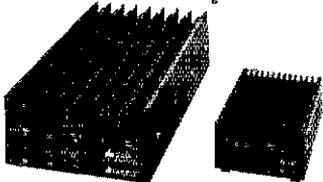


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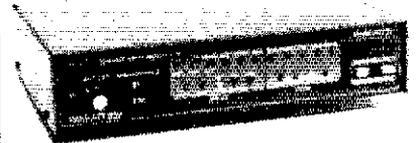
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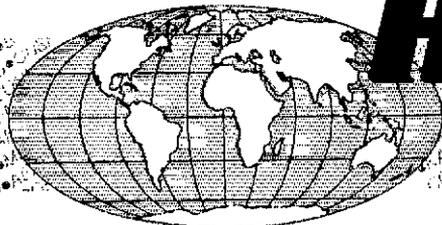
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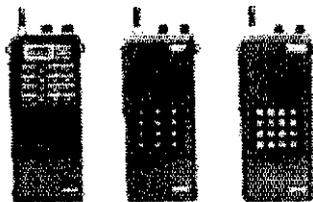
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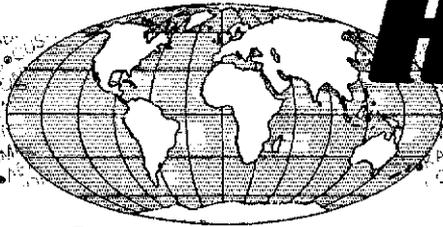
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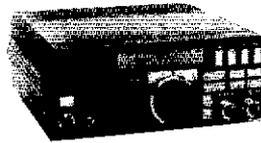
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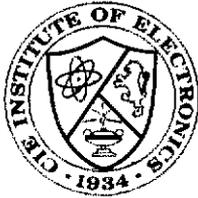
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location for their hamfest which will be at the Will Co. Fairgrounds in Peotone on July 31st. For information and pre-registration for VE exams to be held that date, contact NF9N at 312/448-9432. Thanks this month to Dave, NU9R, president of the Society of Midwest Contesters for the gratis copy of their newsletter "The Black Hole." Members of the Jackson Co. ARES in cooperation with the City of Carbondale ESDA participated in an earthquake preparedness communications and medical services drill held during Earthquake Preparedness week. A sizeable earthquake is long overdue along the New Madrid fault. Such a major disaster will tax all available disaster resources including Amateur Radio to an extent well beyond anything we have experienced in the past. The importance of individual preparedness on the part of amateurs living in or near the New Madrid fault zone in terms of spare equipment and emergency power sources cannot be overemphasized. For more information on the implications of such an earthquake in your specific county, contact your local ESDA coordinator or the Central United States Earthquake Consortium (CUSEC). Traffic: W9HLX 145, K9CNP 128, WA9VLC 114, NN9M 107, K9OEW 95, NC9T 92, W9LWH 44, K9WMP 14, W9RDT 14, W9LQ 12, W9D9ZV 12, KA9CTW/T 11, W9VEY/M 8, WA9RUM 8, N9EDK 6, W9KR 6.

INDIANA: SM, Ron Koczor, K9TUS-ASMS; W9UHM, KD9ER. SEC: WD9AW. STM: W9UJJ. ACC: K9ZBM. TC: K9PS. PIO: KA9LOM. SGL: WA9VCO. BM: N9CJT. NM: JTN KD9DU. QIN K9SJ, ICGN KD9ER, VHF W9PMT, IWN K9ERC.

Net	Freq	Time	Daily UTC	QNI	QTC	QTR	See
ITN	3910	1330Z	2130Z	2760	240	1813	76
QIN	3658	1430Z	0000Z	0300	552	285	1396 86
ICN	3705		2315	135	31	540	28
IWN	3910			1766		364	90
IWN VHF				1197		394	30
VHF NETS				4422	79	4047	198

Appointments: KA9QYK, OO/AA; KA9ERT, OO/AA, N9GKQ, EC Porter County; KA9SHM, District 8 DEC, WA9JWL, OO/AA, OO reports received from KA9FFO, KA9PCT, K9LSB, N9GHT, KA9BYN, WA9VCO, WA9VLC, N9CJT, KA9QYK, KA9DZM, Silent Keys: K9SED, Bedford; W9WVO, Griffith; K9QB, Elkhart; W9YPM, Tennyson; W9BFHA, Wolcottville; W9EOY, Richmond. BPL: W9UJJ, O/O, R/271, S/232, D/1. Welcome to Summer! The cold days of February are just memories and you're all enjoying the sun and visiting the hamfests. I hope you are all planning to attend the 1988 Indiana ARRL Section Convention being held on Saturday, July 9, at the Indy Hamfest. The day will be filled with forums, meetings, ragchewing and fun. The banquet Saturday night will be up to its usual high level. Director Metzger, W9PRN, will be there as will your new SM. Congratulations and welcome aboard to our newest affiliated club, the Calumet Amateur Radio Enthusiasts! Mike, AJ9C, in Lake Station can give you membership info if you're in the area. Our family of affiliated clubs continues to grow, although we haven't added any Special Service Clubs to our ranks lately. The SSC program is still one of the more important programs ARRL has. If you are an officer in one of our affiliated clubs, please remember to get your 1988 report form filled in and mailed to Headquarters. If you lost your form, our ACC, Jim, K9ZBM, can give you a replacement. Hope you survived Field Day! Don't forget to send in your reports to Headquarters. One of the important parts of the activity is knowing who participated. When we sell the emergency capability of ham radio, Field Day statistics are an important yardstick. Welcome aboard, also, to the new appointees listed above. Volunteers are the life blood of ARRL. There's a role for you to play in the Indiana Section. Without you, we can't do a thing! Traffic: W9UJJ 504, K9SJ 251, N9JS 157, KA9FFO 134, KA9LOM 60, NR9K 59, N9HZ 49, K9WVJ 46, W9ZGC 41, KD9ER 37, KA9RNY 37, KA9QMI W9UEM 32, W9PFZ 31, W9D9H 16, W9MDS 10.

WISCONSIN: SM, Richard H. Regent, K9GDF-SEC: W9ZAG. STM: K9TUT. ACC: KA9FOZ. BM: W9BJSW. OOC: NC9G. PIO: K9ZZ. TC: K9ODF. Congratulations to Fox Cities ARC for renewing as a Special Service Club. Our new Section Emergency Coordinator, W9ZAG, was on TV-6 Milwaukee program Gathering Storms explaining how hams spot and report severe weather; W9SMM mobile voice was heard as a weather reporting operator. Badger Emergency Net trying 7.283 kHz until about September. Priest from Poland, who recently moved to Wisconsin and was looking for ham equipment, is happy to get licensed with call KB9AID and find rig, AG9V, our State Government Liaison, has moved out of Wisconsin; anyone interested in handling the SGL appointment duties? K9PHI, President of the 35 member Juneau Snow Marauders, has light duty during the summer. New Official Observer AC9J, July 1st is the start of my fifth year as Section Manager, thanks for all of your help and support. Happy Fourth of July, 9th, South Milwaukee ARC Swapfest, 7:00 AM at American Legion Post, Shepard Ave. north of Ryan Road, Oak Creek, walk-in license exams. Eau Claire Hamfest also July 9th. Don't forget the Milwaukee Circus Parade this year with Amateur Radio Communicators, July 17th. Sorry to report Silent Keys K9JGT and KA9AFB. As a reminder, your Field Day entry must be postmarked July 30th. N9AW with Garage Door Opener Radio Frequency Interference (GDO RFI) qualifies for 20-meter Worked All Garage Doors in his neighborhood. Traffic: W9YPPY 1937, KA9RII 500, W9CBE 306, K9GDF 238, W9YCV 218, KA9BHL 132, W9IEM 118, WA9WYS 111, N9BLL 90, WD9ID 102, W9XCX 85, AG9G 83, KA9KZL 79, K9AKG 71, K9EP 71, K9FHI 64, W9DND 62, W9UCL 59, W9BICH 40, K9UTC 40, W99NRK 35, N9BCX 34, K9GB 31, WD9JID 29, NS9Q 29, W9ODV 26, W9UW 20, W9BJSW 12, K9BED 11, K9LJU 9, W9PVD 8, N9BYS 7, KA9FVX 2.

### DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KC0T—We are well into the season of busted schedules resulting from severe weather. QRN, QSB, power outages and so forth. And, things can get hectic. I just now shut down due to an electrical storm accompanied by a tornado watch. Close hits, etc. were causing the rigs to do funny things so I "pulled the plug" before I got into trouble. On the other hand, how good can it get sometimes? ie: a check-in to the Minnesota Net from a Yankton, SD station operating mobile from his John Deere Tractor! Yes gang, there will be another MSN Newsletter with the publication date uncertain... but there will be one. And I would appreciate input from you if you have something to share or publish in this column. Drop me a note, card or whatever—we would appreciate that. With pleasure, we announce

the Amateur of the Month of April as Jerry Fraser, W0WVO, Marine on St. Croix. Congratulations, Jerry, and keep up the good work! Last month's recipient, Jack, W0UCE, got so carried away with his award that he threw his back out of whack, and is now going through a slow and painful recovery process. And I understand that Wid, W9DM, is slowly getting the better of his health problems too. Best wishes to both W0UCE and W9DM for speedy recoveries. These two stalwarts have left a big hole in the scheme of things. We miss both Wid and Jack! George, KC0T, sent me a copy of the Minnesota Section News Letter that dates back to nearly 21 years ago. That Newsletter was published by WA0MMV, Clarence Ritari of Vermdale. The call signs and names have had a big turnover as you might suspect, but interestingly, the problems seem to still be the same. That's it for this time, CU and 73. Jim Swisher, KA2EPY, STM.

MN EMERGENCY FREQ 3860 kHz BULLETINS 3860 kHz.

Net	Time	Freq	QNI/QTC/See	Net Mgr
MSN/1	6:30 PM	3685	295/128/30	W0UCE
MSN/2	10:00 PM	3685	278/56/30	KD0NH
MSNN	6:00 PM	3710	263/27/30	KA5SBY
MSPN/N	12:05 PM	3190	319/161/30	W0BWN
MSPN/E	5:30	3860	729/167/30	KC0T
MNAMXXNT	8:00 PM	3860	230/22/124	K0CGI

Traffic: W0BWN/J 627, KA2EPY 357, K79J 354, WA0TFC 321, W0GRW 144, N0PFO 101, KA5SBY 59, KA0APP 55, N0JP 54, K0OQI 52, KC0T 51, W0DGFU 41, K0QBE 39, KD0NH 38, KA034, W0KYV 26, W0TIV 24, KD0C1 24, W9DM 11, N0HWD 11.

NORTH DAKOTA: SM, Bill Kurtti, W0CMA—Peace Garden Hamfest, July 8-10, with VE4IHF as the official Hamfest Station will be active under the supervision of KA0SLI from the 7-10. Lots of fun for everyone, campsites with power and water on the grounds. Grand Forks Hamfest Oct. 15. Fargo had a very successful hamfest with 221 registered. Upgrades KA0BO, KA0QY, KA0ZZE, KA0AGJ, K0B6FD, K0B6LZ, K0B6UC, K0B6AW. General KA0T7B, KA0W7X, KA0ZQO, K0BAIH, K0B7IB. Advanced KA0UEH, K0B6BLV Extra, K0B6AMF, KE0SE, W0DBEE. Winners in the ND QSO Party 1st NSQO, 2nd K0E8, 3rd K0GFX Congratulations. W0DDAJ is working on a ND Centennial QSL card that will be used by stations operating in ND Centennial projects. Traffic: KA2FSM 38.

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Goose River	1.9 MHz	9 AM Sun	4/110/7	W8CDO
Wx Nets	3885 kHz	9 AM 12-30, 5:00 PM Da	60/493/35	W8GFE
Data	3885 kHz	8:30 Da	27/560/18	KA0FSM

North 40 146.64 Killedeer repeater 0300 Z SunNS0H  
Storm Net 3885 kHz as needed during storms W0CMB

SOUTH DAKOTA: SM, R. L. Cory, W0BMB-ASST SM: N0ABE, WA0FPR. SEC: KA0PKY. STM: KD0YL. On May 2nd, I had the honor of going to Aberdeen to meet with the HUB City ARC and present them with their certificate of Club Affiliation with the ARRL and again my Congratulations to them on their affiliation. W0SIR, Dick Niesch, the frequency coordinator for our state needs some financial help for postage to carry on this work. He has paid it all himself over the past years, but postage increases are making it difficult. Repeater clubs are asked to send him \$5.00 to cover costs. Moberide ARC will soon be starting a 2-meter net as part of ARES in addition to the Walworth County Emergency CW net on 80 meters. Many hams are in the field for spring work so activity has dropped off some. QCWA Chapter 102 meeting is planned for the Rapid City Hamfest. Traffic: ND0PF 846, K0E8M 203, K0AIE 109, KA0PKY 103, KD0YL 57, W0MZI 46, W0DOMF 31, W0YMB 8.

### DELTA DIVISION

ARKANSAS: SM, Dale Temple, W5RXU—ARRL information available on 3.887.5 at 5:30 local time Sunday afternoons. ASM: Rick Roderick, K5UR. SEC: John Barnett, NS5PU. STM: Don Weatherford, W9OIC. ACC: Dora Anna Graziani, N1SD. SGL: Jim Shaver, W5LCI. TC: Elmer Wingfield, W5FD. OOC: Bruce Vaughan, NR5Q. BM: Elmo Gibbs, W5LL. PIO: Nelson Bailey, K5TML. Repeater Coord: Rick Mobley, W5FDP. The above and numerous ECs, ORS, OBS, etc. make up the ARRL Field Organization in the Arkansas Section. In future Section News, we will list others in the Ark. ARRL family for their appreciated service. If you are interested in serving, let me know. The Malvern repeater was deeply involved in the tornado in Arkadelphia, May 8. WASSJJ and K5TML stood out for their efforts.

LOUISIANA: SM, John "Wondy" Wndergem, K5KR—ASM: K5BCX. SEC: NS5AD. ACC: K5DPG. SGL: KD5SL. TC: W5RWF. OOC: K5KOK. Packet: N5E5. Delta DX Association election for 88-89: Pres: "Wondy", K5KIR. V.Pres: Jim-WASHOD. Sec: John-K5VE. Treas: Chuck-NS5GP. The recently published 1988 ARRL Net Directory contains over four times the La. listings compared to the previous year. It's a helpful reference for La. Hams. I have the FSD-85 Net Registration cards to list your local or area net. The Central La. ARC monthly publication called The Brass Key captures the well done again this year for layout and content. The Vicksburg ARC Newsletter (Mississippi) which has several La. members was also at the top. Also regularly received are: Southeast La. ARC, "The SELARC Hamster," Jefferson ARC, "The Jefferson Report," Acadiana ARC, "The LARC," Iberville Repeater Assoc., "Plaqueminne Plaudit," Radio Amateur Service Club, "Leading Edge," Baton Rouge QCWA Chapter 109, "Newsletter," I appreciate being on the mailing lists and keeping up with what is happening. Again, many thanks to the traffic experts for their tireless and dedicated work. Traffic: DRN-5 for Apr. 688 msg in 60 sessions. 87% by K5WOD, W5WBZ, K5F5V, WA5TKA, KA5PQL, N5LZ and W5JVP. 73 de "Wondy"—K5KR.

MISSISSIPPI: SM, Jim Davis, K5ZS—ASM: W5TRD. SEC: KA4PKA. SGL: KA5WRX. PIO: WNSM. STM: K5W5. BM: W5EPW. TC: K5F5E. OOC: K5K5. ACC: NC5Y. VHF/UHF Coord: NS5DWJ. Packet Mgr, WA5DVB. Laurel ARC planning great Field Day. W5BWN now SK. We will miss you, Tom. DRN5 (W5YDD) Sess 60, QTC 888, Miss rep 97% by N5AMK, K5T5, W5HKW, K5W5, N5HGN, and K5E5C. ARRL Info Net (K5Z5) Sess 4, QNI 30. Miss Slo Net (W5YRX) Sess 18, QNI 51, QTC 5. MTN (W5YRX) Sess 30, QNI 170, QTC 70. Mag Sec Net (W5YRX) Sess 30, QNI 475, QTC 10. GC5BN (W5JXT) Sess 30, QNI 1136, QTC 20. M5GN (K5F5E) Sess 30, QNI 1903, QTC 44. Reg ARRL Bulletins, 12. Propo F Casts 4, CRRL bulletins 1 (Txn to W5EPW, BM Miss ARRL

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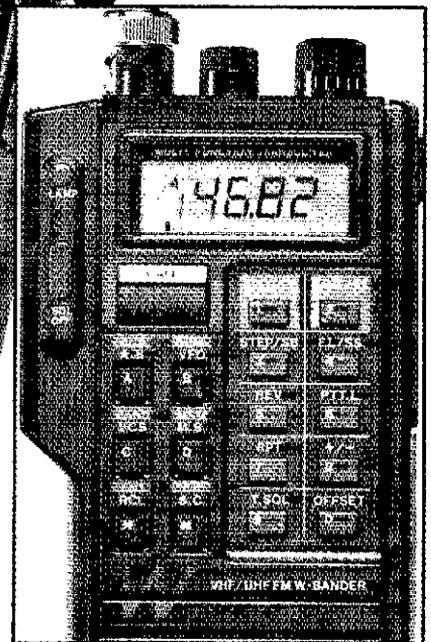
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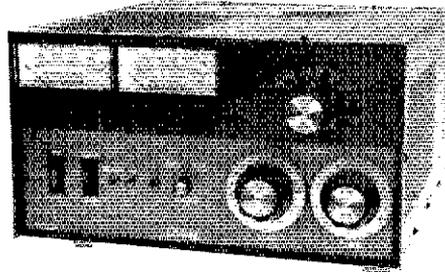
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Lauderdale ARES (KA5VLV) Sess, QNI 10, QTC 1, 1 wx alert from NWS and one drill. Neshoba County ARES (N5EPP) Sess 4, QNI 57, Coast ARES (N5LKT) Sess 4, QNI 101. Traffic: N5AMK, R 154, 169 D-1, total 344. W5JDF, 0 2, S 40, R 38, total 80. KT5Z, S-47, R-38, D-2, total 87. KB5W, 0 3, R 148, S 202, D 5, total 358.

TENNESSEE: SM, Harry Simpson, W4MI—The ASMs were busy during the past month, W4GLS went to the Clarksville Hamfest, W4TYU made Oak Ridge, W4CXY went to Columbia with me. Reports were that everyone had a good time. I know that I did. About 20 of us got together for an impromptu dinner in Columbia on Saturday evening, and that was fun. I suppose the "getting together" is the best part of ham radio. The three Assistant Section Manager appointments turns out to be a good thing, since it allows shorter trips to area hamfests. As an example, W4TYU attended the Oak Ridge Hamfest with just over fifty miles round-trip. If I had gone, eight hundred miles would have been involved. New subject: I am a little bit disappointed at the lack of monthly reports. On one net alone, there was an average of 75 check-ins each day. Reports to me are usually in the teens. It's no trouble—you don't even need a stamp, I am always there to take your message—so how about let's make a record this month? Let's try for 20 reports! Thanks to W4TYU for his fine report on Oak Ridge, to NG4J for her continuing Net Reports, to W4PFP, K4CXY, W4SGI, W4AMCZ and others for their letters. They are all studied and appreciated. SEC K4UVH needs more ECs and DEC's. Why not volunteer to be an EC in your area? Let him hear from you! BM W4SGI needs more Official Bulletin Stations, in order to cover the state quickly. He would appreciate some volunteers. The same thing applies to OOC K4LSP and TC W4HHK. If you can do something good for the order, please volunteer. You will be welcomed! It is with deep regret that I mention the passing of former SEC, Lee Lawrence, W4GZQ, of Bradyville. Lee served us long and well, and will be sorely missed. Traffic: W44FMR 125, K4WVW 58, W4TYV 42, KA5KDB 29, W4MI 25, W4PFP 20, N4OZB 10, W4PSN 10, W4GZZ 5, K14V 8.

### GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, WM4T—April: SEC: WB4NHO. STM: KA4MTX. PIO: WA4SWF. Hope all of you made the annual trip to Dayton! See you at the Ham-O-Rama on June 12th! Other hamfests include August (Georgetown) and September (Louisville). KA4MIC has been appointed as DEC for District 11 (Corbin area). Plans are being made to hold a meeting at the Louisville hamfest to discuss the packet network and also repeater coordination. Time and date will be announced soon. Hope you can come and share your ideas with us!

Net	QNI	QTC	Sess	MGR
MKPN	1318	110	30	WD4RWU
KTN	651	64	30	WB4LBG
KYN	337	126	60	K4AVX/K28Q
KNTN	260	78	39	WA4EBN
TSTMN	651	64	30	K230
SEKEN	105	2	8	K4AVX
7 ARES	83	5	5	WD4PBF
WTEN	38	18	5	KA4MTX
NKEN	81	8	4	W8II0

Traffic: K4VHF 171, WD4RWU 88, K14QH 63, KA4MTX 56, WA4EBN 48, K4AVX 33, N4GNL 30, K4HOE 27, KB4UJA 17, WA4SWF 12, WA4NOG 10, WD4CQF 7, WB4JUN 6, PSHR: K14QH 90, KA4MTX 88, N4GNL 66, K4AVX 62.

MICHIGAN: SM, George E. Pace, W8BGGY—ASM: WA1LRL. STM: WD8KQC. SEC: N8AYQ. SGL: N8CNY. TC: W8YZ. OOC: WA2AJQ. Silent Key, with deep regret, W8CUS. I am pleased to announce the appointment of Jim Hundley, N8AYQ, as MI SEC. Jim has provided excellent leadership in MI ARES as EC of Grand Traverse Co. and Grand Traverse DEC. Jim was recently appointed as MI District 7 ARES/RACES Manager. During the past years, as your SEC, I have appointed 45 ECs and 7 DEC's. ARES and RACES now are a combined program with DEC/RACES Managers in all 7 state districts. Working with our STM, the MI NTS and ARES are blending into a state-wide ARPSC program. Our 1987 SET was a fine example of the total cooperation of these dedicated MI Amateurs. My personal thanks to all of you, who made my job as SEC a challenging and rewarding experience. I ask each of you to give Jim the support necessary to fill his new position as MI SEC. By now, most of you have seen the proposed FCC Part 97 rewrite. I urge each of you to read carefully the proposed document, and make note of any areas that you feel may be a problem. Comments on this Docket, PR 88-139, must be filed with the FCC by August 31. Please let me know of any areas that you feel need further clarification or changes, well ahead of this date. Welcome to a new Club, the Crawford-Roscommon ARC. The Officers are: Pres-K8BLR, VP-W8BCUP, Treas-N8AHZ, Sec-N8MBL, Activities-N8JEM. Editor of their "News Log" publication is N8IJJ. Their repeater is near Higgins Lake on 145.49/89. A recent APOC regional conference was held in Muskegon. District 6 DEC, Hank, W8GVK, setup an ARES/RACES booth. 25 hams from Alaska to Washington signed in. APOC Officials commented that this is the first time ARES/RACES has been seen at one of these conferences. What a great way to bring ARES/RACES out of the closet and present it to the people who work with it on the official level. Great idea, Hank! We need more of this exposure to Public Officials. Please support the following MI area Nets:

Net	Freq	Time/Day	QNI	QSP	Sess	MGR
UPN*	3921	5:00PM Dy	1045	53	34	W8DBH
MACS*	3853	11:00AM M-Sa	387	72	29	K8OCP
MITN	3853	7:00PM Dy	634	177	30	W8EIB
GMN*	3863	8:00PM Dy	855	146	90	W8BR
SEMNT	148.33	10:15PM Dy	358	38	30	N8HSC
GLETN	3832	9:00PM Dy	848	52	30	K8EIZ
WSSBN	3835	7:00PM Dy	622	37	30	W8NDI

\*GMN Fast-6:30 PM Dy; GMN Late 10:00 PM Dy.; MACS-1PM Sun.; UPN-12PM Sun. April traffic as follows: KA8CPS 327, N8HHH 224, WD8KQC 142, N8FTY 84, W8BR 65, N8FPN 57, N8DSW 52, W8DBH 49, W8YIQ 46, K8HAP 39, K8LUP 35, W8BSYA 30, W8BGGY 29, W8EOI 28, K8OCP 25, W8IHX 23, N8CNY 21, N8W8M 21, WD8MJB 20, K18Q 20, W8RNO 18, K8BLZ 19, N8Y8W 19, W8URM 18, W8VIZ 16, W8EIB 14, K8C8U 11, K8RDN 9, W8BEZ 8, N8FIZ 8, N8EXS 6, N8HWO 6, W8YZ 5, W8LRM 5, K8ZJU 5, W8BWJ 5, K8BLAR 5, N8EBG 4, W8CUP 3, K8JG 1. July 30 marks our annual journey to the U.P. Hamfest. Please join your MI League Leadership at the League forum, find out what is going on in the MI ARRL organization.

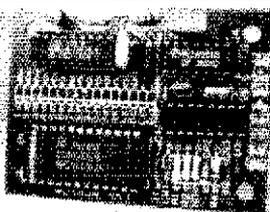
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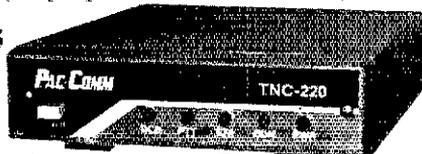
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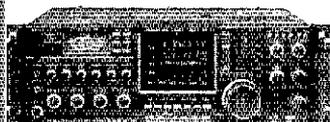
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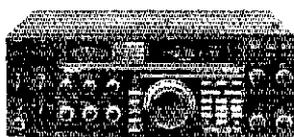
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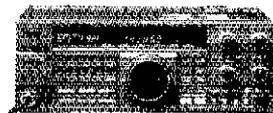
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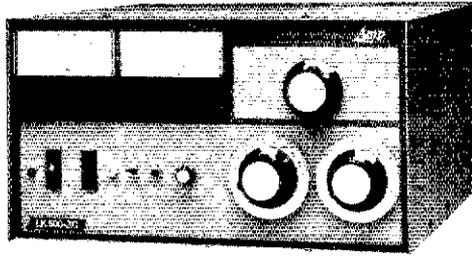
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BNEJ	234	87	30	1845	3.577	W8C
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BNF	206	73	30	1800	3.605	W8EK
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OSN				1810	3.577	N8AEH
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Ohio Section ARES Net  
 Hamfests in July and August: NOARFEST (Wellington) 7/16; Van Wert ARC Hamfest 7/17; TSRAC (Wheeling) Hamfest 7/17; Marysville 8/21; Warren 8/21. Contact Affiliated Club Coordinator KJ30 to list your hamfest on our schedule. Amateur Radio Examinations: Columbus 7/9; Maumee 7/9; Van Wert 7/17; Akron 7/30; Wickliffe 8/6; Columbus 8/6; North Olmsted 8/13; Maumee 8/13; Lisbon 8/20; Canton 8/27. Contact me or Assistant Section Manager N8AUH (phone number above) for details on any session listed above; we can provide names and phone numbers for VE sessions contact persons. The second issue of the Ohio Section Journal should be in the hands of all ARRL Field Organization appointees and Affiliated and Special Service Clubs as you read this. One problem which continues is the "lost" OSJ; the ARRL contact person reported on your club's annual report never passes the OSJ on to the club newsletter editor. This newsletter, put out four times a year by Assistant Section Manager Dave Kersten, N8AUH, and Editor Ron Griffin, N8AEH, contains a wealth of material which can be reprinted in your newsletter. If YOU haven't seen your club's copy, find out why! Section Emergency Coordinator Larry Solak, WD8MPV, has been progressing in our quest for a better ARES identification card, and by the time that you read this, the new version should be available to Ohio Emergency Coordinators. This card will be introduced to all Ohio law enforcement agencies by the Ohio Disaster Services Agency, and should go a long way to making our access easier to authorized disaster sites. Contact WD8MPV for information. The Dayton Hamvention has come and gone, attracting a reported (GASP!) 37,000 visitors this year. The DARA folks had to rush to print more tickets during the event when their supply started getting low! I was unable to attend this mammoth event, once again strapped down by my growing workload and an employer who has come to expect my continued performance! As always, ASM N8AUH, SEC WD8MPV, and ACC KJ30 represented the Ohio Section in fine style! Beginning October 1, a new Section Manager will be writing this column each month. Over the past several months, it has been very frustrating for me to have had so little time available to dedicate to the very important job of Section Manager of Ohio, the largest Section in the ARRL Field Organization. When I undertake a responsibility, I prefer to do a first-class job. Even so, family and work responsibilities must always take priority over Amateur Radio, and my family and job responsibilities have recently put my available time at a premium. I have made the personally painful decision to not seek re-election at the end of my current term (ending October 1, 1988), allowing the administration of the programs of the ARRL in Ohio to pass to someone with more time to devote. During these last several months, the Section has been smoothly running in the very able hands of my Section Cabinet, as listed at the top of this column, and I thank them for their service to Ohio! The stations listed below have practiced their traffic handling skills in preparation for disaster during April 1988; messages during the month of April 1988: K8TVG 346, W8PML 289, K8BW 243, W8B 222, K8JDI 204, K8BHB 197, K8BKU 192, W8ZOL 192, W8BKFN 180, KA8GJV 170, K8VQ 158, W8BC 155, N8AUH 148, KF8J 137, N8IBS 131, W8CZK 125, W8PQT 124, W8AHE 121, KA8CGF 114, N8FWA 106, N8IIP 106, W8EK 102, K8DHD 83, N8GEC 78, W8BIK 70, K8BYU 62, K8CMR 53, W8BKW 52, N8EFB 50, N8X 50, W8MIO 49, N8AEH 49, K8CYV 47, K8BFW 46, W8GMT 46, W8B 46, K8ND 43, W8HGH 40, W8SSI 40, K8BXL 38, W8BKW 37, N8WE 36, W8BYE 36, K8ALV 35, W8BXT 35, W8SKP 30, N8GIB 26, N8HSE 26, N8ISF 25, NY8O 25, K8BAP 25, W8BRB 25, K8E 23, W8JEZ 23, W8LDU 21, K8BSOM 20, W8H 19, K8DRR 18, W8JLV 18, K8VY 18, K8JY 17, W8HHZ 17, W8CXT 17, K8IC 17, K8BNG 16, K8EF 16, W8GQ 15, K8SON 15, K8JPF 14, N8CJS 14, K8NQN 14, K8BDQ 13, N8CQ 13, K8GH 12, N8AJU 12, K8VOY 12, W8BKW 11, N8ZM 10, N8GZX 9, K8TNT 8, N8CW 8, W8MRL 8, N2NS 8, K8RFX 8, K8OOF 8, W8BJAW 6, W8BCSP 6, K8BDL 6, W8BDPZ 6, W8BATN 4, K8CKY 4, W8BFW 4, N8CDL 4, K8JD 4, K8DXZ 3, N8FFH 3, N8HFB 3, W8BGM 3, N8HIL 3, W8NZE 2, K8BMFH 2, K8JUV 2, K8VYT 2, W8BDKQ 1, W8FPA 1. (Mar.) KV8Q 117, K8ND 52, W8ZM 9.

### HUDSON DIVISION

**EASTERN NEW YORK:** SM, Paul S. Vydareny, W8ZVUK—ASM & STM: K2ZM, SEC: WA2ZYM, BM: W8ZIXR, PIO: KB2TM, TC & OO/RFI: KC2ZO, ATC: WA2VGM, SGL: KB2HQ, ACC: KV2A, NWSLTR ED: W82NHC, NET REPORTS FOR APRIL(QNI/QSP): AESN 46/2 CDN 589/79 ESS 343/67 HVN 361/84 NYPON 605/282 NYS/E 325/165 NYS/L 293/207 NYS/M 338/228 SDN 246/95. CLUB NEWS: Albany ARA learned more about the tower bills from W2OQJ and heard more at deregulation from WA2DHF. They welcome new members KA2UWI N2ASB KB2CDS. They provided communications for the March of Dimes walk with WA2YBM KA2MBA N2EMX WD2AJS W82FMB KC2QP NQ2H KB2AFX KB2CT WA2WQZ N2BNY W82VJC W2CDQ N2CKV W82CNS WD2AER KB2AFR W82SBO W2CJO KA2VAH KA2VAF. They report upgrades WA2LVD W82KRS KA1KRT KA2YZW W82HII N2HIL KA2TJO KB2FEW KA2VZW. Their participants in the chopperthon were WA2YBM KB2AFR W2CJO KC2QP KA2QWV. OMARC had their annual pizza party in April and report upgrades W2YYS KB2EEU. PEARL members helped at St. Patrick's Day parade in NYC. SARATOGA RACES heard WA2DHF and WA2VUK talk about recent developments in amateur radio. They welcome AK2E as a new member. SARA had a presentation by N2BFH on operating in the Caribbean and Korea. They report new members W82KMY KB2FGJ W82WWG KB2EUX, upgrade WA2QIN and report SKs W2ZQF W2OP. They participated with AARA on the chopperthon with K2RI N2CNZ N2GXH W82SPN W2ARQ. W2RFP talked about getting more from your

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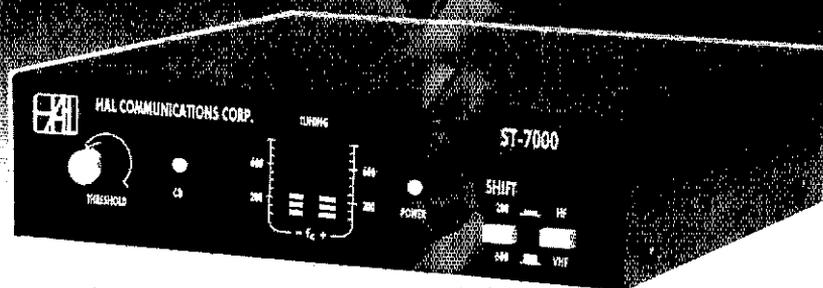
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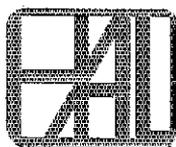
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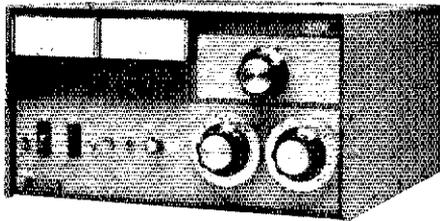
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amateur equipment before WARA. WECA had a discussion of its new bylaws, rules and regulations, and worked on plans for the upcoming public service activities. The very best to everyone for a safe and enjoyable summer and a successful Field Day! Apr. PSHR: WB2VUK W2EG N2HF K2ZV1 WB1BTJ. Apr. Traffic: N2HF 275, WB2VUK 153, K2ZV1 111, NQ2H 109, N2FTR 65, WA2GYY 62, K2ZM 61, W2EG 27, WA3RKB 21, W2CJO 16, K2HNW 9, KA2NGJ 7

**NEW YORK CITY-LONG ISLAND:** SM/SEC. Walter M Wenzel, KA2RGI-ASM: N2GQR. ASM VE: W2NL. ACC: KA2WJL. STM: K2MT. OOC: NB2T. TC: WA2YNH. BM: W2JUP. PIO: KA2LCC. The following are traffic nets in and around the section that handle NLI messages with the April report figures:

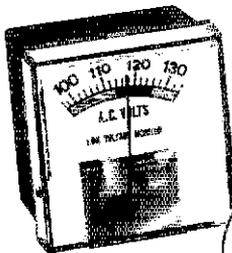
Net	Freq	Time Day	MGR	Sess	QNI	QTC	QSP
BAVHF	145.360R	2000 DYL	K2YQK	—	N/A	—	—
NCVHF	148.745R	1930 M-F	K2HPG	—	N/A	—	—
SCVHF	145.370R	2000 S-F	KA2JMA	—	N/A	—	—
NYPON	3.913	1700 DLY	KA2UBD	30	005	305	262
NYSM	3.677	1000 DLY	N2EJA	30	339	249	226
NYS/E	3.677	1900 DLY	KU2N	30	293	225	165
NYS/L	3.677	2200 DLY	KU2N	30	225	271	519
NLT	26.450	2100 Wed	KB2BKE	—	N/A	—	—
ESS*	3.590	1900 DLY	W2VSS	30	343	—	67
PNS	145.01	24hr DLY	A12Q-4	—	—	—	N/A
PNS(alt)	145.03	24hr DLY	WB2IBO-4	—	—	—	—

\*Independent Net, recognized by NTS, all times are local. Access A12Q-4 (Packet Node Station) via WB2QBP-2 Net-Rom Node (NRN). If for any reason A12Q-4 is down, WB2IBO-4 on 145.03 is the official PNS alternate. Access WB2IBO-4 via K2LSX-7 (NRN) or KA2RGI-1 (Digi). Check into the NYC-LI Ten Meter Net (NLT) for additional traffic handling training. Novices please take note that this net is designed for your participation. EXAM SESSIONS: LIMARC-second Saturday of each month at NY Inst. of Technology, Old Westbury-contact Joe, W2NL (516) 541-2450; SUFFOLK COUNTY VE TEAM-second Saturday of each month at Suffolk County Community College, Selden-contact George, WA2VNV (516) 751-0894; GRUMMAN ARC-second Weds. of each month at Bethpage High School, Bethpage-contact Howard W2QUV (516) 354-6861; GREAT SOUTH BAY ARC-normally fourth Sunday of each month (date shifted for holidays) at the Babylon Town Hall Annex-contact Jim, W2DUK (516) 957-5287. If your group holds regularly scheduled license exam sessions and/or classes, let me know at least three months in advance so they can be added to the column before the printing deadline. Now that the summer months are here and the Public Service activities are at full steam, please remember to take care of yourself and be careful when you are working an event. Always wear the proper clothing to protect you from the weather and supply you with the proper safety in your coverage of events. While I am on the subject of ARES, please remember to support the local ARES Nets during the summer. I know that with the increased daylight the check-ins to a net drop, but just remember the Net Control needs your support also, and it can get quite rough to handle a net when there is only a handful of check-ins, so please remember to check-in to your local net this week and every week. If you need more information about your local ARES group, please contact me and I will get the information to you. For those that do not know, my address and phone are on page 8. Please remember that in a few months, we will be handing the SET on the weekend of October 15-16. Please plan your events to participate this year, plans are under preparation even as we speak right now. Reminder: Suffolk County ARC has a Novice HF Net in operation on 28.320 MHz on Thursdays at 9:00 PM and everyone is welcome. If your club has a Novice Net in operation, please let me know about it so it can be added to the list and hopefully others will check into it and support it also. Traffic: N2AKZ 261, K2YQK 181, KB2BKE 128, N2HLZ 72, N2HPT 65, NB2D 62, K2TWZ 35, W2GKZ 32, N2GNO 23, N2ETO 19, KA2ZYX 16, WA2UKM 12, KA2JMA 9, KA2UIU 8.

