

QST

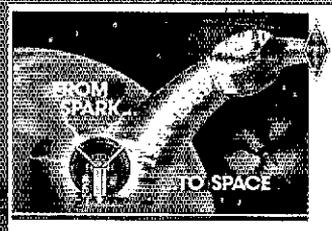
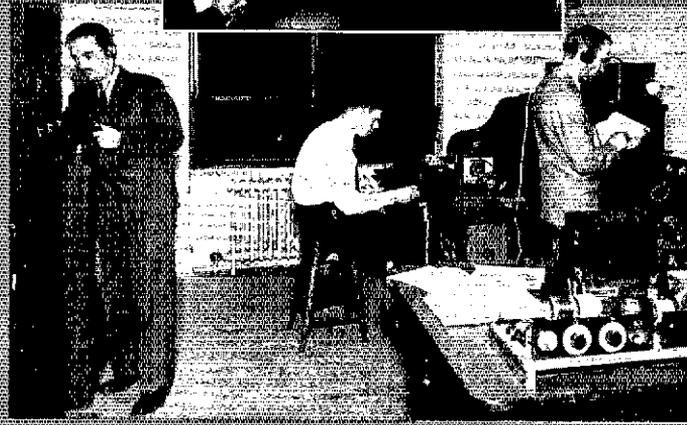
March 1989 \$3.00

US Hams on 18 MHz
See page 13

devoted entirely to Amateur Radio

THE 30s

QST
devoted entirely to amateur radio



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the **3KD Classic**
the **2KD Standard**



Now you have a choice of four high quality HF desk models providing the performance and reliability you have come to expect from a Henry Amplifier

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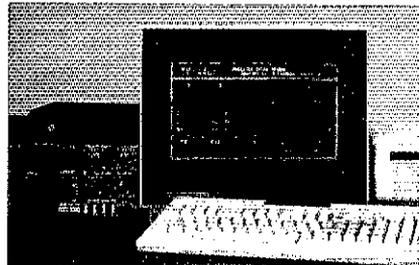
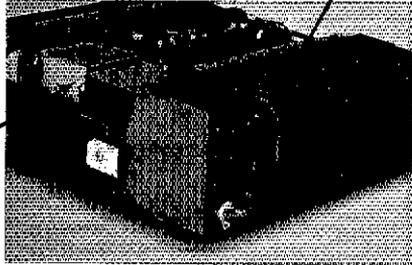
Direct keyboard entry of frequency

All modes built-in USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.

Built-in automatic antenna tuner (optional)

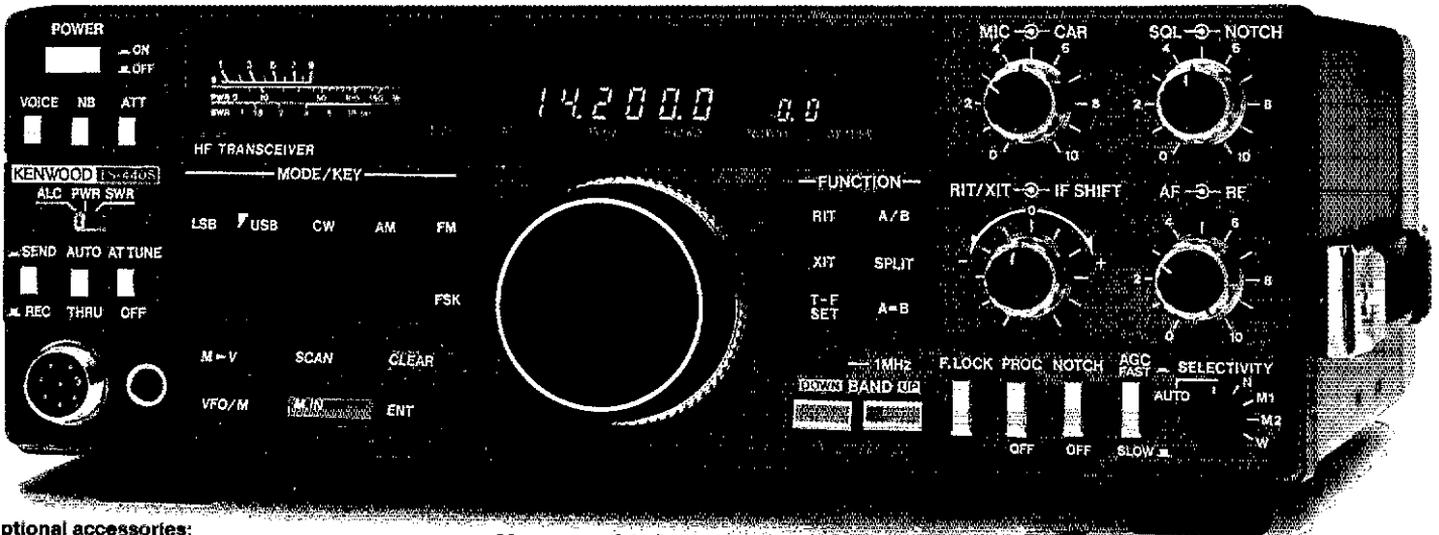
Covers 80-10 meters.

VS-1 voice synthesizer (optional)



- **Superior receiver dynamic range**
Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)
- **100% duty cycle transmitter**
Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)

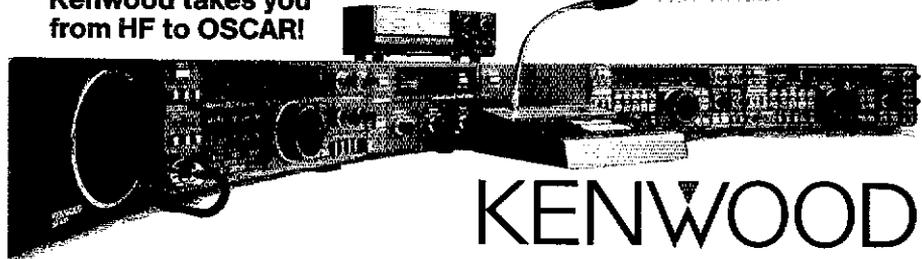
- **Adjustable dial torque**
- **100 memory channels**
Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**
- **Superb interference reduction**
IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.
- **MC-43S UP/DOWN mic, included**
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- **Dual SSB IF filtering**
A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, dual filtering is provided.
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- **AMTOR compatible**



Optional accessories:

AT-440 internal auto. antenna tuner (80 m—10 m)
AT-250 external auto. tuner (160 m—10 m)
AT-130 compact mobile antenna tuner (160 m—10 m) • IF-232C/IC-10 level translator and modem kit • PS-50 heavy duty power supply • PS-430/3-30 DC power supply • SP-430 external speaker • MB-430 mobile mounting bracket • YK-88C/88CN 500 Hz/270 Hz CW filters • YK-88S/BSN 2.4 kHz/1.8 kHz SSB filters • MC-60A/80/85 desk microphones • MC-55 (8P) mobile microphone • HS-5/6/7 headphones • SP-40/50B mobile speakers • MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount • TL-922A 100 W PEP linear amplifier • SM-220 station monitor • VS-1 voice synthesizer • SW-100A/200A/2000 W/P power meters • TU-8 CTCSS tone unit • PG-2S extra DC cable.

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

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OUR COVER

Ham Radio flourished and the technology went wild during the '30s. Pictured are the March 1938 cover (l) which featured fast-scan television; (top to bottom) Hiram Percy Maxim operating; Ross Hull, (George Grammer and Jim Lamb in the Laboratory at 38 LaSalle Road in West Hartford; mobile operating; and ARRL Lab Assistant Vern Chambers, W1JEQ, at the rig.

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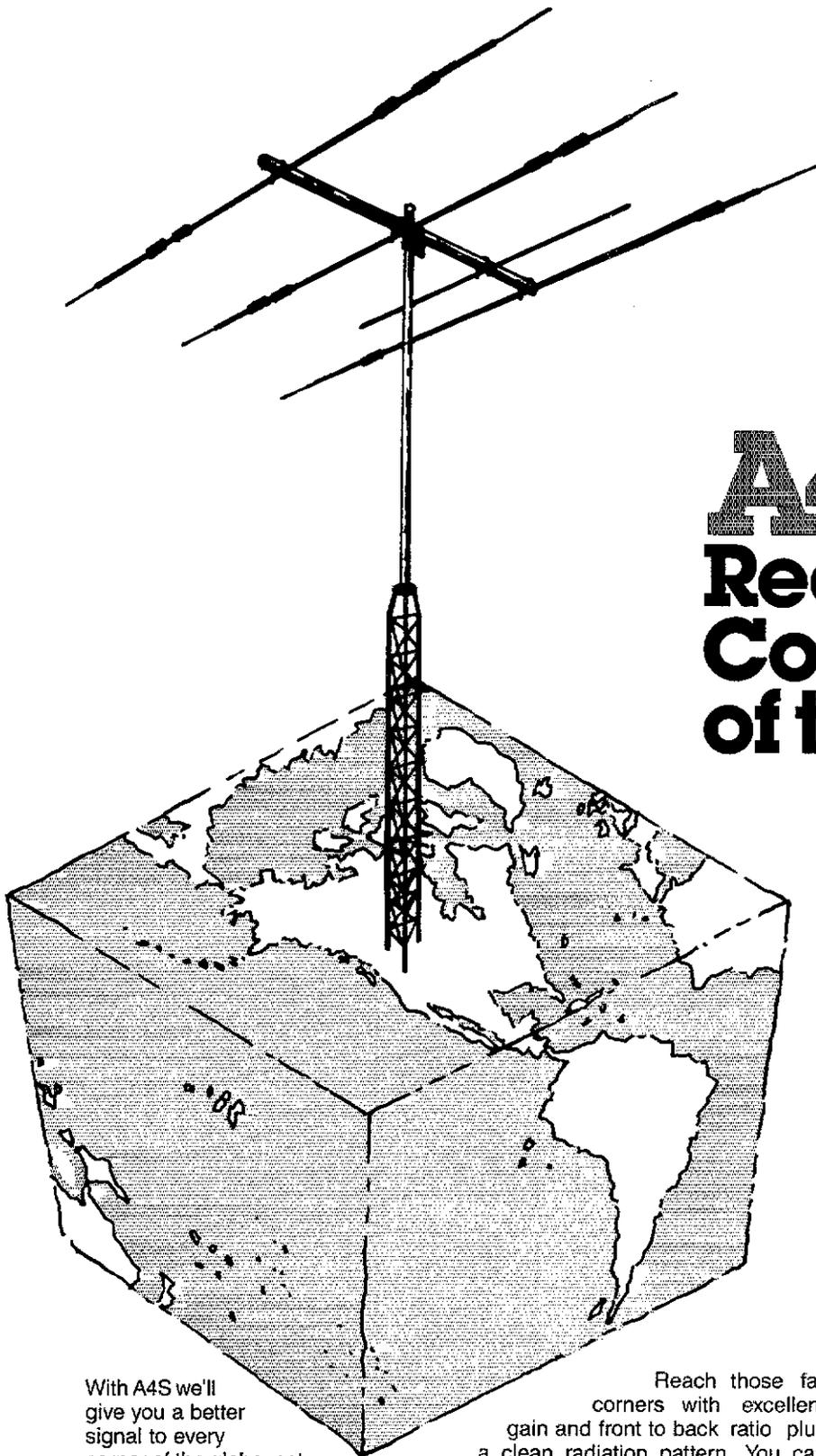
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With A4S we'll give you a better signal to every corner of the globe, not by changing its shape, but by improving the performance of your ham station.

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The all-new TM-221A, TM-321A, TM-421A and TM-521A FM transceivers represent the "New Generation" in Amateur radio equipment. The superior Kenwood GaAs FET front end receiver; reliable and clean RF amplifier circuits, and new features all add up to an outstanding value for mobile FM stations! The optional RC-10 handset/control unit is an exciting new accessory that will increase your mobile operating enjoyment!

• **TM-221A** receives from 138-173.995 MHz. This includes the weather channels! Transmit range is 144-148 MHz. Modifiable for MARS and CAP operation. (MARS or CAP permit required.)

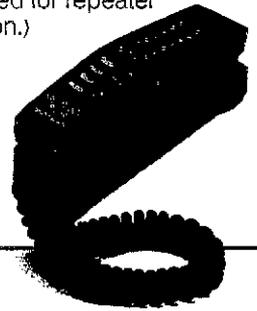
- **TM-321A** covers 220-224.995 MHz, **TM-421A** covers 438-449.995 MHz, and the **TM-521A** covers 1240-1300 MHz. (Specifications guaranteed for Amateur band use only.)
- **Built-in front panel selection of 38 CTCSS tones.** TSU-5 programmable decoder optional.
- **Simplified front panel controls**—makes operating a snap!
- **16 key DTMF hand mic., mic. hook, mounting bracket, and DC power cable included.**
- **Selectable frequency steps** for quick and easy QSY.
- **TM-221A** provides 45 W, **TM-321A** 25 W, **TM-421A** 35 W, and **TM-521A** 10 W. All models have adjustable low power.
- **Packet radio compatible!**
- **Programmable band scanning with memory scanning and memory channel lock-out.**
- **New amber LCD display.**

- **Kenwood non-volatile operating system.** All functions remain intact even when lithium battery back-up fails. (Lithium cell memory back-up, est. life 5 yrs.)
- **14 full-function memory channels** store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2 m is automatically selected.** There are **two channels** for "odd split" operation.
- **Super compact:** approx. 1-1/2"Hx5-1/2"Wx7"D.
- **Microphone test function on low power.**
- **High quality, top-mounted speaker.**
- **Rugged die-cast chassis and heat sink.**



RC-10 Remote Controller

For TM-221A/321A/421A/521A. Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to a combination of two transceivers with the optional PG-4G cable. When two transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)



Optional Accessories:

- **RC-10** Multi-function handset remote controller
- **PG-4G** Extra control cable for second transceiver
- **PS-50/PS-430** DC power supplies • **TSU-5** Programmable CTCSS decoder • **SW-100A** Compact SWR/power/volt meter (18-150 MHz)
- **SW-100B** Compact SWR/power/volt meter (140-450 MHz) • **SW-200A** SWR/power meter (18-150 MHz) • **SW-200B** SWR/power meter (140-450

- MHz) • **SWT-1** Compact 2 m antenna tuner (200 W PEP) • **SWT-2** Compact 70 cm antenna tuner (200 W PEP) • **SWC-4** 1200 MHz Directional coupler • **SP-40** Compact mobile speaker
- **SP-50B** Mobile speaker • **PG-2N** Extra DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile mic. with gooseneck and time-out timer • **MA-4000** 2 m/70 cm dual band antenna with duplexer (mount not supplied) • **MB-201** Extra mobile mount

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

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NEW
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Receiver

Hear it All!



5000

R-2000

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Scan the entire frequency range from 100 kHz to 905 MHz with Kenwood's R-5000, R-2000 and RZ-1. Listen in on foreign music, news, and commentary. Monitor local police, fire, and other public safety services, as well as the Marine channels, and the many other services 50 MHz and above.

(The VHF converter options must be used in the R-5000 and R-2000.)

R-5000

The R-5000 is a high performance, top-of-the-line receiver, with 100 memory channels, and direct keyboard or main dial tuning—makes station selection

super easy! Other useful features include programmable scanning, large, built-in speaker, 110 volt AC or 12 volt DC operation (with optional DCK-2 cable), VHF capability (108-174 MHz) with the VC-20 option, dual 24-hour clocks with timer, and even voice frequency readout with the VS-1 option.

easier. One hundred memory channels with message and band marker, direct keyboard or VFO frequency entry, and versatile scanning functions, such as memory channel and band scan, with four types of scan stop. The RZ-1 is a 12 volt DC operated, compact unit, with built-in speaker, front-mounted phones jack, switchable AGC, squelch for narrow FM, illuminated keys, and a "beeper" to confirm keyboard operation.

Optional Accessory
• PG-2N Extra DC cable

R-2000

The R-2000 is an all band, all mode receiver with 10 memory channels and many deluxe features such as programmable scanning, dual 24-hour clocks with timer, all-mode squelch and noise blankers, a large, front-mounted speaker, 110 volt AC or 12 volt DC operation (with the DCK-1 cable kit), and 118-174 MHz VHF capability with VC-10 option.

Optional Accessories

R-2000:

• VC-10 VHF converter • DCK-1 DC cable kit for 12 volt DC use.

R-5000:

• VC-20 VHF converter • VS-1 Voice module • DCK-2 for 12 volt DC operation
• YK-88A-1 AM filter • YK-88SN SSB filter • YK-88C CW filter • MB-430 Mounting bracket.

Other Accessories:

• SP-430 External speaker • SP-41 Compact mobile speaker • SP-50B Mobile speaker • HS-5 Deluxe headphones • HS-6 Lightweight headphones • HS-7 Mini-headphones.

RZ-1

Wide-band scanning receiver



The RZ-1 wide-band, scanning receiver covers 500 kHz-905 MHz, in AM, and narrow or wideband FM. The automatic mode selection function makes listening

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Vermont
Western Massachusetts

Northwestern Division

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Idaho
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Oregon
Washington

Pacific Division

East Bay

Nevada

Pacific
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San Francisco
San Joaquin Valley
Santa Clara Valley

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Virginia
West Virginia

Rocky Mountain Division

Colorado

New Mexico
Utah

Wyoming

Southeastern Division

Alabama

Georgia
Northern Florida
Southern Florida
Puerto Rico

Virgin Islands

Southwestern Division

Arizona

Los Angeles
Orange
San Diego
Santa Barbara

West Gulf Division

North Texas

Oklahoma
South Texas
West Texas

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William Thompson, W2MTA, RD 1—Rock Rd, Newark Valley 13811 (607-642-8930)

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David Carlson, AA9D, PO Box 123, South Elgin 60177 (312-741-6093)

Bruce Woodward, W9UMH, 6208 Bramshaw Rd, Indianapolis 46230 (317-251-5606)

Richard F. Regent, K9GDF, 5003 South 26th St, Milwaukee 53221 (414-282-0312)

George E. Fredenckson, KC0T, RR #2—Box 352, South Haven 55382 (612-558-6312)

Roger "Bill" Kurti, W00M, Rural Route—Box 34, Rock Lake 58365 (701-266-5646)

Roland Cory, W0YMB, 1010 7th St, W, Moberge 57601 (605-845-2400)

Bob Harmon, W5SEP, Rt 1, Box 219, Winslow 72959

John M. Wondergem, K5KR, 600 Smith Dr, Metairie 70005 (504-837-1485)

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John A. Thernes, WM4T, 80 Locust Ave, Covington 41017 (606-331-0331)

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Vern J. Wirka, WB0GQM, 3106 Vinton, Omaha 68105 (402-341-4572)

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Dianne Lee Marshall, AL7FG, One Dog Path, Ester 99725 (907-479-5819)

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Charles E. Moeller, N4FVU, 116 Willow Winds Dr, Columbia 29210-4454 (803-772-1180)

Claude Feigley, W3ATQ, 135 The Maine, Williamsburg, 23185

Karl S. Thompson, K8KT, 5303 Pioneer Dr, Charleston 25313 (304-776-4352)

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Joe Knight, W5PDY, 10408 Snow Heights Blvd, NE, Albuquerque 87112 (505-299-4580)

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(h—801-544-0056)

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James M. Spann, Jr, WO4W, PO Drawer X, Demopolis 36732 (205-289-1400)

Edmund J. Kosobucki, K4JNL, 5525 Perry Ave, Columbus 31909 (404-322-2856)

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THE AMERICAN RADIO RELAY LEAGUE, INC



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.

CI, 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: 215-6052 FAX: 203-665-7531 (24-hour direct line)

Canadian membership inquiries and correspondence should be directed to CRRL Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-660-1200.

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"It Seems to Us ..."

We Get 17 Meters!

There's a hotel chain that advertises, "No surprises." Most of the time, we agree with those sentiments. We like to know in advance when something important, whether good or bad, is going to happen.

January 30 was different. That morning, the FCC released the news that the long-awaited 18.068-18.168 MHz (17-meter) band would be available to US hams *that very evening!* The timing was a surprise, and a pleasant one. Thanks, FCC!

Surprise or not, there'd been plenty of time to prepare. The first time most hams had heard about a possible new ham band at 18 MHz was in reading November 1971 *QST*, when "It Seems to Us" quoted a speech given by Prose Walker, W4BW, two years earlier at the International Amateur Radio Club, 4U1ITU, in Geneva. Prose said, "Being an optimist, wouldn't it be nice to have amateur bands at 3.5, 7, 10, 14, 18, 21, 24 and 28 MHz? *It sure would!*"

Prose was more than an optimist. He was, and is, a doer. In 1973, when the US government began preparations for what would eventually become WARC-79, Prose was one of a four-man, joint FCC/ARRL committee that developed a draft position for the Amateur Radio Service—a position that included a justification for new ham bands at 10, 18, and 24 MHz. The other three members were Merle Glunt, W3OKN, Frank Williams, N4FK, and Dick Baldwin, W1RU, and to them we also tip our hat for their farsightedness and perseverance. On January 30, thanks in part to the groundwork they laid, the third of the "triple crown" of WARC bands became ours.

Winning US government support for this ambitious plan for new ham bands wasn't easy, and would take more printer's ink in the retelling than we have in the budget for this month's issue. And that was to get just one vote at the 1979 ITU conference! Scores of other countries had to be brought on board, mostly by their own amateurs. The Wireless Institute of Australia was imaginative and effective in getting its government to elaborate the technical basis for the new bands, and to put that material into the ITU preparatory documentation; this made the selling job a whole lot easier. Canada and a number of other administrations, favorably inclined toward Amateur Radio thanks to the hard work of IARU member-societies and individuals, also took the lead in arguing our case. There are dozens, if not hundreds, of names and call signs of key players that could be mentioned here as having made invaluable contributions to the effort, but just for illustration, one 18-MHz contact we very much want to make is with Dr Omar Shabsigh, YK1AO, a member of the Syrian

delegation to WARC-79. If he and Syria had had their way, the new 17-meter band would be twice as wide as it is! If you want the complete history of WARC-79, we commend to your attention "The Geneva Story" in the February 1980 issue of *QST*.

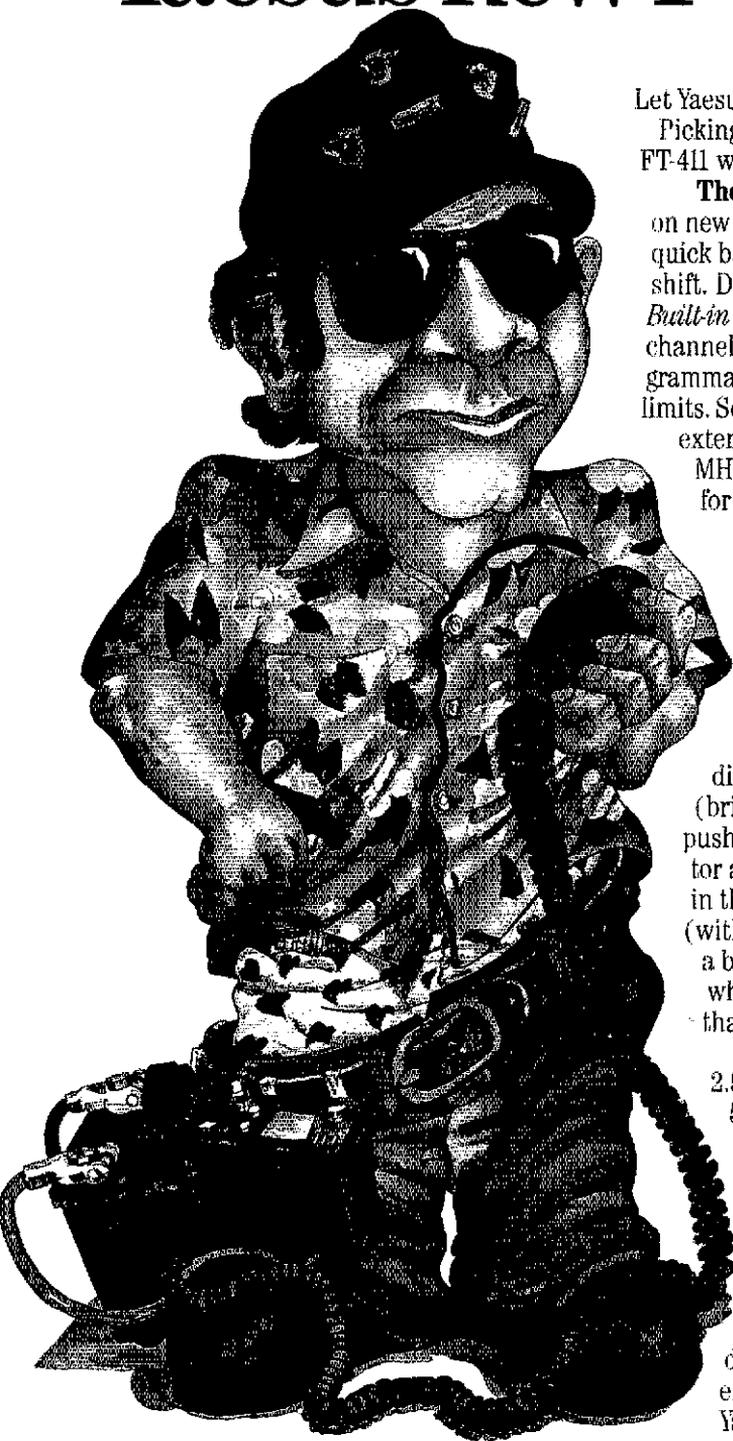
Back to the evening of January 30. The minutes tick slowly by, toward 0001 UTC January 31. A couple of Canadians and French Guiana can be heard on 18-MHz SSB. Do they know what's about to hit them? Maybe the number of signals tuning up (leakage from dummy loads, no doubt) will tip them off. Among those of us responsible for getting the word out, tension builds. Does anyone listen to W1AW bulletins? The answer comes quickly as zero hour arrives: Bedlam! The third WARC "band warming party" is a huge success as thousands of hams from coast to coast tickle their antennas with 18-MHz RF for the first time. We have to dodge a few fixed-service signals like the VOA overseas feed on 18.1569 MHz, and sunrise brings the BBC on 18.080 MHz up to an earsplitting level, but *we're on the band* and making contacts!

So, we have the third of our three new bands. What are we going to do with them? What we've done so far is mostly what we do with the other HF bands, but at a slower pace. Operating is less frenzied on the WARC bands; except for the one-time band-warming parties, contacts tend to be longer and we tend to get to know strangers better when we work them there. For one thing, there's always a question to ask as an ice-breaker: "How long have you been on the band?" or, "What are you using for an antenna?" The new bands are off-limits for contests, pretty much by universal agreement, though a modest amount of awards activity is going on and is likely to increase.

While it's relatively narrow, the new 17-meter band is ideally suited to pick up some of the load from our overburdened 20-meter allocation. It also increases the reliability of our communications over long distances: How many times have you found signals on 20 meters weak, and 15 meters not open over that particular path? By operating smart, following the MUF up and down as it oscillates through the day and year, we can increase our efficiency and enjoyment far more than the addition of 100 kHz of band space might suggest.

From now until July 1, we must use the 18-MHz band with care. Interference to the fixed service, which still has priority, could force the FCC to withdraw the temporary authorization. But *let's use it*. Enjoy!
—David Sumner, K1ZZ

You'll be hard-pressed to beat the performance of Yaesu's new FT-411 handheld.



Let Yaesu's "next generation" handheld lighten your load!

Picking up where our popular FT-209R Series left off, the 2-meter FT-411 will amaze with its astounding array of features!

The brains of a base station. "Sophisticated operation" takes on new meaning in the FT-411. You get 49 memories, plus dual VFOs for quick band-hopping. Keyboard frequency entry. Automatic repeater shift. DTMF autodialer with ten memories of up to 15 digits each. *Built-in CTCSS encode/decode.* Selectable channel steps: 5/10/12.5/20/25 kHz. Programmable band scan with upper/lower limits. Selectable memory scan. And extended receive coverage of 140-174 MHz (MARS/CAP permit required for transmit on 140-150 MHz).

Not bad for a handheld measuring just 55(w) x 32(d) x 139(h) mm (the same size as our FT-23R Series HTs)!

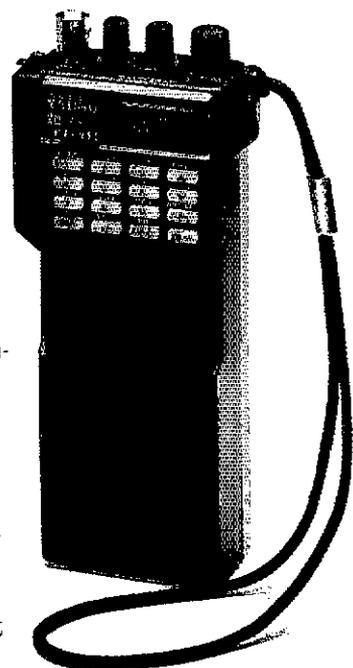
Friendly operation. For operating convenience, the FT-411's keypad features a "do-re-mi" audible command verification. Both the display and keypad can be backlit (brightly!) for night operation at the push of a button. A rotary channel selector allows fast manual tuning. Or key in the frequency directly. Operate VOX (with YH-2 headset option). Plus you get a battery saver to conserve power

while monitoring. And a (defeatable) automatic power-off feature that shuts down your radio if you forget to turn it off!

High power capability. The FT-411 comes equipped with the 2.5-watt, 600-mAh FNB-10 battery pack. Try our optional FNB-12 5-watt, 500mAh pack or tiny FNB-9 2.5-watt, 200-mAh pack. Or get 6 watts output by applying 13.8-volts DC from an external power supply.

Swap options with Yaesu's FT-23R Series. Our rugged best-seller's chargers, batteries, and microphones are fully compatible with the FT-411. The FT-23R is the perfect companion for the FT-411, and at a great price!

Try out an FT-411 today. Ask for it now at your local Yaesu dealer. Or call 1-800-999-2070 for a free brochure. And experience the legendary Yaesu HT performance!



YAESU



Certificate of Appreciation

In Recognition of outstanding services as a volunteer amateur radio operator enhancing The City of Los Angeles Marathon on race day throughout the 26 mile course

Fried Heyn

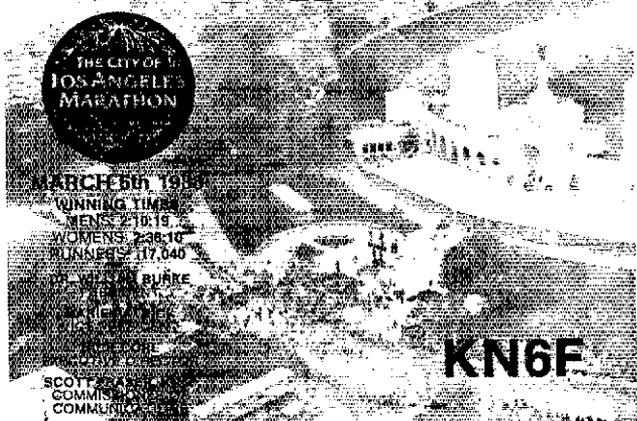
is hereby awarded this Certificate of Appreciation for exemplary efforts and accomplishments which have been of great value to the community and to the City of Los Angeles and which have helped to further the common goal of making our City a better place in which to live.

September, 1988

Tom Bradley
TOM BRADLEY
Mayor



On Your Marks. . . The City of Los Angeles Marathon will be receiving Amateur Radio support again this month. Amateurs who assisted last year received a handsome certificate from Los Angeles Mayor Tom Bradley at a ceremony in City Council Chambers on October 28. The event was covered by print and broadcast media, giving Amateur Radio some excellent post-race publicity. Publicity during the race was aided by the presence of Mayor Bradley (l), as well as the excellent work of the amateurs involved. Scott Fraser, KN6F, of Long Beach, who serves as Commissioner of Communications for the event, has been instrumental in its organization and smooth running. ARRL Southwestern Division Director Fried Heyn, WA6WZO, of Costa Mesa, California, is one of the many amateurs who volunteer their time and expertise to ensure the safe and orderly functioning of the annual 26-mile race.



A New Band! The 17-meter (18.068-18.168 MHz) band was made available to US amateurs at 0001Z on January 31 and US amateurs ushered it in in proper style. For further details, see "It Seems To Us" on page 9, "League Lines" on page 13 and the article which appears on page 33. Have fun, and see you on 17 meters!



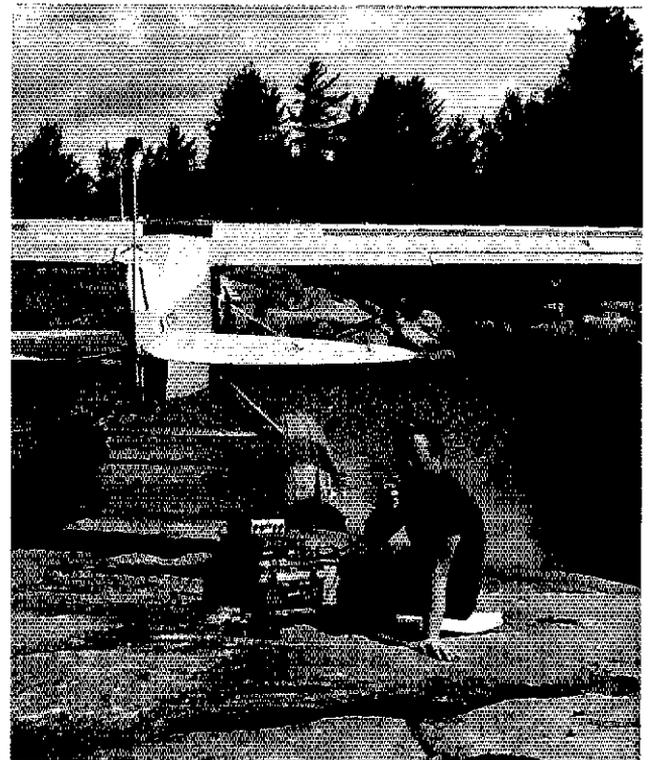
HQ Hallway: (l-r) Graphics Supervisor Sue Fagan, Purchasing Manager Kathy McGrath and Deputy Publications Manager John Nelson, W1GNC, recently decorated the HQ Administrative Building's hallway with six display cases of Amateur Radio memorabilia and many colorful prints of book covers, photographs and original drawings by Phillip "Gil" Gildersleeve, W1CJD. Be sure to spend some time viewing these exhibits the next time you visit HQ. The display cases were funded by a grant from the ARRL Foundation. (photo KC1MP)



FB: The 1988 Roanoke Division ARRL Service Award was presented to Fritz Nitsch, W4NTO (l), by Roanoke Division Vice Director-elect Jimmy Walker, WD4HLZ, at the Spartanburg Amateur Radio Club's annual Christmas dinner. Other awards Fritz has received include the Red Cross 1984 Clara Barton Award and the South Carolina Emergency Preparedness Association 1987 Public Service Award. Congratulations Fritz, and keep up the fine work! (photo courtesy W4PED)



Ring in the New Year: Nathan Moore, N5KSF, of Sherman, Texas, passed his Extra Class exam on January 1, 1989, less than two months after his 10th birthday! Nathan is shown receiving his Certificate of Successful Completion from the VE team leader. Nathan's grandfather, Sam Moore, is AC5D; Nathan's father is NX5Z, and his mother is KF5KT. (photo courtesy NX5Z)



Fly Boys: David Quam, a fire warden with the New York Forest Service, ran across Jack Knott, N2GPH, of Sparta, New Jersey, at Lookout Island in Ontario, Canada. Jack, who was visiting the area by seaplane, was running his rig off a car battery. David happened to be flying by and dropped in for a visit. (photo courtesy David Quam)

League Lines

17-METERS OPEN! In response to a request from the ARRL, the FCC gave the green light to amateur operation on 17 meters (18.068-18.168 MHz) effective on January 31 at 0001 UTC. Although the FCC public notice of the new band had only been issued that day, thousands of amateurs were on hand for the band warming that evening due to WIAW bulletins. WIAW, operated by KJ4KB, worked 70 stations from Virginia to California.

Amateur operation is on a secondary basis to US Government and foreign fixed-service operations. The FCC also amended the amateur service rules in Docket 88-467 so that amateurs will have exclusive use of the 17-meter band after July 1, 1989.

Telegraphy (A1A) emission is authorized for the entire band. 18.068-18.110 MHz is authorized for digital modes (F1B) and 18.110-18.168 MHz authorized for SSB/telephony, SSTV and other analog emission types. The entire band is available to General, Advanced and Extra Class licensees with the maximum power limit of 1500-W output.

Diamond Jubilee award applications are rolling in! One of the ways to earn this handsome certificate is to work 75 ARRL/CRRL Sections. Some applicants are having difficulty identifying Section boundaries in multi-Section states like California and New York. The Section abbreviations are listed in Table 1, page 59, October 1988 *QST*. The Section boundaries are defined by county in the ARRL Operating Manual, Chapter 17, pp 155-56. An SASE to the ARRL Awards Desk will provide you with a copy of the county breakdown to help identify those elusive sections.

It's not too early to mark your calendar for the **1989 ARRL Diamond Jubilee National Convention** on June 2-4 in Dallas/Ft Worth, Texas. More details will appear in future *QST*'s.

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 Dallas/Ft Worth on Saturday, June 3, from 8:30 AM-12:30 PM.

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 is being handled by the Regulatory Information Department at HQ. Written course material will be provided to advance registrants by mail or at the door. The CLE registration charge is \$50 to cover course materials, but admission is free to anyone not desiring them.

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 considerations 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.

Call for papers: Papers are invited for presentation at the ARRL 1989 Educational Workshop scheduled for Saturday, June 3, 1989 at the ARRL National Convention, Dallas/Ft Worth, Texas. Topics include all aspects of *Amateur Radio instruction and recruiting* such as training techniques, curriculum development, acceptance in school systems, one-on-one tutoring, and working with youths, seniors and the handicapped. Prospective speakers please ask Educational Activities Coordinator Rosalie White, WA1STO, at ARRL HQ for an "author's kit." Camera-ready papers are due at HQ by April 28, 1989.

Innovators and experimenters! The ARRL has long recognized the need to support Amateur Radio technical pioneers and has now established *The ARRL Technology Grants Program*. Funds are being established to provide grants to individuals or groups conducting research and development in the general Amateur Radio technology field and to promote development in specific areas of amateur interest. The ARRL Starr Technology Fund for packet-radio innovation and the Anne and Paul Rinaldo Technology Fund for Amateur Radio research and development have now been established. Future issues of *QST* will announce details on applying for a grant and the criteria used to evaluate each grant request. Contributions to the fund of your choice or the program in general should be sent to The ARRL Technology Grants Program, 225 Main St, Newington, CT 06111.

The ARRL Board of Directors met in Hartford January 20-21. Complete minutes of the meeting appear in this issue, beginning on page 58.

CY9DXX—St Paul Island 1988

So close, and yet so far—the VE1DXX delegation conducts a close-range DXpedition from isolated and precarious St Paul Island.

By Jack Columbus, VE1XT
Breton DX Group, VE1DXX
75 Parkwood Dr
Sydney River, NS B1S 1H6

Breathes there a DXer who hasn't dreamed of taking part in a DXpedition to a rare, exotic location high on the DX Century Club "most-wanted" list?

Members of the Breton DX Group, VE1DXX, decided early in '88 to make such a dream come true. As luck would have it, the group all reside in eastern Nova Scotia, which put us only a relatively short distance from a DXCC country that has no permanent population, be it ham radio operators or anyone else for that matter. That country is St Paul Island.

For nonhams, this is merely a small, obscure island stuck part way between the Canadian provinces of Nova Scotia and Newfoundland. Ah, but for hams around the world, a country unto itself—and one that hasn't seen any serious operating for the last few years. What better place for a DXpedition?

The idea is father to the deed. Now we had to start planning to put it into action.

Any DXpedition to a rocky island perched precariously in the North Atlantic has as one of its major considerations the weather. St Paul is a difficult place to get on and off. The island consists of two sections, divided by a 150-foot body of water that the lighthouse keepers refer to as the gully. Weather conditions in that part of the world are at their best in July and August. After checking the calendar for various vacation schedules and family commitments, the dates were set—August 12 to 18. Our crew of operators would be Alan VE1AL; Jack, VE1XT; Dave, VE1AWG and Robert, VE1BHR. Alan, former editor and publisher of a well-known DX newsletter, had been friends for a number of years with Bob, W5KNE, publisher of *QRZ DX*. Bob expressed interest in the venture, and we quickly decided to include him in the DXpedition.

The Canadian Department of Communications (now known as Communications Canada) assigned the special call sign CY9SPI to St Paul Island several years ago. Any Canadian amateur who wishes to go



The small bungalow in the foreground was the operating quarters of CY9DXX. (All photos, except those otherwise noted, courtesy VE1XT)

to the island and operate can do so without prior notification to the Department and merely use that call sign upon arrival. Since there has been at least one previous DXpedition to use that call sign, the Breton DX Group decided a unique call sign, readily identifying our operation, was in order. Since our club call is VE1DXX, we decided to apply for CY9DXX for our group's 1988 operation from St Paul. Communications Canada was reluctant to agree to our request. But, after some gentle persuasion, they were kind enough to allocate CY9DXX for the period August 12-18.

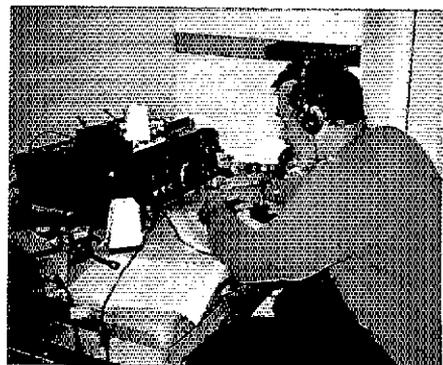
Now that operating permission was secured, we turned our attention to landing permission. St Paul is under the control and administration of the Canadian Department of Transport. Anyone wishing to land must first obtain permission from the Canadian Coast Guard, a branch of the Department of Transport. After assuring the Coast Guard that we would be totally self-sufficient during our stay and that reliable transportation had been arranged, permission for the DXpedition was quickly in hand.

We would get to and from the island by means of a 32-foot fishing boat, skippered by Freeman Morrison of Dingwall, Nova Scotia. Captain Morrison is a veteran fisherman whose father served for a time as lighthouse keeper on St Paul. He readily agreed to take us the 17 miles from Dingwall to the two-acre rock that was to

be our home away from home for seven days in August.

Our thoughts now turned to equipment. We all had rigs of differing vintages we could take along, but state of the art is the way to go on a DXpedition, if it can be arranged. We decided to get in touch with ICOM America in Bellevue, Washington, and in short order they agreed to provide two 761s for use on St Paul.

For antennas, we decided to use two Yagis, a vertical and dipoles. Four tower sections and a tribander were readily donated to the cause by local area hams. VE1AL had a 15- and 10-meter duoband beam which he hadn't had a chance to put





A break in the action for a group shot—(l-r) Robert, VE1BHR; Jack, VE1XT; Alan, VE1AL; and Dave, VE1AWG. Not shown is Bob, W5KNE.

up yet, so it was quickly drafted into service. Things were beginning to shape up. We would have four stations. In addition to the IC-761s we would take along three additional transceivers: an ICOM IC-745 and IC-701 and a Kenwood TS-120.

Since we had to provide our own electrical power, and HF propagation was on the upswing, we decided we would be loud enough without dragging along linear amplifiers. Two Honda 1.5 kW gasoline-powered generators were borrowed—as were a number of containers to hold the estimated 50 gallons of gasoline that would be needed during our planned six days of operating.

Now, it was simply a matter of counting down to “D-Day” and keeping fingers and toes crossed that the weather and sea conditions would cooperate.

Our port of departure, Dingwall, is a quiet, picturesque fishing village nestled at the foot of the Cape Breton Highlands in eastern Nova Scotia. It is a two-hour drive from Sydney, the main population center in Cape Breton. Sea conditions between Dingwall and St Paul are optimum around dawn. That necessitated a departure from Sydney at 3:30 AM local time.

Food supplies had been purchased over the previous few days with the emphasis on canned and nonperishable goods. It was midnight by the time we had finished loading the truck and two cars that would transport us and all our gear to Dingwall. After a few hours of restless sleep, we were up and on our way.

We met Captain Morrison at his home at 5:30 AM, and from there proceeded to the wharf where his 32-foot Cape Island fishing boat, the *Heidi and Heather*, was tied up. The transfer of equipment to the boat took about an hour. As the sun was rising we made our way out of Dingwall Harbor for the 17-mile run to St Paul Island. We couldn't have asked for better weather, temperature in the low 20s Celsius

(approximately 68 °F), and a gentle swell on the Atlantic. An occasional whale and dolphin were spotted during our three-hour sail, and excitement mounted as the hazy outline of St Paul came into view.

The main island is the first to be seen as one approaches from the south. It is three miles long and a mile wide. At one time, it was home for about forty families and was the location of Army barracks during

St Paul Island

About three miles long and one mile wide, St Paul Island (which was added to the ARRL DXCC Countries List in 1975) lies off the northeast corner of Cape Breton Island, jutting out into the Gulf of St Lawrence, 13 miles from Cape North on Cape Breton Island, and about 50 miles from Cape Ray, Newfoundland.

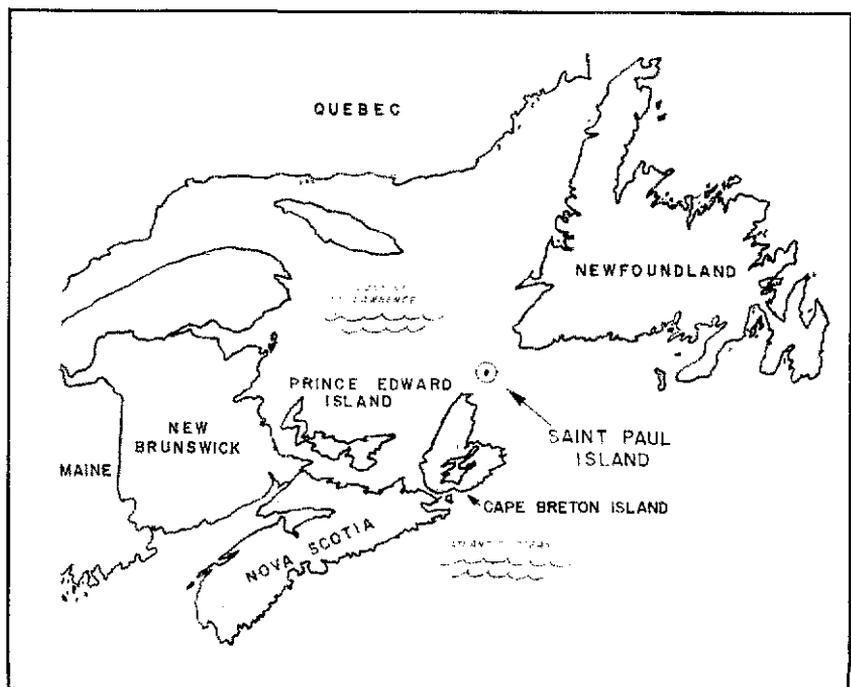
As indicated in the text, the rocky island is a dangerous port of call. In St Paul Island's storied history, numerous ships caught in violent gales were smashed to bits on its reefs, with thousands of lives lost. For those who were lucky enough to have made it to shore, starvation and frostbite awaited.

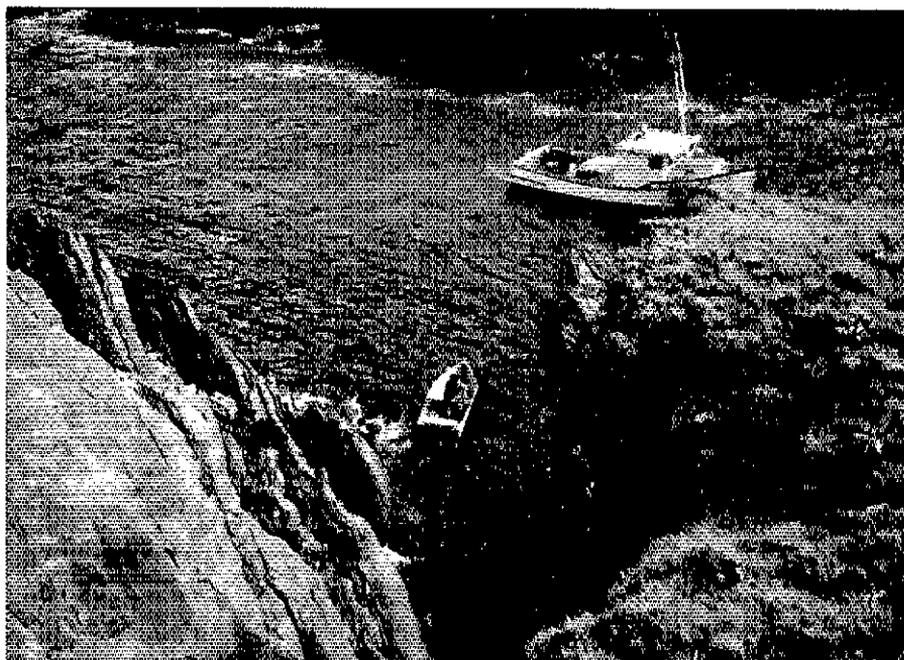
One of the most infamous wrecks occurred in 1815, when the *HMS Royal Sovereign*, transporting British soldiers back to London following the conclusion of what we call the breakers off St Paul. Within minutes, the ship was completely destroyed. There were over 800 troops on board; only a dozen men

survived. In its cargo, the ship carried a large amount of Mexican silver dollars. Some say these coins are still being found among the rocks today.

In 1833, authorities constructed two lighthouses, one on each end of the island to help guide ships to safety, along with a stores and provisions station for shipwreck victims.

By 1885, there were as many as 40 persons stationed on the island—lighthouse keepers, marine radio operators, cooks and rescue personnel and so on. Shortly before World War II, with improved ship-to-shore radio technology and the development of the Coast Guard's (and other mobile life-saving services) rescue capability, the full-time population decreased to about 20. Today, there are no permanent residents on the island—the lighthouse keepers alternate duty on this barren outpost, while maintaining their permanent residences on Cape Breton Island.





Loading gear into a rowboat in the gully and then ferrying it to our waiting fishing boat for the journey home was a laborious process. (photo VE1AL)

World War II. Now it is uninhabited, except for several majestic bald eagles which soar gracefully overhead or serenely gaze from their rocky perches. Captain Morrison pointed out the abandoned South Point lighthouse where his father worked years ago.

The north island, separated from its considerably larger neighbor by a narrow channel, came into view suddenly. The few buildings, together with the lighthouse, seemed a strange, yet welcome, outpost of civilization. Our captain gingerly guided his craft away from the dangerous rocks guarding the small island and into the safety of the somewhat deeper water of the "gully" between the two islands. We were able to see the wooden ramp leading from the water's edge to the main plateau of the north island. One of the lighthouse keepers was waiting for us. He tossed us the rope for the 12-foot aluminum boat that was our means of ferrying the ton-and-a-half of gear from the *Heidi and Heather* to shore.

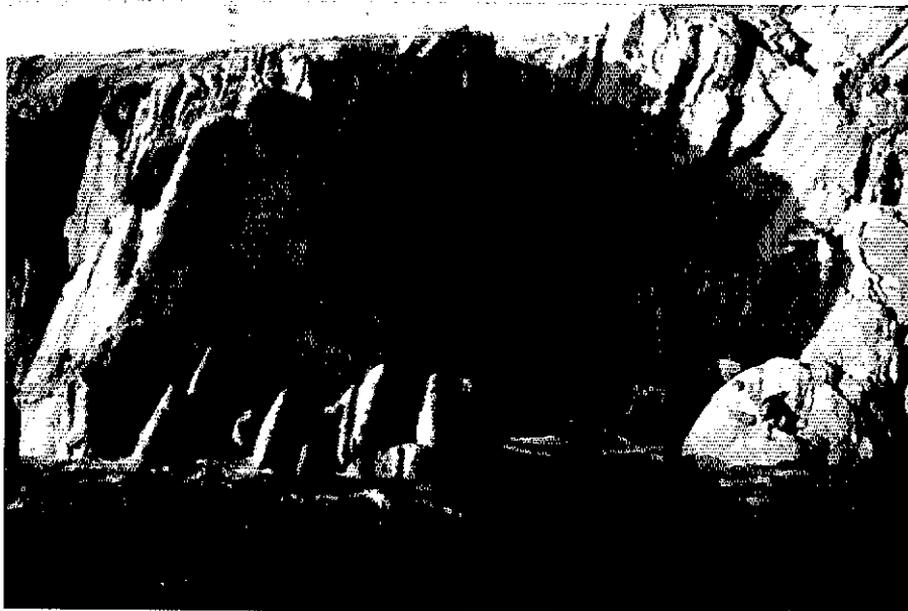
Dave, VE1AWG, volunteered to man the oars of the rowboat, and the first of a dozen or so trips began. All went surprisingly smoothly, including the somewhat awkward tower sections. Within 90 minutes, the *Heidi and Heather* was unloaded, and the Breton DX Group was well—and truly on St Paul Island.

Throughout the morning, the temperature had climbed during which time we carried our gear up the 300-foot ramp in 30 °C (86 °F) conditions, very warm by our standards.

We decided to get on the air as quickly as possible. Within 30 minutes of completing the unloading operation, the all-band vertical was erected, and the IC-761 was

unpacked and powered up. CY9DXX was on the air! Jack, VE1XT, made the first contact at 1359Z with AF2C on 20-meter SSB. In the meantime, the rest of the gear was brought up to our operating spot.

The Coast Guard kindly allowed us the use of a vacant two-bedroom bungalow. It formerly was the home of one of the lighthouse keepers and his family, but had been uninhabited for a number of years. There are no longer lightkeeping families on St Paul. The families live on shore, and the lighthouse keepers themselves rotate home on a 28-day schedule.



Gingerly loading a tower section aboard the rowboat as St Paul 1988 comes to a close.

The bungalow, which was our "home" for the next week, had been converted into a woodworking shop. A little rearranging quickly transformed it into a more-than-adequate ham shack. The two IC-761s and the TS-120 were set up in what was once the living room, and an IC-745 was installed in one of the bedrooms after moving a few sawhorses and pieces of lumber.

The tribander was assembled and erected shortly after noon. The 160- and 80-meter dipoles were next to go up, and then it was time for a breather in the warm afternoon sun. We decided to erect the duobander the next day.

We had hoped propagation would continue to be good—the way it had been going leading up to our trip. But, as fate would have it, HF conditions took something of a nosedive just as we got started. Nevertheless, contacts were made easily into North America and Europe, and well over 1000 QSOs were logged in our first 24 hours of operation. Unfortunately, we didn't hear a single JA or VK for the first three days. Fortunately, on our fourth day (August 15), propagation improved and contacts were made with Japan, Australia and New Zealand.

By this time, however, the weather had deteriorated, and sea conditions were causing breakers to crash ashore. The resulting salt spray caused a fine mist to cover the entire island. The mist began to affect the SWR of our Yagis. Nevertheless, radio activity continued hot and heavy, and the contacts filled many log sheets. However, 10 meters was a major disappointment. The band just did not open and only ten contacts were made during the entire operation. Twenty meters was the workhorse, with over 7700 contacts made. By the time we were ready to pack up for the trip home, we had

logged 13,000 contacts.

The plan was to return home on August 18, but that wasn't to be. Weather conditions turned sour 48 hours before our scheduled departure. Steady winds of 40 knots prevented Captain Morrison from leaving port to pick us up. Fortunately that afternoon, a Coast Guard helicopter was able to land with the relief lightkeeping crew. Bob, W5KNE, was scheduled to leave Sydney for home on Saturday morning, and the weather forecast called for high winds to continue over the next several days. It was beginning to look as if Bob might not make his flight. We explained the situation to the helicopter pilot, and he graciously agreed to fly Bob off the island and drop him off at the airport. Bob made what will probably go down in the *Guinness Book of World Records* as the quickest packing job in ham radio history!

Nevertheless, every cloud has a silver lining. The weather may have prevented our scheduled departure, but at the same time, it gave us another day of operating.

Friday morning dawned bright, and the wind was still strong. The forecast called for the wind to die down that afternoon and then pick up again that evening and to remain strong for the next several days. If we were to get off the island before the following week, it would have to be that afternoon.