**NORTHERN NEW JERSEY:** SM, Robert R. Anderson, K2BJG, ASM (VE Liaison): N2XJ, ASM (FO Info): NW2L. SEC: N2BMN. STM: KA2F, OO/AAC: KA2BZS, AAC: KY2S, SGL: W2KB. TC: K2BLA. BM: N2CXX and PIO: WB2NQV (PH 735-8550). Appointment endorsements for the next two-year term starting 7/88 are: KC2BW EC Garfield, WA2OZR EC Montvale and OES KC2BW, WA2OZR and WB2AIU. New appointments effective 05/88 are: N2AYJ DEC for Middlesex County, WA2SMO EC Belmar and WA2KWC EC Highlands. Field Organization applicants are reminded that ARRL membership is required for leadership and station appointments. Please make sure your membership is current. Congratulations to the following who were newly licensed or upgraded during April sessions conducted by: Cherryville Repeater Assoc (4/8/28, NNJ VE Board (24/12), Ramapo Mountain ARC (9/9), Raritan Bay ARC (6/4), and Sussex County ARC (8/3). Novice (5): J Boekhout, R Belz, K Kastner, and G Zimmerman. Technician (26): KB2ECP, KB2EEN, KB2EOZ, KB2EXZ, KA2FAS, KB2FDO, KB2FHM, KB2FKM, KB2FKL, KA2FRS, KA3STY, F Cappella, G Dirstine, J Hutchinson, KB2EDH, KB2ERU, KB2FIL, WB2VSK, J Corraia, L Perry, KB2CSH, KB2EXY, KB2FDN, KB2ZZR, R Hauser, and KB2EYA. General (11): KB2DJL, KB2DYA, KB2EOH, KA2SLO, J Corraia, KB2EEJ, KB2FGZ, KB2DEZ, N2HDW, KB2EUZ, and KB2EVA. Advanced (9): WB2AEF, KB2AMH, KB2BCF, KB2EOI, KA2FFS, KB2FCQ, W2FNP, WA2PJ, and KB4YKK. Extra (5): WB2ASP, KB2CVN, WB2SMT, WA2OJZ, and K2OZH. Total applicants (93). Total New or Up-Grade (57). 61.3%. Congratulations to W2LVT for No 1 CW from NNJ in the Penn. QSO party. The New Jersey QSO party sponsored by the Englewood ARA will be held Aug 20-21. Once again plaques donated by the NNJ and SNJ Section Managers will be awarded within each section. Contact W2CC for further details. NNJ Traffic handlers are requested to please remember to submit monthly activity reports to STM KA2F to showcase the excellent work NNJ is doing in the NTS. Traffic nets and statistics for March 1988.

Net	MGR	Freq	Time	Sess	Ses	QSP	QNI
NJM	WB2ZJF	3695	1000 DY	31	112	212	—
NJPN	W2CC	3650	1800 DY	36	104	406	—
NJNE	N2ZR	3695	1900 DYP	31	89	217	—
NJNL	WA2EPI	3695	2200 DYP	19	24	46	—
NJSN	KA2INE	3735	1830 DY	31	42	173	—
ORBTN	KA2F	147.12	2000 DY	30	165	340	—
NJTNN	WA2EPI	223.58	2100 DY	31	63	242	—
NJVNE	WB2FTX	146.895	1930 DYP	30	87	443	—
NJVNL	N2FGC	148.40	2230 DYP	31	55	319	—
NJNPL	W2QNL	148.01	24 hr	via	WA2SNA-1	—	—

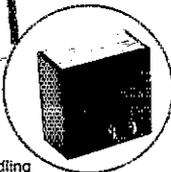
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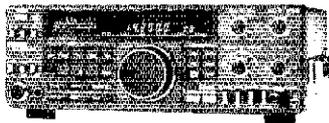
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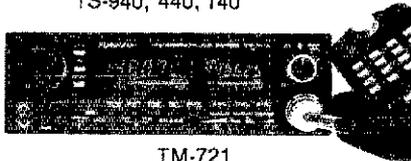
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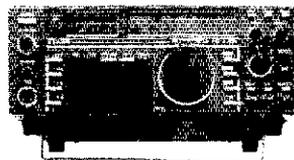


TH-215AT, 315A,  
415A, TH-205AT



TH-25AT, 45AT

# ICOM



IC-735, 761, 751A, 781



IC-02AT, 03AT, 04AT, IC- $\mu$ 2,



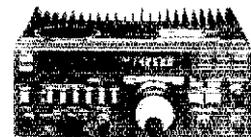
IC-28H, 38A, 48A



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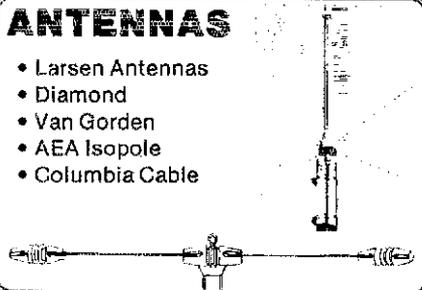
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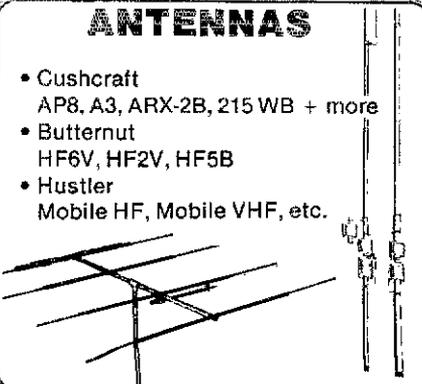
## PUBLICATIONS

- ARRL
- AMECO
- Radio Amateur Callbook
- World Radio TV Handbook
- Gordon West Radio School



## ANTENNAS

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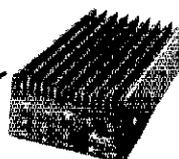
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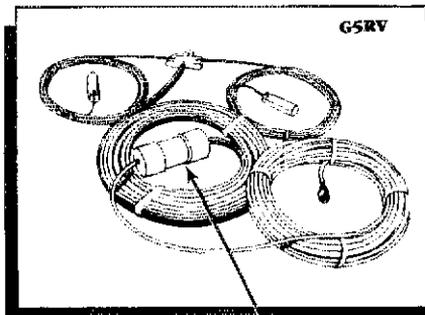


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Packet NTS activity for April, 1988: Total 117. WA2SNA-1 auto forward (79) plus liaison (38) by N2ZT (11), W2QNL (14), WB2FX (13), SAR/PSHR: WB2-TX 138/61, KB2BNW 25/49, KA2INE 73/81, W2QNL 348/126, K2VX 113/99, N2XJ 187/82, W2RRX 78/62, WB2QMP 49/63, KA2F 90/113, N2DXP 178/63, NR2O 58, KB2CYC 17

## MIDWEST DIVISION

**IOWA:** SM, Wade Walstrom, W0EJ—ASM: WB0AVW. SEC: K0DBG. STM: K00XL. ACC: NUJP. OOC: WA0QMU. BM: K0IIR. TC: K0DAS. PIC: W0EOM. The annual Iowa 75 Meter Net Picnic will be held at the Iowa City city park on August 21 at noon. WB0AVW is now the net manager for both the noon and evening sessions of the Iowa 75 meter net. WB0YOW is a new Official Observer and member of the Amateur Auxiliary, K0QVF has been appointed as an Official Bulletin Station. The Iowa Radiosport Society will operate K200RW in December for Iowa's part in the U.S. Constitution Bicentennial celebration. K200RW is the sixth and, probably, the last one authorized to use the 200 designation in Iowa. W08BW is now retired and will probably be heard seeking carer DX. Best wishes, Bobi New call in the section is NY9F. N0DAK had his two-meter radio stolen recently, but with the help of some Cedar Rapids fox hunters and a police detective was able to recover it. Well done! It was great to see so many from Iowa among the 30,000 attending this year's Dayton Hamvention. The Humboldt Amateur Radio Klub was recently designated an ARRL Special Service Club. The Boone Mike and Kay Club assisted the Boone area CROP Walk for hunger and health by providing communications. Traffic: W0SS 196, K0IPT 148, K0ADF 124, W0YLS 113, K00XL 89, K0GP 54, W4JL 46, K0BRE 44, WB0MCX 32, WB0AVW 25, K0VBA 13, WB0OKA 8, W08W 6, K0CKZ 4, W0OMV 4.

**KANSAS:** SM, Robert M. Summers, K0BYF. SEC: N0BLD. STM: W00YH. Net Manager K0BN/KPN, W0FRC. Net Mgr QKS, WB0ZNY. K0RTTY Mgr. open. District Emergency Coordinators are W0QAG, WB0YJT, W0EB, W0FRC, N0K0V, W00CVR, WB0MDF. State Govt Liaison: N0BLD. Tech Coord: open. Bulletin Mgr: K0JDD. ACC: K0EXF. PIC: WB0WSG. Manager of QKS-SS is W0MYM. WX Net Manager, WB0YWZ. A very hearty welcome to two new members of the Ks staff, W00CVR, Liberty, KS, as DEC for District 4 and WB0MDF, KC Ks as DEC for District 9. A full staff of DEC now for Kansas. Hopefully we will see some new EC in the near future. Net reports for March K0BN QNI 1781 QTC 152, KPN QNI 475 QTC 24, K0WVN QNI 1022 QTC 756, K0WV QNI 838 QTC 686, CSTN QNI 2322 QTC 56, QKS 293 QTC 75 and we welcome WB0ZNY as the new manager. QKS-SS QNI 293 QTC 5. Still looking for a new manager for RTTY net. All Kansas amateurs wish K0PCK, SM for MO a speedy recovery after his recent heart attack. An up-to-date report on K0EXF, left elbow on the mend, approx 85% movement back, still not able to pick up over 10 pounds. This is all the weight my doctor says I can lift anyway due to recent gall bladder surgery, at least for the month of May. Had to miss several hamfests and the division convention due to distance. Traffic (March): W0FRC 300, W0FIR 228, N0Z0M 197, K08U 181, WB0ZNY 151, K0EXF 80, N0BZ 73, W0QMT 68, W00YH 67, W0FDJ 64, W0CHJ 18, W0MYM 13, W0RBO 12, N0BDJ 6, K0WE 2.

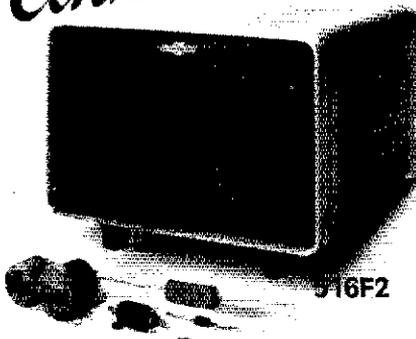
**MISSOURI:** SM, Ben Smith, K0PCK—The Ozarks Amateur Radio Society "Ham of the Year" award goes to KT0B. The PHD provided communications for the Dillard Run, April 24. Club members helping with event were WB0RQC, WB0TIN, K00SX, K00SY, and W0AKUJH. Officers elected for 1988-89 to the Jefferson Barracks ARC are Pres. W00EMS; VP, W05ILK; Sec. N0GX; and Tres. W0MDS. Amateurs belonging to both Kansas City ARES and Heart of America Radio Club provided medical communications for the St. Patricks Day 5k run. K0UAA was net control and organized the ARES participation. The Spring Bike Club of Springfield held their annual Spring 100km bicycle ride April 24. The southwest MO ARC provided communications at the checkpoints and assistance vehicles. Club members assisting were K0UA, K0BGG, W00H, K0BJO, K00UD, K00XJ, K00PO, N00B, W08JR, W00UFV, W00YIU, and W00ZCZ. Happy Birthday to W0CBV who celebrated his 85th birthday April 14. For the 16th year in a row amateurs in the Kansas City area provided communications for the March of Dimes Walk America. Twenty-seven amateurs assisted with the operation that ran from 7:30 AM to 4:30 PM with 5200 walkers participating. W0AIB coordinated the amateur involvement. Silent Key: W0ARA.

Net	Sess	QNI	QTC
MOSSB	30	655	103
MON	60	301	141
MEOV	28	546	126
HBN	21	349	35
RBSBN	29	425	7
STLARES	4	293	4
SWMSKW	4	66	0
PHD	4	117	9
K0CABARC	4	72	4
CMEN	4	69	6
SARN	4	47	0
ZAEN	4	52	6
ARES	5	36	1
CARLN	3	19	0

Traffic: N00N 255, A100 224, W0RYXJ 184, W0BMA 154, K00RB 138, W0HTN 132, K0ML 118, K00CU 74, K20NCU 49, N0R4 45, W00UD 38, K0PCK 17, W0AKUJH 9, K0BAJ 8.

**NEBRASKA:** SM, Vern Wirka, W0BGM—W0BRN, that call sign which is familiar throughout the Nebraska Section, will now be heard with a portable seven added, Longtime Fremont, Nebraska, resident, Harry Snyder, W08RN, and his XYL, Jean are now living in carefree Arizona. Harry is also well known for his technical expertise and has always been willing to lend a helping hand. We wish you well, Harry and Jean, at the new QTH, and will all stay in touch on HF. The Pioneer Radio Club of Fremont is now publishing a monthly newsletter. The editor of the PARC news is Dick Mangum, W07VMQ. The PARC news address is P. O. Box 445, Fremont, Nebraska 68025-D445. The Lincoln Amateur Radio Club with assistance from the AK-SAR-BEN Amateur Radio Club will provide communications for the Cornhusker State Games July 15-16-17. The Victoria Springs Hamfest is July 29-30-31 at the Victoria Springs State recreation area near Anselmo, Nebraska. The Lincoln Amateur Radio Club reports excellent results from a "Hands-On" type of learning the basics of ham radio. There were more participants than expected and more sessions will be scheduled. Some of the basics covered included how to solder, reading schematics,

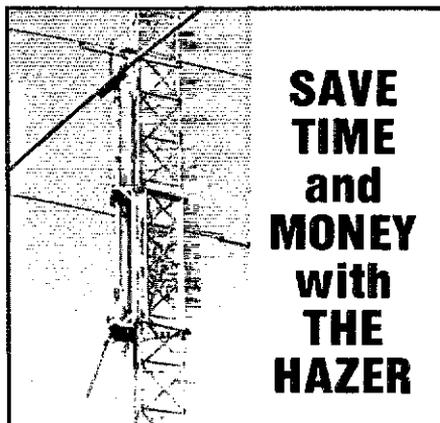
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### OTHER CONFERENCES

**Mid-Atlantic VHF Conference.** This conference was sponsored by the Mt. Airy VHF Radio Club, Oct. 10-11, 1987. 11 papers cover everything from mountain topping to transceivers for the 3400 and 5600 MHz bands. 120 pages. \$10.

**21st Central States VHF Society Conference** held in Arlington, Texas, July 23-26, 1987. 28 papers covering everything from use of TVRO dishes for moonbounce to a solid state amplifier for 5.7 GHz. 166 pages. \$10.

**6th ARRL Computer Networking Conference** held in Redondo Beach, California, August 29, 1987. The latest concepts on networking, high speed modems and other packet-radio technology are discussed in 30 papers that were prepared for the conference. 174 pages. \$10.

**MICROWAVE UPDATE 1987** held in Estes Park, Colorado, September 10-13, 1987. 17 papers on equipment, antennas and techniques for 902 MHz through 10 GHz. Much information on construction of 2.3, 3.4 and 5.7 GHz gear. 136 pages. \$10.

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use of test equipment and antennas/leadings. The section has two new Emergency Coordinators, Fred Weglin, N0GMS, of Valparaiso, covers Saunders County, and Bob Burns, N0DGB, of Nebraska City covers Otoe County.

### NEW ENGLAND DIVISION

**CONNECTICUT:** SM, Dick Pechie, KB1H-STM: K1EIC. SEC: N1DCS. COC: NA1J. ACC: NK1J. PIO: WA1CMF. IC: W1HAD. SGL: K1AH.

Net	NM	Time	Freq	Sess	QNI	QTC
CN	WB1SXZ	7 3 10 PM Daily	3.640	59	340	194
CPN	NK1J	6 PM M-Sat	3.985	30	297	98
		10:00 AM Sun				
NVTN	NM1K	9:30 PM Daily	148.890	30	603	156
WESCONN	N1EOD	8:30 PM Daily	147.180	30	398	131
RASON	KY1F	9:00 PM Daily	146.730	30	232	64
CSTN	K1CE	24 Hour 8SS	145.010	21	99	41
CSN	WB1GXZ	7:30 PM M-F	3.720	21	99	41
TMRCN	NM1K				98	5

Connecticut traffic community continues to set new records in net check-ins, message handling, and representation to region nets. With Field Day history, many local clubs are looking to complete the summer in public service activities. Southington ARA to provide communications for the Top Gun Race in July. ECAPA will set-up a demonstration of ham radio at the Woodstock Fair. Tri-City ARC will again operate a coffee stop on I-95 with the local Boy Scouts during the Labor Day traffic. Be sure to look over the FCC Docket 95-139, a re-write of Part 97. Connecticut Congressman Sam Gejdenson circulating copies of his letter to the FCC in support of continued amateur use of 220-222 MHz. (Docket 87-14) RASON will again organize the "WOUFF HONG" at the NE Division convention at Boxborough in Oct. KA1YP of Waterbury ARC recently cited by United Technologies for extraordinary service in 1987. Shoreline ARC has many nets to partake-10 meter 1930 local time every Tuesday on 28.485, Civil Preparedness Net second Monday at 1930 local time on 145.29, Technical Sessions second Thursday at 1930 local time on 145.290. Connecticut Packet activity is by no means dragging its technical feet. With the organizational help of the ICRC gang and the cooperation of many individuals and clubs, a 220 MHz network is beginning to take shape. K1IKE-2, W1OPS-2, K1MUJ-1, and WA1UQC-8 all part of recent trials on 221.07 MHz. Traffic: W1EFW 344, WB1GXZ 236, NQ1P 182, NM1K 118, KA1GWE 99, W1WP 72, KA1FVY 67, KY1F 66, NK1N 55, N1API 66, NK1J 54, KA1JAN 47, KA1KP 47, KB1ZC 37, W1YOL 36, K1ACE 33, WA1NLD 20, N1BOW 18, W1BDN 17, N1FJW 16, WB1ESJ 11, N1BOW 9, WB2SGI 7, KA1REQ 6, W1QV 5.

**EASTERN MASSACHUSETTS:** SM, Barry Porter, KB1PA-ASM: K9HI. STM: KW1U. ACC: open. PIO: K1HLZ. BM: KB1AF. CO/AA: AG1F. SGL: K3HI. TC: KA1IU. EMass Hotline: 437-0111. Westlink 449-2226.

Net	MGR	Freq	Time(LOC)	Day	Sess	QTC	QNI
EMRI	N1AJJ	3658	1900/2200	DY	48	125	142
EMRIPN	WA1FCD	3880	1730	DY			
EM2MN	KA1MDM	5323	2000	UY	30	150	326
NEEP	K1BZD	3945	0930	SUN	4	3	28
HHTN	NG1A	0484	2230	DY	30	130	388
EMRISS	N1CVE	3715	1800/2030	DY	38	19	54
CITN	KB1AF	745/045	1930	DY	28	41	221

Spring brings club elections to many clubs. To all the outgoing club officers: THANK YOU for all you have done to keep our hobby strong. To the new club officers: GOOD LUCK! The EMass Field Organization is there to assist you in any way we can. Please don't hesitate to call on me or my staff for advice or suggestions. We are averaging 50 new hams a month in EMass. Thanks to all the VE's and instructors who have put a great deal of effort into their "hobby." Now we need to concentrate on follow-up. Does your club have an Elmer program to help the new Novice/Technician hams? Previous studies have shown that we lose over half of newly licensed hams within the first couple of years of their getting licensed. The good weather means it is antenna season. PLEASE be careful when working around antennas and towers. Use good common sense and observe the proper safety precautions and there will be fewer chances for accidents to happen.. It is also flea market season. A recent serious problem has prompted discussion and the beginning of a National Registry of stolen radio equipment. Hams tend to buy all kinds of radio gear at flea markets without any idea if it is stolen or not. This way, you will be able to check the list and at least have a better idea that the seller is selling non-stolen stuff. We are also averaging 2 tower ordinance problems a month in our section. The more publicity our hobby gets, the better the outcomes of these problems will be. Good luck to all in Field Day, and don't forget the bonus for sending me a Radlogram via NTS. There is a possibility that there will be a demo station on Constitution Wharf for the July 4th celebration. Thanks to all who have asked for information about participating in the EMass Field Organization. You should have received the information by now, and I look forward to your participation. Have you expressed your opinion on amateur issues to the section or division staff lately? Traffic: W1CE 569, KW1U 394, KN1K 335, KB1AF 190, KA1MDM 136, NG1A 134, WA1TBY 101, N1AJJ 90, WA1FNM 62, K1GGS 61, KA1BBU 58, N1CVE 55, NK1J 48, K1ABO 46, KA1LH 37, W1DMH 30, KA1NOI 29, KA1EDY 21, K1SEC 21, NK1L 17, KA1EDY 12, KA1LKB 12, WA1CRE 10, KA1KCU 8, N1EGN 4.

**MAINE:** SM, Cliff Lavery, W1RWG-ASM: Bill Mann, W1KX. SEC: KA8UVQ. STM: WAZERT. BS: W1JTH. COC: WA1KX. PIO: KY1E. SGL: K1NIT. TC: KQ1L. ASM/Packet: N1AHH. Phyl Young, W1JTH, Bulletin Manager, reports 75 transmissions by 6 bulletin stations comprising 9 ARRL, 1 Maine, 0 propagation, and 2 packet bulletins on Hancock ARES CMEN SGN M/PSN RACES AEN MENET (packet). As follows: OBS bulletins transmissions

W1KX	12	30	8SS	3.940	RCS/MPS
W1VEH	ME11-12	placed on	MENET	PBBS	in Apr.
W1JTH	1	1	5SS	3.940	SGN
N1EUK	0	12	FM	10770	ARES
N1BCF	12	27	FM	3.940	MPSN alt
WA1NIZ	4	6	FM	13078	AREN

The first annual Mid-Coast/Ankney Hamfest will be held on July 16 at the Union Fairground in Union, Maine, off Route 17. The ARRL forum will be from 9 AM to 10 AM. Traffic: KA1JOU 118, ND1A 72, WAZERT 71, W1RWG 41, W1NSO 40, W1JTH 36, WA1JIE 32, N1BCF 24, W1BMX 20, W1VEH 19, AK1W 14, W1QIC 14, N1BJW 11, WA1YNZ 7, KA1ODT 6, N1EZR 4. PSHR WAZERT W1RWG. The new SM's term begins July 1, 1988; please send your reports of June activities to Bill Mann, W1KX, on that date or after.

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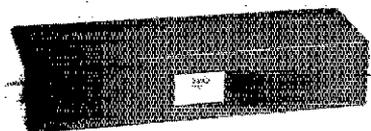
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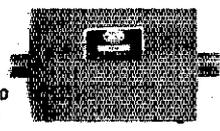
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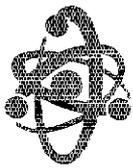
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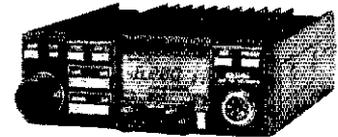
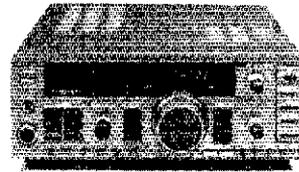
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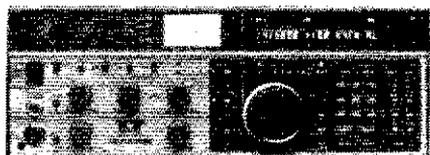
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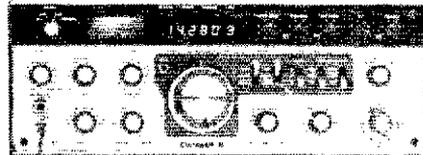
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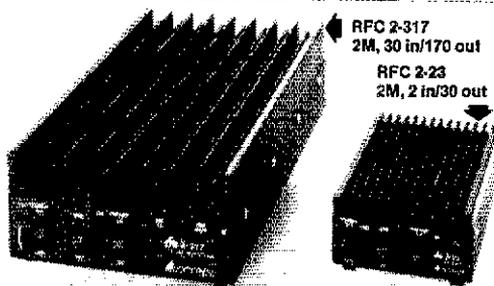
RFC 2-23, 2W in = 30 out  
 RFC 2-217, 2W in = 170 out  
 RFC 2-117, 10W in = 170 out  
 RFC 2-317, 30W in = 170 out  
 RFC 2-417, 45W in = 170 out

### 220 MHz Amps

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 RFC 3-211, 2W in = 110 out  
 RFC 3-112, 10W in = 120 out  
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Pine Tree	30	276	65	ND1A
Aroostook Emerg	4	65	8	WA1YNZ
MePubSvc	4	52	4	K8LUVQ
CanMeEmergency	9	171	7	N1ELK
Races Oxford Cty	4	51	20	W1RWG
Races Hancock Cty	4	43	3	WA2ER1
Races Kennebec Cty	4	—	0	KA1LPW
ARES Cumberland	4	66	0	KA1ODT

**NEW HAMPSHIRE:** SM, Bill Burden, WB1BRE—BM, K1QSM, ACC: K1HM. While getting ready to write this month's report, I suddenly realized how intense our ham activities get around the household. As I write this, a Novice class is in session in the dining room. On the way home, I made a first contact on 2M with a new ham in the Peterborough area. I got two phone calls, one with an inquiry about licenses and one with information about the state org. Note that I didn't initiate any of these events. Someone was taking their time to train new Novices, someone had helped a new ham get his license, another person had found out about the hobby and needed information, and another ham was working on future operating activities! The point is that folks around the section are busy making the hobby work, and I see and hear the results almost every day! Fred, K1ACL, has an excellent series of articles in the GBRA newsletter concerning ARES, NTS and RACES. I recommend it for a clear understanding of the relationships between the three organizations. We had two public-service activities that allowed tactical net operations—NARC members supported the March of Dimes Walk in Nashua and Contocook ARC club members worked the March of Dimes walk in Concord. VE sessions were held in Concord and Salem this month. Ray, KB1NS, of the Brass Pounders reports 17 people received an upgrade or passed the Novice exam. KY1N reports that 29 of 42 applicants upgraded in the exams sponsored by Mt Moriah Fltr Soc. Take a moment to thank the Vol Examiners in your club—they put a lot into Amateur Radio! I visited the Souhegan Valley ARC at the invite of pres Dick, W1FJH, and found lots of activity with an antenna demo and planning for FD. They have good programs, much information available at meetings and are working on Sunday brunch meetings. Our visit to the Contocook club revealed another group on the move. They have both Novice and upgrade classes going, a repeater up and running and will have done FD by this publishing. They are looking at Sat morn breakfast meetings and other social activities. Thanks to Jack, WA1ALM, for the invite. Around the section—Past GBRA Pres (and current VP) Bob, W1HJT, was seen in a Foster's Daily Democrat presenting a set of ARRL pubs to the Dover Public Library from the club. Bob is a candidate for "ARRL Instructor of the Year Award" in recognition of his tireless efforts in teaching and helping new hams. Congrats to Dick, W1QWJ, who has an article on amplifiers being readied for printing QST. Welcome to Marty, NB1H, who takes over as Tech Editor of Ham Radio from Rich Rosen. Here's something a little different—Bill, N1EXT, up at Dartmouth college, is involved in a project to build and race a solar-powered car in Switzerland. He plans to use Amateur Radio for comm between the race car and the chase vehicle, and may use packet for monitoring car parameters! Always something new in the hobby! The Daniel Webster Boy Scout Council will be holding a camporee at Sunapee State Park on Oct 1. They are looking for an Amateur Radio demonstration and emergency comm support. From what I have heard, it seems like scores of NH Hams were at Dayton and had a great time under sunny skies. Any pictures or interesting stories? And finally the NARC Thursday night pizza bash is going very well, reports WA1UJA. We had 90% rep on 1RN rep on 1RN3 this month and new call signs show up in the traffic reports. Is your call sign there? NetTime/Freq/Mgr: GSPN 6 PM/3942/WA1YZN, N1H 7 PM/3547/KB2AN, N1HNT 7 PM M-F/28330/KA1OU, GSFMS 8:30 PM/148.94/N1ALM, GSFNM 8:30 PM/148.475/N1ALM, Traffic: GSPN 147, GSPN 128, N1H 83, W1PEX 183B BPL, N1CPX 311, KB4N 262, K1TOY 258, WA1FHB 231, W1FWR 134, WA1LE 81, NE1J 70, WB1HBB 47, W1QVY 32, W1TN 29, KA1OU 29, K1M 22, N1ALM 21, KA1LBW 18, KA1HPO 14, KA1QIW 13, KA1OL 10, N1DQA 9, KA1JOU 8, K1ACL 5, KA1LMR 3, KA1KFX 3, N1E10 1.

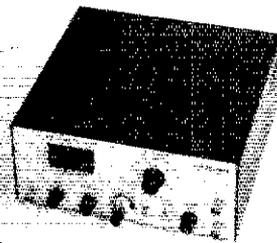
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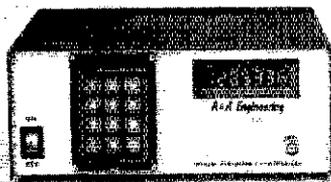
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**VERMONT:** SM, Frank I. Sultor, W1CTM—ASM: AE1T, STM: KT1Q, SEC: W1KRV, PID: WA1YOY. The new slate of CVARC officers include: President (K1HKI-Bob), VP (N1FHI-Dave), Treasurer (K1GR-Tom) and Secretary (WA1PDN-Dan). The new officers as well as all club members had the opportunity to meet with our Division Director (K1KI-Tom) at their June meeting. BARC's last meeting featured our section volunteer legal council (W1SOV-Joe), who briefed the club on the present status of how PRB-1 is being utilized by our court system—for additional info contact W1SOV. The SJRC/BARC sponsored spring class recently graduated 6 new hams. The results of the April 23 VE exam session included the following: General KA2IPA, WB2JIX, Technician KA1QZR/RHV/RNL/RWM/RWN, KA2YJX, plus two new Novices. Sadly, I report that W1KJG (Parks) has become a Silent Key. His dedication to our hobby and to BARC set an example for us all to follow—73. W1UOQ (Mert) is on the mend following recent eye surgery. New hams in the section include: N1FKR/S/T/U/V, N1FLG/FMP, KA1RET/RHV/RKS/RLM/RLN/RLQ/RMN/RMX/RMY/ROI/ROJ/RTH. N1EOZ has recently accepted a position at ARRL HQ as an editorial assistant. Our section's loss is the ARRL's gain! Best wishes, Shel, but don't forget—our Section rep at HQ! Our SEC (W1KRV-Joe) now has about 50 ARES members who are also wx spotters. A new ARES roster will be in the May bulletin. The linking of Red Cross chapters in Brattleboro, Bennington, Rutland and Burlington is being planned utilizing the 39 repeater on Mt. Equinox. Other Red Cross chapters can also be linked in Montpelier, Newport, St. Johnsbury, and White River Jct. utilizing other repeaters which should allow all chapters to be in contact with each other utilizing Amateur Radio—further details to follow. New Windham County DEC is NF1C who is being assisted by new ADEC, W1JLZ. The Dover town EC is K1IK, K21J (Joe) has been appointed to the amateur auxiliary. In order to more effectively provide amateur auxiliary support to the expanding number of repeaters within our section, Pete (AE1T) and Frank (W1CTM) have formed a section RF1 committee comprised of the SM, ASM-AA, TC and VLC. This group will be responsible for standardizing RF1 reports from repeater owners/trustees and acting as liaison to the regional amateur auxiliary monitoring station and the FCC for any required assistance/coordination. It has been an honor for me to have represented you over the last two (2) years as ur SM. The true effectiveness of any SM is directly related

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HDX-555	55'	22'	3	870	15"	21 1/2"	\$2309.00
HDX-572	72'	22'8"	4	1420	15"	25 1/2"	\$3959.00
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\*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.



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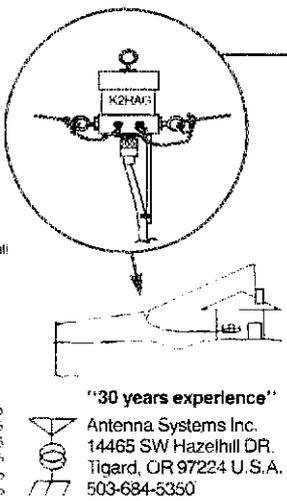
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to the ability and dedication of those who work with him, and in my case, I have had the best! SEC/SGL Joe Stevenson (W1KRV) has been the key organizer of ARES in the section and thru his efforts we now have a true section ARES capability with 217 members. Joe's efforts in publishing the monthly ARES newsletter "The VT Communicator" has been instrumental in maintaining the present high state of section ARES readiness. Ed Bort (KT1Q) have provided outstanding STM leadership over the last four years to maintain an excellent traffic capability throughout the entire section. Trax U both. Additional tx go to PIO (W1KYOY) and TC (W1AIM) who have given me such timely support. I also wish to say tx to each of u who have contributed ur time & talent in helping to make our section one that we can all take pride in. Much has been done over the last 2 years, however, much remains to be accomplished. I ask that u join me in supporting AE1T as he takes over as our new SM. April Traffic report: KT1Q 656, WA2SPL 509, WA1JVV 142, N1DHT 117, AE1T 60, NB1A 44, WK1RV 39. April net report: VTN 30179/152, VSSN 12/5015, BCAN 10/770, CVDXN 5/308, CVFMN 4/717, 1SFMEN 4/657, TSEN 4/610, FSEN 3/402.