Through the facilities of George, VE1XS, a phone patch was made to Captain Morrison on 80 meters, and he agreed to try to reach St Paul that afternoon. He would have to make his approach along the eastern side of the island. The westerly wind was making it impossible to use the wooden ramp where we had landed. That meant an untried and dangerous route off the island. Dave, VE1AWG, had found a natural cut



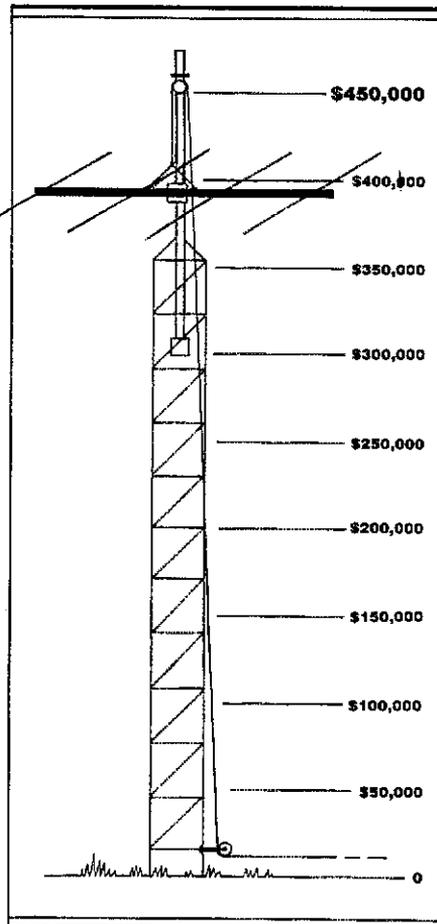
The CY9DXX QSL card shows the gully which separates the north and south island.

in the rocks on the eastern slope of the island. He calculated that by using one of the tower sections as a pylon, we could rig a line to the rocks 90 feet below. We found a fishing bait basket and two pulleys, tested the system and found it workable.

In mid-afternoon, the *Heidi and Heather* came into view. It had been a rough crossing. For the next three hours we gingerly loaded the basket, guided it to our loading point and onto the aluminum rowboat manned by one of the lighthouse keepers. It was a slow, laborious process. The current in the gully was evident. The lighthouse keeper had to keep rowing just to maintain his position. When he stopped, he was quickly carried seaward.

With the loading process completed, we set our course for Dingwall. It was as if the island didn't want to see us leave. Fifteen-foot seas pounded the boat, and waves crashed over the bow. It was like being on a gigantic roller coaster. Finally, at 10:30 PM local time, we docked at Dingwall. Terra firma never felt so good! An hour later, the gear was packed into our vehicles, and St Paul 1988 was but a fond memory.

W1AW Renovation Update



How to Contribute to the W1AW Renovation 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. Does your employer have a match-contribution program? Some major employers will match your contribution.

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

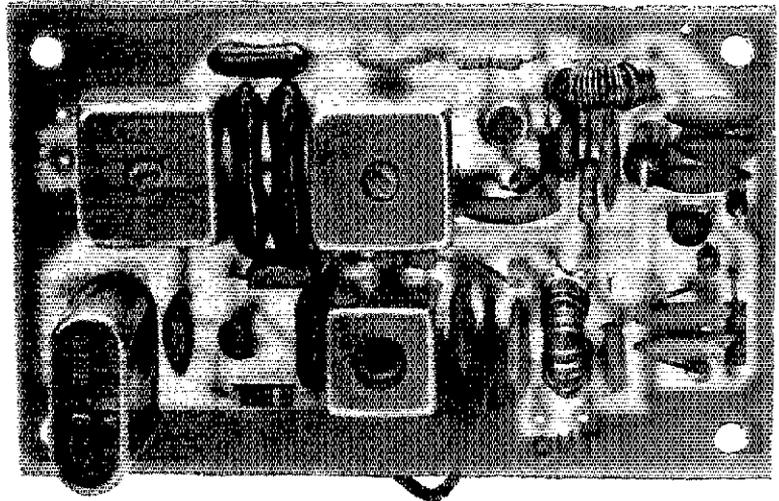
All contributors will receive a handsome certificate, suitable for framing. Members of the *Hiram Percy Maxim and Kilowatt Clubs* will, in addition, have their name and call sign inscribed on a special plaque that will be on permanent display in the renovated W1AW Building. Members of the *Kilowatt Club* 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.



ARRL President Larry Price; W4RA (center) gratefully accepts Kilowatt Club donations for the W1AW Renovation Fund from Central Division Director Ed Metzger, W9PRN (l), and Midwest Division Director Paul Grauer, W0FIR (r). HQ Controller Larry Shima, W0PAN (2nd from l), looks on approvingly. (photo courtesy KC1MP)

A Simple 80-Meter Converter

This 80-m converter is designed for use with the modified AM transistor radio in February 1989 *QST*. You may change the circuit to work with other tunable IFs.



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

Last month we discussed methods for modifying low-cost transistor AM radios for use as ham receivers. In this article, we shall discuss a simple 80-meter converter that is suitable for use with the modified AM radio. If you change the oscillator frequency, it will be possible to use this converter with other intermediate frequencies, such as 1.8 MHz or even 28 MHz.

The converter is crystal controlled, which means that the main receiver becomes a tunable IF. The design presented here is for receiving 3.5 to 3.6 MHz while tuning the main receiver from 600 to 700 kHz. With this scheme, we have "backward" tuning. In other words, on the radio dial, 3.5 MHz appears at 700 kHz, 3.6 MHz is found at 600 kHz, 3.7 MHz falls at 500 kHz, and so on.

Circuit Description

Fig 1 contains the circuit diagram for our converter. There is no RF amplifier ahead of mixer Q1. The added front-end gain is not needed on 80 meters, since the antenna noise will be greater than the mixer noise at this frequency. Also, the converter has greater dynamic range (less subject to overloading) without the added gain provided by an RF amplifier.

L2 and L3 of Fig 1 comprise a band-pass filter (FL1) that permits the passage of the desired band of frequencies (3.5-3.7 MHz). The filter rejects signals above and below the desired range, thereby yielding front-end selectivity. FL1 requires no further adjustment after it is aligned.

A dual-gate MOSFET (Q1) serves as the mixer. It allows adequate dynamic range

for most applications, but is not as strong a mixer as is a diode-quad DBM (doubly balanced mixer). The MOSFET operates as a single-ended mixer that provides approximately 12 dB of conversion gain. A DBM, on the other hand, has a conversion loss of some 8 dB, and it requires considerably greater oscillator power in order to supply the required +7 dBm injection level. You may use a 3N211, 3N212 or 40673 MOSFET for the mixer.

Q2 of Fig 1 is the local oscillator. There is nothing special about this circuit except that it must produce 4-6 volts P-P (peak to peak) to ensure adequate oscillator injection for Q1. Too little injection voltage will result in low mixer gain. Too high an injection level can damage the mixer.

The mixer has a broadband transformer (T1) at the output. R4 establishes the effective Q1 load impedance and aids IMD (intermodulation distortion) performance. T1 has a 10:1 impedance ratio. This provides a 50-ohm output characteristic for T1. The 50-ohm impedance is necessary in order to match the FL2 impedance, which is also 50 ohms.

FL2 is a single-section low-pass filter. It has a cutoff frequency of 750 kHz, which allows all frequencies below 750 kHz to reach the IF amplifier, Q3. The filter blocks the passage of 4.2-MHz energy from Q2 (desirable). FL1 also prevents unwanted BC-band energy above 750 kHz, plus HF-band signals, from leaking through the converter via the antenna. If this unwanted energy were allowed to reach broadband amplifier Q3, it would be amplified along with the desired energy. This would permit it to pass into the tunable IF receiver, which could cause unwanted spurious responses in the tuning range. Our objective is to pass

only the desired IF energy between 600 and 700 kHz.

Q3 of Fig 1 functions as a broadband (untuned) IF amplifier. Feedback is provided by the resistor-capacitor network between the collector and base elements (R7, R8 and C11). This helps to prevent Q3 from self-oscillating and makes the gain constant over a wide range of frequencies (300 kHz to at least 30 MHz). Additional feedback is provided by means of emitter resistor R9. The IF amplifier is arranged to have a 50-ohm input impedance and a 200-ohm output impedance. The stage gain is approximately 12 dB. A 2N5179 CATV transistor may be used in place of the 2N4401 at Q3 to increase the amplifier gain and bandwidth, should you wish to use this amplifier separately for some other application. The 2N4401 is adequate for use in this converter.

Another broadband transformer (T2) is used between the IF amplifier and the converter output. It has a 4:1 transformation ratio, which provides a match between the Q3 collector and a 50-ohm line to the main receiver. I added C12 to bypass VHF harmonic currents and some 4.2-MHz residual energy that was present at the Q3 collector. The C12 capacitive reactance (X_c) is high enough to prevent bypassing the desired 600-700 kHz IF energy. Dc operating voltages are noted in Fig 1.

Construction Notes

Circuit boards are available for this project.¹ A single-sided PC board is used. A scale etching pattern is provided in Fig 2. A parts-placement guide is given in Fig 3.

¹Notes appear on page 20.

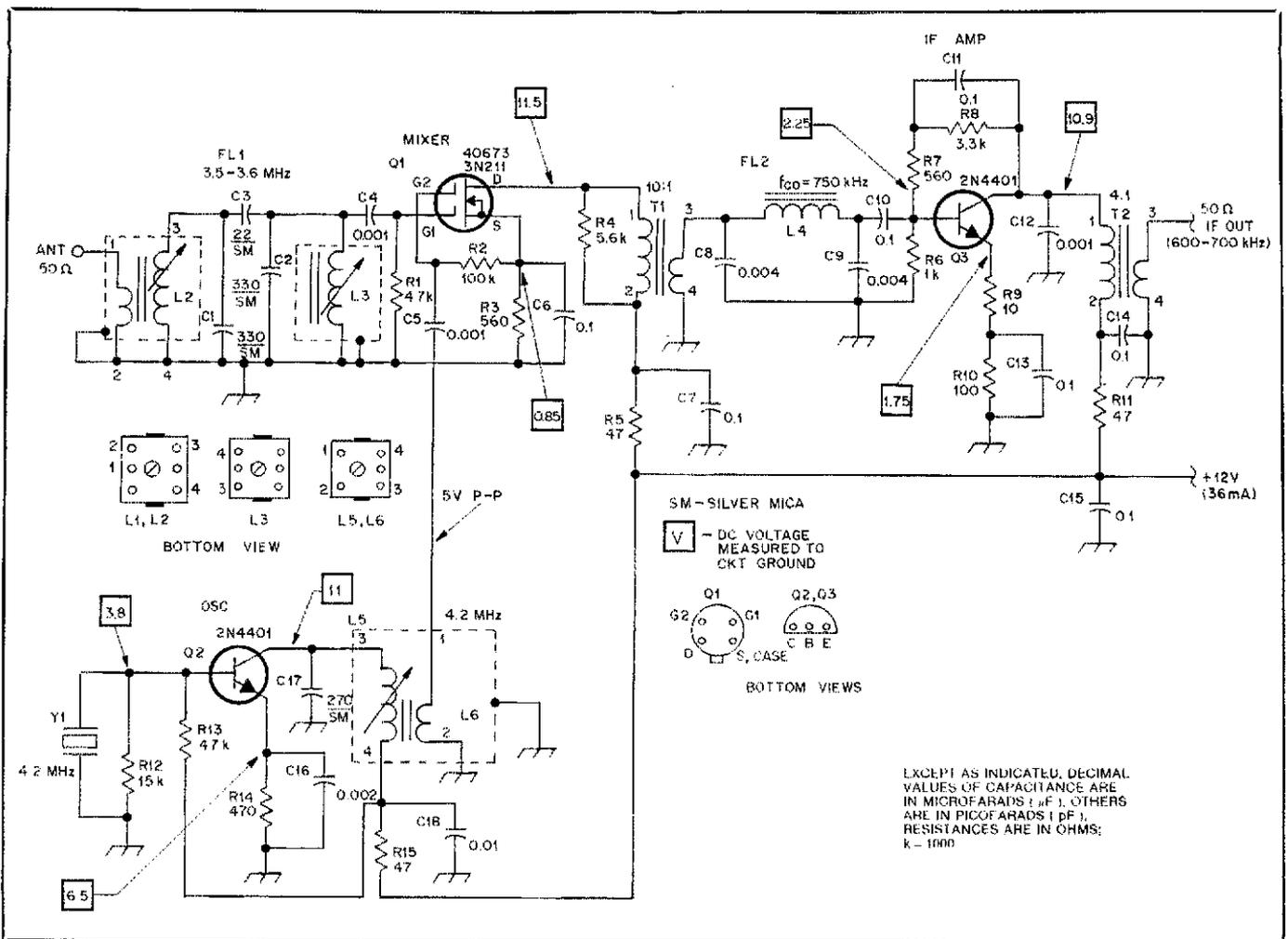


Fig 1—Schematic diagram of the 80-meter converter. Capacitors not marked SM are disc ceramic. Resistors are 1/4-watt carbon composition. Dc voltage is noted in the square boxes.

- L1—4 turns of no. 30 enam wire over grounded end of L2 winding.
- L2, L3—6-μH slug-tuned inductor. Use 24 turns of no. 30 enam wire on bobbin of an Amidon L-57-6 transformer assembly. This is a two-layer winding, 12 turns per layer.
- L4—10-μH miniature RF choke or 13 turns of no. 26 enam wire on an Amidon FT-37-61 ferrite toroid (125 mu).
- L5—3.9-μH slug-tuned inductor. Wind 21

- turns of no. 30 enam wire on the form in an Amidon L-43-2 transformer assembly. This is a two-layer winding, 10½ turns per winding.
- L6—Four turns of no. 30 enam wire over pin 4 end of L5.
- Q1, Q2, Q3—See text for substitutions.
- T1—10:1 broadband toroidal transformer. Use 26 turns of no. 26 enam wire on an Amidon FT-37-43 (850 mu) ferrite toroid.

- Secondary has 6 turns of no. 26 enam wire over primary winding.
- T2—4:1 broadband toroidal transformer. Use 20 turns of no. 26 enam wire on an Amidon FT-37-43 ferrite toroid. Secondary has 10 turns of no. 26 enam wire over primary winding.
- Y1—Fundamental crystal, 4.2 MHz, 30 pF load capacitance. Available from JAN Crystals, 2400 Crystal Dr, Fort Myers, FL 33907, tel 800-237-3063.

FL1 of Fig 1 contains two shielded transformer assemblies. There are Amidon Assoc L-57-6 units that contain adjustment cores made from no. 6 powdered iron.² Toroids of the proper inductance can be used if you are willing to change the PC pattern to accommodate trimmers and fixed-value capacitors for tuning the filter. The assemblies that I used are compact and no more expensive than an equivalent trimmer-toroid combination.

L5 and L6 are also wound on an Amidon shielded-transformer assembly (L-43-2). The shielding helps prevent the 4.2-MHz

energy from being radiated to "forbidden areas" of the circuit.

Y1 may be soldered directly to the PC-board pads. I chose to use an International Crystal Mfg Co PC-mount socket for my HC-6/U style of crystal holder; excessive heat on the crystal pins can damage the crystal.

You may substitute polystyrene capacitors for the ones marked SM. Either type will provide good performance.

You may substitute other transistors for Q2 and Q3 if you don't have 2N4401s. A 2N3904 or 2N2222 may be used at Q2 with

no circuit changes. A 2N4400 or 2N2222A will yield good performance at Q3. Other transistors with equivalent characteristics to the 2N4400/2N4401 are entirely suitable in the circuit of Fig 1. Don't be reluctant to experiment with what you have on hand! In a like manner, if your supply of 0.1-μF capacitors is low or nonexistent, you may use 0.047- or 0.05-μF capacitors. Most of the other capacitor values are sacred, so don't make substitutions for them.

You will find that low-voltage disc and silver-mica capacitors will fit into the available PC-board space better than will the

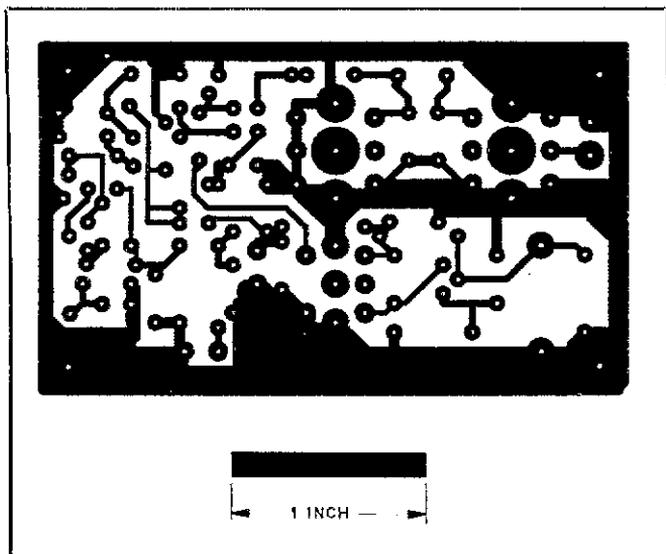


Fig 2—Circuit-board etching pattern for the converter, shown full-size from the foil side of the board. Black areas represent unetched copper foil.

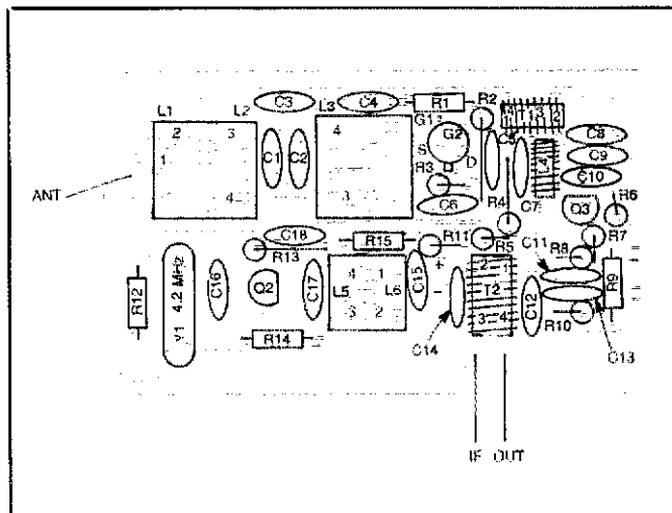


Fig 3—Parts-placement guide for the converter, not to scale. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. Component outlines are not necessarily representative of the shapes of the actual parts used.

larger high-voltage units. Try to locate some 50- or 100-V capacitors for this project.

Check-out and Use

Alignment of FL1 and the adjustment of L5 is all that is necessary to make this converter operate properly. My unit has excellent sensitivity, as noted while using a signal generator (URM-25) with a calibrated output level. A 0.1- μ V signal is loud in the output of my lab receiver—an old NC-125. The detected signal is robust enough to be copied easily in a quiet 80-meter band (minimal QRN and QRM).

If you do not have access to a signal generator, you may tune in a weak CW signal at approximately 3550 kHz. Adjust L2, L3 and L5 for maximum response in the speaker or phones. A scope is handy for adjusting L5 of Fig 1. The slug can then

be adjusted for maximum deflection on the face of the scope tube while sampling the oscillator output at pin 1 of L6. A voltmeter and RF probe may also be used for this adjustment.

If you encounter problems with inadequate oscillator injection for Q1 (less than, say, 4 V P-P), add a turn or two to L6. Do not try to increase the oscillator output by changing the values of R12, R13 and R14.

The voltage notations in Fig 1 are approximate. You may find slightly higher or lower readings, especially if you use substitute transistors at Q2 and Q3. The listed voltages were obtained while using a 5000 Ω /V Radio Shack® VOM. A VTVM may yield slightly higher voltage readings in some parts of the circuit.

The circuit of Fig 1 can easily be modified for use on 40 or 30 meters by changing the component values for FL1

and Q2. The FL1 constants are based on Wes Hayward's (W7ZOI) filter design tables in the Networks and Filters chapter of *The ARRL Electronics Data Book*.³

You will find this converter to be a good performer, irrespective of the receiver with which you use it. It is a fine companion for the modified transistor AM radio described in February 1989 *QST*.

Notes

¹FAR Circuits, 18N640 Field Ct, Dundee, IL 60118, tel 312-428-2431, evenings. Price (as of this writing) per plated-and-drilled board is \$5.85.

²Transformer assemblies and toroids are available by mail from Amidon Assoc, 12033 Otsego St, N Hollywood, CA 91607.

³*The ARRL Electronics Data Book*, 2nd Ed, 1988, available from ARRL for \$12 (plus \$2.50 shipping and handling, or \$3.50 for insured parcel post or UPS), or from your local dealer.

New Products

AO-13 HANDBOOK

□ The *AMSAT-OSCAR-13 Handbook*, written by Richard Limebear, G3RWL, and published by AMSAT-UK, is now available. *The AO-13 Handbook* covers many aspects of the newest AMSAT spacecraft in detail. Chapter titles include: Brief History; History of AO-13 and the Ariane Rocket; Launch/Positioning Typical Session; Bandplan; Operating Events; General Information; Operations

(Scheduling, Communications, Time Delay, Doppler, Station Requirements, TX System, RX System, Typical Stations); Orbital Predictions; Tracking; Satellite Hardware (Transponders, Attitude Control, Beacons, Mode B, L, JL and S); Telemetry and Data formats (RTTY, BPSK, decoding equations); Information Sources; Reference Books; The Future; AMSAT Organizations; Acknowledgements.

The book is over 50 pages long, and

AMSAT-UK has made arrangements with Project OSCAR to release the book in North America. Those outside North America should contact AMSAT-UK directly. *The AO-13 Handbook* can be obtained for \$12 (price includes shipping from the UK) from Project OSCAR, PO Box 1136, Los Altos, CA 94023-1136. For more details, please send an SASE to Project OSCAR. [Txn Ross Forbes, WB6GFJ, President, Project OSCAR].—*Rus Healy, NJ2L*

Flagpole J For 10 Meters

You don't have to hide your antenna—put it out in the open for everyone to see! Just disguise it. . .

By Jim Hendershot, WA6VQP
333 Miller Way
Arroyo Grande, CA 93420

It had to happen. Even though I was a dyed-in-the-wool VHFer, HF fever was bound to hit me sooner or later. Before Novice enhancement, HF was a fascinating place where my higher-class ham buddies would spend long and wonderful hours, while I could only think of CW on the 40-meter Novice band. Yuk! Not being very good on CW, I couldn't get excited about spending hard-earned bucks to buy an HF rig just to use it for a few minutes on CW.

Two things changed all of that. The first was, of course, Novice enhancement. The second was the Santa Maria swapfest. Father's Day saw me heading down to the annual event loaded with junk—determined to make a killing. Not only did I do well, but after much judicious haggling and some good advice from one of my HF buddies, I also came home with a nice, new. . . well, almost new. . . IC-745. Oh, boy! Ten meters, here I come!

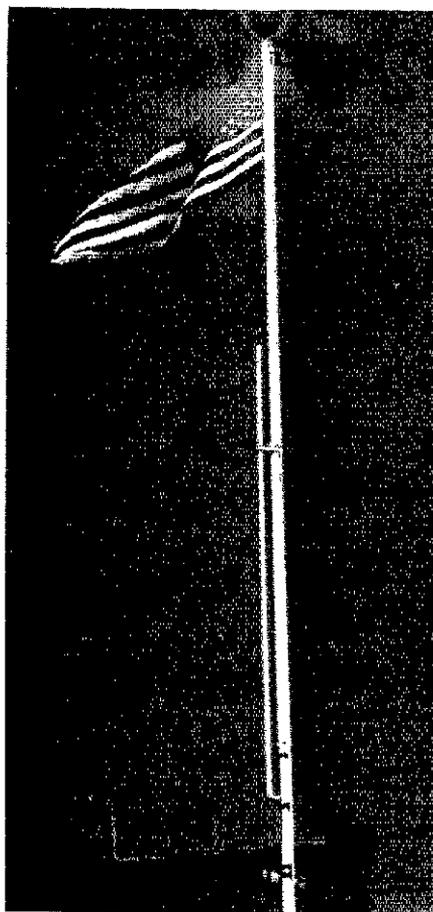
"Not so fast, young man!" I could hear my wife say it before I even asked. "You're not putting up some ugly antenna on my house! No way!" Having had this reaction from my XYL to the installation of even small VHF antennas, I knew putting up something big for use on HF would really be a problem. Something different was in order, but what?

After making some discrete inquiries, I discovered that my wife was wishing for a replacement flagpole for the house. A few months earlier, the old one had become unserviceable. That was it! A 10-meter antenna disguised as a flagpole! I immediately thought of using a quarter-wave antenna, but it was a bit too short for a good flagpole, and I couldn't figure out how I was going to hide all those radials.

I'd just been working on some antennas for the 2-meter band and 220, and had had great success with the J design. "Why not a 10-meter J?" I thought. Why not, indeed? So I set about building my wife's new flagpole—and my new antenna.

Construction

Because I live near the ocean, I decided to make the antenna from copper pipe to



minimize corrosion. But there's no reason why galvanized steel pipe, or perhaps thick-walled aluminum tubing, couldn't be substituted. The Flagpole J is made with conventional copper plumbing pipe, which is readily available at hardware stores. I used 1½-inch pipe for the bottom half of the antenna, reducing it to ¼-inch pipe for the top half. The J section is made from ¾-inch pipe.

Building the Flagpole J is simple and straightforward. Fig 1 shows how the antenna is constructed. One distinguishing feature is the length of the radiating element. In most J antennas, this element is three-quarters of a wavelength long. Because of mechanical considerations, the Flagpole J is only one-half-wavelength long.

First, cut all of the pieces of pipe to their proper lengths. Use a tubing cutter or hacksaw, and deburr the cut ends. Prepare the

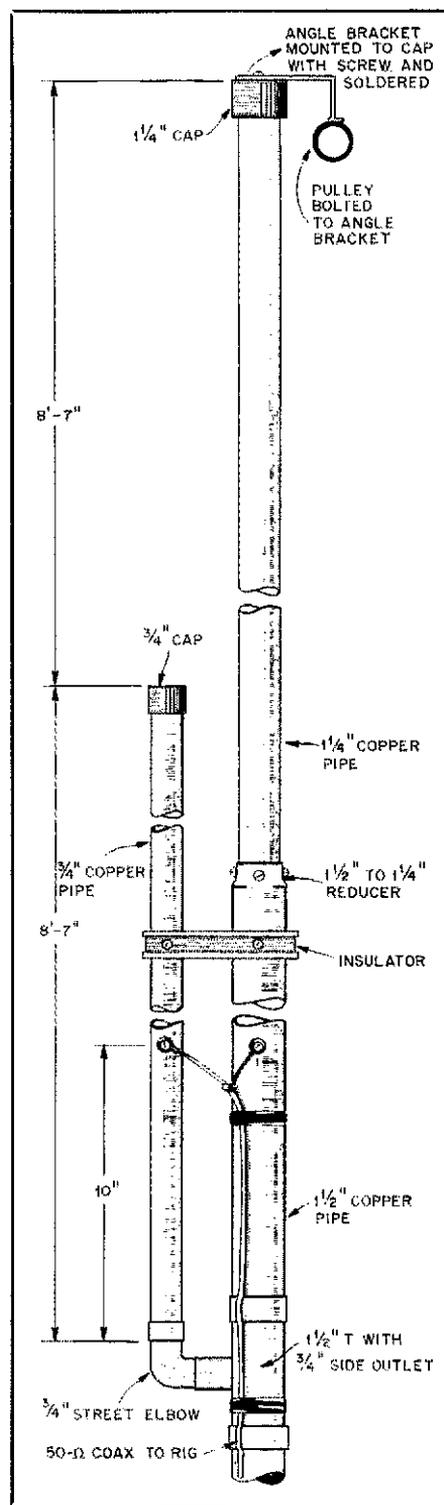


Fig 1—Construction of the 10-Meter Flagpole J.

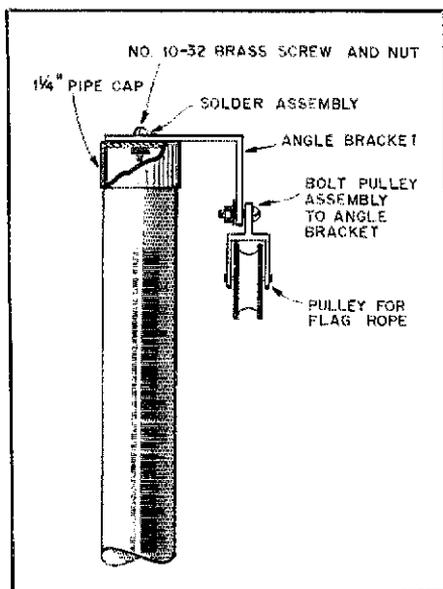


Fig 2—Top cap and pulley assembly for the Flagpole J.

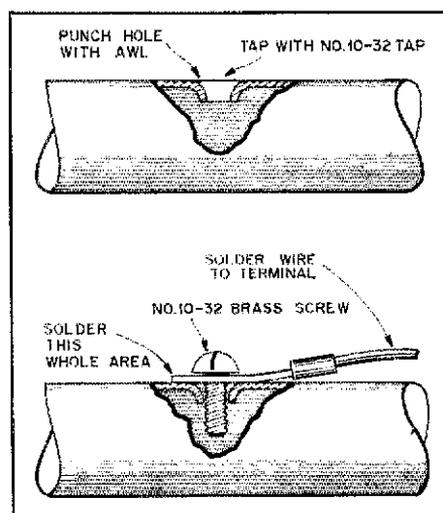


Fig 3—Feed-point attachment details.

top pulley assembly (assuming you intend to use this antenna as a flagpole, too) as shown in Fig 2. Next, solder all the pipe caps and reducers onto the various pipe sections, then finish by soldering together the antenna sections. Use soldering flux or tinner's fluid to ensure good bonding. Resin-core solder will not do the trick on copper pipe. It's best to clean the metal with flux first, then use solid-core solder to make the joint. Avoid the use of acid-core solder. Be sure to clean all the joints when you're finished soldering.

If you're going to paint the Flagpole, first perform the following steps. See Fig 3. Mark the location of the two feed-line terminals. Use a sharp punch or awl to make a hole large enough to pass a no. 10-32 tap. Punching a hole is better than

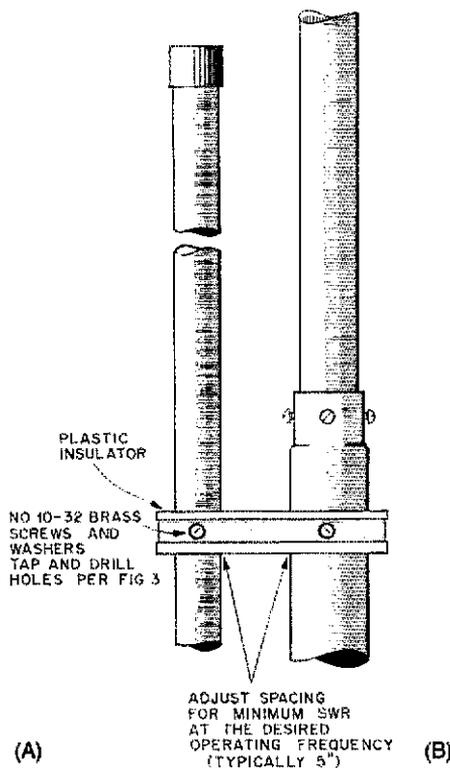


Fig 4—Detailed drawing (A) and photo (B) of the insulator attachment.

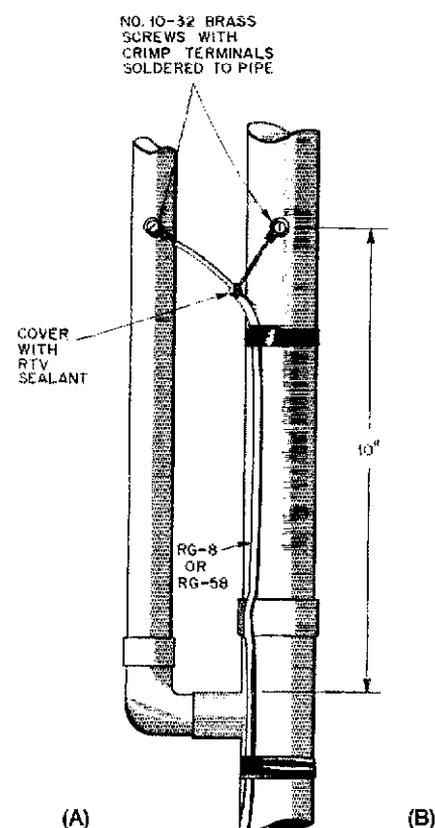


Fig 5—Feed-point attachment detail drawing (A) and photo (B). See Fig 3.

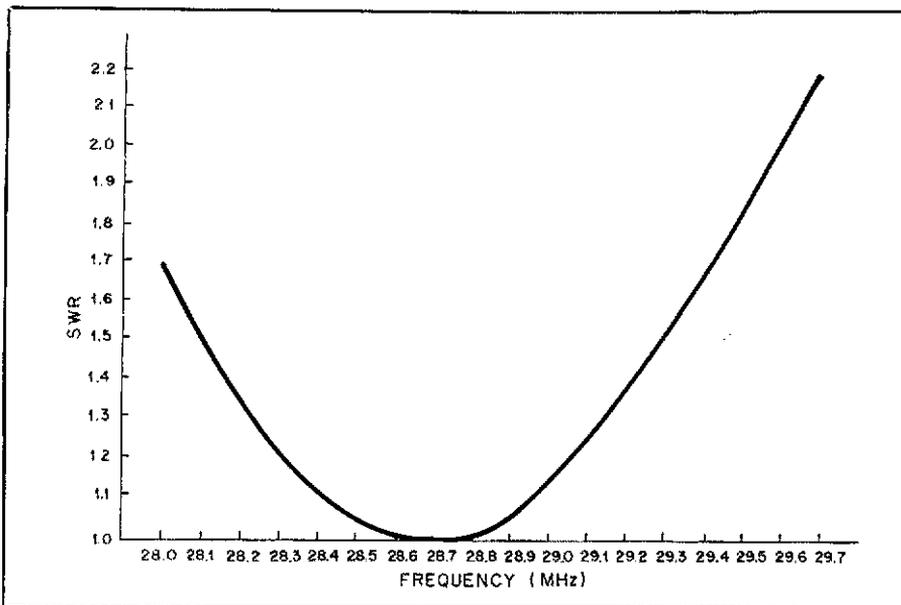


Fig 6—SWR curve of the Flagpole J.

drilling a hole because punching produces a tapered hole that is well-suited for threading. After tapping the holes, use brass screws to fasten the terminals that will connect to the feed line. Punch and tap the

holes for the insulator-mounting screws as well.

Prior to painting, thoroughly clean all exposed metal parts. Mask the area around each feed-line terminal, then spray the

entire assembly with a good-quality epoxy paint. If your decor allows, use white paint; it will reduce thermal expansion and contraction, making your paint job last longer. When painting, use several light coats rather than one heavy coat. The finish will be smoother, with fewer drips and runs, and it will also be more durable.

When the paint is dry, attach the plastic insulator with brass screws as shown in Fig 4. I used a piece of UV-resistant PVC for the insulator. After the insulator is attached, connect the feed line to the two terminals as shown in Fig 5. Solder the center conductor and braid to the terminals using resin-core solder. Then, apply RTV® silicone sealer to the end of the feed line to seal out moisture.

Tune-Up

Mount the antenna in an area that is free of obstacles and allows you to reach the insulator to adjust its spacing. Set your rig to the center of your desired operating range and measure the Flagpole's SWR—it should be less than 3:1 right off the bat. (If not, check for such things as shorted feed-line conductors, wrong element lengths or bad coax-connector installation.) Adjust the insulator spacing for minimum SWR. You should be able to get it very close to 1:1.

Building The Flagpole J For Other Bands

You can scale the Flagpole J up or down to operate on a variety of bands—all the way from UHF down to 160 meters. At 2 meters and above, a few constructional changes are in order: No stub insulator is required (the antenna is very rigid with the short dimensions required) and a variable capacitor is installed at the top of the short J section. I made a capacitor from brass hardware (see Fig A).

Scaling the Flagpole for other bands is simple. The main section is roughly one-half wavelength long. Its length can be calculated using the formula

$$\text{Length (in feet)} = 492 / \text{frequency (MHz)} \quad (\text{Eq 1})$$

The short vertical section is about a $\lambda/4$, and is therefore one-half the length of the longer section.

The feed line is tapped up the Flagpole at a distance equal to about 1 inch per meter of wavelength, so a 2-m J would have the feed line attached about 2 inches from the bottom, a 6-m J about 6 inches, and so on. Final determination of this distance is done during tuning, described later.

The distance between the two vertical members of the J should ideally be no greater than 1% of the wavelength, or about 0.4 inch per meter of wavelength. So, a 2-m J would have the elements spaced about 0.8 inch apart, a 6-m J about 2.4 inches apart, and so on. (I used a rule-of-thumb spacing of 0.5 inch per meter of wavelength with no observable problems.) The element spacing can be adjusted for minimum SWR at the top of the smaller vertical member—a sort of fine-tuning point.

Once you build the Flagpole J for the desired band, it must be tuned to match the feed-point impedance to that of the feed line. The tuning process is an interactive one with two adjustments. First is the location of the feed-line tap, second is the spacing between the two elements. To find the proper feed-line tap point, attach the center conductor and shield to the Flagpole with plastic wire ties. Then, move the feed point up and down until you find the point of minimum SWR. Now, adjust the element spacing for minimum SWR. Alternate between the two adjustments until an absolute SWR minimum is reached; it should be very close to 1:1. If you've built the Flagpole with a tuning capacitor as shown in Fig A, adjust the capacitor instead of changing the element spacing.—Jim Hendershot, WA6VQP

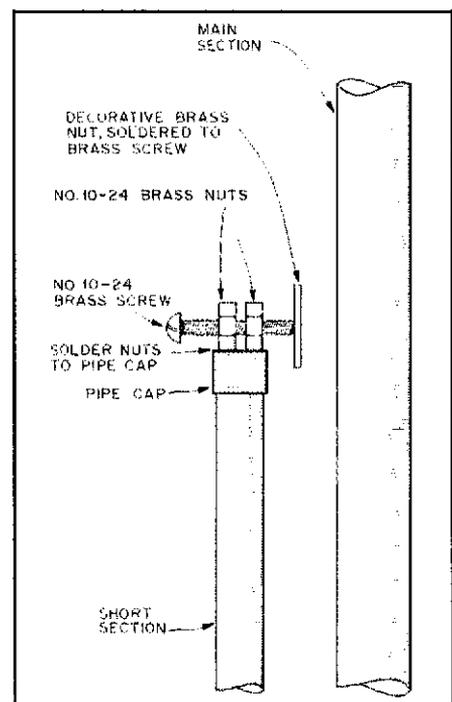


Fig A—Details of the homemade capacitor for VHF/UHF versions of the Flagpole J. The capacitor plate can be made from a piece of sheet brass. (I used a decorative brass nut that is part of a lamp-shade support.)

Once the initial tuning is done, mount the Flagpole at its permanent position. Make sure the antenna is clear of power lines. Use a solid mounting base and substantial hardware to secure the Flagpole J. Remember, this much metal has a lot of wind load, and average house eaves won't handle it well.

Summary

The SWR curve of my Flagpole is shown in Fig 6. I have my Flagpole tuned to favor the lower end of the 10-meter band, but I can QSY to the upper part of 10 meters without trouble. Results with the Flagpole J have been very gratifying. I've received

excellent signal reports. I've no more "hot shack" problems: this is an elevated-feed antenna design, so it does not require radials or any other type of counterpoise. But what really makes this antenna shine is that my wife really likes her new flagpole! I was afraid she might complain about the J element. Instead, she commented on how nice it was to have a "modern flagpole" design with that extra little pole on the side. Well, whadda ya know...

Jim Hendershot was first licensed as WA6VQP in 1973. In addition to the ARRL, Jim is a member of AMSAT and the Radio Club of America. He serves as an Assistant Technical

Coordinator (ATC), helping to resolve RFI and other technical problems.

Jim is the Director of Engineering for Western Mobile Communications, Inc. of Arroyo Grande, California. Jim was educated in electronic engineering at California State Polytechnic University and has worked in various areas of the communications industry for over 17 years. His background includes experience in mobile telephone and radio, as well as commercial radio and television.

Jim is familiar with most aspects of VHF and UHF radio design. He has a substantial background in digital and analog design, and has worked with complex RF filter design in combiner and antenna systems, as well as voice and data transmission systems. Jim's listed in the 25th edition of Who's Who in Finance and Industry.

Amateurs: Record and Report "POW/MIA" Transmissions

To the Amateur Radio community:

I am the Chief of the Defense Intelligence Agency Special Office for Prisoners of War and Missing in Action; I am also K4FFT. My office is responsible for collecting and analyzing information that possibly relates to Americans who remain unaccounted for in Southeast Asia. While some of the information we collect is generally accurate and some is helpful to US government efforts to account for our missing men, from time to time we encounter bogus information. Sadly, bogus information often receives greater attention than valid information.

I am writing this letter to alert the US Amateur Radio community to an incident that occurred in October 1988 and to describe the outcome of that incident.

On October 4, two US amateurs—in North Carolina and in Ohio—monitored a 10-meter CW transmission. The sender claimed to be one of "700 US Marines" being held prisoner near Hanoi and used the name "John Gefton." This transmission included several SOS calls and pleaded for anyone receiving the transmission to notify US officials. The amateur in North Carolina tape-recorded a portion of the transmission. Both US amateurs noted that the transmission had a very rough, chirpy note.

On October 6, the North Carolina amateur monitored what he believed to be the same transmitter on almost the same frequency. At that time, the station was signing a Swiss call sign, was in contact with Canadian and US stations and, indicated that he was located near Geneva. In checking the *Callbook*, the US amateur noted that no such call sign appeared in the Swiss listings. He notified the FCC, who monitored the transmissions and conducted direction finding. Also, the North Carolina amateur tape-recorded most of the October 6 transmission.

Analysts in my office interviewed both of the US amateurs and spoke with the FCC Monitoring and Enforcement Division. In the first place, there are not "700 Marines" still missing in Southeast Asia. Fewer than 300 Marines are unaccounted for. Secondly, there is no one missing with the name "John Gefton" or any reasonable variation thereof.

Most important, however, is the technical evidence analyzed by the FCC. In comparing the October 4 and 6 tape recordings, the

FCC concluded that both signals originated from the same transmitter. The FCC DFing located the transmitter in Europe; lines of bearing encompass Geneva. Furthermore, the lines of bearing, if extended around the globe, do not come close to Vietnam. Thus, based on both internal and external evidence, we have concluded that the October 4 "distress" signal was a hoax, probably originating from a bootlegger in Switzerland.

I feel it is important that this information be disseminated among the US amateur community for two reasons. First, I understand that some details of this caper were printed in one or more amateur newsletters, and I want to ensure that the outcome receives the same coverage as the initial report. Secondly, I want to advise US amateurs of what to do if any such incident comes to their attention in the future.

If anyone should monitor any transmissions alleging knowledge of, or in any way connected with, Americans missing in Southeast Asia, please do the following:

- A. Tape record the transmission.
- B. Note frequency, time, date, type of signal.
- C. Obtain a beam heading.
- D. Copy it if it is a CW signal, write down the gist if it is voice.
- E. If possible, notify the nearest FCC field station and ask them to DF the signal.
- F. Notify me: Colonel Joe Schlatter, DIA Special Office for PW/MIA or one of the analysts in my office. You should telephone collect, 202-694-4708 or 202-695-0501. Follow up by writing: DIA, Special Office for PW/MIA, Room 2E230, The Pentagon, Washington, DC 20340-5390.
- G. Monitor on or near the same frequency for several days.

The US government is exerting every effort to obtain the fullest possible accounting for our men missing in Indochina. My office has 39 full-time intelligence professionals dedicated solely to this issue. We are assisted by teams in Southeast Asia collecting information and by the entire spectrum of US intelligence and diplomatic activities. General John W. Vessey, former Chairman of the Joint Chiefs of Staff, serves as the President's personal POW/MIA Emissary to Vietnam and continues to have close contact with Vietnamese officials, urging them to cooperate in reaching the accounting we seek. The support

for this issue from Congress, veterans, the general public and—most importantly—the families of the missing men is superb. Sadly, answers to the fates of these men are not yet available to the US government. The answers lie with the Indochinese communist governments. Their cooperation recently has improved and the uncertainty of over 100 families has been ended in the past few years.—Joseph A. Schlatter, Colonel, USA, Chief, Special Office for Prisoners of War and Missing in Action.

Strays



WRITING TO HQ.?

Each year, ARRL HQ receives some 350,000 pieces of correspondence, which translates into a lot of cards and letters that have to be sorted, routed to the proper department and answered. To help us continue to provide prompt, efficient service to our members, we ask that you follow these guidelines when writing to ARRL.

- 1) Use a separate piece of paper for each separate request.
- 2) Type your letter (if possible), or print or write clearly.
- 3) Include your name, address, call and membership number from your QST label.
- 4) Enclose a business-sized, self-addressed, stamped envelope if a reply is required.
- 5) Address your request to a particular individual or department, if possible, especially when responding to correspondence received from HQ.
- 6) Send a check or money order (IRCs for foreign requests) when applicable. Do not send cash.

I would like to get in touch with...

anyone who has a schematic for a Palomar Electronic Corp model TX-50 3-30M broadband amplifier. The above company is no longer in business and is not the current Palomar. Paul London, KI4XZ, 1311 Santiago Ct, Punta Gorda, FL 33950.

Why Proper Amplifier Tuning is Important

A grounded-grid linear amplifier should be tuned so that most of the electrons emitted by the cathode reach the anode circuit. Electrons that fail to reach the anode are lost to grid current. This condition occurs when the amplifier is loaded too lightly—the result of *setting the loading capacitor for too much capacitance* during tune-up. As grid current rises and fewer electrons reach the anode, distortion increases and output power decreases. Thus, a triode amplifier can be tuned up with fair accuracy by simply applying maximum drive power and quickly adjusting the amplifier's TUNE and LOAD controls for *maximum power output*.†

Electrons are negatively charged. Positive charges attract them. The more positive the charge, the stronger the attraction. The 0-V potential of a grounded control grid is more positive than the negative charge of an electron leaving the cathode of a vacuum tube. This causes excessive current to flow in the control-grid circuit unless the tube anode is *substantially more positive than the control grid throughout the anode-voltage cycle*.

The output of a grounded-grid RF amplifier tube appears at the tube anode as RF ac superimposed on the dc anode supply. As a rule of thumb, successful attraction of most of the cathode's electrons requires that the instantaneous anode voltage not fall below about +200 to +300 V (relative to the grounded grid) during the lowest point of its downward voltage swing (that is, during the anode-current peak). Loading the amplifier too lightly—that is, adjusting the amplifier LOAD control for too much loading capacitance—causes the minimum anode voltage to fall below this level. The result is a dramatic increase in grid current and distortion, and a reduction in peak power output. Loading the amplifier too heavily—insufficient loading capacitance—also causes the output power to decrease because the amplifier output network is not adjusted to the impedance-transformation ratio necessary for maximum power transfer between the amplifier and its load.—Richard L. Measures, AG6K

†After the amplifier has been tuned for maximum output, a slight increase in linearity can usually be secured by increasing the amplifier loading—that is, by *decreasing* the loading capacitance—until output power decreases by a few percent. Note, however, that this small improvement in linearity is seldom detectable in practice because the IMD performance of tube amplifiers is usually significantly better than the IMD performance of the bipolar-transistor-output transceivers commonly used nowadays as exciters.

can be calculated by using a variation of Ohm's Law.

As Fig 1B illustrates, the anode parasitic suppressor ($L_S R_S$) is in series with C_{AG} . Because of this, whatever RF current flows through C_{AG} also flows through $L_S R_S$. Once we know the magnitude of the RF current through C_{AG} , we'll know how much current flows through the $L_S R_S$ network. This information, in conjunction with the impedance of $L_S R_S$, will allow us to calculate the RF voltage drop across $L_S R_S$, and, therefore, the RF voltage drop across R_S .

Calculating the AC Anode Voltage

The peak ac anode voltage depends on several factors: the dc anode voltage, the grid voltage with respect to ground, and whether or not the amplifier is properly tuned. (For more on how amplifier tuning affects peak ac anode voltage, see the sidebar, "Why Proper Amplifier Tuning is Important.") Assuming that the amplifier is properly tuned, the peak *change* in anode voltage is equal to the dc supply voltage minus about 200 to 300 V. (Using the lower number results in a more conservative suppressor-resistor-dissipation estimate.)² This peak voltage can be converted to its root-mean-square (RMS) value by dividing

it by $\sqrt{2}$ (approximately 1.414).³

At this point, we can begin working a sample problem. A hypothetical MF/HF amplifier contains a 3-500Z triode ($C_{AG} = 4.7$ pF) operating in grounded grid at a dc anode supply of 4 kV. Its anode parasitic-suppression network consists of a 0.05- μ H inductor in parallel with a 25- Ω resistor. From the foregoing discussion, we calculate that the peak change in anode voltage is 4000 V – 200 V, or 3800 V. To find the RMS equivalent of this voltage, we divide 3800 by 1.414. Answer: The 3-500Z in the hypothetical amplifier operates at an RMS anode potential of 2.687 kV.

Calculating the Reactance of C_{AG}

We can find the reactance of C_{AG} with the capacitive reactance formula ($X_C = 1 \div 2\pi fC$). Applying this to our sample problem: The 3-500Z's anode-to-grid capacitance is 4.7 pF; at 29.7 MHz, $X_{C_{AG}}$ is $-j1140 \Omega$.

Calculating the RF Current Through $X_{C_{AG}}$

Ohm's Law serves here. Substituting $X_{C_{AG}}$ for R, the RF current through C_{AG} can be found with the formula $I = E \div X_{C_{AG}}$, where I is the RF current in amperes and E is the RMS anode voltage.

Based on an anode potential of 2.687 kV RMS, the RF current through C_{AG} of a 3-500Z (4.7 pF) is 2.36 A RMS at 29.7 MHz. Because the parasitic-suppression network ($L_S R_S$) and C_{AG} are in series, the RF current through $L_S R_S$ is also 2.36 A RMS at 29.7 MHz.

Calculating the Suppressor-Network Impedance

Because the suppressor-network components are connected in parallel, the RF voltage drop across R_S is equal to that across $L_S R_S$. To calculate this voltage drop, we must first calculate the network impedance.

$L_S R_S$ exhibits a *complex impedance* because it consists of reactance (X_{L_S}) and resistance (R). The presence of reactance makes finding the network impedance a bit more complicated than solving a simple parallel-resistance problem.

Two approaches can be used to find the impedance of $L_S R_S$; which approach you use depends on whether you prefer to think in terms of impedance or its reciprocal, admittance. The sidebar, "Finding Impedance by Solving for Admittance," explains the admittance approach.⁴ For those who prefer to work with impedance, the impedance of $L_S R_S$ can be found with the equation

$$Z = \frac{R_S X_{L_S}}{\sqrt{R_S^2 + X_{L_S}^2}} \quad (\text{Eq 1})$$

where

Z = network impedance in ohms

R_S = resistance of R_S in ohms

X_{L_S} = reactance of L_S in ohms

Returning to our sample problem: The suppressor network in the anode of the 3-500Z consists of a 0.05- μ H inductor in parallel with a 25- Ω resistor. X_{L_S} can be found with the inductive reactance formula ($X_L = 2\pi fL$); in this case, X_{L_S} is equal to $j9.3305 \Omega$ at 29.7 MHz. Solved with $R_S = 25 \Omega$ and $X_{L_S} = 9.3305 \Omega$, Eq 1 reveals a network Z of 8.74 Ω at 29.7 MHz.

Calculating the RMS RF Voltage Across the Network

Finding the voltage across the network requires only the application of Ohm's Law (in this case, $E = IZ$, where I is the network current [2.36 A] and Z is the network impedance [8.74 Ω]). Answer: At 29.7 MHz, the RMS voltage across our hypothetical LR parasitic-suppressor network is 20.6 V.

Calculating the Power Dissipated in R_S

Now that we know the voltage drop across the network (and, hence, across R_S), we can calculate the power dissipated in R_S with the equation $P = E^2 \div R_S$, where P = power in watts, E = the RMS voltage drop across R_S , and R_S = resistance of R_S in ohms.

Concluding our sample problem: A drop of 20.6 V RMS across R_S (25 Ω) indicates

Finding Impedance by Solving for Admittance

More radio amateurs seem to be familiar with *series* LRC circuits and *impedance* in units of *ohms* than with *parallel* LRC circuits and *admittance* in units of *siemens* (S, equal to $1/\Omega$). Impedance (Z) describes the ability of a circuit to *resist* the flow of ac. Admittance (Y, equal to $1/Z$) describes the ability of a circuit to *conduct* the flow of ac. Whether you decide to evaluate a circuit in terms of resistance or conductance is akin to deciding whether a container is half full or half empty. Both viewpoints are valid, but one approach may be more useful than the other, depending on the nature of the circuit (or the function of the container).

The concept of impedance is more useful than admittance in work with series circuits, in which *the current is uniform in all elements and the voltage across all elements is different*. Admittance is more useful than resistance in work with parallel circuits, in which *the voltage across all elements is uniform and the current in all elements is different*.

In the relatively well-known realm of impedance, capacitive reactances (X_C) are expressed in units of negative ohms because voltage across the capacitor lags the current through the capacitor by 90° of the waveform applied to the capacitor. Inductive reactances (X_L) are expressed in units of positive ohms because, in an inductor, the voltage across the inductor leads the current through the inductor by 90° of the waveform applied to the inductor.

In the reciprocal world of admittance, the reactance polarity signs reverse, and reactance (X) undergoes a name change to *susceptance* (B). For example, a capacitor that exhibits a capacitive reactance (X_C) of -3Ω at a given frequency exhibits $+1/3$ S of capacitive susceptance (B_C , equal to $1/X_C$) at that frequency.†

(These values can also be written as $X_C = -j3 \Omega$ and $B_C = +j/3$ S, respectively. The *j* indicates [for purists] that the reactance/susceptance values are imaginary—in this case, they are multiplied by the square root of -1 —but the presence of *j* can be inferred whenever reactive [X] or susceptive [B] values are present in an equation.) Inductive susceptance (B_L) is equal to $1/X_L$.

Why consider a parallel LR circuit in terms of admittance rather than impedance? The formula for the impedance of *parallel* reactance and resistance (see Eq 1 of the main text) may scare away people who are otherwise comfortable with the formula for the impedance of *series* reactance and resistance ($Z = \sqrt{R^2 + X^2}$). By converting the reactance in a parallel circuit to susceptance, and the resistance in the same parallel circuit to conductance, you can use the series impedance formula to find the impedance of a parallel RX circuit merely by solving the equation and dividing 1 by the resulting admittance (Y). As Fig A shows, this is easier done than said!

I have found that it's easier for me to keep things straight in a parallel-circuit problem if all conductance, susceptance, and admittance values are written as $1/\text{ohms}$ (S). (This technique also speeds converting conductance, susceptance, and admittance values to the more familiar ohm values: Merely invert the $1/$ fractions and replace S with Ω .) For me, a conductance of 0.008333 S is easier to visualize if it's expressed as $1/120$ S; either way, it's still a brown-red-brown (120- Ω) resistor!—Richard L. Measures, AG6K

†Although the signs change, physical reality does not: Voltage leads current in an inductor, and current leads voltage in a capacitor, regardless of whether reactance or susceptance is used to characterize these components!

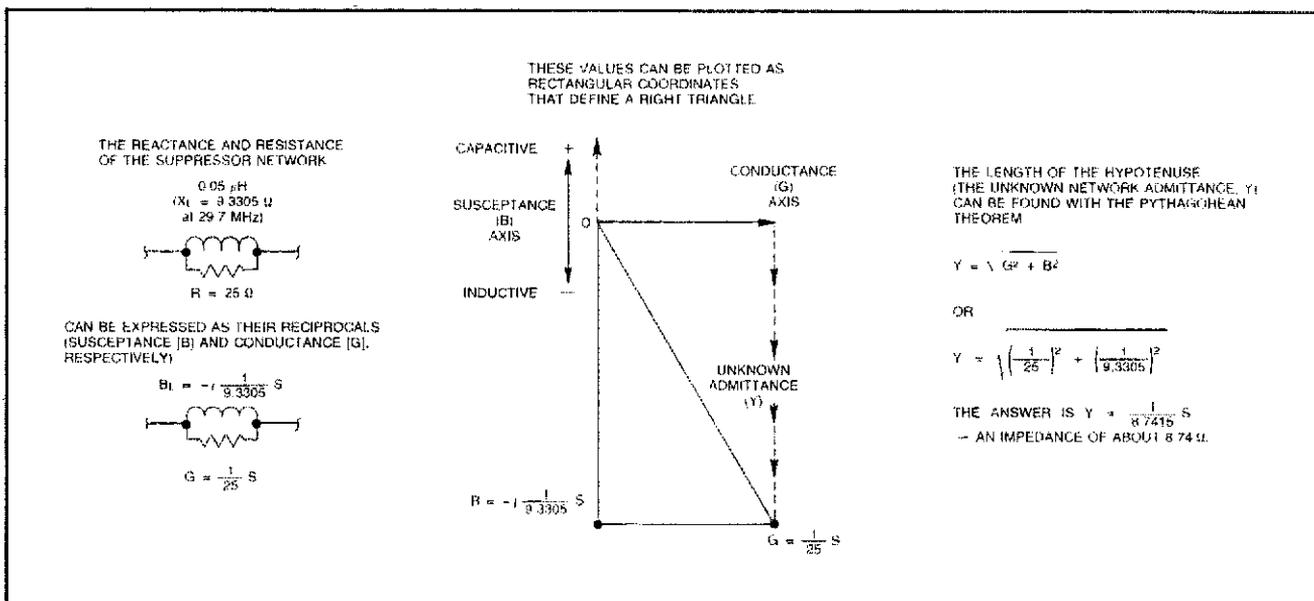


Fig A—The impedance of a *parallel* RX circuit can be calculated with a variation on the familiar *series* RX impedance formula by using the reciprocals of resistance (R) and reactance (X) (conductance [G] and susceptance [B], respectively) in the series formula. The result is the *admittance* (Y) of the parallel circuit; the impedance of the circuit equals $1/Y$. This example also reminds us that the familiar formula for Z of series RX (and Y of parallel GB) is based on the *Pythagorean theorem*: In both cases, we're working with vector quantities to solve for the hypotenuse of a right triangle. (For more information on working with complex impedances, see Chapter 2 of *The ARRL Handbook* and Chapter 5 of *The ARRL Extra Class License Manual*.)

that R_S dissipates 17 W at 29.7 MHz.

Finer Points

R_S dissipates 17 W as a result of the sinusoidal RF circulating current that passes through the 3-500Z anode lead and the parasitic-suppression network. An additional, lesser current flows through the anode lead and suppressor during the 180° (or so) of downward anode-voltage swing that occurs when the tube conducts. These pulses occur at the amplifier operating frequency—29.7 MHz in the sample problem. This additional current causes a half-wave, RF-pulse voltage drop across R_S that adds, on the bottom half of the cycle, to the R_S voltage drop due to sine-wave circulating current. This increases the total power dissipated in R_S .

The fact that this waveform is a half-wave RF pulse instead of a sinusoid complicates the math necessary to find the additional power dissipation caused by this current. An accurate mathematical analysis would require the generation of a formula that accurately describes a waveform consisting of the half-wave RF pulse plus the sinusoidal circulating-current waveform. Calculus could then be employed to more closely calculate the RMS power actually dissipated in R_S . Such analysis is beyond the scope of this article.

It is somewhat easier to use this approximation: In a typical amplifier, the half-wave anode-current pulse increases the power dissipated in R_S by about 15% over that due to RF circulating current. Thus, in our sample problem, the total power dissipated in R_S is 1.15×17 W, or 20 W.

Practical Notes

Twenty watts represents, to me at least, a surprising amount of HF power dissipation in a fairly low-inductance LR parasitic suppressor. (Although the network inductance in the sample problem was 0.05 μ H, most of the parasitic suppressors I've seen contain more inductance than this. The resistors in such networks probably dissipate more power than what we've calculated here.)

Of course, the sample problem represents a worst-case scenario of 29.7-MHz "lock-to-talk" RTTY or FM operation at full power. Many radio amateurs use their amplifiers at reduced anode voltage during RTTY and FM operation, however; the parasitic-suppression resistors in these amplifiers are probably not subjected to more than half of the ≈ 20 -W maximum dissipation calculated in the sample problem. SSB operation, during which amplifier tubes operate at a duty cycle of about 15% with normal human voices, subjects R_S to about 3 watts of average dissipation at 29.7 MHz. This partially explains why the typical parasitic-suppressor assembly survives even though it contains only two or three 2-W resistors.

Another factor in the survival of seemingly underengineered suppressor networks is that modern metal-film and metal-oxide-film "flameproof" resistors are very rugged: They are not as easily turned into "crispy critters" as were the heat-intolerant, phenolic-cased, carbon-composition resistors of yesteryear. (I have tested modern, 2-W [rated at 70 °C ambient], metal-and metal oxide-film resistors that can dissipate 5 watts each in free air for 1 hour with no apparent changes. These amazing resistors can dissipate 20 watts each for at least 6 seconds with no permanent change in appearance or electrical characteristics.)

An amplifier tube that exhibits more than the 4.7 pF of C_{AG} exhibited by the 3-500Z in our sample problem will subject a parasitic-suppression network to substantially more RF circulating current than the 2.36 A in the sample problem. The resultant higher RMS voltage drop across R_S increases dissipation exponentially (remember, the voltage term is squared in $P = E^2 \div R$). For example, an 8877 has 10 pF of C_{AG} —more than double the capacitance of a 3-500Z. This means that, for the same anode voltage and LR values used in the example, the 8877's anode circulating current more than doubles (to about 5 A RMS)—more than doubling the voltage drop across R_S . Because voltage is squared in the power equation, the power dissipated by R_S would increase by a factor of greater than 4 to more than 80 W at 29.7 MHz!

Finding the optimum inductance for L_S is a tricky balancing act.⁵ An inductance small enough to keep R_S from roasting on 10 meters may not necessarily be enough to prevent VHF parasitic oscillation, especially if the suppressor inductor is made of (high-Q) copper (or, worse yet, silver-plated copper) instead of low-Q nichrome or similar resistance wire.

One solution to the suppressor-dissipation problem is to use a large, noninductive, Global™ resistor for R_S .⁶ Unfortunately, Global resistors are expensive. A more cost-effective solution is to use two (or more) small LR parasitic suppressors, built around inexpensive 2-W metal-film resistors, in series. For an amplifier tube that has a C_{AG} of 20 pF or more, it's easier to build a long-lived LR parasitic suppressor using heat-tolerant nichrome wire or ribbon for L_S and R_S than it is to build a suppressor based on a conventional resistor.

Summary

The resistors used in anode LR VHF parasitic-suppression networks dissipate considerable quantities of HF power, especially at the upper end of the HF range. This power dissipation can be calculated with sufficient accuracy to allow specification of R_S wattage by design rather than

by guess. If you would like to discuss any part of this article with me, call me at 805-482-3034.

Notes

- ¹Power dissipation in the suppressor resistor due to dc anode current is negligible because the resistor is bypassed for dc by the suppressor inductor.
- ²The minimum-anode-voltage requirement of amplifier tubes is generally related to power-handling capability: Higher-power tubes generally have higher minimum anode-voltage requirements than lower-power, lower-voltage tubes.
- ³This relationship is true only for pure sine waves; the relationship between peak and RMS voltages is more complex for nonsinusoidal waveforms. For the purposes of this discussion, it's acceptable to assume that the RF waveform at the anode(s) of a vacuum-tube, linear RF amplifier is sinusoidal. The concept of RMS voltage is valuable to us because it allows direct comparison of the heating effects of dc and ac. The heating caused by a drop of 1 V RMS across a given resistor is equivalent to the heating caused by a drop of 1 V dc across the same resistor.—Ed.
- ⁴It can be argued that the relationship between current and voltage in a parallel-LR network is better analyzed in terms of admittance because an admittance diagram (Fig A in the sidebar) can be drawn for combinations of parallel L, R and C, but an impedance diagram cannot. Despite this, however, either concept—impedance or admittance—may be successfully (and simply) applied to finding the power dissipated by R_S . Thus, we present the application of both concepts for the reader's convenience. The simple, reciprocal impedance/admittance conversions discussed in the sidebar are unrelated to finding the series equivalent of a parallel circuit or the parallel equivalent of a series circuit; such transformations offer no shortcuts in finding the power dissipated in R_S . "Finding Impedance by Solving for Admittance" discusses conversion of the parallel reactance and resistance of L_S to parallel susceptance and conductance (B_S and G_S) so that an admittance diagram can be drawn.—Ed.
- ⁵Richard Measures' technique for measuring the inductance of the suppressor inductor will appear in a forthcoming Hints and Kinks column.—Ed.
- ⁶A friend of mine uses a 50-W Global resistor for R_S in his large amplifier; the resistor gets very hot during key-down testing at 29 MHz. This resistor has never burned out, but it has glowed dull red a few times during a parasitic oscillation near 68 MHz! □

New Products

BEAM-HEADING PRINTOUTS

□ Listings of beam headings and distances from your location to each DXCC country are available from Jack Hurray, W8JBU. Jack makes the printouts in near-letter-quality print, and can determine your geographical coordinates if your location has a population of more than 100 persons. If there are fewer than 100 in your town, Jack requires your latitude and longitude to make the printouts. Price: \$8. For more information, contact Jack Hurray, W8JBU, 253 River Rd, Hinckley, OH 44233, tel 216-278-2600.—Rus Healy, NJ2L

Collinear Phased Antennas for the HF Bands

Need a good-performing wire antenna? A collinear phased array could be just what you're looking for!

By Douglas J. Fouts, K1GQR
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University of California
Santa Barbara, CA 93106

The thrill of chasing DX is an integral part of Amateur Radio. With the increase in sunspot activity, there's more DX fun every day! Unfortunately, newcomers (and some old-timers) sometimes think that the only way to work DX is with the aid of costly towers, rotators and beams. This article shows you how to design and build an effective DX antenna called a collinear phased array. Collinear antennas are easy and inexpensive to construct, and if you already have a dipole or an inverted V, you already have many of the materials you'll need.

Collinear-Array Fundamentals

Basically, a collinear array is nothing more than two or more radiating elements that are strung together, end to end.¹ The radiating elements are usually a half wavelength long, but other lengths can be used. Fig 1 shows a collinear array that is composed of three half-wave, center-fed dipoles. If the three transmission lines that lead from the common feed point in Fig 1 to the centers of each dipole are the same length, the currents in all three dipoles will always be traveling in the same direction at a given time (the three dipoles are in phase). The term *collinear* is used because the radiating elements are arranged geometrically in a straight line.

If the three dipoles shown in Fig 1 are fed in phase, the fields created by the dipoles will also be in phase. At a distant receiving antenna in a direction perpendicular to the array elements, the energy radiated by the three dipoles adds, creating a received signal that is stronger than if only one dipole was used. This principle also applies to the reception of incoming waves: A perpendicular incoming wave strikes all three dipoles at the same time. The signals induced in the dipoles add in phase, making the received signal stronger than if only one dipole was used. The theoretical gain of a collinear phased array

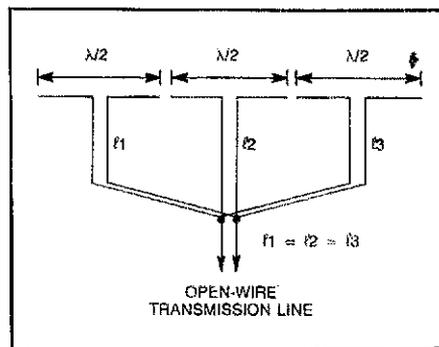


Fig 1—A three-element, collinear phased array fed with equal-length sections of open-wire line. (This is the simplest way to feed a collinear array.) See text.

Table 1

Number of wavelengths of open-wire transmission line required to connect two to five elements to a common feed point

Number of elements	Wavelengths of transmission line
2	1.5
3	3.0
4	5.0
5	7.5

over a half-wave dipole is 1.9 dB for an array with two elements, 3.2 dB for a three-element antenna and 4.3 dB for an array with four elements.

Feeding Collinear-Phased Arrays

The use of multiple feed lines as shown in Fig 1 has the advantage of ease of construction and tuning. The only things you need to tune this antenna system are a tape measure, a transmitter and an SWR bridge. The use of multiple feed lines has several *disadvantages*, however. Feed lines

should run perpendicular to the antenna for at least a half wavelength before turning any corners. This can be an unsightly mess, difficult to implement (depending on the installation) and, most of all, costly. Table 1 shows the minimum amount of parallel-conductor transmission line that is necessary to connect multiple elements to a common feed point.

The preferred methods of feeding collinear phased arrays are shown in Figs 2 and 3. Fig 2 shows the feed system for an antenna with an odd number of elements, and Fig 3 is that for an antenna with an even number of elements. The advantage of these feed methods is that only one feed line is required, and its length isn't critical. In general, the feed methods shown in Figs 2 and 3 are less costly, easier to construct, and visually unobtrusive. The disadvantage is that some means (such as an RF noise bridge) is required to adjust the quarter-wave phasing lines.

The short arrows next to the antenna elements in Figs 2 and 3 indicate the direction of current flow during half of a cycle of the applied signal. During the following half cycle, all currents flow in the reverse direction. In a long, continuous wire, the direction of current flow reverses every half wavelength. Figs 2 and 3 show that all currents in the radiating sections are in phase.

The short vertical sections shown in Figs 2 and 3 are quarter-wave phasing stubs. The current flowing on one side of a stub is equal in amplitude to the current flowing on the other side at every point along the length of the stub. Because the currents flow in opposite directions, their magnetic fields cancel, and the stub does not radiate. The current amplitude is not constant along the length of the stub: The current is at a minimum at the top of the stub, and reaches a maximum at the bottom of the stub.

Both voltage- and current-feed methods are shown in Figs 2 and 3. Voltage feed is so named because the antenna is fed at a

¹Notes appear on p 32.

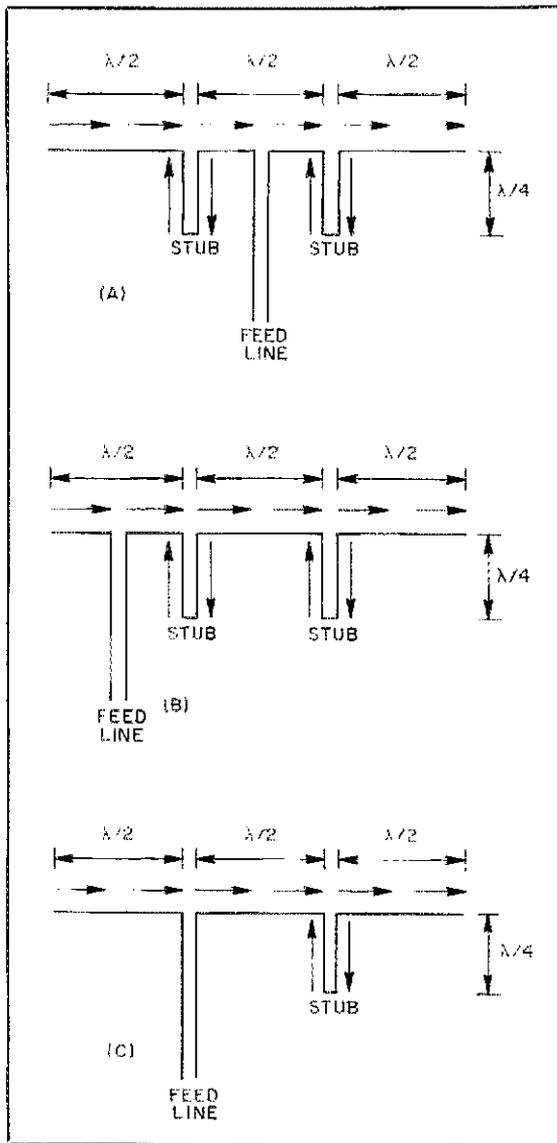


Fig 2—Feeding an odd number of collinear elements. At A, balanced current feed. At B, unbalanced voltage feed. At C, current feed.

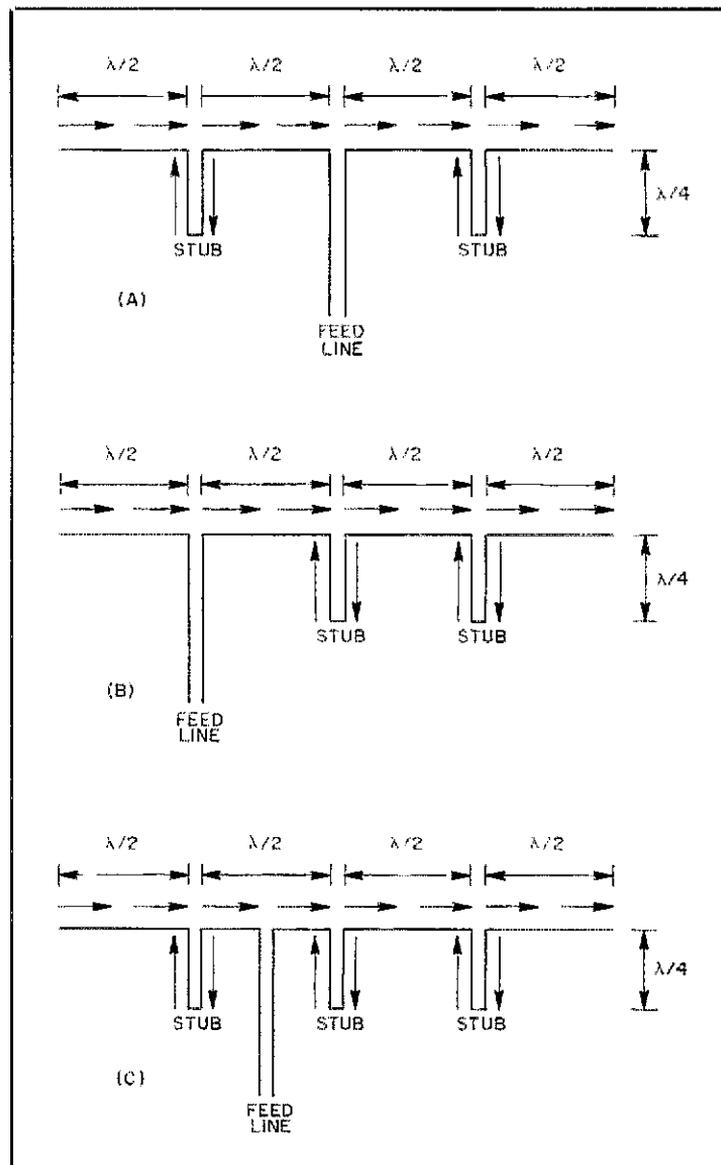


Fig 3—Feeding an even number of collinear elements. At A, balanced voltage feed. At B, unbalanced voltage feed. At C, current feed.

point of maximum voltage (minimum current). Current feed is feed at a point of maximum current (minimum voltage).

Collinear phased arrays work best if they are balanced (equal signal amplitudes flow on both sides of the antenna at a given time). Therefore, current feed is preferred for an antenna with an odd number of elements (Fig 2A). The feed-point impedance of a current-fed antenna is slightly over 300 Ω and provides a reasonable match to 300- or 450-Ω open-wire transmission line. Voltage feed is preferred for an antenna with an even number of elements (Fig 3A). The feed-point impedance of a voltage-fed antenna is over 1000 Ω. If a particular installation requires an off-center feed, current feeding is the preferred method because of its more favorable feed-point impedance.

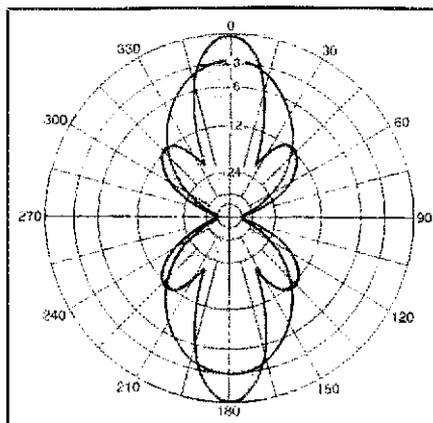


Fig 4—Radiation patterns of center-fed collinear phased arrays. The unshaded pattern is for an antenna with two elements; the shaded pattern is for a four-element antenna.

Radiation Patterns

Collinear phased arrays are bidirectional. In addition to some minor lobes, they produce two major lobes perpendicular to the antenna wire. The more elements the antenna has, the more narrow the major lobes (and the more numerous the minor lobes). Fig 4 shows the radiation pattern for collinear phased arrays with two and four elements. In addition to the coverage provided by the major lobes, the minor lobes usually provide adequate coverage for local communication.

Construction

The first step in constructing a collinear phased array is to decide the directions of the major lobes and how many elements the antenna should have. This depends on the location of the desired DX, whether or not

these locations all lie in (or close to) a straight line and how much room there is at the installation site. If the desired DX locations all lie in (or close to) the same direction (or 180° from each other), the antenna can be built with many elements, assuming that the necessary space is available. On the other hand, if the desired DX is fairly spread out, the wider major lobes of an antenna with fewer elements may be more desirable.

If the gain and directivity of a three-element array is desirable but there isn't enough space for it, and if there is more than the required amount of space for a two-element array, an extended double Zepp (EDZ) should be considered. The EDZ—a special case of the two-element collinear phased array—has a gain of approximately 3 dB over a half-wave dipole, and is only 1.28 λ long. For information on this antenna, see *The ARRL Antenna Book* and *QST*.²

Collinear phased arrays work best if they are erected parallel to the ground. This means that a support is needed at each end—the higher the support, the better. If minimizing cost is important, or if less directivity is desired, the antenna can be erected as an inverted V. If this is done, the apex angle should not be less than 90°. The antenna may have to be raised and lowered several times during construction and tuning, so it is a good idea to use support structures with pulleys, as shown in Fig 5. The antenna can then be raised and lowered easily with halyards.

Materials

The radiating sections of the array should be constructed from no. 12 or 14 copper-clad steel wire, such as Copperweld™. The extra strength of steel wire is desirable because the antenna must bear the weight of the phasing stubs and transmission line. If minimizing cost is important, the antenna can be built from no. 12 insulated copper wire (the kind used for house wiring). If copper wire is used, however, the antenna may not stay up during severe weather, and the conductors may stretch excessively if they're not well supported.

The radiating sections of a collinear phased array must be an *electrical* half wavelength long, which means that they will be slightly shorter than the calculated value given by the equation

$$\text{length (feet)} = 468 \div f \text{ (MHz)} \quad (\text{Eq 1})$$

There are two methods that can be used to find the correct electrical length for the materials being used; both start with the same step. Calculate the length of a half wavelength of wire using Eq 1. Use a frequency at the center of the desired band for this calculation.

The next step in using the first method is the construction of a half-wave dipole

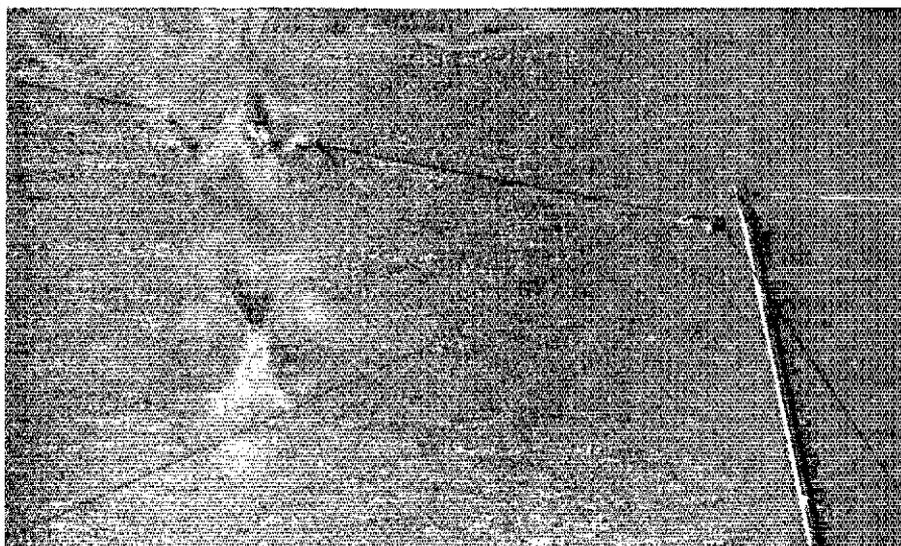


Fig 5—Supporting mast for a collinear phased array. The guy cable that pulls in the same direction as the antenna prevents the mast from bending backward when tension on the antenna is released.

that uses the same antenna wire and insulators that will be used in the construction of the collinear antenna. Connect a 50- or 75-Ω transmission line to the dipole, and raise the antenna into position. Good-quality transmission line is not necessary for this test; an old piece of RG-58 or RG-59 will work fine. A balun is not required either. Resonate the dipole by pruning equal amounts off each end for best SWR. Once the dipole is resonant, it can be lowered and measured to determine the correct length for the half-wavelength elements.

The second method for determining the proper element length is similar to the first, except that you'll need to build a full-wave dipole and then prune it for resonance at half of the desired center frequency. (You can only use this method if half of the desired center frequency falls in an amateur band.)

The first method is preferred if you are building a current-fed antenna, because the test dipole can be used as an element of the collinear array. The second is the preferred method when constructing a voltage-fed antenna, for the same reason. Once an electrical half wavelength has been determined, the radiating elements for the collinear antenna can be cut and assembled. A word of caution is in order here: The ends of the radiating elements are points of high voltage. If you intend to use high power (1 kW or more), large insulators, such as those shown in Fig 5, should be used. If large insulators aren't available, or if cost must be minimized, two smaller insulators in series can be substituted.

The Phasing Stubs

The quarter-wave phasing stubs can be



Fig 6—A coiled quarter-wave phasing stub constructed from no. 12 insulated copper wire.

constructed from almost any type of wire. If the antenna is to be fed with less than 100 W, 300-Ω TV twin lead can be used. If higher power levels are anticipated, no. 14-conductor, 1-inch spaced, balanced transmission line can be used. Wide-spaced line such as this can, however, be hard to resonate because of its low Q. It is also more expensive than no. 12 insulated copper wire.

The phasing stub shown in Fig 6 is constructed from no. 12 insulated-copper house wire: Two quarter-wavelength pieces of wire are twisted tightly together. No. 14 zip cord could also be used to make the phasing stubs. Figs 2 and 3 show the phasing stubs hanging straight down, but this is visually obtrusive. (To make the stubs even less noticeable, make them of wire with blue or clear insulation.) Because the stubs don't radiate, they can be coiled, as shown in Fig 6.³ This lowers their resonant frequency a bit, so coil them *before* pruning them to resonance.

To resonate the phasing stubs, an RF noise bridge is required. Any of the commonly available commercial units work fine for this.⁴ Connect the bridge's unknown input to the end of the phasing stub that will eventually connect to the radiating elements. Leave the other end of the stub open. An open quarter-wave transmission line behaves like a series resonant circuit. Follow the instructions that come with your bridge for finding the resonant frequency of a series resonant circuit. The actual resonant frequency should be lower than the calculated value. Prune each stub until it is resonant at the antenna's center frequency, and then attach it to the radiating elements. Solder together the wires at the other end of the stub.

Collinear phased arrays should be fed with balanced transmission line. At output power levels of 100 W or less, if the line length is not too great, 300-Ω TV twin lead can be used. TV twin lead is too lossy for long runs, though, and it can't handle high power. For runs of more than 1 λ and/or high-power applications, transmission line with no. 14 (or heavier) conductors should be used. If this is unavailable, or if cost is being kept to a minimum, a suitable transmission line can be made from two lengths of no. 12 or 14 copper wire. Keep the wires 1 inch apart with plastic-sheet or weatherproofed-wood spacers attached at 6-inch intervals along the length of the line.

If the antenna is current fed and has been designed and built correctly, the transmission-line SWR should be less than 3:1. The SWR on a voltage-fed antenna will be higher. With a short, low-loss transmission line, a high SWR can be tolerated. If, however, the line length is more than 1 λ and low-loss line isn't used, a matching stub may be required. Information on stub matching with transmission lines can be found in *The ARRL Antenna Book*.⁵

Because of the SWR-protected final amplifiers in today's solid-state, broadband rigs, antenna tuners are needed with most antennas—including collinear phased arrays—to present a suitable SWR to such radios. If you use a tuner that doesn't have a balanced-line output, connect the feed line to a 4:1 balun and run a short piece

of coax from the balun to the tuner. If a tuner is used, a collinear array can be used on bands other than the one that it is designed for, with some sacrifice in performance.

A Collinear-Phased Array in Action

I constructed my antenna for 21.225 MHz, the center of the 15-meter band. The antenna has four elements, is voltage fed through a home-brew L-network tuner, 50 feet of RG-213 coax, a 4:1 balun and 20 feet of open-wire transmission line. The antenna height is 30 feet, and the wire is oriented in a southwest/northeast direction. The major lobes point toward the middle of South America and Japan.

I tested the antenna during the 1988 CQ WPX SSB contest, in which I worked many stations in South America and Asia. Signal reports were quite good. After the contest, I had lengthy QSOs with several stations in South America and Japan, during which I received signal reports indicating that the collinear works about as well as a three-element triband Yagi. I also made some contacts with stations in Eastern Europe, Australia and New Zealand. Although signal levels off its ends are lower, the antenna is not totally useless in these directions.

With the aid of a tuner, my 15-meter collinear is useful on other bands. I used the antenna on 40 and 80 meters during the WPX contest, and I worked stations all over the US with my 100-W signal.

Conclusion

After constructing and using the 15-meter collinear antenna as described in this article, I have come to the conclusion that, for my needs, it is probably the best-

performing antenna for the money. Like many hams, when I first got started in ham radio I put up a multiband dipole and fed it through a tuner. Because of this exercise, two guyed masts, antenna wire, transmission line, a balun, a tuner and some insulators were already on hand. I borrowed an RF noise bridge, so the only parts I had to buy for this project were the wire for the phasing stubs and a few insulators. In total, I spent less than \$10—a lot less than I'd have to spend to put up a small Yagi!

Acknowledgment

I thank Dr Stephen I. Long, AC6T, for loaning me his RF noise bridge.

Douglas Fouts was first licensed at age 11 in 1968. He has held the calls WN6ZKU, WA6TDY, and KI6QR. Through Amateur Radio, he became interested in electronics, which has become his profession. Doug has worked for Burroughs Corp (now Unisys) as a design engineer, and is now a PhD candidate in Electrical and Computer Engineering at the University of California at Santa Barbara.

Notes

¹For more information on collinear-array theory, see G. L. Hall, ed, *The ARRL Antenna Book*, 15th edition (Newington: ARRL, 1988).

²See note 1 and J. Reh, "An Extended Double Zepp Antenna for 12 Meters," *QST*, Dec 1987, pp 25-27. Also see J. Reh, "Extended Double Zepp Calculations," *QST*, Aug 1988, p 51.

³At any point along the stub, most of the energy is concentrated close to and between the conductors. Therefore, coiling the stubs does not degrade their performance. See J. D. Kraus and K. R. Carver, *Electromagnetics*, 2nd edition (New York: McGraw-Hill, 1973), pp 520-521.

⁴Palomar Engineers, MFJ and Heathkit® all make RF noise bridges.

⁵See note 1, Chapters 26 and 28.



QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

The February issue of *QEX* includes:

- "A Low-Noise Preamp For Weather Satellite VISSR Reception," by H. Paul Shuch, N6TX. Paul describes a preamp that not only does a credible job receiving stretched VISSR signals on a 12-foot-diameter TVRO dish, but provides spectacular standard WEFAX reception using a dish made from a 2-foot-diameter snow sled!

- "RF Power FETs—Their Characteristics and Applications," Part 2, by H. O. Granberg, K7ES. With RF power FETs turning up in Amateur Radio circuits at an ever-increasing rate—make sure you don't fall behind the times. Learn about the advantages and disadvantages of modern power

MOSFETs (as compared to bipolar transistors) in this fact-filled article.

- In "Correspondence," Craig Carter, KA9OOP, tells how to build a simple, high-stability audio oscillator using a single quad op amp.

- "VHF + Technology," by Geoff Krauss, WA2GFP. This month: 432-MHz state of the art, and where's that good, old-fashioned VHF + er gumption?

- "Components" by Mark Forbes, KC9C. A scan of AMD's Am79C401 packet controller; Siemens' SAB82525 data controller; an Exar high-speed datacomm chip set; Ericsson/Rifa's PBL3726/19 telephone speech-circuit IC; a Silicon Systems DTMF transceiver; a digital audio converter IC from Crystal Semiconductor; US Sertek's PS/2 chip set; and an active 180° splitter from Anadigics.

QEX is edited by Paul Rinaldo, W4RI, and is published monthly. The special subscription rate for ARRL/AMSAT members is \$10 for 12 issues; for nonmembers, \$20. There are additional postage surcharges for mailing outside the US; write to Headquarters for details.

The 17-Meter Band—What Can We Expect?

The FCC has released the 17-meter band to US amateurs! Here're some characteristics of—and ways of getting active on—this interesting band.

By Doug DeMaw, W1FB
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On January 31, 1989, the FCC granted US amateurs of General, Advanced and Extra class access to the spectrum segment between 18.068 and 18.168 MHz (17 meters) on a shared, noninterference basis. What can we expect by way of propagation in the 18-MHz band? How does 17 meters compare to 15 and 20 meters? How elaborate an antenna do you need to maintain regular communications on 17 meters? These are the kinds of questions I

am asked at hamfests and on the air—the answers are given here.

Experiences on 17 Meters

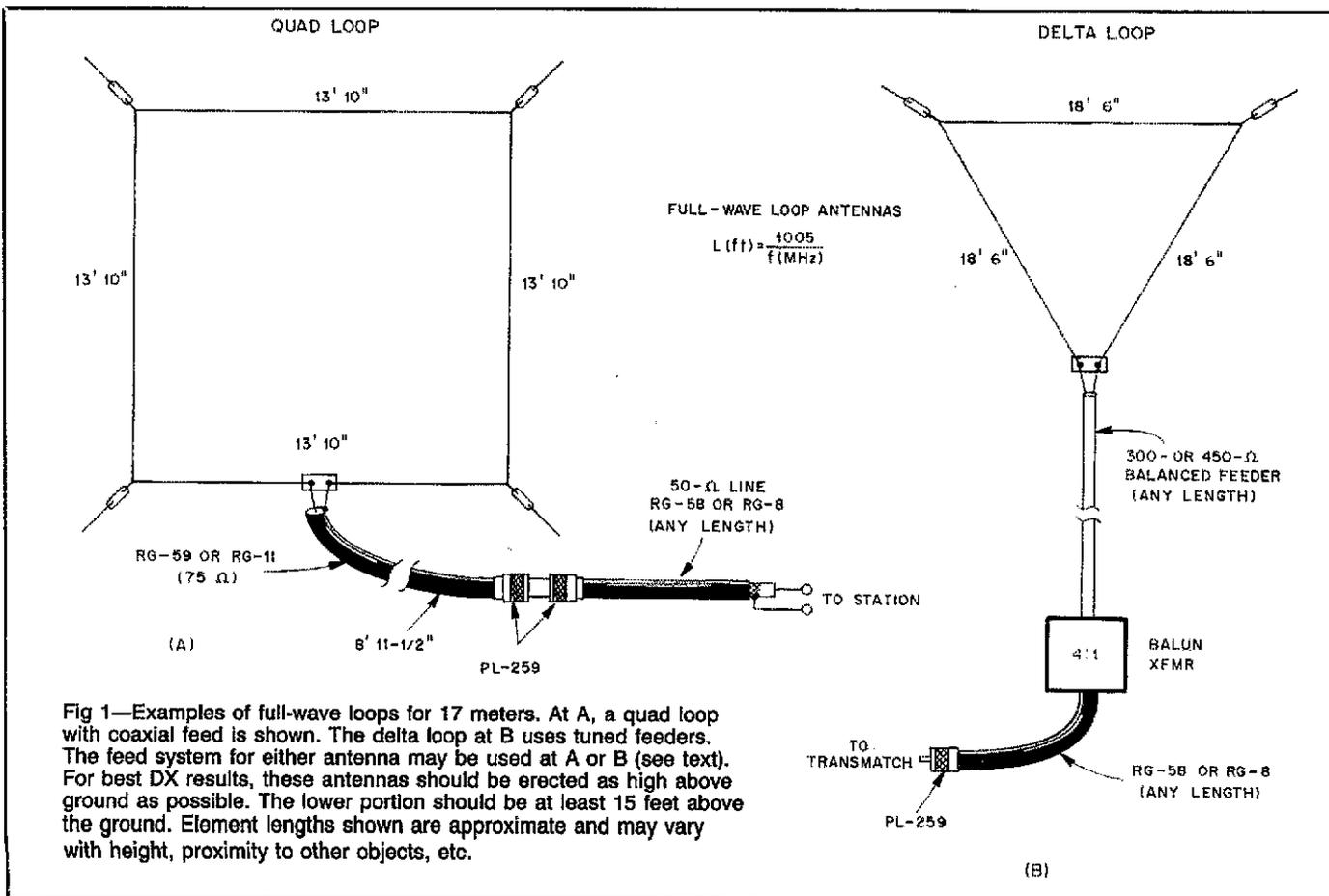
I held an experimental license (KM2XQV) during 1985 and 1986. The license permitted me to operate on the 18- and 24-MHz (17- and 12-meter) bands for the purpose of propagation study and antenna development. I shared the experimental work with Bill Orr, W6SAI (KM2XDW), Stu Cowan, W2LX (KM2XDU), Prose Walker, W4BW (KM2XKO) and Bob Haviland, W4MB (KM2XJM). We were assigned another frequency, 13.560 MHz, for coordination during our experiments. Regular schedules were kept on 18.111 MHz USB. If conditions were favorable for communications on 17 meters, we would move to 12 meters

(24.9 MHz) and run comparative tests.

Bill Orr is located in California, Prose Walker and Bob Haviland live in Florida and Stu Cowan operated from New York and New Hampshire during the tests. I live in the northwest corner of lower Michigan. This spread of locations was ideal for week-to-week propagation tests. Transmitter power-output levels ranged from 100 to 600 W, and various wire and directional gain antennas were used during our tests.

What Can You Expect of the 17-Meter Band?

Because 17 meters is between the 15- and 20-meter ham bands, it is logical to assume that 17-meter propagation is a mix of that found on 15 and 20 meters. Our experiences indicated that F-layer propagation was



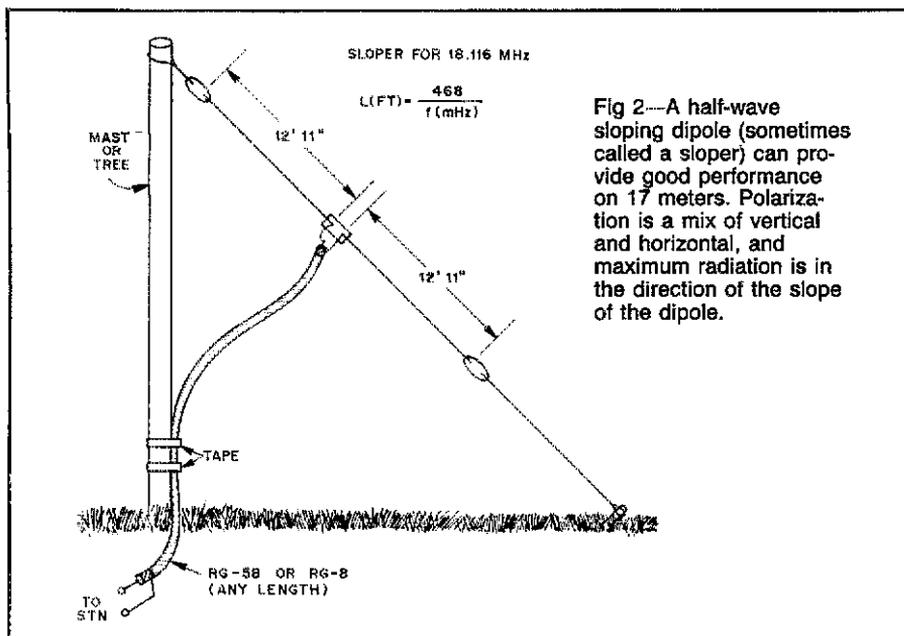


Fig 2—A half-wave sloping dipole (sometimes called a sloper) can provide good performance on 17 meters. Polarization is a mix of vertical and horizontal, and maximum radiation is in the direction of the slope of the dipole.

harmful interference to US government and foreign fixed-service operations). The band will become an exclusive amateur allocation on July 1, 1989.

17-Meter Antennas

One of the fortunate aspects of upper-HF-band propagation is that good results can be had with low power and modest antennas. Simple dipoles or ground-plane verticals will help you to get the job done with a 100-W rig. I have also found that good results are possible with an end-fed, random-length wire antenna on 17, 15, 12 and 10 meters. Results are not as great as those you could expect with a beam antenna, but solid communications are possible.

Fortunately, antennas for the 17-meter band are small and relatively easy to construct. A simple quad loop (erected vertically—see Fig 1A) can be made from wire and supported by trees. This type of antenna exhibits maximum directivity broadside to the loop. Only 55 feet of wire is required, overall, to make such an antenna—each side of the loop should be 13 feet, 10 inches long. If you prefer a triangular delta loop, each of the three sides will be 18 feet, 6 inches long. Fig 1B shows details for this type of simple antenna. You may feed it with a quarter-wave coaxial matching transformer, then use 50-Ω coaxial line (any length) from the transformer to the ham shack. The length of the RG-59 or RG-11 transformer is 8 feet, 11½ inches (this length was calculated based on a velocity factor of 0.66). The typical feed impedance of this full-wave loop is 100 to 115 Ω; hence the need for the step-down transformer when you use 50-Ω feed line for your station (RG-58 or RG-8).

Loop antennas work well with tuned feeders. Good results can be expected with 300-Ω TV line, 450-Ω ladder line, or homemade open-wire feeders. You can use a 4:1 balun transformer and Transmatch for converting the balanced line to unbalanced line where the feeder enters the ham shack. Alternatively, you may prefer to use the decoupling technique discussed in *QST* by Zack Lau, KH6CP.¹

Quad loops fed at a lower corner have vertical polarization and a fairly low radiation angle. Feeding a quad loop at the center of the upper or lower horizontal sections provides horizontal polarization and a slightly higher radiation angle. You may want to experiment along these lines in order to determine the best configuration for your 17-meter communications needs.

I prefer to use tuned feeders for my full-wave loops. This allows me to use the antenna on other frequencies above the design frequency. For example, my 80-meter loop works very well on 40, 30, 20, 17, 15, 12 and 10 meters. Furthermore, loops are low Q antennas, have greater bandwidths than dipoles, and are generally quieter receiving antennas. Loops are also less

dominant during our tests. We did not have the opportunity to examine short-range, point-to-point paths, owing to the large distances between our stations. Again, we can expect the ground-wave path on 17 meters to be a distance that compares closely with those on 15 and 20 meters.

Our use of simple antennas and moderate transmitter power indicate that DX communications on 17 meters should be very good. Certainly, a directional gain antenna at a suitable height will enable you to work anywhere in the world when conditions are good. Low-power communications, down to the QRP level (5 W output), should also be possible. In fact, PY2AMI operates a 5-W beacon on the 18-MHz band that is frequently heard in New England. See the sidebar, "Who's on 17 Meters?" for more information about what signals you'll likely find on the new band.

Undoubtedly, there will be times when 15

meters will not be open, or will have died out, but when the 17-meter band still permits communications. This phenomenon can be observed by comparing propagation on 10 and 15 meters, or 15 and 20 meters at certain times.

Frequency and Mode Allocations

The amateur frequency allocation on 17 meters is 18.068 to 18.168 MHz. General, Advanced and Extra class operators can use the entire band. Permitted emissions are: A1A (CW) on the entire band; F1B (digital modes such as RTTY and packet radio), 18.068 to 18.110 MHz (the three IARU regional band plans designate 18.100 to 18.110 MHz for RTTY and packet radio); analog emission types (telephony, television and facsimile), 18.110 to 18.168 MHz. The output-power limit on the band is 1500 W, and the allocation is presently secondary (that is, amateurs must avoid causing

Who's on 17 Meters?

The International Amateur Radio Union (IARU) member-societies of the following countries have notified the IARU International Secretariat of the availability of 17 meters for their use: Algeria, Andorra, Antigua & Barbuda, Argentina (18.073-18.0765, 18.0835-18.0895, 18.0965-18.1085, 18.1215-18.149 and 18.1515-18.1675), Australia (less 18.071-18.079, 18.101-18.109, 18.121-18.134, 18.141-18.149 and 18.156-18.164), Austria, Bahamas, Bahrain, Belgium, Botswana, Brazil[†], Brunei, Canada, China, Colombia, Costa Rica, Cyprus, Czechoslovakia, Denmark, Djibouti, Egypt, El Salvador, Faroe Islands, France, Gabon, German Democratic Republic, Federal Republic of Germany, Grenada, Honduras, India, Ireland, Israel, Italy, Kuwait, Liberia, Liechtenstein, Luxembourg, Malaysia, Mauritius, Monaco (less 18.103-18.116, 18.129, 18.135 and 18.165), Netherlands, Netherlands Antilles, New Zealand, Nigeria, Norway, Oman, Panama, Papua New Guinea, Peru, Portugal, San Marino, Senegal, Sierra Leone, Singapore, South Africa, Sri Lanka, Sweden, Switzerland, Syria, Tonga, Trinidad & Tobago, Turkey, United Kingdom, USA, Vanuatu, Yugoslavia, and Zambia.

[†]PY2AMI operates a beacon near 18.100 MHz. This beacon runs 5 W to a groundplane antenna.

¹Notes appear on p 52.
(continued on page 52)

Amplifier Cool-Down Circuits

Pamper your expensive transmitting tubes with one of these weekend projects.

By Mark Mandelkern, KN5S
5259 Singer Road
Las Cruces, NM 88005

Large transmitting tubes are expensive, and there are no signs that their prices are coming down! Many builders feel that for longest tube life, cooling airflow should be continued for a few minutes after voltage is removed from the amplifier-tube filaments or heaters. This is especially important immediately after a prolonged transmitting period. Here are three circuits that provide a tube cool-down period. The first is a simple manual circuit I've used in several amplifiers over the last 20 years. The other two are automatic circuits I've used to replace the manual one, just for fun; they've been operating well for over a year. The automatic circuits shut off the blowers just as I'm going out the shack door.

The manual cool-down circuit is shown in Fig 1A. When S1 is set to OPERATE, both the filaments/heaters and blower are on. When the switch is set to COOL, only the blower runs. Although the circuit looks simple, it's really the most sophisticated of the three circuits. Its essential element is a human brain (not shown in the diagram), which must remember to switch S1 to COOL, and then to OFF a few minutes later. After so many years, I got tired of this approach. It's especially inconvenient if, as I do, you like to chat right to the last millisecond before dashing off to work.

The second circuit is shown in Fig 1B. It uses a thermostatically operated vacuum-delay relay that I got at a flea market. I designed the circuit according to the following specification: The circuit should be entirely add-on, and not require breaking the supply current path for the blower in normal operation (that would reduce the reliability of the cooling-air supply). This requires that relay contacts must not carry blower-motor current, except during the cool-down period. This way, a bad relay, bad contacts or any other cool-down circuit failure will not prevent normal blower operation. In addition, the circuit draws no current after the cool-down period is completed.

The circuit shown in Fig 1B operates as follows: When the switch is in the OPERATE position, the filament/heater transformer and blower each receive line current

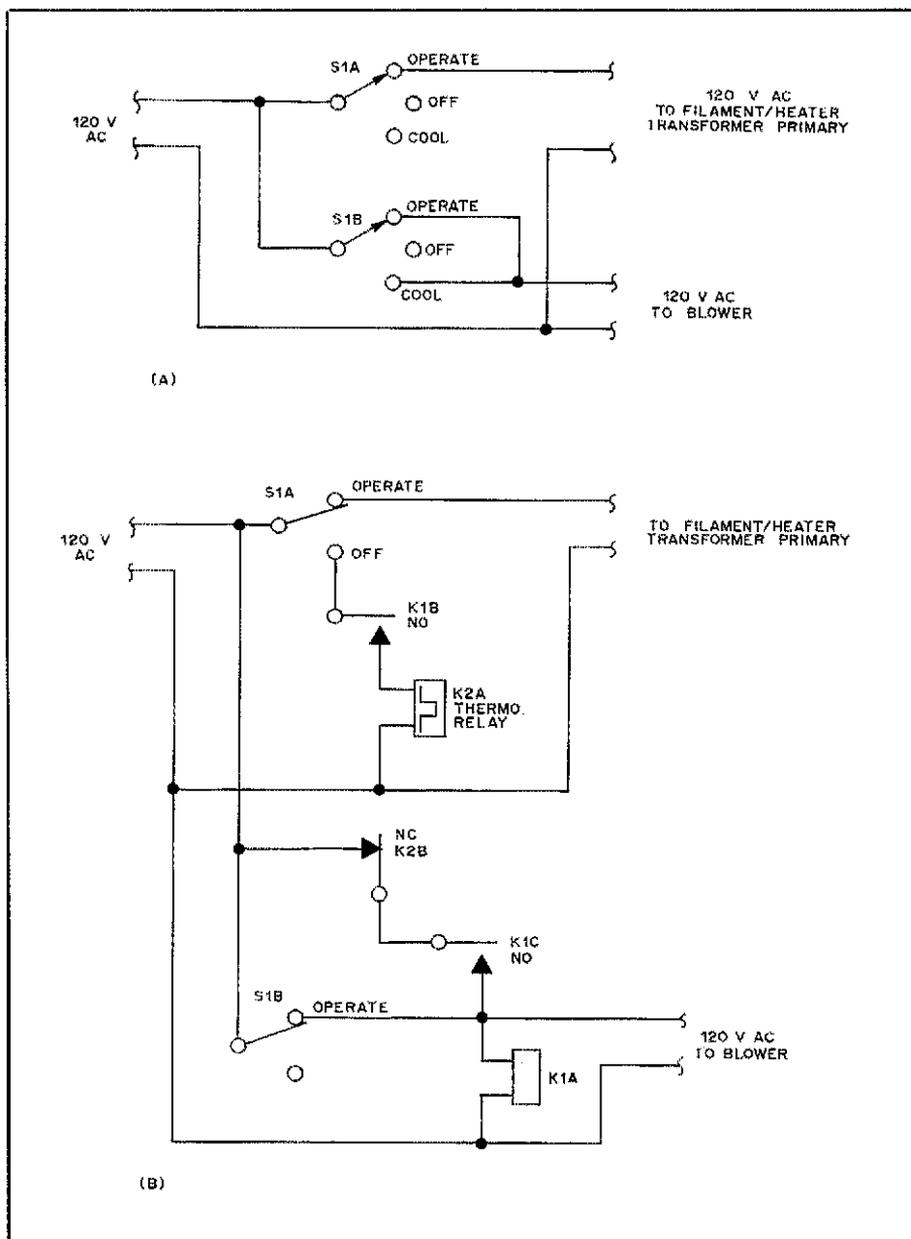


Fig 1—At A, a circuit for manually delaying the removal of blower airflow from an amplifier after filament/heater voltage has been removed. At B, a delay relay regulates the cool-down period and shuts off the blower after a fixed delay.

K1—DPST relay, 120-V ac coil.
K2—Delay relay (Amperite type 115C120;
normally closed, 120-second delay).

Allied Electronics stock number
711-1613.
S1—DPDT switch.

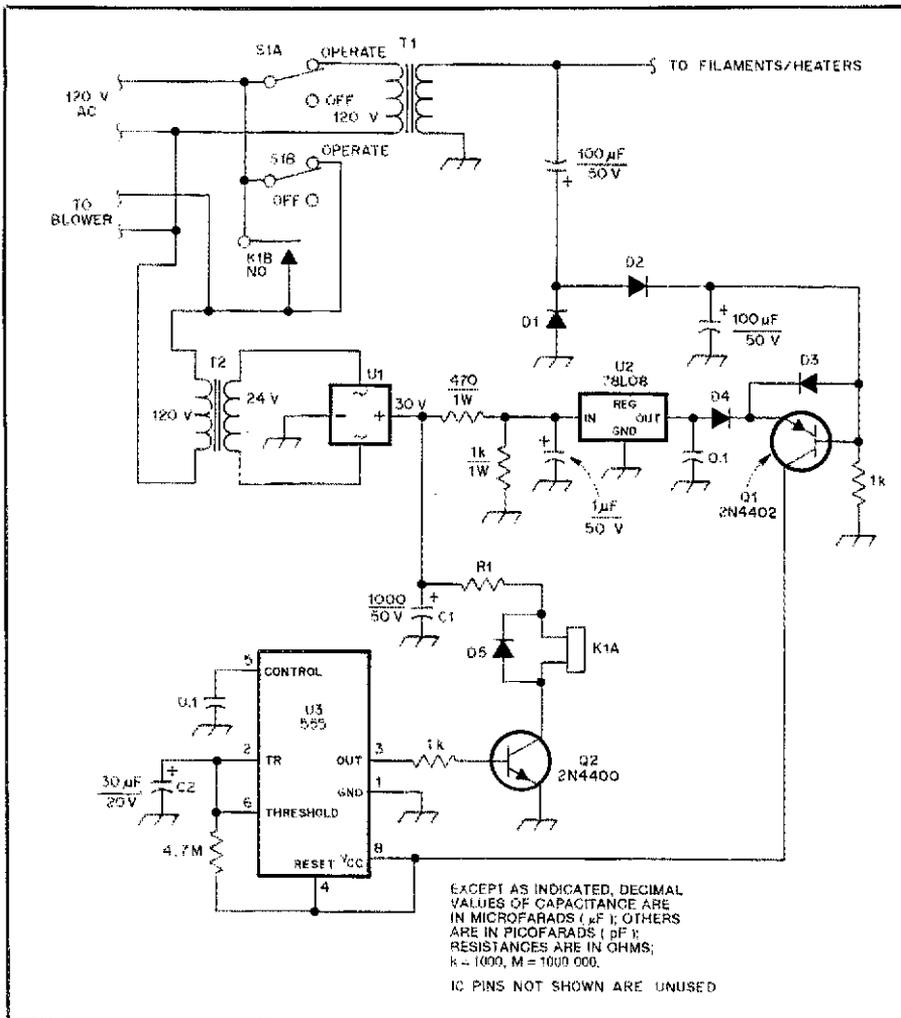


Fig 2—IC-timer cool-down-delay circuit.

- D1-D4—1N4003.
D5—1N4148.
K1—24-V-dc coil relay (All Electronics no. 4PRLY-24N, socket no. PRLY-SC).
R1—Select to obtain proper coil voltage.
S1—DPST toggle.

- T1—Amplifier filament/heater transformer.
T2—120-V primary, 24-V, 0.5-A secondary.
U1—Bridge rectifier, 1 A, 200 V.
U2—78L08 regulator (Digi-Key stock number AN78L08).
U3—555 timer.

through S1, and K1 is energized. When the amplifier is turned off, ac is removed from the filament/heater transformer, but K1 remains energized through delay relay K2's contacts (K2B) and K1C. The blower is powered through the same circuit. When S1 is switched to the OFF position, K2's heater is energized through S1A and K1B. When K2 has completed its delay period, its contacts open, K1 drops out, the blower stops and ac is removed from K2. I had to place a small resistance in series with the delay relay heater to bring the warm-up time up to the rated two minutes. (Maybe that's why I got it for only a dime at the flea market!)

Because I had only one delay relay, and because new delay relays cost hundreds of dimes, I used an IC timer in the cool-down delay circuit shown in Fig 2. This circuit is a bit more complicated, but was fun to build. The circuit has the same add-on safety feature as the one in Fig 1B. An

additional feature is that the relay is not energized during normal operation—only during cool-down periods.

The circuit in Fig 2 functions as follows: The 555 timer (U3) is used in a variation of the monostable mode, which provides one positive pulse immediately after IC turn-on.¹ When the amplifier's filament/heater circuit is turned on, the 30-V dc power supply comes on also. The presence of filament/heater voltage keeps supply voltage from reaching U3. When power is removed from the filaments/heaters, the supply voltage is applied to U3, and the timing period begins.

The supply voltage for U3 is switched by Q1. When S1 is in the OPERATE position, current derived from a rectifier doubler on

¹H. Berlin, *The 555 Timer Applications Sourcebook* (Indianapolis: Howard Sams Co, 1976), p 20, Fig 2-7 (A).

Table 1

Component Suppliers

Allied Electronics
401 E 8th St
Fort Worth, TX 76102
tel 800-433-5700

All Electronics
Box 587
Van Nuys, CA 91408
tel 800-256-5432; in California,
800-258-6666

Circuit Specialists
Box 3047
Scottsdale, AZ 85257
tel 800-966-0764

Digi-Key Corp
Box 677
Thief River Falls, MN 56701
tel 800-344-4539

the filament/heater line biases Q1 off. As S1 is set to the OFF position, there is actually a split second when ac is removed from the blower and T2. During this time, C1 supplies plenty of current to turn on the timer chip, Q2 and K1. This energizes the blower and T2, so the relay is held in. After timing capacitor C2 charges to the threshold level, the timer output goes low, and the relay opens. Power is then removed from the blower and T2. I chose C2 to yield a two-minute cool-down period. C2 should be a low-leakage tantalum or electrolytic unit.

Parts for these circuits are available from the suppliers listed in Table 1. In lieu of the handy little 78L08 regulator, a 78M08, 7808 or an adjustable regulator configured for an 8-V output may be used.

Maybe you'll start with the manual (Fig 1A) circuit to cool down your amplifier, but I hope it doesn't take you 20 years before you try the others!

Strays



I would like to get in touch with...

anyone who has conversion data for a TBX-6 WWII receiver/transmitter built by General Electrics for the Navy. Steve Kiraly, WA2O, 51 Ramon Blvd, Freehold, NJ 07728, tel 201-462-2705.

anyone with a schematic for a Dumont model 304-A oscilloscope. Paul Kemp, 3104 N Delaware, Independence, MO 64050-1111.

Alinco DJ-100T Hand-Held 2-Meter FM Transceiver

Reviewed by Glen E. Norton, KC1MM

The DJ-100T represents Alinco Electronics' entry into the world of miniature hand-held transceivers, and offers many of the features hams have come to expect in VHF hand-held rigs. Weighing in at a hair over half a pound, the DJ-100T is plenty of radio packed into an attractive and compact package—with a price tag that's in the same range as those of most transceivers in its size/performance class. The DJ-100T is supported by a modest complement of accessories (discussed later) that meet the operating needs of the average hand-held-radio user.