**WESTERN MASSACHUSETTS:** SM, Bill Voadisch, W1UD—OO/RFI: N1CM, PIO/ACC: K1BE, SEC/SGL: WB1HH, TC: KA1JM. STM: W1KK. Congratulations to Dick, WB1HH, for the successful Yankee/Rowe SEC test. Over 100 places of health and welfare traffic was generated to the 50 states. 14 official messages were directed from CD planners to zone communities. The list of participants is too extensive to mention in this column. You know who you are and I say, "a job well done." NOBARC members offered their time and communication expertise during the Bay State Winter Games held in Williamstown. A dual torch run, Adams and Pittsfield to Williamstown, really took some coordination. Ask Harold, N1FRP, how to light a torch in a high wind, he knows how. Stations that participated in this two-day event were KA1IG, N1FRP, WB1HH, KA1LKO, WA1VHC, KA1PIJ, KA1LZC, WA1WEJ, KA1GK, WA1ABL, WA1VPX, KJ1K, KA1NE, WB1EWM, W1QOC, WA1AZX, KA1EKQ, KC1EB, WB1BTJ, W1YBT. The antenna for the digi on Graylock has been repaired and is working great. Bill Wornham, WA1CRE, CD Director of the town of Townsend suggests that all repeater control operators should have the manual of identifying numbers for transportable materials. Those are the numbers you see on trucks and trains. These define the type of cargo the vehicle is carrying. An accident could be a disaster if the material is not dealt with properly. We as amateurs could, through our repeater system, identify the content and avoid any possible problem. Active nets in WMA section WESTERN MASS PHONE NET: 3937 kHz M-S 6:00 PM WESTERN MASS NET (CW): 3562 kHz 7:00 PM, WESTERN MASS EMERG. NET 3937 kHz Sun. 8:30 AM CMARA, Wor. Tec. and Post 73 Clubs provided communications for the Red Cross 10-mile Road Race and the Bi-Centennial Parade in Milford, MA. The club repeater W1BIMR and 223.5 were used. Participants were W1SPG, KA1JED, OTQ, MOW, OTR, OTS, QOI, QOZ, N1DEM, EKO, FBQ, FIY, NE1C, NQ1U, WB3EJA, W1EWL, NMQ, K1HMC, ISW, ODW, RLY, WA1BD, TNT, QGU, KA1FXK, JWA, QFU, IFV, N1FMG and NQ1N. W1UD has a BBS up and running for the Leominster/Fitchburg area. It auto-forwards to the NTS. Congratulations to K2TK. He's going to take that long walk down the isle the 21st of May. Traffic: N1TV 21, KA1IFC 576, WB1HH 109, KA1OFC 33, KB1TH 34, W1SJV 23, W1KK 71, K1JHC 84, KA1EKQ 42, WA1YYW 65, NQFSM 11, WA1OPN 8, KC1D1 16, KA1EXJ 73, W1UD 284, KA1QV 73.

**NORTHWESTERN DIVISION**  
ALASKA: SM, Dianne Marshall, AL7FG—SEC: KL7AF. DEC Interior: NL7HI. STM: KL7VY. Mike Doph, KL7JBV, was appointed EC Kodiak Island. Congratulations, Mike. Still looking for volunteers for other appointments. We are still waiting with baited breath for the Field Day results and the announcement of who got stuck with the High Point Trophy. Last February was the 16th birthday of the Alaska Snipers Net. Thanks to Del and Rosemary for running such an outstanding net. For your calendar: The Arctic Amateur Radio Club will have their Hamfest on August 27 at the Tanana Valley Fairgrounds in Fairbanks. Last reminder for the Motley Group Picnic July 22, 23, 24, 1988 at Byers Lake campground, mile 147 Parks Highway. Everyone is welcome. Come watch Wayne feed the bears.

**IDAHO:** SM, Don Clower, KA7—SEC: K7REX. STM: W7GHT. OO: WB7CYO. ACC: N7BI. PIO: W7GE. July 2nd-8th is the week that several club stations in Idaho will be signing with the special "2007" prefix to celebrate the Bicentennial. There will be a station operating from the State Capitol. Drop in and join the fun. Gov. Andrus signed a proclamation declaring this week as Amateur Radio Week in Idaho. Well, I finally got on packet, and I can be reached via the ARES PBBS on 145.05. I will start leaving APRIL info on the ARES PBBS also. W1MU will be at Macks Inn, ID, this year on Aug. 12-14. Come on up and enjoy a FB hamfest. Hope to hear and work you on Field Day. 73, Don. Traffic: W7GHT 118, WADYDG 9.

**MONTANA:** SM, Ken Kopp, K0PP—WA7AA1 replaces SK NN7J as Pres of FVARC (Kalspell). ASM N7A1K new Pres of Eaglehead Rptr Assn Bozeman). 1988 RACOM officers: KF7FW/Chair, WB7USV/Vice Chair, K0PP/Sec-Treas. ACC N7BKW and SM K0PP visited FVARC (Kalspell), GHRC (Bozeman), HARC (Missoula) clubs and QCWA luncheon during month. K0PP also visited YRC (Billings) and GCARC (Helena). K0PP has programs available and welcomes club invitations. Take part in Section activities; OO Coordinator W7LR looking for OO volunteers, and K0PP has BM and other appointments waiting. GHRC (Bozeman) joined W1AW's Century Club with \$101 contribution to renovation project. See Apr QST, page 48, if you'd like to join. We're "lookin' good" with Section League membership up 6.3% from a year ago, compared to 4% nationwide. Traffic: WB7WVD 68 (PSHR).

**NET**

Net	Sess	QNI	QTC	MGR
IN	30	293	74	KA7EEE
MSN	4	83	0	K0PP
MTN	29	1696	87	KF7R

**OREGON:** SM, Randy Stinson K2TT—ASM: KM7R. STM: W7VSE. SEC: W7FBP. PIO: K7YVN. SGL: KA7KSK. ACC: W7FQ. RFI: AK7T. OO: KA7HJT. STC: N7ENI. We have some new officers in the Umpqua Valley ARC and they are President

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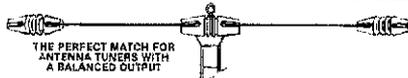
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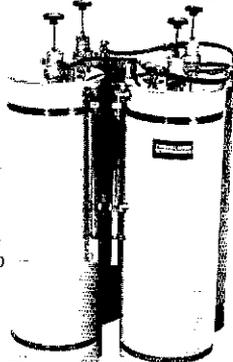
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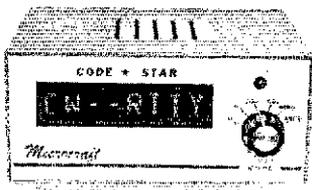


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Bill Gibson KF7BX; 1st VP. Slim Bose, W6BWO; 2nd VP. Steve Maxwell, WJTE; Secretary Dick Wharton, N6MOK, and Treasurer Jack Nicholas, W7LNE. Good luck Gentleman. While we are talking about Southern Oregon we have a new District Emergency Coordinator there and his name is Paul Chierichetti, K86PGE. One of Paul's jobs will be to help the Emergency Coordinators establish an understanding between government agencies that deal with the forest fires in the counties. As you know from last year, there was some difficulty with the hams helping because of a number of reasons. We also have a new District Emergency Coordinator in Northwest Oregon and his name is Bob Dorman, KV7F. Bob will be looking for Emergency Coordinators in Washington and Yamhill counties plus setting up some SETs in the area and whatever else he can do to help the ECs. Bob is no stranger to the ARES, and I am looking forward to his help. Traffic (P) = Packet: W7VSE 369, N7BGW 217, WG7H 196, WB7VSN 163, KA7EEE 129, N7ELF 137, W7LRB 68, W7LNE 55, WB7EMO 47, N7CPA 49P, N7APC 42, WB7SZM 41P, KZ7T 39P, W7ODG 27, KA7OFM 11P, KA7AID 9, KD7YJ 9P, Late March N7ELF 98, K7IFG BBS Station 166P which would count as 332P plus 703 pieces of informal traffic and bulletins.

WASHINGTON: SM, Brad Wells, KR7L—STM: KD7ME. SEC: KA7INX. TC: W7BUN. OOC: N7DVR. SGL: KD7AC. BM: N7CAK. PIC: N7FKV. ACC/ASM: KC7PH. ASM: KD7G. ASM: KD7G. ASM: KA7CSP. ASM: W7OUF. ASM: K7CLL. Clubs that wish to operate in November with the special "200" prefix must get their application into the Club Services Department of ARRL. However, you must plan on operating from the State capitol in Olympia. Some recommendations from the Pacific Area Staff meeting in April are: recruitment of more traffic handlers, revision of the ARRL Public Service manual, revise or abandon the annual SET exercise, and standardizing all digital-mode NTS procedures. The Clallam County ARC provided communications April 23 for the Kiwanis Walk-America involving 165 participants. 30 Spokane area hams provided the medical communications for the 1988 Bloomsday Run. The Northwest DX Convention will be July 22-23-24 at the Richmond Inn in Vancouver, B.C. For information, contact Ken Thompson, Box 3048, Blaine, WA 98230. Subscribers to the WWDXC Toiem Tabloid were treated to a handy chart of great circle bearings to all DX countries (Now if only I could work all of them). Got a note from W7LKB (who upgraded to Extra) which read: "I didn't change the call. I have had this call for over 41 years and my wife for over 44 years, and don't figure on changing either one." KA7HAM is now operating the 145.37 Grass Mountain repeater. This is a wide-coverage machine at 4500 ft and can be accessed from both sides of the Cascades. Geno has also proposed the idea that if all repeaters were capable of operating under a common PL tone, it would simplify their use during ARES activities and exercises. We currently have a problem in both Anasin and Columbia counties, where their respective DEM's will not allow amateurs to sign up as emergency workers. Hopefully, this problem will be resolved in the near future with the assistance of both the State DEM and the FEMA Regional office. Congrats to Pat, N07L, who has taken on the job of EC for Columbia County. Sorry to report that KA7JFX has resigned his EC position due to other commitments. Radio Club of Tacoma has renewed as a Special Service Club. Don't forget the Okanogan Valley Hamfair July 8-9-10 at Summerland, B.C. (6 miles north of Penticton on Hwy 97). Flea market, ham videos, code contest, seminars, and Sunday breakfast are a few of the activities. For more info write Okanogan Valley Hamfair Society, Box 477, Penticton B.C. V2A 6K6 or contact VE7RS on WARTS net. I've received a copy of the Kitsap County ARES/RACES Organization Manual put together by Cal Johnson, N7DXS. A very professional job and something that would be of interest to all ECs. Congrats to W7DLB and all who helped provide communications for the Lewis and Clark '88 Preview Run. This was a test for the Cross-State Marathon Run scheduled next year. PUBLIC SERVICE HOURS: ASOTIN 11, BENTON 137, FRANKLIN 137, KING 331, KLICKITAT 255, PIERCE 159, THURSTON 156, WALLA WALLA 40. Traffic: K7AJT 10, K87BMC 10, WA7CBN 68, K7CLL 11, N7DIP 7, N6EQZ 107, KR7F 66, W7GB 103, N7GGJ 108, K7GXZ 346, W7IEU 9, W7IGC 308, N7IJJ 6, W7LKB 74, W7LG 126, KA7PMD 19, K7SUX 40, KA7TTY 11, WA7TWB 14, K7UQH 77, WB7WOW 243, WA7YEN 28, KD7G, KD7ME, KR7L.

## PACIFIC DIVISION

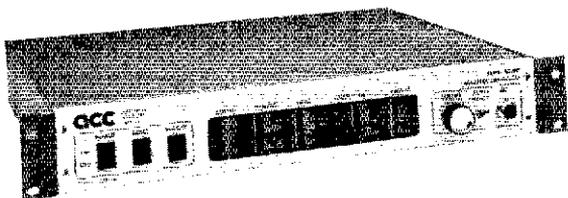
EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, WB3FCV. SEC: W6LKE. STM: K6APW. OOC: NY6Z. TC: N6AMG. Welcome to new OOs WN6P and NT6V. EBARC welcomed new members K2KGE, KL7OZ, K6BAM, WA6SYK, Harland Shaw and Bob Fields. Their FD Chairman N6KMK is busy appointing Team Captains and finding a new site. LARK's newsletter featured a very revealing article on what took place at a recent tower permit appeal hearing. The author's key points were to have all of your facts straight ahead of time, and not to let your emotions interfere with your logic. They have revived the issue of club incorporation and their SEC/TREAS WB6J is being assisted by K6USH, K2BIO, KF6VU, K8BBD and WA6TGF, in studying the issue. BARC has established three teams for FD - Site, Equipment and Operation. The Site Team is handling the Saturday Night Barbeque! April Traffic: WB6DOB 149, W6VOM 104, WB6UZX 32.

NEVADA: SM, Joe Lambert, WB1XD—ASM: Curly Silva, K7HRW. Disaster struck in May in Henderson, Nevada. The Las Vegas area ARES/RACES team was ready. Lead by N7CXD and NK7N, many LV area hams pitched in during the emergency. This included KC7HT, N7CAH, N7CFC, KB7LD, KB7LB, AD7K, N7BIH, N7GWW, N7GQR, and many others. Thanks for a job well done. SNARS provided communications for motorcycle races over both Easter and Mother's Day. LV area hams provided support for 3 bicycle races and 2 motorcycle races during April and May, and for the L.A. Police Marathon, April 22-24, from Baker to Las Vegas. Thanks, N7CXD. LVRAC sponsored a picnic May for all So. Nev. hams. WADG reports that their 147.03 repeater is on the air. WADG meetings are now at Cattins Restaurant at 2005 Villanova in Reno, AI. K7CIW, has commitments which preclude him from continuing as Technical Coordinator. Thanks, AI, for your years of service. A new TC will be announced soon. Don't forget the Reno Hamfest August 20, at Idylwild Park. We expect a large turnout and a good time to be had by all.



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**PACIFIC:** SM, Jonathan Starr, AH6GJ—Greetings from the land of the convertible airliner. WH2AEN, DEC Guam, asks for participation in the Marianas Emergency Net on 7088 KHz LSB Sundays (Guam Date) at 0000z. 7088 was recently used by several ARES hams along with Anderson AFB Command Post and two Jima Coast Guard when an imminent eruption threatened Pagan Island North of Saipan. On March 26th communication was provided for the Guam Marathon by WH2AEN, W1YRM, KH2CG, KH2CS, KH2DF and KH2E. Paul Takamiya, Education Officer of Oahu County Civil Defense Agency, spoke at the April 28th meeting of the Emergency Amateur Radio Club. On April 30th, KH6H was assisted with the Maui March of Dimes Walkathon by KH6JJS, AH6HW, KH8OB, KH6WA, KH6UU, WH8BXK, AH6AZ, AH6IF and N6HPQ. All Pacific ARRL Members are requested to note the date on which QST arrives each month, and send the results in August to me (Jon AH6GJ). The Kauai Amateur Radio Club has signed a memorandum of Understanding with the County of Kauai, which will allow the club repeater to be used by County RACES in an emergency. There is a phenomenal growth occurring in ARES and RACES participation throughout the Pacific. Keep up the great work. Aloha, de AH6GJ.

**SACRAMENTO VALLEY:** SM, Bob Watson, W6IEW-ASM:N6JTT. STM: W6WVJZ. SEC: N66A. DECS: KE6EF, N6AUB, KE6NS. OOC: WY60. PIDs: AA6DX, WA6UZR. ACC: TC: W6RFF. BM: W65FX. SGL: N6IG. Was invited last month to the meeting of the Sierra ARC in beautiful Plumas County and after arriving home got a letter from their Don Taylor, K7FAM, with details of their extensive plans for our visit. It was mailed in plenty of time but the PO didn't cooperate, taking more than two weeks to deliver it. Anyway Marj, N6JTT and I enjoyed meeting all the friendly people of your active club. The River City ARCS radio school instructors are just loafing this time with only 51 students instead of their normal 85-100. Don't they know that just after becoming a Special Service Club is no time to relax. Amateur County ARC has "gone public" with both their 2M, 146.835 (which has always been open) and 441.535 repeaters. PL has been changed to 100 Hz and when needed on 2M can be overridden with a touch-tone code of 111. Many thanks to the many clubs that include me on their newsletter mailing list. It really helps to keep me up on doings in the Section and I read them from cover to cover although I haven't room to use much from them in this report. Don't forget the Section Net the first Sunday of the month at 8:00 P.M. on 146.085, input up, 600 MHz. Traffic: W6WVJZ 135, N6LUY 148, K6SRF 79, W6ZUD 60, W6RFF 22, W66SRQ 4.

**SAN FRANCISCO:** SM, Bob Smith, N6A1T—Glad to see all the activity at FD this year. Next month for the SCRA-REXDA challenge winner, can you wait? Newest club newsletter in the section is the WAVELENGTH, published by Anchor Bay ARC, two issues out and going strong. SCRA is into FOX HUNTS, if you're in the area listen to 146.73 for details. The SCRA ANNUAL FLEA MARKET has been switched to the National Guard Armory in Santa Rosa. HARC and W5YI groups in Eureka are actively conducting VE test sections in Humboldt County. The 220 node system in NW Ca. is almost in place, just let the SNOW go away for awhile. DNARC has the RIGHT IDEA, visual demos about antennas, lite bulbs, fluorescent bulbs, etc. Need any old tubes, contact Hoppy, K6MUP, at the Locked tube stash, 10k in glass for \$1-\$5 each, what a deal! The Section Emergency Coordinators post is open in the Section, any one interested? Also the EC position in San Francisco City and County, anyone interested in SFRC? Summer is here and the A-THON's are everywhere, need help, contact me about the newest A-THON Book from ARRL about the right way to do it. Get out and support your local club, and AMATEUR RADIO. Traffic: N6FWG/T 41.

**SAN JOAQUIN VALLEY:** SM, Charles McConnell, W6DPD—SEC: W6CUB. STM: N6AWH. TC: W6EXV. ACC: W6DPD. Asst SMs: W6TRP and K6YK. Emergency Coordinators are still in Calaveras, Madera, Mariposa, and Mono Counties. Contact W6DPD or W6CUB if you can assist in this important area. 1988 officers of CCAC are: Pres W6AZBL, VP W6HMB, Sec W6BJT, and Teas W6JLL. The Club meets the third Monday in Fresno. The Club operates 146.79 MHz, 223.78 MHz, and 444.25 MHz repeaters. 1988 officers of the San Bernardino Microwave Society are: Pres W6BDNX, VP K6MBL, Treas W6BDA, Corres. Sec W6GOYR, and Rec. Sec W6AFMX. This Society promotes activity on UHF and higher frequencies. W6EXV is working on a KW amp for 2300 MHz. W6SVM is a SILENT KEY. K6BGM is Extra. K6BUUW is Tech. K6BTQW is General and is now N6RTU. The 46th Fresno Hamfest is now history. The attendees had a good time. K6BETA won the Grand Prize, a Yaesu FT 290R. W6AKZY, W6AUB, W6JPS, N6HWN, W6AYAB, W6SSX, N6HEW, W6AZBL, and W6UBK won prizes. The Sierra Hamfest is planned for Reno in August. More details should come on this later. Traffic: N6AWH 160, W6AYAB 26, K6PMG 8, K6RAU 3 (Mar.) N6AWH 99, K6PMG 11, K6DS 7, W6B1TM 1.

**SANTA CLARA VALLEY:** SM, Glenn Thomas, W6W6—SEC: W6OCV. TC: W6PWW. STM: N6JLI. PIO: W6SOML. ASM: N6JQU. ACC: W6MKM. BM:(vacant) OOC:(vacant) (April '88) There is a new Amateur Radio hotline in the area! (408) 971-1242 is the ARRL Amateur Radio class hotline, where you can find out about licensing classes in the area. Of course, I can only put the classes I know about, so if your club is having a class, either for novices or upgrades, let me know a month or two before the class starts so that I can publicize it on the ARRL Hotline!...The IBM club at their monthly meeting saw "The Earthquake is Coming," a video tape from PBS. The IBM club meets on the third Tuesday of every month at 5 PM at the IBM facility in San Jose, according to Weo Moerner WN6I, IBM ARC President. ...both SPECS and SVECS had successful pancake feed breakfasts. SVECS heard from Jim Berkland, the county geologist who has had some success in the field of earthquake prediction. ...the EMARC group heard from Ray W6ATKV on how to work the RS-10/11 satellites. ...the FARS group held their annual Homebrew Contest. Traffic (April): NR7E 86 (0), W8KZJ 82 (2), K6GSXW 11 (2) K6GIWG 4, (0) N6JLJ 3 (0).

## ROANOKE DIVISION

**NORTH CAROLINA:** SM, W. Reed Whitten, AB4W—ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: K4IWW. ACC: WC4T. TC: K4ITL. SGL: KE4ML Our new SEC is Tom Parker, N4MYB. Tom has served as EC for Wake Co. and has directed amateur operations during emergencies at the State EOC. He lives in Wilmington and is a valuable addition to the section staff. Tom is the first SEC to be provided with a state car equipped with siren and lights, and issued a call sign for use on NC emergency frequencies. (His position as supervisor of

the Wilmington office of NC Alcohol Law Enforcement, however, may have been a factor in this vehicle assignment. ...He is assisted by our DECS: WA4MOK, KA4PAZ, K44ME, WB4SGA and WB4HRR; who have been doing a SUPER job! Certificates of Merit were announced for EACH of them at the Charlotte Hamfest. One DEC slot, in the western end of the state, is open. The DEC is our liaison with the NC Emergency Management's Area Coordinator and the ECs in a 15-18 county area. [BT] Hurricane season is already here; a 28-county exercise will be held in eastern NC on June 15 with extensive amateur participation planned. [BT] Be sure FIELD DAY reports are sent in to document our sections extensive participation. Have a critique & discussion at next meeting - or on the air - to maximize value of this exercise. [BT] Your SM, SGL KE4ML, ACC WC4T, DECS WB4SGA & WB4HRR and ECs N4EY, W4NHV, KA4WYC attended the LPM and NC meeting Charlotte May 14-15. W4MHF and Mecklenburg ARS did a great job putting on this important meeting. Discussions included NTS/Packet, ARES, open ARRL board meetings, club matters, publicity/PIO and many other subjects. [BT] Cary ARC Swapfest is on July 16. WCARS - Asheville Hamfest is on July 31. [BT] Silent Keys: W4CH, WB4CYN and WD4EOK. [BT] Traffic: K4NLK 234, AA4VZ 190, KA4EYF 168, AA4TE 124, N4MQU 94, K4IWW 90, W4WII 79, WD4HTE 68, N4JRE 62, K4IYV 61, N4UE 51, N9CGD 50, WD4MRD 36, AB4EM 35, W4MNR 34, W4EHF 30, KA4TLC 30, N4LST 20, A4JF 17, W4LVZ 16, W4ZEDN 14, NT4K 5, N4CJ 1. (Feb.) AA4MP 96. (Mar.) NE4J 30.

**SOUTH CAROLINA:** SM, Jimmy Walker, WD4HLZ I attended a meeting of the SoCarVOAD April 20 at the Red Cross in Columbia. We discussed the idea of signing an MOU with the Governors Office and of listing capability info and activation protocol for each of the member organizations. What is SoCarVOAD? It is the South Carolina chapter of National Voluntary Organizations Active in Disaster. The purpose is to bring together national organizations active in disaster service to foster more effective service to people affected by disaster through-cooperation, coordination communication, education, convening mechanisms and mitigation. Requirements for membership state each organization must be national in scope and purpose, voluntary memberships and not-for-profit structure and active in disaster. In SC, 16 of the 22 national organizations are represented in the SoCarVOAD. In addition, DSS, Governors Office and Council of Churches are associate members. This is quite an elite group of organizations and you (Amateur Radio) are one of the 16. Traffic: KB4BZA 99, N4MEJ 87, KA4LRM 51, W4DRF 30, WB4UDX 20, WD4PKZ 10.

**VIRGINIA:** SM, Mark Witt, NN41-SEC: N4EXQ. ACC: NT4S. OOC: W4HU. BM: AB4U. SGL: W4UMC PIO: AA4VP. TC: WX4C. STM: KB4WT.

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VSNB	6:00	3947	K44BR
VSN	6:30	3680	N4KSO
VN(EARLY)	7:00	3680	N4GHI
VN(LATE)	10:00	3680	WB4KSG
VLN	10:15 PM	3947	KA4TWI
SVEN	7:15 PM	146.82	NT4S
STARES	9:00 PM	146.97	KJ4VT
DEC/EC	9:45 PM	3910	KA4NWK

(3rd Wed.)  
Field Day traffic to be sent to the SM or SEC. Packet use for reports encouraged. Must be in proper ARRL format. Richmond and Roanoke will be using BI-Centennial call signs. Enjoyed visit at Virginia Beach and HRRR Clubs in May. Three repeaters in South Tidewater autopatch open for emergency use to law enforcement. Barryville Hamfest Aug. 7, VA Beach Sept. 17-18. OOC reports 26 operating practice notices sent out. Notices are to help stations with operating practices. New OO appointments: K1ZZI, NN41, N4QAJ, ACC reports 19 Affiliated Clubs have returned annual reports. BM has state fairly covered, still looking for OBS in some areas. VIRGINIA HAM new format looks super-next issue in July - Thanks AA4VP. SEC appointments: OES: KC4DY, WB4PKY, N4EHJ, N4LSS; ECs: WB4WHH, WB4PEA, KK4PP, N4RCC, N4FZA, N4VL, WA4PAM. STM reports 40 stations reporting 3821 pieces of traffic. Traffic for April with N4GHI and K4DOR repeating BPL. Traffic: N4GHI 683, K4DOR 516, WB4PNY 395, K4MXT 305, N4EXQ 195, WD4FTK 193, AA4AT 168, W3ATQ 137, KB4WT 130, W4JLS 129, KB4NGO 129, K4K4V 83, W4TZC 67, K4BGZ 61, WB4ZNB 51, N6ANQ 51, WD4MIS 49, WB4KSG 47, K4JVT 45, WB4EDB 41, N4KSO 35, WB4ZTR 36, KB4OPR 36, K4JM 34, K4R3R 33, NN41 28, N4SMB 21, K4HJ 16, WB4KIT 16, K4IWL 14, K8BL 13, KB4UED 12, WA4TV8 10, N4FTN 9, WA4LTO 9, K4GR 6, K4VVK 5, K4BTF 5, NN40 2, W4HU 0.

**WEST VIRGINIA:** SM, Karl S. Thompson, K8KT—SEC: K9QEW. STM: N8FXH. ACC: W8ACTO. SGL: K8BS. TC: K8LG. RC: W8OZT. W8MIO is the new Pres. of PARK. congrats Corinne. WV now has 25 active ECs and 605 ARES members. 11 operators participated in Berkeley Co. fire net. Remember Jax Mill H. F. July 2nd and 3rd.

Net	Freq	Time	QNI	UTC	Sess	NM
WVFN	3865	6:00	1029	193	30	W8YP
WVMD	7235	11:45	758	56	30	W8FZP
WVN	3567	7:00	271	82	30	K8BQ
WVRN	3640	6:30	205	50	30	K8LG
WVNN	3730	5:15	130	34	29	W8BV

HILLBILLY 14290 Noon Su 134, 224  
Traffic: W8YP 295, W8BV 29, K4MIA 250, K8PTF 226, W8FZP 123, K9QEW 88, KD9WX 87, K8UGY 81, K8E5F 65, K8ZXP 61, W8DHC 44, K8KT 38, N8FXH 31, NC8G 27, K8QHC 23, K8QGF 8.

## ROCKY MOUNTAIN DIVISION

**COLORADO:** SM, Bill Sheffield, KO2J—ASM: K4MQA. SEC: W80TUB. STM: K80Z. ACC: W80DUV. BM: K8WOP. OOC: K8BCDN/W8JR. PIO: N8DZA. SGL: W8QFBQ. TC: W8LJF. Packet radio was used to a large extent during the recent Medical Set held in conjunction with ARES, Fitzsimmons Army Med. Ctr. Aurora Fire & Police and several area hospitals in Denver, Greeley and Ft. Collins. W80TUB, SEC, reports that much was learned by the three ARES districts involved in the SET. Many of the UHF/VHF enthusiasts will be mountaintopping and giving out some rare grids for the June VHF QSO Party. Field Day is a major event with reports of several clubs & groups gearing up for the mountains to the plains of Colorado for this contest weekend. Good luck to all. July 17th is DRC's Ultimate Swapfest to be held Jefferson City Fairgrounds, Golden. Contact ACBS. July 23-24th, Mtn. ARC Swapfest & Campout, Red Rocks Campground, Woodland



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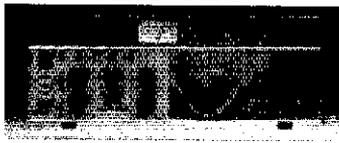
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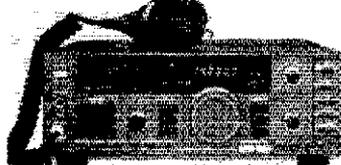
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Park. Contact N&CMD, July 30th, SKI Country ARC Swapfest, CMC, Glenwood Springs. This event is being held the weekend of the Carbondale Fair. Come for a weekend of fun. Contact K&GJZ, NETS: CWN: QNI 76, OTC 25, ONF 271, 27 sess. COL: QNI 1019, QTC 52-127, QNF 960, 30 Sess. HNN: QNI 1891, QTC 116-899 QNF 1184, 30 sess. NCTN: QNI 193, QTC 62, QNF 285, 27 Sess. SCTN: QNI 210, QTC 24, QNF 209, 25 Sess. Traffic: N0HFZ 355, K0HOA 180, K&WIE 92, K&BZ 82, W0BFFV 80, W0DDBZ 62, K&INI 32, K&E01 22.

**NEW MEXICO:** SM, Joe T. Knight, W5PDY—ASM: K&BIS. SEC: K&YEJ. DEC: W&DHC. STM: N05T. NMs: W&A5LNO, K&5NNG, W&QNR. TC: W&BYG. ACC: K&5EBE. Southwest Net meets daily, 3583 at 0230 UTC, handled 131 msgs with 220 checkins. NM Roadrunner Net meets daily, 3939 at 0100 UTC, handled 63 msgs with 1410 checkins. NM Breakfast Club meets daily, 3939 at 8:30 AM, handled 181 msgs with 999 checkins. Yucca 2-mtr Net, 78/18, handled 11 msgs with 332 checkins. Caravan Club 2-mtr Net, 68/06 with 116 checkins. SCAT Net, 66/06 handled 4 msgs with 552 checkins. Info Net 12/72, with 101 checkins. VY sorry to report the passing of K&SLI. He will certainly be missed. The "BEAN FEED" was a success even if the weather didn't cooperate. W&SXH, K&EFF & Sarah Jane McKemey (sxl of W&VYC) were the winners of the main prizes. Looking forward to Ft. Tuthill (Flagstaff) July 29-31, and WIMU August 12-14. Traffic: K&NSD 80, W&DAD 46.

**UTAH:** SM, Jim Brown, NA7G—SEC: Rich Fisher, NS7K. STM: John Sampson, W7OXC. Davis Co. ARC managed the March of Dimes walkathon in Brittl on April 23. It was successful because of a good turnout of helping hands. The Ogden ARC part. At the recreation of the Golden Spike ceremony at Promontory—a yearly event that the OARC consistently does well. I'm looking forward to WIMU, being held the 2nd wknd of Aug. at Mack's Inn (SW of Jackson). Make your reservations early. 73 de NA7G. Traffic: NS7K 87, W&7KHE 76, N7JLC 67, W&7MEL, N7UUN 30, NA7G 23, W7OXC 7.

**WYOMING:** SM, Jim Ralsler, N7GVV—ASM: Steve Cochran, W&7H. SEC: Jim Anderson, W7TZK. NM: Dick Murdock, K&7AR. NM: Norres Mogenssen, W7MZW. NM: Mac McDonald, W&7K. This report starts my 2nd year as your SM. I want to thank all of you for making the job enjoyable. Next month is the WIMU Hamfest which will be held at Mack's Inn, Idaho. The dates are August 12-14. Utah is the host this year. The Cheyenne club will be putting a club station on the air this summer, congratulations. Traffic: W7TZK 290, N7NH 313. Cowboy Net held 21 sessions with 704 QNI and 8 QTC. Pony Express held 4 sessions with 180 QNI and 4 QTC. Campbell County EOC was put in service this month with some problems with RFI with the amp online. 73 till next month.

## SOUTHEASTERN DIVISION

**ALABAMA:** SM, James Spann, W04W-ASM: W&XI. SEC: K&4GDN. STM: N&RT. ACC: AA4BL. PIO: K&4KCH. SGL: N&FRQ. OOC: K&4VS. TC: N&QII. BM: K&4AZL. John Murphy of Alabaster, K&4AZL, is our new Section Bulletin Manager. He is in need of a few good OBS volunteers - call him if interested. New AEND Manager is K&4BPP - let's give him our support by checking into the net (3725 kHz at 5:30 local time daily). Baldwin county has a new RACES/ARES net Sundays at 1500 local time on the 146.685 MHz repeater. Hurricane season is here - are you ready to help in case our services are needed? Our SEC, Boyd K&4GDN, has developed a new section emergency plan that divides the state into nine districts - Birmingham, Huntsville, Montgomery, Mobile, Tuscaloosa, Shelby, Ozark, Anniston-Gadsden, and Demopolis. Each district will have a DEC, and each county in the district will have an EC. That means we are in need of a total of 67 ECs, and many counties do not have one. Contact K&4GDN if interested. Our PIO, K&4KCH, distributes a section news update each month via packet - club newsletter editors are urged to use this.

Net	Freq	Sess	QNI	QTC	MGR
AEND	3725	30	138	36	K&4BPP
AENB	2985	34	318	79	W&CAT
ATNM	3985	34	3158	78	W&OE

**PSHR:** W&4JDH, W&4PIM, W&4CKS, N&4RT. BPL: W&4JDH. Traffic: W&4JDH 1024, W&4CKS 169, W&4PIM 167, N&4RT 20, W&4ZPZ 11, W&4DGH 10, W&4OW 8, W&4TVY 2.

**GEORGIA:** SM, Eddy Kosobucki, K&4JNL—ASM & ACC: W&4ABY. SEC: N&4E. STM: W&4WGL. Asst STM (Packet): W&4CO. BM: W&4ZOU. OOC: W&4TG. PIO: W&4DEB. SGL: W&4UVV & TC: W&4PAH. Well here it's already July & time for the 60th annual Atlanta Hamfestival scheduled for July 9 & 10 at the World Congress Center. If a new Radio Amateurs have never attended one of the larger hamfests this is our opportunity. PSHR honorees for the mo of April are: W&4COL, W&4DVZ, W&4RWB, K&4FG, W&4WQL, K&4BJN, K&4HHE, K&4JK & W&4HON. Tnx to all the OBS & Packeteers for relaying W1AW's bulletins & other info throughout the section. 1988-89 Columbus ARC officers are: Pres: W&4TOM, VP: K&4DOW, Sec: W&4TMK, Treas: K&4NZ & Act Mgr: W&4KCC. W&4ABY the section ACC & I both have a listing of all the affiliated ARC's, so if ur club or group need info please feel free to call on us for ur needs. Tnx to all who have given their time & equipment to the many "Special Olympics".

The sponsors really appreciated the help. How abt this: On Tues 4/19 the Atlanta ARC Lenox RPT 146.82 and out on 440 (449.825) was linked to the Evergreen Interie of Washington State, Idaho, Oregon & British Columbia. The operation in this mode was for one hr & check-ins were taken in the complete coverage area. HQ is sending me on all test sites in the section. If u need info on EXAMS contact me. If ur VE group is planning a future exam, please send the info to HQ, but do it well in advance. If u feel that u can qualify to be an OFFICIAL OBSERVER & give the time, please contact our section coordinator, W&4TG, Harvey Chase at PO Drawer 160, Gray, GA 31032-0160. There are many intractions that occur & the OOs responsibility is to HELP all of the HAMS. Once agn when u attend a hamfest, please go to the ARRL booth & fill out an ARES card. It costs nothing & u don't have to be an ARRL member, but we'd like to have u. CU in ATLANTA. Traffic: W&4COL 194, K&4FG 84, W&4DVZ 80, K&4HHE 53, W&4WQL 52, W&4HON 24, W&4RWB 24, K&4EV 17, K&4BAI 16, K&4NK 14, N&4MWR 12, K&4NJL 8. (Mar.) K&4JK 4.

**NORTHERN FLORIDA:** SM, Roy Mackey, N&4DI—ACC: Giff, W&4RIQ. ASM: Bill, K&4BL. OOC: John, AB6I. TC: Ed, W&4RAO. STM: Flip, AA4HT. BM: Dave, N&4GMU. SGL: John, K&4N. SEC: Rudy, W&4PUP. PIO: Petey, W&4PUO. Many

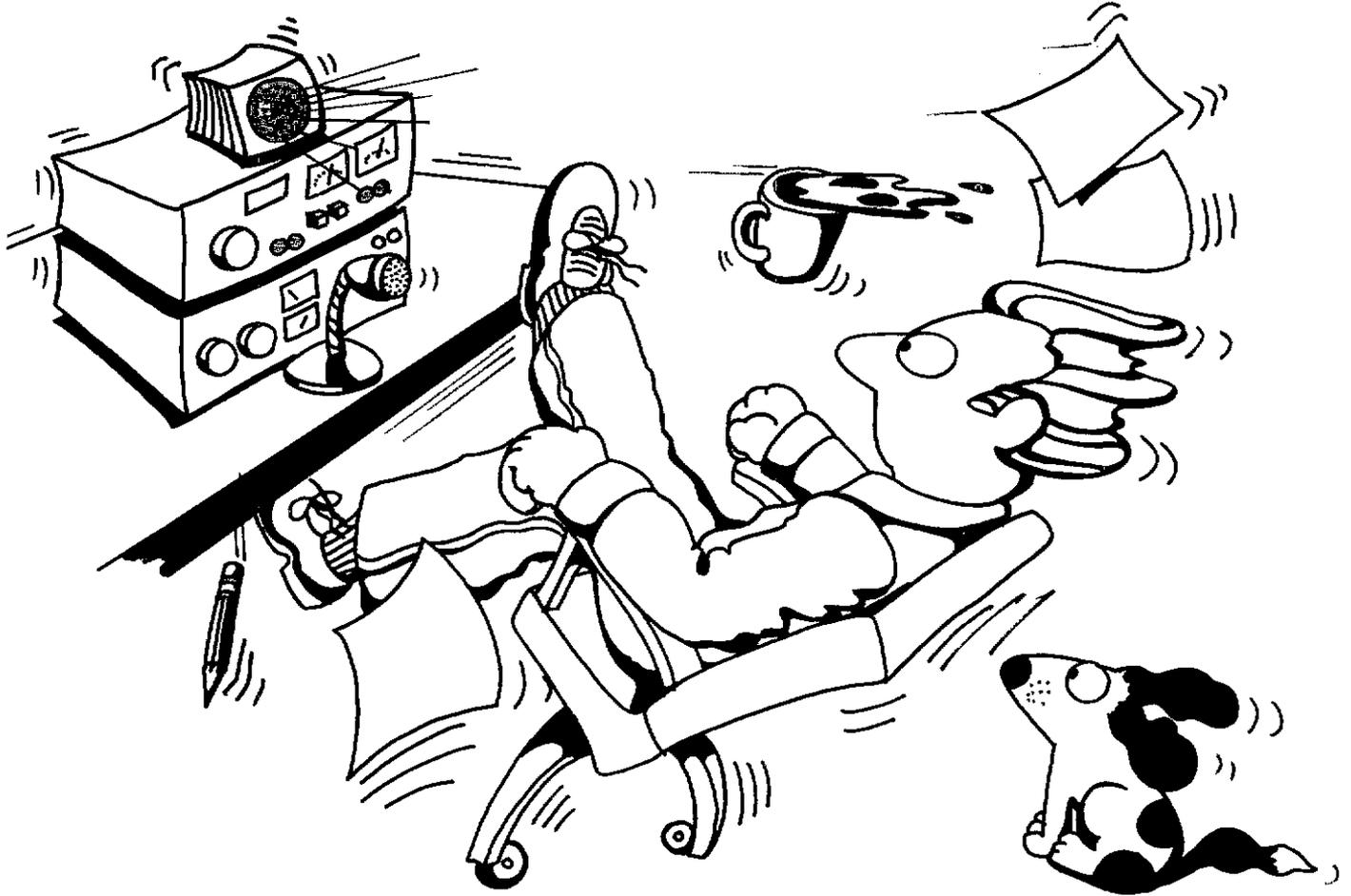
thanks to all the clubs and radio operators I met during my trip in April. Sun County, Silver Springs, Miracle Strip and the Playground ARC were the ones visited then. I will try to visit others as the schedules fit and also a few of the Hamfests coming up this Summer. BARS from Jacksonville Beach reports their new officers are K&4BPP, Pres; W&4KNE, VP; K&4AOI, Secy; W&4SQB, Treas; with Board members, W&4QBM, K&4AGY, and W&4UR. Congratulations to all the new and re-elected officers. Keep your club moving ahead and you will continue to grow, and thanks to John for reminding me!! Hi. This is the first month for AA4HT to be reporting the SARs and PSHR numbers to ARRL and Florida Skip via W&4PFFK, and I want to thank him for helping out this time. OARC in Orlando has elected K&4HO Pres, N&4MWL VP, W&4UJF Treas, K&4DG, Secy, and Board Members are W&4LBA, K&4UT, K&4EE, N&4MHV, N&4JIM and N&4LQD. All these people are to be congratulated, too, since it is a great responsibility to keep busy clubs moving ahead all the time. They, OARC, are just now finishing a Novice class and the LMAFS club in Altamonte Springs is starting one. 15 prospective Novices are meeting Monday evenings for the next eight to ten weeks. We'll be awaiting the new call signs of these new Novice Radio Operators. 73, Roy, N&4ADI. Traffic: W&4HX 734, W&4QXT 586, W&4DIO 490, K&4CY 315, N&4PL 315, N&4SS 298, AA4HT 294, K&4LB 287, N&4JA 286, K&4RL 268, W&4GHU 124, N&4GMU 114, W&4EYU 102, AA4OC 94, W&4D 83, W&4YWF 82, AA4FG 75, N&4DY 49, K&4FL 49, W&4UEA 47, N&4QY 46, N&4JHI 39, W&4XK 28, K&4NN 25, W&4SXW 25, W&4PUP 21, N&4COD 20, N&4NKI 20, K&4CC 18, W&4ZTR 17, W&4M 9, W&4AT 7, K&4FTM 5, W&4JH 2.

**SOUTHERN FLORIDA:** SM, Richard D. Hill, W&4PFFK-SEC: W&4SS. STM: K&4ZK. TC: K&4I. BM: W&4DKB. PIO: W&4WYR. SGL: K&4AN. OOC: W&4T&H. ACC: K&4EUK, W&4DKB reports 71 bulletins received and 146 sent by AA4BN 17, W&4DL 49, W&4AEC 71, W&4F 7, K&4IEK 24, W&4DKB 27, and W&4ARLV 22. Band conditions on 80 meters have been very bad the past several nights. Of course, it is nice to be able to take traffic under ideal conditions, but nights like these give us the opportunity to test and hone our skills for an actual emergency. Hurricane season is nearly upon us again, so who knows? This may be the year we need to be ready to deal with emergency/battery power and QRP, emergency antennas, antennas lowered or with one or both legs on the roof and so on. I listened to K&4FZL pass several pieces of Florida traffic to K&5W on RN5 during these conditions, and it was the perfect picture of two experienced ops working full breakin to perfection as the traffic was slowly but surely moved. Hopefully these conditions won't last too long but take advantage of them while they do - Hi!!! Congrats to the Hollywood ARC who has been renewed as a Special Service Club. W&4SOU said that the Polk Ham Club's annual Amateur Radio Communications Operations at the 1988 Sun & Fun EAA Fly-in experienced its biggest, busiest, and best year so far. A total of 744 visitors signed the guest register at the message center, 332 of these were Amateur Radio Operators. A total of 504 messages were sent to 45 states and three countries, Brazil, Venezuela and Canada. A note from W&4JM says he is getting over his second operation in four months and doing FB. Received a copy of the antenna ordinance as passed by the Pinellas Park City Council - in part they got approval to go to 75 feet. Congrats on a job well done and your info ref DX will be appreciated for this column. W&4DVU reported for the South Hillsboro ARK that the Huskin Days Springfair was a big success with 8 SHARK members working the parade down US 41. SHARK has an all-YL state of officers this year. SHARK T&LES also featured W&4NT who used a 33-1/2 foot center fed Zepp antenna in his attic to work all continents and 95 countries. The Fort Myers Modulator said that KY&T treated the club to an account of his world travels by sailboat in which he and his crew have sailed 15,000 miles from June 1987 to January 1988. The boat and crew are in Durban, South Africa where John will soon rejoin them to continue their trip around the world. AA4WJ, former SEC for Southern Florida, is now out of the hospital following a pretty serious leg infection. The Martin County ARC Common Emitter is sporting a new format - looks good. The Tampa ARC and W&4DUG sent thanks via their newsletter, QRM, to all the many traffic handlers who helped with the Florida State Fair traffic. K&4W&Z also reporting for W&4DUG sent an SAR totaling 508 for their participation at the Girl Scout Extravaganza held at the State Fair Grounds April 9. The Gator Chapter of QCWA reports that Mae, and Al Burke, W&3CUL and W&3VR, recently celebrated their forty-sixth wedding anniversary. The Broward ARC has been asked to handle communications for the annual Waterway Cleanup and once again the club has proved to be equal to the task. From the Everglades ARC Beam: it seems that K&4BU gets left out of callbooks and other things - well his gremlin struck again and he was left off of their list of those helping out with the bicycle races at Flamingo - maybe this will help make up for it!! Hi. Bulletins also sent by the Palmetto ARC, the South Brevard ARC SP&RK, South Florida F.M. Assoc., the Manasota Repeater Assoc., and the Sarasota ARA. Thanks much for the info - keep it coming. Special congratulations to K&4J and W&4AKI who have received 60 year plaques! The ARRL Information Net meets on 3940 at 8:00 AM each Saturday morning - please join us. 73 de W&4PFFK. Traffic: W&3CUL 3058, W&3VR 1079, W&4DKB 517, W&4W&ND 512, W&4DUG 508, W&4PFFK 357, W&4NFK 355, K&4EUK 344, K&4SCL 297, K&4K&V 254, K&4IA 240, K&4ZK 222, W&4ARLV 218, W&4AEC 197, K&4GMU 195, AA4BN 183, W&4RUE 179, K&4FZL 172, W&4WYU 150, W&4TH 143, N&4ET 107, K&4NFX 103, N&4MML 78, W&4DL 74, K&4Y&H 70, W&4AID 70, W&3TLV 65, N&4HAS 64, K&4Y&U 52, K&4LPL 44, K&4SIH 44, K&4JW 42, K&4GR 42, W&4F 40, W&4GCK 37, K&4FQU 32, K&4AR 31, K&4J 31, W&4LGT 30, K&4Z&W 29, K&4AJR 28, K&4YB 26, N&4ORZ 25, K&4SAKY 21, N&4KO 20, W&4N&K 18, K&4AUIA 17, W&3LR 17, N&4PFF 16, N&4SDS 15, N&4QER 14, N&4FL 12, W&4VWJ 12, N&4COI 12, AB&BC 12, W1K&M 11, W&4MPV 10, K&4EHP 10, AA4CH 9, K&4UHT 8, K&4OVC 6, N&4NGP 6, N&4XSQ 6, W&4HXU 6, AA4WJ 5, W&4PIL 5, K&4GDU 5, W&4VZ 4, N&4PSV 3, K&4EWO 2, W&4NSY 2, K&4KNZ 2, K&4JA 1, AA4IF 1, W&4DWN 1, W&4MFD 1, N&4RHJ 1. (Mar.) K&4Y 136, W&4VZ 111.

**SOUTHWESTERN DIVISION**

**ARIZONA:** SM, Jim Swafford, W7FF—STM: W7EP. NMs: K7POF, K&6LL, W&7CAG. Congrats to Art, N&27D, Bullhead City for being certified as newest OO, and member of Vol Mon program. Your SM visited Western ARC meeting recently, and talked about the club's possible affiliation with the League.

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**Table 4—Comparison of HF Amplifier Manufacturers**

NCJ Survey 1988 vs 1981

Manufacturer	1988	1981
Home-brew	23%	17%
ETO-Alpha	21%	17%
Heathkit	20%	37%
Dentron	7%	13%
Drake	6%	—
Ameritron	5%	—
Henry	4%	3%
Amp Supply	3%	—
Other	11%	4%

*Table and operator statistics excerpted with permission from March/April 1988 issue of the NATIONAL CONTEST JOURNAL, published by the American Radio Relay League, Inc.*

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July/August 1987

Volume 19, Number 4

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Also showed and left copy of "The New World of Amateur Radio," for their use in recruiting. Good group out there on the river! The OPRC annual picnic was attended by a few hardy souls who brave the chilly and windy wx to eat NINTE's great hamburgers. Maybe bigger turn-out next year. GVRG send in report on their recent special event, the "Titan Missile Silo Operation." 736 QSOs with 48 states using 20 ops., 4 rigs, and 5 bands. (1 N1X Sam, W6ROD). Transmissions from OSCAR 11 digtalker giving the position of the Russian and Canadian skiers over the polar trek were recently heard in Tucson on 145.825 MHz by your SM using a hand-held radio. We're anxiously awaiting launch of OSCAR Phase 3C, and hope by the time you read this, it will be in orbit and operating. Art, W1FJ, has volunteered for, and has been appointed our new Bulletin Manager for the AZ Section. He's interested in working with Bob, W7EP, our STM in getting NTS on packet radio. FB. Also, he has written a BBS User's Guide covering both the W0RL and the WA7MLB BBS type systems. The tango document is available by sending SASE with enough postage to W1FJ at his home QTH in Scottsdale. (Tnx Desert Aire Waves.) Saw and talked to numerous AZ DXers at the Visalia InVX convention including N7US and KY7M from the CADXA, and W6YOY and xyl WA6NMC from the SADXA. Get well wishes to Betty, W7GFF and Earl, K7JKM, both recuperating from recent hospitalization. Miss both of you on the nets. Recent EC appointment in Prescott area is W7UJ. By the time you read this, the 1988 Field Day will be history. Hope all clubs and groups who turned out had successful operations, and improved their skills in operating as well as "improving" under field condx. Don't forget Ft. Tullih hamfest, July 29, 30, and 31 at Flagstaff with K1ZZ and ON4UN on the program. Drop by the booth and "chew the rag." 73. Jim.

Net Abbrev QNI Traffic Sess

Southwest Net SWN 220 131 30

Arizona Cactus Net(HF) ACN 629 41 30

Arizona Cactus Net(VHF) ACN 242 52 30

Arizona TFC & Emerg Net ATEN 1004 1116 30

Trific: W7AMM 144, W7KCM 82, WE7G 81, W7EP 55, K6LL 34, W7OIF 26, W7KXE 24, K7POF 22, N7ETP 13.

LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF— The greater Visalia DX Convention is over! Congratulations to N6OU, Edgar, and his XYL Irene for a great get-together. I attended several of the planning meetings for this convention where W6ACA, WK6V, N6IC, WA6LGD, NK6A and the other dedicated volunteers did a commendable job. WA6QXX, Chuck, reports that he has a new record for the Panama Canal on 220 MHz. Every hour on the hour while passing thru the Canal he conducted propagation tests from the ship. The Los Angeles EC group had their greatest ever activity month in April. On the 9th of April the disaster planning group met at the Northridge Hospital. This hospital has grown to be one of the really large hospitals in the San Fernando Valley with hello ports and special facilities for handling emergencies. The disaster planning groups included the ARRL ARES coordinators, the Red Cross, the San Fernando Radio Club, the LA Fire Dept. and the host, the Civil Air Patrol. CAP has established a room and station at the N.R. Hospital for emergency and disaster coordination. Follow up meetings are planned. Hank, K6YMJ, and Dennis, KA6GSE, had a tour of the Coast Guard Air Station by Lt.Jg. Sommer on April 16, where they discussed the disaster roll of Coast Guard Air Station and the ARES communications interface plans. April 18, Hank, K6YMJ, Mike, N6KWS, and Dennis, KA6GSE, met with members of the School District Disaster group to explain that ARES has a lot of experience and would like to help them understand the over all interface problem with the Fire Dept., the Red Cross, the Police, RACES and other emergency services. My latest information indicates that the LA school system is planning to cooperate with ARES. Mike, N6KWS, is looking for teachers to help with a training program. Mike is the NW District EC. Another first for the ARES group was provided by Dennis, KA6GSE, and Hank, K6YMJ, during the Law Enforcement Relay Race to Las Vegas, April 23-24. Dennis and Hank established a TV link for the relay race from Baker to Las Vegas. The Nation's largest County Fair will have Ham Radio. The permanent Ham Radio Booth will have an operational station and display again this year thanks to W66QNR. N6GXZ is leading this effort for the volunteers from member clubs of the Los Angeles Area Council of AR Clubs. Volunteers will be needed daily from 10 AM to 10 PM, Sept. thru Oct. 2, 1988. Registration will begin in July. Please call N6GXZ or KN6H for more information. The Museum of Science and Industry in Los Angeles Exposition Park is making room for Ham Radio. AA6BX reported to the Los Angeles Area Council of AR Clubs. More details will be reported as they develop. TL6DN Margie (N6MMZ) has been on the FRIENDLY ET DX NET many times in the past few months. Margie's father John, W6YAR, is heading a fund for his missionary daughter to raise money to ship a donated tower and beam to the Central African Republic where only two or three hams are active. Please contact John, W6YAR, if you can help. His phone is (213) 864-4915. STM News: Summer is now on its way. We will need help to fill the upcoming vacation spots. W66VY has new Kenwood TS 940, also has been in hospital for heart surgery. Good luck. Ron, K6YBV was in hospital for a few days; back home and doing well. Please keep your reports coming in as we want to show our activity is improving. K6UYB back from the Colorado PAS meeting which was a great success. Traffic: N6LHE 505, K6UYB 426, W6INH 289, W6TH 210, W66VY 67, K1EA 43, W6NKE 30, K6YBV 22.

SAN DIEGO: SM, Arthur R. Smith, W6INI—SEC: W6INI. TC: N6JZE. STM: N6GV. Thru efforts of W6BOS, Amateur Radio was presented at Air/Space America Air Show in May. Jim ARES thru one of the following ARES nets:

2000 Sat 144.25 MHz	Section Net	SSB
* 2000 Tue 146.55 MHz	Southern Dist Net	FM
* 2000 Tue 147.06 (+) Mhz	Southern Dist Net Rptr	FM
1930 Wed 147.18 (+)	Coronado ARES Net	Rptr
		FM
1900 Wed 147.555 MHz	S D Emerg Net (SD OEM)	FM
1930 Sat 147.57 MHz	E Dist ARES	FM
1930 Sun 147.57 MHz	E Dist ARES	FM
* 1900 Sat 224.9(-) MHz	Section Net Rptr	FM

\*Novices Welcome.  
\*Except 1st Tue only.  
1988 Club Officers: S Bay ARS Pres. WA6RPP, VP KB6TPO, Sec. W6TKS, Tres. N6FMI; SD Rptr Assn. Pres. K6GAO, VP WA6URS, Sec. W6GIC, Tres. N6ICC. Get started in message handing thru the North County Traffic Net sponsored by

Palomar ARC; meets nightly at 8:00 PM on 146.73(-). The net met 28 times with 444 ck-ins, handled 71 msgs. Traffic: K6ZM 77, N6GV 74, K6ZH 46, N6RVO 27, K6JD 24.

SANTA BARBARA: SM, Thomas I. Geiger, W2KVA— ASM/Ventura: N6MA, ASM/Sbar: W66BYU. ACC: K6SBAH, BM: K6XG, STM: N6WP, OOC: W6AKF, PIO: N6FOU, TC: W6KVF, SEC: W66IJ, DEC/Ventura: W66RVA, DEC/Sbar: N6AJA, DEC/SLO: W66IJ. This month congratulations go to the Ventura Co. ARC, K6MFP, for another fine hamfest, and to the UCSB ARC, W6RFU, for a great demonstration booth at UCSB's "Super Saturday." The W6RFU bunch won a major award in this event for the second year in a row, walking away with "Most Animated Booth" honors. (They were last year's "Best Information Booth" winners.) The UCSB event attracts over 6000 visitors annually, and the group gave Amateur Radio some very fine visibility. Joy Sheller, club VP, writes: "We had several distinguished visitors...including the new chancellor...and several administration officials...were filmed by channel 3, KEYT, and interviewed by the school newspaper...We were only given 3 1/2 hours to completely set up in an unknown location. Talk about preparation for Field Day!" The club will soon be the Section's newest affiliated radio club—congratulations and welcome, W6RFU. Resuming our interrupted story about the field organization, we now look at the "New ARRL." In the late seventies, there was much criticism of the League (most of it unwarranted). In response, ARRL national leadership looked for ways to make the structure more responsive to the individual members. This was no easy task, and much effort and thought went into the final result. In 1980, I was privileged to participate in a meeting to discuss the matter. The list of attendees provides a measure of the seriousness with which this subject was viewed. The meeting was hosted by our own Section Communications Manager, Bob Dyruff, W6POU. The Santa Barbara ARC was represented by WA6VNN, Orange Section by current SW Div Director Fried Heyn, WA6WZO, and his lovely wife, WA6WZV. Div. Director (now ARRL First VP) Jay Holladay, W6EJL, was there, as was Pete Hoover, W6ZH, Steve Place, W6IEY, flew in from Newtonington, and ARRL First VP (later, President) Vic Clark, W4KFC, and President Harry Dannels, W2HD, also flew in from the East Coast. (Sadly W4KFC and W6POU are now Silent Keys. Their guidance is sorely missed.) The details of the meeting are not significant. The fact that ARRL leadership at the highest levels was vitally concerned with the wants and needs of the general membership is well worth remembering. The result of that meeting and many others is the organization we have today. Next month, we'll finish with a look at how the SBAR organization is put together. Traffic: W6NOF 138, N6NLW 110, K6HGB 54, K66IEC 37.

### WEST GULF DIVISION

NORTH TEXAS: SM, Phil Clements, K5PC—Asst. SM: K5MXQ. SEC: W5GPO, STM: W5VMP, PIO: K5HGL, BM: W5QXK, TC: W5LNL, OOC: W5BJP, SGL: N1CWP, ACC: W5URI. Our ARES organization has just undergone a thorough "housecleaning" by W5GPO, our Section Emergency Coordinator. Emergency Coordinators who did not submit an annual report to us for 1987 have been dropped from the roster. This report has been mandatory for many years, and is the only required paperwork that an EC must do each year to retain his appointment. Gerald Payton, N5GFC, has been appointed District EC for district 6, which covers Dallas, Kaufman, Rockwall, and Ellis counties. He has lots of good ideas for the complete revamping of that district's organization, and will be making several changes soon to increase the overall efficiency of the operation. This district plays a key role in all Section ARES activities as the majority of our manpower and equipment utilized for emergency preparedness lie within its boundaries. We expect great things from district 6 in future ARES operations. New officers for the Garland ARC: Pres. W5QV, V.P. K5FSD, Sec. KA5CHY, Tres. W5B5WJ, Editor, K5F5PE. The annual joint meeting of the 7290/TEX CQ Mtg. Nets was held at Rusk State Park on April 29, 30, and May 1st. I enjoyed the fellowship; seeing many friends, and meeting new ones! A truly great gathering of the "crop of the crop" in traffic handlers. Thanks to KA5AZK and the gang for making it all come together! Our next two major events Ham-Com and Field Day will give me another chance to visit with you in person. Hope to see you then. 7290 Traffic Net for April: QNI/2 961, QTG/501 in 47 sessions. North East Texas Traffic and Emergency Net (Longview) for April: QNI/52 in QTG/3 9 sessions. PSHR for April: WZ5N, W5VMP, K5UPN, K5F5BL, KA5ZWP, W5DEEH, K5BADE, and K5MXQ. Traffic: W5NTN 341, K5UPN 201, W5VMP 181, W5DEEH 174, A15K 171, K5F5BL 157, K5BADE 128, WZ5N 95, K5MXQ 88, KA5AZK 54, K5NSG 31, KA5ZWP 29, WA5E2T 20, K5CDS 6.

OKLAHOMA: SM, Bill Goswick, K5WG-ACC: Ernie Buck, W55CDW, BM: Howard Baker, W5AS, OOC: W. Goswick, K5WG, SEC: Bennett Basore, W5ZIN, SGL: Larry Hazelwood, W5NZS, STM: Sam Sifton, K5V5, TC: Ken Isbell, W5QMJ. Congratulations to Beau Jayroe, KA5VYG, 14 year old 9th grader and member of the Altus Area Amateur Assn. on winning first place in the electronics category at the SW Interscholastic Meet at Southwestern State University, Weatherford. The Sooner Traffic Net has moved to 3845 kHz, still Monday thru Saturday at 1730 hours local. The Moreland Swapfest and Eyeball QSO was again a success: lots of fun, lots of people there, and lots of goodies in the flea market. Make plans for that one again next April. Enid's 34/94 machine is back on the air with lightning protection much improved. Their 220 machine should be operational as you read this. Jim, K5F5D, Chuck, WA5UJF, Dan, K5CAY, Ron, W5DHUT, and Ken, W5QMJ, of the Enid ARC recently claimed the world record on lowering the top section of a super heavy-duty tower. Seems that they just don't take pulley hooks like they used to. Traffic: K5FRD 227, W5AS 207, N6IKN 90, WA5OJLV 85, W5R5 55, K5GBN 44, WA5ZOO 32, K5V5 31, WA5OGC 28, K5CXP 27, W5VLU 26, W5VOP 22, W5J1, 1. BPL-K5FRD, W4AS PSHR-K5FRD, K5CXP W5AS. March Traffic: W5AS 263.

SOUTH TEXAS: SM, Arthur R. Ross, W6KR-ASM: N5TC, STM: W5SO, SEC: K5GD, PIO: WA5U7B, OOC: WA2JLL, ACC: W5YDD, BM: K5CVD, TC: N25U, SGL: K5JKJ, OBS: N5AF reports Sam Houston ARK had good results with Novice class; new Amateur: K5SEWU, K5SEYR, K5BFWB, K5F5PP, K5B5FPQ, K5B5FSO, K5B5FSW, K5B5FSX, K5B5FUG.

(continued on page 128)

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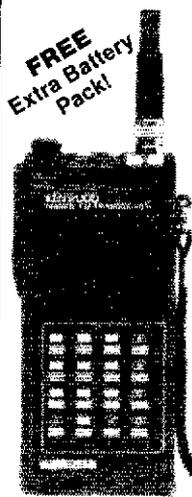


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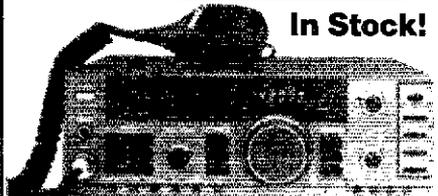
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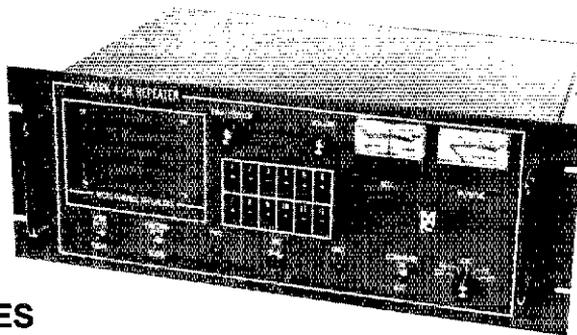
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## \$12,000,000 Scanner Sale

Uniden Corporation of America has purchased the consumer products line of Regency Electronics Inc. for \$12,000,000. To celebrate this purchase, we're having our largest scanner sale in history! Use the coupon in this ad for big savings. Hurry...offer ends July 31, 1988.

### ★ ★ ★ MONEY SAVING COUPON ★ ★ ★

Get special savings on the scanners listed in this coupon. This coupon must be included with your prepaid order. Credit cards, personal checks and quantity discounts are excluded from this offer. Offer valid only on money orders mailed directly to Communications Electronics Inc., P.O. Box 1045—Dept. UN12A, Ann Arbor, Michigan 48106-1045 U.S.A. Hurry...coupon expires July 31, 1988. Coupon may not be used in conjunction with any other offer from CEI. Limit one coupon per scanner. Add \$7.00 for shipping per scanner in the continental U.S.

**Regency TS2-SA2** ..... \$269.95  
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### NEW! Bearcat® 760XLT-SA3

List price \$499.95/CE price \$279.95/SPECIAL 12-Band, 100 Channel • Crystalline • AC/DC Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz. The Bearcat 760XLT has 100 programmable channels organized as five channel banks for easy use, and 12 bands of coverage including the 800 MHz band. The Bearcat 760XLT mounts neatly under the dash and connects directly to fuse block or battery. The unit also has an AC adaptor, flip down stand and telescopic antenna for desk top use. 6.5"16" W x 1 1/4" H x 7 3/4" D. Model BC 560XLT-SA3 is a similar version without the 800 MHz band for only \$219.95.

### SALE! Regency® TS2-SA

List price \$499.95/CE price \$309.95/SPECIAL 12-Band, 75 Channel • Crystalline • AC/DC Frequency range: 29-54, 118-175, 406-512, 806-956 MHz. The Regency TS2 scanner lets you monitor Military, Space Satellites, Government, Railroad, Justice Department, State Department, Fish & Game, Immigration, Marine, Police and Fire Departments, Aeronautical AM band, Paramedics, Amateur Radio, plus thousands of other radio frequencies most scanners can't pick up. The Regency TS2 features new 40 channel per second Turbo Scan™ so you won't miss any of the action. Model TS1-SA is a 35 channel version of this radio without the 800 MHz band and costs only \$239.95.

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List price \$799.95/CE price \$329.95/SPECIAL 16 Channel • 25 Watt Transceiver • Priority The Regency RH256B is a sixteen-channel VHF land mobile transceiver designed to cover any frequency between 150 to 162 MHz. Since this radio is synthesized, no expensive crystals are needed to store up to 16 frequencies without battery backup. All radios come with CTCSS tone and scanning capabilities. A monitor and night/day switch is also standard. This transceiver even has a priority function. The RH256 makes an ideal radio for any police or fire department volunteer because of its low cost and high performance. A 60 Watt VHF 150-162 MHz version called the RH606B-SA is available for \$429.95. A UHF 15 watt, 10 channel version of this radio called the RU150B-SA is also available and covers 450-482 MHz, but the cost is \$419.95.

### ★ ★ ★ Uniden CB Radios ★ ★ ★

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- PRO520XL-SA Uniden 40 channel CB Mobile ... \$59.95
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### Bearcat® 200XLT-SA3

List price \$509.95/CE price \$279.95 12-Band, 200 Channel • 800 MHz. Handheld Search • Limit • Hold • Priority • Lockout Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz. The Bearcat 200XLT sets a new standard for handheld scanners in performance and dependability. This full featured unit has 200 programmable channels with 20 scanning banks and 12 band coverage. If you want a very similar model without the 800 MHz band and 100 channels, order the BC 100XLT-SA3 for only \$199.95. Includes antenna, carrying case with belt loop, ni-cad battery pack, AC adapter and earphone. Order your scanner now.

### Bearcat® 800XLT-SA

List price \$549.95/CE price \$259.95/SPECIAL 12-Band, 40 Channel • No-crystal scanner Priority control • Search/Scan • AC/DC Bands: 29-54, 118-174, 406-512, 806-912 MHz. The Bearcat 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9 1/4" x 4 1/2" x 1 1/2". If you do not need the 800 MHz band, a similar model called the BC 210XLT-SA is available for \$196.95.

### Bearcat® 145XL-SA

List price \$189.95/CE price \$98.95/SPECIAL 10-Band, 16 Channel • No-crystal scanner Priority control • Weather search • AC/DC Bands: 29-54, 136-174, 406-512 MHz. The Bearcat 145XL is a 16 channel, programmable scanner covering ten frequency bands. The unit features a built-in delay function that adds a three second delay on all channels to prevent missed transmissions. A mobile version called the BC 560XLT-SA is available for \$98.95, from Communications Electronics Inc.

### Regency® Informant™ Scanners

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BC760XLT 800 MHz mobile scanner Only \$279.95

### ★ ★ ★ Uniden Cordless Phones ★ ★ ★

A major consumer magazine did a comparison study on cordless phones. The check points included clarity, efficiency and price. Uniden was rated best buy. XE700-SA Uniden Cordless Phone with speaker ... \$114.95

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If you purchase a scanner, CB, radar detector or cordless phone from any store in the U.S. or Canada within the last 30 days, you can get up to three years of extended service contract from Warrantech. This service extension plan begins after the manufacturer's warranty expires. Warrantech will perform all necessary labor and will not charge for return shipping. Extended service contracts are not refundable and apply only to the original purchaser. A 2 year extended contract on a mobile or base scanner is \$29.99 and 3 years is \$39.99. For handheld scanners, 2 years is \$59.99 and 3 years is \$79.99. For radar detectors, 2 years is \$29.99. For CB radios, 2 years is \$39.99. For cordless phones, 3 years is \$34.99. Order your extended service contract today.