The DJ-100T's standard features include 10 dual-function memories (discussed later), a dual-tone multifrequency (DTMF) pad, a programmable subaudible tone encoder, and switchable high/low power output. The standard battery pack (EBP-9NA) provides 2.5 watts of RF output (450 mW in the low-power mode), and has a built-in dc-to-dc converter that allows easy mobile operation. Other features include a backlit liquid-crystal display (LCD), a battery save function and a call channel that provides instant access to your favorite repeater or simplex frequency.

Familiarization

Becoming familiar with the DJ-100T is a fairly easy task, requiring only a small investment in time. Most of the controls are self-explanatory and straightforward. The brief instruction manual included with the rig does an adequate job of describing the operation of the rig, but no schematic or block diagrams are provided for reference.

The DJ-100T's frequency coverage is 144.000 to 147.995 MHz, in 5-kHz steps. The rig's LCD provides a four-digit frequency readout (digits for 10 MHz, 1 MHz, 100 kHz and 10 kHz), as well as a 5-kHz indicator. In addition, the LCD provides the following indicators: memory number, relative signal strength/RF output level, frequency lock, offset (+, -, or none) and a segment indicating call-channel operation. Although the display measures only 3/4 × 3/8 inch, I found it easy to read (even in direct sunlight) and quite appealing to the eye. Lamps located behind the LCD provide more than adequate display lighting during night operation.

After choosing one of the 10 memories, selecting the operating frequency is a simple matter of setting the four right-most digits of the desired frequency. This is accomplished via two frequency step keys (UP and DOWN) which, when used separately or in combination with one or two other

keys, either increases or decreases the frequency in 1-MHz, 100-kHz, 10-kHz or 5-kHz steps. Because control labeling is minimal, it is easy to confuse the key sequences required to change frequency, but I found this to be only a minor inconvenience. Once the proper offset is chosen (± 600 kHz or simplex), the contents of the memory or VFO can be locked to prevent accidental alteration. Repeatedly pressing the MEMO button sequentially steps through each of the memories, and holding this button down executes a quasi-memory scan.

The DJ-100T has a battery-save function that keeps power consumption minimal during periods of inactivity. To do this, the DJ-100T turns off many of its functions for 0.7 to 0.8 seconds during each second. If the rig detects activity on the receiving frequency, it enables all functions. There are no signs visible to the operator that this function is working—it just silently extends battery life.

In one respect, the DJ-100T has a rather unusual means of operation. Each of the ten memories can also function as a VFO. If you want a memory to hold the frequency and offset of a repeater that you use a lot, you can lock the contents of the memory after loading. (This is done by holding the function key and pressing the CALL key at the same time.

Unlocking the memory is done the same way.) If, however, you don't use a particular frequency often, you can elect to keep the memory unlocked. In the latter case, you can change the frequency and/or offset stored in the memory at will. If you should do this and then step through the memories until you reach the same one, the frequency and offset information will be the same as

they were when you tuned away. It is possible to lock all the memories, in which case you'd need to unlock a memory before you could use it as a VFO.

Operation

Once familiar with the use of the various operating controls, I found operation of the DJ-100T to be, for the most part, effortless. Because of the radio's small size, though, I found both the DTMF pad and the 7-position DIP switch used to program the continuous tone-coded squelch system (CTCSS) tones to be a bit difficult to manipulate, even with my average-sized, nimble fingers. Most of the controls are fairly easy to use, however, despite the compactness of the transceiver.

Being used to a full-sized (ie, larger) hand-held rig, I initially found the DJ-100T to be a bit awkward to handle. I soon adjusted to the rig's scaled-down dimensions, however, and came to appreciate its lightweight design. The transceiver is well balanced, fits nicely in the palm of the hand, and is equally comfortable in either hand. All the radio's features worked fine, and I found no unpleasant surprises or drawbacks in the design. The standard battery pack provided an acceptable span of operation between charges, and held its charge even during extended periods of inactivity. One shortcoming of the DJ-100T is the lack of a battery charge indicator.

One feature I found particularly useful is the CALL button. When pressed, this button causes the DJ-100T to toggle back and forth between the current memory and memory 0. This allows you to monitor a second frequency without stepping through each of the memories. The DJ-100T also provides the ability to monitor the input frequency of a repeater input/output pair at the touch of the SHIFT button.

In performance, the DJ-100T seems to hold its own quite nicely. Reports from hams familiar with my voice (both on the air and in person) indicate that the signal quality of the DJ-100T is comparable to that of my own hand-held rig. In fact, most times there was no perceivable difference in performance. On the receiving end, however, things were somewhat different. I found the audio quality of the DJ-100T to be too tinny for my liking, and the radio's limited distortion-free audio output made mobile operation quite inconvenient. An external speaker hookup is possible.

Accessories

Alinco makes four battery packs designed to accommodate most operating



Table 1

Alinco Electronics DJ-100T 2-meter FM Transceiver, serial no. 0000606

Manufacturer's Claimed Specifications

Frequency coverage: 144 to 147.995 MHz.

Mode of operation: FM.

Frequency display: not specified.

Frequency resolution: 5 kHz.

Frequency accuracy: not specified.

Power requirements: squelched, 42 mA; maximum audio output, 98 mA; transmit high power, 750 mA; transmit low power, 350 mA.

Transmitter

Power output: low, approx. 450 mW; high, 2.5 W (with EBP-7NAZ or EBP-9NA battery packs).

Spurious signal and harmonic suppression: better than 70 dB.

Receiver

Type: dual conversion; first IF, 21.6 MHz; second IF, 455 kHz.

Receiver sensitivity: better than 0.25 μ V for 12-dB SINAD.

Squeech sensitivity: not specified.

Receiver audio output: more than 200 mW at 10% distortion (8- Ω load).

Color: black.

Size (H x W x D): 6.625 x 2.375 x 1.19 inches with FNB-10 battery pack.

Weight: 0.55 lb.

Measured in ARRL Lab

As specified.

As specified.

4-digit LCD, black digits on light gray background.

As specified.

Indicated frequency, 146.000 MHz; measured frequency, 146.0000 MHz.

Squelched, 35 mA; maximum audio output, 102 mA; transmit high power, 790 mA; transmit low power, 380 mA.

Transmitter Dynamic Testing

Low, 480 mW; high, 2.5 W.

See Fig 1.

Receiver Dynamic Testing

As specified.

0.26 μ V for 12-dB SINAD.

0.42 μ V for 20-dB quieting.

0.22 μ V (not adjustable).

228 mW at 10% total harmonic distortion (THD) with an 8- Ω load.

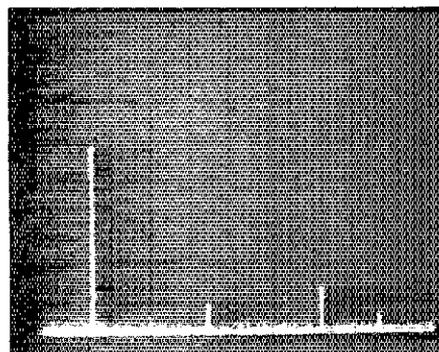


Fig 1—Worst-case spectral display of the Alinco DJ-100T. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. Output power is approximately 2.5 W at 146 MHz. The fundamental has been reduced by approximately 32 dB by means of notch cavities to prevent spectrum-analyzer overload. All harmonics and spurious emissions are at least 66 dB below peak fundamental output (-66 dBc). The DJ-100T complies with current FCC specifications for spectral purity.

Please clearly identify the item you wish to bid on, using the manufacturer's name, model number, or other identification number if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by the successful bidder, FOB Newington. The successful bidder will be advised by mail of the successful bid. No other notifications will be made, and no information will be given by telephone to anyone regarding final price or identity of the successful bidder.

Please send your bids to Kathy McGrath, Product Bids, ARRL, 225 Main St, Newington, CT 06111.

GLB Netlink 220 220-MHz high-speed data transceiver, s/n 10. Minimum bid \$440.

GLB Netlink 220 220-MHz high-speed data transceiver, s/n 11. Minimum bid \$440.

ICOM IC-228H 2-meter FM mobile transceiver, s/n 671-001094 (see Product Review, Jan 1989 QST). Minimum bid \$320.

Kenwood TM-721A 144 and 440-MHz mobile transceiver, s/n 9042797, and Kenwood RC-10 remote controller, s/n 8120059, sold as a package only (see Product Review, Feb 1989 QST). Minimum bid \$517.

New Products

GENERAL CLASS LICENSE COURSE

Radio Shack® stores now carry a General Class license preparation course published by Master Publishing, Inc. The course includes exam questions and answers, two Morse code tapes designed to help you increase your CW speed from 5 to 13 WPM, explanations of correct test answers, study hints, an FCC Form 610 and an ARRL membership application. The course was prepared by Gordon West, WB6NOA. Price: \$19.95.—Rus Healy, NJ2L

needs. Depending on the battery used, the DJ-100T provides maximum RF output of 2.5, 4.5, or 6.5 W. All but the battery that allows 4.5-W operation include a built-in dc-to-dc converter. When used with the compact battery pack that gives 4.5-W operation, the DJ-100T truly becomes a "shirt-pocket" rig. Most other common hand-held transceiver accessories are also available for the DJ-100T: wall chargers, speaker/microphone, earphone/microphone, cigarette-lighter plug (with and without line filtering), dry cell case and a soft carrying case. The rig comes with the EBP-9NA battery pack, a "rubber duck" antenna, a wall charger, a belt clip and a wrist strap.

Conclusions

In my opinion, Alinco Electronics has done an adequate job of designing and manufacturing the DJ-100T. My main concern with the DJ-100T is durability. Although the transceiver appears to be fairly sturdy, I wouldn't expect the battery pack supplied with the rig to withstand much of an impact. The DJ-100T should, however, stand up fairly well to everyday wear and tear.

The restriction of allowing only a \pm 600-kHz offset and frequency coverage limited to the ham band may cause some

hams to look to other manufacturers to provide the answer to their hand-held-transceiver needs. Also, the lack of any indication as to the amount of remaining charge in the battery can be an inconvenience. Even without these features, I received a great amount of operating pleasure from the DJ-100T.

Price class: \$299. Manufacturer: Alinco Electronics, 20705 S Western Ave, Suite 104, Torrance, CA 90501, tel 213-618-8616.

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment "off-the-shelf" from Amateur Radio dealers. ARRL receives no remuneration for items presented in the Product Review or New Products columns.—Ed.]

The following ARRL-purchased Product Review equipment is for sale to the highest bidder. Prices quoted are minimum acceptable bids and reflect a discount from the purchase price.

Sealed bids must be submitted by mail and be postmarked on or before March 27, 1989. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

A BREATH-ACTUATED KEY

□ When several of us learned the code at about the age of 11, we sent to each other for practice in several ways: saying "dit dah," blowing between our fingers like a Bronx cheer, or blowing on a piece of grass held between our thumbs. Then, when I was at the University of Chicago in the late 1930s, it occurred to me again how rapid and accurate the tongue is when compared with fingers at the straight key—so I made a breath-actuated key out of a cylindrical tube shield with a rubber membrane stretched across one end. Contacts cemented to the rubber did the electrical work.

For over 50 years, I've used an improved version that's based on a varnished mailing tube (Fig 1). To use it, just blow the whispered equivalent of "dit dah" into the open end of the tube; you needn't hum a tone!—*Julian S. Lorenz, MD, KE6VL, PO Box 1765, Chico, CA 95927*

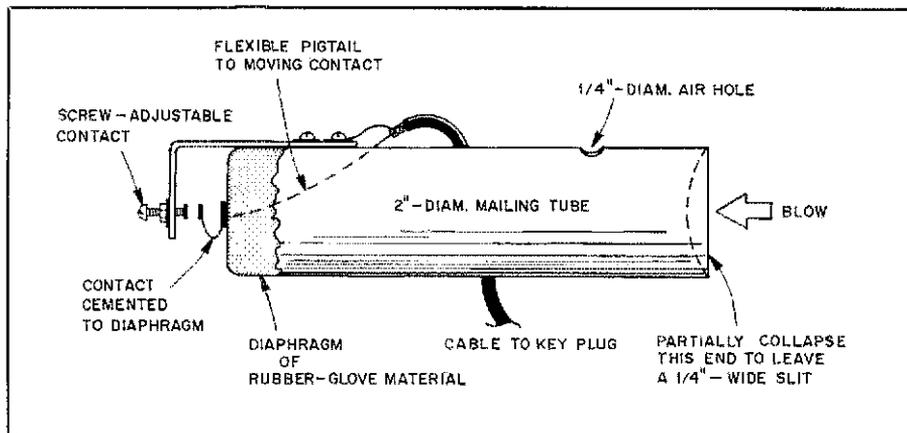


Fig 1—Julian Lorenz sends crisp code with this breath-actuated key. The cable can be fastened to the tube with tape; the KE6VL version uses a screw, washer and bolt for cable strain relief. Although this gadget may rival an acoustic phone DX contest (see next item) as a radio-club fun generator, it's far more than a novelty: Handicapped hams have been using such "Huff and Puff" keyers for years.

RADIOLESS RADIO FOR CLUB-NIGHT FUN†

□ A contest inertia problem always nettled Bud Frohardt, W9DY, president of the Radio Amateur Megacycle Society. Take ARRL's Field Day, for example. The club's dozen or so operators each naturally required a half hour, more or less, to limber up and get contest exchanges rolling smoothly. This was especially true if any exchange specifications differed from the previous year's routine. Clearly, this warm-up hesitation subtracted from the overall results.

Bud mulled over remedial measures for a while, then had each member bring a pencil to a pre-FD RAMS meeting where prepared sample contest log sheets awaited. The pages carried sample exchange info for initial reference, as well as assigned call signs. For an added fillip, W9DY selected juicy calls—SY1MA, AC4YN, YK1AA, etc. A chance to be rare DX! When the gang had their pencils and paper ready, Bud hollered "Go!" and the fun began.

Slowly at first; the guys were a little self-conscious opening up, talking to themselves as it were. Then "SY1MA" and "AC4YN" called short CQs, and the fight was on. Bedlam! Cupped hands beamed audio all over the hall, QSOs began adding up and 20 never sounded so grand.

After a riotous twenty minutes, W9DY silenced the battle. By then, RAMS not only

had the Field Day exchange down pat, but they had also established to the satisfactory enlightenment of everyone the minimum station identification tolerated by FCC in such activities. *This* is important. A later tape playback added to the fun. Member Jim Moss, WB9AJZ, it was ascertained, won this impromptu DX test by working every other "station" and a dupe besides.

Parker Brothers probably could do up a fancy package for this little gig, but all you really need are pencils, scratch paper and a little lung power. When the bands drop dead, folks, don't fidget, fret and fume. Call a club meeting and go all-audio, even oral telegraphy if you like. Instant pile-up, and any number can play.—*Rod Newkirk, W9BRD, 7862B W Lawrence Ave, Norridge, IL 60656*

ON BURYING COAXIAL CABLE

□ Buried feed line is aesthetically pleasing because it's invisible! If you're like me, however, the possibility of coax contamination or damage by soil, water ingress and frost is sobering. What to do?

In my installation, I first buried PVC tubing to act as a conduit for my feed line and rotator-control cable. I used black, 1½-inch-OD tubing purchased from a local plumbing supply shop; it comes in 25-ft rolls and is very flexible, but not flexible enough to collapse during burial.

Once the tubing was in place in the ground, I fed a length of Copperweld™ copper-clad-steel wire through it as a "fish" wire. Next, I secured one end of my rotator-control and feed lines to the fish

wire and pulled them through the plastic tubing.

This simple and relatively inexpensive procedure has enabled me to enjoy years of worry-free service from my cable assemblies.—*Edward Peter Swynar, VE3CUI, 48 Evergreen Dr, Whitby, ON L1N 6N6*

NOISE-SUPPRESSION AND BRAKE-CONTROL MODIFICATIONS FOR THE HY-GAIN HDR 300 ANTENNA ROTATOR

□ After installing my Hy-Gain® HDR 300 rotator, I observed that a new noise source had appeared on 6 meters. I traced the noise to the HDR 300: The noise emanated from the ribbon cable associated with the rotator's multiplexed LED display! I solved this problem by wrapping aluminum foil around the ribbon cable and wrapping bare wire around the foil. After taping the foil-wire sleeve in place and dressing it to keep it out of contact with other HDR 300 wiring, I grounded the sleeve wire to common on both of the HDR 300's PC boards. RFI problem solved!

The second HDR 300 problem I solved was one of my own doing: Sometimes, I left the brake off with the rotator turned on. Because my antenna stack is large enough to windmill in a strong wind, I worried that damage might occur if I left it unbraked. This problem can be solved as follows:

Replace the HDR 300's stock SPDT RIGHT/LEFT switch with a 3PDT, center-off unit. Wire this switch as shown in Fig 2. One of the additional two poles goes

†Reprinted from *Hows DX?*, QST, Jul 1973, pp 106-110.

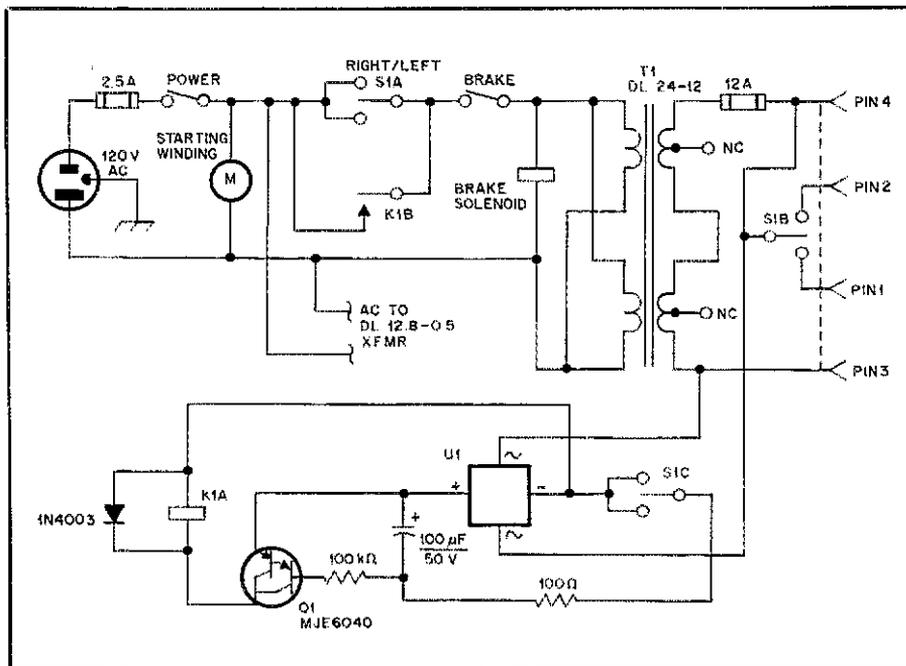


Fig 2—Delayed automatic braking for the Hy-Gain HDR 300 rotator. T1 is shown wired for 120 V ac. K1 is a 28-V dc relay; S1 is a 3PDT, center-off toggle rated for 120 V ac service; U1 is a 4 A, 100-PIV bridge rectifier. Resistors are 1/2-W carbon film.

between the HDR 300's POWER and BRAKE switches; the third pole serves as part of added brake-control circuitry (also shown in Fig 2).

Whenever S1 (RIGHT/LEFT) is thrown and the rotator BRAKE switch is on, the voltage at the secondary of T1 is rectified, charging the 100-µF capacitor and turning on Q1. Q1 actuates K1. When S1 is released, the rotating motor stops and the path between U1 and Q1's base circuitry is cut by S1C. Q1, K1 and the rotator brake solenoid stay on, however, because of the charge remaining on the 100-µF capacitor. When the capacitor discharges sufficiently through the 100-kΩ resistor to turn off Q1, K1A opens, cutting ac mains current to the brake solenoid and engaging the brake.

With the RC values shown in Fig 2, the delay between opening the RIGHT/LEFT or BRAKE switch and engagement of the brake is about 7 seconds. This allows the rotating antenna stack to coast to a stop before the brake engages.—Paul D'Anneo, K6UZK, 6126 Ocean View Dr, Oakland, CA 94618

H & K INTERACTION: SOLDERING TO STAINLESS STEEL

In "Soldering to Stainless Steel—Almost," *QST*, March 1988, Edson B. Snow, W2UN, described a method of welding a brass patch (eminently solderable) to stainless steel (difficult to solder). In response to this, readers write:

□ I've been soldering to stainless steel for over 20 years, achieving structurally sound joints that compare favorably with joints

in iron or brass. There's no trick to it. At one time, I used a special paste flux, but now I use ordinary zinc chloride/hydrochloric acid liquid flux, available at hardware stores. Bar solder (40% tin, 60% lead) or rosin-core wire solder works well.

The metals to be soldered to *must* be clean. Tin each piece separately, then clamp or otherwise hold the pieces together. Next, heat the work and flow solder into the joint.

For joining thick pieces of stainless-steel at right angles, I clamp them securely into position (*after* tinning), *carefully* preheat the parts with a propane torch (taking care not to discolor the metal) and finish the job with a large soldering iron. This method allows me to pile up enough solder to form fillets that greatly strengthen the joint.

—Ed Nickerson, K4EBF, 610 N Yachtsman Dr, Sanibel, FL 33957

□ Ed Snow's H & K note on soldering stainless steel prompted me to look up the solders I've been using. *Stay-bright*[™] (manufactured by the J. W. Harris Co, Inc) or Kester[®] "Sil-Strong" (4% silver, 96% tin) solder will do an excellent job on stainless steel and many other metals. "Sil-Strong" melts at 430 °F and can be applied with a regular soldering iron; it's also claimed to be five times stronger than regular tin-lead solder—a statement that, according to my experience, seems to be true.

I found both products at my local hardware store. They're more expensive than regular soft solders, but since they do the job, they're worth the price.—Bill Corse, K3YSL, PO Box 125, New Freedom, PA 17349

□ Fabricators of kitchen equipment find stainless steel to be one of the easiest metals to solder. The secret is to use the proper flux. A number of such fluxes are available on the market, and these can be obtained at sheet-metal supply houses. I use Lloyd's stainless-steel flux, which is manufactured by the Johnson Mfg Co, Princeton, IA 52768. (Although my name is Lloyd, I have no connection with this company.) I've had no problems with corrosion of the soldered joints; just be sure to rinse or wipe the work clean with a damp rag when finished.—Lloyd Franklin, W9WUR, 8006 S Kirkland Ave, Chicago, IL 60652

KEEPING TRACK OF SCRAP WIRE LENGTHS

□ By winding moderate lengths of wire on an 8-inch-diam form, it is easy to know the approximately total length of the wire (in feet) just by counting the number of turns and multiplying by 2. (Each turn is slightly longer than 2 ft, because the circumference of a circle is equal to π [about 3.1416] multiplied by the circle's diameter.) I do this before putting wire away for storage in the junk box by using an 8-inch kitchen pot as a temporary coil form.—James A. Herb, W3SHP, 23 E Pine St, Selinsgrove, PA 17870

A TWO-BAND LOOP FOR 30 AND 40 METERS

□ After trying to find a way to place a 30-m delta loop inside an existing 40-m loop, I remembered an article in *All About Cubical Quad Antennas*¹ describing a

¹W. Orr and S. Cowan, *All About Cubical Quad Antennas* (Wilton, CT: Radio Publications, 1970).

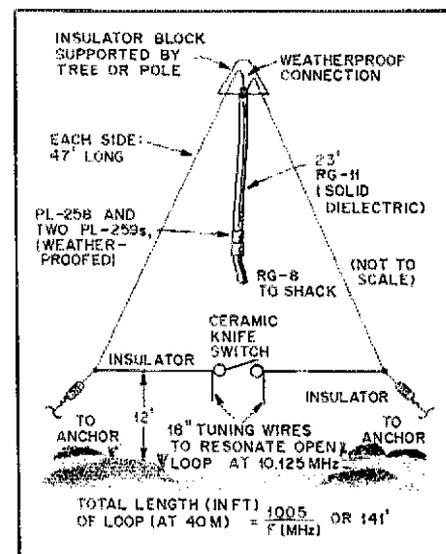


Fig 3—Jim Brenner's 30- and 40-meter loop. Note the 18-inch tuning wires used to lower the antenna's 30-m resonance from 10.5 to 10.125 MHz. The antenna is top-fed via a 1/4-λ 40-m matching section. See text.

$1\frac{1}{2}\lambda$, or "Mini X-Q," loop. The gain of this antenna was said to be about 1 dB more than a 1λ loop. I installed a large, ceramic SPST knife switch in the center of the delta-loop's bottom leg (see Fig 3). With this switch open, the full-wave, 40-m loop becomes a $1\frac{1}{2}\lambda$, 30-m loop! The resonant frequency of this arrangement was 10.5 MHz. By adding 18-inch wires to the loop at both sides of the switch, I obtained resonance at 10.125 MHz.

Since the bottom of the loop is only 12 ft above ground, it's a simple matter to reach the band switch from ground level. (Caution: High RF voltage appears at the switch when the antenna is used for transmitting on 30 m.) Incidentally, the loop also works well on 15 m (SWR under 2:1 across the band) when set for 40 m, and I have used the 30-m configuration successfully on 80 m with the help of an antenna tuner.—*James Brenner, NT4B, 5690 SW 36th Ave, Ocala, FL 31674*

A SOURCE OF SHIELDING MATERIAL FOR RF PROJECTS

□ I discovered a source of sheet-brass scrap on a recent visit to a local automobile radiator repair/rebuild shop. The sheet brass used at such shops is semisoft and is an excellent material—and very cheap at scrap prices of less than a dollar per pound—for use in building RF-tight boxes. A \$5 selection allowed the fabrication of several small boxes for VHF converters and preamplifiers with hand tools and a soldering iron. This material is vastly cheaper than the copper tooling material I've previously used for this purpose.—*Larry Kayser, WA3ZLA, PO Box 6, Alplaus, NY 12008*

AN EASY FOOT SWITCH

□ An inexpensive PTT switch can be built quickly from a plastic cassette case and a microswitch, as shown in Fig 4. Wire the switch first. Next, file a notch in the side

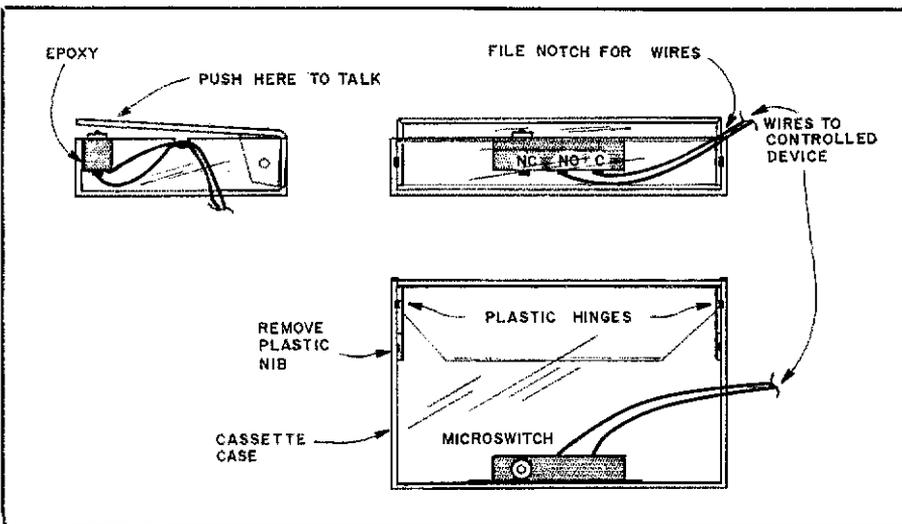


Fig 4—Harold Keenan's foot switch is based on a cassette-tape case and a microswitch.

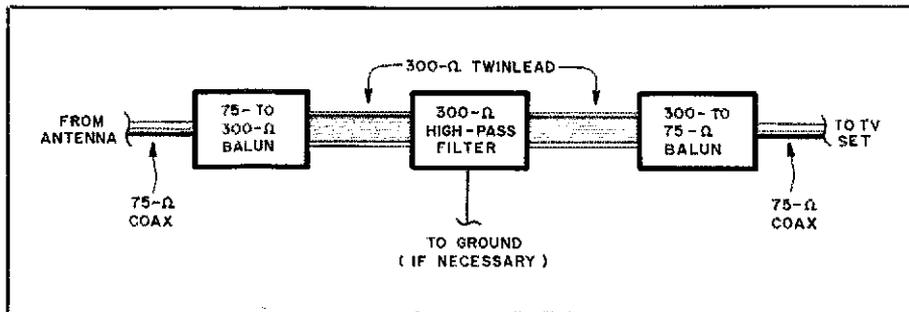


Fig 5—Jim Rafferty's addition to H & K's anti-TVI arsenal: Inserting two transformers and a 300-Ω filter in a 75-Ω TV antenna system quashes RFI caused by shield-borne HF energy.

of the case for wire egress, and file off the nib inside the case that resists the cover's movement. Fasten the wired microswitch to the inside front of the case with epoxy adhesive. Connect the wires to the device you wish to activate, and press the cover to close the switch.—*Harold Keenan, KBIUS, 85 Topstone Dr, Danbury, CT 06810*

300-Ω FILTER IN 75-Ω TV COAX CURES SHIELD-CONDUCTED TVI

□ High-frequency RF traveling on the shield of 75-Ω TV feed tends to bypass 75-Ω high-pass filters installed in the line. Solution: Use two 75-to-300-Ω impedance transformer/baluns and a 300-Ω high-pass filter as shown in Fig 5. Suitable transformers and filters are available from Radio Shack®, TV dealers, electronics stores and similar sources.—*Jim Rafferty, N6RJ, 5693 Grandview, Yorba Linda, CA 92686*

AK7M: In addition to offering an obstacle to shield-conducted HF energy by breaking the coax shield, this transformer-filter-transformer fix may owe part of its success to inefficiency of the 75-to-300-Ω transformers at HF.

BEWARE YOUR CRANK-UP, TILT-OVER TOWER!

□ We've all heard stories of crank-up towers. Here's one that demonstrates potential danger standing in thousands of backyards.

Hurricane Gloria blew through Connecticut in 1985. After coming home from the office just before the storm, I disconnected and walked my 48-ft vertical antenna down in a minute or less. Then I cranked my 60-ft tower down to 40 ft—a level at which the Yagi mounted atop the tower was just above the big maple that has grown up under it. (The tower had not been lowered for six years; now that the tree was much larger than it had been when the tower was installed, lowering the antenna would have to involve alternately tilting the tower and lowering its top section in steps to keep the Yagi clear of the maple while minimizing the overhung load on the tower pivot.)

Initially, I cranked down the top tower section. When the time came to tilt the tower, I called my wife, Shirley, to manage the winch as a check against my pulling the tower bottom away from the post too quickly. Frustratingly, the tower would not pivot! Getting down closer to the ground, I got a grip on the tower base and pulled hard. Although the tower swung out into position, I did not see what had resisted the pivoting.

I then assumed the cranking-over task, with Shirley guiding cables and latch-lock pull ropes, and the 160-m antenna wire, away from tree branches on either side of the tower. As I cranked, I could not believe my eyes as the bottom of the tower moved slowly *sideways*—perhaps as much as a foot! I locked the winch and grabbed the bottom of the tower to halt its motion. The tower seemed to be *barely* attached to the top of the ground post at the hinge. I secured the bottom end of the tower with a line and decided to investigate this strange behavior.

The tower has a 10 × 10-inch steel plate welded into it; this plate is bolted flat against the hinge plate on the ground post. The hinge consists partly of a 4-inch-long

heavy steel tube welded horizontally to the top of the 8-inch-diam ground post. Similar tubes on either side of, and aligned with, this tube are welded to the hinge plate that bolts to the tower. I remembered that four 1-inch bolts had secured the tower to the hinge plate. Could these have come loose in six years of windstorms? No—inspection showed that they were unchanged.

As I continued to inspect, I was shocked and literally terrified to see daylight through one of the two joints in the hinge through which the hinge pin should have been visible. *The heavy steel tower, canted 40° from horizontal, half extended, with Yagi and rotator heavily stressing the pivot, was right over my head and held in place only by the remaining end of the hinge pin—and that had started to twist off when the tower moved sideways!*

I locked the winch and ran out from beneath the tower. There it stood. Which was safer: Bringing the tower down or putting it back up? I went indoors to think. The hinge pin was equipped with a dowel pin to keep the hinge pin from sliding out of the hinge tubes; that dowel forced the hinge pin to rotate with the tower. It was between the dowel pin and the center hinge tube that the hinge pin had sheared—apparently when I pulled the tower bottom away from the ground post. The hinge pin had apparently been frozen by rust in the center hinge tube (stationary on the ground post). If the other end of the pin had also sheared, the tower—with rotator and beam—would have come loose from the ground post, lifting me into the sky before falling off the post, and likely onto both of us. (Shirley would have been under the tower at the tilt-over crank at the time.)

Because the other end of the hinge pin had not sheared, I reasoned that, contrary to what the tower manufacturer had intended, the pin had turned in the other end tube (welded to the tower) and was probably undamaged aside from being bent when the tower moved sideways. It seemed that cranking the tower back to vertical and leaving it extended to 40 ft (to allow it to clear the tree) rather than cranking it to horizontal with the top section and Yagi extended—a much greater load on the hinge—would be much safer.

When the rain let up, I chained the tower to the top of the ground post, drilled out the end of the broken hinge pin, put a jack under the bottom end of the tower to take the weight off the broken hinge pin, and drove the broken pin out. At the same time, I replaced the old hinge pin with a *stainless steel* pin—which the tower manufacturer should have used in the first place.

I would like to promulgate some words of experience to fellow hams who own tilt-over towers: Lubricate the hinge pin as best you can. Painting it to keep the rain out is inadequate in the long run. If you have an old tower, beware of rust freezing the hinge pin at points you cannot see. If the

pin freezes, tilting the tower can easily shear off the pin and drop the whole tower *on you*. Rock the tower slightly before cranking it over, and be certain you understand which part of the hinge pin should rotate in relation to the tower. Don't be satisfied only with the fact that the pin appears to turn!

We all know that crank-ups are dangerous. (A local VHFer had both wrists broken when he reached to stop a flailing tower crank.) The hinge pin is an inobvious source of danger. Replacing it with a stainless-steel pin is mighty good insurance.—*Ned Raub, W1RAN, 12 Deerfield Rd, Waterford, CT 06385*

HOMEMADE CONDUCTIVE GLUE

□ I needed an electrically conductive paste, much like the "Aquadag" coating on CRTs, in order to repair a circuit board on a calculator that used graphite instead of copper. I found that by mixing about six parts of graphite powder to one part of model-airplane cement, I ended up with a very good conductive material when the mixture dried. Don't use an epoxy or white glue; these adhesives produce a nonconductive coating when they cure or dry.—*Fred L. Redburn, KX5F, 13005 Heinemann Dr #710, Austin, TX 78728*

THAT FT-102 RECEIVER-INPUT FUSE

□ If, all of a sudden, your Yaesu FT-102 transceiver sounds like its antenna is disconnected, and all you get is hash no matter how much you increase the AF gain, the cause may not be as serious as it first appears.

Not long after my '102 went out of warranty a few months ago, this very thing happened. After checking the antenna connection, tuning up the transmitter (no problem there), and checking the '102 operating manual for a solution (none found), I decided to put off shipping the rig to Yaesu for a checkup and seek an answer on the air (with another transceiver!). In conversation with Larry

Oldham, WA0HBB, I got some advice and a great suggestion:

"Inside the final-amplifier tank cage, there is a relay board attached directly to the SO-239 coax connector at the rear of the rig. On this board, there is a 'grain-of-wheat' incandescent lamp connected across two vertical pins. This little monster acts as a fuse and has a habit of either lasting forever or just going poof. It is in the receiver antenna line."

With the rig unplugged from the wall and its high-voltage filter capacitors safely discharged, I removed this useless component and replaced it with small-diameter wire (a resistor or capacitor pigtail will do) and have been back in business again—no problems, no aftereffects.—*Tom Galante, WA1PWZ, RFD 1 Nichols Rd, Center Ossipee, NH 03814*

AK7M: Hints and Kinks is uncomfortable with passing along this hint without comment. "Either lasting forever or just going poof" describes the action of a fuse to a T! In my opinion, it's far better to replace the FT-102's incandescent-lamp antenna fuse with *another incandescent lamp of the same type*.

HAND-KEY INPUT FOR THE MFJ GRANDMASTER KEYS

□ At the same time I decided to add a hand key to my station, I realized that my MFJ Grandmaster keyer has no hand-key input. A look at the Grandmaster circuit revealed no obvious place to put one in, since there are no active-low points in the circuit that can be "wire-ORed." Even the base of Q4 (the transistor in the grandmaster that drives transistors that switch the keyer's positive and negative outputs) is active high. I finally decided to wire-OR hand-key drive to the input of pin 5 of U7 in the Grandmaster, since this would allow the hand key to control the keyer's sidetone. That point is already decoupled from the rest of the circuit by a 1N4148 diode (D8) and (from the keyer's TUNE switch) by a 24-kΩ resistor.

I added the circuit shown in Fig 6 to invert the hand-key input. Although I have

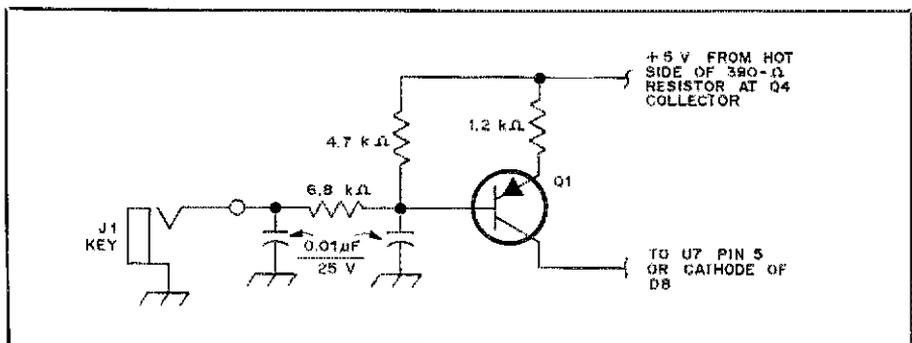


Fig 6—Mark Muehlhausen added a hand-key input to his MFJ Grandmaster keyer by adding this circuit. J1 is a key jack of your choice; Q1 can be a 2N2907, 2N3906 or similar general-purpose PNP transistor; and resistors are 1/4-W carbon film. Component designators D8, Q4, and U7 refer to MFJ Grandmaster parts; see your Grandmaster schematic for details.

encountered no RF-triggering problems with this circuit. I suggest taking two precautions to minimize RF effects on the hand-key input: (1) Don't omit the bypass capacitor between the hot side of the key jack and ground, and (2) run shielded cable to the key. Many modern small-signal transistors use very small silicon chips and have gain far into the UHF region; they'll amplify dc and RF if given half a chance!
—Mark H. Muehlhausen, K9ZXB, 531 Merlin Dr, Schaumburg, IL 60193

A SLIDING ELEMENT MOUNT FOR SMALL BEAM ANTENNAS

□ One of the more frustrating parts of experimental UHF and VHF Yagi antenna construction is getting optimum spacing and adjustments done without wasting materials or drilling unnecessary holes. My solution to this problem is shown in Fig 7.

The materials needed are copper-plated steel welding rod, plumber's tape, acid-core solder and sheet-metal screws. First, cut the elements to length. Cut the plumber's tape

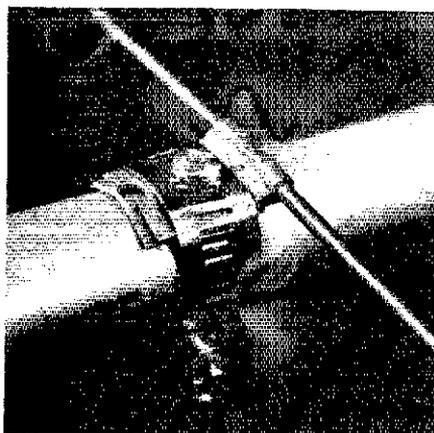


Fig 7—Kenneth Munford's adjustable element mount. The screw is added after final element placement has been determined. See text.

into 2-1/8- to 3-1/8-inch strips, and form a U 2-1/2 inches from one end of each strip. Using a vise or locking pliers, crimp

the tape securely around the center of each element. Solder the tape to each element using a propane torch or high-power soldering iron. To put the antenna together, use hose clamps to secure elements to the boom. The elements can be adjusted for proper spacing merely by loosening the clamps.

This element-mounting technique offers a bonus: By placing the antenna upside down on a flat surface and loosening the clamps, the elements can be moved into perfect alignment with each other. To finish the job, drill a hole through clamp, tape and boom at each element, and turn a sheet-metal screw into each hole.

An 11-element Yagi constructed in this way has survived at 60 ft above ground for the past six years. It has withstood rain, snow, ice and 75-mi/h winds that toppled a broadcast tower 1 mile away. When the antenna was taken down recently, it was found to be in perfect electrical and mechanical condition.—Kenneth S. Munford, N7KM, 3791 W Linda Vista Ave, Cedar City, UT 84720

New Products

COMTEC ACB-4 ARRAY SWITCH AND RCB-5 REMOTE COAX SWITCH

□ ComTec, of Hopkinton, Massachusetts, has introduced the ACB-4 remote array switch. The ACB-4 is intended for switching currents of the correct magnitudes and phases among four vertical elements in the popular four-square vertical array (the ACB-4 is also usable with two elements). Power division is claimed to be within 1 dB of optimum, and phase distribution within 5° of optimum.

The ACB-4 includes a relay switch box and the control box for the shack. Required

equipment not included with the ACB-4 are two wavelengths of 75-Ω coax (for a four-vertical array) and a three-conductor control cable. Both types of cable are available from ComTec.

The RCB-5 is a remote coax selector capable of switching among five antennas from a single feed line. Any combination of antennas can be selected simultaneously. Power handling is rated at 5 kW, and SWR is rated at less than 1.5:1 from dc to 450 MHz.

ACB-4 price: \$195 in kit form, \$260 assembled (kit availability scheduled for April 1989). Specify band (160, 80, 40, 20, 15 or 10 meters) when ordering. RCB-5 price: \$129.95. Add 10% (plus \$20 shipping and handling) for all foreign orders. Available from ComTec, PO Box 202, Hopkinton, MA 01748.—Rus Healy, NJ2L

KENWOOD RZ-1 WIDEBAND SCANNING RECEIVER

□ The RZ-1 covers 500 kHz to 905 MHz in AM, narrowband FM and wideband FM. Automatic mode selection, 100 memory channels, direct keypad or VFO memory entry and versatile scanning (of memories and bands) functions are included. 12-V dc operation and a built-in speaker make the RZ-1 convenient for mobile work. Other features include a front-panel headphone jack, switchable AGC, squelch (narrowband FM only), illuminated keys and a beeper to confirm key operation. Suggested retail price: \$599. Contact Kenwood USA, Communications and Test Equipment Group, 2201 E Dominguez St, Long Beach, CA 90801, tel 213-639-4200 for more information.—Rus Healy, NJ2L



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SERVICES AND MATERIALS FOR HANDICAPPED HAMS

□ The appearance of the item, "Computer Assistance for the Disabled Amateur," in QST, Jul 1988, p 47, prompted me to write. I am the Technical and Training Director of The National Institute for Rehabilitation Engineering (NIRE). The NIRE is a voluntary, nonprofit organization for the handicapped. We offer analysis, counseling and advice; equipment, work and environmental services. We do dispense equipment, but usually refer people to local vendors when appropriate.

Over the years, we have been successful in helping elderly, hearing-impaired hams to better use and understand their receiver's audio output. We do this using a speaker or (preferably) headphones, coupled through an amplifier and signal processor connected to the receiver's output.

We do not have catalogs. Handicapped people are invited to contact us by letter or telephone. There is no cost or obligation for such inquiries and contacts.—*Don Selwyn, W2GFR, PO Box T, Hewitt, NJ 07421*

USING A COMPUTER TO OPTIMIZE A COMMERCIALLY MADE YAGI ANTENNA

□ A friend of mine recently purchased a commercially made, five-element, monoband 15-m Yagi (a Hy-Gain 155BA) to add to his "Xmas-tree" stack. Because wind load and tower torque were major considerations, he was interested in

Table 1

Element Construction Schedule of the Unmodified Five-element Hy-Gain 155BA Yagi

Element Diam	Tapered Selection (in.)				Cylindrical Equivalent (ft)	Effective Length (ft)	Spacing From Ref. (ft)
	1	2	3	4			
Ref.	5.0	76.75	3.25	66.00	24.185	24.060	0
D.E.	5.0	64.75	3.25	64.00	21.931	21.806	7.458
D1	5.0	64.75	3.25	64.00	21.931	21.806	13.000
D2	5.0	64.75	3.25	56.00	20.647	20.522	18.062
D3	5.0	64.75	3.25	57.00	20.807	20.683	25.062

reducing the number of antenna elements to four, if the change produced no significant reduction in performance.

Jim Lawson, W2PV, has shown conclusively that overall boom length—not the number of elements on the boom—establishes the maximum obtainable gain, as long as there is sufficient coupling between the element structure.¹ This is contrary to the popular misconception you sometimes hear expressed. Many amateurs, particularly newer ones, have been led to believe that if five elements are good, six elements are better.

Some operators stroke their egos by reporting to the world that they are using a "six- or seven-element beam antenna," when, in fact, they are using a six- or seven-element tribander on a 24-foot boom,

which has about half of its elements active on any one band.

For several years, I have been using a version of MININEC, which I call YAGINEC,² to computer-model Yagi antennas using my IBM® PC. I wrote YAGINEC for my own use, to reduce the labor and error-prone data-input requirements of MININEC. In benchmark comparisons I have made and compared with W2PV's computer results, the differences have been almost insignificant. I trust the results, and have designed and constructed several Yagi antennas using YAGINEC. The measured results are always very close.

In order to use YAGINEC, each antenna

²K4VX will be happy to supply a copy of YAGINEC to anyone who sends him a PC DOS® or MS-DOS® formatted 5¼-in. floppy disk and a self-addressed stamped mailer.

¹J. Lawson, *Yagi-Antenna Design* (Newington: ARRL, 1986).

Table 2

Unmodified Hy-Gain 155BA Yagi

Element	Length (ft)	Spacing From Ref. (ft)	Element Diam (in.)
Ref.	24.060	0	0.875
D.E.	21.806	7.458	0.875
D1	21.806	13.000	0.875
D2	20.522	18.062	0.875
D3	20.683	25.062	0.875

Z₀ at 21.300 MHz is 50.1 ohms.

Freq (MHz)	Gain (dBi)	F/B (dB)	Impedance (ohms)	SWR
21.000	9.43	17.21	31.05 -j34.38	1.76
21.050	9.46	17.80	29.74 -j33.38	1.65
21.100	9.48	18.57	28.16 -j32.20	1.53
21.150	9.50	19.57	26.35 -j30.77	1.40
21.200	9.52	20.89	24.35 -j29.04	1.28
21.250	9.54	22.72	22.23 -j26.97	1.12
21.300	9.55	25.30	20.06 -j24.55	1.00
21.350	9.55	28.80	17.90 -j21.77	1.26
21.400	9.53	29.97	15.83 -j18.65	1.55
21.450	9.49	25.55	13.90 -j15.24	1.97

Table 3

Hy-Gain 155BA with First Director (D1) Removed

Element	Length (ft)	Spacing From Ref. (ft)	Element Diam (in.)
Ref.	24.060	0	0.875
D.E.	21.806	7.458	0.875
D1	20.522	18.062	0.875
D2	20.683	25.062	0.875

Z₀ at 21.250 MHz is 51.45 ohms.

Freq (MHz)	Gain (dBi)	F/B (dB)	Impedance (ohms)	SWR
21.000	8.62	8.88	34.25 +j6.45	1.52
21.050	8.58	8.71	35.48 +j9.35	1.40
21.100	8.54	8.54	36.76 +j12.23	1.28
21.150	8.50	8.38	38.09 +j15.09	1.18
21.200	8.45	8.23	39.50 +j17.92	1.09
21.250	8.41	8.09	40.98 +j20.72	1.00
21.300	8.37	7.96	42.53 +j23.47	1.08
21.350	8.33	7.85	44.18 +j26.16	1.18
21.400	8.29	7.75	45.88 +j28.80	1.24
21.450	8.25	7.66	47.69 +j31.35	1.33

Table 4
Hy-Gain 155BA With Second Director (D2) Removed

Element	Length (ft)	Spacing From Ref. (ft)	Element Diam (in.)
Ref.	24.060	0	0.875
D.E.	21.806	7.458	0.875
D1	21.806	13.000	0.875
D2	20.683	25.062	0.875

Z₀ at 21.300 MHz is 73.94 ohms.

Freq (MHz)	Gain (dBi)	F/B (dB)	Impedance (ohms)	SWR
21.000	9.28	18.82	29.11 -j45.03	2.53
21.050	9.33	19.68	26.82 -j43.33	2.27
21.100	9.39	20.80	24.43 -j41.30	1.99
21.150	9.46	22.29	22.00 -j38.92	1.72
21.200	9.52	24.35	19.58 -j36.19	1.44
21.250	9.58	27.26	17.24 -j33.12	1.17
21.300	9.64	30.49	15.02 -j29.75	1.00
21.350	9.69	29.04	12.97 -j26.10	1.46
21.400	9.72	24.31	11.13 -j22.22	2.03
21.450	9.73	20.29	9.50 -j18.15	2.92

Table 5
Optimized Four-Element Yagi

Element	Length (ft)	Spacing From Ref. (ft)	Element Diam (in.)
Ref.	23.710	0	0.875
D.E.	21.800	7.458	0.875
D1	21.900	14.916	0.875
D2	21.200	25.062	0.875

Z₀ at 21.250 MHz is 41.22 ohms.

Freq (MHz)	Gain (dBi)	F/B (dB)	Impedance (ohms)	SWR
21.000	9.69	16.85	29.45 -j30.63	2.10
21.050	9.71	17.95	27.28 -j29.65	1.93
21.100	9.74	19.49	24.71 -j28.19	1.73
21.150	9.76	21.80	21.90 -j26.14	1.49
21.200	9.77	25.81	18.99 -j23.44	1.24
21.250	9.76	36.50	16.16 -j20.12	1.00
21.300	9.71	30.74	13.57 -j16.25	1.40
21.350	9.60	21.67	11.32 -j11.92	2.03
21.400	9.39	16.62	9.46 -j7.25	3.07
21.450	9.03	12.87	8.02 -j2.36	4.73

Table 6
PV4 Version With the Boom Extended To 26.5 Ft.

Element	Length (ft)	Spacing From Ref. (ft)	Element Diam (in.)
Ref.	23.523	0	0.875
D.E.	21.600	5.732	0.875
D1	21.708	15.039	0.875
D2	20.794	26.500	0.875

Z₀ at 21.200 MHz is 50.09 ohms.

Freq (MHz)	Gain (dBi)	F/B (dB)	Impedance (ohms)	SWR
21.000	9.89	20.33	18.47 -j31.67	1.78
21.050	9.93	22.21	17.71 -j29.71	1.57
21.100	9.96	24.69	16.78 -j27.60	1.37
21.150	10.00	27.68	15.70 -j25.28	1.17
21.200	10.02	28.69	14.53 -j22.73	1.00
21.250	10.03	25.35	13.30 -j19.93	1.27
21.300	10.02	21.40	12.08 -j16.86	1.63
21.350	9.98	18.10	10.91 -j13.55	2.16
21.400	9.88	15.34	9.84 -j10.00	2.95
21.450	9.71	12.94	8.91 -j6.24	4.09

element must be entered as a cylindrically equivalent element, rather than a tapered element. To convert a tapered element to its electrically equivalent cylinder, I wrote a program based on algorithms in W2PV's material. This taper-calculation program also derives the element-tip length for tapered-element construction from cylindrical-element data.

Before the equivalent cylindrical length can be used in YAGINEC, the effect upon overall length caused by the element-to-boom mounting must also be derived. To do this, I again referred to W2PV's data and assumptions. Because this particular commercial Yagi uses a quasi through-the-boom method for element mounting on a 2-inch boom and a 1/16-inch-thick mount around the boom, about 1-1/2 inches must be removed from the equivalent cylindrical element length to obtain the effective cylindrical length.

The taper schedule for all five elements (phone-band settings) is shown in Table 1, along with each element's spacing relative to the reflector. Section 1 of each element is the equivalent diameter of the element-to-boom clamping device, measured to the center of the boom. The element clamp is also a small part of the radiating element. Section 3 is the end of the 7/8-inch tubing, which has been swaged to 1/2 inch to connect it to the 7/16-inch tip section. The equivalent cylindrical length is derived from these data, and reduced by 0.125 feet to account for the through-the-boom effect prior to using YAGINEC.

The YAGINEC results for the unmodified commercial five-element Yagi are shown in Table 2. According to YAGINEC analysis, this antenna lives up to the manufacturer's claimed front-to-back (F/B) figures over most of the 15-meter band. The YAGINEC forward-gain figures are for free space (compared to an isotropic source—dBi), and must be reduced by 2.14 dB to compare them to the gain of a resonant half-wave dipole in free space.

Because this particular antenna uses a hairpin, or beta, matching system, the driven-element impedance must be capacitive (the element is physically short); hence the negative reactance exhibited across the band. This capacitive reactance is canceled by the inductive reactance of the hairpin stub. Note that changing the length of a driven element in a Yagi antenna has very little effect upon the antenna's forward gain and F/B. As shown in Table 2, the driven-element's capacitive reactance of -j24.55 ohms at 21.300 MHz can be matched with an equal inductive-stub reactance to produce a resistive 50.1 ohms. Not a bad match!

My friend wanted to make any modifications to his antenna as simple as possible, so I first made a YAGINEC run just removing the first director and leaving the remaining elements unchanged. Although that four-element version had a very wide bandwidth, the forward gain was reduced, and the F/B poor (see Table 3). I then made a run with director no. 2 removed and director no. 1 replaced. These serendipitous results (see Table 4) were quite surprising. Not only did the forward gain improve slightly at the high end of the band, but the F/B increased also, and there appeared to be little change in operating bandwidth. Before this design could be used, the driven element required some adjustment to find a good match to the hairpin matching system; however, these results gave me encouragement that I was on the right track.

I then used YAGINEC to make a number of iterations, varying element lengths and spacings. The results of these efforts are shown in Table 5. This version has excellent F/B, slightly more forward gain than the original five-element antenna, and reasonable SWR bandwidth. The forward gain and the maximum F/B also peak near the same frequency. This is not the usual case for most Yagi antennas.

I did not try removing director 3, of course, because that would electrically shorten the entire structure. Also, I did not want to change the boom position of the driven element, as that would require a complete change in the hairpin matching system also.

If your antenna is still in its box, you may want to think about making the conversion to the four-element version, or perhaps extending the director end of the boom to 27 feet and turning the antenna into a PV4 Yagi. My YAGINEC runs of the PV4 design (see Table 6) used the lengths taken from Bill Myers' QST

Table 7

Element Construction Schedule for the Optimized Yagi

Element	Tapered Selection (in.)				Cylindrical Equivalent (ft)	Effective Length (ft)	Spacing From Ref. (ft)
	1	2	3	4			
Diam	1.625	0.875	0.5	0.4375			
Ref.	5.0	76.75	3.25	64.00	23.835	23.710	0
D.E.	5.0	64.75	3.25	64.00	21.925	21.800	7.458
D1	5.0	64.75	3.25	64.75	22.025	21.900	14.916
D2	5.0	64.75	3.25	60.25	21.325	21.200	25.062

Table 8

Element Construction Schedule for the PV4 Yagi

Element	Tapered Selection (in.)				Cylindrical Equivalent (ft)	Effective Length (ft)	Spacing From Ref. (ft)
	1	2	3	4			
Diam	1.625	0.875	0.5	0.4375			
Ref.	5.0	76.75	3.25	62.75	23.657	23.532	0
D.E.	5.0	64.75	3.25	62.75	21.725	21.600	5.732
D1	5.0	64.75	3.25	62.50	21.708	21.583	15.039
D2	5.0	64.75	3.25	57.75	20.919	20.794	26.500

article.³ The results are slightly more optimistic than Bill's numbers, but are included for comparison purposes. In Tables 7 and 8, I have included the tapered-element schedule for constructing these antennas. For either version, the driven-element dimensions are based on using the supplied hairpin match.

I make no claim that either version will make you first in every pile-up, or that it will put you on top of the Honor Roll, but you can be assured you will have as much forward gain as possible for the boom length you have. Now, if you really want forward gain with good F/B, I have an eight-element, 10-meter monster Yagi on a 58-ft boom up and running: I call it my "elephant gun." YAGINEC predicts a gain of 13.5 dBi, but that's the topic of another story!—*Lew Gordon, K4VX, PO Box 105, Hanibal, MO 63401*

³B. Myers, "The W2PV Four-Element Yagi," *QST*, Oct 1986, pp 15-19.

New Books

THE SOVIET MARITIME RADIO-TELETYPE DICTIONARY

By Gary Gorka and Fred Osterman. Published by Universal Radio, 1280 Aida Drive, Reynoldsburg, OH 43068. First edition, 1988. Soft cover, 8½ × 11-inches, 102 pages, \$11.95.