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  - MT5100 PLUS-SA Regency marine transceiver ... \$134.95
  - R1090-SA Regency 45 channel scanner ... \$119.95
  - NEW! R2060-SA Regency 60 channel scanner ... \$144.95
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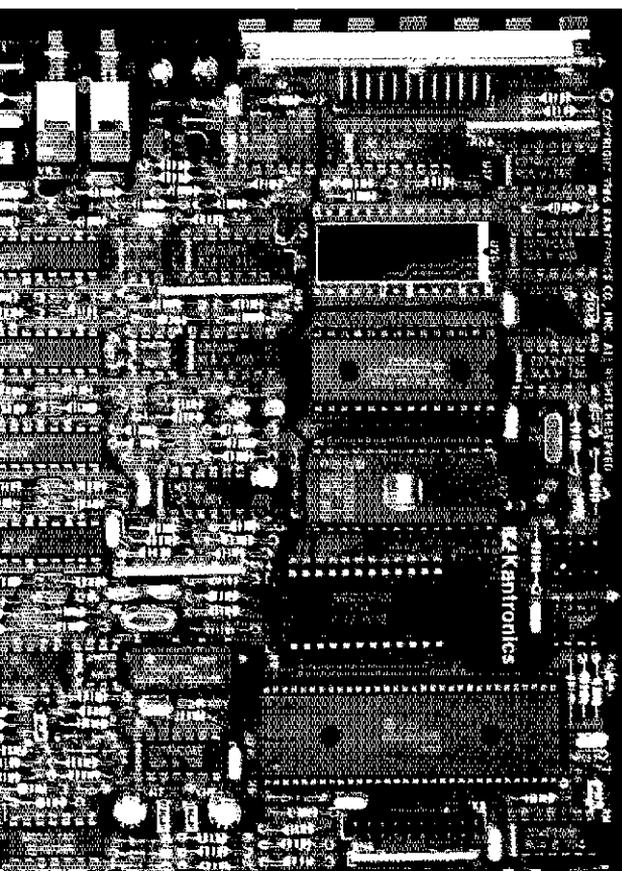
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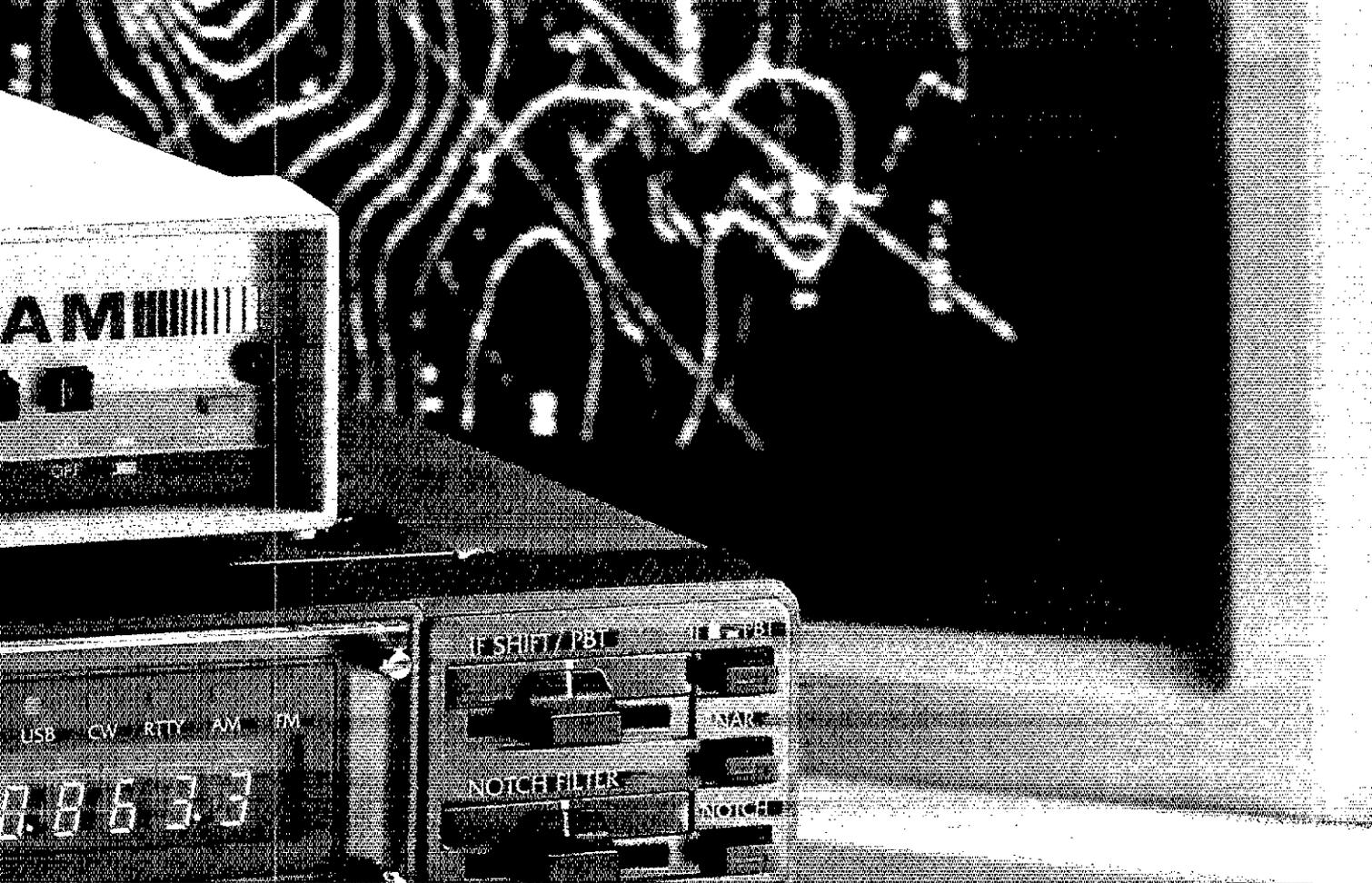
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GRAYLINE PROGRAM

by ON4UN

YOUR LATITUDE IS 47 DEG. NORTH  
 TIME OF YEAR (MONTH/DAY) = 11 / 7  
 YOUR SUNRISE IS AT 14.59 UTC  
 GRAY LINE WIDTH IS 46 MINUTES

YOUR LONGITUDE IS 122 DEG. WEST  
 YOUR SUNSET IS AT 00.44 UTC  
 MINIMUM TARGET DISTANCE IS 14000 KM.

PREFIX	COUNTRY	CITY	KM.	START	END	MIN/TARG
FBX	KARQUELLEN ISL.		19136	14.26	14.41	20
PH	MAYOTTE		18019	14.52	15.12	20
FE	REUNION ISL.		17113	14.26	14.41	20
FR	EUROPA ISL.		16837	15.23	15.32	20
FR	GLORIOSO		15931	14.42	15.02	20
FR	JUAN DE NOVA		16390	15.07	15.27	20
FR	PROMELIN		16524	14.26	14.39	20
TS	SOMALI	MOGADISHU	14416	14.34	14.54	20
VKO	HEARD ISL.		18714	14.26	14.40	23

PREFIX	COUNTRY	CITY	SUNRISE	SUNSET
EAC	BALEARIC ISL.	PALMA	04.27	19.20
EAB	CANARY ISL.	STA. CRUZ	06.12	20.06
EAS	CUBA & MELILLA	MELILLA	05.02	19.30
EI	IRELAND	DUBLIN	04.03	20.55
EL	LIBERIA	MONROVIA	08.33	19.02
EP	IRAN	TEHRAN	01.23	15.54
ET	ETHIOPIA	ADDIS ABEBA	03.10	15.48
F	FRANCE	PARIS	03.53	19.57
F	FRANCE	MARSEILLE	04.03	19.22
F	FRANCE	BORDEAUX	04.21	19.52

STATION COORDINATES: 34.2 DEG NORTH, 118.1 DEG WEST

PREFIX	COUNTRY	CITY	DIR	(KM)	DIST (MILES)
( )	ABU ALI		23	14269	8868
IA	ORDER OF MALTA	ROME	34	10180	6314
LSI	SPRATLEY		302	12908	8022
MA	MONACO		38	8738	5432
SB6-7	AGALEGA & ST. BRANDON		12	17301	10752
SB6	MAURITIUS		18	18595	11432

COIL CALCULATION

by ON4UN

THIS PROGRAM CALCULATES THE COIL PARAMETERS GIVEN A REQUIRED INDUCTANCE OR THE COIL INDUCTANCE GIVEN THE COIL PARAMETERS FOR BOTH AIR WOUND AND TOROIDAL INDUCTANCES.

ALL DIMENSIONS ARE IN INCHES

AIR WOUND COIL OR TOROIDAL CORE? (A/T) >

COMPUTE INDUCTANCE (I) OR COIL PARAMETERS (C) >

REQD. INDUCTANCE (uH) > ? 3.4  
 COIL DIAMETER IN INCHES > ? 3  
 COIL LENGTH IN INCHES > 4

REQUIRED NUMBER OF TURNS = 9

# Low Band DXing Software

by John Devoldere, ON4UN

This inexpensive software will save you plenty of time. DXers will find these programs useful: grayline, great circle, and sunrise/sunset time listings. Of particular interest are the types of problems you can solve that have to do with antennas and transmission lines: mutual impedance, element driving impedance, voltage or impedance along with feedlines, feedline transformer, shunt or series input L network iteration and design, shunt or series impedance network, Pi or T line stretcher, feedline T junction/parallel impedances, SWR iteration and calculation, stub matching, horizontal antenna wave angle, vertical antenna design program, top loaded vertical design program, vertical array pattern calculation, element taper, coil calculation, RC/RL circuit transformation and obtaining precise resistance and capacitance values.

When ordering specify format; these versions are available for \$30: MS-DOS for IBM and IBM compatibles, DOS 3.3 for Apple 2C, 2E, or 2+, CP/M for Kaypro or Xerox, CB-128 CP/M for the Commodore C-128. The Macintosh version is \$35. Please add \$2.50, (\$3.50 for UPS) shipping and handling.

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plus 2 more awaiting calls. N5MAQ reports upgrading to Extra; GREAT OBS W5KLV reports 9 bulletins in April, read on 9 nets. HOT HOG NEWS, Brady, reports WQ5Z working on BBD NETROM digipeater to improve area packet optnc. DRN5 NM WBSYDD reports 688 messages in 60 April sessions; STX represented 100% by KD5KQ, W5SHN, W5SHZQ, W5KLV, N5DFO, W5VX, W5CTZ, KE5ZV, W5ZJY, W5EPA, W5FQU, WBSYDD. PIA N5FIX, Northwest ARS, Houston, reports NARS members W5AF, KB4AEJ, N5KEU, KA5QAP, N5FIX, KE5IC, KF5SB, W5BKK, KB5AEL, KA5AKG, KA5DNP, KF5ZL provided communications for Reeling Hegata canoe race on Buffalo Bayou; NARS picnic a big success with 30+ members and wives present; NARS has changed from 15 meters net to 10 meter net to get Novices in; NARS operators KF5ZL and KB5AEJ were two of the local Hams who provided communications for the Multiple Sclerosis 150-mile bike race from Houston to Austin; all helped greatly with the many minor injuries and mishaps. BM K5CVD reports the South Texas Section Leadership Packet Bulletin Board (STSL/BBS) on 145.09 for full service operation as section-wide clearing house; visited Brazosport and NARS with plans for more visits; D-CAT, Houston, installing NETROM NODE digipeater on 145.07 atop eight story building. CAND ANM WBSYDD reports 497 messages in 30 April sessions; RN5 represented 100% STX stations helping were: KE5ZV, KD5KQ, W5KLV, W5EPA, W5FQU, NX5V, W5ZJY, N5DFO, WBSYDD. NM KA5AZK reports 7290 Traffic Net had 501 messages in 47 April sessions; QNI 2963; NTS liaison 2 per session. Brazos Valley ARC, Ft. Bend and Harris Counties, reports good results from recent VE test sessions; upgrades for KB5PE, KE5JA to Extra; N5KXU, N5KWQ, KB5EG to Advanced; KA5OJE, KB5EGH to General; KB5BXO, KB5DGA to Technician; three passed test elements, one unlicensed went to Advanced, one unlicensed to General, three unlicensed to Technician; GREAT GOING GANG! Texas Southmost ARC, Harlingen, gave good service to RioFest 88 on very short notice with N5HTI, W5AZRP, KD5IU, K5CZA, KA5WQ, W5ADYV, K5LAE and W5WRW. PIA N5ZJ, Sequin, reports new Novice KB5FUH; W5DLN, K5IG, N5KEI and N5ZJ served the Sequin Walkathon. Newly appointed Houston ECHO PIA K5SHQ reports estimated 30 emergency calls to various agencies in April; provided 30 operators to Heart and Sole Run involving 2000+ runners; 20 members helped at the Special Olympics (article and pix to ARRL soon). PIO W5UZZ busy with visits to Houston area clubs; he and BM K5CVD conduct ARRL forums at meetings; attended Angleton Hamfest where Vice-Director N5TC chaired AFRL Forum. Traffic: WBSJ 387, WBSYDD 323, W5CTZ 228, W5SGKH 163, W9OYL 112, WR5O 75, W5EPA 65, NV5L 56, W5BGE 43, W5FQU 42, AC5Z 34, KGSIS 39, WA2VJ 26, W5UZZ 22, N5ZJ 4.

WEST TEXAS: A. Milly Wise, W5OVH—ASM: KA5PTG. ASM: K05D, ASM: WD5EFJ, ASM: WF5E, ASM: N5DO. SEC: W5MVJ. PIO: KESZW. ACC: K5IS. OOC: K5KNC. BM: K5VRF, TC: K5CU. STM: AE5I. The Amarillo Red Cross holds disaster training courses on third Monday of each month—the West Texas Section Managers Net now meets on the first and third Thursday of each month at 0100 Z on 3931. We may have to change time and freq. due to QRN and QRM on the freq. ASM Raiford, WD5EFJ, and N5DOX, Bill, are trying to coordinate off-road fire fighting equip. with water trucks, mobile radios with quick connect power cords (to battery) and magnetic antennas capable of hitting repeaters would be a great asset—the new repeater on Christmas Mt. in Alpine & Terlinga area freq. is 148.82, remote base 146.72. Thirteen hams participated with Snyder ARC for the City of Snyder's disaster drill. Big Springs ARC holds Novice classes every Tuesday, taught by George, WA5RWF, & Bucky Gardner. W5TOC reports Sweetwater repeater link is 147.72/147.12. The ten meter net freq. of 28.454 has been designated as a common West Texas Emerg. Net freq. K5GSA, N5HDA, K5KKO & W5XE all of El Paso went to Big Bend and helped Alpine hams with comm. for bicycle races. DEC N5PFR, Herb, El Paso, is seeking dedicated ARES members in far West Texas counties. The overall performance of the Mobile Comm. Trailer of the Prairie Dog ARC of Childress was judged superior. 73, SM, Milly Wise, W5OVH. Traffic: AE5I 112, N5KJC 16, W5OVH 4.

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"They said I couldn't work DX with just 100 watts. Especially with a radio that has less than 1000 switches on the front panel.

But the truth is, I'm working lots of DX, more than some of these blockbuster types, thanks to my Yaesu FT-747GX.

You see, my no-nonsense FT-747GX was designed with me in mind, so I can hop around the band fast to nail those DX stations. While the other guys are warming up their amplifiers, I'm working the new country!

My FT-747GX has a super receiver, with a directly-driven mixer for great overload protection. And, Yaesu included the CW filter in the purchase price

(I used the money I saved on postage for the QSL cards!).

And my FT-747GX is loaded with other features. The receiver works from 100 kHz straight through to 30 MHz, and it's a fantastic shortwave broadcast receiver. I can use all twenty memories for that alone! Plus it's got dual VFOs. A noise blanker. Split frequency operation for the pile-ups. And scanning up the band helps me check out openings as they happen.

I just put in the optional crystal oven, and next month I'm going to pick up the FM board. I can't wait to tell my buddies I worked England on a repeater!

And with the money I saved when I bought my FT-747GX, I got

a second ten-meter antenna for satellite work on the high end of the band. I use my personal computer to tell me what satellites are going by, and the computer even sets the frequencies on the radio for me.

Now my friends are getting FT-747GX rigs, too. I knew they'd figure out my secret weapon sooner or later. But now I'm setting the pace!

Thanks, Yaesu. You've made a rig that makes sense."

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701  
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# YAESU

## "They laughed when they saw my radio. Then they saw my logbook."





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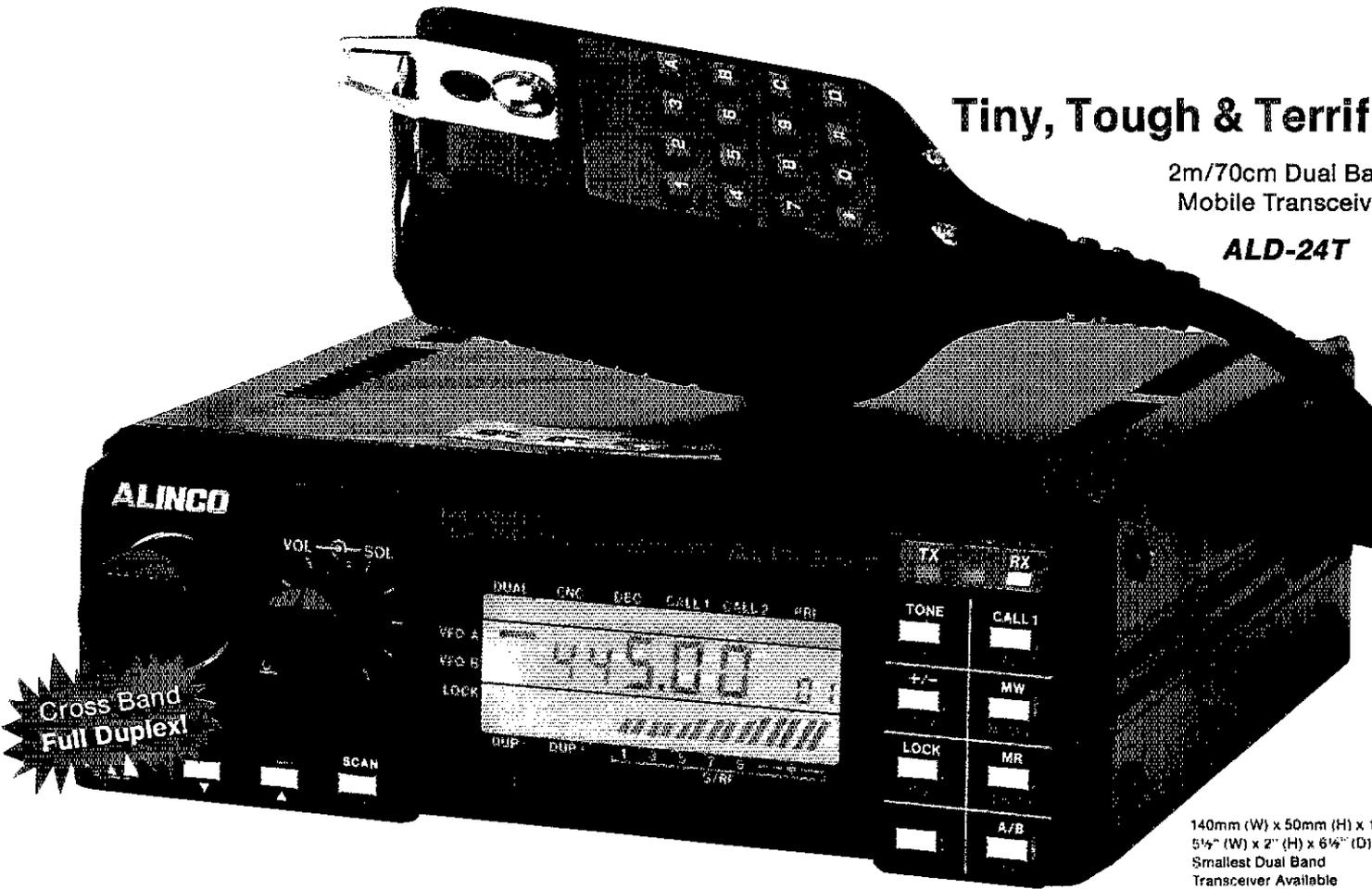
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## Dual Bander

### Tiny, Tough & Terrific

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Mobile Transceiver

**ALD-24T**



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5 1/4" (W) x 2" (H) x 6 1/4" (D)  
Smallest Dual Band  
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With ALINCO's advanced engineering and technology, the ALD-24T 2m/70cm Dual Band Mobile Transceiver is designed to be the ultimate in compact size with an impressive array of features, allowing maximum flexibility in installation and ease of operation.

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- \* Many more features, see your Dealer!

Also available:  
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**\*ALL ALINCO Products carry a 2-year Factory Warranty.  
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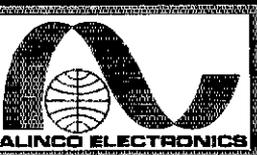
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## Tiny, Tough & Terrific



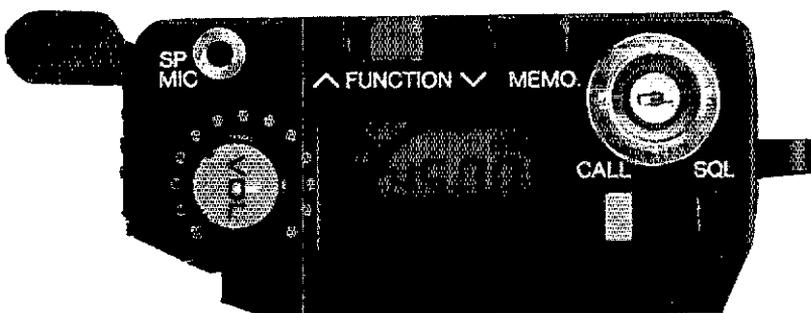
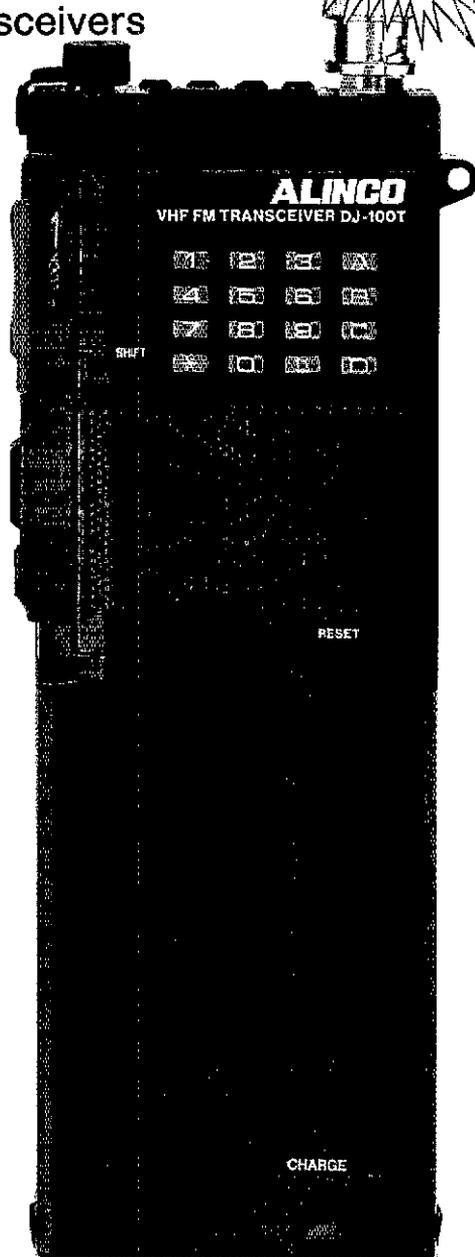
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- **Tiny** = 1-3/16" D x 2-3/8" W x 6-5/8" H
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**Suggested List Price \$299.00**

- LCD with Switchable Backlighting
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## Rechargeable Battery Packs: Their Life and Power

**T**wo frequently raised questions among VHF operators are which optional battery packs to use with a particular handheld transceiver and how long will that battery operate between recharges. Such inquiries are quite understandable yet obviously open-ended, as specific answers are influenced by one's utilized power levels and operating style. . . and that also varies on a day-to-day basis. Assuming the general capabilities and limitations of various battery packs are understood, however, it is surprisingly easy to determine the battery pack(s) best suited to your needs and to estimate their life between charges. This Tech Talk will take a closer look in those directions.

Rechargeable battery packs are basically refillable or reusable energy storage mediums, each type exhibiting a different voltage and current rating to fill a particular requirement or purpose. Higher voltage packs produce a higher power output from their properly mated transceiver, lower voltage packs produce lower output (and reduced transceiver height), and high current packs of either voltage produce longer operating times between recharges. These functions are possible because FM communications convey intelligence in frequency rather than in amplitude or signal level variations. Battery pack voltage can thus be changed without degrading the mode's high quality audio.

As further insight into battery pack selection, let's analogize their current rating or storage capacity to automobile fuel tanks (after all, they are both energy reservoirs). A small auto with an economy-size fuel tank can travel X-number of miles before going dry or refueling. A larger and more powerful vehicle requires more fuel for traveling a comparable distance, thus it is equipped with a larger capacity tank. Relating those concepts to handheld FM transceivers explains why very small battery packs can be used with pocket-size transceivers and larger packs are mated with high power handhelds. The small unit simply requires less milliamps-per-hour of operation.

Visualizing the automobile fuel tank analogy, two methods of increasing operating times

between refills come to mind: use a larger capacity tank or carry a spare tank for quick swaps. Before considering that decision, let's calculate a handheld's milliamp-hour consumption in the same way we estimate an auto's miles-per-gallon rating. These calculations are not a new discovery, incidentally, but simply a readaptation of a proven principle. Early Volkswagens did not include a fuel gauge, for example, and their owners seldom unexpectedly ran out of fuel. They simply kept track of miles traveled and refilled accordingly. An included low capacity spare tank was also lever-accessible for emergencies.

A fully charged 8.4 volts/270mAH battery pack like ICOM's BP-22 will deliver 27mA for 10 hours, 54mA for 5 hours, 270mA for 1 hour, or 540mA for 1/2 hour. That pack is supplied with ICOM's IC-u2AT transceiver which draws 600mA during transmit, 60mA on receive, and 30mA when squelched. During a typical 5 hour period, let's assume you enjoy a combined and total time of 4½ hours silently monitoring with the unit squelched (135mA used), 30 minutes listening to repeater conversations (30mA used) and 10 minutes actually transmitting (100mA used). Soon thereafter, the rig's battery monitor will indicate a depleted pack. If you switch to a spare BP-22 at that time, your operating period will be doubled. If you swap to an optional 600mAH/long-life BP-23 instead, over 10 additional hours of similar style operating are ready for use.

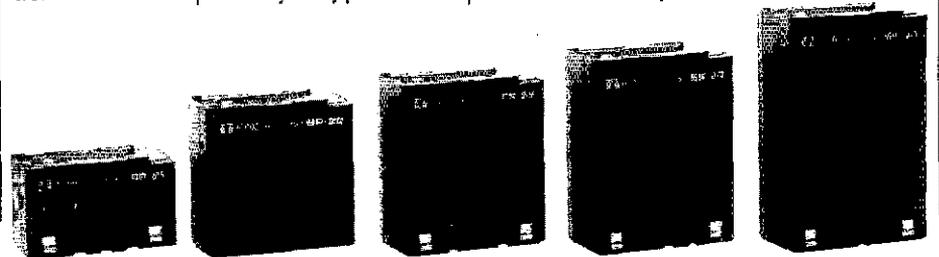
The previous calculations, incidentally, were simplified for understanding and did not include the ultra-low current battery saving mode in ICOM's Micro and "G" series handhelds. When these units sit quietly squelched for 30 seconds, they automatically shift to saving mode and draw a scant 6mA. That explains why many proud ICOM

owners report surprisingly good battery life even under very long operating conditions.

Continuing our discussion, ICOM's optional 10.8 volt/600mAH BP-24 raises an IC-u2AT's output from 1.4 to 2.6 watts while also providing long life between chargings. The handheld's height increases only 23mm with this pack change. Alternately, ICOM's ultra-compact BP-21 reduces an IC-u2AT's height to 30mm shorter than a BP-22-equipped handheld for shirt pocket use. This 7.2 volt/120mAH pack shifts the IC-u2AT (or IC-u4AT) to 1.2 watts output with operating time approximately half of our previous BP-22 example.

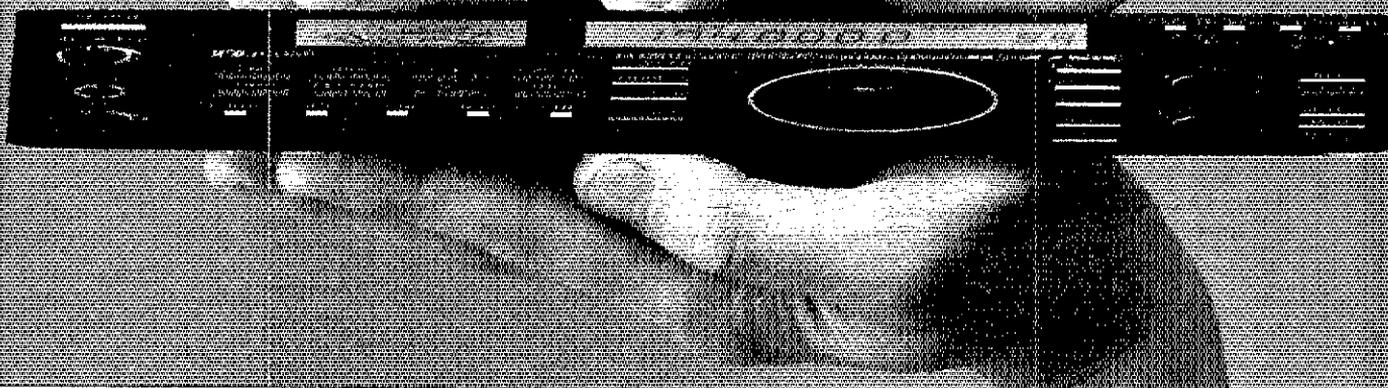
While the previous discussion exemplified ICOM's Micro series handhelds and their battery packs, its information also applies to other units like the new "G" series handhelds. When selecting optional packs, simply remember, high voltage packs mean higher transceiver output, lower voltage packs mean lower output, and high current packs of either type mean longer life. Alternate using your spare packs so they stay healthy; use them until your handheld's monitor just indicates depletion. Recharge them fully and you will always enjoy long battery life.

ICOM's wide selection of optional battery packs is especially designed to give you maximum flexibility in overall transceiver size, power output and operating time. Your choice of specific battery packs will naturally depend on your style of operating. Guided by the previous information, however, you can easily calculate your own requirements and purchase that item in a knowledgeable manner. ICOM is dedicated to assuring your full understanding and long-term enjoyment of amateur radio! Your inquiries and comments are always welcome.



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**ICOM****Handhelds**

# HOW DO YOU PACK 7 WATTS, 20 MEMORIES AND SCANNING INTO A HANDHELD?

**IC-2GAT: 7 Watts** Rx 138-174MHz, Tx 140-150MHz

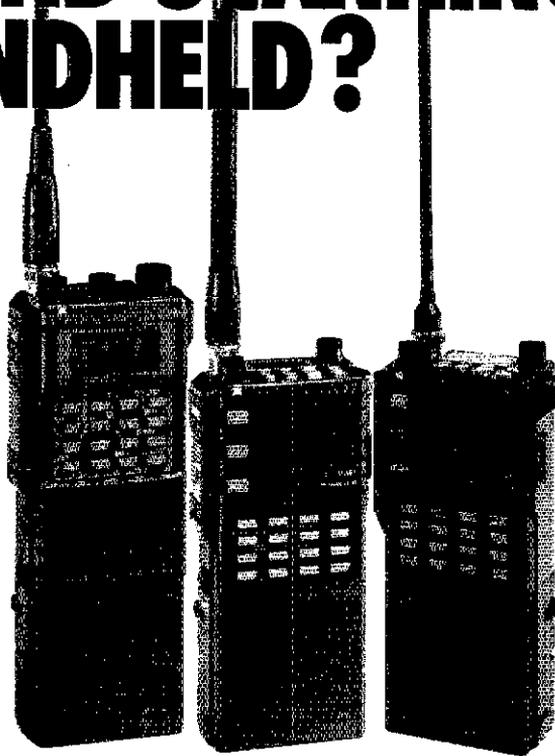
**IC-4GAT: 6 Watts** 440-450MHz

**IC-32AT: 5 Watts** Rx 138-174MHz/440-450MHz;  
Tx 140-150MHz/440-450MHz

## A New Generation of Powerful, Versatile Handhelds.

*Select a new "G Series" or dual band ICOM transceiver and enjoy full base station luxury in a portable unit designed especially for you!*

- **Maximum Frequency Coverage.** The IC-2GAT receives 138-174MHz, including NOAA, and transmits 140-150MHz to include CAP and MARS frequencies. The IC-4GAT operates 440-450MHz, and the IC-32AT receives 138-174MHz and operates 140-150MHz/440-450MHz.
- **Most Powerful Handheld!** The IC-2GAT delivers seven watts! The IC-4GAT is six watts and the IC-32AT is five watts! One watt level selectable for local QSO's.
- **20 Memories.** Store any frequency, Tx offset and subaudible tone in any memory. Total flexibility!
- **Programmable Scanning** of band and memories plus easy lockout and instant memory recall.
- **Additional Features.** Battery saver, call channel, all subaudible tones, multi-function LCD readout and DTMF pad.
- **Compatible Accessories.** All ICOM IC-2AT/02AT series battery packs, headsets and speaker mics are interchangeable.
- **Optional UT-40 Beeper** silently monitors a busy channel for your calls. When the pre-programmed subaudible tone is received, the unit beeps and the LCD flashes.



**IC-32AT**  
2 Meters and  
440MHz

**IC-2GAT**  
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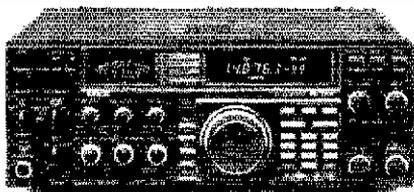
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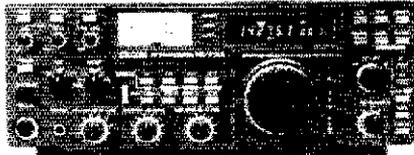
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IC-761 HF xcvr/SW rcvr/ps/AT	2699.00	2369
HM-36 Scanning hand microphone	47.00	
SP-20 Ext. speaker w/audio filter	149.00	139 <sup>95</sup>
FL-101 250 Hz 1st IF CW filter	73.50	
FL-53A 250 Hz 2nd IF CW filter	115.00	109 <sup>95</sup>
FL-102 6 kHz AM filter	59.00	
EX-310 Voice synthesizer	59.00	



**VHF/UHF/1.2 GHz Mobiles**

IC-751A 9-band xcvr/1.30 MHz rcvr	1699.00	1449
PS-35 Internal power supply	219.00	199 <sup>95</sup>
FL-32A 500 Hz CW filter (1st IF)	69.00	
FL-63A 250 Hz CW filter (1st IF)	59.00	
FL-52A 500 Hz CW filter (2nd IF)	115.00	109 <sup>95</sup>
FL-53A 250 Hz CW filter (2nd IF)	115.00	109 <sup>95</sup>
FL-33 AM filter	49.00	
FL-70 2.8 kHz wide SSB filter	59.00	
RC-10 External frequency controller	49.00	



**HF transceiver/SW rcvr/mic**

IC-735 HF transceiver/SW rcvr/mic	1099.00	959 <sup>95</sup>
PS-55 External power supply	219.00	199 <sup>95</sup>
AT-150 Automatic antenna tuner	445.00	389 <sup>95</sup>
FL-32A 500 Hz CW filter	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	

**Other Accessories**

IC-2KL 160-15m solid state amp w/ps	1999.00	1699
PS-15 20A external power supply	175.00	159 <sup>95</sup>
PS-30 Systems p/s w/cord, 6-pin plug	349.00	319 <sup>95</sup>
MB Mobile mount, 735/751A/761A	25.99	
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ret. xtal for 751A	79.00	
PP-1 Speaker/patch	179.00	164 <sup>95</sup>
SM-6 Desk microphone	47.95	
SM-8 Desk mic - two cables, Scan	89.00	
SM-10 Compressor/graph EQ, 8 pin mic	149.00	139 <sup>95</sup>
AT-100 100W 8-band auto. antenna tuner	445.00	389 <sup>95</sup>
AT-500 500W 9-band auto. antenna tuner	589.00	519 <sup>95</sup>
AH-2 8-band tuner w/mount & whip	659.00	589 <sup>95</sup>
AH-2A Antenna tuner system, only	519.00	449 <sup>95</sup>
GC-5 World clock	91.95	89 <sup>95</sup>

**VHF/UHF base multi-modes**

IC-275A 25W 2m FM/SSB/CW w/ps	1299.00	1149
IC-275H 100W 2m FM/SSB/CW	1399.00	1229
IC-375A 25W 220 FM/SSB/CW	1399.00	1229
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	1249

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IC-475H 75W 440 FM/SSB/CW..... 1599.00 1429  
 IC-575A 25W 6/10m xcvr w/ps ..... 1399.00 1249



**IC-471H 75W 430-450 Closeout** 1399.00 989<sup>95</sup>

PS-35 Internal power supply	219.00	199 <sup>95</sup>
AG-35 Mast mounted preamp	99.95	
AG-35 (Purchased with IC-471H)	99.95	9 <sup>95</sup>
SM-6 Desk microphone	47.95	
EX-310 Voice synthesizer	59.00	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	34.00	
UT-15S UT-15S w/TS-32 installed	96.00	

**VHF/UHF/1.2 GHz Mobiles**

IC-290H 25W 2m SSB/FM	Closeout	639.00	549 <sup>95</sup>
IC-27A 25W 2m FM/TTP mic	Closeout	429.00	349 <sup>95</sup>
IC-27H 45W 2m FM/TTP mic	Closeout	459.00	399 <sup>95</sup>
IC-37A 25W 220 FM/TTP mic	Closeout	499.00	399 <sup>95</sup>
IC-47A 25W 440 FM/TTP mic	Closeout	549.00	469 <sup>95</sup>
PS-45 Compact 8A power supply	145.00	134 <sup>95</sup>	
UT-16/EX-388 Voice synthesizer	34.99		
SP-10 Slim-line external speaker	35.99		
IC-28A 25W 2m FM, regular mic	429.00	349 <sup>95</sup>	
IC-28A 25W 2m FM, TTP mic	469.00	409 <sup>95</sup>	
IC-28H 45W 2m FM, TTP mic	499.00	439 <sup>95</sup>	
IC-38A 25W 220 FM, regular mic	459.00	369 <sup>95</sup>	
IC-38A 25W 220 FM, TTP mic	489.00	429 <sup>95</sup>	
IC-48A 25W 440-450 FM, regular mic	459.00	369 <sup>95</sup>	
IC-48A 25W 440-450 FM, TTP mic	509.00	449 <sup>95</sup>	
HM-14 Extra TTP microphone	59.00		
UT-28 Digital code squelch	39.50		
UT-29 Tone squelch decoder	46.00		
HM-16 Speaker/microphone	34.00		

IC-228A 25W 2m FM/TTP scan mic	509.00	449 <sup>95</sup>
IC-228H 45W 2m FM/TTP scan mic	539.00	479 <sup>95</sup>
UT-40 Pocket beep function	45.00	
IC-900A Transceiver controller	639.00	569 <sup>95</sup>
UX-19A 10m 10W band unit	299.00	269 <sup>95</sup>
UX-29A 2m 25W band unit	299.00	269 <sup>95</sup>
UX-29H 2m 45W band unit	349.00	319 <sup>95</sup>
UX-39A 220MHz 25W band unit	349.00	319 <sup>95</sup>
UX-49A 440MHz 25W band unit	349.00	319 <sup>95</sup>
UX-59A 6m 10W unit	349.00	319 <sup>95</sup>
UX-129A 1.2GHz 10W band unit	549.00	499 <sup>95</sup>
IC-3200A 25W 2m/440 FM w/TTP	695.00	579 <sup>95</sup>
UT-23 Voice synthesizer	34.99	
AH-32 2m/440 Dual Band antenna	39.00	
AHB-32 Trunk-lip mount	35.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	22.00	
Larsen PO-MM Magnetic mount	22.00	
IC-1200A 10W 1.2GHz FM Mobile	699.00	629 <sup>95</sup>
IC-1271A 10W 1.2GHz SSB/CW base	1269.00	1129
AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	125.00	114 <sup>95</sup>
EX-310 Voice synthesizer	59.00	
TV-1200 ATV interface unit	139.00	129 <sup>95</sup>
UT-15S CTCSS encoder/decoder	96.00	
RP-1210 1.2GHz 10W 99 ch FM xcvr	1529.00	1349
RP-2210 220MHz 25W repeater	1649.00	1469
RP-3010 440MHz 10W FM repeater	1299.00	1149

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**Hand-helds**

IC-2A 2-meters	Regular SALE	289.00 259 <sup>95</sup>
IC-2AT with TTP		319.00 279 <sup>95</sup>
IC-3AT 220 MHz, TTP		349.00 299 <sup>95</sup>
IC-4AT 440 MHz, TTP		349.00 299 <sup>95</sup>
IC-02AT/High Power		409.00 349 <sup>95</sup>
IC-03AT for 220 MHz		449.00 389 <sup>95</sup>
IC-04AT for 440 MHz		449.00 389 <sup>95</sup>
IC-u2AT for 2m w/TTP		329.00 289 <sup>95</sup>
IC-u4AT 440 MHz, TTP		369.00 329 <sup>95</sup>

IC-u2A for 2m w/o TTP  
 Reg. \$299 - Closeout \$259<sup>95</sup>

**Accessories for micros - CALL**

**Aircraft band hand-helds**

IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	Regular SALE	473.00 419 <sup>95</sup>
A-2 5W PEP synth. aircraft HT		525.00 479 <sup>95</sup>
A-20 Synth. aircraft HT w/VOR		625.00 569 <sup>95</sup>

**Accessories for all except micros**

BP-7 425mah/13.2V Nicad Pak - use BC-35	Regular	79.00
BP-8 800mah/8.4V Nicad Pak - use BC-35		79.00
BC-35 Drop in desk charger for all batteries		79.00
BC-16U Wall charger for BP7/BP8		21.25
LC-11 Vinyl case for Dlx using BP-3		20.50
LC-14 Vinyl case for Dlx using BP-7/8		20.50
LC-02AT Leather case for Dlx models w/BP-7/8		54.50

**Accessories for IC and IC-O series**

BP-2 425mah/7.2V Nicad Pak - use BC35	Regular	49.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak		39.50
BP-4 Alkaline battery case		16.00
BP-5 425mah/10.8V Nicad Pak - use BC35		65.00
CA-5 5/8-wave telescoping 2m antenna		19.95
FA-2 Extra 2m flexible antenna		12.00
CP-1 Cig. lighter plug/cord for BP3 or Dlx		13.65
CP-10 Battery separation cable w/clip		22.50
DC-1 DC operation pak for standard models		24.50
MB-16D Mobile mtg. bkt for all HTs		25.99
LC-2AT Leather case for standard models		54.50
RB-1 Vinyl waterproof radio bag		35.95
HH-SS Handheld shoulder strap		16.95
HM-9 Speaker microphone		47.00
HS-10 Boom microphone/headset		24.50
HS-10SA Vox unit for HS-10 & Deluxe only		24.50
HS-10SB PTT unit for HS-10		24.50
ML-1 2m 2.3w in/10w out amplifier	SALE	99.95
SS-32SMP Commspec 32-tone encoder		27.95

**Receivers**

R-71A 100kHz to 30MHz receiver	Regular SALE	\$999.00 869 <sup>95</sup>
RC-11 Infrared remote controller		70.99
FL-32A 500 Hz CW filter		69.00
FL-63A 250 Hz CW filter (1st IF)		59.00
FL-44A SSB filter (2nd IF)		178.00 159 <sup>95</sup>
EX-257 FM unit		49.00
EX-310 Voice synthesizer		59.00
CR-64 High stability oscillator xtal		79.00
SP-3 External speaker		65.00
CK-70 (EX-299) 12V DC option		12.99
MB-12 Mobile mount		25.99
R-7000 25MHz to 2GHz scan rcvr		1199.00 1049
RC-12 Infrared remote controller		70.99
EX-310 Voice synthesizer		59.00
TV-R7000 ATV unit		139.00 129 <sup>95</sup>
AH-7000 Radiating antenna		99.00 (11)

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# ICOM

# Mobiles



# YOU'RE LOST WITHOUT IT

Whether you're trying to find your way to an unfamiliar location or need assistance in an emergency, ICOM mobiles help you find your way. ICOM's dependable mobiles steer you to a friendly voice or a helping hand.

### Most Popular Mobiles.

ICOM's popular mobiles include the 2-meter **IC-28A** and **IC-28H**, 220MHz **IC-38A**, 440MHz **IC-48A** and 2-meter/70cm dual band **IC-3200A**.

### 21 Memories.

Store frequency, offset and tone, with an offset check button on the front panel. The **IC-3200A** features 10 fully tunable memories.

### Packet Perfect.

The **IC-28/38/48** series includes a high speed microprocessor and switching circuit for superb packeting!

### Top Features.

- Band and Memory Scanning
- Compact Size
- All Subaudible Tones Built-In
- Backlit LCD Readout with Dimmer
- DTMF Mic Included



**"I feel any company willing to build radios as survivable as my IC-28A deserves my ham radio dollars..."**

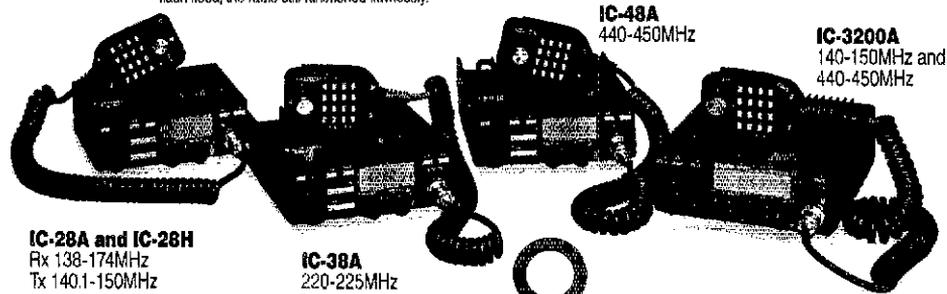
-Jonathan Starr AH6GJ  
After his truck and IC-28A were washed away in a flash flood, the radio still functioned flawlessly.

### Options.

Options include the **UT-28** digital coded squelch, **SP-10** speaker, **HS-15/HS-15SB** boom mic and **PTT** switchbox and **PS-45** AC power supply.

### ICOM Mobiles.

Don't be lost without them. Find them at your local ICOM dealer.



**IC-28A and IC-28H**  
Rx 138-174MHz  
Tx 140.1-150MHz

**IC-38A**  
220-225MHz

**IC-48A**  
440-450MHz

**IC-3200A**  
140-150MHz and  
440-450MHz

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# ICOM

# IC-735 HF Transceiver



# 'MOST RELIABLE HF'

"Of all the possible radios, I chose the ICOM IC-735 for my CQWW QRP world record attempt."

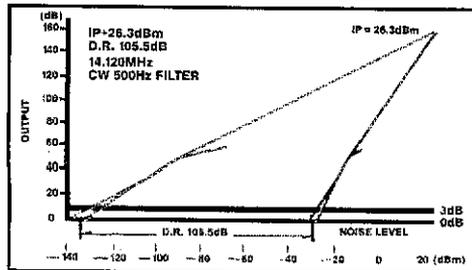
Danny Eskenazi, K7SS World High QRP Score  
 -1987 CQWW SSB (R2FRI)  
 -1986 CQWPX SSB (K7SS/WHe)  
 -1986 AHRL DX PHONE & CW (K7SS KH6)

ICOM's IC-735 is the world's most popular HF transceiver. With the highest performance, smallest size, and best customer satisfaction of any HF transceiver, the IC-735 is the winner's choice for fixed, portable, or mobile operations.

- **Field Proven 100W Transmitter** with 100% duty cycle. Proudly backed with ICOM's full one-year warranty.
- **105dB Dynamic Range Receiver** includes passband tuning, IF notch, adjustable noise blanker, and semi or full CW QSK.
- **Conveniently Designed.** Measures only 3.7"H by 9.5"W by 9"D.



- **Optional AH-2 Automatic Tuning Mobile Antenna System** covers 3.5MHz-30MHz and tracks with the IC-735's tuned frequencies.
- **All HF Amateur Bands and Modes** plus general coverage reception from 100kHz-30MHz.



- **12 Tunable Memories** operate and reprogram like 12 separate VFO's. Supreme flexibility!

**Additional Options:** SM-10 graphic equalized mic. PS-55 AC power supply, AT-150 automatic antenna tuner for base operation.

**ICOM's IC-735...** a proven winner for reliable worldwide HF communications. See it today at your local ICOM dealer.

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 \*Final contest results pending.



# Depend on Paragon Performance!

Transmitter audio quality that is a pleasure to hear and a receiver that has set new standards for sensitivity and quietness. Receives from 100 kHz to 29.999.99 MHz with two tuning rates. Transmits on all bands from 1.8 MHz to 29.999.99 MHz with 100 watts output. SSB, CW, real FSK and optional FM. Standard equipment includes speech processor, noise blanker, dual VFOs, TX split, RX split and QSK with a changeover time of 30 ms or less. Five i-f filter positions with the 6 kHz AM filter and 2.4 kHz SSB filter, standard. Optional 1.8 kHz, 500 Hz and 250 Hz filters. All are push button selectable in any mode. Passband tuning, notch filtering, audio bandpass filtering, tone control, squelch and more!

Sixty-two programmable memories that store frequency, mode, filter selected, channel number and a 7 character alphanumeric "tag" for I.D. Scan rate is selectable and as each memory is scanned all of the stored information is displayed (what a

light show!). The scanning routine is easily controlled with both individual and global lock-out and reset functions. Alternately, the memories can be tuned with the main tuning knob.

Frequency selection is with the main tuning knob, direct keypad entry or up/down buttons that will shift in 100 kHz or one MHz increments or to the next ham band. DISPLAY button selects 24 hour clock or date or tag. VOICE button causes a voice frequency announcement when optional synthesized voice board is installed.

Rear panel controls adjust the VOX, CW monitor level and tone, and SSB sidetone monitor level. Switching is provided to control conventional linear amplifiers and high speed switching for QSK linears, such as the Titan. Other rear panel connections are included for a transverter, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc and provision for the optional RS-232 control interface.

An absolute delight for the all mode operator.

The construction of the Paragon is impressive too. All of the circuit boards are G-10 glass epoxy and can be removed easily. All aluminum construction and the use of an external power supply, keeps the weight of the Paragon at a svelte 16 lbs.

The Paragon is the result of a three year computer aided (CADEC 4) engineering effort. Much of that effort was invested in improving receiver performance. We are proud of the Paragon and we think it has set new standards of excellence in synthesized rigs. Check it out yourself. We think that you will share our pride in the Paragon.

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**TEN-TEC**

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Sevierville, Tennessee 37862  
615/453-7172



# Harness the Titan Power!

The TITAN has it all! Maximum legal power with ease, all bands 160 through 15 meters (through 10 meters after authorized modification), lightning fast QSK for full break-in CW and the digital modes, plus a two speed blower for quiet operation on phone. This awesome performance from a desk top amplifier is made possible by a pair of Eimac® 3CX800A7 ceramic triodes and an absolute "horse" of a power supply.

The heart of the power supply is our own tape wound, four core, Hypersil® transformer which weighs in at an impressive 41 pounds. This transformer is conservatively rated at 2.5KVA CCS (continuous commercial service) or 9KVA IVS (intermittent voice service). The power supply is housed in a separate utility enclosure for remote operation and is nearly noiseless even at full power.

Front panel features include an instantaneous 10 element LED peak output power indicator, a dedicated plate current

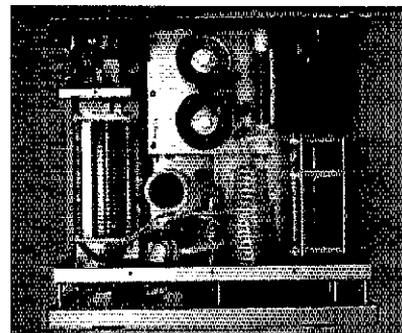
meter, a multi-meter to read grid current, forward power, reflected power or plate voltage, HI/LO plate voltage select, STBY/OPR switch and power ON/OFF switch. A red LED warns you if grid current becomes excessive and three other LEDs indicate status: WAIT, STBY and OPERATE. Vernier TUNE and LOAD controls, in combination with an outstanding RF deck design, make the Titan a real "pussy cat" to load and operate.

The low drive requirement of the Titan (65 watts in for 1500 watts output typical) makes life much nicer for your exciter too. Operating temperatures are significantly lower and component life extended accordingly. This is especially comforting using "keydown" modes such as RTTY. Adjustable ALC is provided for controlling exciter RF output levels.

The Titan has been the subject of two "product review" magazine articles. See QST, April 1986; CQ February 1986.

The Titan is designed to match our 100 watt exciters but it pairs up nicely, no matter what exciter you operate. If you are ready to choose your dream amplifier the Titan has everything but the highest price. Check it out!

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Superior RF switching and equipment protection for amateur, military and government communications stations.

- Exclusive center "off" (ground) position internally disconnects and grounds all antenna circuits for maximum protection when operator is away from the station — an Alpha Delta first!
- Incorporates the famous replaceable Arc-Plug™ cartridge for continuous protection of the active antenna circuit. Unused antenna circuits are automatically grounded — an Alpha Delta first!
- The Model DELTA-4 Switch features a custom designed cast housing with constant impedance micro-strip cavity construction for outstanding performance through UHF. No lossy wafer switches are used.



- Positive detent ball bearing switch drive tells you which position you're in . . . without guessing . . . without looking.
- DELTA-4 handles full legal power.
- Designed and produced in the U.S.A. by Alpha Delta.

Model DELTA-4 (UHF connectors, 500 MHz) . . . . . \$74.95

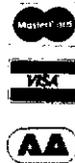
Model DELTA-4/N (N-type connectors, 1.3 GHz) . . . . . \$89.95

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See Data Sheet for surge limitations.

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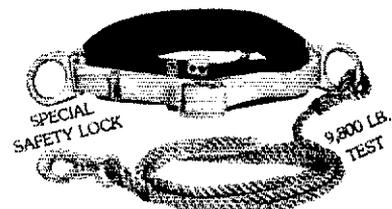
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### HF Linear Amplifiers

Designed and built to give reliable long-life performance. All four models cover 160 through 15 meters.

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**AL-80A** with 3-500Z tube - 1000 watts PEP output.

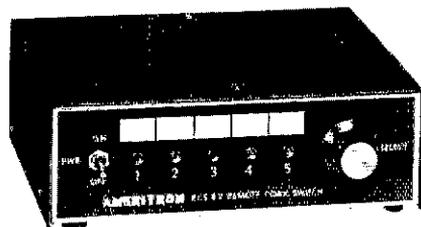
**AL-1200** with 3CX-1200A7 tube - full legal output with 100 watts drive.

**AL-1500** with 8877 tube - full legal output with 65 watts drive.

### RCS-4 FOR CONVENIENT INSTALLATION

No control cable required.  
Selects one of four antennas.  
**VSWR:** under 1.1 to 1 from 1.8 to 30 MHz.  
**Impedance:** 50 ohms.  
**Power capability:** 1500 watts average, 2500 watts PEP maximum.

### Remote COAX Switches



### RCS-8V FOR SPECIAL APPLICATIONS

Selects up to five antennas.  
**Loss at 150 MHz:** less than .1 dB.  
**VSWR:** under 1.2 to 1 DC to 250 MHz.  
**Impedance:** 50 ohms.  
**Power capability:** 5 kW below 30 MHz, 1 kW at 150 MHz.

Available at your dealer-Send for a catalog of the complete AMERITRON line.

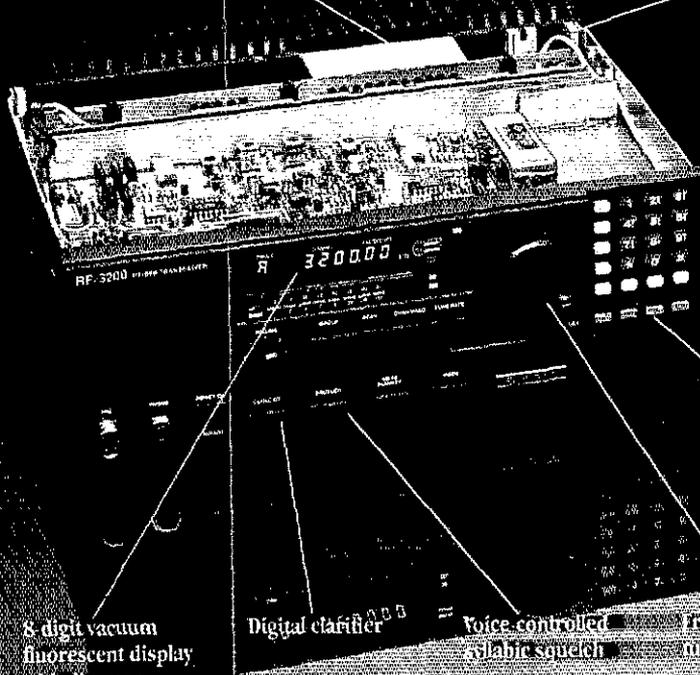
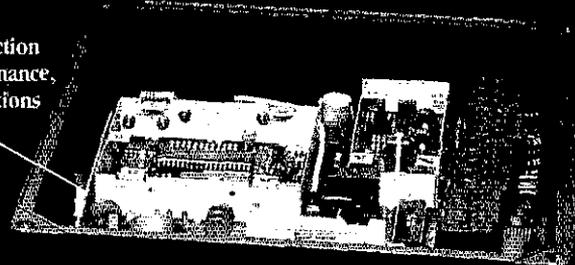
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with dimmer

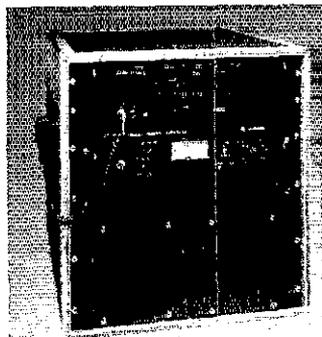
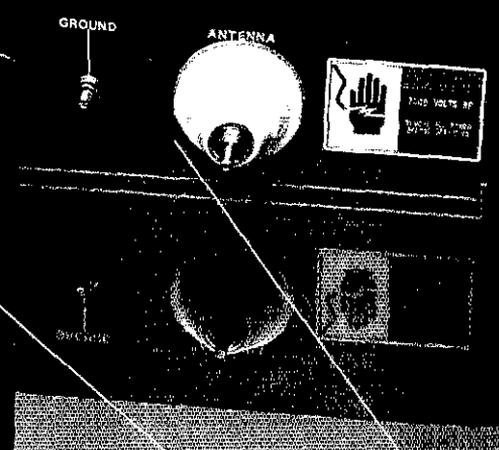
Digital clarifier

Voice controlled  
syllabic squelch

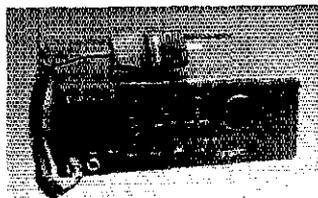
Frequency channel  
memory knob

Keyboard tuning  
programming with  
security access

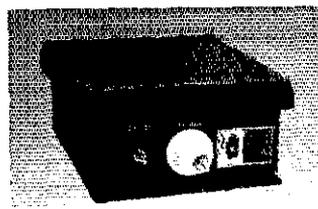
Sealed fiberglass  
case for exposed  
installations



RF-3230 1kW Solid-State Amplifier  
with RF-3200



RF-3200 Series Transceiver



RF-3281 Digital Antenna Coupler

Harris introduces the RF-3200, a new series of HF-SSB high-performance, long-range voice-and-data communications transceivers. The RF-3200 Series rugged design, outstanding reliability, and minimal maintenance costs, make them ideal for:

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HF EQUIPMENT	LIST	TS-680S 9-band Xcvr w/6m/mic	1099.95	DKC-2 DC cable kit w/cig plug	12.95
TS-940S 9-band Xcvr/15-30 MHz Rcvr	\$2219.95	PS-50 Heavy duty power supply	229.95	VS-1 Voice synthesizer	59.95
AT-940 Automatic antenna tuner	239.95	PS-430 Compact AC power supply	194.95	R-2000 150 KHz-30 MHz digital receiver	749.95
TS-940S w/AT-940 auto tuner installed	2449.95	PS-30 Power supply	194.95	YG-455C 500 Hz CW filter	124.95
SP-940 External spkr w/audio filters	104.95	SP-430 External speaker	64.95	YG-455CN 250 Hz CW filter	144.95
YK-88C-1 500 Hz CW filter (1st IF)	94.95	AT-250 200w 9-band automatic ant tuner	399.95	VC-10 118-174 MHz VHF converter	194.95
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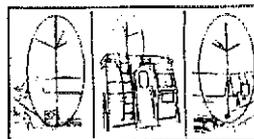


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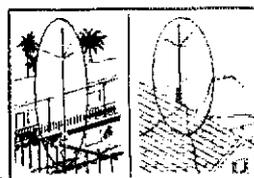
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It's here now! The affordable, "Kenwood Quality" hand-held transceiver. Standard features include a large, easy-to-read LCD display, wide-range power requirements (operates on 7.2 VDC-16 VDC), 1-channel memory, built-in battery saver circuit, and, when operated on 12 VDC, a robust 5 watts of power! The die-cast metal rear panel/heat sink assures cool, reliable operation. Receiver frequency coverage from 141-163 MHz is also standard—you can even listen to the "weather channels" at 162.40 or 162.55 MHz!

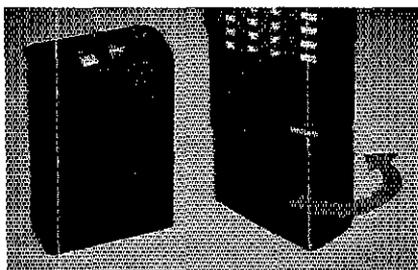
Monitor switch—to check frequency when PL encode/decode switch is on.

Extended frequency coverage for certain MARS and CAP operations.

3 memory channels store frequency and offset. And so easy to use! Simply press the memory channel number to recall your favorite channels!

Night light, offset/reverse.

16-key DTMF pad for repeater autopatch is standard.



NEW! Twist-Lok Positive-Connect™ battery case. A wide range of quick-change commercial duty battery packs are available.

12 VDC input terminal—allows direct mobile or external power supply operation. When 12 VDC is applied, power output increases to 5 watts!

Heavy-duty final amplifier and heat sink. The die-cast rear panel assures reliable operation. With the optional 12-volt PB-1 battery pack, the TH-205AT provides 5 W output. The standard 8.4 volt PB-2 provides 2.5 W output. (500 mW low power).

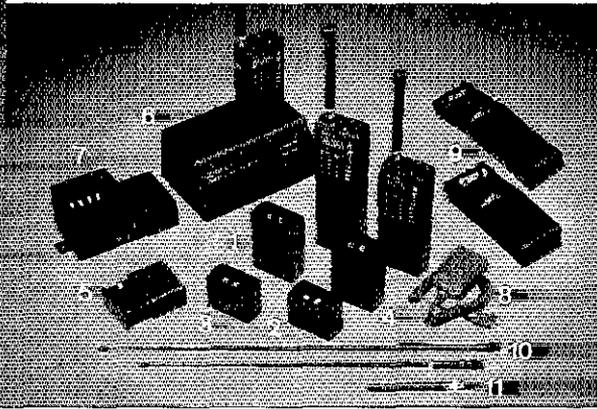
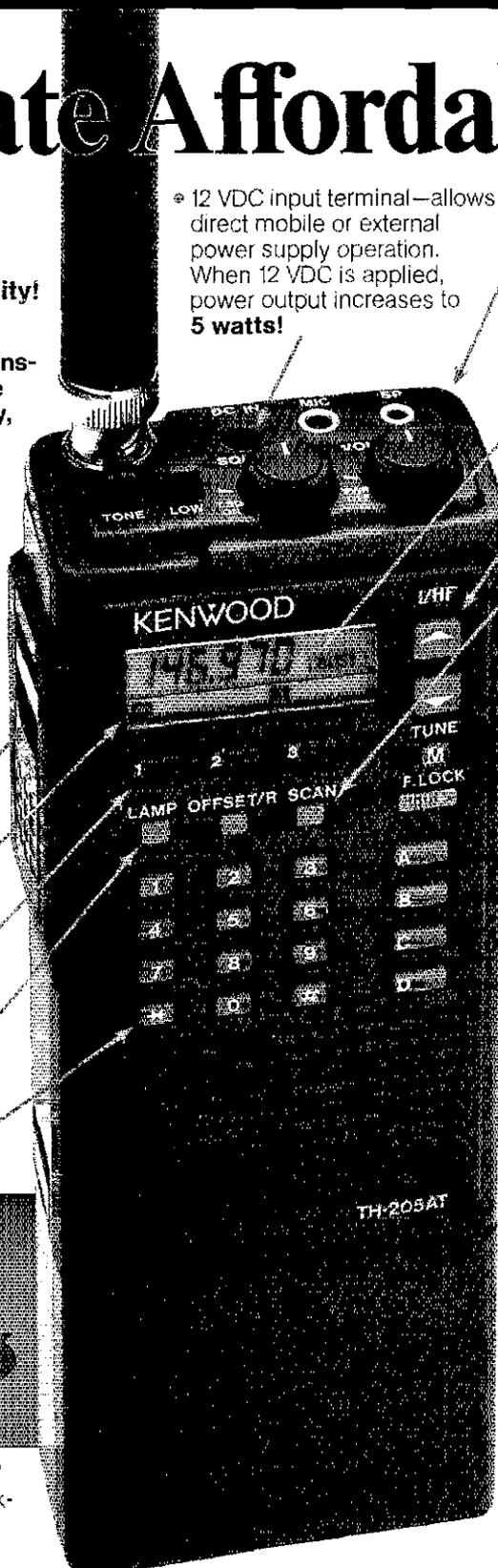
Large, easy-to-read LCD display. Frequency, offset, memory channel, TX, RX, and battery indicator.

Frequency UP/DOWN keys. Used to select frequency or scanning direction.

Scan function

Automatic battery saver circuit extends battery life. No buttons to push!

Supplied accessories include: Rubber flex antenna, belt hook, 8.4 V, 500 mA NiCd battery pack, wall charger...



#### Optional Accessories:

- 1) PB-1 12 V 800 MAH NiCd batt. pack (5 W output)
- 2) PB-2 8.4 V 500 MAH NiCd batt. pack (2.5 W output)
- 3) PB-3 7.2 V 800 MAH NiCd batt. pack (1.5 W output)
- 4) PB-4 7.2 V 1600 MAH NiCd batt. pack (1.5 W output)
- 5) BT-5 AA manganese/alkaline battery case
- 6) BC-7 Rapid charger for PB-1, 2, 3, or 4
- 7) BC-8 Compact battery charger
- 8) SMC-30 Speaker microphone
- 9) SC-12, SC-13 Soft cases
- 10) RA-3, RA-5 Telescoping antennas
- 11) RA-BB StubbyDuk antenna • TSU-3 CTCSS encode/decode unit • VB-2530 2 m, 25 W RF power booster • LH-4, LH-5 Leather cases • MB-4 Mobile bracket • BH-5 Swivel mount • PG-2V DC cable • PG-3C Filtered cigar lighter cord

## KENWOOD

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2201E. Dominguez St., Long Beach, CA 90810  
P.O. Box 22745, Long Beach, CA 90801-5745

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



# A GREAT SIGNAL THIS SUMMER!

**HIGH PERFORMANCE LOG PERIODIC ANTENNA  
ONE ANTENNA COVERS 50-1300 MHZ!!**

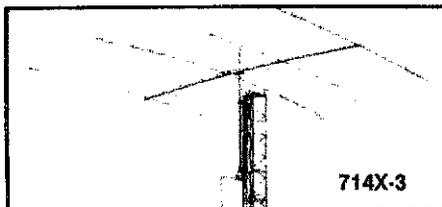
**WIDE COVERAGE  
LOW VSWR  
HIGH GAIN**

- LIGHTWEIGHT
- EASY ASSEMBLY
- SMALL SIZE

(CLP5130-1 illustrated)  
Mast not included

CLP5130-1 50-1300 MHz 25 el. 500W 6' Boom \$239 + shipping  
CLP5130-2 105-1300 MHz 20 el. 500W 4'6" Boom \$139 + shipping

Operate on 6m, 2m, 1 $\frac{1}{2}$ m, 70cm, 900 MHz and 1.2 GHz using only one antenna and one feedline. No tuning is required and the VSWR is 2:1 or less across the entire frequency range with excellent forward gain. The boom is made of high quality aluminum and the elements are pre-cut for easy assembly. Each model can be mounted for either vertical or horizontal polarization. Create VHF/UHF log periodics are great for the amateur bands, scanners and numerous other applications.

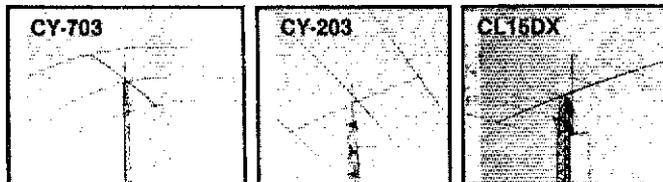


**714 Series Tribanders  
15-20-40 Meters  
On One Boom!**

Model	Elements 40-20-15	Boom Length	Longest Element	Turning Radius	Wgt. Lbs.	Power PEP	Price
714T	2/4/4	28'6"	43'	25'3"	71	2 kw	\$574.
714X	3/4/4	32'5"	44'	26'2"	75	2 kw	\$782.
714T-3	2/4/4	28'6"	43'	25'3"	75	3 kw	\$707.
714X-3	3/4/4	32'5"	44'	26'2"	80	3 kw	\$928.

(Prices include balun)

**Rugged High Performance Mono Banders!**



Model	Freq MHz	El.	Mono Bander Data			Wgt. Lbs.	Power	Price
			Boom Length	Longest El.	Turning Radius			
CY104	28.0	4	18'8"	18'4"	12'11"	19	2 kw	\$185.
CL10DX	28.00	6	30'6"	18'1/2"	16'1"	33	2 kw	\$310.
CY154	21.00	6	40'8"	24'3"	24'3"	58	3 kw	\$205.
CL15DX	21.00	4	18'8"	24'5"	15'5"	21	2 kw	\$559.
CL20	14.00	4	30'9"	36'8"	36'8"	58	3 kw	\$495.

*Price does not include shipping.*

**ALSO AVAILABLE: ROOF TOWERS •  
MONOBANDERS • TRIBANDERS • TOWERS •  
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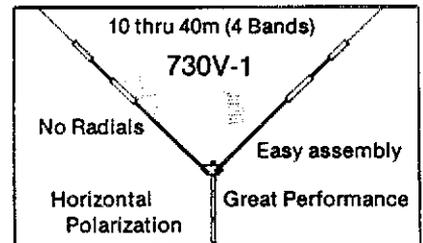
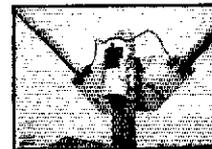
**ROTATORS**

Unique mast centering guide  
Rugged mast clamps  
Military Type Weather Proof Cable connector  
Worm gear (RC5A-3 cut out)  
No brake!  
Second overlay  
Manual control  
Speed control  
Preset function  
RC5A-3  
(Lower mast bracket available)

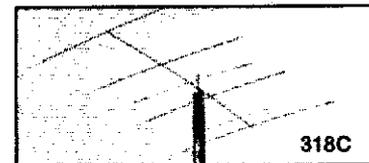
RC5-1	10 sq. ft.	\$251
RC5-3	10 sq. ft. preset	\$328
RC5A-2	25 sq. ft.	\$399
RC5A-3	25 sq. ft. preset	\$459
RC5B-3	35 sq. ft. preset	\$736

All rotators will fit most towers. Please call for additional information.

**730V-1 DIPOLE!**



Find out why more and more people are replacing their lossy verticals and moving up to the super performing 730V-1 dipole. The 730V-1 consists of two 19 ft. heavy duty, self-supporting elements and bracket with an efficient balun that is ready for mounting on a standard TV mast. Rotation is not necessary! The V-dipole is superior to standard vertical antennas in gain, noise and efficiency. \$159 + shipping.



**318 Series Tribanders  
10-15-20 Meters**

Model	Elements 20-15-10	Boom Length	Longest Element	Turning Radius	Wgt. Lbs.	Power PEP	Price
318JR	3/3/3	13'1"	31'1"	15'9"	28	1.2 kw	\$289.
318	3/3/3	16'4"	31'1"	17'4"	40	2 kw	\$345.
318B	3/4/4	20'11"	31'1"	18'4"	49	2 kw	\$434.
318C	5/5/5	29'10"	31'1"	21'	58	2 kw	\$643.
318B+7	1/3/4/4	20'11"	37'7"	19'11"	52	1 kw	\$806

(Prices include balun) 2 kw



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Digital QSOs

## Matching Pair

Look for  
FUJI  
and  
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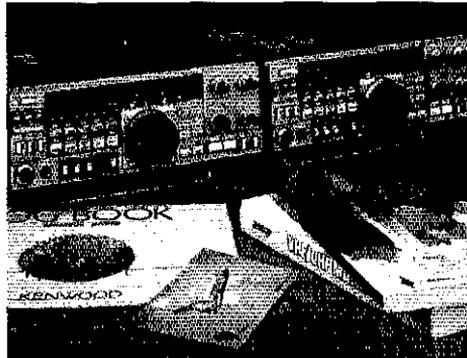
### TS-711A/811A VHF/UHF all-mode base stations

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.**

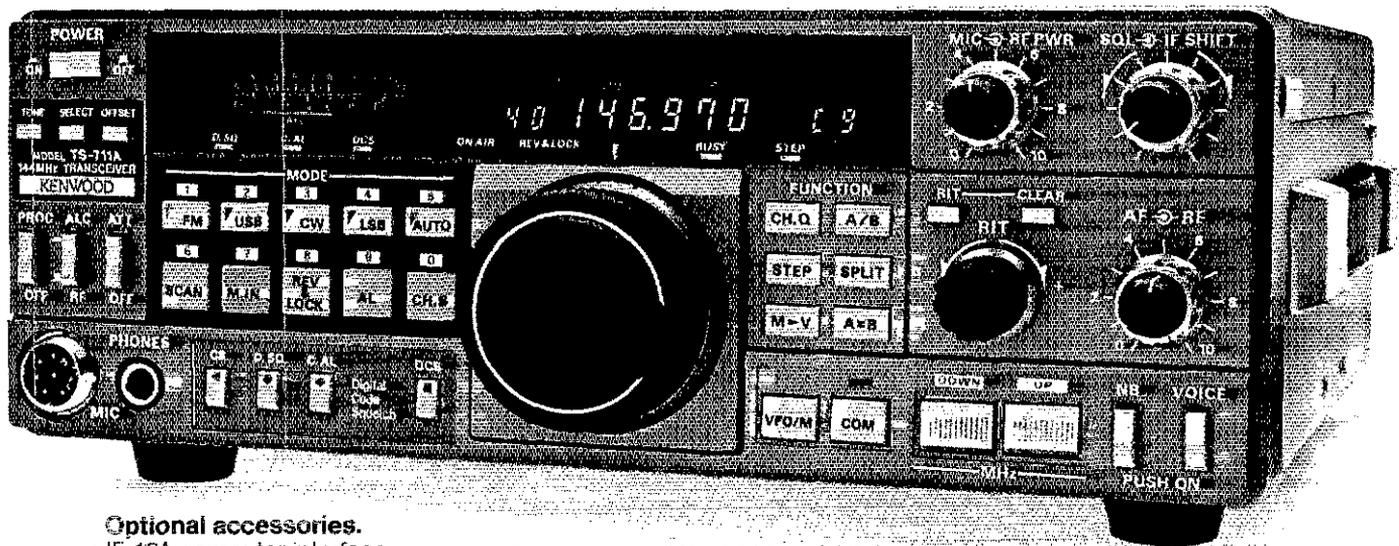
• **Speech processor.**  
For maximum efficiency on SSB and FM.