Reviewed by Kirk Kleinschmidt, NT0Z

If you've ever encountered a Soviet maritime RTTY signal and tried to decipher its cryptic message—or if you'd like to listen in on the world's largest user of short-wave RTTY—*The Soviet Maritime Radioteletype Dictionary* may be what you've been looking for. Although limited in appeal, this book contains a wealth of information that would otherwise require exhaustive, and perhaps frustrating, research to obtain—on Soviet RTTY usage, names, customs and maritime information.

The book's authors, Gary Gorka, a Slavic languages specialist, and Fred Osterman, N8EKU, an SWL editor and author, take you from an introduction to Soviet communications, through several chapters on Russian names, holidays, numbers and phrases, to a comprehensive dictionary of more than 1600 words and phrases you're likely to encounter on the Soviet maritime RTTY bands. Here's a rundown of the chapters in *The Soviet Maritime Radioteletype Dictionary*. Introduction; The Soviet Union and Com-

munications; How to Use the Dictionary; Abbreviations and Notations; Personal Messages; Commercial Shipping Messages; RTTY Message Charts; Soviet Maritime RTTY Dictionary; Brief Guide to Common Phrases; Russian Names; Soviet Holidays; Quick Reference: Days, Months, Numbers; Commonly Heard Ships; Geography and Maps; Transliteration Tables; Station List; References.

Armed with this book, you have the capability to decode and understand RTTY terminology and hundreds of Soviet RTTY messages, including personal messages, message header formats (these describe the type of the transmitting vessel, its name, the port being called, time, date, and name and address of the addressee) and much more. Also included is a list of commonly-heard ships and shore stations. The ships can be looked up in shipping references such as *Jane's Ships of the World* to bring the action closer to home, to relate to the messages on a more personal basis. All of the listings, tables and phrases in the book are cross-referenced three ways: RTTY, Russian Cyrillic and English.

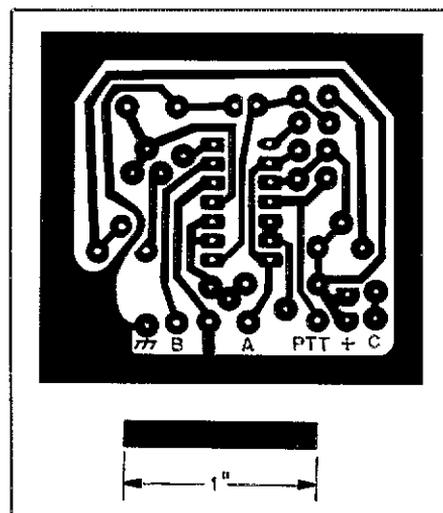
If you're not into RTTY, the *Dictionary* still contains a lot of useful information, especially for the DXer and SWL. With the Soviet Union's recently expanded freedom of communication, there's a need for information of this type.

The Soviet Maritime Radioteletype Dictionary appears to have been prepared with a laser printer, and produced in small quantity. Its pages are stapled together between a heavyweight paper cover. It's not a flashy gloss-and-leather book, but the information it contains is solid. You can obtain a copy of this book by sending

\$11.95 (plus \$1 for shipping) to Universal Radio, 1280 Aida Drive, Reynoldsburg, OH 43068, tel 800-431-3939.

Feedback

□ The PC-board etching pattern for Gregory Graham's "A Versatile Timer/Controller" (*QST*, Aug 1988, pp 25-26) misconnects the output of UIC to UID and the components that set the timer's turn-off delay. The correct pattern is shown at right. *QST* thanks Charles G. Plunk, WD4OZN, for pointing out this error.



Keeping a Station Log

Have you ever wondered if a log is really worthwhile, or how to keep one that will be really valuable to you? Here's the scoop on the how and why of logkeeping.

By Jeff Kilgore, KC1MK
ARRL Editorial Supervisor

Back in the old days (actually not all that long ago!), the FCC required every amateur to keep a detailed station log. However, most amateurs kept a log not simply because they were required to, but because it was useful and demonstrated pride in their amateur activities.

Even today, with the log no longer a requirement, many amateurs still keep a detailed station log—they find it a valuable record of their operation and are usually glad to show it off. Why bother with all that paperwork when it is no longer required by the FCC? Isn't it too much bother when you're having fun making contacts on the bands?

Keeping Track

Every amateur has things they need (or like) to keep track of—states and countries worked, information needed for various awards and so on. A well-kept log is a valuable part of your efforts towards Worked All States, Worked All Continents and other operating awards. While you will want to keep a running list of states and countries, your log is the perfect place to keep the detailed information on each contact. If you include the date(s) worked on your list of states or countries worked, it is a simple matter to reference the contacts in your log.

A log is also valuable for documenting your station's ability to work into various areas, as well as the effects of any equipment changes or possible deterioration in your station. If you find that your signal reports from a given area have dropped by four S units, you may need to check your station out to make sure everything is up to snuff. Of course, this could be a result of another factor, such as propagation; nonetheless, over a period of time signal reports can be useful if you realize their limitations. Of course, if you are interested in propagation, your log can be quite an

asset—it contains information on stations worked, the date, time of day, frequency and signal reports!

Your log is also a good place to keep notes on modifications and changes to your station. Not only will it be easy to find when you want to refer to it, it will be easier to note the effects of such changes by referring to your contacts before and after. It makes sense to keep your station records as organized as possible so you will have them when you need them.

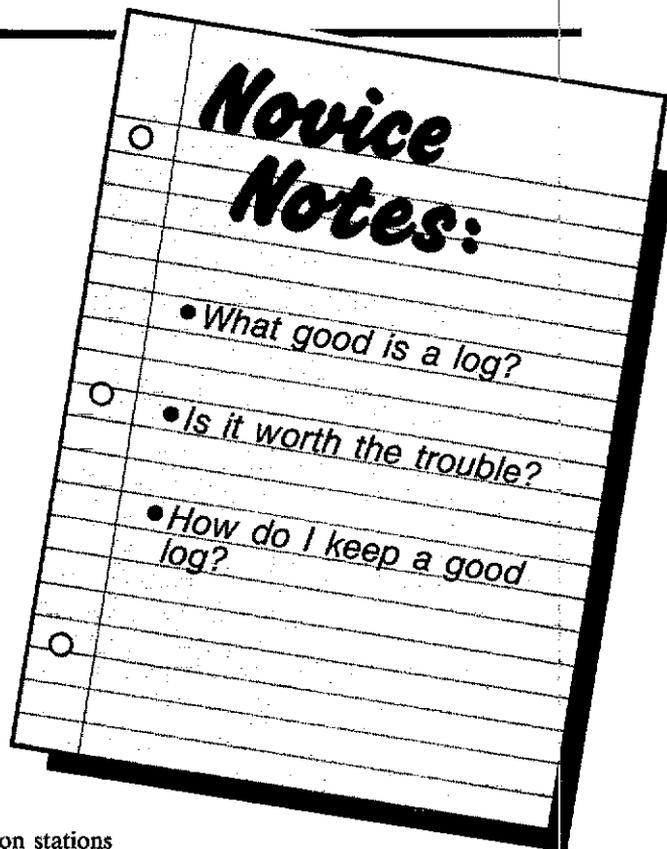
While you're at it, why not keep other changes in your log? For example, when you upgrade, note it in your log—it marks an important point in your growth as an amateur. It deserves noting and will be a

fond remembrance in the future.

Part of the enjoyment in Amateur Radio is remembering what we have accomplished in the past. A look back at your log will bring to mind many accomplishments you may have forgotten—the time you busted a pileup to work some rare DX, or perhaps a pleasant hour-long QSO you had forgotten. It is often amazing how clearly you will remember a contact when you see the entry in your log.

Dealing With Problems

Although we always hope to avoid problems with TVI and RFI, sometimes



DATE	FREQ	MODE	POWER	TIME	STATION WORKED	REPORT SENT	REPORT REC'D	TIME OFF	COMMENTS	USL	
18 Jun	29360	SSB	20	0045	W05JVV	59	57		San Antonio, TX	Gary	✓
18 Jun	21321	SSB	100	2154	G3PRC	58	57		Plymouth Radio Club	Butchie	✓
	21331			2229	SP3IBS	58	57		Wales, Rland	Stan	✓
	21325			2235	YU4EBL	59	59		Yugoslavia	Fodt	✓
8 Jun	21316			2139	Y23EK	59	59		E Germany	Horst	✓
	3958			2315	W1LTS	59	59		Magnets, MA	Cookie	✓
9 Jun	21330			0350	K4JUG	58	56		Hamlet, NC	Francis	✓
	3890			2214	W200C	59	59		Deerfield, NH	Perry	QSO ✓
11 Jun	3743	CW		1400	K4IRYZ	469	469		Middlesex, VT	Unk	int contact ✓
13 Jun	21350	SSB		2257	F8JH	58	58		Vierzon, France	Fran	✓
15 Jun	14240			0221	N1Z0D	59	59		Little Rock, AR	Jim	QSO ✓
16 Jun	3730	CW		0200	N1FGB	599	599		Hartford, CT	Jeff	✓
27 Jun	3909	SSB		2200	K1PQE	59	59		VT Sideband Net		✓
				2257	N2GSA	57	59		Long Island Exp. Mob's	Amly	✓
30 Jun	3984			0200	WB2JX	59	59		Hinesbury, VT	Bevin	✓
					KB1UM	59	59		S. Burlington, VT	Mike	✓
7 Jul	3736	CW		0150	KB2FMY	599	599		Phillipsbury, NJ	Anthony-Gorman	✓

Here's an example of a properly filled-out log page. After making a few entries, the process becomes easy and takes only a moment. Don't deny yourself one of the pleasures of Amateur Radio—you'll really appreciate a well-kept log in years to come.



The *ARRL Logbook* has room to log 925 QSOs, as well as useful information such as listing of Q signals, a time-conversion chart, the ITU phonetic alphabet, RST chart, international call-sign prefixes and more. The *ARRL Minilog* is ideal for portable or mobile operation.

these problems do occur. If you have an accurate log, TVI and RFI complaints are much easier to deal with.

If your neighbor says you were interfering with *ALF* last Monday evening, take a look at your log. Perhaps you weren't even on the air then—without a log, it might be difficult to determine exactly when you were operating. While the fact that your log shows you were not on the air may or may not convince your neighbor that you are not the cause of the problem, it will at least put you a little more at ease and help you to deal with the situation.

Even if you were on the air, your log is still useful. Find out what times the problem occurred, then check your log—perhaps you can find a pattern there. Does the interference occur only when you are operating on 10 meters? If there is a pattern, it can help you locate the problem, whether the fault is in your station or elsewhere.

In short, an accurate log, together with your skill and knowledge, is one of the best tools you have in dealing with TVI and RFI complaints.

Keeping a Log

Now that you've seen the value of keeping an accurate log, how do you go about doing it? Should you just scribble your notes on any paper that is handy at the moment, or buy a computer to keep your log on?

You have a number of options, so you have to decide which one will work best for you. Just scribbling notes on a piece of paper won't do—you'll probably lose a lot of information this way, particularly as the years go by and the pieces of your log seemingly scatter to the four winds.

Then again, neither is it necessary to keep your log on a computer. While computerized logkeeping is certainly a viable alternative, many amateurs prefer to keep their logs by hand. If you do not presently own a computer, you may not want to rush out and buy one just to keep your log on. If you already own a computer, or if you were planning on buying one for other uses, by all means investigate the various logging programs available (see the sidebar, "Logging Programs: What's Available?"). One of them may be just what you are looking for, or you may decide to stick to manual logging. Also, keep in mind that a computer log is only as accurate as you make it—remember the old saying "garbage in, garbage out" (GIGO).

If you are a programmer, either by hobby or profession, you might consider writing your own logging program. I wrote a logging program for my computer, but omitted many features that would probably be desirable for others. Actually, I intended to add more features after getting the basic program running, but I found that I really did not like logging on the computer. To enter information in the computer, I have to roll my chair a few feet over, thereby leaving my comfortable operating position. I still use my logging program, but only as a backup to my normal handwritten log. Every few days I enter the information from my log into the computer, which creates log files by month. I do this so that it will be easy to print out information I may need.

If you are a contester, you will probably want automatic dupe checking in your log program, and perhaps automatic preparation of contest logs for submission. If you are a DXer, your program might keep track of countries worked and confirmed. If you're a traffic handler, it could handle information on your message flow.

If you elect to keep your log by hand, there are a number of logbooks available, or you may elect to make your own. I find the standard *ARRL Logbook* fits my needs quite well—there are areas provided for all the normal information, and the comments section has enough room for me to make whatever other notes are necessary. If you make your own, remember to make it organized—loose pieces of paper floating around the shack do not constitute a log. Some sort of binding is practically essential.

The key is to determine your logging needs first, and then decide on a method that will fulfill these needs. It should be accurate, contain all the information you require, and be simple and quick enough that you always use it. At a minimum, your log should include the date, time, frequency, mode, power, station worked, signal reports, QTH and name. An area to check off for QSLs sent and received is handy, and you'll want to make provisions for other information you need. If you collect 10-10 numbers or other special information, provide a place for this.

Wrapping Up—or Logging It

Don't delay—if you are not already keep-

ing an accurate log, start today. Don't cheat yourself of an important Amateur Radio tradition. Once you start, keeping a log will become easy and automatic. What's more, you'll appreciate its value more and more as time goes by.

Logging Programs: What's Available?

There are so many logging programs available that no list can begin to scratch the surface. So, rather than provide a list, I'll try to steer you to a few sources.

The ARRL Program Exchange includes a number of logging programs (available in written program listings, not on disk), both for specific computers and generic programs which may be adapted to run on many machines. For a list of programs available, write ARRL, Dept PX, 225 Main Street, Newington, CT 06111. Programs are available for a small fee to cover copying and mailing costs.

The On Line column in *QST* also frequently has information on logging programs, including evaluations of programs available both commercially and from other amateurs.

Talk to other amateurs about your needs—someone may know of a program that will fit the bill for you.

Check out Amateur Radio-related bulletin boards—these often have logging programs available, or information on logging programs. User groups are another potential source of information, as more and more amateurs become active in them.

If you have, or are familiar with, a data-base program, perhaps you might consider setting it up to keep your log. Once you have set up your log template, you have a powerful logging program which can be adapted as your logging needs change.

Lastly, if you're a programmer, consider writing your own logging program. By doing this, you can customize it to exactly fit your needs. If you do write your own program, consider making it available to other interested amateurs—it may be just what someone else needs as well!

Strays



I would like to get in touch with...

□ anyone using an Apple II series computer in conjunction with ham radio with knowledge of any available programs. Bob Spiers, W4JOU, 502 Lillian Dr, Madeira Beach, FL 33708.

Douglas Lockhart, VE7APU, Packet Radio Pioneer

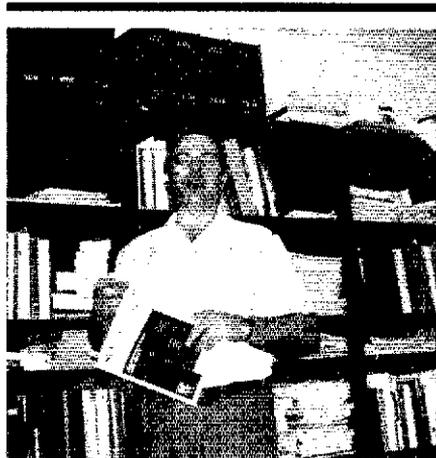
By Sheldon H. Ball, KC1MP
ARRL Editorial Assistant

Doug introduced bit-oriented protocols to packet radio and developed the first terminal node controllers (TNCs) for Amateur Radio in 1978. Through his leadership in the Vancouver Amateur Digital Communications Group (VADCG), Doug was instrumental in making the new technology available to amateurs, thus laying the foundation for future packet-radio networks. In 1984, Doug was named Canadian Amateur of the Year for his work in packet radio. First licensed in 1957, Doug now holds the Canadian Amateur Radio Operator's Advanced Certificate with the Amateur Radio Digital Operator's Certificate #14. His main interests in Amateur Radio are VHF packet experimentation, although he does admit to doing a little HF work. Doug's most memorable contact was with Art Collins, W0CXX, the founder of Collins Radio, on CW in 1957. He belongs to the ARRL, CRRL, VADCG and the Vancouver Amateur Radio Club. He is a member of the League's Digital Communications Committee. Doug is retired from IBM as a program support specialist and keeps busy as a property manager and part-time data communications consultant for industry. When asked whether his career was affected by Amateur Radio, Doug modestly flipped the question by saying that some of the things he learned in IBM influenced his interest in packet radio. Doug's other interests include cooking foreign food, gardening and travel.

How did you get into packet radio?

In 1978, the Department of Communications came out with the digital license in Canada. I had the highest license, so I wanted to get the whole works. This new license didn't offer that many new privileges for me. I thought that from my background at IBM dealing with digital communications aspects, I could pass it easily. So I got the information on the examination and read it over. I got very interested in some other aspects of communication that I hadn't considered. Up to that time, I had only been exposed to digital communications over wires, basically

telephone networks. Because of my background in several disciplines—radio communication, software, design, hooking up the circuits and hardware—I saw an idea of how to put these things together. Also, I had just read about the Intel 8273 product, which was the first asynchronous bit-oriented chip that was available on the market. I knew something about the IBM protocols, so I thought you could put this chip together with a little microprocessor and write a protocol for it to allow data communications experiments to go on Amateur Radio.



Doug Lockhart, VE7APU, checks out a copy of *Spectrum* magazine while explaining his outlook on the future of packet radio during his QST Profile interview.

Up to this time, there were several reasons why people could not do it practically. First of all, there was no enabling legislation—licensing didn't permit it up to then; at least it was perceived that licensing didn't permit it. In actual fact, looking back on it, that really wasn't an obstacle. The Canadian government's change in the regulations demonstrated that it was not an obstacle at all. In fact, the government wanted us to experiment in this area. The

second problem was that there was nothing available to easily do the bit-oriented protocol work until the Intel 8273 chip came along. At the time I saw it, there was only preliminary information about it. Number three, there was no software available to hams to do the basic required link-level protocol. Also, personal computers had only become available three years earlier.

So just around 1978, all these things seemed to come together and create this possibility. I saw a way of putting everything together and maybe bring Amateur Radio digital communications ahead many years. The most advanced digital communications being done at the time on the ham bands was Baudot RTTY. Even in '78, those techniques were decades obsolete, and hams were mainly using that form of communication because commercial users had gone to something better and were tossing out the old Baudot machines. My perspective of the "advanced" thinking of the time was that we were going to improve amateur digital communication by getting rid of the Baudot machines and going to the ASCII TTY machines, which were beginning to be tossed out as being obsolete as well. If Amateur Radio persists in just using tossed-out technology from commercial users, we're never going to be able to hold our heads up high in the world. The gap between technology and what hams were using was getting further apart in years. Each year that went by was better than the year before, admittedly, but it was still losing ground. I felt the evolutionary approach to getting amateur technology moved ahead to more modern times wasn't working. You had to take a jump. So I decided to build something that used the best protocols and the best design to go from 1930 technology to the latest [1978] technology, or what I perceived it to be. That's why I put out the TNC. My hope was that hams would take a big leap forward and upgrade the technology. To some extent it happened. It hasn't gone as far or as fast as I'd like it to go.

Tell us about the prototype TNC.

The way I started to get this project under

way was by saying, "I need some help." I knew I could do everything, but I couldn't do it in a reasonable amount of time, and it would be a lot of work. I called a meeting by sending out notices to all the [Vancouver area] Amateur Radio clubs in January '79. There were about 30 people there. I laid out all my ideas of what I thought was quite possible for hams to do. The people in the room had never heard anything like that before, and most of them thought it was complete blue-sky work. Some of them thought it could never be done.

Everybody knows what can be done with packet radio now. Packet radio is part of ham radio now. Then, things were different. Some people opposed it because it was going to change ham radio. [They said] ham radio had to be person-to-person communications. They had very fixed ideas. Others thought no one could ever do it. Others felt you couldn't go as fast as the data rates I was talking about without investment in commercial equipment that cost hundreds of thousands of dollars. There was a lot of disbelief. The meeting started at 7:30, and I was still talking at 11:00. People were walking out. It was getting late and they were getting tired. I decided to make a plea for some support. I said, "Anyone who wants to stay, I'll take your names and we'll see what we can do." A few did stay, and those people did work on the project, and we got a lot of work done.

In 1979, we made a prototype board for what we called the station node controller, because the concept I had for packet radio is not the same as it's being practiced today. The station node controller was the central control station for the channel that ran in an S-100 PC, because that was the most advanced PC available. We designed a board to operate in the PC which used the 8273. Then, for the end users of the network, we decided to name the device for the point in the network that it represented, which was the termination of the network. So we called it a terminal node, and the unit we created was a controller that allowed that function to be performed. So we called it a terminal node controller. The TNC was a specific type of node in the network, which was made up of specialized nodes, such as station, gateway, repeater nodes, and the terminal node was the node the end user had. The idea at the time was that the developers of the network could put all the software in at the station-node level, and this would allow rapid development of the technology, because you would not have to change all the programs running in the terminal nodes all the time. You would just change the station node in order to give the terminal nodes more functionality.

So what was going on concurrently in the US?

There were no packet-radio organizations

and no experimentation was being conducted. Subsequently, I did a lot of work in various parts of the US to get US hams interested in amateur packet radio. It was difficult because most US hams felt that they had to violate the rules to do what we were doing. At that time I don't think it was legal for hams in the US to use even the ASCII code.

So this digital license was a catalyst from the government?

The digital license in Canada did not come by amateurs from the ground up, from amateurs demanding that the government change the regulations to permit this type of operation. In fact it's just the reverse. The digital license was designed by the government to encourage hams to develop equipment that they could use to solve frequency-contention problems. They thought hams could come up with something cheap with some new techniques and use the limited VHF frequencies in particular. And you can tell that from statements made by Dr De Mercado, the government representative who was the main author of the new regulations, and also from the regulations themselves which said, "Here are frequencies in the 220-MHz band and the 420-MHz band, and here's the bandwidth stations should operate in and so on." The government at the time had a concept of how they hoped hams would develop the type of equipment the government wanted. As a matter of fact, there was strenuous opposition to the digital license by amateurs. I would say they were in the main against it. They had violent fights when the government announced it. Some accused Dr De Mercado of trying to destroy Amateur Radio by allocating frequencies in 220 MHz just for packet radio use only. The government, in spite of everything, rammed it though.

What is the future of high-speed digital communications, and what does it mean to Amateur Radio?

It's hard to predict the future. I guess maybe I set my sights too high. The objective was to get a widespread high-speed reliable digital communications network going in Amateur Radio that would be as good as or better than the best commercial communications networks. That was my thought at the time—why I built the first TNC, why I organized the first meeting, and why I did all that work. That was my vision of what Amateur Radio could do. I think Amateur Radio can still do that, but it seems that 10 years have gone by, and I haven't seen this thing developed yet. I don't know when or if it's going to come about now. In some ways it's harder to be technically innovative now than it was back in '79. Hams now have a more fixed idea of what packet radio is. What I want to do is give it a whole new name. What hams look at as packet radio now is not what I

was thinking in '79, and we're still a long way away from the widespread high-speed reliable communications network that I envisaged. I think we can do it technically. I didn't see any insurmountable technical problems back in '78, and I don't see that the problems today are insurmountable, but our group could do only so much. Right now we're hoping that someone else can do a lot of the rest. I think we made a good start. My vision for packet radio is not one the average amateur envisages for a suitable project for hams, because otherwise it would have been done by now. If it's getting there, it's getting there by a very circuitous route.

What about HF?

I don't know that packet radio is well suited to HF communication. When I developed it, it was intended for VHF, UHF and microwave. It is being used on HF. It's mainly useful for when you have reliable communications channels. It requires a 99.9% reliability of the bits getting through to be useful, because you have to have a whole set of bits coming through in order to receive the thing perfectly. One should remember that the very first TNC was designed to operate at up to 64 kbauds. I don't think HF is the *major* direction that amateur packet radio should be heading. I think HF packet radio can be pursued, but I think the main future is on VHF and above.

Strays



SAY A LITTLE PRAYER

□ While driving on a northern Virginia interstate highway, I looked in my rear view mirror, read the license plate behind me, and thought I had located someone deeply into religion. I saw what appeared to my feeble eyesight to be the word "AMEN." When the car passed me, all fell into place. It was a ham who must have been praying for an exotic QSO. His call was N3MA.—George A. Stein, NJ3H.

I would like to get in touch with...

□ anyone with schematics/manuals for a WW II Navy HF receiver type CCT-46077 2-20 MHz made by Stromberg Carlson for Westinghouse and the accompanying type CAT-20086 rectifier power supply made by Westinghouse. Also, schematics/manuals for a Signal Corp BC-459A transmitter and power supply. I wish to put an all-WW-II-vintage station on the air to work special-event stations associated with related events. Bob Pinkus, WA8NYY, 5280 Gander Rd W, Dayton, OH 45424.

We Get Down to Business!

Meet Your 1989 Foundation Board and see what's in the works for your favorite program!

By Mary E. Schetgen, N7IAL
Secretary, The ARRL Foundation

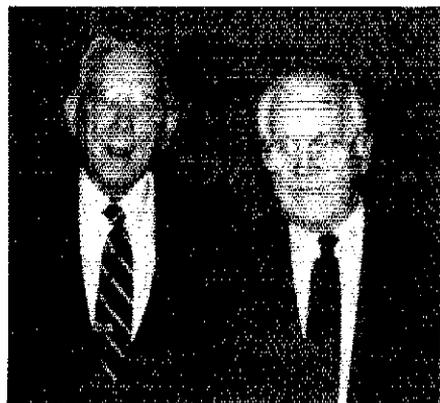
Members of the Board of Directors of the ARRL Foundation met in a brisk session the night of January 21, 1989 in Hartford, CT. As this meeting came right at the close of the ARRL Annual Meeting of the Board of Directors, no time was lost in getting right to the business of interest to our Foundation supporters. Highlights of the meeting include:

- \$10,000 Grant Approved For Courage Handi-Ham System

The Courage Center Handi-Ham System Equipment Loan Program is about to get some assistance in helping to sustain the popular Equipment Loan Program. A \$10,000 grant by the Foundation, to be disbursed over a three-year period, has been made to the Handi-Ham Endowment Fund. Additional funding above the granted amount was discussed for consideration at a later date.



Even a late-evening (9:30 PM!) start for our Annual Meeting didn't dampen the spirits of your 1989 ARRL Foundation Officers and Directors: Top (l-r), Directors Tom W. Frenaye, K1KI, Frank M. Butler, Jr, W4RH, Rush S. Drake, W7RM, and President Paul Grauer, W0FIR. Front row (l-r), Secretary Mary E. Schetgen, N7IAL, Director Leonard M. Nathanson, W8RC, and Treasurer Larry J. Shima, W0PAN. Not shown, Directors Ralph V. Anderson, K0NL, Dick L. Eilers, W0YZV, President Emeritus Robert York Chapman, W1QV and L. Phil Wicker, W4ACY.



ARRL Foundation President Paul Grauer, W0FIR, and Edmond Metzger, W9PRN, expressed appreciation for the enthusiastic support shown by contributors throughout the year and they're working to shape the programs you've asked for. (photos courtesy W0PAN)

- Scholarship Awards Increase

The Paul and Helen L. Grauer Scholarship will now make *two* \$500 awards each scholarship season. The L. Phil Wicker, You've Got A Friend in Pennsylvania, and the Perry F. Hadlock Memorial Scholarships have each been increased to \$1000. Write the ARRL Foundation for full scholarship(s) information and applications.

- Victor C. Clark Youth Incentive Program Grants Increase

The Board approved five (5) separate grant requests for the following groups:

BSA Troop 11—Middle Tennessee Council. \$500 for school station and radio kits project.

Chaminade-Madonna College Preparatory Radio Club—Hollywood, FL. \$500 for an OSCAR 13 project.

Saint Patrick's High School—Halifax, Nova Scotia. \$500 for purchase of used HF gear for club start.

Oklahoma State University. \$500 for IEEE, W5YJ and local middle schools on HF DX geography-awareness project.

Turner High School—Burneyville, OK. \$500 for extension of science curriculum involving Amateur Radio in an economically depressed regional area.

SIMPLE WILL KIT NOW AVAILABLE

When planning your will, you may have thought about including a gift to the ARRL Foundation program of your choice. We've anticipated your questions in our Simple Will Kit, an easy-to-follow, straightforward informational package (including forms) that you and your attorney can use when planning your estate and will. To send for our free package, just write: Simple Will Kit, The ARRL Foundation, 225 Main Street, Newton, CT 06111.

THE MEMORIAL CONTRIBUTION

The Foundation receives several memorial contributions each month. Some are from clubs; most are from friends or the family of a cherished Silent Key. *All* contain the carefully written, heartfelt remembrances of times spent with a departed ham friend or family member. Letters recall Joe, with the terrific fist or Molly, who *always* seemed to be the cutup at club meetings. They recall an Elmer or student, friend or spouse. Hams may be the most generous people on earth—certainly the willingness to share their feelings in the form of letters and notes accompanying contributions strengthens this notion. We'd like to thank all memorial contributors for making a donation on behalf of a Silent Key, and especially for the generosity of

spirit shown by the many written tributes we receive.

CONTRIBUTOR'S CORNER

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

The Victor C. Clark Youth Incentive Program Fund

IBM Corporation, for William P. Ellis
in memory of Paul C. Ellis
IBM Corporation, IBM Quarter Century Club
in memory of Paul C. Ellis
Tom Frenaye, K1KI

The Jesse Bieberman Meritorious Membership Fund

Ian A. Kellman, MD, K3IK

The Goldwater Fund

Frank Parker Heinemann, W1YG
D. Ross Webster, K6WM
in memory of Arthur H. Nelson,
WA6SWK

The Paul and Helen L. Grauer Scholarship Fund

Paul Grauer, W0FIR

The Perry F. Hadlock Memorial Scholarship Fund

Doris J. Hadlock

The General Fund

Danny R. Sumendap, YC0JAP
Robert P. Felton, K7WLX
Richard Taylor, WA1TFM
Carl A. Felt, Jr
Robert H. Vroman, K8PHZ
Leslie R. Yoder, W6SMR
Paul C. Russo, Sr, N2HQH
Kenneth P. Greene, K6BIQ
Barry L. Reitz, KA3BBK
Mike P. Rogers, G4NAR
Werner Ertelt
Guy Black, W4PSJ
Northwest Amateur Radio Council, Inc
Gerold International Booksellers, Inc
Sid S. Axelrod, KA1GLP
David C. Miller, K0RJL
Eric Fort
Shirley Holmgreen, KB7AOV
Richard H. Seigle, KA9UTR

Nick P. Fofonoff, KA1CYT
James A. McHugh, Jr, WB2NRT
Ernest G. Whitney, WB3DGD
C. M. Aker, K6YFX
Tri-City Amateur Radio Club (CT)
in memory of Earl F. Tracy, W1KYV
Ralph P. Horian, N7BD
in memory of Francis J. Masser, W6AVD
Mount Beacon Amateur Radio Club
in memory of Kenneth Taber, W2AGQ
Mount Beacon Amateur Radio Club
in memory of Ted Buley, W2RTE
Dick L. Eilers, W0YZV
Roger E. Knowles, W9HCW
David A. Horn, W8SBM
Milton Chambers, N4POB
John V. Boehme, K4PRK
Bruce A. Canan, KE8UG

As received and acknowledged during the month of December. 



THE ARRL FOUNDATION, INC.

"for the advancement of amateur radio"

The 17-Meter Band

(continued from page 34)

subject to detuning from nearby conductive objects.

A 17-Meter Sloping Dipole

Many hams have towers, masts or trees available for antenna support. You may want to take advantage of an existing support structure and erect a sloping dipole, like the one shown in Fig 2 (p 34), for 17 meters. This antenna yields a combination

of vertical and horizontal polarization, has a reasonably low radiation angle (good for DX), and has some directivity in the direction of the wire slope. The conductors may be made of no. 12, 14 or 16 hard-drawn copper wire or Copperweld™, or other wire.

Summary

I gathered a fair amount of useful information while doing experimental work in the 17-meter band. Although I've directed attention toward simple antennas in this article, there are a number of other conventional antennas that will provide good performance on 17 meters. Suggested additional reading includes *The ARRL Antenna*

Book and *W1FB's Antenna Notebook*.²

I'd like to express my gratitude to Bill Orr, W6SAI, Prose Walker, W4BW, Bob Haviland, W4MB, and Stu Cowan, W2LX, for their help in collecting the information that made this article possible.

Notes

1. Lau, "Using a Coax Transmatch with Open-Wire Line," Technical Correspondence, QST, May 1988, p 43.
2. G. L. Hall, Ed, *The ARRL Antenna Book*, 15th edition (Newington: ARRL, 1988), and D. DeMaw, *W1FB's Antenna Notebook* (Newington: ARRL, 1987). 

What is Amateur Radio?

Amateur Radio, also known as "ham radio," is communicating. Hams, who must be licensed by their governments, operate two-way equipment from their homes and cars. They communicate with other hams across town or across the world on special sets of radio frequencies, or bands, that are set aside for Amateur Radio use.

Who are hams?

Just about anyone can be a ham—there are no age limits. Many people with disabilities find a door to the world in Amateur Radio. Some famous people are hams, but most are just people from all walks of life who like making new friends around the world.

How can I become a ham?

Getting a ham radio license is easier than you may think. In the US, the Novice (beginner's) license requires only passing a 30-question written exam on basic electronic theory and FCC rules and regulations, along with copying and sending Morse code at five words per minute.



The American Radio Relay League (ARRL) offers a wide variety of information for persons interested in radio communication. We can also provide you with a list of clubs and instructors in your area. Many local Amateur Radio clubs offer licensing courses several times a year.

For a prospective ham packet, contact the ARRL, Dept Q, 225 Main St, Newington, CT 06111, tel 203-666-1541.

ARRL Requests Oral Argument in 220-MHz Docket

In January there were two important "battles" in the fight to preserve the entire 220 MHz band for the Amateur Radio Service. The first was the ARRL decision to petition the FCC requesting an oral argument before the FCC Commissioners regarding 87-14. If an oral argument is granted, this will be the first oral argument before the FCC on an amateur matter in many years.

Here's a summary of our request: The ARRL said Docket 87-14 "failed utterly and completely to take into account the inability of the Amateur Radio Service, for technical reasons, to reaccommodate the thousands of displaced users" from 220-222 MHz to 222-225 MHz. Also, the "devastating" loss of 220-222 MHz on the development of national data communications "has never been adequately conveyed to the Commissioners," and the economic effect of this loss has also been "misunderstood" by the Commission.

Our request quotes Public Law 100-594, which states that "government agencies shall take into account the valuable contributions made by Amateur Radio operators when considering actions affecting the Amateur Radio Service" and points out this legislation clearly warrants the Commission to consider the result of the reallocation on the Amateur Radio Service, the future of the amateur packet radio and voice repeater networks and the effect of 87-14 on the ability of the Service to render emergency communications.

The ARRL request concluded: "Oral argument will permit the League to present, in concise fashion, the truth about the effect of the reallocation on the Service and factual data on the subject which has not thus far been adequately conveyed to the Commissioners."

Section 1.423 of the Commission's rules provides for oral argument in rule making proceedings if the Commission determines it is warranted. It is not known if and when the Commission will grant the request.

The second battle rages in the FCC docket files. Back in November 1988, United Parcel Service filed a Petition for Rulemaking, RM-6595, to "assist the Commission in the formulation of service rules for the 220-222 MHz band and to ensure that the much-needed spectrum is available on a timely basis." This is an apparent effort to speed up the release of these frequencies for private land mobile use.

The ARRL has now filed comments strongly opposing the UPS Petition. We said: "It is apparent that UPS submitted its petition primarily as an attempt to justify the frequency allocation relative to the Docket 87-14 appeals, rather than to establish permanent operating parameters for the

private land mobile use of the band. The first half of the petition, for example, makes no reference at all to the specifics of the UPS proposal for implementation of the band, but rather is a statement of the alleged justification for the frequency allocation...the UPS petition is thus no more than an unauthorized pleading submitted with the intent to influence the Commission's deliberations on reconsideration in Docket 87-14."

Our petition also pointed out: "The UPS petition, however, seeks to implement a frequency band which may well never be available to the Land Mobile Service. It would be highly premature, and a waste of the Commission's time and resources, to commence a proceeding which may be rendered moot by action on any of the more than 500 reconsideration petitions now on file."

Even assuming, for argument's sake, that 220-222 MHz was ultimately reallocated to both the government and non-government Land Mobile Services, paragraph 57 of the 87-14 Order noted there would have to be a coordination procedure developed for the band between the two users. It would certainly be premature to propose any channelization plan prior to the development of sharing arrangements between government and non-government services. The ARRL concluded by urging FCC to dismiss the UPS Petition.

ARREST MADE IN ATLAS/DENTRON INVESTIGATION

Michael D. Harrison, WB2PTI, of Ocean-side, New York, was arrested January 26 by a US Postal Inspector and charged with mail fraud and wire fraud. Harrison was arraigned before US Magistrate Alynne Ross on January 26 and released on a \$25,000 personal recognizance bond.

According to a complaint filed in United States District Court, Eastern District of New York, by US Postal Inspector Martin T. Biegelman, Harrison "did knowingly and wilfully devise a scheme and artifice to defraud and did...place and receive items through the United States Mail and did transmit sounds in interstate commerce using wire communications."

The complaint states that Harrison, also known as "John McNamara" and "Mike Hanson," "placed advertisements for Atlas Radio, Inc. in the November and December 1988 issues of 73 Amateur Radio Magazine and placed advertisements for The New Dentron Radio Company, Inc. in the January through December 1988 issues of 73 Amateur Radio Magazine." QST was approached by Harrison, but declined to run

any of his ads.

According to the ads, Atlas had joined with Uniden to market the AR/HR 2510 10-meter mobile transceiver, a statement denied by Gary Kline, attorney for Uniden Corporation of America. The complaint stated "Mr. Kline told me [Biegelman] that Atlas Radio approached Uniden in early 1988 wanting to act as its distributor, but Uniden declined...Uniden has never had a relationship of any kind with defendant MICHAEL D. HARRISON and never gave him or anyone else permission to use Uniden's name in Atlas' advertisement...the advertisements are misleading in that Uniden has not joined forces with Atlas and was not even aware of the advertisements until after they appeared in the magazine. Mr. Kline further advised me that Uniden has initiated a civil action against Atlas Radio and HARRISON for the unauthorized use of its name."

In a letter to ARRL HQ, Biegelman asked that amateurs be advised of his investigation and for any victims to contact him by letter and "include a detailed statement of facts, date and magazine where they saw the advertisement, date of order, what was ordered, copy of front and back of check or money order sent, was the US Mail used and how, did the person receive what was ordered, what representations or misrepresentations were made by Michael Harrison or any other person from Atlas/Dentron, etc, what efforts were made by the victim to contact Harrison and what was Harrison's response." Please include any other pertinent facts and send this info, including copies of advertisements, letters, receipts, etc to Martin T. Biegelman, Postal Inspector, PO Box 160, Hicksville, NY 11802-0160.

FCC ENFORCEMENT ACTIONS

□ The FCC has fined seven New York City men a total of \$6500 for illegal repeater operation on frequencies allocated to the US government for fixed, mobile and satellite communications. The illegal radio station was installed by a licensed radio amateur, Michael Munoz, N2FRV, who was fined \$2000. Fined \$750 each were Alex Matos, John Mateo, Angel Matos Jr, Edward Matos, Edison Tavarez and Louis Rosario.

□ In further action, the FCC has initiated criminal prosecution against Rubel's CB Sales of Toledo, Ohio for the marketing of illegal CB radio equipment. According to an FCC news release, equipment valued at \$3000 was seized from the Ohio company.

FCC ANNOUNCES AWARDS

The FCC's highest award for distinguished service, the Gold Medal, was presented to Alex D. Felker, N4LF. Felker

was cited for superior executive qualities as Chief of the Mass Media Bureau. Under his guidance, the Bureau prepared nearly 200 Commission actions and achieved record performance in the processing of applications. He joined the FCC in 1972 and has worked in the Common Carrier Bureau, Field Operations Bureau, Office of Plans and Policy and has served on Chairman Patrick's personal staff.

The Gold Medal is awarded each year for sustained extraordinary achievements related to the objectives of the FCC. The Silver Medal, signifying meritorious service, was presented to Martha Contee; William Luther, W3ZME; Gary Stanford, W4FDP; and Michael Wack.

FAR ANNOUNCES SCHOLARSHIPS

The Foundation for Amateur Radio, Inc (FAR), a nonprofit organization with headquarters in Washington, DC, plans to award 32 scholarships for academic year 1989-90 to assist licensed radio amateurs.

The Foundation, composed of 50 Washington-area Amateur Radio clubs, fully funds four of these scholarships with the income from grants and its annual ham-fest. It administers, without cost to the donors, seven scholarships for the QCWA; five for the Baltimore (MD) ARC; three for the Radio Club of America; and two each for the Dade (FL) Radio Club, the Amateur Radio News Service, the 10-10 International Net, and the West Allis Radio Amateur Club of Milwaukee. It also administers one each for the Richard G. Chichester Memorial, the YLRL, the Columbia (MD) Amateur Radio Association, the Frederick (MD) Amateur Radio Club and the Vienna (VA) Wireless Society.

Licensed radio amateurs may compete for these awards if they plan to pursue a full-time course of studies beyond high school and are enrolled in or have been accepted for enrollment at an accredited university, college or technical school.

Some of the scholarships require the holding of at least an FCC General class license. The awards range from \$500 to \$2000 with preference given in some cases to residents of specified geographical areas or the pursuit of certain study programs.

Additional information and application forms can be obtained by letter or QSL card postmarked prior to May 31, 1989 from FAR Scholarships, 6903 Rhode Island Ave, College Park, MD 20740.

The Foundation for Amateur Radio is devoted exclusively to promoting the interests of Amateur Radio and those scientific, literary and educational pursuits that advance the purposes of the Amateur Radio Service.

HEATH'S POCKET PACKET TNCs DONATED FOR USE IN SHUTTLE

Two representatives from the Heathkit Company recently presented three HK-21 Pocket Packet TNCs to the Johnson Space Center ARC for use in a proposed experi-

FCC-Issued Call Sign Update

The following is a list of "just issued" call signs as of January 1.

District	Group "A" Extra	Group "B" Advanced	Group "C" Tech/Gen	Group "D" Novice
0	WQ0H	KF0AD	N0KAN	KB0DTE
1	NU1Z	KC1NA	N1GEO	KA1SZU
2	WM2X	KE2KT	N2IVX	KB2GVJ
3	NT3F	KD3KX	N3GSU	KA3TZF
4	AB4MH	KM4LX	N4UQF	KC4IGC
5	AA5JM	KG5QJ	N5NOV	KB5IDT
6	AA6MB	KJ6PM	N6TYB	KC6BKJ
7	WV7Z	KF7QI	N7MBB	KB7GLA
8	WN8K	KE8VX	N8KEP	KB8GCA
9	WE9X	KE9OC	N9IAG	KB9BWQ
Guam	KH2K	AH2CD	KH2DN	WH2ALU
Hawaii	**	AH6JM	NH6SH	WH6CBP
Alaska	**	AL7KR	NL7PJ	WL7BTD
Virgin Islands	NP2E	KP2BN	NP2CT	WP2AGE
Puerto Rico	**	KP4PV	WP4SY	WP4IGP

** All 2 x 1 call signs have been issued in the district.

ment on a future space shuttle flight.

The primary purpose of the presentation was for use on the proposed Shuttle Amateur Radio Experiment (SAREX) tentatively scheduled for March 1990. If the project is approved, NASA will mount one of the TNCs into the SAREX casing unit, with modifications for use in zero gravity.

ATLANTA RC SCHOLARSHIP

The Atlanta Radio Club announces it will have up to \$2000 available to award in its 1989 scholarship program. Applicants must be licensed amateurs graduating from high school and entering an approved college or university as freshmen for the first time. Awards will be made on a basis of scholarship, Amateur Radio achievements, citizenship and/or leadership, and financial need. Some preference will be given to people living in Georgia and adjoining states. For further information and application forms, write Phil Latta, W4GTS, 259 Weatherstone Pkwy, Marietta, GA 30068.

TEAM TO STUDY NO-CODE ISSUE

ARRL President Larry Price, W4RA, has appointed the ARRL No-Code Study Committee. The Committee's charge is to explore the implications of a no-code amateur license and make a report to the Board of Directors at its second 1989 meeting. The committee members are ARRL Vice President George Wilson III, W4OYI and Director Rodney Stafford, KB6ZV, representing ARRL; John Crovelli, W2GD, and Ken Kopp, K0PP, representing the general amateur community; C. Mike Lamb, N7ML, CEO of Advanced Electronic Applications (AEA) and Y. E. "Ed" Juge, W5TOO, director of market planning for Radio Shack/Tandy Corporation, representing the Amateur Radio industry interests. ARRL EVP David Sumner, K1ZZ, will be acting as ARRL HQ Liaison. Special liaisons appointed by President Price are Tom Atkins, VE3CDM, President, CRRL; and Leland Smith, W5KL, President of

QCWA, to ensure that the Committee has input from these organizations.

PACKET STA HAS BEEN EXTENDED

The ARRL has learned that the FCC has extended the Special Temporary Authority (STA) for certain unattended HF packet stations to operate until January 5, 1990. The STA extension only applies to those 75 stations who are currently operating under the STA.

SECTION MANAGER APPOINTMENTS

In the San Francisco Section, Richard Wilson, K6LRN, has been appointed to complete the term (until September 30, 1989) of Robert Odell Smith, NA6T (resigned).

In the Delaware Section, Harold K. Low, WA3WIY, has been appointed to complete the term (until December 31, 1989) of Robert J. Pegritz, KC3TI (resigned).

In the Maine Section, Clyde E. Bonesteel, Jr, WA2ERT, has been appointed to complete the term (until June 30, 1990) of Bill Mann, W1KX (resigned).

In the Virginia Section, Claude Feigley, W3ATQ, has been appointed to complete the term (until March 31, 1990) of Mark Witt, NN4I (resigned).

In the Colorado Section, Edith Sheffield, KA0MQA, has been appointed to complete the term (until September 30, 1989) of William Sheffield, KQ0J (resigned).

SECTION MANAGER ELECTION RESULTS

The following Section Managers will begin a two-year term of office April 1, 1989:

Uncontested

Arizona	James E. Swafford, W7FF
Arkansas	Bob Harmon, W5SEP
Kentucky	John A. Thernes, WM4T
Orange	Joe H. Brown, W6UBQ
Puerto Rico	Alberto L. Valldejuli, WP4CSG (will begin a term of 18 months)

The 1989 Annual Meeting of the ARRL Board of Directors

A brief summary of actions taken

By Michael R. Riley, KX1B

Assistant to the Executive Vice President

The ARRL Board of Directors held its annual meeting in Hartford, Connecticut on January 20 and 21. This article highlights a few of the more important issues discussed during the two-day assembly.

The Washington Arena

Early in the meeting, ARRL President Larry Price, W4RA; Executive Vice President David Sumner, K1ZZ; and Counsel Chris Imlay, N3AKD, all reported on aspects of the tireless and multifaceted campaign to retain the entire 220- to 225-MHz band. The most recent action was to request oral argument on the ARRL



The 1989 ARRL Board of Directors at the 1989 Annual Meeting in Hartford, Connecticut. (Meyers Studio photos)

Table 1

ARRL Standing Committees

Executive Committee (Minute 62)

Larry E. Price, W4RA, Chairman
Hugh A. Turnbull, W3ABC
Paul Grauer, W0FIR
Stephen A. Mendelsohn, WA2DHF
Tom Frenaye, K1KI
Jay A. Holladay, W6EJJ
David Sumner, K1ZZ

Administration and Finance (Minute 74)

Edmond A. Metzger, W9PRN, Chairman
Fried Heyn, WA6WZO
Joel M. Harrison, Sr, WB5IGF
Clyde O. Hurlbert, W5CH
James E. McCobb Jr, K1LLU

Membership Services (Minute 74)

Marshall Quiat, AG0X, Chairman
Frank M. Butler, W4RH
John C. Kanode, N4MM
Jay A. Holladay, W6EJJ

Publications Committee (Minute 74)

Jim Haynie, WB5JBP, Chairman
Howard Mark, W0OZC
Leonard M. Nathanson, W8RC
Tod Olson, K0TO

Volunteer Resources (Minute 74)

Rodney J. Stafford, KB6ZV, Chairman
Rush S. Drake, W7RM
Evelyn Gauzens, W4WYR
George S. Wilson III, W4OYI

Petition for Reconsideration of the FCC decision last August to reallocate 220 to 222 MHz to the Land Mobile Service. (Minutes 9, 14 and 15)

In other FCC-related matters, the Board set out guidelines for Reply Comments in

PR Docket 88-139, concerning the rewrite of the amateur rules. By the time you read this, the ARRL will have filed in favor of expanding the 6-meter repeater subband down to 51 MHz in PR Docket 88-527, with the use of the band to be determined by detailed band planning. The Board asked its officers to follow up on PRB-3, concerning special call signs. It's been more than a year since the close of comments, and no action has been taken by the FCC. (Minutes 97, 24 and 120)

The Board reaffirmed the League's position that all amateur communications for the news media must meet all the elements of the FCC four-part test. The ARRL Executive Committee is to develop and implement plans of action to bring about a higher level of FCC enforcement of the amateur rules, and to cause the FCC to use the authority given it by Congress to control the immunity of electronic devices to radio-frequency interference. (Minutes 116, 105 and 81)

Also, in an attempt to better inform ARRL members of the fast-paced and important activities in Washington, regular summaries of government activity related

Table 2

Officers and Directors of the ARRL Foundation (Minutes 16 and 64)

(Members elected to new three-year terms of office are in boldface)

Officers:

Paul Grauer, W0FIR, President and Director
Mary Schetgen, N7IAL, Secretary
Larry Shima, W0PAN, Treasurer and Director
Robert York Chapman, W1QV, President Emeritus
L. Phil Wicker, W4ACY, Honorary Vice President

Directors:

Ralph V. Anderson, K0NL
Rush S. Drake, W7RM
Dick L. Eilers, W0YZV
Thomas W. Frenaye, K1KI
Frank M. Butler, Jr, W4RH
Edmond A. Metzger, W9PRN
Leonard M. Nathanson, W8RC

Table 3

Summary of Board Actions

<i>Minute Purpose</i>	<i>Disposition</i>	<i>Minute Purpose</i>	<i>Disposition</i>
<i>Awards and Acknowledgements</i>			
89 Resolution thanking John Parrott, W4FRU	Adopted	126 1989 ARRL Foundation budget	Adopted
90 Resolution thanking Project Suncoast Seniors volunteers	Adopted	127 Educational Advisor Program implementation	Adopted
103 Resolution congratulating AMSAT and Rich Ensign, N8IWJ	Adopted	<i>Amateur Radio Operations</i>	
128 Resolution thanking staff	Adopted	23 ARRL to advocate awards activities on 10 MHz	Adopted
<i>ARRL Organizational (Regarding the Articles of Association or By-Laws)</i>			
45 & 46 Amending of By-Law 19 (sending Director/Vice Director ballots via first-class mail)	Lost	26 MSC study of 160 through 10-meter automatic packet-radio feasibility	Adopted
49 & 114 Amending of By-Laws 19, 20 and 24 Inclusion of By-Law 41A (ARRL Election Committee)	Adopted	86 MSC spectrum management impact and feasibility study of packet operation on 10-meters above 28.3 MHz	Adopted
113 Amending Article 7	Lost	92 MSC study of ARRL school-club roundup contest	Adopted
117 Amending of By-Law 36	Lost	<i>Publications/Media</i>	
<i>ARRL Organizational (Other than the Articles of Association or By-Laws)</i>			
7 Minutes of 1988 Second Meeting amended	Adopted	78 & 109 ARRL committee reports to be available to membership	Adopted
18 & 98 1989 ARRL budget	Adopted	110 & 112 A & F to study making the budget available to membership	Postponed
28 NTS Logo design by W6BNJ chosen	Adopted	91 FCC repeater operation regulations in <i>Repeater Directory</i>	Referred to PC
29 ARRL VEC Statement of Purpose	Adopted	93 Printing of foreign incoming QSL bureaus w/restrictions	Adopted
30 Procedures to modify or form ARRL Sections Committee on Elections Procedures	Postponed	101 Advertising approval process article in <i>QST</i>	Adopted
41 recommended policy regarding reimbursable expenses	Adopted	107 Study on <i>QST</i> availability in Hawaii, Puerto Rico, Virgin Islands	Referred to PC
42 VRC to examine terms of Section Managers	Adopted	108 Change in Technical Excellence Award program	Adopted
43 Improved information flow to newly elected Directors/Vice Directors	Adopted	116 Reaffirmation of Amateur Radio/media guidelines	Adopted
44 & 115 Standards of candidate conduct during ARRL elections	Adopted	119 Regular summaries of Amateur Radio-related government activities to be published	Adopted
48 & 83 Guidelines for mass communication by candidates for election	Adopted	<i>International Amateur Radio Union (IARU) Matters</i>	
50 Top priority to HQ emergency plan	Adopted	53 IARU assistance requested regarding communication emergencies	Adopted
51 Proposed HQ emergency coordinator duties	Adopted	65 ARRL vote for IARU Proposal 185	Adopted
52 NTS position papers request by ANERCOM	Adopted	66 ARRL vote against IARU Proposal 186	Adopted
54 ANERCOM charter for 1989	Adopted	67 ARRL vote for IARU Proposal 187	Adopted
55 1989 ANERCOM budget	Adopted	68 ARRL vote for IARU Proposal 188	Adopted
77 1989 ARRL Arkansas State Convention	Adopted	69 ARRL vote against IARU Proposal 189	Adopted
79 1989 ARRL Nebraska State Convention	Adopted	70 ARRL vote for IARU Proposal 190	Adopted
80 ARRL Executive Committee to review Board Standing Orders	Adopted	7 ARRL vote for IARU Proposal 191	Adopted
82 DXAC operating fund increase	Lost	<i>Regulatory Matters</i>	
84 1989 ARRL Alabama State Convention	Adopted	24 ARRL to file comments supporting 6-meter repeater subband expansion	Adopted
87 Division of Washington Section	Adopted	81 EC to develop and implement plan for FCC to establish RFI standards	Adopted
88 Dates of 1989 Second Meeting of the Board	Adopted	97 Reply Comments Part 97 Rewrite	Adopted
94 Election Committee study of length of term for directors and vice directors	Adopted	105 EC to develop and implement plan for greater FCC enforcement	Adopted
95 VRC to develop criteria for performance appraisals of advisory committee appointees	Adopted	120 Resolution regarding PRB-3	Adopted
96 MSC study of terms of reference for VHF Repeater and VHF/UHF Advisory Committees	Adopted	<i>Miscellaneous</i>	
99 NTS National Traffic Service Award	Adopted	22 AMSAT invited to designate liaison on spectrum management matters	Adopted
100 VRC study of section emergency stations	Adopted	25 Funding for development of automated DXCC process	Adopted
104 1989 ARRL Northwestern Division Convention	Adopted	37 ARRL to apply for Sr Associate Membership in EEPA	Adopted
106 A & F to study completing 1990 budget by June 15, 1989	Approved	38 Eighth ARRL Computer Conference to be held in Colorado Springs, CO	Adopted
111 Petitioning of the Board by membership	Postponed	85 Funding for the new printing press, paper cutter and folder	Referred to A&F
118 VRC study of Local Government Liaison appointment	Adopted	102 MSC to examine contest log checking procedures	Adopted
121 The obtaining of "Official Family" QSL cards by Section Managers	Lost		
122 1989 ARRL Division budgets	Adopted		
123 1989 ARRL Committee, task group and task force budgets	Adopted		
124 1989 Travel budget for ARRL QSL Bureau managers	Adopted		
125 1989 NTS budget	Adopted		



W1UED, W4OYI and W5CH follow the action.



W6EJJ, W4RA and K1ZZ listen to the discussion.



Three of the new vice directors, W6DPD, WD4HLZ and KQØJ, are "taking it all in" during their first Board of Directors Meeting.

Director Tom Frenaye, K1KI, were elected to serve on the ARRL Executive Committee (EC). Table 1 lists all EC members. Executive Vice President David Sumner, K1ZZ, replaces Perry Williams, W1UED, as ARRL Secretary, allowing W1UED to devote more time to Washington, DC-related matters. (Minutes 62 and 63, respectively)

ARRL VEC Statement of Purpose

The purpose and objectives of the ARRL Volunteer Examiner Coordinator are now

clear. If you're involved with the ARRL VE Program, Minute 29 is well worth reading.

National Traffic Service Award

The Board, responding to the concerns of many members, approved a National Traffic Service award to those who furnish assistance in the way of FM repeaters, packet digipeaters, packet bulletin boards or similar services through which NTS traffic flows. (Minute 99)

Election of New ARRL Foundation Directors

The ARRL Foundation affords many young amateur operators the opportunity to better themselves by furthering their formal education. Three directors have been newly appointed to the foundation (Minute 64). Directors and officers of the foundation are listed in Table 2.