• **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

# KENWOOD

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2201 E. Dominguez St., Long Beach, CA 90810  
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## NYE TAKES THE GUESSWORK OUT OF PEP MEASUREMENTS! Know your Peak Envelope Power for SSB, AM and Pulse.

Check these features . . .

- (3) **MODES** — Peak Average and Peak and Hold with a unique non-drift Sample & Hold Analog memory circuit.
- (2) **RANGES** — Automatically switched power scales to 5 KW.
- **FULLY AUTOMATIC SWR** — Separate full time meter displays ratios directly without drift.
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- **ADDED FEATURES** —
  - Switchable Reverse Power all Mode Metering
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  - Heavy duty Nicad batteries charged by the applied RF for the field and a charger is supplied for fast charging and backlighting of the meters for the Ham Shack.

Two Models available the RFM-003 and RFM-005 depending on the power scaling desired.

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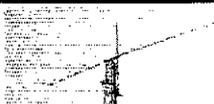
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Light Weight/High Strength ALUMINUM Tubing (Alloy 6061-T6) for Masts and Telescoping Elements

How many antennas have you seen ruined by the failure of the mast? If you are stacking antennas, or have a beam antenna, our 6061-T6 Aluminum masts will increase the survivability of your antenna system. These masts are 67% lighter and 50% stronger than galvanized steel tubing. An example of the weight difference is: 2" OD x 1/4" Wall x 24' Long, AL-39#, Steel-112#

**Sizes Available:**  
1 1/2" to 8" OD x 1/4" to 3/4" Wall x 24' Long (For masts and booms) 1/2" to 2" OD x .058" Wall x 12' Long (Drawn for telescoping), 1/4" and 3/8" 6061-T6 Rod, 12' lengths.

Club and volume discounts are offered. MC & VISA accepted. For a complete stock list, please write or call.

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(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" x 11" sheet of paper.

(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received July 14 through August 13 will appear in October QST. If the 13th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in QST advertising.

(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in your advertising before your ad can appear.

The publisher of QST will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

The League reserves the right to decline or discontinue advertising for any reason.

### CLUBS/HAMFESTS/NETS

**PROFESSIONAL CW operators**, retired or active, commercial, military, gov't, police etc. invited to join Society of Wireless Pioneers—W7GAQ/6, 146 Coleen Street, Livermore, CA 94550.

**IMRA**—International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510.

**THE Veteran Wireless Operators Association**, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

**HAVE A-M capability?** Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

**FCC EXAMS**, Novice-Extra Class, Walk-in's only. Sunnyvale VEC ARC, POB 60142, Sunnyvale, CA 94088-0142, 408-255-9000, 24/hr. Gordon, W6NLG, President, Flea Market, March-Sept, Foothill College, Los Altos Hills, CA.

**JOIN The Old Old Timers Club**, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C., 20933 Brant Avenue, Long Beach, CA 90810.

**MARCO**: Medical Amateur Radio Council, operates daily and Sunday nets. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. For information, write MARCO, Box 73's, Acme, PA 15610.

**LITTLE Big Horn Net** Sundays: 14.067 MHz, 2200 UTC, 21.176 MHz 2230 UTC. Historians and Native Americans welcome. SASE W2DAC.

**LOUISVILLE HF Society**—New club. Novices, Ragchewers, DXers, Contesters Contact N4XM, KD4U, KK4Q for info 502-239-8123.

**54th ANNUAL Hamfesters RC Hamfest**, New Location—Will County Fairgrounds, Peotone, IL (was at Santa Fe Park). New Date—Sunday, July 31, 1988. Flea market, indoor dealer booths. Exams (pre-register by June 30). Call NF9N, 312-448-9432, for information.) Tickets: \$3 advance, \$4 at gate. SASE to Hamfesters, 13058 Finch Court, Lockport, IL 60441.



# The 3CX1200A7 continues the EIMAC tradition of serving AMATEUR RADIO.

EIMAC was right there to meet Ham requirements of 1500 watts PEP with its 3CX1200A7 tube. Leading manufacturers count on its proven performance and reliability.

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The rugged 3CX1200A7 takes size into consideration and, by design, is recommended as a single, low-cost alternative for a pair of EIMAC 3-500 Z tubes for new amplifier designs.

#### **General Specifications**

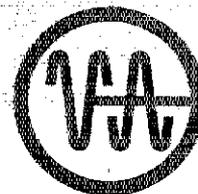
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- Plate dissipation: 1200 watts
- Glass chimney SK-436 available
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NORTHERN New Jersey—Sussex County ARC Hamfest, Sunday, July 17th, Sussex County Fairgrounds, Augusta, NJ, 8:00 AM, Indoor/Outdoor space. Acres of parking. Refreshments. Talk-In 147.90/30 and 146.52. For information call Donald Stickle, K2OX, 201-663-0677.

THANK You for attending Warren Ohio Hamfest. See you August 21, 1988.

BUTLER Hamfest, Butler, PA. Sept. 11, 1988. For Hamfest Flyer and Ticket Information Contact: Ed, WB3LKO, 445 Morton Avenue, Butler, PA 16001.

THE 10th Annual TSARC Wheeling Hamfest/Computer Fair, Sunday, July 17, Wheeling Park, 9 AM to 4 PM. W/P's Largest Dealers welcome, 30,000 square feet under roof; 5 acres flea market. Family activities at Park. Admission: \$3 in advance—\$4 at door. To reserve space contact: Saml Williams, KB8AAV, 9 East High Street, Flushing, OH 43977, 614-958-3652; for tickets: TSARC, Box 240, RD 1, Adena, OH 43901, 614-546-3930.

HAMFEST—Mid-Coast/Yankee Hamfest, July 16th at Union Fairgrounds, Union, Maine. Camping, exhibits, lobster dinner. Info: Carl Ingerson, N1DXM, P.O. Box 929, Union, ME 04849.

1988 "BLOSSOMLAND Blast" Sunday, October 2, 1988. Write "Blast", P.O. Box 175, St. Joseph, MI 49085.

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DON'T buy QSL cards until you see my free samples or draw your own design. I specialize in custom cards. Send black and white sketch; will give quote. I would also like to introduce you to our personalized QSL Business Cards. Same size as standard business cards (3-1/2 x 2). Write or call for free samples. Little Print Shop, Box 1160, Pflugerville, TX 78660, 512-990-1192.

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The FT-23R comes with a 7.2-volt, 2.5-watt battery pack. The FT-73R with a 7.2-volt, 2-watt pack. And the FT-33R with a powerful 12-volt, 5-watt pack.



You can choose the miniature 7.2-volt, 2-watt pack shown in the photo below. And all battery packs are interchangeable, too.

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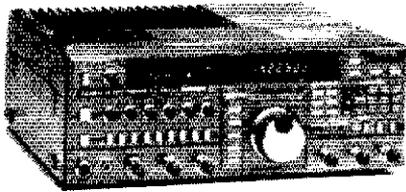


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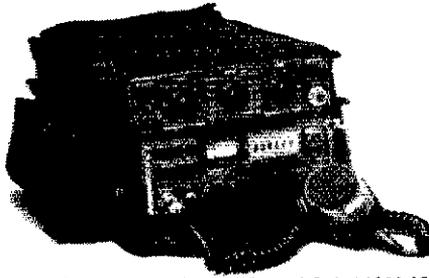
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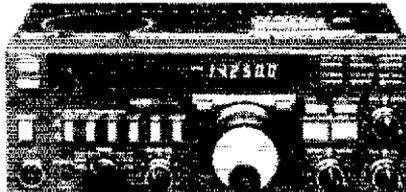
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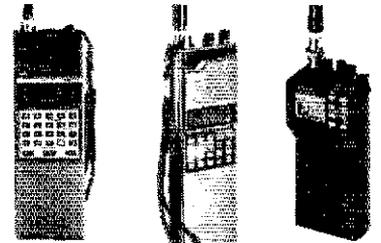
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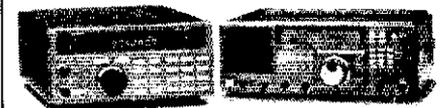
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FT-209RH/709R/109R FT-727R FT-23R/33R/73R

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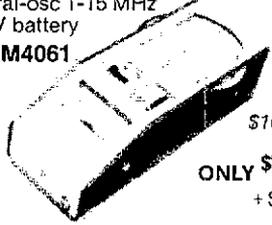
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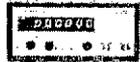
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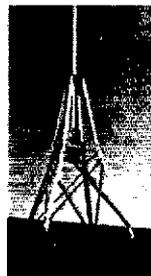
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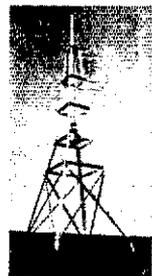
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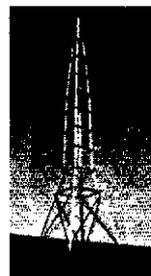
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CR-18



CR-30



CR-45

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CR-45	14'9"	23 @ 90 MPH	39"	881	57	328.00
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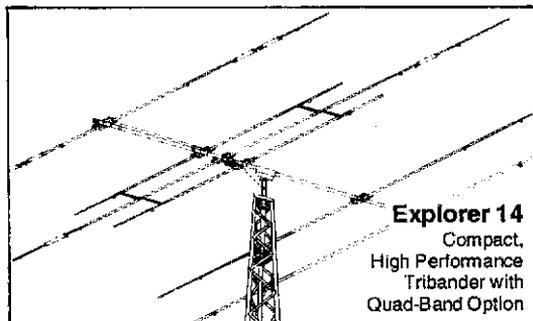
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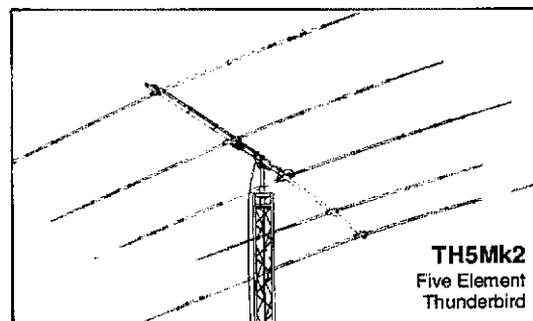
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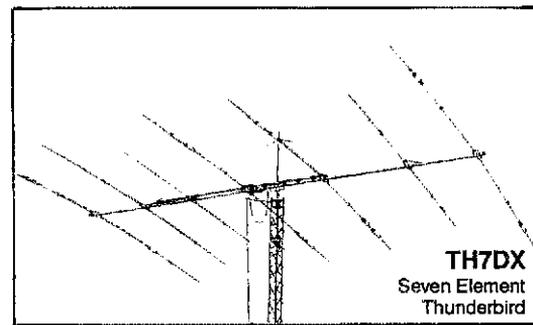
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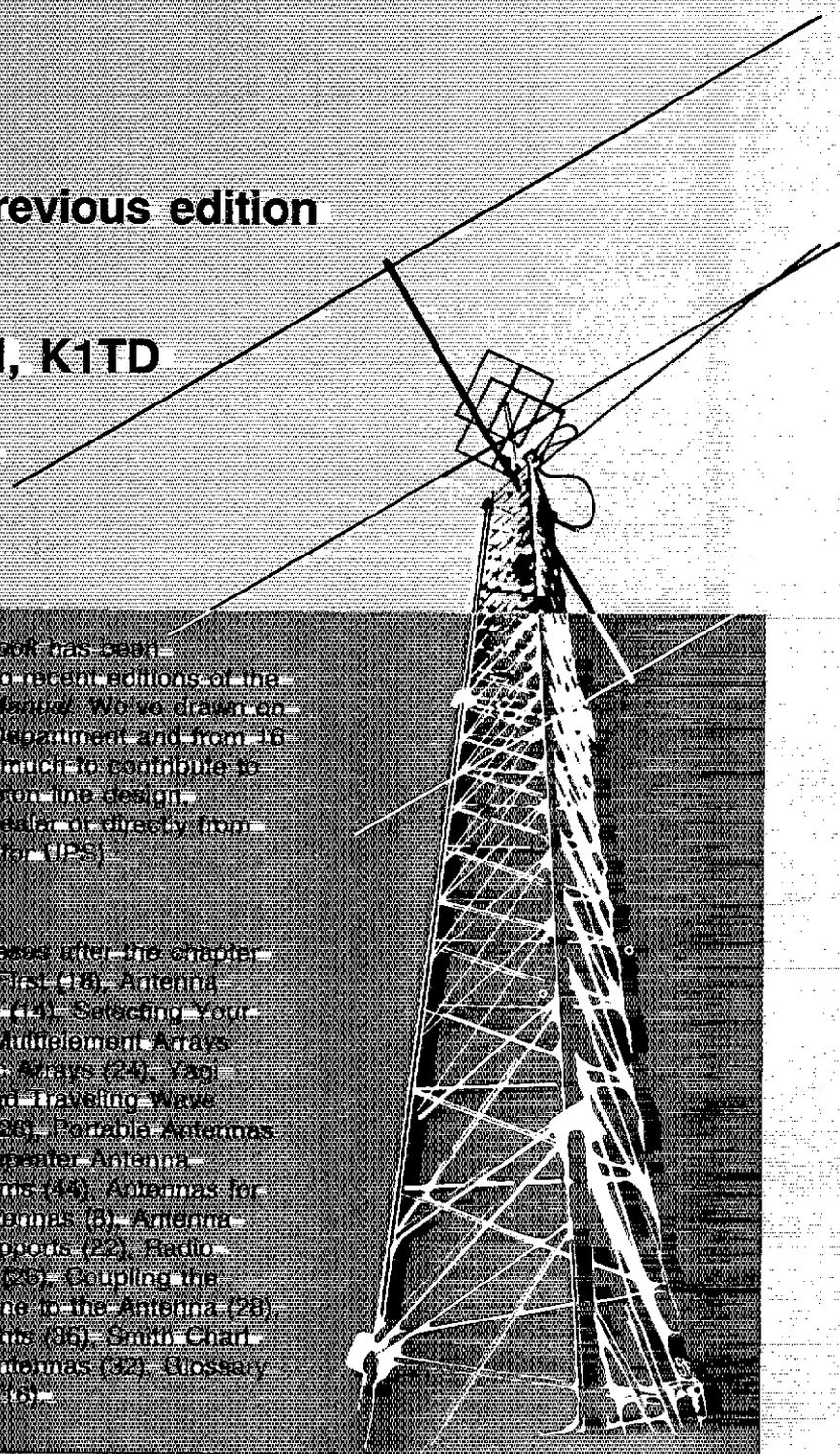
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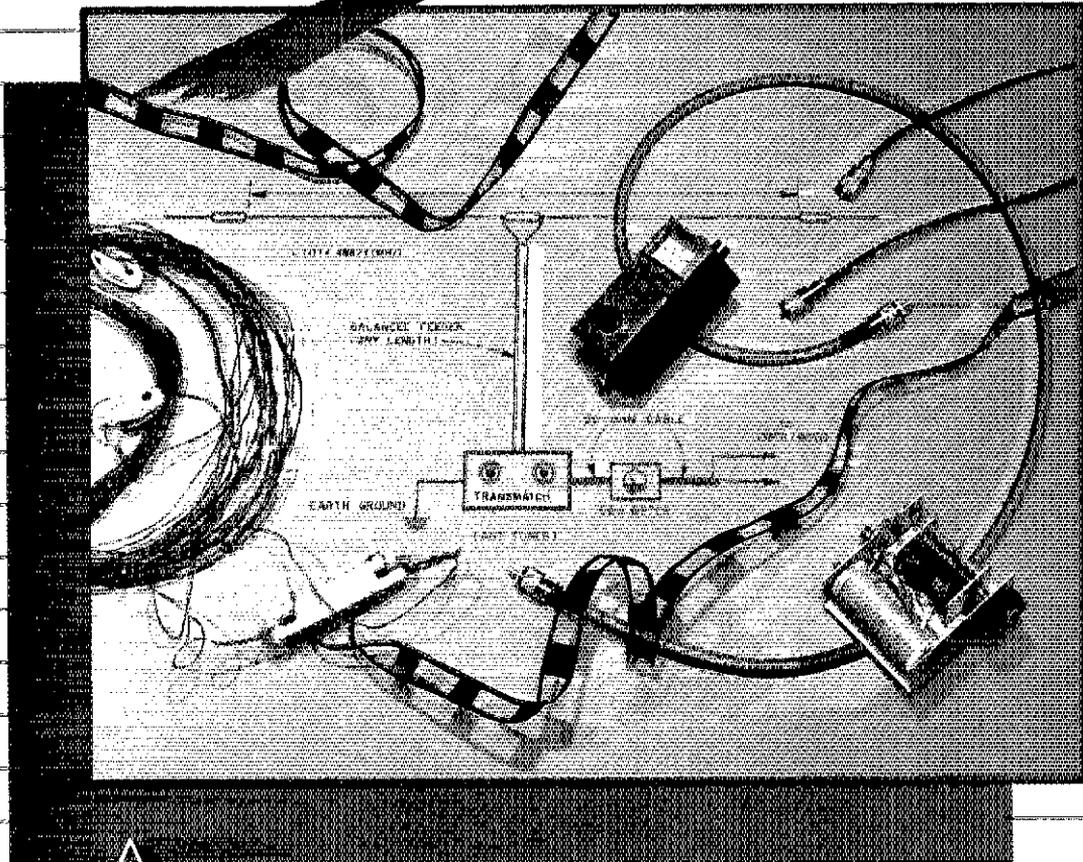
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# MFJ TUNERS

The world's most popular 3 KW roller inductor tuner with cross-needle meter gives you the widest range matching network available for coax, balanced lines and random wires *plus* you get antenna switch, dummy load and balun - all at a super price . . .

The MFJ-989B is a compact 3 KW PEP roller inductor tuner with lighted Cross-Needle SWR/Wattmeter that handles the highest power of any MFJ tuner! Its roller inductor allows you to get your SWR down to the absolute minimum. And you get other outstanding features like an antenna switch, dummy load, balun and more -- all at an outstanding price.

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MFJ-989B \$349<sup>95</sup>

knob for precise inductance control. And because it has the widest range matching network available for coax, balanced lines and random wires. And it covers 1.8 to 30 MHz continuously.

The MFJ-989B's 2-color, lighted Cross-Needle Meter not only gives you SWR automatically with no controls to set but also forward and reflected power at a glance!

Plus . . . 6-position antenna switch, 50 ohm dummy load, 4:1 balun for balanced lines, ceramic feed-through, and flip-stand for easy viewing. Meter light requires 12 V

## MFJ's Best VERSA TUNER II



**MFJ-949C** MFJ's all-in-one Deluxe Versa Tuner II gives you a clutter-free shack and all the features you could ever want at a super price. Here's what you get: coax/balanced line/random wire 300 watt tuner for 1.8-30 MHz, Cross-Needle SWR/Wattmeter, 50 ohm dummy load, 4:1 balun and 6-position antenna switch . . . all in a compact 10x3x7 inch cabinet that matches the smaller new rigs.

You can tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

A lighted Cross-Needle meter gives you SWR, forward and reflected power -- all at a glance. A 6-position antenna switch lets you select 2 coax lines, direct or through tuner, random wire/balanced line and dummy load. 1000 volt capacitors, efficient airwound inductor, heavy duty switches.

## MFJ's smallest VERSA TUNER

**MFJ-901B**  
\$59<sup>95</sup>

The MFJ-901B is our smallest -- 5x2x6

inches -- (and most affordable) 200 watt PEP Versa tuner -- when both your space and your budget is limited. Matches dipoles, vees, random wires, verticals, mobile whips, beams, balanced and coax lines continuously 1.8-30 MHz. Excellent for matching solid state rigs to linears. Efficient airwound inductor. 4:1 balun.

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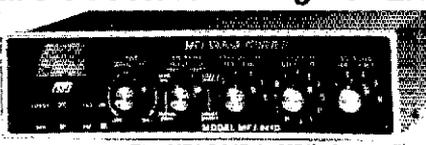
**MFJ-920**  
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**MFJ-921**  
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MFJ's newest VHF tuners cover both 2 Meters and the new Novice 220 MHz bands. They handle 300 watts PEP and match a wide range of impedances for coax fed antennas. MFJ-921 has SWR/Wattmeter.



## MFJ's Fastest Selling TUNER



The MFJ-941D is MFJ's best selling MFJ-941D 300 W PEP antenna tuner! Why? \$99<sup>95</sup> Because it has more features than tuners costing much more and it matches everything continuously from 1.8-30 MHz.

It matches dipoles, vees, verticals, mobile whips, random wires, balanced and coax lines.

SWR/Wattmeter reads forward/reflected power in 30 and 300 watt ranges. Antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass. Efficient airwound inductor gives lower losses and more watts out. Has 4:1 balun. 1000 V capacitors. 11x3x7 inches.

## MFJ's Mobile TUNER



Don't leave home without this mobile tuner! Have an uninterrupted trip as the MFJ-945C extends your antenna bandwidth and eliminates the need to stop, go outside and readjust your mobile whip.

You can operate anywhere in a band and get low SWR. You'll get maximum power out of your solid state or tube rig and it'll run cooler and last longer.

Small 8x2x6 inches uses little room. SWR/Wattmeter and convenient placement of controls make tuning fast and easy while in motion. 300 watts PEP output, efficient airwound inductor, 1000 volt capacitors. Mobile mount, MFJ-20, \$3.00.

## 2 KW COAX SWITCHES

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MFJ-1702, \$19.95. 2-positions. 60 dB Isolation at 450 MHz. Less than .2 dB loss.

**MFJ-1701**  
\$29<sup>95</sup>

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## MFJ's 1.5 KW VERSA TUNER III



The MFJ-962B lets you use your MFJ-962B barefoot rig now and have the capacity to add up to a 1500 watts PEP linear amplifier later. Its small size -- 10 $\frac{3}{4}$ x4 $\frac{1}{2}$ x15 inches -- matches the new compact rigs.

A lighted Cross-Needle SWR/Wattmeter makes tuning a snap and gives you SWR, forward and reflected power -- all at a glance.

6-position antenna switch handles 2 coax lines, direct or through tuner, wire and balanced lines. 4:1 balun, efficient airwound inductor with heavy duty ceramic switch, 6 KV capacitors. Flip-stand tilts tuner for easy viewing.

## MFJ's Random Wire TUNER

**MFJ-16010**  
\$39<sup>95</sup>

You can operate all bands anywhere with any transceiver when you let the MFJ-16010 turn any random wire into a transmitting antenna. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. Handles 200 watts. Ultra compact 2x3x4 in.

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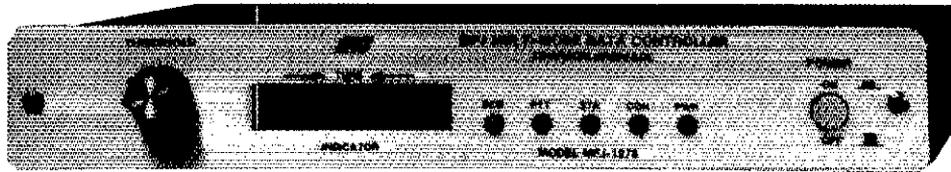
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Plus you get high performance HF/VHF/CW modems, software selectable dual radio ports, precision tuning indicator, 32K RAM, AC power supply and more.

You'll find it the most user friendly of all multi-modes. It's menu driven for ease of use and command driven for speed.

A high resolution 20 LED tuning indicator lets you tune in signals fast in any mode. All you have to do is to center a single LED and you're precisely tuned in to within 10 Hz -- and it shows you which way to tune!

All you need to join the fun is an MFJ-1278, your rig and any computer with a serial port and terminal program.

You can use the MFJ Starter Pack to get on the air instantly. It includes computer interfacing cable, terminal software and friendly instructions . . . everything you need to get on the air fast. Order MFJ-1282 (disk)/MFJ-1283 (tape) for the C-64/128 and VIC-20 or MFJ-1284 for the IBM or compatible, \$19.95 each.

## Packet

Packet gives you the fastest and most reliable error-free communications of any amateur digital mode.

With MFJ's super clone of the industry standard -- the TAPR TNC-2 -- you get genuine TAPR software/hardware plus more -- not a "work-a-like" imitation.

Extensive tests published in *Packet Radio Magazine* ("HF Modem Performance Comparisons") prove the TAPR designed modem used in the MFJ-1278 gives better copy with proper DCD operation under all tested conditions than the other modems tested.

Hardware DCD gives you more QSOs because you get reliable carrier detection under busy, noisy or weak conditions.

A hardware HDLC gives you full duplex operation for satellite work or for use as a full duplex digipeater. And, it makes possible speeds in excess of 56K baud with a suitable external modem.

Good news for SYSPOs! New software lets the MFJ-1278 perform flawlessly as a WORL/WA7MBL bulletin board TNC.

## Baudot RTTY

You can copy all shifts and all standard speeds including 170, 425 and 800 Hz shifts and speeds from 45 to 300

baud. You can copy not only amateur RTTY but also press, weather and other exciting traffic.

A high performance modem lets you copy both mark and space for greatly improved copy under adverse conditions. It even tracks slightly drifting signals.

You can transmit both narrow and wide shifts. The wide shift is a standard 850 Hz shift with mark/space tones of 2125/2975 Hz. This lets you operate MARS and standard VHF FM RTTY.

You get both the American Western Union and the international CCITT character sets, Autostart for unattended reception and selectable "Diddle".

A receive Normal/Reverse software switch eliminates retuning and Unshift-On-Space reduces errors under poor receiving conditions.

## ASCII

You can transmit and receive 7 bit ASCII using the same shifts and speeds as in the RTTY mode and using the same high performance modem. You also get Autostart and selectable "Diddle".

## CW

You get a Super Morse Keyboard mode that lets you send perfect CW effortlessly from 5 to 99 WPM, including all prosigns -- it's tailor-made for traffic handlers.

A huge type ahead buffer lets you send smooth CW even if you "hunt and peck".

You can store entire QSOs in the message memories. If you wanted to! You can link and repeat any messages for automatic CQs and beaconing. Memories also work in RTTY and ASCII modes.

A tone Modulated CW mode turns your VHF FM rig into a CW transceiver for a new fun mode. It's perfect for transmitting code practice over VHF FM.

An AFSK CW mode lets you ID in CW. The CW receive mode lets you copy from 1 to 99 WPM. Even with sloppy fists you'll be surprised at the copy you'll get with its powerful built-in software.

You also get a random code generator that'll help you copy CW faster.

## Weather FAX

You'll be fascinated as you watch WEFAX signals blossom into full

fledged weather maps on your printer. Other interesting FAX pictures can also be printed -- such as some news photographs from wire services.

Any Epson graphics compatible printer will print a wealth of interesting pictures and maps.

Automatic sync and stop lets you set it and leave it for no hassle printing.

You can save FAX pictures and WEFAX maps to disk if your terminal program lets you save ASCII files to disk.

Pictures and maps can be printed to screen in real time or from disk on IBM and compatibles with the MFJ-1284 Starter Pack.

You can transmit FAX pictures right off disk and have fun exchanging and collecting them.

## Slow Scan TV

The MFJ-1278 introduces you to the exciting world of slow scan TV.

You'll not only enjoy receiving pictures from thousands of SSTVers all-over-the-world but you can send your own pictures to them, too.

You can print slow scan TV pictures on any Epson graphics compatible printer. If you have an IBM PC or compatible you can print to screen in near real time or from disk with the MFJ-1284 Starter Pack.

You can transmit slow scan pictures right off disk -- there's no need to set up lights and a camera for a casual contact.

You can save slow scan pictures on disk from over-the-air QSOs if your terminal program lets you save ASCII files.

The MFJ-1278 transmits and receives 8.5, 12, 24, and 36 second black and white format SSTV pictures using two levels.

## Contest Memory Keyer

Nothing beats the quick response of a memory keyer during a heated contest.

You'll score valuable contest points by completing QSOs so fast you'll leave your competition behind. And you can snag rare DX by slipping in so quickly you'll catch everyone by surprise.

You get iambic operation with dot-dash memories, self-completing dots and dashes and jamproof spacing.

Message memories let you store contest RST, QTH, call, rig info -- everything you used to repeat over and over. You'll save precious time and work more QSOs.

You get automatic incrementing serial numbering. In a contest it can make the difference between winning and losing.

A weight control lets you penetrate QRM with a distinctive signal or lets your transmitter send perfect sounding CW.

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Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

Plus . . . printing in all modes, threshold control for varying band conditions, tune-up command, lithium battery backup, RS-232 and TTL level serial ports, watch dog timer, FSK and AFSK outputs, output level control, speaker jack for both radio ports, test and calibration software, Z-80 at 4.9 MHz, 32K EPROM, and socketed ICs. FCC approved. 9x11/2x9 1/2 inches. 12 VDC or 110 VAC.

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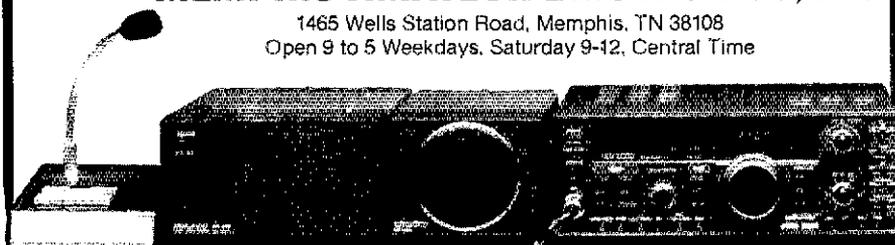
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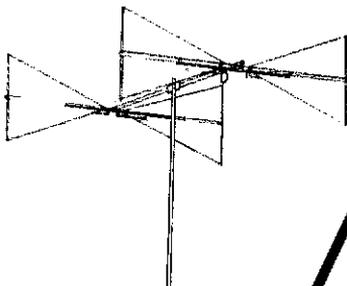
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GE MUSAPHONIC AM-FM five tube table radio circa 1965. Labels and tubes missing. Can anyone supply model number, tube layout, or schematic. N1ATB

FOR SALE: Hallicrafters S22R Receiver 110 KHz-18 MHz good condition. Wm. E. Bastian, N9BOE, 702 Farmer Avenue, Tomah, WI 54660, phone 608-372-7293 ev.-wkends.

WANTED: Older model bugs of any make and Dow Keys out of Canada. Smiley White, WB4ECB, POB 5150, Fredericksburg, VA 22403, 703-373-0996.

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WANTED: Mini Products B24 Compact 2 Element Beam for Balcony. Phil Eprile, VE3FGZ, Apt. 2009, 57 Charles Street West, Toronto M5S 2X1, call 416-929-5326 my time 8 AM or 11:30 PM.

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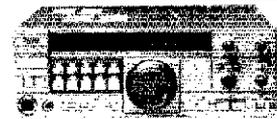
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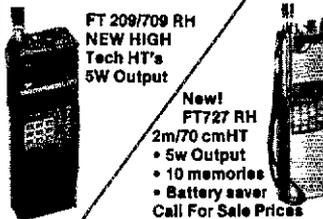
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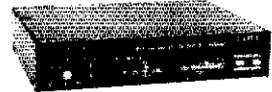
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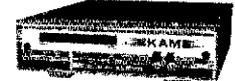


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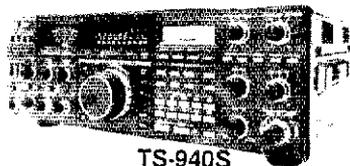
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R-5000 100 kHz-30 MHz	999.95	Call \$
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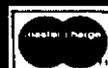


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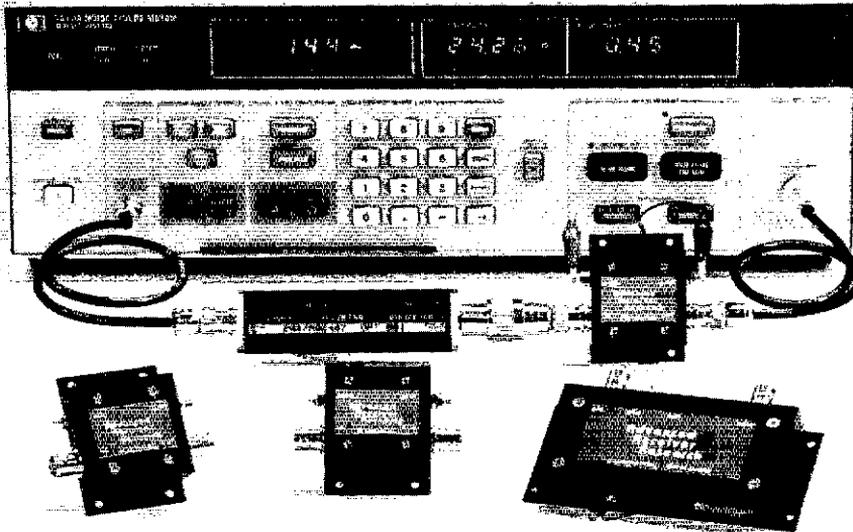
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P50VD	50-54	< 1.3	15	0	DGFET	\$29.95
P50VDG	50-54	< 0.5	24	+ 12	GaAsFET	\$79.95
P144VD	144-148	< 1.5	15	0	DGFET	\$29.95
P144VDA	144-148	< 1.0	15	0	DGFET	\$37.95
P144VDG	144-148	< 0.5	24	+ 12	GaAsFET	\$79.95
P220VD	220-225	< 1.8	15	0	DGFET	\$29.95
P220VDA	220-225	< 1.2	15	0	DGFET	\$37.95
P220VDG	220-225	< 0.5	20	+ 12	GaAsFET	\$79.95
P432VD	420-450	< 1.8	15	-20	Bipolar	\$32.95
P432VDA	420-450	< 1.1	17	-20	Bipolar	\$49.95
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SP50VD	50-54	< 1.4	15	0	DGFET	\$59.95
SP50VDG	50-54	< 0.55	24	+ 12	GaAsFET	\$109.95
SP144VD	144-148	< 1.6	15	0	DGFET	\$59.95
SP144VDA	144-148	< 1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	< 0.55	24	+ 12	GaAsFET	\$109.95
SP220VD	220-225	< 1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	< 1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	< 0.55	20	+ 12	GaAsFET	\$109.95
SP432VD	420-450	< 1.8	15	-20	Bipolar	\$62.95
SP432VDA	420-450	< 1.2	17	-20	Bipolar	\$79.95
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SELL: ICOM 271H/Mast Mount Pre-Amp, mint \$725. ICOM 471H/Mast Mount Pre-Amp, mint \$750. Pakratt PK-64/HFM-64 Modem, mint \$150. Azden PCS-4000, \$175. All manuals and original cartons. I ship. Peter Dahl Plate Transformer. 230 Vac Pri..3000 Vac @ 1.5 Amp CCS Sec..New.\$200. U ship. Maxwell High Voltage Capacitor. Oil Filled.55uF @ 6KV. New \$50. KABCCC, Mill, 313-695-1572, after 5 PM, 1084 Holly Hook Circle, Grand Blanc, MI 48439.