Following This Article

A table summarizing the actions taken by the ARRL Board of Directors appears with this article. As this provides only a thumbnail description of what happened, we urge you to read the entire text of those items that interest you in the official Minutes, which begin on page 58. 



KB6ZV and N4MM digging through the financial reports.

to Amateur Radio will be published. (Minute 119)

Welcome to a New ARRL Section!

With the division of Washington Section into Eastern Washington (EWA) and Western Washington (WWA), there are now 69 ARRL Sections. The new Washington sections are divided by the Cascade Mountain range. If you live in Washington, check the Minutes of the Board Meeting to determine which new section you're in. (Minute 87)

Executive Committee Elections and a New ARRL Secretary

Director Hugh Turnbull, W3ABC; Director Paul Grauer, WØFIR; Director Stephen Mendelsohn, WA2DHF; and

Strays



Portable packet radio equipment donated by AEA, Tandy Corp. and Yaesu USA and shipped to the USSR by the ARRL has been put into operation in Armenia. The photo shows W. Levchin, UG6GG (right) demonstrating the equipment to colleagues in Yerevan. An article in the January 13 issue of *Sovetskaya Rossia* put it this way:

TO HELP THE "SEARCH"

Tens of thousands of people are still searching for each other after the disastrous earthquake which took place on December 7th of the last year. They are able to do it faster and better now with the packet communication system which was put into operation yesterday at "The Search" computer center of the Central Committee of the Armenian Young Consomol League. The necessary equipment was a gift of the American radio ham society.

There is much to be done for the "Search": over five thousand people who hope to find their loved ones turn to them every day.—TASS, Yerevan

Moved and Seconded . . .

MINUTES OF THE 1989 ANNUAL MEETING OF THE BOARD OF DIRECTORS THE AMERICAN RADIO RELAY LEAGUE, INC. January 20-21, 1989

Summary Agenda

1. Roll Call
2. Moment of Silence
3. Consideration of the Agenda for the Meeting
4. Approval of the Minutes of the 1988 Second Meeting
5. Reports by the Officers
6. Receive Reports and Consider Recommendations of the Committees
7. Elections of Executive Committee Members and Secretary
8. Election of ARRL Foundation Directors
9. Consider IARU Proposals
10. Appointment of the Committees
11. Report of the Host Director, 1989 ARRL National Convention
12. Consideration of other ARRL National Convention Matters
13. Directors' Motions
14. Authorization of certain expenses for 1989

1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in Annual session at the Parkview Hilton Hotel, in Hartford, CT, on Friday, January 20, 1989. The meeting was called to order at 8:36 AM EST with President Larry E. Price, W4RA, in the Chair and the following Directors present: Hugh A. Turnbull, W3ABC, Atlantic Division; Edmond A. Metzger, W9PRN, Central Division; Bruce L. Meyer, W8HZR, Dakota Division (Vice Director, acting); Joel M. Harrison, Sr., WB5IGF, Delta Division; Leonard M. Nathanson, W8RC, Great Lakes Division; Stephen A. Mendelsohn, WA2DHF, Hudson Division; Paul Grauer, W0FIR, Midwest Division; Tom Frenaye, K1KI, New England Division; Rush S. Drake, W7RM, Northwestern Division; Rodney J. Stafford, KB6ZV, Pacific Division; John C. Kanode, N4MM, Roanoke Division; Marshall Quiat, AG0X, Rocky Mountain Division; Frank M. Butler, Jr., W4RH, Southeastern Division; Fried Heyn, WA6WZO, Southwestern Division; Jim Haynie, WB5JBP, West Gulf Division. Also present as members of the Board without vote were: Jay A. Holladay, W6EJJ, First Vice President; George S. Wilson, III, W4OYL, Vice President; Clyde O. Hurlbert, W5CH, Vice President; Tod Olson, K0TO, International Affairs Vice President; David Sumner, K1ZZ, Executive Vice President; and James E. McCobb, K1LLU, Treasurer. Also in attendance at the invitation of the Board as observers were the following Vice Directors: James M. Mozley, W2BCH, Atlantic Division; Allan L. Severson, AB8P, Great Lakes Division; Paul Vydareny, WB2VUK, Hudson Division; L.C. "Chuck" Miller, WA9KUH, Midwest Division; C.O. "Cliff" Laverty, W1RWG, New England Division; William R. Shrader, W7QMU, Northwestern Division; Charles P. McConnell, W6DPD, Pacific Division; James G. Walker, WD4HLZ, Roanoke Division; William M. Sheffield, KQ6J, Rocky Mountain Division; Evelyn D. Gauzens, W4WYR, Southeastern Division; Wayne Overbeck, N6NB, Southwestern Division; and Sam C. Sitton, KV5X, West Gulf Division. There were also present: Thomas B.J. Atkins, VE3CDM, President, The Canadian Radio Relay League, Inc.; Harry J. Danaïs, W2HD, ARRL President Emeritus; Secretary Perry Williams, W1UED; Counsel Christopher D. Imlay, N3AKD; Larry Shima, W0PAN, Controller; Paul Rinaldo, W4RL, Publications Manager; John F. Lindholm, W1XX, Membership Communications Services Manager; Richard K. Palm, K1CE, Field Services Manager; and Michael Riley, KX1B and Robert Schetgen,

KU7G, Assistants to the Executive Vice President.

2) The assembly observed a moment of silence in recollection of Radio Amateurs who have passed away since the previous Board meeting, especially Hal A. Bubb, W1JTD, and Walker A. Tompkins, K6ATX; and for Mr. Lindholm's mother, Tyne Lindholm.

3) The agenda was amended to move the Treasurer's report to be first in the reports of Officers. Whereupon, on motion of Mr. Kanode, seconded by Mr. Mendelsohn, the agenda was ADOPTED as presented.

4) The Chair recognized John C. Kanode in his new role as Director, Roanoke Division. Mr. Kanode presented the greetings of past Director Gay E. Milius, Jr., W4UG. Mr. Frenaye introduced C. O. "Cliff" Laverty, new Vice Director, New England Division. Mr. Stafford introduced Charles P. McConnell, new Vice Director, Pacific Division. Mr. Kanode introduced James G. Walker, new Vice Director, Roanoke Division. Mr. Quiat introduced William M. Sheffield, new Vice Director, Rocky Mountain Division and Mr. Haynie introduced Sam C. Sitton, new Vice Director, West Gulf Division (applause). The Chair noted with regret the absence of Dakota Division Director Howard Mark, W0OZC, because of illness, and of Howard S. Huntington, K9KM, Vice Director of the Central Division, because of business travel; and of Joseph A. Butler, K5OS, Vice Director of the Delta Division, because of illness in the family.

5) On motion of Mr. Frenaye, seconded by Mr. Butler, it was VOTED to postpone consideration of the Minutes of the 1988 Second meeting until later.

6) Mr. McCobb presented the report of the Treasurer. The report covered briefly sales and purchases of stock during the year and investments in short to medium-term bonds with yields of 9 to 11 percent. Overall financial figures for 1988 are not yet available, but will be presented in the printed Annual Report.

7) The Minutes of the 1988 Second Meeting were amended at Minute 13 by adding after the second sentence: "The Committee had met with representatives of the VHF/UHF and VHF Repeater Advisory Committees, the ARRL Committee on Amateur Radio Digital Communication, and members of the amateur spectrum management community in Torrance, California, on March 26th, and on July 19 with the chairman of the VUAC, Thomas Kirby, W1EJ. The portions of these committee reports dealing with subbands for automatic beacon operation were considered at this time." A new minute 32 A was inserted after Minute 32 reading: "Mr. Overbeck, as liaison, presented the report of the VHF/UHF Advisory Committee. The main substance of the report had been considered earlier, with the report of the Membership Services Committee." On motion of Mr. Mendelsohn, seconded by Mr. Metzger, the Minutes of the 1988 Second Meeting were approved as amended.

8) The Chair appointed Mr. Hurlbert as Parliamentarian for the Meeting.

9) Mr. Price presented his report as President. He mentioned the resignation of Mr. Williams as Secretary as of the end of the Meeting, in order to devote full effort to Washington affairs, especially the 220 MHz matter. The report also covered international travel, IARU officer nominations and proposed changes in its constitution; preparation for a possible future World Administrative Radio Conference; progress by the Officers on strategic planning; the appointment of a special committee to study the implications of a no-code license, and recent communications with the Radio Sports Federation of the USSR. During the course of the above the Board was in recess from 10:05 to 10:30 AM.

10) Mr. Holladay presented his report as First

Vice President, also mentioning the 220 MHz matter, rewrite of the Amateur Radio regulations in Docket 88-139, spectrum-management activities with the Membership Services Committee, travel to the Seventh Triennial Conference, IARU Region 3 in Seoul, and the IARU Administrative Council Meeting which followed.

11) The report of Vice President Wilson covered his work as chairman of the special committee reviewing the rewrite of the amateur rules and the special committee on elections. He was also active with the Legal Strategy Committee and the Administration and Finance Committee and participated with the other officers in beginning strategic planning.

12) Vice President Hurlbert emphasized the need for dedicated leadership by the ARRL Board in order to consolidate and continue the gains made in the past several years in membership, budget, and membership service improvements, through staff re-organization leading to increased morale and performance. The hobby is changing rapidly, with new technology and new modes coming at an accelerating rate, but the average age of the amateur population continues to rise, suggesting that the subject of some type of a no-code license must be revisited.

13) Mr. Olson presented his report as Vice President, International Affairs. The report covered meetings of ARRL officials with officials of Liga Mexicana de Radio Experimentadores (LMRE), Paul Rinaldo's attendance at the CCIR interim meeting in Geneva, President Price's attendance at the annual meeting of the CRRL, the 75th Anniversary of the Radio Society of Great Britain ceremonies attended by President Price and EVP Sumner, the meetings in Korea mentioned above, and the establishment of an Ad Hoc Planning Committee for the 1989 Regional Conference to be hosted by ARRL.

14) The Executive Vice President, Mr. Sumner, presented an extensive report on the affairs of the League. Spectrum challenges, membership growth, extraordinary expenses for 1988, staff matters, publications, advertising initiatives, Amateur Radio recruitment and training activities and WIAW renovation were among the topics addressed.

15) In his report, Counsel Imlay summarized FCC regulatory matters, two of which have filing deadlines right after the Board Meeting: in PR Docket 88-139, the rewrite of the Amateur Rules reply comments (deadline January 31) and six meter repeater expansion, PR Docket 88-527, comments (deadline January 27). The report also covered Amateur Radio RF1 and antenna matters, including cases in a number of locales. During the course of the above, the Board was in recess for lunch and the taking of the official photograph from 11:52 AM to 1:15 PM, reconvening with all persons herebefore mentioned present except Treasurer McCobb.

16) Mr. Grauer, as President, presented the report of the ARRL Foundation for 1988, an outstanding year for that activity. Three new scholarships were added to those already being presented and the meritorious membership program was revived. New promotional material and a monthly QST column helped bring about an increase in contributions of 33%, totaling nearly \$80,000 for the year.

17) Canadian Radio Relay League President Atkins brought greetings from the ARRL's "sister organization." He highlighted CRRL activities during the past 12 months including a successful membership campaign, the debut of QST CANADA, discussions on restructuring the Amateur Service, the USSR/Canadian Transpolar SKITREK expedition, and the planning for the forthcoming Canadian National Convention hosted by the Winnipeg Amateur Radio Club.

18) Mr. Metzger, as chairman, presented the

report of the Administration and Finance Committee. He then moved, seconded by Mr. Grauer, that the Board of Directors hereby approves the 1989 Operating Budget submitted by the Executive Vice President on December 20, 1988. It was moved by Mr. Frenaye, seconded by Mr. Harrison, that the motion be amended by striking the text and substituting therefor the following: "That approval of the 1989 ARRL Budget be deferred until a complete summary is drafted of major new goals this Budget attempts to address, including the funding levels for each; summary functional budgets are produced within each department showing funding comparisons between 1987 and 1988 actual and 1989 planned; and a balance sheet is produced showing income and expense levels expected for 1989. Directors and Officers will be provided with regular summaries of financial status during this and subsequent years. Until the Board approves the 1989 Budget, spending should not deviate significantly from that of 1988 without prior notification of the full Board by the Administration and Finance Committee. The revised budget will be prepared in time for consideration at the next meeting of the Executive Committee." It was moved by Mr. Heyn, seconded by Mr. Haynie, that consideration be postponed until the morrow. Mr. Nathanson raised a point of order: one could not postpone two motions in a single action. The Chair ruled that there was a motion and a proposed amendment. A motion to postpone applies to the motion and all subsidiary motions, such as a motion to amend. Mr. Frenaye questioned the Chair. The Chair cited two sections of Robert's Rules; the Parliamentarian concurred. Whereupon, the question being on the motion to postpone the entire matter until the morrow, the same was ADOPTED.

19) On motion of Mr. Metzger, seconded by Mr. Mendelsohn, it was VOTED that John H. Nelson is authorized to co-sign checks drawn on the Connecticut Bank and Trust Company checking account on behalf of the Executive Vice President in accordance with standing orders of the Board.

20) On motion of Mr. Turnbull, seconded by Mr. Haynie, it was VOTED that the Executive Vice President is authorized to reimburse the Southwestern Division for an amount not to exceed \$527.48 for additional 1988 expenses.

21) On motion of Mr. Turnbull, seconded by Mr. Butler, it was VOTED that the Executive Vice President is authorized to reimburse the DX Advisory Committee for an amount not to exceed \$236.78 for additional 1987 and 1988 expenses.

22) Mr. Quiat, as chairman, presented the report of the Membership Services Committee. It was moved by Mr. Heyn, seconded by Mr. Butler, that the ARRL invite the Radio Amateur Satellite Corporation (AMSAT) to designate a liaison for spectrum-management matters. Said liaison would participate with the ARRL Membership Services Committee in developing band plans and in other spectrum-management activities. On motion of Mr. Quiat, seconded by Mr. Haynie, it was VOTED to amend the motion by striking the second sentence thereof. Whereupon, the question being on the main motion as amended, the same was ADOPTED.

23) It was moved by Mr. Kanode, seconded by Mr. Nathanson, that the ARRL work to bring IARU Region 2 policy regarding awards activity on 10 MHz into conformity with IARU Regions 1 and 3 at the upcoming Region 2 Conference in Orlando, Florida, and if that change is accomplished, the ARRL accept 10 MHz contacts for the Worked All States Award (basic, CW, RTTY, Packet and QRP) and DX Century Club (CW and digital QSOs for the mixed, CW and RTTY awards, but not 5 Band DXCC). It was moved by Mr. Hurlbert that the motion be amended by striking the references to DXCC, but there was no second so the motion to amend was lost. The question then being on the original motion, the same was ADOPTED. During the course of the above, the Board was in recess from 2:55 PM to 3:22 PM.

24) On motion of Mr. Harrison, seconded by Mr. Mendelsohn, it was VOTED that the ARRL file comments in support of expansion of the 6 meter repeater subband as proposed in FCC Docket 88-527. Such comments shall include a statement that detailed planning of the use of 51.0 to 52.0 MHz will be accomplished by voluntary band planning. Any revision to the existing ARRL 6-meter

Band Plan should take into account the impact on existing users.

25) It was moved by Mr. Quiat, seconded by Mr. Harrison, that the sum of \$50,000 be appropriated for the hardware, software and development costs associated with the development of a program to automate the DXCC process. The ayes and nays being ordered on request, the question was decided in the affirmative with 14 votes in favor to 1 vote opposed. All of the Directors voted aye except Mr. Frenaye who voted no, so the motion was ADOPTED.

26) On motion of Mr. Heyn, seconded by Mr. Mendelsohn, it was VOTED that the Membership Services Committee is requested to study the appropriate frequencies and other necessary considerations for automatic packet-radio operation in the 160- to 10-meter bands and report its recommendations to the Board at its second 1989 meeting.

27) Mr. Haynie, as chairman, reported for the Publications Committee. The committee decided that installation of an 800 number for orders should be deferred until the Publications Sales Branch is able to process credit card orders in real time. The Committee did not recommend discounts for sales of ARRL Publications at conventions, but observed that clubs can enroll as dealers under the proper circumstances, and receive discounts on convention business that way. The Emergency Communications Coordinators Manual and Self Test has been printed. Arrangements have been made for sale of ARRL publications by Waldenbooks. A draft of "Your Guide to ARRL Services" has been prepared. After several years, a revised version of *Operating an Amateur Radio Station* is in print. Equipment for computer-aided drafting (CAD) has been installed in the Graphics Department. Purchase of a new offset printing press for use in Headquarters could save \$4800 per month, the committee believes. Finally, the committee commended the Circulation Department for a fine job, particularly in respect to membership-supplies upgrades. During the course of the above, Mr. Sheffield took the seat for Mr. Quiat at 4:34 PM.

28) At 4:44, Mr. Holladay took the Chair for President Price. Mr. Mendelsohn, as chairman, presented the report of the Volunteer Resources Committee. On his motion, seconded by Mr. Kanode, it was VOTED to adopt the NTS logo submitted by Kyle Thompson, W6BNJ, which was chosen by the committee during the recent contest.

29) On motion of Mr. Meyer, seconded by Mr. Butler, it was VOTED that the following statement of purpose is adopted for the ARRL Volunteer Examiner Coordinator: The purpose of the ARRL/VEC is to provide amateur licensing examination for prospective new hams and upgrade exam opportunity for those already licensed. Objectives: the ARRL VEC will provide sufficient number of examination opportunities to meet the above purpose, on a schedule that is convenient to the applicants. The ARRL VEC will provide the examination candidate with tests that meet all applicable requirements of current Federal Communications Commission rules and regulations and are administered in accordance with those requirements and generally accepted educational testing principles and practices. The ARRL VEC will provide a service level of the highest order to our customers, the Volunteer Examiners. During the course of the above, at 5:04 PM, Mr. Quiat returned to his seat.

30) It was moved by Mr. Drake, seconded by Mr. Harrison, that the Rules and Regulations of the ARRL Field Organization be changed by inserting a new Number 8, as follows, with all succeeding numbers being increased by one:

8. In the event that members of a particular section shall desire to modify an existing section or form an entirely new section 1) A presentation shall first be made to the Division Director by members or Section Managers for dividing a present section and will include suggested county or natural geographic boundary lines. 2) If the Director decides the case has merit, the Director shall present the case to the Volunteer Resources Committee for review. The Volunteer Resources Committee shall forward it to the full Board for action with a recommendation for action. Maximum publicity will be given during the process to the affected sections. 3) In the event of rejection by either the Director, Volunteer

Resources Committee or the Full Board, upon petition to the Field Services Manager of 10% of the number of Full Members voting in the previous section election, a referendum shall be held on the question. 4) If the Board or the referendum favor the creation of a new section, then an interim Section Manager will be appointed by the Field Services Manager in consultation with the Division Director, and the new section election shall be scheduled into the next reasonably available Section Manager election cycle, following established routine. On motion of Mr. Nathanson, seconded by Mr. Stafford, it was VOTED to postpone consideration of the matter indefinitely. Messrs. Quiat, Drake, Harrison, and Mendelsohn requested to be recorded as opposed to postponement. During the course of the above, Mr. Price resumed the Chair at 5:25 PM.

31) The Board was in recess for dinner from 5:30 PM to 8:15 PM, reassembling with all persons herebefore mentioned present, except Mr. McCobb.

32) Mr. Price, as chairman, reported briefly for the Executive Committee and presented the report of the Committee of Tellers for the 1988 Director and Vice Director Elections.

33) Mr. Holladay, as chairman, presented the final report of the Special Study Committee on Advisory Committees. The Committee recommends that its last remaining task, updating the Terms of Reference for the VHF Repeater Advisory Committee and the VHF/UHF Advisory Committee, be assigned to the Membership Services Committee, and that the Special Committee be discharged.

34) Mr. Wilson, as chairman, reported briefly for the Part 97 Re-write committee. A motion will be offered later in the meeting concerning the filing of Reply Comments in PR Docket 88-139. On behalf of the committee, Mr. Wilson commended Maty Weinberg and Paul Rinaldo for their invaluable staff work in support of the committee.

35) Mr. Olson, as chairman, reported briefly for the Planning Committee for the 1989 IARU Region 2 Conference. The Committee had held its first in-person meeting the previous day, and had reviewed the plans for the Conference, now scheduled for October 16-20 in Orlando. There is a possibility of a change in date.

36) Mr. Turnbull, as chairman, presented the report of the RFI Task Group. The group remains concerned about the FCC's handling of complaints where amateurs are alleged to cause interference to home electronic devices. Two amateurs had been released from restrictions since the 1988 Second Meeting, but the amateur alleged to interfere with a pacemaker still may not operate from his home. A potential pilot project involving amateur RFI teams cooperating with FCC District Offices has been outlined and is under study. Approaching the problem from another angle, the League is represented on two standards committees, one working on RF immunity of TV sets and VCRs, the other on signals emanating from appliances. The report recommends continued League participation.

37) Mr. Mozley, as chairman, presented the report of the Committee on the Biological Effects of Radio Frequency Energy. The committee reports that the Environmental Protection Agency has suspended its work on proposed standards for exposure to non-ionizing electromagnetic radiation. The EPA rationale for the decision was that the science is not strong enough, right now, to justify further work, and there are no studies which conclusively link RF exposure to increased incidence of cancer or any other disease. The Accredited Standards Committee C 95, which may be soon under new sponsorship, is proposing revision of guidelines for exposure to radio frequency energy, with one limit for occupationally exposed persons and a more stringent limit for the public. The committee has contributed RF safety related questions to the question pools for both the Novice and Technician License examinations and it has contributed educational material concerning RF safety to the *Handbook*, the *Antenna Book* and the forthcoming *Microwave Book*. On motion of Mr. Olson, seconded by Mr. Frenaye, it was VOTED that the ARRL, as an extension of its on-going concern for Amateur Radio safety, apply for Senior Associate Membership in the Electromagnetic Energy Policy Alliance, an organization formed to

promote responsible and rational public policies with respect to potential electromagnetic field hazards. Mr. Heyn requested to be recorded as voting no.

38) Mr. Butler, as liaison, presented the report of the ARRL Committee on Amateur Radio Digital Communication. The report covered work on possible revisions to the AX.25 link-layer protocol, a schedule for future computer networking conferences, the need for an HF working group to further development of modems and protocols, evaluation of lessons learned from a special temporary authorization under which some 75 stations have been conducting automatic HF-packet operations, and the one-year extension of time for the STA to January 5, 1990. On motion of Mr. Quiat, seconded by Mr. Heyn, it was VOTED that the eighth ARRL Computer Networking Conference be held in Colorado Springs, Colorado, October 7, 1989, under the sponsorship of the Tucson Amateur Packet Radio Association with co-sponsorship by the USAF Academy Radio Club.

39) Mr. Quiat, as chairman, presented the report of the Legal Strategy Committee. Subjects with which the committee was involved during the year included FCC General Docket 87-14, reallocation of the 220-222 MHz band, antenna litigation in Boulder, Colorado, the Overbeck study of covenants, and ordinance problems in several cities. The committee sponsored a Continuing Legal Education seminar at the National Convention in Portland, and plans another one for the National Convention June 2-4 in Dallas. The committee is in the process of preparing new material for the Volunteer Legal Counselors and for members to use when facing antenna problems in their communities.

40) Mr. Frenaye, as chairman, presented the report of the Education Task Force. The greater part of reportable activity by the Task Force occurred early in the year and was covered in the minutes of the Second Meeting of the Board, in July, 1988. Analysis of the report by the staff and discussion on how it may be implemented are in progress. The Committee feels there is a need for continued professional study and review of proposed training materials by a small group of professionals in an advisory capacity to ARRL Headquarters.

41) At this point, 9:36 PM, Mr. Holladay took the Chair for President Price. Mr. Wilson presented the interim report of the Committee on Elections Procedures. On motion of Mr. Frenaye, seconded by Mr. Wilson, it was VOTED that the portion of the 1980 Ethics Committee report quoted in paragraph 2.3 of the interim report of the Committee on Elections Procedures be adopted as a policy of the League applicable to all officials eligible for travel reimbursable by the League, and that the same be included in the Directors' Workbook and in the materials sent to all candidates.

42) On motion of Mr. Heyn, seconded by Mr. Mendelsohn, it was VOTED that the Volunteer Resources Committee examine the present practice of having the terms of Section Managers expire at different times throughout the year and recommend any needed changes to the Board.

43) On motion of Mr. Harrison, seconded by Mr. Heyn, it was VOTED that newly elected Directors and Vice Directors be placed on electronic mail, put on the distribution list for the Directors' Letters, and start receiving copies of correspondence with members (new Directors only) as soon as declared elected.

44) On motion of Mr. Heyn, seconded by Mr. Frenaye, it was VOTED that the following material be included in the Directors' Workbook and in the materials sent to each candidate upon his nomination: "Each candidate for Director, Vice Director or Section Manager may submit a 300-word statement for inclusion with the ballot. The submission of this statement shall be filed as elsewhere required, and must be relevant, truthful, and not misleading, which matters will be conclusively determined by the committee having oversight over elections generally. With this statement, the candidate may submit his or her black and white photograph not larger than 3 inches high and 2 inches wide to likewise be included with the ballot. The standards of truth and relevancy apply to all mailings by a candidate." Mr. Nathanson requested to be recorded as voting no.

45) It was moved by Mr. Frenaye, seconded by

Mr. Kanode, that By-law 19 be amended by adding the words "First Class" before the word "mail" in the next-to-last sentence so that the phrase will read "Secretary shall send by First Class mail." At 10:20 PM, on motion of Mr. Nathanson, seconded by Mr. Stafford, it was VOTED that the Board Meeting be recessed until 8:30 AM on the morrow.

46) The Board reassembled at 8:35 AM, with Mr. Price in the Chair and all persons hereinbefore mentioned present except Mr. McCobb. Mr. Holladay assumed the Chair for Mr. Price and debate resumed on Mr. Frenaye's motion to amend By-law 19. A roll call vote being required by the Articles of Association, the question was decided in the negative, 5 in favor to 10 opposed. Those voting in favor were Messrs. Harrison, Mendelsohn, Frenaye, Quiat, and Butler. Those voting no were Messrs. Turnbull, Metzger, Meyer, Nathanson, Grauer, Drake, Stafford, Kanode, Heyn, and Haynie. So the motion to amend By-law 19 was LOST.

47) It was moved by Mr. Wilson, seconded by Mr. Heyn, that the third-class timetable for elections shown in paragraph 2.4.2 of the committee report be adopted. The Parliamentarian advised the Chair that the motion would involve amendment of By-laws 18, 19, and 20. Since the motion did not offer specific language for amendment of the By-laws as required by Robert's Rules of Order, the motion was ruled out of order.

48) It was moved by Mr. Frenaye, seconded by Mr. Mendelsohn, that no League funds may be used for the printing or mailing of newsletters by a Board member in a Division in which a Board election is to take place during the campaign period. The campaign period is defined to be the period from the deadline for receipt of nominating petitions for Director and Vice Director until the day ballots are counted. If both Director and Vice Director are unopposed, this restriction is lifted and may be otherwise lifted by the Executive Committee. Newsletters include mailings to selected subsets of ARRL members within the Division, including clubs. This policy shall be included in the Director's Workbook and in the material forwarded to each candidate upon nomination. It was moved by Mr. Quiat, seconded by Mr. Kanode, that the motion be amended by substituting the following: No League funds may be used for the printing, reproduction, or dissemination of mass communication by a Vice Director or Director in a Division in which a Board election is to take place during the campaign period. The campaign period is defined to be the period from the deadline for the receipt of nominating petitions for Director and Vice Director until the day ballots are counted. If both Director and Vice Director are unopposed, this restriction is lifted and may be otherwise lifted by the Executive Committee. Such unreimbursable communications include mailings to selected subsets of ARRL members within the Division, including clubs. This policy shall be included in the Director's Workbook and in the material forwarded to each candidate upon nomination. On motion of Mr. Nathanson, seconded by Mr. Mendelsohn, it was VOTED that consideration of this matter be postponed until after lunch. During the course of the above, the Board was in recess from 9:52 to 10:16 AM.

49) It was moved by Mr. Harrison, seconded by Mr. Frenaye that there is hereby established a permanent "Elections Committee," and that this committee has the following duties under the following directions:

1. After staff determination of eligibility with respect to age, and continuity and class of license and membership, the committee will review the personal qualifications of all candidates nominated for Director and Vice Director, and render a decision thereon, provided that four affirmative votes are required for the committee to determine a candidate disqualified.

2. The committee will review 300-word statements submitted by candidates to determine that same are true and not misleading before they are included with the ballots. In doing so, the Committee may consider any information available to it and may conduct such investigation, not involving reimbursed travel, as it may determine appropriate. If, in the judgment of the committee, four members concurring, the 300-word statement should be corrected, it may request such. If the candidate

chooses not to comply with such request, the statement of such candidate will not be included with the ballot.

3. Following the official count of the ballots in such elections, the committee shall stand ready to receive and act upon any challenge to the election by a defeated candidate. If the committee believes, four members concurring, that there was improper conduct, and that the outcome of the election reasonably might have been expected to have been different had the conduct not have occurred, the committee may order rebaloting.

4. The committee may make recommendations to the Board concerning campaign practices.

5. The committee may render non-binding, confidential opinions to prospective candidates concerned about eligibility.

6. The committee chairperson will make an annual written report to the Board concerning the general activities of the committee, and shall make an immediate special report to the Board in the event it takes any of the actions requiring four votes. The annual report will be part of the Corporate records, but the special reports will be held confidential by the Secretary under lock and will be available only to the candidate adversely affected or to someone designated in writing by the candidate. These special reports rendered to the Board may be reviewed by Board members at any time, also on a confidential basis. Should the adversely affected candidate choose to make the matter public, the restriction on confidentiality is lifted.

7. The committee will consist of five members (one of whom will be designated by the President as chairperson and another as alternate chairperson) and two alternates, none of whom may be an incumbent member of the Board or a candidate for such office. Members shall be appointed by the President, subject to confirmation by the full Board. No member of the committee shall serve with respect to any matter arising for the Division from his residence. If a member is unable to serve, he shall be replaced, as to that matter, by the eligible alternate having the least time to serve on his current term.

8. The term of members of the committee will be five years with one term expiring each year. The terms of alternates will be two years, with one expiring each year. Should a vacancy occur on the committee, a replacement shall be named in the same manner as the original selection for the unexpired term. A member may be removed by a vote of two-thirds of the Board. In the initial appointments the expiration of the initial members' terms will be specified so as to create sequential expirations.

9. Members of the committee will be reimbursed, subject to existing League reimbursement policy, for expenses for telephone, electronic mail and postage.

10. Any action of the committee may be overruled by a vote of two-thirds of the Directors.

11. By-law 19 is amended by substituting the words "Elections Committee" for "Executive Committee" each time it appears. Mr. Nathanson reported that he intended to offer an amendment to the motion, but that it was in the process of being reproduced so the Board members would have the text in front of them. Whereupon, on motion of Mr. Wilson, seconded by Mr. Mendelsohn, it was VOTED that consideration of the matter be postponed until after lunch. At 10:47 AM, Mr. Price returned to the Chair.

50) Mr. Stafford, as liaison, presented the report of ARRL National Emergency Response Committee (ANERCOM). On motion of Mr. Stafford, seconded by Mr. Mendelsohn, it was VOTED that the Executive Vice President give top priority to the completion and implementation of a headquarters Emergency Plan consistent with the recommendations in ANERCOM's 1988 Final Report.

51) It was moved by Mr. Stafford, seconded by Mr. Butler, that the Executive Vice President give due consideration to the creation of a full-time staff position whose sole responsibilities shall be those set forth on page 2 of the 1988 ANERCOM report. The creation of this position may be accomplished by adjusting the duties and responsibilities of an existing staff position so that after adjusting such duties and responsibilities, the position shall be as defined in the ANERCOM report. It was moved

by Mr. Heyn, that the motion be amended by inserting duties (A) to (F) enumerated on page 2 of the report. But there was no second, so the motion to amend was LOST. The question then being on the motion as offered by Mr. Stafford, the same was ADOPTED.

52) On motion of Mr. Stafford, seconded by Mr. Heyn, it was VOTED that each of the National Traffic System area staffs provide ANERCOM (by October 1, 1989) position papers on: (a) incorporating digital-mode gateways as a integral part of NTS on a daily basis; (b) an assessment of the present ability of NTS to relay a large volume of messages within 48 hours of an extensive communications emergency; (c) a five-year projection of NTS manpower which will be available to handle a large volume of messages via NTS.

53) On motion of Mr. Stafford, seconded by Mr. Harrison, it was VOTED that the ARRL seek the assistance of the IARU in all three Regions in identifying those parties who have authority for directing Amateur Radio emergency communications within their respective countries.

54) On motion of Mr. Stafford, seconded by Mr. Mendelsohn, it was VOTED that ANERCOM continue in existence during 1989, and that its charter during that period consist of the following: In 1989, ANERCOM will: (a) continue its efforts to interface with served agencies according to the original ANERCOM charter; (b) develop a specific proposal for marketing Amateur Radio emergency communications capabilities among prospective users; (c) evaluate the potential effectiveness of training materials prepared by the League, based upon the input ANERCOM receives from meetings with clients; (d) provide an independent evaluation of real-life emergency communications situations based upon monitoring of transmissions and after-action reports; (e) that upon receipt of the information requested from other committees, ANERCOM complete its review of issue number 4 (Gateways) as contained in its 1988 charter.

55) On motion of Mr. Stafford, seconded by Mr. Heyn, it was VOTED that ANERCOM's budget for 1989 be fixed at \$7,500.

56) In the absence of a written report from the Shuttle Amateur Radio Experiment (SAREX) Working Group, Mr. Sumner reported that its chairman, Roy Neal, K6DUE, was optimistic with regard to future Shuttle flight opportunities.

57) Mr. Shrader, as liaison, presented the report of the VHF Repeater Advisory Committee. The committee felt it would not be advisable to require repeaters having autopatches to incorporate a "911" access system. The principal problem is the burden potentially imposed on law enforcement personnel receiving emergency "911" calls through an amateur repeater with coverage outside the individual "911" jurisdiction. The committee is generally supportive of the 13- and 33-centimeter band plan efforts of the VHF/UHF Advisory Committee.

58) Mr. Kanode, as liaison, presented the report of the Contest Advisory Committee. Issues considered by the committee include classification of contest entrants who use a spotting net, possible changes in the condition under which a multi-operator station's score can be included in a club aggregate score, ways of promoting interest in having Field Day operations at locations accessible to the general public, and ways to develop recommendations relating to VHF and UHF contesting.

59) Mr. Drake, as liaison, presented the report of the DX Advisory Committee. In its deliberations, the committee rejected establishment of an RTTY honor roll and a reduction in the endorsement level for RTTY DXCC. The committee recommended inclusion of Malaj Vysotskij Island on the DXCC countries list. Similarly, it approved the addition of Rotuma, part of the Republic of Fiji, to the list. On the other hand, the committee declined to restore Okino Tori Shima to the list.

60) Mr. Vydareny reported briefly for the Public Service Advisory Committee.

61) Mr. Overbeck, as liaison, presented the report of the VHF/UHF Advisory Committee. The Membership Services Committee has already acted on recommendations contained in the report, a thorough one comprising some 32 pages including appendices.

62) At this point, the Chair announced the open-

ing of nominations for Director members of the Executive Committee for the year and appointed Messrs. Olson, Holladay and Rinaldo as tellers. Mr. Harrison nominated Mr. Nathanson. Mr. Heyn nominated Mr. Haynie. Mr. Kanode nominated Mr. Turnbull. Mr. Metzger nominated Mr. Grauer. Mr. Quiat nominated Mr. Butler. Mr. Stafford nominated Mr. Frenaye. Mr. Harrison nominated Mr. Mendelsohn. On motion of Mr. Haynie, seconded by Mr. Butler, it was VOTED that nominations are closed. With eight votes being required for election, the tellers declared Mr. Turnbull elected on the first ballot; the second ballot was inconclusive. Mr. Grauer was elected on the third ballot; Mr. Mendelsohn on the fourth ballot; and Mr. Frenaye on the fifth ballot. Whereupon, the chair announced Messrs. Turnbull, Grauer, Mendelsohn, and Frenaye would be Director members of the Executive Committee for one year (applause). The Board was in recess from 12:27 to 1:35 PM, reassembling with all members hereinbefore mentioned present except Mr. McCobb.

63) The Chair announced that Mr. Williams had resigned as Secretary effective at the end of this meeting, in order to concentrate on his work as Washington Area Coordinator. He declared that nominations were open for Secretary to complete the current term. Mr. Turnbull nominated David Sumner, K1ZZ. On motion of Mr. Grauer, seconded by Mr. Butler, it was VOTED that nominations are closed. Whereupon, the Chair declared Mr. Sumner elected as Secretary for the balance of the term ending with the annual meeting of 1990.

64) Turning to agenda item 8, the President announced three vacancies on the Board of Directors of the ARRL Foundation. On motion of Mr. Grauer, seconded by Mr. Harrison, it was VOTED that the following are named as Directors of the ARRL Foundation, for three-year terms: Edmond A. Metzger, W9PRN; Dick L. Eilers, WØYZV; Frank M. Butler, Jr., W4RH (applause).

65) Next was consideration of proposals offered by the Administrative Council of the International Amateur Radio Union, for vote by member-societies. On motion of Mr. Olson, seconded by Mr. Haynie, it was VOTED that the ARRL cast an "aye" vote on proposal 185, which nominates Richard L. Baldwin, W1RU for IARU President and Michael J. Owen, VK3KI for Vice President for five-year terms. Mr. Nathanson requested to be recorded as voting no.

66) It was moved by Mr. Olson, seconded by Mr. Nathanson, that the ARRL cast a "nay" vote on IARU proposal 186, proposed amendments to Article I of the IARU constitution, and the Executive Vice President is directed to advise the IARU member-societies of the reasons therefor. The ayes and nays being ordered on request, the question was decided in the affirmative, 12 votes in favor to 3 votes opposed. Messrs. Turnbull, Metzger, Meyer, Harrison, Nathanson, Mendelsohn, Grauer, Frenaye, Drake, Stafford, Kanode and Haynie voted aye. Messrs. Quiat, Butler and Heyn voted no. So the motion was ADOPTED, casting a nay vote on proposal 186.

67) On motion of Mr. Olson, seconded by Mr. Mendelsohn, it was VOTED that the ARRL cast an "aye" vote on proposal 187, amendments to Article II.

68) On motion of Mr. Olson, seconded by Mr. Heyn, it was VOTED that the ARRL cast an "aye" vote on proposal 188, amendments to Article III. Mr. Nathanson requested to be recorded as voting no.

69) On motion of Mr. Olson, seconded by Mr. Mendelsohn, it was VOTED that the ARRL cast a "nay" vote on proposal 189, amendments to Article V.

70) On motion of Mr. Olson, seconded by Mr. Butler, it was VOTED that the ARRL cast an "aye" vote on proposal 190, amendment to Article VI. Mr. Vydareny took the seat for Mr. Mendelsohn at 2:17 PM.

71) On motion of Mr. Olson, seconded by Mr. Butler, it was VOTED that the ARRL cast an "aye" vote on proposal 191, amendments to the By-laws. Mr. Nathanson requested to be recorded as voting no.

72) With unanimous consent, the Chair temporarily bypassed agenda item 10, Appoint-

ment of Committees.

73) Mr. Haynie, as host Director, reported on plans for the 1989 ARRL National Convention, in observance of the ARRL National Jubilee/75th anniversary. The Convention is to be held June 2-4 at the Sheraton/Arlington Convention Center, between Dallas and Fort Worth, Texas. The amateur station at the convention will be operated under the license of the Big Spring Amateur Radio Club, W5AW. Commercial booths for the convention are already sold out, but there is to be a 700-table flea market. During the course of the above, Mr. Mendelsohn returned to the table at 2:30 PM. Mr. Holladay took the Chair for Mr. Price from 2:35 to 2:42 PM.

74) Without objection, Mr. Price returned to agenda item 10 and announced the following appointments to Standing Committees: Administration and Finance: Mr. Metzger, chairman, Mr. Heyn, Mr. Harrison, Vice President Hurlbert. Membership Services: Mr. Quiat, chairman, Mr. Butler, Mr. Kanode, Vice President Holladay. Publications: Mr. Haynie, chairman, Mr. Mark, Mr. Nathanson, Vice President Olson. Volunteer Resources: Mr. Stafford, chairman, Mr. Drake, Mrs. Gauzens, Vice President Wilson.

75) Mr. Grauer, as host Director, presented a brief preview of the National Convention to be held in Kansas City, Missouri, June 8-10, 1990. During the course of the above, Mr. Sitton took the seat for Mr. Haynie, at 2:47 PM.

76) The Chair observed that the 1988 ARRL National Convention Committee and the amateurs of the Northwestern Division had done a great job in supporting the convention in Portland, and noted the generosity of the Convention Committee in making a substantial donation of proceeds to the ARRL Foundation. He congratulated Director Drake on behalf of the Board (applause).

77) The Chair announced that the floor was open for motions from Directors, agenda item 13. On motion of Mr. Harrison, seconded by Mr. Kanode, it was VOTED that an ARRL Arkansas State Convention be approved for April 8, 1989, in Little Rock, Arkansas. At 2:52 PM, Mr. Haynie returned to his seat.

78) It was moved by Mr. Mendelsohn, seconded by Mr. Frenaye, that the Officer reports, Director reports, committee reports, proposals, motions and election results of Officers and committees be bound following each Board Meeting and be made available at nominal cost to members. The Executive Vice President shall exercise editorial control over the work. It was moved by Mr. Heyn, seconded by Mr. Grauer, that the matter be referred to the Executive Committee for study. On motion of Mr. Haynie, seconded by Mr. Metzger, it was VOTED that the matter is laid on the table. Messrs. Frenaye, Heyn, Mendelsohn and Nathanson requested to be recorded as voting no on the motion to table.

79) On motion of Mr. Grauer, seconded by Mr. Butler, it was VOTED that an ARRL Nebraska State Convention is approved for February 25-26, 1989, at Kearney, Nebraska.

80) On motion of Mr. Frenaye, seconded by Mr. Harrison, it was VOTED that the Executive Committee review the present list of Board Standing Orders. The review should examine whether they are outdated or unnecessary and whether they are being followed in day-to-day practice. Any recommendations for change should be presented to the Board at the July 1989 meeting.

81) On motion of Mr. Stafford, seconded by Mr. Quiat, it was VOTED that the following resolution is adopted:

WHEREAS, the US Congress passed legislation, in 1982, providing that the FCC has the authority to determine RFI susceptibility standards for home electronics equipment, and

WHEREAS, the FCC has for a period of seven years refused to establish satisfactory mandatory standards for such RFI susceptibility and

WHEREAS, it is in the interest of the electronics manufacturers to postpone the implementation of RFI standards as long as possible and against the interests of the public and the amateur community to prolong such implementation, now therefore

BE IT RESOLVED that the Executive Committee develop and implement a plan of action to bring about FCC compliance with the 1982

legislation by establishing RFI susceptibility standards. Such a plan of action could include, but not necessarily be limited to,

1) a letter-writing campaign by ARRL members to their Congressional representatives, and

2) use of Washington-based resources for direct Congressional contacts.

82) It was moved by Mr. Kanode, seconded by Mr. Haynie, that the DXAC operating fund be increased from \$500 to \$1000 per year. It was moved by Mr. Frenaye, to substitute the following: that the operating budgets of the Advisory Committees for 1989 be set at \$500. The Chair ruled that the substitute was out of order, in that it called for a result contrary to the motion it was intended to amend. The question then being on Mr. Kanode's motion, the same was LOST. The Board was in recess from 3:30 to 3:48 PM.

83) Mr. Quiat asked for unanimous consent for the withdrawal of his amendment to Election Committee motion 3.2 (see minute 48, above) so as to offer a substitute; there was no objection. It was moved by Mr. Quiat, seconded by Mr. Stafford, that the Election Committee motion be amended to reflect the following text: "In any League election, during the campaign period (the period from the deadline for receipt of nominating petitions for Director and Vice Director until the day ballots are counted) any mass communication at League expense in whole or in part, dealing with any candidate in any way or issued by a candidate, League or section official in the Division of the candidate, shall be approved by the EC prior to the issuance of such communications. The EC shall deny approval of any communication which in its opinion, reasonably might affect the outcome of such election." On motion of Mr. Heyn, seconded by Mr. Mendelsohn, the amendment was amended by substituting the phrase, "ballots are due" for the phrase "ballots are counted". The question being on the amendment as amended, the same was ADOPTED. The question being on the main motion as amended, it was ADOPTED.

84) On motion of Mr. Butler, seconded by Mr. Heyn, it was VOTED that an Alabama State Convention is approved for May 6-7, 1989, in Birmingham, Alabama.

85) It was moved by Mr. Haynie, seconded by Mr. Harrison, that the Board authorize \$50,000 for the purchase of a new printing press, paper cutter and folding machine along with other related miscellaneous equipment. It was moved by Mr. Heyn, seconded by Mr. Metzger, that the matter be postponed indefinitely. After discussion, without objection Mr. Heyn withdrew his motion. On his further motion, seconded by Mr. Quiat, it was VOTED that the matter is referred to the Administration and Finance Committee.

86) On motion of Mr. Harrison, seconded by Mr. Haynie, it was VOTED that the following resolution be adopted:

WHEREAS, FM packet operation is not permitted on 10 meters above 28.3 MHz by FCC regulations, and

WHEREAS, a large interest exists in the US for this type of authorization, as authorization exists in Canada and other countries, and

WHEREAS, FCC action would be required to permit such access, now therefore

BE IT RESOLVED that the Membership Services Committee is directed to study the feasibility and spectrum-management impact of such authorization, with a report to the Board at the 1989 Second Meeting.

87) It was moved by Mr. Drake, seconded by Mr. Frenaye, that the ARRL approve the division of the present Washington section into two new sections. These sections shall be named Western Washington Section (WWA) and Eastern Washington Section (EWA), respectively consisting of the counties West and East of the Cascade Mountain range. The Western Washington Section shall comprise the counties of Whatcom, Skagit, San Juan, Island, Snohomish, King, Pierce, Thurston, Clallam, Jefferson, Mason, Kitsap, Grays Harbor, Pacific, Lewis, Wahkiakum, Cowlitz, Clark and Skamania. The Eastern Washington Section shall comprise of the counties of Okanogan, Chelan, Douglas,

Kittitas, Yakima, Klickitat, Benton, Franklin, Walla Walla, Adams, Grant, Lincoln, Ferry, Stevens, Pend Oreille, Spokane, Whitman, Columbia, Garfield and Asotin. A roll call being ordered on request, the question was decided in the affirmative, 10 votes in favor, 3 votes opposed, 1 abstention and 1 member not voting. Those voting in favor were Messrs. Harrison, Mendelsohn, Grauer, Frenaye, Drake, Kanode, Quiat, Butler, Heyn and Haynie. Those voting opposed were Messrs. Turnbull, Nathanson and Stafford. Mr. Meyer abstained, and Mr. Metzger did not vote. So the motion was ADOPTED.

88) It was moved by Mr. Stafford, seconded by Mr. Kanode, that the 1989 Second Meeting of the ARRL Board of Directors be held in Hartford, Connecticut beginning on Friday, July 21. It was moved by Mr. Grauer, seconded by Mr. Nathanson, that the motion be laid on the table. Mr. Heyn rose to a point of order: There was no "urgent, immediate need" for tabling under Robert's Rules of Order. The Chair ruled that the motion was in order. Mr. Heyn appealed the ruling of the Chair, but the Chair was sustained. Thereupon, the question being on the motion to table, the same was LOST. Returning to the main motion, changing the date of the Second Meeting from that specified in the By-Laws, it was ADOPTED.

89) On motion of Mr. Kanode, seconded by Mr. Harrison, the following resolution was unanimously ADOPTED:

WHEREAS, John H. Parrott, Jr., W4FRU, has served with diligence for many years on the DX Advisory Committee, and

WHEREAS, under his Chairmanship the Committee embarked on a rewrite project for DXCC rules that involved a major worldwide study, and,

WHEREAS, the DX community has overwhelmingly praised these efforts, now, therefore,

BE IT RESOLVED, that the ARRL Board of Directors applauds W4FRU for his outstanding service to Amateur Radio, the ARRL and the DX Community and wishes him well upon his retirement.

90) On motion of Mr. Butler, seconded by Mr. Mendelsohn, the following resolution was ADOPTED:

WHEREAS, the level of positive interest shown by ARRL volunteers involved in the ARRL New-Ham Pilot Recruitment Project in Florida was critical to the success of said project, and

WHEREAS, more than 130 volunteers enthusiastically supported and participated in the project, and

WHEREAS, the project, having been judged as successful, is to be developed into a nationwide program, now therefore,

BE IT RESOLVED by the ARRL Board of Directors, in Annual Meeting assembled, that the ARRL volunteers in Florida who participated in the ARRL New-Ham Recruitment Pilot Project are to be commended for their efforts and recognized as the pioneers of the ARRL New-Ham Recruitment Program.

91) It was moved by Mr. Harrison, seconded by Mr. Mendelsohn, that FCC Regulations pertaining to repeater operation be printed in the ARRL Repeater Directory. On motion of Mr. Heyn, seconded by Mr. Quiat, it was VOTED to refer the matter to the appropriate committee.

92) On motion of Mr. Mendelsohn, seconded by Mr. Heyn, it was VOTED that the Membership Services Committee study the desirability and implementation of a school-club round-up contest to be held each year, similar in length to the Novice Round-up.

93) On motion of Mr. Frenaye, seconded by Mr. Haynie, it was VOTED that the ARRL periodically print the names of countries which maintain incoming QSL Bureaus that restrict forwarding of QSLs only to members of that country's national radio organization.

94) On motion of Mr. Drake, seconded by Mr. Harrison, it was VOTED that the Elections Committee re-examine the question of length of terms for Directors and Vice Directors.

95) On motion of Mr. Stafford, seconded by Mr. Mendelsohn, it was VOTED that the Volunteer

Resources Committee develop objective criteria whereby each Advisory Committee chairman may evaluate the participation level of each Director's appointee to his respective Advisory Committee.

96) On motion of Mr. Kanode, seconded by Mr. Mendelsohn, it was VOTED that the Membership Services Committee study the Terms of Reference of the VHF Repeater and VHF/UHF Advisory Committees and recommend any necessary changes, particularly with respect to spectrum-management matters.

97) On motion of Mr. Wilson, seconded by Mr. Mendelsohn, it was VOTED that in filing reply comments in PR Docket 88-139, rewrite of the amateur radio regulations, Counsel is authorized 1) to amend any clear drafting errors; 2) to seek deletion of sections 96.319(c) and (d) as proposed by the League in its original filing; 3) to amend Section 96.319(a) so that it will read as follows: "(a) Transmitters used as target signal sources for the purpose of improving and exercising direction-finding skills may operate under local or remote control". The Board was in recess from 5:01 to 5:17 PM.

98) Mr. Metzger called up for discussion the motion of the Administration and Finance Committee which would have approved the 1989 operating budget and the proposed amendment thereto by Mr. Frenaye. The matter had been introduced on the previous day, but consideration had been postponed to this day. Without objection, Mr. Frenaye withdrew his motion to amend. Whereupon it was VOTED that the Board of Directors hereby approves the 1989 operating budget submitted by the Executive Vice President on December 20, 1988. Mr. Haynie requested to be recorded as voting no.

99) On motion of Mr. Meyer, seconded by Mr. Mendelsohn, it was VOTED that the ARRL shall offer a National Traffic System Service award to those who furnish assistance in the way of FM Repeaters, Packet Digipeaters, Packet Bulletin Boards or similar services through which NTS traffic flows.

100) It was moved by Mr. Nathanson, seconded by Mr. Mendelsohn, that the Board of Directors refer to the Volunteer Resources Committee, for study, the concept of a single emergency station per section to be designated the station to be contacted in international emergencies. On motion of Mr. Stafford, seconded by Mr. Heyn, the motion was AMENDED to add "with input from ANERCOM" after "Volunteer Resources Committee." Whereupon, the question being the motion as amended, the same was ADOPTED.

101) On motion of Mr. Mendelsohn, seconded by Mr. Frenaye, it was VOTED that an article shall be prepared and printed in QST to explain the advertising approval process and how the League's advertising policy benefits the members.

102) On motion of Mr. Frenaye, seconded by Mr. Stafford, it was VOTED that the Membership Services Committee examine the methodology used for contest log checking, determine whether it meets with the standards expected by those submitting contest entries, recommend any improvements deemed necessary to insure the ARRL Contest program remains of top quality, and report back to the Board at the July 1989 meeting.

103) On motion of Mr. Drake, seconded by Mr. Frenaye, the following resolution was ADOPTED:

RESOLVED that the ARRL Board of Directors, in meeting assembled, expresses its appreciation and congratulations to AMSAT, and particularly to Rich Ensign, N8IWI, for the innovative and effective way in which SKITREK was used to bring Amateur Radio to the attention of thousands of young people in classrooms throughout the US and Canada.

104) On motion of Mr. Drake, seconded by Mr. Mendelsohn, it was VOTED that an ARRL North-western Division Convention is approved for August 19-20, 1989 in Tacoma, Washington.

105) On motion of Mr. Stafford, seconded by Mr. Butler, the following resolution was unanimously ADOPTED:

WHEREAS, when the ARRL entered into an agreement with the FCC's Field Operations Bureau establishing the Amateur Auxiliary to the Field

Operations Bureau, the agreement included an implied covenant that the FCC would continue its enforcement activities related to violations of Part 97 of the FCC's Rules and Regulations, and

WHEREAS, since the Amateur Auxiliary was created, it has become apparent that the FCC has, for whatever reason, been unwilling to take effective enforcement action for violations of Part 97, and

WHEREAS, this lack of enforcement has resulted in many serious violations of the FCC Rules and Regulations in Part 97, now therefore

BE IT RESOLVED that the Executive Committee in concert with the Counsel and the Legal Strategy Committee develop and implement a plan of action to bring about a higher level of FCC enforcement of the Part 97 Rules and Regulations.

106) On motion of Mr. Stafford, seconded by Mr. Wilson, it was VOTED that the Administration and Finance Committee study the possibility of completing and distributing the 1990 budget to the Board by June 15, 1989.

107) It was moved by Mr. Stafford, seconded by Mr. Kanode, that the Executive Vice President shall take any and all necessary steps to ensure that QST is available to the ARRL members within the State of Hawaii no later than the fifth day of the month for the month shown on the face of QST. It was moved by Mr. Butler, seconded by Mr. Quiat, that the motion be amended by adding after, "State of Hawaii," the following: "Commonwealth of Puerto Rico and Territory of the Virgin Islands." On motion of Mr. Heyn, seconded by Mr. Frenaye, it was VOTED to refer the motion and the amendment to the Publications Committee for study. The Board was in recess at 6:10 PM, reconvening at 6:54 PM with all of the persons hereinbefore mentioned present except Mr. McCobb.

108) On motion of Mr. Stafford, seconded by Mr. Frenaye, it was VOTED that authors of articles for any periodicals published by the ARRL shall be eligible for the Technical Excellence Award.

109) On motion of Mr. Kanode, seconded by Mr. Mendelsohn, it was VOTED to lift from the table Mr. Mendelsohn's motion concerning publication of Board Meeting reports and its pending amendment (see minute 78, above). Whereupon, the question being on the proposed amendment, the same was LOST. On motion of Mr. Kanode, seconded by Mr. Frenaye, the motion was AMENDED to read: "The Executive Vice President is directed to make available to members copies of the reports of the Standing Committees of the Board, Ad Hoc Committees, and Advisory Committees following each Board Meeting at the time the Board Minutes are published in QST. Members are to be charged the cost of reproduction and mailing for the copies that they request. This action becomes effective with the 1989 Second Meeting." The question then being on the main motion as amended, the same was ADOPTED.

110) It was moved by Mr. Butler that the Administration and Finance Committee study ways to make the ARRL Annual Budget, after approval of the Board, available to League members at cost of reproduction and mailing. The Chair ruled that the motion has failed for lack of a second. Mr. Frenaye noted that the Chair had failed to ask "Is there a second?" The Chair requested the Parliamentarian to research the question; meanwhile he asked Mr. Butler to continue with his next matter.

111) It was moved by Mr. Butler, seconded by Quiat, that the members of any Division may petition the members of the Board through their Division Director, based on the following criteria:

1) The petitioner and all signers must be Full Members of the League in good standing, and the number of signatures must be at least 5% of the membership of the Division in which the petitioner resides.

2) Such petitions shall be submitted to the appropriate Division Director, with a copy to the League President.

3) The Director shall attempt to resolve the issues in the petition with the petitioner within sixty days of receipt. If no resolution is possible, the petition shall be presented by the Director to the Board at its next meeting, along with his/her comments if any. On motion of Mr. Nathanson,

seconded by Mr. Metzger, it was VOTED to postpone the matter indefinitely.

112) The Parliamentarian reported to the Chair that Robert's Rules of Order notes it is customary but not required for the Chairman to ask, "Is there a second?" before announcing failure of a motion for lack of a second. The Chair reversed his previous ruling at Minute 110. Whereupon, Mr. Butler again moved, seconded by Mr. Quiat, that the Administration and Finance Committee study ways to make the ARRL Annual Budget, after approval by the Board, available to League members at cost of reproduction and mailing. On motion of Mr. Nathanson, seconded by Mr. Metzger, it was VOTED that consideration of the matter is postponed indefinitely.

113) It was moved by Mr. Metzger, seconded by Mr. Grauer, that Article 7 is amended by deleting from the first sentence thereof the word "recall" and the comma following it. A roll call being required, the question was decided in the negative, 4 votes in favor to 11 opposed. Messrs. Metzger, Grauer, Drake and Kanode voted aye; Messrs. Turnbull, Meyer, Harrison, Nathanson, Mendelsohn, Frenaye, Stafford, Quiat, Butler, Heyn and Haynie voted nay. So the motion to amend Article 7 was LOST.

114) Mr. Nathanson asked the Board once again to consider Mr. Harrison's Minute 49 motion on behalf of the Elections Committee which proposed establishment of a permanent Election Committee; the motion offered in the morning had been postponed "until after lunch." It was moved by Mr. Nathanson, seconded by Mr. Wilson, to amend the motion by striking the text and substituting therefor: Moved, By-laws 19, 20 and 24 are amended by deleting the words "Executive Committee" and substituting the words "Election Committee." By-laws are further amended by the insertion between By-laws 41 and 42 of the following:

"41A Election Committee. There shall be an Election Committee composed of three Directors. The Election Committee shall have charge of the balloting for ARRL Director and Vice Director, the duties including but not limited to

- a) receipt of petitions,
- b) receipt of all campaign statements and materials,
- c) printing of the ballots,
- d) counting of the ballots, and
- e) promulgating the results. The members of the Committee shall be annually appointed by the President at the Annual Meeting from among those Directors not subject to election during the year of service."

During the course of this debate, at 7:48 PM, Mr. Mozley took the seat for Mr. Turnbull. A roll call vote being ordered on request, the amendment to the earlier motion was ADOPTED 10 votes in favor, 4 votes opposed and 1 abstention. Those voting in favor were Messrs. Metzger, Meyer, Harrison, Nathanson, Mendelsohn, Frenaye, Drake, Quiat, Butler and Haynie. Those voting nay were Messrs. Mozley, Grauer, Stafford, and Kanode. Mr. Heyn abstained. At this point, 7:52 PM, Mr. Turnbull returned to his seat. The question then being on the motion as amended, a roll call vote being required, the question was decided in the affirmative 12 votes in favor to 3 votes opposed. Those voting aye were Messrs. Turnbull, Metzger, Meyer, Harrison, Nathanson, Mendelsohn, Frenaye, Drake, Quiat, Butler, Heyn, and Haynie. Those voting opposed were Messrs. Grauer, Stafford and Kanode. So the By-laws are AMENDED.

115) It was moved by Mr. Harrison, seconded by Mr. Mendelsohn, that whereas, the Board has during this session passed a motion proposed by the Elections Committee labeled 3.9 (see minute 44 above) and whereas, the language needs some crafting, now therefore the Board does proceed to reconsider said motion. But the motion to reconsider was LOST.

116) On motion of Mr. Mendelsohn, seconded by Mr. Wilson, the following resolution was unanimously ADOPTED:

WHEREAS, at Minute 16 of the July 1988 meeting, the Board adopted the guidelines set forth by the Ad Hoc Committee on Amateur Radio and the Media for amateur/media contact; and

WHEREAS, those guidelines are, and were intended to be, subject to the policies and rules of the FCC governing such amateur/media interactions; and

WHEREAS, the Commission, in Docket 88-139, proposed to incorporate existing policy on amateur/media interaction in the rewritten rules, the text of which was supported by the League's comments in that proceeding with only minor changes; and

WHEREAS, efforts have been made in that proceeding by media entities to significantly broaden the ability of news media to utilize Amateur Radio for commercial news gathering purposes, now, therefore

BE IT RESOLVED that the Board hereby affirms that its policy governing amateur/media interaction is and has been consistent with the literal, not liberal, interpretation of the "four part test" established by the FCC in Docket 79-47, to wit: Conveying news information to media sources can be done on amateur radio only when all of the following conditions are met: 1) the event is unforeseen, and 2) the news information is directly related to the event, and 3) the information is critical to protecting the safety of life of individuals or the immediate protection of property, and 4) the news information cannot be transmitted by any means other than an amateur radio station, because normal communications systems including wireline or radio, are not available.

117) It was moved by Mr. Mendelsohn, seconded by Mr. Turnbull, that By-law 36 shall be amended as follows. Sentence one shall read: "Each standing committee shall consist of at least 2 Directors and a Vice President or Vice Director, or both." Sentence two shall be struck. A roll call vote, with 12 votes necessary for adoption, was required. There were 10 votes in favor and 5 votes opposed. Those voting in favor were Messrs. Turnbull, Metzger, Meyer, Harrison, Mendelsohn, Grauer, Kanode, Quiat, Butler and Haynie. Those voting nay were Messrs. Nathanson, Frenaye, Drake, Stafford and Heyn, so the motion to amend the By-law was LOST.

118) On motion of Mr. Mendelsohn, seconded by Mr. Harrison, it was VOTED that the Volunteer Resources Committee is directed to study the desirability of establishing the field organization appointment of Local Government Liaison. The Committee shall report its findings to the Board of Directors not later than July 1989.

119) On motion of Mr. Frenaye, seconded by Mr. Stafford, it was VOTED that regular summaries of pending and completed government activity relating to Amateur Radio be published in an effort to better inform all amateurs concerning regulatory action that may affect them. The Board was in recess from 8:30 to 8:48 PM.

120) On motion of Mr. Frenaye, seconded by Mr. Haynie, the following resolution was unanimously ADOPTED:

WHEREAS, FCC action on PRB-3, an inquiry concerning the issuance of call signs, has been delayed since September 1987, now, therefore

BE IT RESOLVED that the President and Executive Vice President continue to urge the FCC to act expeditiously on this matter, especially regarding the availability of call signs for club stations. During the course of the above, at 8:49 PM, Mr. McConnell took the seat for Mr. Stafford.

121) It was moved by Mr. McConnell, seconded by Mr. Frenaye, that Section Managers be allowed to obtain "Official Family" QSL cards at no cost to the ARRL. Cards are to be paid for at the time of order, the price to include shipping. But the motion was LOST. Mr. Frenaye and Mr. Heyn requested to be recorded as voting aye. At this point, 8:54 PM, Mr. Stafford returned to his seat.

122) Moving now to item 14 on the agenda, on motion of Mr. Mendelsohn, seconded by Mr. Kanode, it was VOTED that the Executive Vice President is hereby authorized to reimburse Division Directors for actual expenses incurred by them during the year 1989 in the proper administration

(continued on page 74)

Michigan Hams Provide Communications in Chemical Fire Disaster

By George Race, WB8BGY, and Joe Turner, K8CQF

Genesee County (MI) EC, WD8JCN, received routine notification of a fire at Diverse Plastics Inc in Flint at 8:15 PM on November 29, 1988. KA8OWR and W8WN arrived at the fire scene fifteen minutes later. KB8ATR assumed the position as Net Control at the Disaster Coordination Center located in the Flint Township Fire Hall. By 8:45, all Amateur Radio communications nets were in operation, with Don, KA8EUV, taking NCS responsibility at Central Dispatch.

There were hazardous chemicals at the scene which could not be fully identified due to burned labels and tags. KA8OWR and a fire coordinator were able to get within 20 feet of the barrels, but were driven back by heat and dense smoke. KA8PRV, a General Motors Safety Team member, called the National Hazardous Chemical Hotline in Washington, DC and Union Carbide's hazardous chemical office to determine the danger involved with the burning identified chemicals.

N8HKV telephoned ARRL Michigan Section Manager, WB8BGY, related the circumstances of the situation and obtained the phone number of Michigan District 3 Assistant DEC, WA1ELA. He contacted Dr Dennis Klipa, N8ERF (see photo below), who is a research chemist at the Dow Chemical Corporation in Midland. WB8BGY notified Jay, N8FTY, District 2 DEC, of the need for the Packet Radio Hazardous Material Program in the Flint area. Jay subsequently called N8JAT, BBS system operator in the Saginaw area. Working with N8JAT, N8ERF identified the partially named chemicals based upon his research background, and relayed the information to Genesee County officials through N8JAT. In addition, N8ERF contacted N8ERV with critical information regarding the toxicity of the chemicals involved in the fire. Since the Amateur Radio information was deemed to be faster and more accurate than some of the information through government channels, the Genesee County Central Dispatch Coordinator ordered his personnel to send and verify information through NCS operator KA8EUV.

KA8ATR issued orders that all hams working in the fire area for more than five minutes report to the triage area for medical examinations before going home. As it



KB8DFX, KA8TMO and KA8YTT provide communications support in aftermath of Flint Michigan fire. (photo courtesy K8ZIS)

turned out, KA8OWR and KA8ASN were both hospitalized after suffering respiratory reactions to the burning hazardous chemical fumes.

The District 3 ARES/RACES Net was called into service to provide liaison and resources for Genesee County by ARRL District Emergency Coordinator, K8CQF. Shortly after 9:00 PM, WB8BGY



N8ERF, a research chemist, succeeded in identifying the unknown chemicals involved in the disaster. (photo courtesy Saginaw News)

broke into the Great Lakes Emergency and Traffic Net, which operates daily on the Michigan emergency frequency of 3.932 MHz. Net Control Station WD8BSE was advised of the the Genesee County emergency operation, and the frequency was established for the ARES/RACES DEC and EC coordination in Districts 2, 3 and 4, with WB8COU acting as liaison to the net from the disaster area.

N8FTY then put the Michigan Emergency Packet Network (MEPN) into operation. Bulletins were sent throughout the network advising of the possible need for volunteers in the Genesee County area. The packet system was placed in the *Round Table* mode, which is provided by the WØRLI BBS software, and a conference bridge was established between the Michigan SM, DECs, ECs and the disaster area. This system succeeded in providing real-time updates on various volunteer resources. 220 MHz coordination was also provided between Washtenaw and Wayne Counties.

Local residents, 60 fire fighters and two amateur operators were treated for respiratory problems from the toxic fumes and smoke. Twenty-seven fire agencies were involved in bringing the situation under control, along with three police departments, dozens of volunteers from the Red Cross and Salvation Army and numerous radio amateur groups. Initial reports said that 3000 residents were to be evacuated, but, in fact, only 800 were evacuated. Amateur Radio operators intercepted a message that residents were to be permitted to return to their homes by 3 AM; however, the fire was still burning and the State Fire Marshal, after being notified by hams of the impending return of residents, countermanded the earlier order and kept the residents out of the area until the situation was fully under control.

Several notable communications events occurred during this disaster. For example, the packet-radio hazardous-materials data base, developed and disseminated by N8JAT, was used for the first time in an actual chemical disaster. In addition, the computer program *Q and A* was used to track both volunteers and victims during a real disaster. The packet-radio program *Finder* is now replacing *Q and A* within the district but was not used during this

particular disaster due to the lack of a trained operator being available at the start of the disaster. The *Round Table* packet program, included in the latest version of the WØRLI BBS software, was used to advise Michigan ARRL Officials in real-time about conditions within the disaster area. This allowed immediate updates throughout MEPN (Michigan Emergency Packet Network) and kept the county areas informed of the developing situations.

Government disaster officials were in awe to discover how sophisticated a communications system we were able to make available on short notice. They were also impressed with our ability to track people with a computer program, give them the status of people and their locations and quickly identify and list potential problems of hazardous materials.

In Michigan, all of this is made possible because of preparation, practice and training provided by the Michigan ARRL leadership. DECs, ECs and the many members of ARES and RACES have created a ready-to-swing-into-action system that can meet the challenges of disaster communications.

The night will not be forgotten, but will mark the beginning of further training and preparation from lessons learned during the Flint disaster that will further define and refine our Michigan ARES and RACES programs.

EMERGENCY PREPAREDNESS— TAKE IT TO WORK WITH YOU

By Keith Higgins, WA6IYL
Correspondence Manager, W6FXN/R
Seismic Precursor Net

When the Department of Defense expressed its support of emergency communications networks, to be manned by licensed and trained radio operators, the amateur community in Downey, California responded aggressively. A model implementation of DOD's desires can be found in Downey, where planners of city emergency services endorse the mutual assistance agreements they have with Rockwell International's Space Transportation Systems Division, home of America's Space Shuttle.

Following the October 1, 1987 Whittier Narrows earthquake, licensed amateur employees consolidated their resources and volunteered to assist the company and its plant protection services with emergency preparedness. Encouraged by supervision and management, 37 hams run daily emergency radio drills on 2 meters and on 23 cm.

The heart of the system is the 1.2 GHz WB6POO/R machine operating on 1284.400 MHz in the Downey facility with

ARRL EC Training and Certification Course Now Available

One of the primary reasons for the existence of the Amateur Radio Service is its ability to serve the public, especially with respect to providing emergency communications. The American Radio Relay League recognizes this fact with its commitment in its Amateur Radio Emergency Service, support for the government's Radio Amateur Civil Emergency Service and with a number of formal agreements in place with special disaster and emergency-oriented civil and government agencies.



The new ARRL Emergency Coordinator's Training and Certification course (now available to all DECs and ECs from your Section Emergency Coordinator and/or Section Manager) is the next phase of evolution of the League's commitment to excellence in modern emergency communications support. It serves to ensure that official Field Organization appointees engaged in ARES work and others will acquire, develop and refine the skills needed to perform at a high standard when asked to respond in an emergency communications situation.

All ARRL Emergency Coordinators and District ECs now have the opportunity, but are not required, to take this course and successfully pass the certification examination. Contact your Section Emergency Coordinator or Section Manager for further details.

a 2-meter link. This machine provides emergency communications capability both within the facility and also with other company sites in Cypress (Orange Co) and Palmdale. A 440-MHz frequency is also utilized for inter-facility contacts.

During activation, several simplex frequencies are monitored on both the VHF and UHF bands. If the emergency relates to a seismic event, the W6FXN/R machine, which serves much of Southern California with earthquake detectors and widespread seismic reporting activities (see *QST*, FM/RPT, October 1987) is also monitored by the WB6POO/R staff. Multiple net controllers are used to segregate problem assessment and problem solution. The plan

seeks to reduce the burden of decision-making on a single net controller. In an emergency such as a fire, earthquake, hazardous chemical spill or explosion, the usefulness of any radio system must not be degraded by any form of traffic saturation. Implementation of subnets is considered an asset in the function of disaster management.

With participating employees still mindful of the tragic 1986 Cerritos air crash disaster, all drills are taken very seriously by the volunteers. The enthusiasm for this service reaches the executive branch of the company where the civil defense program is monitored by a company vice president.

The potential need for industrial emergency communications has proven to be real, and the hams who work in Downey have committed themselves to assist their fellow man. Assisting those dedicated hams will be the WB6POO/R machine and the many knowledgeable people who have applied this resource into such a commendable service. It is hoped that many other high-population industries will soon be relating similar reports of ham radio's service to society.

Field Organization Reports December 1988

ARRL Section Emergency Coordinator Reports

Twenty-six SEC reports were received, denoting a total ARES membership of 22,048. Sections reporting were: ENY, GA, IA, IN, LA, MI, MN, MO, MS, NFL, NH, NNJ, NLI, NV, OH, OK, ORG, PAC, SD, SDG, SJV, UT, VA, WA, WNY, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	132	90.00	1134	2292
TCC Central				
TCC Pacific	110	88.70	862	1662
Summary	242	89.35	1996	3954
Cycle Three				
TCC Eastern	60	96.77	230	463
Cycle Four				
TCC Eastern	162	97.01	1466	2939
TCC Central	70	84.30	552	1178
TCC Pacific	121	90.30	1056	2098
Summary	353	90.53	3074	6215

TCC Roster

Eastern Area, Cycle 2: KW1U, Director. K1EIC WA1FCD KN1K KA1MDM KT1Q W1QYY KW1U WB2EAG WA2FJJ W2FR NN2H WB2MNA W2MTA KA2UBD N2XJ N3AZW N3EMD KQ3T NC3V NJ3V WA3YLO AA4AT K4DOR WD4FTK W4FRR N4GHI WB4PNY N4SS KA8CPS WD8LDY W8PMJ NJ8S KA8WNO WB8YDZ W8YP VE3ORN

Eastern Area, Cycle 3: KN1K, Director. WA1FCD WA2SPL N3EMD W3JKX W3OKN AA4AT K8TPF KA8WNO.

Eastern Area, Cycle 4: KN1K, Director. KB1AF W1CE W1EFW KN1K W1NLM W1QYY KY1T KW1U W2FR W2GKZ NQ2H KB2HM W2LWB W2RQ WA2SPL K2VX N2XJ N3FM W3GL

WB3GZU KQ3T NC3V WA3YLO N4GHI WB4KSG KB4N
WB4PNY K4SCL N4SS N4TE W4UQ K4WJR K4ZK W8BO
WBPMJ N4BS K8TPF K8WNO N8XX VE3FAS VE3GSQ.

Central Area, Cycle 4: K5GM, Director. W4ZJY W85J K5MXQ
WZ5N W85O N5TC K5TL W5TNT KB5W W9CBE W9UYU
A100 KSOU.

Pacific Area, Cycle 2: ND5T, Director. W5JOV KB5UL K6UYK
W6FO V6CHK W7AMM KF7R W7TGU W7IGC N6HFZ N6IA.
Pacific Area, Cycle 4: K6DJ, Director. N2IC ND5T W5OVK
K8LL W6EOT W6INH W6VZT K7GXZ W7EP W7GHT W7LG
W7VSE K7CPT KN7B NN7H NR7E K0EZ K0TER K0DD
KJ9G.

156 WB2VUK K0ERM NY8W
W2QNL 105 W4KSO 69
154 W0DYH 85 KBJD
N4GHI W3VW W4ZJY
153 K9CNP N8GPU 68
WB4DVZ KA2ZKM WA3WY
151 WA2FJ 84
WA9VND 104 W67H
AA4TE K0JH
W0S0 KA11FC
145 W0S0 83
WA4QXT 103 W3FA
W12G N6NLW W0TFC
144 N8FOO KJ9J
WF60 WB4KSG N2GPA
142 WA2SPL 102
KD8HB 102
AG9G W87WOW
K5CXP W4JLS
K41FVY N3COY
N3AZW KA2VZX
K5UPN W2GJ
K0KPY 82
WA2ERT 81
101 KA2INE
N4MEJ W9DM
K8TVG N8IC
K2VX N5KCL
N3EMD KA2QOO
WA2JBO 80
100 KA1JXH
101 W7LN
N4SCKS KA8WNO
N4SMB 78
W6VOM K0PCK
99 W88SYA W89KBW
AA4HT K4MTX N59Q
N5MEA W8DHB N2DXP
WE2G N8FPN WB2FTX
NB2D W8BYPG
77 W8WVJ
W86OBZ W2MTA
W3AVZ K1ABO
76 W4ALY
121 N7BGW
W8KQC W1KX
120 75
W7VSE WB2OMP
119 K8LB
N4TJT K3JL
K14W WB2QIX
96 61
N3EGF W0UD
K14YV KA0PDM
NM1K W8EIB
KW1U NAORZ
WB4ZTR W9UMH
117 94 W5TU
WA0HTN W1K N2ABA/T
KD7ME K2YAI
K2JW
116 60
K4ZK N3VJ
N2EIA 93 W5BCPY
KT1Q N2AKZ
KA7EEE K3RXK N2HLZ
KK4FV KCGY W6NL
WB1HIH W1PEX KA6TND/T
114 W4RWB 57
W4ANK N8HWD N1DUB/T
K2YQK N09T 56
113 WA4RUE KQ3T
KB1AF K4BGZ
91 72
N8IYE K8DKU
KF5RD W4HON
N1FLO N8JVY/T
111 71
WB4WQL KA9RII
KB9LT N7GGJ
AA4AT KB4GCY/T
89 WB1BTJ
110 KA1NXT 48
N3CWE W8IIOT
WA9VLC K8BCPS 47
WB2EAG WA1JVY KA2JMA/T
KA2JBD 88 WB4ZTR 45
N8FWA AK1W
K8WNO 69 N2EVG/T
109 WA4JDH 43
108 N8HSC
N2XJ K4LFP KA2UJY/T
WA4TXT N2IKR/T
86 KA1MDM
107 68
N9BDL WB4HRR N8HRW/T
NO3M KA0ARP KA9CTW/T
N2HSP/T

20 Meter ISSB Net 27 1773 371
75 Meter ISSB Net 31 1236 1392

20 Meter ISSB Net 27 1773 371
75 Meter ISSB Net 31 1236 1392

Brass Pounding 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	Acvd	Sent	Divd	Total
KA0ARP	3006	91	3294	11	6557
WA4TGF	2609	8	2609	8	5234
N8FBW	---	---	---	---	4444
W8AKF	492	1122	1433	392	3439
W3CUL	740	897	1366	112	3135
K4DOR	131	990	1121	35	2277
W8Y9PY	0	1195	102	728	2025
WB0TAX	82	950	950	15	1997
WA2SPL	6	972	969	41	1988
WD4IID	592	359	795	95	1841
W1PEX	0	409	1380	19	1808
N4GHI	71	778	752	48	1649
WA4JDH	14	755	766	3	1583
KB4N	0	742	708	0	1450
WA9VND	6	668	603	62	1339
WF6O	7	606	616	48	1277
W8WVJ	220	280	781	6	1267
N3AZW	87	523	563	48	1221
K9ZBM	321	364	502	34	1221
W2MTA	9	670	533	8	1220
K1ABO	18	542	488	102	1150
W4ALY	21	555	433	28	1037
KK4FV	2	466	528	5	939
WD4MIZ	0	483	483	0	966
K4MTX	0	481	481	3	965
AA4HT	63	464	398	39	984
K9CJG	7	558	38	342	943
K8UYK	35	440	461	3	939
WX4H	2	440	435	5	882
AJ6F	0	0	419	430	849
K5UPN	0	302	527	4	833
WA1VXW	2	408	401	9	820
WA4QXT	81	320	371	44	816
KA8FEZ	---	---	---	---	808
K4NLK	30	359	394	19	805
N1CPX	6	323	390	28	745
K89LT	41	335	361	6	743
KB4KCV	317	49	352	23	741
AL7IN	5	363	368	0	736
N4EXQ	17	368	238	114	733
W6NL	---	---	---	---	698
KF5BL	27	347	248	78	698
K8DKU	---	---	---	---	696
W7AMM	21	323	330	17	691
N3EMD	0	315	364	5	684
WA1FHB	1	340	341	0	682
KW1U	13	364	285	17	679
NJ3V	34	308	328	1	673
W8DYX	---	---	---	---	670
AA4AT	0	331	324	13	668
N4HOG	0	328	328	0	656
K4ZK	4	320	308	15	645
WA6YNT-1	0	319	319	0	638
WA1TBY	7	292	303	35	637
W3ATO	0	315	310	5	630
W8ERQ	---	---	---	---	624
W8ZOL	---	---	---	---	615
K8JDI	---	---	---	---	614
W7VSE	2	330	251	19	602
WA4PFK	28	318	233	23	600
WB2OWO	55	212	267	72	596
W3WV	0	297	299	0	596
W3CKN	0	277	316	1	594
W1UD	105	148	284	41	578
WB4WT	3	308	157	102	568
K3RLI	0	281	282	0	563
WA4EIC	15	241	244	61	561
W8PMJ	---	---	---	---	560
N1DMV	2	270	262	14	549
KK4NN	81	192	253	32	538
W4NFK	19	258	249	12	536
WD8KQC	0	267	260	20	537
KY1T	57	208	264	5	534
K8BCPS	5	273	242	11	531
N2EIA	3	253	260	15	531
KA4TLC	8	305	201	10	525
K8TVG	---	---	---	---	525
KQ3T	1	290	221	8	520
KT1Q	1	353	160	5	519
N6NLW	15	246	242	2	505
W1EFW	19	220	249	15	503
N8FWA	---	---	---	---	501

BPL for 100 or more originations plus deliveries

KB4HJQ	317
K4EJK	152
WC4D	149
K1TQY	124
WB2OMP	121
N2DXP	120
WA4RUE	112

National Traffic System

Net Sess T/c Avg Rate Rep % Area

Cycle Two

Area Nets	Sess	T/c	Avg	Rate	Rep %	Area
EAN	31	1939	62.54	1.253	96.2	
CAN						
PAN*	62	819	13.65	.645	98.9	

Region Nets

1RN	62	651	10.50	.477	100.0	100.0
2RN	61	629	10.31	.564	98.7	100.0
3RN	31	345	11.12	.550	92.8	100.0
4RN	62	1146	8.02	.360	61.0	100.0
RN5	62	1361	21.95	.667	89.6	
RN6	56	282	5.12	.414	---	100.0
RN7	62	683	10.70	.631	93.3	100.0
8RN	62	679	10.95	.450	100.0	
9RN	62	474	7.64	.364	96.7	
TEN	62	603	9.72	.284	82.6	
TWN	56	664	11.85	.697	91.7	96.7
ECN						77.4

Cycle Three

Area Net Sess T/c Avg Rate Rep % Area

EAN	31	934	30.13	1.049	90.7	
-----	----	-----	-------	-------	------	--

Region Net

1RN						90.3
2RN	31	180	5.80	.433	98.7	96.7
3RN	29	103	3.55	.289	90.8	96.7
4RN	26	253	9.04	.467	87.1	96.7
8RN						96.7
ECN						93.5

Cycle Four

Area Nets Sess T/c Avg Rate Rep % Area

EAN	31	2634	84.97	2.015	99.5	
CAN	31	1696	54.71	1.791	100.0	
PAN	31	1284	41.41	1.229	100.0	

Region Nets

1RN						100.0
2RN	27	136	5.03	.535	39.7	100.0
2RN	62	364	5.87	.442	97.3	100.0
4RN	62	1259	20.31	.611	98.0	100.0
RN5	62	1149	18.53	.860	83.4	100.0
RN6	62	649	10.47	.750	98.0	100.0
RN7	62	615	9.92	.849	96.7	100.0
8RN	60	686	11.43	.540	94.0	100.0
9RN	62	635	10.24	.900	93.1	100.0
TEN	62	713	11.50	.735	79.6	100.0
TWN	60	382	6.37	.538	92.0	100.0
ECN						96.7
ARN	31	213	6.87	.164	100.0	100.0

* PAN operates both cycles one and two
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, DE, EMA, EPA, GA, ID, IL, IN, KS, MDC, ME, MI, MN, NC, NFL, NLI, NTX, OH, OK, OR, ORG, RI, SB, SCV, SD, SFL, UT, VA, VT, WA, WNY, WPA, WTX, WV.

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 NTB 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, will be awarded a special PSHR certificate from HQ.

494	198	188	163
WBAKF	KB4WT	W4HDW	KF5BL
366	193	173	162
KC9CJ	N4EXQ	WB2OWO	W8BV

The following stations qualified for PSHR during the month of October 1988, but were not listed in the January 1989 column: N0DPF, K0ERM, K0KPY, K08YL.

Independent Nets

Net Name	Sess	T/c	Check-Ins
Amateur Radio Telegraph Society	27	432	412
Central Gulf Coast Hurricane Net	31	329	3492
Clearing House Net	31	412	390
Empire Slow Speed Net	31	71	421
Golden Bear Amateur Radio Net	31	629	1959
HBN	31	512	720
IMRA	27	1015	1910
Mission Trail Net	31	169	814
NYSPTEN	31	98	587
West Coast Slow Speed Net	31	118	439
7290 Traffic Net	51	1088	3508

Fish and Rice—Very Nice

ZK1XV on Penrhyn Island, Northern Cook Group
By Ronald "Bing" Crosby, VK2BCH

The islands known as the Cook Islands in the South Pacific cover 750,000 square miles, but the land mass amounts to only 93 square miles with a population of approximately 18,000. The islands are self-governing, with a 24-member parliament. (New Zealand is responsible for defense and foreign relations and generously subsidizes the financial income.) The climate in the southern group of nine islands is warm, with winter being virtually nonexistent, leading to an economy based on agriculture and tourism. The six islands of the northern group are mostly low-lying atolls with a very hot climate. The coconut palm represents the main source of income, with pearl shells, pearl culture and fishing supplementing the revenue. It is believed that two of the northern group islands were visited by the Spanish navigators Mendana and Quiros in 1595 and 1606.

My first trip to ZK1, Cook Islands, in June of 1986 took me only to Raratonga, the capital. This was an easy trip and I lived in the lap of luxury. My ham equipment was loaned to me by ZK1CX (onetime Director of Education in the South Pacific). Neville and his charming wife Tere run a motel on Raratonga, and hams are most welcome at any time.

During this visit I had visions of a visit to the North Cook group (Penrhyn Island, 1000 km north of Raratonga), which has an airstrip three km long, built by the Yanks in WWII. My inquiries showed promise, but a charter flight was far too expensive. I investigated a shipping company which runs a service to the northern islands. At the docks I checked on a small ship of about a thousand tons. At best it could be described as a rust bucket that stank. The cabins cost \$600 and were impossible. The only alternative was to travel as a deck passenger at \$200 return. This turned out to be the best way, and the fresh sea breezes were a delight.

My return to Raratonga in May of 1987 was filled with the excitement of a trip to a rare DX country, no ham having been there for three years. With what I brought and what was loaned to me by ZK1CX, I was ready to go. Next, I purchased provisions (at twice the VK cost) to last me a month. The shipping firm assured me that a return ship would be back to Penrhyn in a month and that the trip would take four days. (They fooled me, however—it took eight days.)

On the night before departure, I attended a party and came away with a severe case of food poisoning. Luckily, the ship's departure was put off for several days. The ship called in at the islands of Manihiki and Rakahanga—beautiful and friendly, but with oppressive heat.

At last we arrived at Penrhyn Island, which looked beautiful, on June 1. I was met by the Assistant Administration officer, a well-educated young man, and we became friends. I was taken to the government rest house and

soon had things sorted out. With the help of a young boy named Taco, I soon had a dipole and inverted V up in the palms. My first contact was with the MC of the 14.220-MHz net, and it went well.

A failing I have is that I trust people. I purchased 24 cans of beer and refrigerated them. (On this island the generator runs six hours in the morning and five in the evening, so a cold drink was always available.) The next morning, however, I found all the beer gone. The culprit, a sailor of low local reputation, was found asleep, still drunk.

The island of Penrhyn is a delight. Swimming in the lagoon was like taking a warm bath. However, sanitation left much to be desired; there was no running water. My exercise consisted of long walks in the cool of the evening, with incredible sunsets and swaying palms.

I was pleased with the DX situation. With wire antennas less than 30 feet high, I needed some "list taker" assistance. Through the kindness of OZ1BTE and OZ1FTE, I managed to work many of the Europeans.

Time went quickly. At the end of June, I was told no ship for another month. (I was fast running out of European-type food; no potatoes, green vegetables or eggs were available. I was eating tuna three times a day and craving some red meat.) After six weeks, however, and no ship, I heard a rumor that an aircraft was to fly in with a medical team. Sure enough, after seven weeks on the island,

I arranged with the pilot for a return trip to Raratonga. (It took eight days to travel by ship to Penrhyn, and the return flight took just 2½ hours.)

Visalia, California DX Convention, April 21-23

The Northern California-hosted DX bash advance registration (until March 20) is \$40. Make checks payable to 1989 International DX Convention. Include an SASE and send to David Engle, KE6ZE, 1063 Summerwood Ct, San Jose, CA 95132.

Dayton HamVention® DX Dinner, April 28

The Southwest Ohio DX Association notes that the keynote speaker will be Dave Heil, recently J52US. The banquet will be at the Stouffer's Dayton Plaza Hotel at 6:30 PM. Send a check for \$22 (payable to SWODXA) and an SASE to Scott Lehman, N9AG, PO Box 803, Greenville, OH 45331.

DX REALITIES SOUTH OF THE BORDER

XE1MD/6D5MD forwarded the following material to your editor in hopes that it might help "both sides" of a pileup. "A lot of our hams and would-be DXers come from what the US calls CB. Concepts such as split frequency or a second VFO are unknown to them. Information about working a list or in a pileup is nil. Confirmed DXers aren't prone to let out some of their "secrets" for fear of being surpassed by their pupils. There are no genuine DX books in Spanish or Portuguese. Now, with the onset of monoband DXCC awards, things got worse. To avoid the endless calling/pileups, can DXpedition operators stand by for Caribbean and Latin American stations only, after W5s and W0s? Extend your kindness to work transceive. No harm will result; we are not as yet so numerous, and this will permit relatively new operators using a 15-year-old QRP transceiver to make the contact. Attend to your order; indicate clearly when your QSL information. You won't waste time—you'll get more contacts in an hour and more hams will be happy than frustrated. DX is a game and a "new one is a great reward."

IY4M 10-METER BEACON

I4SN recently alerted this editor that the I4YM beacon missed last spring's listing. This automatic beacon, sponsored by the Bologna Branch of the Italian Society (ARI), is housed in the villa where Marconi made his early wireless experiments. Characteristics: 28,195 kHz, 20 watts, antenna is a 5/8-wave ground plane. Code speed 15 WPM, locator JN54OK. The message: IY4M Robot QRV QRV. During a 30-second interval at the end of each message, calls are accepted and decoded. Reports are welcomed: IY4M, Box 2128, I-40100, Bologna, Italy. As of last July, IK6BAK, a new 24-MHz beacon, is operational on 24,915 kHz. Reports are welcomed via Eliseo Chiarucci, via Sterpeti 50, I-61030, Montefelecino (PS), Italy.

CIRCUIT

VE2NV: In mid-November, *The ARRL Letter* noted the passing of Jack Ravenscroft, VE3SR. Jack was never a quitter and fought the long hard RFI fight for his fellow VE hams. An admirable DXer with years as VE2NV, old friend VE3SR/VE2NV will be sorely missed.

W5OB: W5OUD relays the sad news that Bob Robertson, W5OB, an avid CW contester-DXCC participant (352-confirmed) became a Silent Key on December 16. W5OB was a charter member of the Westside ARC of New Orleans, First Class CW Operators' Club, OOTC, QCWA, Delta DX Association and a Life Member of ARRL.

K3MO: K5UC reports the passing of his brother, who was first licensed as W8HGG (before 1930). In spite of debilitating illness, K3MO was active through the Peter I operation. Joe made Honor Roll, was an A-1 operator and earned the Outstanding Western Pennsylvania DX award.



Hatching up ways to snag the next one: (l-r) W5UCQ, W5SZ, K5RE.

JX1UG: LA1UG hopes to operate from Jan Mayen until the middle of April. Ivar's eastern QTH is unfavorable for NA, but he hopes to spend some time on the western side. Cards go to Mathias Bjerrang, LA5NM, P.O.B. 210, N-9401 Harstad, Norway.

Routings: VU2WAP via WA2YMX. EI4GV operated EJ/BG late December. This and future expeditions (ZA, July?) via Peter's new QSL Manager, KB1XN. NT5D/KH6 via Richard A. Matthews, NN5W, 5316 Holly, Bellaire, TX 77402. VU2GI/VU2UGI via Jim Mortensen, N2HOS, 65 Holly Place, Briarcliff Manor, New York, NY 10510. TA3B/TA3C, Box 839, Izmir, Turkey. UD6DF, Box 72, Baku, Azerbaijan, USSR RB7GG, Box C 73, Kherson 325000, USSR. CT3FN via HB9CRB, EA9TP via EA9IB, HD8D via N6EK, FH5EG via F6EZV, 7P88DP via W8JBI, 9H3EH via DL2GBT, CT3FN via HB9CRV.

Great Expeditions: Thanks to an anonymous column reader for the tip on this interesting bimonthly magazine featuring adventure, off-the-beaten-path discovery and budget travel. My sample Sep-Oct issue contained notes on travel in West Africa, trekking through Somalia, an Antarctic safari, on the trail in Ecuador and a feature "on the road" to legendary Timbuktu (Mali). Further details from Great

Expeditions Magazine, Box 8000-411, Sumas, WA 98295-8000.

Volunteers: Linguist K3CHP is available for QSL manager service for some DX station: Joe Mikuckis, 6913 Furman Parkway, Riverdale, MD 20737.

QSL Corner

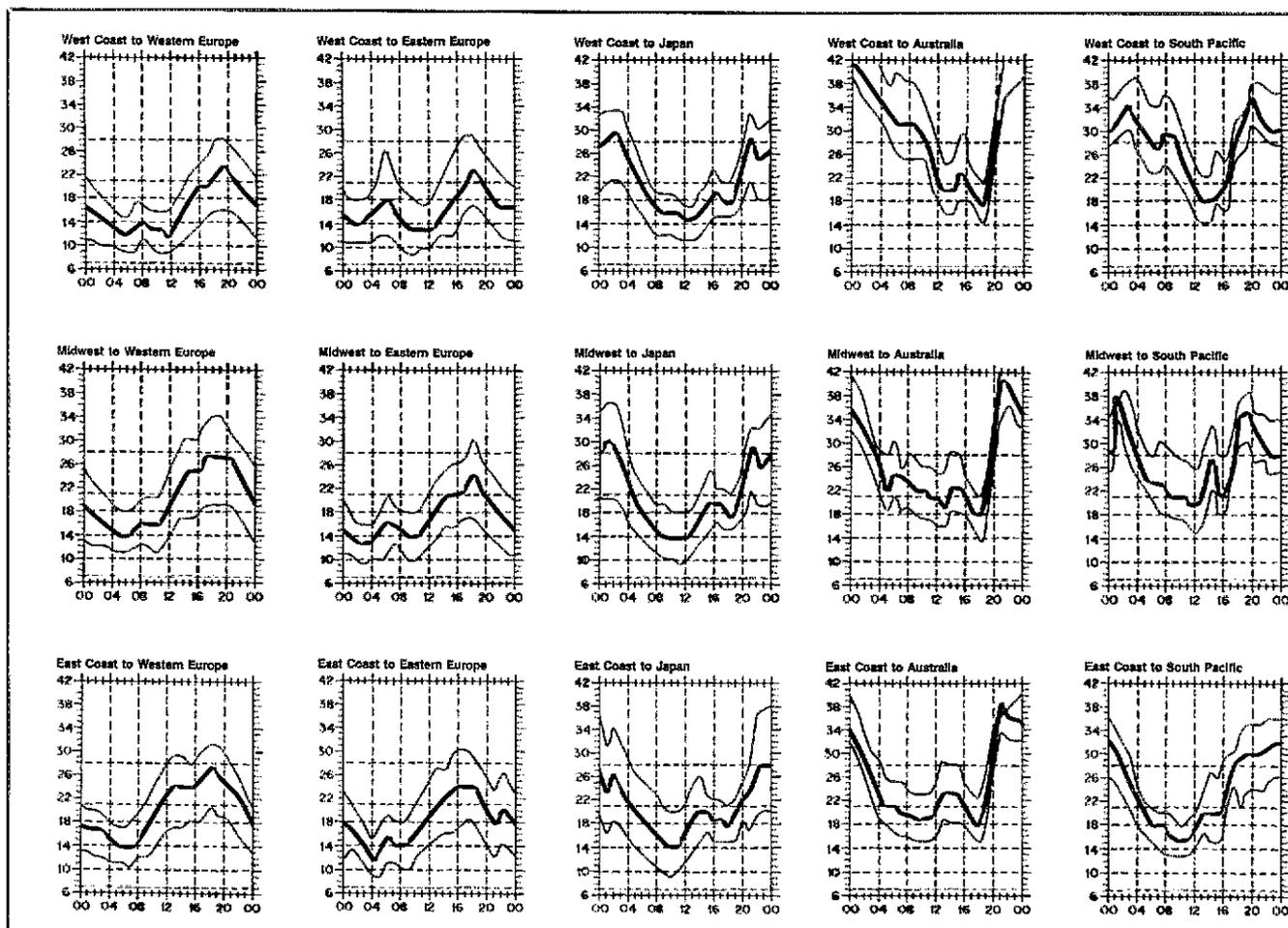
Administered By Joanna Hushin, KA1IFO

ARRL-MEMBERSHIP OVERSEAS QSL SERVICE

Send outgoing cards: American Radio Relay League, QSL Bureau, 225 Main St, Newington, CT 06111, USA.

This is an "outgoing" service that allows ARRL members to send DX QSL cards to foreign countries at minimum cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the foreign *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, airmail postage and envelopes can be prohibitive.

An unlimited number of QSLs may be sent for



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

distribution 12 times per year. The fee is just \$2 per pound or portion thereof (150 QSL cards average a pound). For those not quite so DXactive (sending 10 cards or less), enclose \$1. Recommended size of QSL cards is 3½ × 5½ inches (90 mm × 140 mm).

The ARRL-Membership Overseas QSL Service operates *only* in an outgoing capacity. To receive QSLs from DX stations, see "The ARRL DX QSL Bureau System" (Incoming), Dec 1987 *QST*, page 56, or send an SASE to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.

US amateurs may send SWL reports to foreign shortwave listeners. Unlicensed (associate) members may send SWL cards to foreign amateurs. QSL managers: write for details.

Note: The ARRL QSL Service should not be used to exchange QSL cards within the 48 contiguous states.

Requirements

1) Presort your DX QSLs alphabetically by call-sign prefix (AP, C6, CE, DL, F, G, JA, LU, PY, 5N, 9Y, and so on).

2) Enclose the address label from your current copy of *QST*. The label shows that you are a current ARRL member.

3) Enclose payment of \$2 per pound of cards—approximately 150 cards weigh one pound. A package of ten (10) cards or less costs only \$1. Please pay by check (or money order)

and write your call sign on the check. Send "green stamps" (cash) at your own risk.

4) Include only the cards, address label and check in the package. Wrap the package securely and address it to the ARRL Outgoing QSL Service, 225 Main St, Newington, CT 06111.

5) Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

6) Blind members who do not receive *QST* need only include the appropriate fee along with a note indicating that the cards are from a blind member.

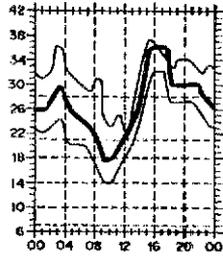
7) ARRL affiliated-club stations may use the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that affiliation is current. In addition to sending club station QSLs through this service, affiliated clubs may also "pool" their members' individual QSL cards to effect an even greater savings. Each club member using this service must also be a League member. Cards should be sorted "en masse" by prefix, and a *QST* label enclosed for each ARRL member sending cards.

Countries not Served

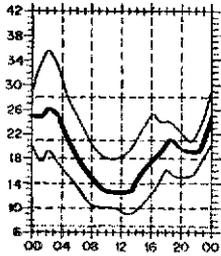
A5	Bhutan	A7	Qatar
A6	United Arab Emirates	BV	Taiwan
		C9	Mozambique

D6	Comoros	VP2E	Anguilla
ET	Ethiopia	VR6	Pitcairn Is
HZ	Saudi Arabia	XT	Burkina Faso
J5	Guinea-Bissau	XU	Kampuchea
KC4	US bases in Antarctica	XW	Laos
		XX9	Macao
KC6	Belau	XZ	Burma
KC6	Micronesia	YA	Afghanistan
KH1	Baker and Howland Is	ZA	Albania
		ZD7	St Helena
KH3	Johnston Is	ZD9	Tristan da Cunha
KH5	Palmyra and Jarvis Is	ZK2	Niue
		ZK3	Tokelau
KH7	Kure Is	3C	Equatorial Guinea
KH9	Wake Is		
KP1	Navassa Is	3V	Tunisia
KP5	Desecheo Is	3W	Vietnam
P5	North Korea	3X	Guinea
SU	Egypt	4W	North Yemen
T2	Tuvalu	5A	Libya
T3	Kiribati	5H	Tanzania
T5	Somalia	5R	Madagascar
TJ	Cameroon	5U	Niger
TL	Central African Rep	5X	Uganda
		7O	South Yemen
TN	Congo	7Q	Malawi
TT	Chad	8Q	Maldives
TY	Benin	9G	Ghana
TZ	Mali	9N	Nepal
V4	St. Christopher and Nevis	9U	Burundi

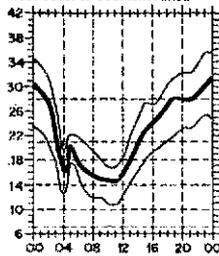
West Coast to South America



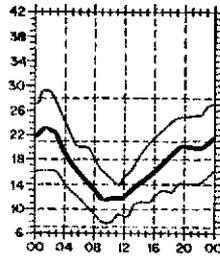
West Coast to Central Asia



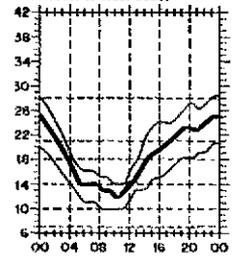
West Coast to Southern Africa



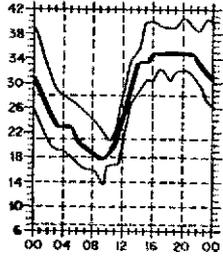
Alaska to East Coast



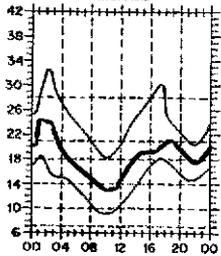
East Coast to West Coast



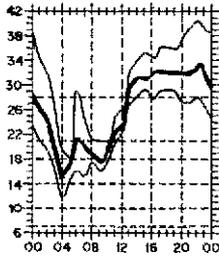
Midwest to South America



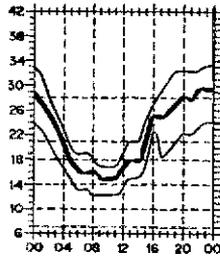
Midwest to Central Asia



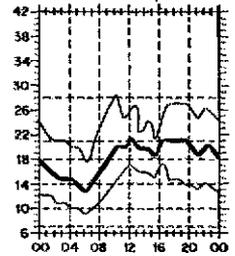
Midwest to Southern Africa



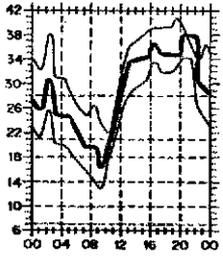
Hawaii to East Coast



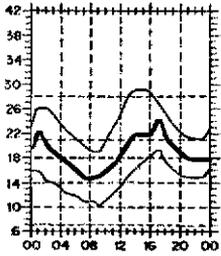
Hawaii to Western Europe



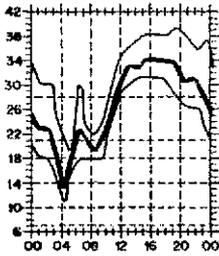
East Coast to South America



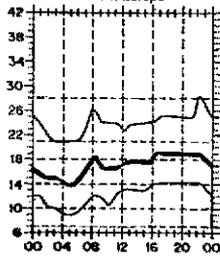
East Coast to Central Asia



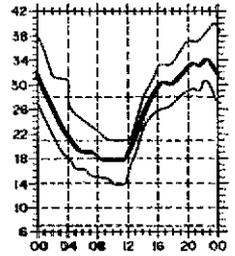
East Coast to Southern Africa



Alaska to Western Europe



Puerto Rico to West Coast



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 March 16 to April 15, 1989, assume a sunspot number of 163, which corresponds to a 2800-MHz solar flux of 206.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official DXCC Countries List. You may endorse your award in 25-country increments through 250, 10-country increments through 300, and 5-country increments above 300. The Satellite and 160 Meter DXCC awards are endorsable in 10-country increments through 200, and 5-country increments above 200. The totals shown below are exact credits given to DXCC members from November 1 to December 5, 1988. An SASE will bring you the rules and applications forms for participation in the DXCC program. Send \$1.00 to request the ARRL DXCC Countries List.

New Members

Mixed

DF5BL/102	JA2FCZ/303	TF3IM/101	N1CJQ/101	N2FFB/106	N4GYT/102	K85NR/100	WA6MUK/102	W8UML/102
DJ6QO/116	JA3DLE/134	VE3NBW/103	N1EUD/121	NS2E/101	N4LUF/156	KE5RG/121	K7JBC/106	WD8CDW/157
G0YF/103	JA7AQR/305	VE3OMM/102	WA1OWH/110	WA2C/199	N4QJW/105	KF5DX/278	NX7L/102	KA9AUF/110
GI4CRL/113	JH9PJL/130	VE8DX/125	K2AQ/106	K3FRU/100	N4SRK/100	N5AXV/103	WE7E/113	KD9TH/103
HB9DLU/200	LA1JFA/120	XE1MD/290	K2LZJ/101	KB3UU/117	WA4TWA/108	KB6RXF/107	K8CHN/105	K0HB/113
IS0UWS/120	LZ1QI/229	YV5IVB/161	K2OP/100	KC3WY/101	W4AN/107	KI6BU/249	N8DGZ/104	K0UYH/209
IS9VSC/302	OZ3PZ/330	KA1BJ/124	K2QJ/110	KB4YMB/105	WV4F/105	KI6PG/104	N8EFB/123	KE0EB/102
JE1WBA/109	SM3LIV/145	KA1MJR/103	KA2UHS/137	KK4YA/104	K5XK/158	N6IXX/102	NJ8X/103	NB0Q/110
JJ18BO/111	SP6CDK/258							

Phone

DJ6QO/115	HB9DLU/194	JJ1SBO/111	SM3LIV/140	N1EOA/102	KD3CQ/107	W4ZPQ/103	KI6PG/101	N8DGZ/104
DU1DZA/104	IN3DEI/313	JA2FCZ/297	SP6CDK/257	N1EUO/121	NJ3I/102	KD5GD/126	KI6SC/105	K9WMM/102
EA7CD/155	IN3NMP/118	JA3DLE/115	YC0RX/100	WA1OWH/100	KB4YMB/105	KF5DX/270	KI6UT/108	N9EZ/108
EA7FZY/111	ISKQF/303	JA3EQO/110	YV5IVB/132	WB1CAT/104	KC4BQX/101	KG5FX/124	N6HEW/108	W9NCJ/100
G4YFR/114	I5MPN/316	JH9PJL/130	4Z4GM/109	K2EWA/106	KK4YA/102	W5XQ/104	WA6AJB/113	K0UYH/173
G0AGF/107	IC8SDL/192	LZ1QI/136	KA1DIG/100	KA1DUHS/135	N4LUF/139	K6IS/103	K7VNT/100	KD0DI/105
H44RO/119	I8OOZ/247	OZ5GB/130	KN1N/106	WA2USA/121	W4AHR/101			

CW

DF9UH/117	IN3RZY/201	JF4PXF/119	VE3OMM/102	NM2Y/101	KA3OGL/102	K5XK/134	WE7E/101	KA9TNZ/112
DJ7XG/103	I50XIE/111	LZ1QI/190	YV5BH/128	W2SPN/178	W4UW/101	NZ7W/104	WF7S/110	W9DUG/190
DL2MDZ/105	JE1WBA/107	PA3BBP/110	K1IN/131	WA2USA/104	W4XD/104	WA7OET/103	KX8N/101	

RTTY

OH3SR/120	W3PTM/105	W6ZID/100	W8GKM/102
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160 Meters

NR1R/146	WB2P/108	K9AJ/109	WB9Z/104
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10 Meters

DL2BCW/107	OH2FS/209	K1CLN/109	N2HJZ/100	KB3QM/125	KB5DZY/106	W6KZM/159	WA8BYA/100	W9ROK/116
JG3NRP/108	ZP3JCV/184	N1CIX/105	NY2E/110	KF4GW/101	KE6KT/100			

Satellite

W4BE/112

5BDXCC

YU2RA	WA4IUM	K4AMC	KA5RNH	K0JZM	KY0A	WB5CRG	JA0CKE	N6GAH
N8FGH	WA2DSC	JW7FD	TR8JLD	JH1OJU	W5LQN	JA0DWY	ND0F	LZ1QI
DL2KC	EA3CZM	K8OQL	JA7FWR	OZ8XW				

New Honor Roll Members

Mixed

317	310		
OZ3PZ/330	SM0BZH/323	K8ZO/314	
315	SP6AEG/314	WA8OSE/321	
CA4CR/326	YU3AW/318	WB9OQU/314	
312	N4AXR/315	K0JW/321	
SM6CAS/333	N4BPP/314		
	W6TFO/319		

Phone

311			
UA3CT/328	DK1FW/325	N4AXR/315	
W4WMC/318	I2PKF/314	WA4BM/314	
AB9O/311	IN3DEI/313	W5AYZ/318	
310	ON5HU/317	W5UYD/325	
CE3GN/319	K4KJZ/315	K8ZO/314	

CW

308
YU2TW/313
AA4KT/312
W0JZ/310

Endorsements

Mixed

CT4NQ/134	JA1RLV/321	SM5CSS/303	K1AN/294	WA1GSO/256	AA4H/311	NZ5O/155	WJ6O/290	KB9MI/249
DF1SD/272	JA1TNV/264	SM6DHU/337	K1AP/311	WA1WTP/306	AA4KT/316	W5CFI/325	K7AU/125	KG9N/303
DF6MB/261	JH1OCC/201	SM6DIN/280	K1BV/333	WA1ZAM/301	AA4TV/252	WB5CRG/308	K7HRW/277	KD9QJ/300
DK1YK/328	JA3GM/328	SM6VR/342	K1DFC/338	WB1DQC/315	AB4AE/270	WB5ZRK/305	K7ZBV/315	N9CIC/234
DK5WS/313	JA3PXH/310	SM7CRW/320	K1FJ/153	K2BZT/361	K4ICH/283	W5CP/269	N7EMY/174	N9ER/305
DL7ALM/209	JL3VW/240	SM7KIL/203	K1JUI/255	K2LS/314	K4IQJ/224	W5SE/277	N7OT/305	NF9V/270
EA1BC/352	JF4PAG/169	SM7NDX/185	K1KA/289	KA2OOG/250	K4KC/343	AJ6V/305	NTY7/162	NJ9Q/260
EA2CR/292	JA6VA/332	SM2DRH/293	K1UO/321	KB2RA/292	K4PR/304	K6BUU/276	W7CUS/277	W9DC/340
EA3NA/330	JH7DNO/316	SP5EYU/321	K1ZLA/225	KC2YI/249	K04J/159	K6JR/334	WA7G/291	W9JEK/125
F2BS/343	JA8FKO/321	SP6AZT/262	KA1RRL/153	KA1RF/270	KR4D/303	KB6CLL/239	WA7GCS/130	W9MYG/310
G6KX/211	JA9SC/320	UA3CT/350	KB1BE/305	W2IRV/354	N4JCC/153	KF6TE/150	WA7GCA/271	W9TNZ/198
F3KMQ/311	LA8PF/285	VE2JUL/135	KB1HJ/285	W2MUM/340	N4OT/264	KG6JW/179	WR7C/209	WA9XB/280
GM3AWW/305	LA9SN/237	VE3NN/155	KB1KA/180	W2VP/300	N4TG/270	KI6VR/152	K8RW/180	WA9WYB/282
HA9PP/212	OE2DYL/296	VE3XN/336	KC1DQ/136	WA2AOG/305	NE4A/321	N6IZM/261	K8RYU/155	WA9YY/175
HK3YH/310	OH2BCV/330	VE4AGT/156	KE1K/295	WA2F/294	W4JKC/266	N6NBB/200	KC8NU/249	WB9POH/301
I1BW/300	OK3SG/312	VE6EJ/200	KN1M/281	WA2JTY/219	W4KGG/127	N6NXV/125	KG8K/258	A6C/300
I1ZL/356	OK1MG/343	VE6VM/322	N1CIX/251	WA2UDT/223	W4ROM/226	N6VI/299	KM8E/261	K8AW/316
IK2FAD/172	ON8BC/322	VE7IU/170	N1CNC/225	WA2UGT/153	W4USW/236	NY6M/KH/248	N8B7/316	K0NN/300
IK2FEO/156	ON8HF/295	W1JZ/308	N1HT/308	AJ3K/293	W4VOS/234	W6BJH/331	NEBQ/265	K0ST/165
I3EVK/338	PA3APW/219	NA1N/227	NA1R/324	K3KG/328	WA4AFE/157	W6KUT/362	NJ8O/184	K0BB/300
I4MKN/335	PA3DKX/210	NR1R/324	W1BL/321	KA3IFX/228	WA4CMS/168	W6OAO/200	NV8N/273	KB0JL/265
I5ARS/347	PY1DFF/269	W1ESN/321	W1ODY/328	NM3C/228	W4M/249	W6CX/158	W8CHV/316	KD0ZR/257
I5ZJK/303	PY1HX/357	W1GUW/314	W1TRC/321	W3HCW/290	W34S/256	W6RKP/358	W8IWI/158	KU0A/176
I6CGO/264	PY2AN/201	W1JGUW/314	W1WAI/311	W3NB/335	KA5GIS/127	W6US/329	WA8LLY/183	N0XA/316
IK7L/336	SL6AS/291	W1ODY/328	W1WAI/311	W3CQN/310	KA5SWC/140	W6YU/307	WB8SFF/207	NY0VY/75
I7PZB/348	SL0ZZ/189	W1TRC/321	W1WAI/311	WB3FD/300	KE5OD/175	WA6AJB/171	A19Y/149	W0BX/271
IT9AF/320	SM4CEZ/126	4X4IL/250	W1WAI/311	WB3KHU/234	N5AN/325	WA6DHA/154	K9GX/317	W0MHK/272
IT9QDS/305	SM4DDS/187	AE1H/207	W1WAI/311	AA4DO/280	NJ5X/320	WB6WQA/209	K9ZO/317	WA0EWU/150
IK0APR/259	SM5CAK/339		W1WAI/311					

Phone

A35SA/208	I3LBW/266	OE2DYL/296	YV5AJK/350	W1TRC/320	WA2MIS/181	W4UW/309	KJ6GC/175	WA8OSE/315
CP5LE/209	I4BAC/325	ON8HF/272	ZL4BO/329	W1VRK/292	WA2UGT/153	WA4JGV/226	N6CFQ/160	K9DXO/322
CP5TC/178	I4LCK/336	PA3AWQ/227	ZP5CF/359	W1WAI/225	AJ3K/278	WA4MXD/174	N6NXX/125	K9EC/206
CT1AIF/149	I5JHW/301	PY1DFF/202	ZS6FU/293	WA1GSO/227	KA3LHP/152	WA4RXC/215	W6BCZ/149	K9GX/317
DF5CL/190	I5KWW/316	SM5CAK/325	4X4IL/243	WA1WMS/278	NB3T/290	WB4CSK/250	W6KUT/347	K9MDC/273
DF9RB/303	I7IVL/316	SM5CCH/250	K1KA/166	WA1WTP/305	NK3U/201	WZ4I/310	W6RKP/352	K9PSN/301
DK2WV/192	IK7AFM/290	SM5CSS/283	K1UO/321	WA1ZAM/295	W3HCW/290	KD5DR/250	W6US/270	K9ZO/310
DK3PZ/306	I0MPF/323	SM6CAS/329	K1ZLA/225	WB1DQC/315	AA4DO/260	KE5PA/281	W6VZZ/151	KB9M/249
DK6WS/313	IK0APR/258	SM6DHU/310	KA1ACC/279	K2BZT/354	AA4H/268	KF5MP/179	W6ZNL/160	KD9OY/199
DK9KD/321	IK0GPP/302	SM6VWR/332	KA1GPR/132	K2EWB/279	AA4KT/314	N5FTR/164	W6APRS/204	KG9N/288
DL2XN/265	JH1OCC/195	SM7CRW/319	KB1BE/305	K2LS/267	AA4TV/248	NJ5X/286	K7ZBV/315	N9BRV/146
DL4NN/227	JA3GM/318	SM7NDX/149	KB1HJ/260	KB2HN/150	AB4AE/270	NQ5W/279	KB7UH/293	N9ER/297
DL9SC/152	JA3PXH/303	VE1JL/271	KE1KA/180	KB2RA/291	K4II/304	NT5C/251	KC7XB/280	W9DC/337
EA4DO/338	JL3VW/240	VE3XN/335	KE1K/271	KB2WN/239	K4KC/341	NZ5O/146	KT7V/295	W9IT/296
EA4GT/282	JF4PAG/169	VE4AGT/156	KN1M/229	KD2BW/177	K4PR/297	WB5CRG/307	WB5ZKR/288	W9LCR/125
EA5BC/284	JA6VA/299	VE6EJ/142	N1CIX/232	KE2CG/217	KK4OK/154	WB5ZKR/288	AH6HY/200	WA9BDX/150
F2BS/341	JA7AQR/304	VE7UJ/170	N1TZ/302	NZ2L/152	KR4D/208	AH6HY/200	KC8OB/291	K0MPP/273
HK3JH/226	JE7JZ/159	VE7WO/336	NR1R/324	W2GHV/298	N4ONI/272	K6JR/334	KD8KX/250	KB0G/277
HK3YH/300	JH7DNO/313	VK1ZL/270	W1DFO/156	W2VP/296	N4PYD/177	KB6CLL/239	NE8Q/265	KU0A/176
HK8BVN/297	JA8FKO/229	XE1MD/288	W1ESN/287	WA2BGE/296	NE4A/308	KB6SL/200	WB8CE/209	A00S/200
IK2ECN/227	JA0SC/274	XE1XY/162	W1FAB/282	WA2C/189	W4BIM/305	KG6FG/259	W8WJ/158	NY0V/202
I3EVK/336	LU4MEE/308	YU2OM/297	W1ICU/335	WA2F/294	W4MOM/295	K16BU/249	WA8LLY/153	W0IZ/316

CW

DK9KD/128	JA8FKO/308	SM5CAK/270	YB2BNJ/201	N1TZ/204	N3BQS/131	W4MLA/254	W6BJH/300	KB9OD/251
DL1KB/284	OK1MG/303	SM5CSS/250	YT7OQ/127	NR1R/309	W3NB/198	K5WGG/204	W6MND/179	N9ER/200
DL4NN/166	ON8HF/243	SM6DIN/273	ZS6BSZ/250	WA1GSO/151	AA4DO/226	KC5M/286	W6YQ/271	NF9V/231
G2GM/251	OZ1FRF/308	SM7NDX/125	K1ST/298	WA1WTP/204	K4II/294	KK5K/198	WE6V/158	W9NGA/249
IK6CG/233	OZ7BW/318	SM0BZH/291	KA1AE/203	K2BZT/304	K4PR/250	NT5G/233	W7KSK/162	WA9YYY/161
JA2ADY/283	PA3DKX/210	SP5DRH/176	KA1CB/273	KA2AOT/211	KR4D/233	WB5TKO/124	WA7G/190	A00S/283
JA3GM/310	SL0AS/291	SP5EWY/301	KN1M/202	AJ3K/183	N4OT/248	WB5ZKR/274	WA8LLY/127	K0OST/154
JA3PXH/300	SL0ZZI/188	VE6EJ/153	N1CIX/177	KX3I/199	NE4A/254	NY6M/KH2/146	K9GX/299	KB0G/277
JA6VA/300	SM4DDS/187	VE7WO/294	N1CPC/182					

RTTY

W2FG/201	W7KS/150	W0IZ/177
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160 Meters

OK1MG/130	YU2TW/161	K2FL/109	W8ILC/139	N0XA/188
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10 Meters

K2FL/318	AA4TV/171
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DXCC NOTES

Honor Roll Reminder: Those wishing to upgrade their standings or qualify for the Honor Roll must have their cards into HQ no later than March 31, 1989 to be listed in the 1989 Honor Roll listing.