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OK710	30/40 M conv. Exp 14

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58D0S	trap doublet 10 thru 80 meters

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25BS	2 meter 5 element beam
28BS	2 meter 8 element beam
214BS	2 meter 14 element beam
64BS	4 element 6 meter beam
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V-3S	collinear gain vertical 220 MHz
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A147-22	22 element 'Power Packer'
A144-10T	10 element 2 mtr 'Oscar'
A144-20T	20 element 2 mtr 'Oscar'
215WB	15 element 2 mtr. 'Boomer'
220B	17 element FM 'Boomer'
230WB	144-148MHz, 30 element
32-19	19 element 2 mtr. 'Boomer'
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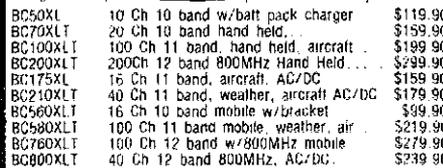
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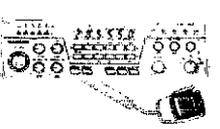
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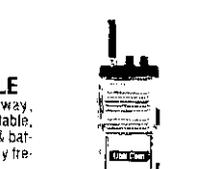
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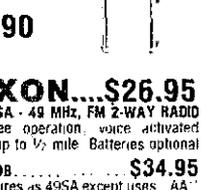
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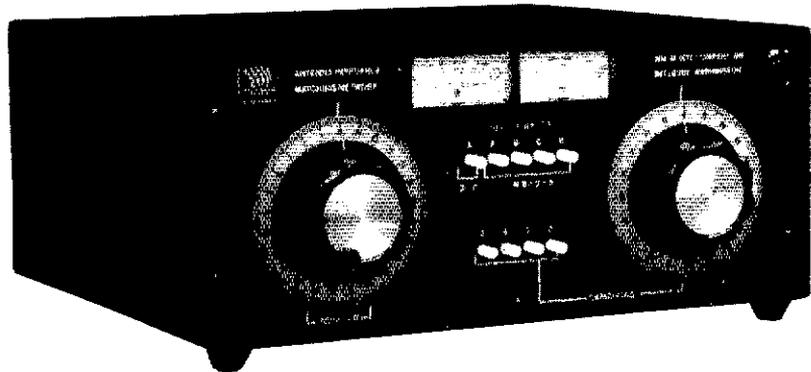
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same features as 49SA except uses AA nicad batteries and comes with battery charger

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<b>PS4</b>	\$19.90
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<b>PS7</b>	\$24.90
Fully regulated, 7 amp constant, 10 amp surge capacity	
<b>PS12</b>	\$34.90
Fully regulated, 10 amp constant 13 amp surge, electronic overload protection w/instant auto reset.	
<b>PS20</b>	\$64.90
Fully regulated, 25 amp surge capacity, 13.8 VDC, 20 amp constant, with meter	
<b>PS25</b>	\$79.90
Regulated 4.5-15VDC-25 Amp constant 27 amp surge, instant auto reset, dual meter for current & voltage.	
<b>PS35</b>	\$99.90
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\* 1.8 MHz will not tune on some antennas

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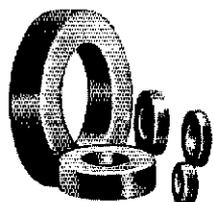
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WANTED: Lafayette CB Rig HB-115A. Paul Berkowitz, 3715 Woodley Road NW, Washington, DC 20016, 202-226-7538 work, 202-363-8593 home.

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WANTED: Heathkit Receiver HR-1680. Ray Farmer, WA4EVS, 516 Chestnut Street, Corbin, KY 40701, 608-528-3539.

WANTED: 500 Cycle Collins Mechanical Filter. Type F455J05. Collins P/N 526 915400. Write W0EFK, Pehoshek, 10812 Thomas Avenue South, Bloomington, MN 55431, home 612-881-1376.

WANTED: Collins 32V2 circular dial, sweep generator for aligning tube type receivers. Dick Geordan, W6SGJ, 1347 Albertson, Covina, CA 91722, 818-339-9852 after 5 PM PDT.

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	AC-4 AC supply 69 mc	IC-28H 2m FM Xcvr 349 w
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	DC-4 DC supply 59 f	IC-3200A/UT-23 2m/440 499 m
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	FL-500 500 Hz filter 39 m	IC-451A 430 Xcvr 469 m
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	MN-4 Ant tuner 69 m	IC-48A 440 FM Xcvr 349 m
	MS-4 Speaker 19 fc	IC-720A Xcvr 529 f
	P-75 Phone patch 49 m	PP-1 Phone patch 129 f
	R-4A Ham Rcvr 149 c	PS-20 Power supply 159 fv
	R-4B Ham Rcvr 179 m	R-71A SW Rcvr 689 f
	R-4C Ham Rcvr 249 m	UT-39 Encoder; u2A 15 m
	RCS-4 Ant switch 89 m	<b>KANTRONICS</b>
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<b>CRI-200 Interface</b>	\$139 m	MC-60A Desk mic 79 m
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		R-600 SW receiver 229 w
		SP-520 Speaker 29 m
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		TH-41AT 440 FM HT 149 m
		TK-1 Memory ps 15 mw
		TR-7625 2m FM Xcvr 169 f
		TS-430S Xcvr 599 m

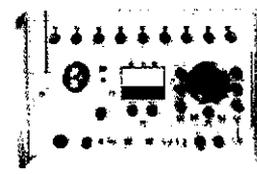
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FT-ONE/4 filts/fm/ram 1269 f	FTV-650B 6m transverter 149 f	FV-101B Remote VFO 99 m	NC-9B Wall charger 9 w	SP-101PB Spkr/patch 49 mt	XF-30C CW filter 35 v	XF-8.2HSN SSB filter 35 w	YH-77 Headphones 15 m	YM-35 Microphone 15 w
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The following are NEW Close-outs, Overstock merchandise, New displays, Demos, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Most Close-outs available at the Milwaukee store only.

<b>AEA</b>	AC-3 13.8v 520ma p/s 495	DF-180 Dig freq control TS-180 495
	PK-64 Packet controller 1495	MC-600A 4-pin dtx desk mic 695
	PK-64 w/HFM modem 1595	R-1000 SW receiver (DEMO) 4295
	PK-64A Packet controller 1995	RA-1 2m flex ant for TR-2200 65
	PK-64A w/HFM modem 2495	SP-100 Ext speaker for R-1000 395
<b>AMP SUPPLY</b>	LA-1200 HF amplifier 1895	TR-8400 440 FM Xcvr DEMO 1995
	LA-1000A HF Amplifier 3995	TR-9130 2m SSB/FM demo 3995
<b>ANTENNA SPECIALISTS</b>	HM-228 2m flex ant/F conn 295	<b>MFJ</b>
	HM-748 2m cowl mt disguise 395	MFJ-74 11V inverter 495
	HM-798 2m Ford cowl mt dis 395	MFJ-29D Small ext speaker 145
<b>BUTTERNUT</b>	SC-3000 30-512 MHz scan ant 495	MFJ-410 Code gen/keyer 995
	CES	MFJ-481 Memory keyer 695
	800-YS Scanner unit, FI-227R 1995	MFJ-494 Super kybd DEMO 1995
<b>CUSHCRAFT</b>	ABW-14SK 4 Big Wheel stk. kit 65	MFJ-1233 Modem 195
	DAIWA	<b>MIDLAND</b>
	AC-2A Charger for MT-20A 65	18-950 220 % tkn/roof ant 1495
	AK-406K Active audio filter 995	<b>MILLER</b>
	BA-1 Battery holder for MT-20A 95	C-601 3" RG-58 w/PL-2595 295
	BA-3 Battery for MT-20A 249	<b>REGENCY</b>
<b>DRAKE</b>	7805 R-7 service manual 295	MA-50 Battery for HRT-2 195
	R-4245 service manual 295	MA-60 Test/inj. cable, EC-175 65
	RTM-7 10mhz rmg mod, FR-7 850	<b>SHURE</b>
<b>EIMAC</b>	HR-3 Heat dissipating connect 65	R-70 Cartridge, 570/571/572 495
	SK-400 Socket for 4-400A 995	<b>STANDARD</b>
	SK-416 Chimney for 4-400A 495	MC-3 Mobile charger 195
	SK-516 Chimney for 3-1000Z 695	Mini clip kit for LCC-2 195
	SK-612 Socket for 4CX250B 495	<b>TELEX</b>
	SK-650 Socket for 4CX250B 295	HFV-91 LL wt single phone 295
<b>HUSTLER</b>	SPS-144 2m 2m mobile ant 145	ProCom 200 Headset/bm mic 495
<b>KENWOOD</b>	ED-10 Call sign display 495	<b>TEN-TEC</b>
	FC-10 Frequency controller 295	214 Electret desk mic 395
	LH-1 Leather case (2400) 295	260 18A power supply 1095
	LH-2 Leather case (2500/3500) 295	560 Corsair Xcvr DEMO 7995
	PS 20 Power supply 395	1145 Large knob kit, 509/540 590
	KPS-7A Power supply 495	1150 Overvoltage protector 95
		<b>YAesu</b>
		NC-7 Desk charger 495
		Battery holder for FRG-7 195
		Dig. interface, FR-101 aux 295
		Dig. display interface kit, 221R 295
		FP-8 8 Amp power supply 495
		FI-703R/TTP 440 FM HT/TTP 1695
		MMB-2 Mobile mt, FI-2 Auto 195
		PB-1424 Marker unit, FI-620B 195

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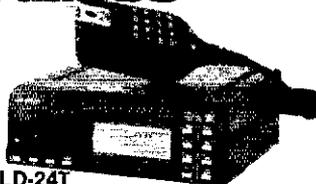
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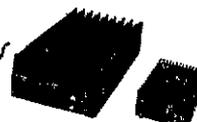


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MODEL	BANDS	LENGTH
GD-6:	80-40-20-17-12-10M	137'
GD-8:	80-40-30-20-17-15-12-10M	137'
GD-7:	160-80-40-20-17-12-10M	255'
GD-9:	160-80-40-30-20-17-15-12-10M	255'

Choose between 500W PEP or 2KW versions. Install as a horizontal dipole or an inverted-V. SWR usually better than 1.5:1. No tuner needed if properly installed. See letters of our ham customers in our data report. The GD-windom dipoles are no dummy load antennas. Our special GD-balun (500W or 2KW) matches the low impedance (50Ω) coax feedline to the high impedance windom-type antenna. All GARANT GD-windom dipoles come with a 3-year limited warranty and a 10-day money-back guarantee. Who else has that much confidence in his products?

VE2MNL, Michel: "I have installed my GD-7. Only one antenna to cover 7 bands with practically perfect SWR on all bands. VE1AZZ, Gordon on his GD-8: "I find the SWR exactly as you claimed." VE7TH, John on his GD-9: "FB on all bands. Great for DX." VE7BKU, Rob on his GD-8: "A great antenna. Excellent bandwidth." VE1VCD, Stu: "Very pleased with the GD-6/2KW. In less than six months operation have logged over 85 different countries. Recommend it to anyone considering a wire antenna."



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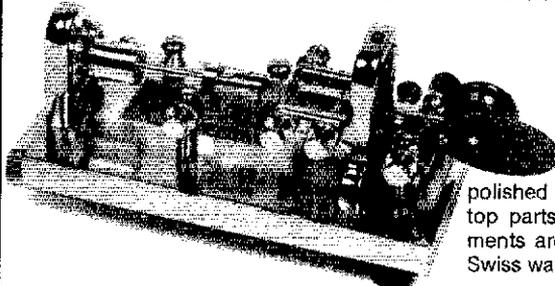
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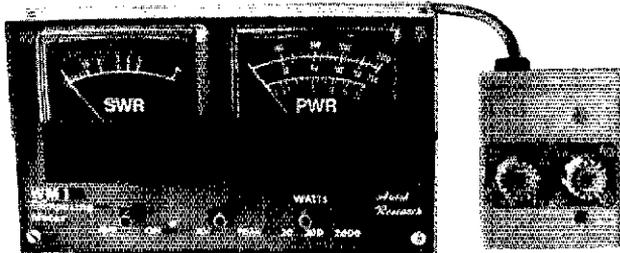
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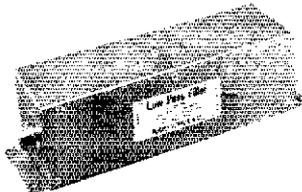
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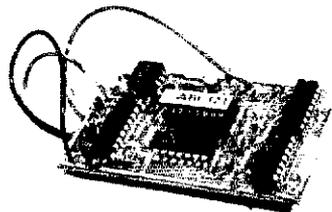


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• KANTRONICS • KENWOOD • MFJ • MOSLEY • SANTEC  
• TELEX HY-GAIN • TENTEC • YAESU • AND MORE!**

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**Factory Authorized Dealer!**

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Prices are subject to change without notice or obligation. Products are not sold for evaluation.



Katherine, KA3IYO

**"CHOICE OF THE DX KINGS"**



**2 ELEMENT—  
3 BAND  
KIT SPECIAL** **ONLY  
\$269<sup>95</sup>**  
FOB Calif.

**CONTENTS**

- 8 Fiberglass Arms, 1 pc. White 13 ft.
- 2 End Spiders (1 pc. castings)
- 1 Boom/Mast Coupler, 2" to 2"
- 16 Wraplock Spreader Arm Clamps
- 1 CUBEX QUAD Instruction Manual (Boom and wire not included)

**MK III 2 EL COMPLETE "PRE-TUNED" QUAD ONLY \$299.95**

2-3-4 or more element Quads available. Send 50¢ (cash or stamps) for complete set of catalog sheets, specs & prices

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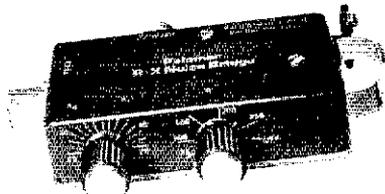
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A subsidiary of Zenith Electronics Corporation

CL-792

## R-X NOISE BRIDGE

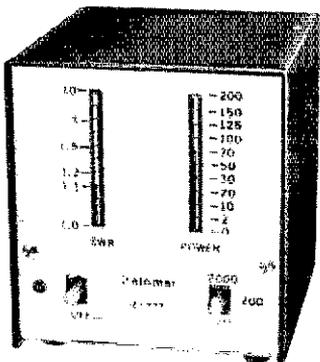


### •Learn the truth about your antenna.

The Palomar R-X Noise Bridge tells you if your antenna is resonant or not and, if it is not, whether it is too long or too short. It gives resistance and reactance readings on dipoles, inverted Vees, quads, beams, multiband trap dipoles and verticals from 1 to 100 MHz.

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Shows power and SWR on bright red light bars. See PEP and SWR while you talk! Automatic "hands-off" SWR reading. Power ranges 20-200-2000 watts. Works from 1-30 MHz. For 115-v AC, 220-v AC and 12-v DC models also available.

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Send for FREE catalog that shows our complete line of noise bridges, SWR meters, pre-amplifiers, loop antennas, VLF converters, audio filters, baluns, RTTY equipment, toroids and more.

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Phone: (619) 747-3343

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Advertising Manager

Angela Beebe, Advertising Assistant

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# ANTENNA/TOWER SALE!

**hy-gain**

## CRANKUP SALE!

All Models Shipped  
Factory Direct—  
Freight Paid\*!

Check these features:

- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	\$CALL
HG52SS	52 ft	9 sq ft	\$CALL
HG54HD	54 ft	16 sq ft	\$CALL
HG70HD	70 ft	16 sq ft	\$CALL

Masts—Thrust Bearings—  
Other Accessories Available  
—Call! Prices Shown Are  
Your Total Delivered Price  
In Continental U.S.A.!

## ROHN Self Supporting Towers ON SALE! FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save \$
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant. Load*	Weight	Delivered Price*
HGX40	40 ft	10 sq ft	228	\$379
HGX48	48 ft	10 sq ft	303	\$489
HGX56	56 ft	10 sq ft	385	\$569
HDBX40	40 ft	18 sq ft	281	\$459
HDBX48	48 ft	18 sq ft	363	\$559

\*Your Total Delivered Price Anywhere In Continental 48 States. Antenna Load Based on 70 MPH Wind.

## ROHN Guyed Tower Packages

- World Famous Rohn Quality and Dependability
  - Rugged high wind survival—provides safe installation
  - Multi purpose towers satisfy a wide range of needs
  - Complete packages include: guy hardware, turnbuckles, guy assemblies, w/lorq bars, concrete base, rotor plate and top section per manufacturers specs.
- Packages shown below are rated for wind zone "B" (86 mph wind), Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

Model 25G	Model 45G	Model 55G
50'	\$ 699	\$1239
60'	769	1399
70'	829	1539
80'	989	1719
90'	1069	1999
100'	1149	2179
110'	1359	2329
120'	1429	2489



These rugged crankup towers and masts now available from Texas Towers!

Check these features:

- All steel construction
- Hot dipped galvanized
- Totally self-supporting—No guys needed

Coax arms, Thrustbearings Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock.

CALL FOR SALE PRICES!

Model	Min.Ht.	Max.Ht.	Ant. load*	Sale price
MA40 mast	21'	40'	10 sq ft	\$629
MA550 mast	22'	50'	10 sq ft	\$99
TX438	22'	38'	18 sq ft	\$19
TX455	22'	55'	18 sq ft	\$185
TX472	23'	72'	18 sq ft	\$279
HDX55	22'	65'	30 sq ft	\$279
HDX572	23'	72'	30 sq ft	\$359

Note: Towers Shipped Freight Collect From Visalia, CA Factory

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

### RG-213U

\$ 29/ft \$279/1000 ft  
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

### RG-BX

\$ 19/ft \$179/1000 ft

- RG8X—95% Bare Copper Shield •Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

### 9086

\$ 39/ft \$379/1000 ft

- Same specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

### HARDLINE/HELIX®

Lowest Loss for VHF/UHF!

1/2" Alum. w/poly Jacket	\$ .79/ft.
1/2" LDF4-50 Andrew Helix®	\$ 1.79/ft.
3/4" LDF5-50 Andrew Helix®	\$ 3.99/ft.

select connectors below.

Helix® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	6	9	2.3	5.2
RG8X	52	8	12	3.5	5.8
9086	50	4	6.4	1.7	3.1
1/2" Alum	50	3	5	1.2	2.2
1/2" Helix	50	2	4	9	1.6
3/4" Helix	50	1	2	5	9

### HARDLINE & HELIX® CONNECTORS

Cable Type	UHF FML	UHF MALE N	FML N	MALE
1/2" Alum	\$25	\$25	\$33	\$33
1/2" Helix®	\$29	\$29	\$29	\$29
3/4" Helix®	\$55	\$55	\$55	\$55

### COAX CONNECTORS

Amphenol Silver PL259	\$1.25
UG21B N Male	\$2.95
9086/9913 N Male Connector	\$4.95

### ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga. . . . . \$ .10/ft.  
1/4 mile 18ga copper-clad steel wire . . . . . \$30  
Dog bone end insulator . . . . . \$79 ea.

### Van Garder

1:1 Balun	\$15	Center Insulator	\$8
Dipole Kits	D80 \$31.95/D40 \$28.95		
Short Dipole Kits	S080 \$35.95/S040 \$33.95		
All-band Dipole w/ladder line	\$29.95		
G5RV all band antenna	\$49.95		

### ALPHA DELTA

DX-A 160-80-40 Sloper \$49

### CUSHCRAFT

A3 3-el Tribander	\$259
A4S 4-el Tribander Beam w/S.S. Hdwr.	\$349
A743 & A744, 30/40 mtr KIT for the A3 & A4	\$ 89
AP8 80-10 mtr Vertical	\$139
AV5 80-10mtr Vertical	\$119
D40 40mtr Dipole	\$159
40-2CD 2-el 40 mtr Beam	\$339
A50-5 5-el 6 mtr Beam	\$ 98
215 WB NEW 15-el 2 mtr Beam	\$ 89
230 WB NEW 30-el 2 mtr Beam	\$229
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### hy-gain

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20S8AS 5-el 20-mtr Beam . . . . . \$29

15S8AS 5-el 15-mtr Beam . . . . . \$29

10S8AS 5-el 10-mtr Beam . . . . . \$29

204BAS 4-el 20-mtr Beam . . . . . \$29

64BS 4-el 6-mtr Beam . . . . . \$29

12 AV0 20-10 mtr vertical . . . . . \$29

14 AV0 40-10 mtr vertical . . . . . \$29

18 AVT/WB 80-10mtr Vertical . . . . . \$29

18HTS 80-10 mtr Hy-Tower Vertical . . . . . \$29

23BS 3-el 2 mtr Beam . . . . . \$29

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214BS 14-el 2-mtr Beam . . . . . \$29

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### HUSTLER

6BTV 80-10 mtr Vert	\$149	5BTV 80-10 mtr Vert	\$129
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G6-144B 2-mtr Base	\$89		

Mobile Resonators 10m 15m 20m 40m 75m

400W Standard \$16 \$17 \$19 \$22 \$26

2KW Super \$20 \$22 \$25 \$29 \$39

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HF6V 80-10m Vertical \$129 Delivered

- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical \$129 Delivered

- Full Legal Power
- Automatic Band Switching

Accessories:

RMK II Roof Mtg. Kit	\$49
STR II Stub-Tuned Radials	\$29
TBR160 160m Coll Kit	\$49
30m Add-on Kit	\$29
20m Add-on Kit	\$39
17/12m Add-on Kit	\$27

FREE UPS on ACCESSORIES when purchased w/antenna

### HF5B "Butterfly" 20-10m Compact Beam \$199.00

- Unique Design
- Turns w/TV Rotor
- Reduces Size
- Boom Length 6 Feet
- No Lossy Traps
- Element Length 12.5 Feet

FREE UPS Shipping in Continental USA

### MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam	\$399.95
KT34XA 6-el Broad Band Triband Beam	\$589.95

### ROTORS

Alliance HD73 (10.7 sq ft rating)	\$119.95
Alliance U110 (3 sq ft rating)	\$49
Telex CD 4511 (8.5 sq ft rating)	\$CALL
Telex HAM 4 (15 sq ft rating)	\$CALL
Telex Tallwister (20 sq ft rating)	\$CALL
Telex HDR300 Heavy Duty (25 sq ft rating)	\$CALL

### ROTOR CABLE

Standard 8 cord cables \$ .19/ft  
(vinyl jacket 2-#18 & 8-#22 ga)

Heavy Duty 8 Cond cable \$ 36/ft  
(vinyl jacket 2-#16 & 6-#18 ga)

### ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G	\$48.00	45G	\$133.00
25G	\$56.00	55G	\$165.00

ALL ACCESSORIES IN STOCK—CALL

### ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	\$1049.
FK2558	58 ft.	13.3 sq. ft.	\$1099.
FK2568	68 ft.	11.7 sq. ft.	\$1149.
FK4544	44 ft.	34.8 sq. ft.	\$1389.
FK4554	54 ft.	29.1 sq. ft.	\$1469.
FK4564	64 ft.	28.4 sq. ft.	\$1579.

25G Double Guy Kit . . . . . \$279.  
45G Double Guy Kit . . . . . \$299.

\*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

### TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	\$ 15/ft
1/4 EHS Guywire (6650 lb rating)	\$ 18/ft.
5/16 EHS Guywire (11,200 lb rating)	\$ 29/ft.
5/32 x 7 G Aircraft Cable (2700 lb rating)	\$ 15/ft
3/16 CCM Cable Clamp (3/16" or 5/32")	\$ 45
1/4 CCM Cable Clamp (1/4" Cable)	\$ 55
1/4 TH Thumbie (fits all sizes)	\$ 45
3/8EE (3/8" Eye & Eye Turnbuckle)	\$6 95
3/8EJ (3/8" Eye & Jaw Turnbuckle)	\$7 95
1/2 x 9EE (1/2" x 9" Eye to Eye Turnbuckle)	\$9 95
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1/2 x 12EE (1/2" x 12" Eye & Eye Turnbuckle)	\$12 95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle)	\$13 95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle)	\$16 95
3/16" Preformed Guy Grip	\$2 49
1/4" Preformed Guy Grip	\$2 99
6" Diam - 4 ft Long Earth Screw Anchor	\$14 95
500 D Guy Insulator (5/32" or 3/16" Cable)	\$1 69
502 Guy Insulator (1/4" Cable)	\$2 99
5/8" Diam - 8 ft Copper Clad Ground Rod	\$12 95

### PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	\$ 32/ft
HPTG4000 Guy Cable (4000 lb rating)	\$ 52/ft
HPTG6700 Guy Cable (6700 lb rating)	\$ 72/ft
9801LD Cable End (for 2100/4000 cable)	\$9 95
9902LD Cable End (for 8700 cable)	\$11 95
Stocktast Potting Compound (does 6-8 ends)	\$16.95

### GALVANIZED STEEL MASTS

Heavy Duty Steel Masts ? in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	\$29	\$49	\$69	\$89
18 in Wall	\$49	\$89	\$129	\$149
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(Prices & Availability Subject To Change Without Notice)

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**KENWOOD**



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- All Band, All Mode Transceiver
- Direct Keyboard Entry
- Engineered for the DX-Minded and Contesting Ham
- Its Got It All!

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- Add Optional 6m, 2m & 70cm Modules
- Dual VFO's
- Full CW Break-in
- Lots More Features

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- 160-10M/General Coverage Receiver
- Built-in Power Supply and Automatic Antenna Tuner
- SSB, CW, FM, AM, RTTY
- QSK to 60 WPM

**ALINCO**



**ALD-24T** DUAL BAND MOBILE

- 140-149.995 MHz/ 440-450 MHz
- 25 Watts on Both Bands
- Crossband Full Duplex
- 21 Memory Channels
- CTCSS Encoder/Decoder, Standard

**KENWOOD**



**TS-140S** AFFORDABLE DX-ing!

- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
- Compact, Lots of Features

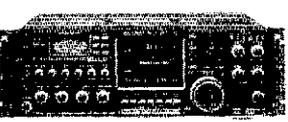
**YAESU**



**FT-736R** VHF-UHF BASE STATION

- SSB, CW, FM on 2 Meters and 70 cm
- Optional 50 MHz, 220 MHz or 1.2 GHz
- 25 Watts Output on 2 Meters, 220 and 70 cm
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**ICOM**



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- 5 Function Display Screen
- Built-in Spectrum Scope
- 150 Watts Output
- Built-in PS and AT

**concept**

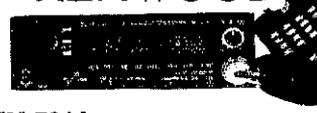
2m and 220 MHz Amplifiers  
GaAsFET Receive Pre-Amps  
and High SWR Shutdown Protection

MODEL	144 MHz	220 MHz
2-23	2 in/30 out	
2-217	2 in/170 out	
2-117	10 in/170 out	
		220 MHz
3-22		2 in/20 out
2-211		2 in/110 out
3-312		30 in/120 out

CALL

SALE PRICED

**KENWOOD**



**TM-721A** DELUXE FM DUAL BANDER

- 2 Meters (138.000-173.995 MHz) 70 cm (438.000-449.995 MHz) Receiver Range
- 45 Watts on 2 Meters 35 Watts on 70 cm
- 30 Memory Channels

**YAESU**



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THE "ANSWERING MACHINE" MOBILE

- Rx: 138-174 MHz
- Tx: 144-148 MHz
- 45W Output
- Digital Voice Recorder
- FT-712 RH for 70cm

**ICOM**

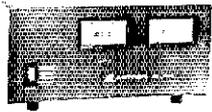


**IC-900** SIX BANDS IN ONE MOBILE

- Remote Controller, Interface A Unit, Interface B Unit, Speaker, Mic and Cables
- Six Band Units to Choose
- 10 Memories Per Band
- Programmable Band Scan
- Fiber Optic Technology

SALE

**ASTRON CORPORATION**



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- RS12A . . . \$68
- RS20A . . . \$88
- RS20M . . \$105
- VS20M . . \$125
- RS35A . . \$133
- RS35M . . \$149
- VS35M . . \$165
- RS50A . . \$189
- RS50M . . \$215
- RM50A . . \$219
- VS50M . . \$229

**KENWOOD**



**TH-25AT** POCKET-SIZED AND POWERFUL

- Frequency Coverage: 141-163 MHz (Rx), 144-148 MHz (Tx)
- Front Panel DTMF Pad
- 5 Watts Output
- 14 Memories
- TH-45AT Available for 440 MHz

**YAESU**



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- Super "Mini" HT's
- Zinc-Aluminum Alloy Case
- 10 Memories
- 140-164 MHz, 440-450 MHz
- 2W Battery Pack or Optional 5W Pack

**ICOM**



**IC-μ2AT**  
**IC-μ4AT**

MICRO HT'S FOR 2M, 440

- Pocket Size HT Fun
- Ten Memories
- LCD Readout
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- Up to 3 Watts Output
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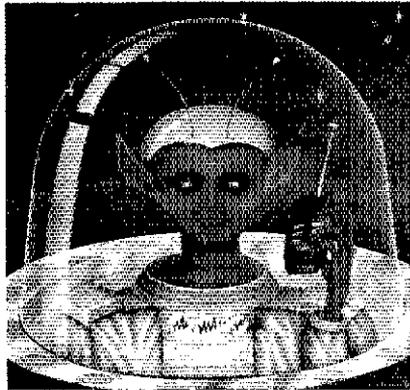
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# Yaesu's FT-736R. Because you never know who's listening.



Why just dream of talking beyond earth?

With Yaesu's new FT-736R VHF/UHF base station, you can discover some of the best DX happening in ham radio. Via moonbounce. Tropo. Aurora. Meteor scatter. Or satellites.

You see, the FT-736R is the most complete, feature-packed rig ever designed for the serious VHF/UHF operator. But you'd expect this of the successor to our legendary FT-726R.

For starters, the FT-736R comes factory-equipped for SSB, CW and FM operation on 2 meters and 70 cm (430-450 MHz!), with two additional slots for optional 50-MHz, 220-MHz, or 1.2-GHz modules.

Crossband full duplex capability is built into every FT-736R for satellite work. And the satel-

lite tracking function (normal and reverse modes) keeps you on target through a transponder.

The FT-736R delivers 25 watts RF output on 2 meters, 220 MHz, and 70 cm. And 10 watts on 6 meters and 1.2 GHz. Store frequency, mode, PL frequency, and repeater shift in each of the 100 memories.

For serious VHF/UHF work, use the RF speech processor. IF shift. IF notch filter. CW and FM wide/narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Preamp switch for activating your

tower-mount preamplifier. Even an offset display for measuring observed Doppler shift on DX links.

And to custom design your FT-736R station, choose from these popular optional accessories: Iambic keyer module. FTS-8 CTCSS encode/decode unit. FVS-1 voice synthesizer. FMP-1 AQS digital message display unit. 1.2-GHz ATV module. MD-1B8 desk microphone. E-736 DC cable. And CAT (Computer Aided Transceiver) system software.

Discover the FT-736R at your Yaesu dealer today. But first make plenty of room for exotic QSL cards. Because you *never* know who's listening.

## YAESU



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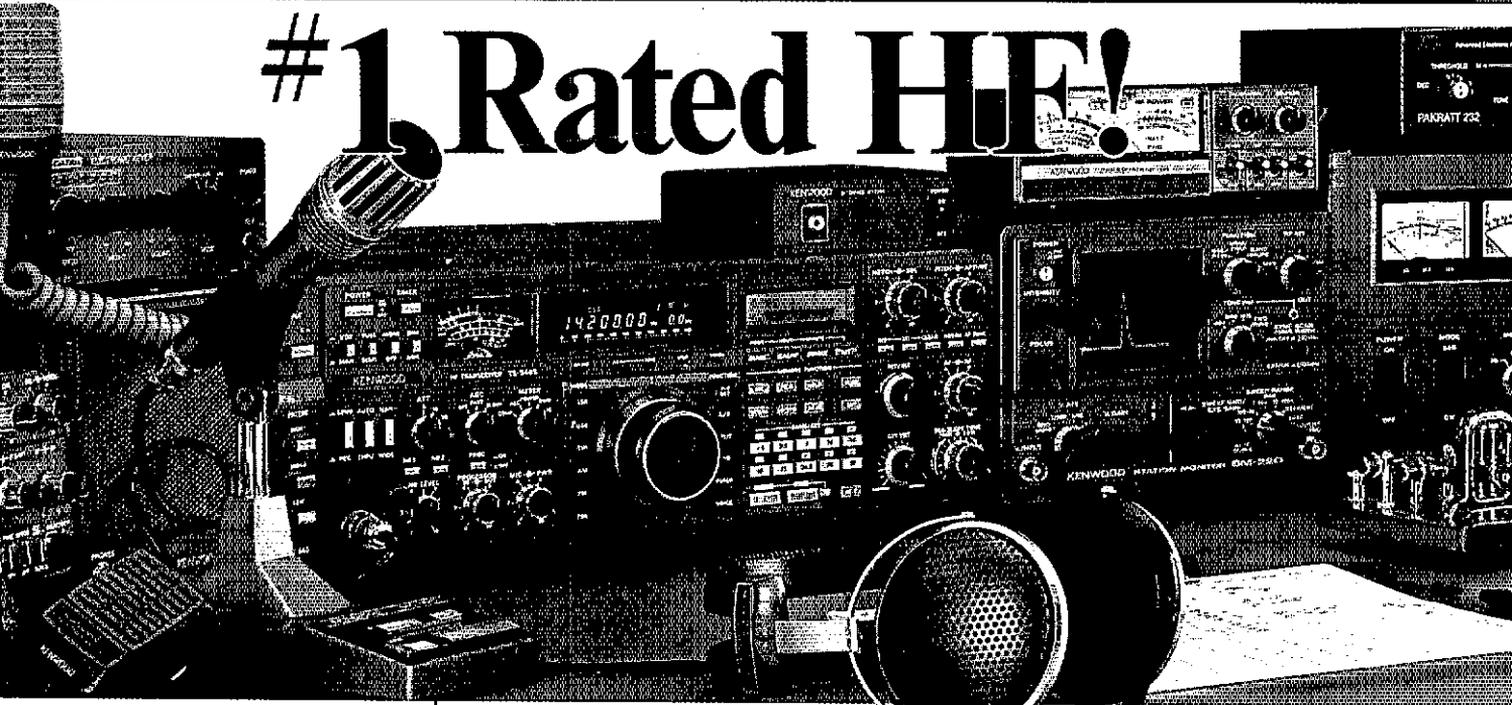
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# KENWOOD

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## #1 Rated HF!



### TS-940S

#### Competition class HF transceiver

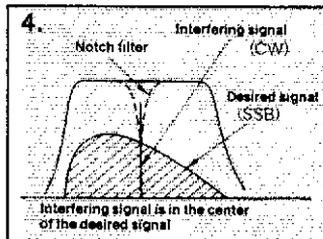
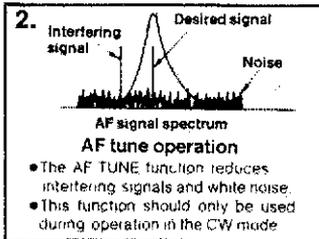
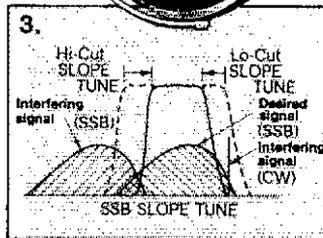
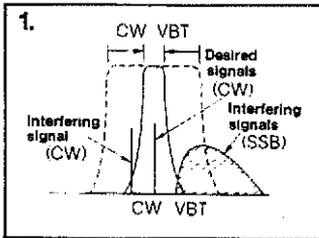
TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle **time**. The TS-940S is guaranteed to operate at full power output for periods **exceeding one hour**. (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in **parts per million!**

#### Optional accessories:

- AF-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

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



1) **CW Variable Bandwidth Tuning.** Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) **AF Tune.** Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.

3) **SSB Slope Tuning.** Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) **IF Notch Filter.** The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

- 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
- IF-232C/IF-10B computer interface.

# KENWOOD

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