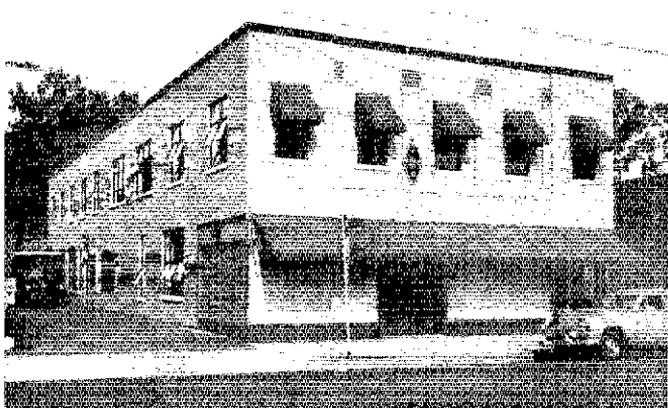
Annual Listing Corrections

Mixed: JA3ART/324, PY4OD/353, YU7DR/251, K2UFM/327, K2YGM/316, K3YGU/231, NA5U/281, W5UC/250, W6TFO/319, W7ID/310, W8CHV/312. Phone: K1DRN/342, WB2CEI/314, N7DES/104, W8GKM/334.

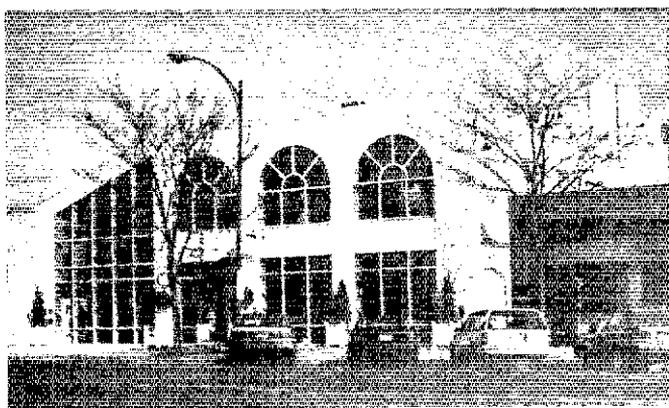
Submission of Rotuma Cards

On December 29, 1988, the ARRL Awards Committee unanimously accepted the ARRL DX Advisory Committee's recommendation that Rotuma be added to the ARRL DXCC Countries List. Further consultation between the two committees, however, was required to resolve details of card submissions. Both committees jointly announced that DXCC credit will be given for contacts on or after November 15, 1945. Both the recent 3D2XX and the 1982 3D2XR operations will be creditable. Other operations, if any, will be accredited upon receipt of complete documentation. QSL cards may be submitted for Rotuma credit on or after June 1, 1989. Cards submitted before that date will be returned with no action. There are a few DXCC members who have been given Fiji credit based on a 3D2XR or other Rotuma QSO. They may resubmit this QSL card for the proper Rotuma credit (along with a Fiji card for Fiji credit) on or after June 1, 1989.

Strays



Do you remember the old (pre-1963) ARRL Headquarters building at 38 La Salle Rd, West Hartford, (left)? "It ain't no more!" Here are



photos of the old building and the facade as it appears today (right). The address is now shown as 36 La Salle Rd. (Tnx W1CUT)

F2 Propagation and the Solar Cycle

There has been much speculation as to how good Cycle 22 will be, and when it will peak. Some, observing the spurt in flux numbers and accompanying eruption of 6-meter DX back in December, decided that this was the peak and that it would be downhill from there. Some credence was lent to this view by a prediction, given wide publicity early in 1988, to the effect that Cycle 22 would peak by the end of the year. As I have said before in this column, I believe that late 1988 was more like late 1978, not like late 1979, so, obviously, I disagree with the view that we have seen the peak. If my view is true, it would put us about a year from the peak of the current solar cycle. The last cycle, Number 21, peaked in December 1979 with a smoothed sunspot number of about 164. Also, note that excellent propagation persisted for several years after the peak, but began only about a year prior to the peak. Solar cycles characteristically rise more rapidly than they fall. This would indicate that the years to come will be good ones for F2 propagation.

My ideas of our current cycle are shared by two others. One is Jack Power, W2AXU, a veteran sun watcher and well-known 6-meter operator. He was reminded, by reviewing this column for late 1978 and early 1979, that he called the last peak quite well. In the February 1979 issue, he found a prediction that he had made regarding Cycle 21. W2AXU had said that the peak would come in June 1980 with a smoothed sunspot number of 155. As noted above, the actuals were a peak in December 1979 with a count of 164. Feeling that he did just about as well as the professionals, Jack has decided, rather than quit while he is ahead, that he will give it another try. Flushed with this confidence, he goes way out on a limb and tells us that he believes that Cycle 22 will peak in March 1991 with a smoothed sunspot count of 171. We can all hope that he is right for, if he is, we are in for even better and more long-lived conditions than prevailed during the heydays of Cycle 21. If you weren't around during that one, ask anyone who was and be prepared to be regaled with stories of outstanding DX.

The other correspondent is Richard Kennedy, WA5QCP, who submits a prediction of his own, along with some other thoughts with respect to F2 propagation at 50 MHz. His prediction is based on studying the shapes of various solar cycle curves and coming to the conclusion that Cycle 21's curve was much like that of Cycle 18. This, along with the slope of the beginning of the current cycle, leads him to believe that Cycle 22 will be much like Cycle 19. That was the "granddaddy" of them all. Based on the continued similarity between the curves of

Cycles 19 and 22, WA5QCP estimates a peak smoothed sunspot count of 180 (not far from W2AXU's 171) occurring in March 1990. That's a year ahead of Jack's predicted peak. It will be interesting to see which of these two is closer. WA5QCP also notes that the best time for DX is November, not December and January, with a secondary peak in March and April. I think that many who were active during earlier cycles will concur with him on that. However, this past December was considerably better than November. This was certainly due to a sudden and pronounced increase in solar flux which took place in December. If the flux had stayed relatively flat, November would have probably been the better month. The early spring peak, my observations tell me, emphasizes propagation to South America and the Pacific and is generally felt to a greater extent in the Midwest and Western States than in the East. Like all generalizations, however, this one can be fraught with inaccuracy.

WA5QCP's other point is that there are definite skip zones associated with 6-meter

F2 propagation. He notes that the minimum direct distance he worked, during Cycle 21, was about 1750 miles. From there, the number of stations heard and worked picked up but dropped out again at about 3250 miles. He notes that from 3250 miles to about 5250 miles, almost nothing was heard. For example, he observes that the FY7THF beacon was almost never heard at his El Paso, Texas QTH. He then notes a pickup in activity between 5250 and 6750 miles. He says that his best DX was a station on Guam at 6750 miles. However, many have worked much farther than this. For example, I too worked Guam, but from Maryland. Many contacts were made between Japan and southern South America, nearly halfway around the world. And then there were those long-path contacts, for example between southern Florida and Japan, not to mention the two contacts with India made by VE1AVX (now YX) and VE1ASJ.

These are but a few of the many fascinating aspects of VHF propagation of any kind. That's why we love the world above 50 MHz so much!

ON THE BANDS

6 Meters—All I can say is that the eastern half of the country owes this conductor a big debt of gratitude. As was predictable, not long after W3XO's antennas came down for the move to Texas, the band erupted with transatlantic and transcontinental DX. After hanging in the 160- to 180-range for most of November, the solar flux began to rise during the first part of December. On December 7, WA1OUB worked G18YDZ and G4GLT. Although both had weak signals, this apparently was a direct F2 opening. December 11, K1OYB in Maine reports working G3USF, GM0EWX and G18YDZ while running just 10 W to a 5-element beam at 20 feet. WA1OUB, at the same time, was busy snagging 27 G and EI stations, some up to S9 plus 40. Earlier in the day Bob had worked J52US, in west Africa, for a new country. On the 13th WB6FCS excitedly called this conductor on the phone to report working DJ3OS/EA8 with 5 x 5 signals both ways. Warren believes that he may have been the only West Coast station to make it. He did hear the EA8 working East Coast stations following the QSO, however. WB6FCS notes that his setup is nothing special, an ICOM 551D to an 11-element KLM at 55 feet. Apparently, he was just in the right place at the right time. By the 16th, the flux had reached 239 and things really began to happen. The 1s and 2s experienced a significant opening around 1845Z to J52US. The following day, the flux climbed to 250 and the day began with a QSO between KP2A and CT3BX. About 1400Z the 1s began hearing the FY7THF beacon and by 1450, an opening developed between VP2MJ and the VE1s while

a huge backscatter opening took place among stations up and down the East Coast. At the same time, some contacts were completed with several Portuguese stations, and HC1BI worked into northern New England. Only one-half hour later, at 1530Z W7HAH in Montana heard HC2FG. The first hint of a transcontinental opening occurred at 1815 when K1JRW copied W6XJ. By 1930 many stations in the West and Midwest were able to work KH6HI and W6JKV heard the KP2A beacon for about 45 minutes beginning at 2000. The 18th began with the East Coast working PZ1AP, P43AS, OA8ABT and HC1BI. Many of these stations were workable in the south central part of the country as well. W400 in south Florida worked OA8ABT for country number 77 plus HC5K and HC2FG that day. By 1600Z J52US worked a number of stations from the East Coast as far west as Colorado. One of those was W5UWB in south Texas for country number 56 for John. With the flux still holding at 249, the 19th brought an opening between the Ecuador stations and the UK. That must have been exciting on both ends. The next few hours brought contacts between KH6IAA and KH6JJI in the midsection of the country and even included a QSO at 1920Z between VE1YX and KH6IAA. Just following that, at 1925, W7FN worked VP5D. A transcontinental opening from the 1s, 2s and 3s to the West Coast lasted up through 2120Z. Outstanding conditions continued on the 20th with the flux still hovering at 252. VE1YX and others in the Northeast worked into western Europe. Altogether, Bob made 50 contacts up through 1730Z. Even as far south as South Carolina, one G was worked by WA4VCC.

70-cm Standings

For WAS holders, listings are WAS number, call state, call areas worked and grids worked. For others, call, state, US states worked, call areas worked and grids worked. Call areas are the 10 US 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 those Maidenhead designators worked since the VUCC award was instituted January 1, 1983. Those not showing some indication of activity or interest within the past two years are subject to being dropped. They will be reinstated upon presentation, in writing, of a statement that they are still active on the band and wish to be listed in the 70-cm Standings. It is not necessary to have worked any new states or grids in order to remain listed or be reinstated. Compiled January 7, 1989. Updates for next listing must be received by July 5, 1989.

1 W0YZS*	MO	---	---	W2VC	NJ	27	11	78	WB4NXY	KY	29	8	90	W5DFU	OK	20	8	69	WB9SNR	IL	34	11	77	
2 K2UYH*†	NJ	55	---	WC2K	NJ	25	12	96	KC4EG	KY	28	8	65	WA5HNK*	TX	19	6	44	WB9CJR	IL	27	8	74	
3 K5JL*†	OK	48	---	K2GK	NY	24	10	77	W4ISS	GA	25	8	---	KE5EP	TX	19	---	75	WB9MSV	IL	25	8	92	
4 WB5LUA*	TX	41	---	W2PGC	NY	24	10	45	WA4CQG*	AL	25	8	---	W5ASH	TX	18	8	69	NC9F	IL	20	9	51	
5 W5FF*†	NM	28	---	W2CNS	NY	20	9	---	N4MW	TN	24	8	59	W5SXD	TX	17	5	36	K9VGE	WI	17	9	70	
6 W1JR*†	MA	54	176	N2WK	NY	18	9	54	WS4F	GA	23	8	61	K5JRH	TX	17	4	---	W0UC/9	WI	14	4	59	
7 W0RAP*†	IA	42	190	WA2FUZ	NY	18	8	---	WB4SLM	GA	21	8	70	N5BBO	TX	12	3	58	W9YCV	WI	13	6	35	
8 WB0TEM*	IA	---	---	N2BJ	NY	16	8	46	WA4SBC	VA	21	7	46	W5UWB	TX	11	3	17	K99NM	WI	9	3	---	
9 KA0Y*	IA	---	---	K2OVS	NY	16	6	20	N4VC	TN	21	6	54	W5NZS	OK	6	---	50	K0TLM*†	MO	47	24	91	
10 WA4MVI*†	SC	26	---	KU2A	NY	11	6	25	K4QF	AL	21	---	---	W6ABN*†	43	34	---	---	K0ALL*	ND	41	21	---	
11 K5FF*†	NM	29	---	KB3PD*	DE	40	12	78	K4CKS	GA	17	6	81	N6AMG*	9	16	---	---	W0RT	KS	28	7	79	
12 DL9KR*†	VA	55	202	W3RLE	PA	31	11	68	K4CI	FL	16	8	72	K6JYO	9	6	---	---	WB0DRL	KS	21	6	74	
13 K4QIF*	VA	38	---	W3IP	MD	28	10	57	WD4DGF	TN	15	6	29	K6QXY	4	3	---	---	W0OHU	MN	20	6	46	
14 K1FO*†	CT	44	206	WA3FYJ	PA	25	10	44	WB4RUA	GA	15	4	31	WA6HXM	4	2	---	---	W0JRP	MO	19	8	63	
15 KL7WE*	AK	---	---	WB3LJK	MD	24	10	65	K4KAE	SC	14	8	---	---	---	---	---	---	KC0QR	NE	18	8	80	
16 N4GJV*	NC	---	---	AE3T	PA	23	8	---	WA4OFS*	FL	13	11	53	W7FN*	WA	45	34	101	KC0OG	NE	18	6	56	
				KB3QM	DE	23	---	54	WA4QWC	FL	11	---	---	W7HAH*	MT	42	25	87	K0IFL	MO	18	6	54	
K1LPS*	VT	22	12	31	K3HZO	MD	22	10	51	WD4AFY	GA	10	4	35	W4WD/7*	UT	38	33	---	N0LL	KS	17	6	68
WA1HYN	RI	17	8	45	W3ZJ	MD	22	9	58	WD4FAB	FL	10	3	52	W7JF*†	MT	34	25	---	WA0TKJ	KS	15	5	50
W1RIL	MA	15	9	36	W3WFM	MD	21	9	60	WD4AHZ	FL	9	2	55	W7RV	AZ	7	5	47	K0RZ*	CO	11	6	49
AF1T	NH	14	8	---	WB2DNE/3	MD	17	8	51	KA4CRT	MS	8	2	16	K7ICW	NV	4	2	20	WB0DGF	NE	10	3	25
W1EJ	NH	13	8	---	K23X	PA	13	5	30	NA4I	GA	5	2	14	W8IDU*	MI	41	11	---	N0BTN	NE	6	3	19
N1AIS	MA	11	5	---	AC3T	DE	13	5	18	W0RRY/5*	OK	48	35	165	W8YIO*	MI	40	31	105	KH6HME	2	2	6	
W1FAJ	CT	10	3	12	WA3DMF	MD	10	5	13	WB5AFY*	TX	42	33	158	WB8BK	MI	33	9	133	VE1UT	NS	14	6	---
KA1DHO	MA	9	4	11					W5RCI*	MS	41	23	152	N1B0	OH	31	10	119	VE3LNX	23	10	67		
									KSUR	AR	29	10	144	W8MIL	MI	20	9	55	VE4MA*†	48	48	---		
									K5SW	OK	28	9	112	K8AXU	OH	20	7	---	G3SEK*	29	46	190		
									W5HN	TX	26	8	62											
									WA5VJB	TX	22	7	---											

*Some states or grids worked via EME.
†WAC

---Information not provided.

The opening extended west at least as far as the 9s where K8EFS Michigan worked PA00OS at 1638Z. This transatlantic opening lasted well into a transcontinental opening with 6s reporting hearing a few weak Gs. With the flux on the 21st still up at 252, HC5K worked PA0HIP, KP2A worked into Finland, and many more QSOs took place between western Europe and the eastern part of the US. For example, K3ZO near Washington came up with 32 Gs, 3 GWs, a single GM, GJ, PA and CT. WA4MMP says that it took until this time for the Europeans to reach his area of southeast Virginia, but he finally contacted a number of Gs. WB8VYF reports working 30 to 40 Gs and 3 PAs. Not to be outdone, VE1YX completed QSOs with over 100 Europeans that day. Once again, the transatlantic and transcontinental openings appeared to overlap. At one point, G4BWJ reported hearing 6s. This emphasizes the point that it is very important that we refrain from working each other, whether it be via sporadic E, F2 backscatter or direct F2 inside the DX window. Let's give the Europeans every chance to work those elusive western states as well as the westerners a chance to get a few European contacts. The same goes for the Pacific in the case of eastern stations. Sporadic E also played a large part in the menu for December 21, with KG4SM Guantanamo Bay Cuba and HH7PV being widely worked in the eastern part of the country. One who picked up the KG4 was W3TFA in the Washington area. Stan runs a Heathkit Sixer to a small beam! There was also widespread E_s across the country which led to a very notable contact for WS4F in Georgia. At about 2250, KC7IJ in Idaho, after working stations to the east on E_s, heard a JA and managed to work JA8ISU at 2252Z. WS4F, hearing the exchange, called the JA at the end of the contact, and worked him right away. He heard no more Japanese and JA8ISU tried

for 10 or 15 minutes to work some more East Coast stations to no avail. I guess that no one else was attentive to the relatively weak signal. At any rate, congratulations are in order to WS4F and JA8ISU.

December 22 was another good day with the flux up to 255. To get things rolling, OH2TI and KP2A held a QSO at 1245Z, and other European stations worked KP2A plus KP4 and P43AS. KP2A added 7 new countries to his total that day. ZD8MB is another DX station that made the day for a number of 6-meter DXers in the Northeast. As the F2 propagation moved west, following the sun, more transcontinental contacts were made followed by KH6IAA working West Coast and Arizona stations. Then, at 2135Z, KL7NO was into south Texas for the first time this cycle. He was worked by a number of 5s including W5OZI for Pat's 50th state. The following day, the flux is still at 255 and more Europeans are worked by stations in the eastern US and Canada, and a considerable number of transcontinental contacts took place as well. W6JKV reported working 4s followed by KL7NO. WA1OUB reports working 51 Europeans and 18 West Coast stations.

Although the flux on the 24th was down to 229, it was still an interesting day. WA1OUB had 72 European QSOs and J52US provided his rare country to a number of Gs, PAs and OHs, while the Gs were also working the East Coast. At 1830, KL7WE's beacon on 50.065 was heard in New England and later in the Pacific Northwest. This is apparently a new beacon. KL7NO completed about 18 QSOs with upper Midwest stations. Earlier in the same day at 0745Z, VK3OT found out too late that he was being heard in Finland. Hearing 48.25 video, he decided it was from Hong Kong. He determined later that it was European.

Christmas Day, although the flux was down

to 220, provided a large heap of presents for 6-meter operators. Many of these came in the form of contacts with J52US. Dave was widely worked across the southern part of the country including here in Texas and as far west as Santa Rosa, California where he went into the log of WA8LLY/6. Steve also heard the ZD8MB beacon. There was even another transcontinental opening, and W3TFA and his Sixer made his first F2 contact of the cycle working W6JKV. Also, the West Coast was treated to a major opening to the Caribbean beginning about 2000Z with HH7PV, VP5D and KP4EOR gladdening the hearts of many 6s and 7s. Despite a further drop in the flux to 201, the 26th still provided plenty of goodies. It would have probably been considered monumental if it weren't for the fantastic days that preceded it. VP2MJ, J73PD and HC5K worked into the 5th call area beginning about 1400Z. Later, J52US worked a number of stations across the country all the way to the West Coast. This time K6QXY, K6HCP and N6AMG were among the lucky ones. There are also reports of ZD8MB and a ZS3 being worked in the Northeast. N0LL worked KH6HI, KH6JI, W6YLZ/HK6, KH6FOO and KH6IAA between 1913 and 1949.

Things continued pretty much the same for the next few days with fewer, but nevertheless, some European contacts made by Northeast stations. WA1OUB had 9 on the 26th, 29 on the 27th and 21 on the 28th. HP3XUH in Panama worked a number of PYS on the 29th. He also contacted KG4SM for a new country for both of them. With the flux down to 182, the final day of 1988 brought the next big opening. It treated the West Coast from Oregon to southern California to contacts with VK1s, 2s, 3s, 4s and 5s. Some 6s worked as many as 40 down-under stations. More VKs were in the next day with K6MYC comment-

ing that it was particularly interesting to get in on a VK opening from his QTH in Hawaii and then travel back to California and work some of the same people 24 hours later. Apparently through an E_s link-up, NØLL had a near-miss with VK2OF about 0230Z January 2, but managed to work VK4BRG at 0327 for country number 60. Larry runs only 80 W to a 5-element Yagi. He says that his beacon now runs 21 W to stacked halos.

Many of the above reports were extracted from information supplied by K5ZMS of SMIRK. I am indebted to Ray for the help.

An interesting report is sent from Mar del Plata, Argentina by LU4EJ. Mariano writes that on November 27 he worked VP8PTG for the first 6-meter contact between LU and VP8. On the same date, FM5WD and PZ1AP were also worked by him and LU4DBK.

A letter from FK1TS compares conditions between this year and last. Phil feels that E_s and TE are better this year, not to mention F2. He listens regularly on 28.885, so give him a shout if conditions look favorable.

WA8LLY/6 notes a problem common to HF operating. That is stations calling the DX without first hearing them. Often, when the DX comes back, the calling station does not respond. Steve complains that this process

merely causes QRM and can result in stations who are hearing the DX missing the opportunity for contacts.

2 Meters—Very little has been reported relative to 2-meter TEP which often occurs during the fall and spring months of high solar activity years. In this hemisphere, it is quite common for Caribbean stations to be able to work into southern South America many evenings. Such propagation is reported by LU4EJ Mar del Plata, Argentina. Mariano says that around 2400Z on November 10, he worked KP4EOR and NP4X on 144.150 with 599 signals both ways. He adds that KP4EOR also worked stations in Brazil and Uruguay on the same occasion. LU4EJ runs 500 W from a pair of 4CX250Bs to an 8-element Yagi.

Think you need lots of mechanical planning and a big array to work moonbounce? According to the 2 Meter *EME Bulletin*, WØKEA proved the contrary. By the light of the moon, Phil set up two 13-element vertically polarized Yagis. Using only "armstrong" azimuth and elevation control and eyeball tracking, he managed to work WSUN, N5BLZ, W4ZD, VE7BQH, W7IUV, KB8RQ and K6MYC

during the first weekend of last fall's EME Contest.

WA4MMP in southeastern Virginia wants it known that the Tidewater 2-Meter Activity Net meets Mondays at 2100 Eastern Time on 144.230. Bill serves as net control. Also in the net department, KC5IJ reminds us that the Headquarters SWOT nets are still active. The Saturday morning net meets from 0700 to 0800 Central Time with KA5NGG as net control. The other meets Wednesday evenings at 2100 local time with N5CTE as net control. Both nets originate in the Dallas/Fort Worth area and are held on 144.250.

The Higher Bands—WB5LUA reports that he and KD5RO/2 have broken the North American meteor-scatter DX record for 70 cm with an SSB contact covering 1239 miles. The sked was run between 1100 and 1356Z December 13 using 10-second sequencing. The two experienced bursts of up to 5 seconds in length with the bursts occurring about every 10 seconds. WB5LUA runs 800 W to 4 F9FTs at 85 feet, and KD5RO runs 400 W to a single K1FO type Yagi. WB5LUA says that the previous record was between WØLER and W2AZL and was made during the Perseids in 1972.

Moved and Seconded. . .

(continued from page 63)

of ARRL affairs in their respective Divisions and in accordance with Board policy, up to the amounts as follows: Atlantic Division \$12,000; Central Division \$8,500; Dakota Division \$4,500; Delta Division \$10,000; Great Lakes Division \$15,000; Hudson Division \$8,500; Midwest Division \$6,000; New England Division \$9,000; Northwestern Division \$13,000; Pacific Division \$10,500; Roanoke Division \$11,000; Rocky Mountain Division \$8,500; Southeastern Division \$12,000; Southwestern Division \$13,800; West Gulf Division \$12,000.

123) On motion of Mr. Haynie, seconded by Mr. Butler, it was VOTED that the Executive Vice President is hereby authorized to reimburse the following Committees, task groups and task forces

created by the Board, for expenses incurred by them during the year 1989 in the proper execution of their duties and in accordance with Board policy, as follows: Ad Hoc Committee on Elections \$3,800; Planning Committee for 1989 IARU Region 2 conference \$3,000; RFI Task Group \$2,500; Committee on Biological Effects of RF Energy \$5,500; Committee on Amateur Radio Digital Communication \$10,000; Legal Strategy Committee \$15,000.

124) On motion of Mr. Kanode, seconded by Mr. Heyn, it was VOTED that, to continue the Board's policy of reimbursing QSL Bureau Managers of the League for certain travel in furthering ARRL organizational objectives, the Executive Vice President is hereby authorized to pay, during the year 1989, a total amount not to exceed \$4,000 under terms following the general pattern established by the Board.

125) On motion of Mr. Mendelsohn, seconded by Mr. Frenaye, it was VOTED that, to continue the Board's policy of reimbursing National Traffic System Officials above the section level for certain approved expenses in furthering ARRL organizational objectives, the Executive Vice President is hereby authorized to pay, during the year 1989, a

total amount not to exceed \$10,000 under terms prescribed by the Field Services Manager following the general pattern established by the Board.

126) On motion of Mr. Grauer, seconded by Mr. Harrison, it was VOTED that the Executive Vice President is hereby authorized to pay administrative expenses of the ARRL Foundation, Inc. up to \$2,000 in 1989.

127) On motion of Mr. Frenaye, seconded by Mr. Heyn, it was VOTED that Headquarters staff implement an Educational Advisor program as described in the report of the Executive Vice President.

128) On motion of Mr. Mendelsohn, seconded by Mr. Nathanson, it was unanimously VOTED that the Board of Directors thanks the staff, especially Lisa Clark, Robert Schetgen and Mike Riley, for their support of the Board Meeting.

129) There followed an opportunity for all present to make final comments. There being no further business, the Board adjourned *sine die* at 9:45 PM. (Total time in session as a Board 18 hours, 46 minutes; Direct authorizations \$268,364.26)

Respectfully submitted,
Perry Williams, WIUED
Secretary

Strays



ELECTRONICS TRAINING GROUP, WHERE ARE YOU?

□ The Electronics Training Group (ETG) was organized in the spring of 1941 for the specific purpose of providing US Forces with a pool of specially trained radar and communications specialists. Recognizing that many qualified candidates were hams, George Bailey, president of the American Radio Relay

League, was asked by the National Defense Research Committee to head up recruiting. Nearly 500 men with experience in electronics communications were commissioned as Second Lieutenants.

These officers, led by a small group of active duty reserve officers, were sent to England for training with British Air Warning units. By December 7, 1941, nearly 200 were in the UK, officially as "Military Observers" attached to the US Embassy.

Following Pearl Harbor, many were immediately assigned to operational units and a number died in action with the RAF and other

British units. Others returned to the US to work in the labs or to be redeployed to other overseas theaters as radar and communications officers in Signal Corps or Air Force units.

Louis Goetz, K5WK, member of ETG #1, is trying to locate former ETG members for the purpose of getting out a newsletter, holding mini-reunion in connection with other amateur and professional meetings—perhaps even a 50th anniversary reunion in 1991. Former ETG members or those with knowledge of ex-ETG people are asked to write Louis P. Goetz, K5WK, 1611 S Missouri, Roswell, NM 88201.

Something for Nothing

What would you say if I told you there is a technique that allows combining the outputs of two 50-mW microwave sources and yields an output of 200 mW? Impossible—can't be done—is the first thought that comes to mind, but under special circumstances, this feat *can* be performed using a special technique.

If two Gunn-oscillator sources are combined using the correct method, this apparent "free" power can be realized. Of course, the power has to come from *some-where*: It comes from an increase in the output from each Gunn oscillator by a synergistic coupling between them. Exactly why the output of one Gunn oscillator increases in the presence of the other is difficult to say. Theories about how this occurs range from harmonics causing parametric conversion processes to the effects of one Gunn oscillator presenting a non-linear load to the other. For the amateur, however, it is important just to know that the technique can work—even if it is not understood!

Original work on this >100% coupling efficiency was reported in the March 1983 issue of the *Microwave Journal* (pp 91-98). Two Gunn-oscillator outputs were combined in a dielectric waveguide. Individually, the two oscillators produced 64 and 70 mW, respectively, but produced a combined power output of 235 mW. The Gunn oscillators used were rather unusual by amateur standards: They were constructed using small cavities in a silicon-resonator block (rather than the more common metal cavity).

Amateurs also seldom use the dielectric-waveguide technique to couple the oscillator outputs. The *Microwave Journal* article noted that both oscillators locked to the same frequency and no spurious outputs were observed. The stability of the combined oscillators was found to be *higher* than that of the individual oscillators.

A recent report in the *RSGB Microwave Newsletter* (Oct/Nov 1988 issue) mentions work of T. Leighfield, G3KEU, which more directly relates to amateur practice. He coupled the outputs of two 10-mW oscillators using a waveguide *magic tee* (discussed later), and obtained a combined power of 38 mW—almost 3 dB more than expected. The *Microwave Newsletter* article did not mention exactly how the coupling was done. For those not familiar with the magic tee, a brief description is in order.

The magic tee is a four-port hybrid waveguide junction that combines an E-plane T with an H-plane T, as shown in Fig 1. In coaxial or microstrip circuitry, the analogous device is the "rat race." When

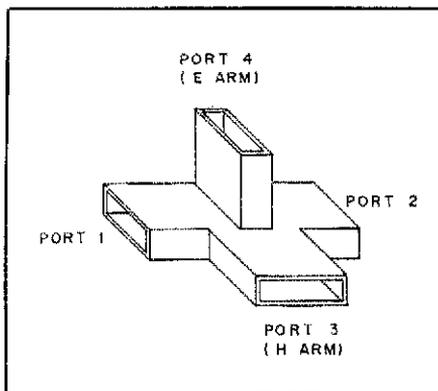


Fig 1—A specialized transmission-line coupler: A waveguide hybrid combiner, also known as a *magic tee*. Such a combiner can be used to combine the outputs of two Gunn-oscillator sources to obtain more output than the sources can provide when combined in other ways. See text for details.

all four ports of a magic tee are properly matched, power applied to one port splits equally between two other ports, and the fourth port is isolated. With reference to Fig 1, power applied to port 3 (the H arm) splits equally, and in phase, between ports 1 and 2, and applies no power to a matched load on port 4 (the E arm). Similarly, power applied to port 4 splits equally, but out of phase, between ports 1 and 2, and no power is applied to a matched load at port 3. Power applied to ports 1 or 2 will appear at ports 3 and 4.

Because this is a reciprocal device, it can be used to combine (as well as divide) power from two sources. Coherent power sources connected to ports 3 and 4 can deliver power to port 1 or 2 exclusively, depending on their phase relationship. Likewise, in-phase sources coupled to ports 1 and 2 will deliver their combined output to port 3, while out-of-phase sources will deliver power to port 4.

Magic tees have many uses in microwave equipment. One example is as a balanced mixer. Detector diodes are attached to ports 1 and 2, a local oscillator is attached to port 3 and the incoming signal is applied to port 4. Because of the properties of the junctions, at one diode the incoming and LO signals are in phase, and at the other diode the signals are out of phase. By suitably combining the two diode (IF) outputs, the signal components can be made to add while the noise components of the LO mixing are canceled.

A second use for such a hybrid combiner is as a duplexer. A transmitter is coupled to port 1, a receiver to port 2, an antenna to port 4 and a matched load to port 3. In

any application, the individual ports may be tuned using waveguide irises and/or tuning screws.

There are a number of ways of coupling two Gunn oscillators using a magic tee. If the two oscillators operate in a phase-locked condition and the arms of the tee are equal in length, and if the oscillators are coupled to ports 1 and 2, the combined output appears at port 3 when port 4 is terminated. Matching screws may be required, and experimentation with arm length (or the use of a phase shifter) may be needed to obtain maximum power output. For those using Gunn oscillators, this technique appears to be a good way to increase power output and get "something for nothing." I would like to hear from anyone who tries this technique, particularly those with successful results!

CONFERENCE NEWS

The 1989 Microwave Update, held in Estes Park, Colorado in previous years, will be held in Arlington, Texas in 1989. It will take place on the weekend of October 6-8, 1989 at the Flagship Inn. Anyone wishing to make a presentation or submit a paper should contact Al Ward, WB5LUA, Rte 9, Box 132, McKinney, TX 75069.

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 1989, p 104
Considerate Operator's Frequency Guide	Jan 1989, p 77
DXCC Annual Listing	Jan 1989, p 71
Frequency/Mode Allocations	Jan 1989, p 77
Hamfest Calendar Rules	Apr 1988, p 73
License-Renewal Information	Jan 1989, p 76
Major ARRL Operating Events and Conventions—1989	Jan 1989, p 65
Packet-Radio Frequency Recommendations:	
Below 225 MHz	Sep 1987, p 54
Above 225 MHz	Mar 1988, p 51
QSL Bureaus	
Incoming	Dec 1988, p 74
Outgoing	This issue, p 68
Reciprocal Operating Agreements	Oct 1988, p 63
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VUCC Annual Listing	Dec 1988, p 85
What is Amateur Radio?	This issue, p 54

Using OSCARs In Communications Emergencies

The devastating Armenian earthquake of last December and the resulting disruption of normal communications reprieves a long-sought, yet poorly nourished, dream of OSCAR users: to be of real communications service in a disaster such as befell Yerevan and its environs. It's fair to ask: With the several OSCARs now in orbit, why was no use made of them in the Armenian earthquake disaster? In the answer to this question, we may find the means to realizing the dream of successful OSCAR emergency communications.

For those amateurs most active and conversant with developments in the Amateur Radio community, it seemed strange to see NBC's Tom Brokaw doing a live network TV broadcast via satellite from the most heavily damaged areas when no OSCAR stations were operating from Armenia. Why? The simple answer is that probably very few in the affected area were radio amateurs, and those who were could not afford the relatively expensive equipment required to be active and competent on today's satellites such as AMSAT OSCAR 13 (AO-13). Why should this be?

The shortest answer is that if there were sufficient resources available, there probably would have been a satellite capable of serving well in the Armenian disaster. The technical requirements for using the satellite would have been sufficiently pedestrian that many more amateurs could be active on the satellites. The resources could be applied either at the user point or at the satellite design and construction point. But the sad fact is that today's satellites are notoriously poor in emergency communications. OSCARs have been insufficiently attractive to garner the broad-based support required to finance a satellite of the type required to serve well in a disaster such as occurred in Armenia.

The reason you were able to see Brokaw from Armenia is that NBC flew in a "flyaway" earth terminal, linked it through an Intelsat satellite over the Atlantic and got "plugged into" the network and US viewers via New York. The flyaway earth station cost a few million dollars, the satellite itself, upwards of \$50 million. So, for roughly the annual gross revenues generated by all of Amateur Radio in the US, one could own the capability to communicate the programming you saw on NBC that night.

Sure, this example is overstated. But it illustrates a point. That is, where communications capability is concerned, if you

throw bucks at a problem, oftentimes you can make the problem go away. Thus, if we really wanted this emergency communications capability to be provided by OSCARs, it *could* happen by the prudent application of "cubic dollars."¹

Let's look at those chief performance characteristics that determine if a given OSCAR could be used for emergency communications. First we'll look at the typical emergency situation. Then we'll see how today's OSCARs stack up in terms of compatibility with emergency situations. Finally, we'll see if satellites planned for the future offer any improvements in emergency communications capabilities.²

Imagine yourself in charge of a major disaster scene in a remote Central America region. Your initial air reconnaissance of the affected area shows enormous destruction. Thousands are dead; many more thousands are injured. Power is out. Fires are raging. Local resources are overwhelmed. Worse yet, your telecommunications access to the outside world has been ravaged. Not a single telephone line to possible relief support centers in other countries remains viable. The final blow to your last-ditch approach comes when the local ham radio operator tells you a huge solar flare yesterday has wiped out all HF communication.

"OK," you grumble, "Now what do we do?!"

Then, like the answer to a prayer, word comes that a student from the university has his new OSCAR station operating on battery power. It's available to you to call the outside world for help. Your helicopter makes a beeline for the university, lands on the lawn, and in seconds you're in the radio room with the student and anxious faculty.

"Well," you challenge, "Let's see this satellite station in action!"

"Oh, General. I thought you knew. The OSCAR won't be accessible for another, er, 5 hours and 22 minutes!" the student sheepishly confesses.

"Great!" you think. What good is a satellite emergency communication system if one must sit around and wait for it! ??\$#@&&%#!

And that's just the point. Today's most capable OSCAR, AO-13, is in an orbit that is optimized for things other than serving emergency communications requirements. In fact, if a worst-case scenario were played out, AO-13 could conceivably be out of range for a couple of days!³ Emergency communicators and managers consistent-

ly state that when communications are urgently needed, they are needed at that instant—not five hours from now, perhaps not even five minutes from now.

In a typical emergency scenario, the first minutes and hours are critical. Outside resource managers urgently need to know what's going on and what's needed to cope. Ham radio operators have traditionally been most valuable when plugged into these situations. Placing radios and the skill to use them in the hands of citizens is simply a great way to ensure these last-resort links to the outside world will exist in times of grave crisis. Indeed, this is widely recognized among authorities around the world and serves to justify our use of the valuable spectrum we occupy. So it is in the first moments after a disaster has unfolded that hams quite often earn their keep. What's going on in those first moments?

First to go is power and telephone. In an urban setting, gas and water supplies are likely cut. In a rural setting, power and telephone lines are even more vulnerable. (It's unlikely that gas and water utilities were there in the first place.) So, to start with, the emergency station will probably need an independent power source. That means a generator or battery must be available. Hopefully, outdoor antennas are available. Will they survive an earthquake? How about a typhoon, hurricane or tornado?

Today's OSCARs are simply not *designed* for emergency communications. There are a bunch of reasons why.

In its Molniya orbit, AO-13 disappears for hours on end. When it's in view, it's great to use—if your station is compatible. What does that mean? When it's at apogee, it takes a fair amount of power to access it: about 1 kW ERP.⁴ That means you need a bunch of UHF power, or a big antenna array, or both. How long can your power-hungry UHF amplifier rely on available emergency power? Conversely, if you're running a low-power rig and making up for it with lots of antenna gain, will that big array survive the "big wind" or that really "big shake?" Similarly, for a portable station, can you provide the several hundred watts required to run a portable AO-13 earth station?⁵

Furthermore, there is the issue of modality. Will AO-13 be in the proper operating mode when it draws into view? Need I wait several hours for the "proper mode" (the one I'm equipped for) to be on line?

Then there's the issue of equipment

availability. There are several darn good reasons why today's and tomorrow's satellites need to operate at UHF and above.⁶ But using UHF, such as Modes B, L and S,⁷ places a heavy burden on users in some nations. In some LDNs,⁸ a commercial 70-cm, all-mode transceiver will cost what an average person earns in a month or more. The result is that the amateur satellite communications equipment infrastructure in many nations is negligible—essentially zero. This works precisely contrary to the essential notion of placing radios in the hands of the citizenry so as to allow them to be the first to communicate when the walls come tumbling down.

To summarize to this point, to cover a broad area, the satellite needs to be in a high orbit, such as a Molniya. Because the satellite is in a high orbit, using it takes a significant amount of power on the uplink and a fairly large antenna array on the downlink.⁹ Moreover, to avoid ionospheric absorption, terrestrial QRM and more, the satellite must use UHF and above. Added to these formidable constraints is the coup de grace for many amateurs in the LDNs: the prohibitively high cost of UHF radios. Thus, you likely have a null set: no hams on OSCARs from devastated areas, and poor prospects for flying in a portable OSCAR terminal that will be a major asset in an emergency situation. Ergo: no AO-13 operations from Armenia. QED.

Is there any solution to the conundrum, this conspiracy of physics and economics militating against those who have the ken, but not the means, to bridge the yawning gap of nonconnectivity?

A geosynchronous satellite with its 36,000-km altitude would solve only part of the problem. By definition, its position stays fixed, so it's always in view of a select group of ground stations. That takes care of the accessibility issue—if the disaster occurs in the satellite's footprint. But the altitude of the satellite requires that the uplink and downlink power be of the same order of magnitude as that needed to communicate through AO-13: moderately high.¹⁰

What about low earth orbiting (LEO)¹¹ satellites such as UO-11 and FO-12? Unfortunately, these satellites' apparitions last less than 18 minutes. Then, at best, one must wait another two hours or so for the next orbit. Or, it could be eight to ten hours before a suitable LEO satellite reappeared. Furthermore, since the footprint of a LEO satellite is typically not intercontinental in size, connectivity between, say, Yerevan and Washington would be negligible. No. A single LEO satellite is clearly not the way, either.

But there is an alternative to expensive geosynchronous satellites and minimally sufficient LEO satellites: multiple, low-cost LEO satellites. Make them cheap enough,

and you can buy a lot of them. Make them light and small enough, and you can launch a lot of them. If you can launch a lot of them, you can reduce the time between successive accesses. With a sufficient number of such satellites, you could have continuous coverage. If they are in LEO, the path losses can be reduced, and earth-station performance requirements can be relaxed. So can the requirements on the satellite. With sufficient margin, even omnidirectional antennas can be used on the ground. Talk about wind and shake survival! If a 7-inch whip antenna can't survive...

But there remains one more nut to crack: connectivity. With LEO, you have smaller footprints. Question: How do you provide connectivity between two locations that are never concurrently in the footprint of LEO satellites? Answer: Make them store and dump satellites (SADS). Make them non-real-time systems. Make them digital store and forward satellites. Put a computer and lots of memory on board. Pick up messages here. Drop them off a few minutes later there. A flying mailbox, as they are called. Whether called by its quasi-generic name PACSAT (for Packet Satellite) or Microsat for its breed of Lilliputian stature, a constellation of small, LEO, store-and-dump satellites could provide the backbone for a truly worldwide network of emergency satellite communicators.

For more information on getting started on OSCAR and information on AMSAT membership and membership benefits, call AMSAT at 301-589-6062 or write: AMSAT, PO Box 27, Washington, DC 20044. Please include a business-size SASE.

Is this the final answer to getting satellite-compatible stations deep into the Amateur Radio infrastructure at last? Or will we merely be trading impediments? After all, with LEO/SADS, instead of requiring a powerful UHF station, one will need a very modest UHF station and a modest computer terminal because the communications would transpire via packet radio.

My sense is that this is heading in the right direction, but I suspect access to suitable digital equipment deep in remote areas of Uruguay will be difficult, for example. What is different about this prospect, though, is that by their very compact nature, attaché-case-sized earth stations for working through LEO/SADS will be easily configured, obtained, shipped, air-dropped and activated from the most remote regions. This prospect stands in contrast to the bulk and complexity of present-day AO-13 earth stations of comparable capability.

Experimenters and emergency operations planners will get an opportunity to see what might be achieved with LEO/SADS later this year when several Microsats sponsored by several Amateur Satellite organizations are launched by Arianespace. Using these initial entries as models for future constellations should provide a suitable baseline of experience from which to architect a comprehensive packet satellite-based emergency communications system comprising both terrestrial and space segments.

Notes

¹The term "cubic dollars" is one drawn from my automobile racing days when, as an illequipped, self-financed racer, I was consistently beaten by well-financed, well-prepared shops and especially by the bigger engines. This was my first exposure to the expression "you can't beat cubic inches," meaning the bigger engines always win. Later, this was permuted to "you can't beat cubic dollars," for it was shown that even more important than high engine displacement was the thorough preparation and sophisticated equipment that dollars often allow. An analogous expression persists, methinks, in Amateur Radio circles concerning the use of amplifiers in contests.

²The other elements of a successful emergency communications system, namely well-trained people and procedures, will be covered here in a subsequent installment.

³AO-13's orbit, like the other Phase 3 satellites before it, was optimized to provide the best DX possible on a worldwide basis with a single spacecraft while sharing the resource among users in disparate locations on a more or less equitable basis. The Molniya orbit selected does that quite well. But its major detraction is its absence for hours, sometimes days, at a time from a given location.

⁴Effective radiated power; 1 kW ERP results from feeding a 10-dB-gain antenna with 100 watts of RF.

⁵Assuming—again—that portable stations by their nature need to use small, quickly erected antenna arrays. Thus, you need more RF power to offset the lower antenna gain warranted by the dictates of "portability."

⁶The rationale has been detailed on several occasions in material pertaining to AO-13 and Phase 4. See past installments of this column, and V. Riportella, "Introducing Phase 3C: A New, More Versatile OSCAR," QST, Jun 1988, pp 22-30.

⁷Mode B uses 70 cm up and 2 m down. Mode L uses 24 cm up and 70 cm down. Mode S uses 70 cm up and 13 cm down.

⁸Lesser-developed nations.

⁹Compared to, say, a low earth orbiting satellite such as UO-11. AO-13 can be as much as 42,000 km away from you, while UO-11 can be up to 3,100 km away. This means there is a 13.5:1 distance ratio, and consequently, a 184:1 or 22.6-dB signal-strength ratio between the two. (Signal strength decreases as the square of the distance; 13.54 squared is about 184.) In other words, a 70-cm uplink to both satellites results in a signal that is 22.6 dB stronger at UO-11 than at AO-13 when both are at their maximum ranges from your QTH. This is because of the vast differences in the height of their respective orbits.

¹⁰One measure that could offset earth station power requirements is to put a larger antenna array on the satellite itself. But making up for earth station inadequacies by improving the satellite is a prohibitively expensive proposition. Putting hardware into orbit can cost \$10,000 per pound.

¹¹A LEO is typically less than a couple of thousand kilometers high.

FM/RPT Column Survey Results, Part One

The FM/RPT Column Survey was presented in the November 1988 installment of this column. Since then, I have received your responses, dutifully entered them in my computer, tabulated the results and will present them here for your consideration. (A similar survey was run in the January 1981 installment of this column and, where applicable, I compare the 1981 results with the current results.)

Since the survey was so long, the results will be published in two installments. This, the first installment, will deal with the state of the FM and repeater mode and its users (questions 1 through 6 and 14). The second installment, which will be presented next month, will deal with the state of this column (questions 7 through 13).

Survey Results (Questions 1 through 6, plus 14)

Question 1. *What is your location?*

The greatest response was from the Fourth call area, which was represented by 16% of all respondents, followed closely by the Second (14%), Sixth (12%), First (11%), Eighth and Third (10% each) call areas. The Fifth (8%), Zero (7%), Ninth (6%) and Seventh (4%) call areas followed with Canada and other foreign countries trailing the pack (1% each). In contrast, the Sixth call area provided the greatest number of responses in 1981 (with 21%)

Question 2. *What is your license class?*

Advanced class licensees submitted the most responses (29%) and were followed closely by Technicians (27%) and Extras (24%). Generals (18%), foreign licensees (3%) and Novices (1%) followed. In 1981, the first and last place positions were the same as the current survey with Advanced class licensees leading (with 36%) and Novices trailing (0%). Generals (23%), Extras (20%) and Technicians (18%) filled the second-through-fourth spots of the 1981 field.

Question 3. *Which bands do you use in the FM and repeater mode?*

All, except Novice licensees, who responded to the survey use 2 meters. This compares with 94% of the 1981 respondents who used 2 meters. Here's how the other bands fared, in order of popularity:

Band (MHz)	Respondents Using This Band (%) 1988	1981
440	44	20
220	29	15
29	26	N/A†
50	16	8
1240	3	1
902	1	N/A††

† 29 MHz was not a choice in 1981
†† 902 MHz was not an Amateur Radio Band in 1981

Usage of the VHF and UHF FM-and-repeater bands has certainly increased since 1981. Back then, nearly everyone was using 2 meters; however, only one out of five were using another VHF/UHF band. Today, two out of five are using another band besides 2 meters. This verifies what most of us thought was true: that there has been a migration to the other VHF/UHF bands, especially 220 MHz and 450 MHz, because of the crowded conditions on 2 meters.

Ten-meter FM has come from nowhere (it did not even place in the 1981 survey) to take over fourth place with nearly one-third of the respondents using it. There are a number of reasons for this growth, including the favorable sunspot cycle conditions that are present and the availability of inexpensive 10-meter FM transceivers; however, I believe that the primary reason for the increase in usage is that the 10-meter FM capability is now present in most of the HF transceivers that have been sold in the past five years. Previously, your typical HF transceiver might cover 29 MHz, but did not provide the FM mode. To operate on 10-meter FM required the addition of an FM module, at best, or extensive transceiver modification, at worst. Today, your typical HF transceiver not only covers 29 MHz and provides the FM mode, but also includes the capability to transmit and receive on different frequencies for 10-meter FM repeater operation.

Question 4. *Which band do you use most often in the FM and repeater mode?*

The most popular bands are 2 meters (83%), 220 MHz (9%), 450 MHz (7%), 6 meters (3%) and 29 MHz (2%). If you add up the percentages, the total is 104% because some of the respondents said that they used two or more bands most of the time.

Although the response to question 3 indicates that more hams than ever before are using other VHF and UHF bands, the response to question 4 indicates that 2 meters is the band that four out of five use most often.

Question 5. *How many repeaters do you use on a regular basis?*

The majority of respondents use two or three repeaters on a regular basis. Two-repeater users were represented by 29% of the respondents and three-repeater users by 28%. One-, four- and five-or-more-repeater users were represented by 16%, 14% and 11% of the respondents, respectively. Two percent of the respondents use no repeaters (some people still prefer simplex FM operation).

A repeater is like a family and most adults tend to deal with three "families:" their family by blood, their family by marriage

and their family by employment. And that is about all one can handle. (How many times have I gotten my wife's cousins' names mixed up?) Similarly, a ham cannot be expected to deal with more than two or three repeater families, so the average respondent frequents two or three repeaters.

Question 6. *Are you a repeater owner?*

The response to this question in 1981 and today were nearly identical. In 1981, 18% owned repeaters; today 19% do.

Some things never change. The one-to-four ratio of repeater owners to nonowners that has been maintained between 1981 and today indicates either that one in four aspire to ownership or that to own a repeater, you need an average of four users. I do not know the answer to this one, but I expect that in the future, this ratio is bound to increase because as the number of users increases, the number of owners will stabilize because the finite number of available repeater channels will become full.

Question 14. *Please include your name, call sign and number of years licensed.*

Although this question was optional, nearly everyone responded. Part C of this question is the only part that lends itself to statistics that are of any pertinence to the state of the FM and repeater mode. And in that regard, the average respondent has been licensed 17 years, which corresponds nicely to the start of the FM and repeater boom back in the early 1970s. To some, the attraction of the FM and repeater mode was the impetus to get a ham license and those that did liked what they found and have remained active in the mode.

REPEATER LOG

According to November 1988 reports received, repeaters were involved in the following public-service events: 754 vehicle emergencies, 33 medical emergencies, 17 criminal activities, 17 fire emergencies, 9 alerts/drills, 8 public-safety events, 1 power failures, 2 search and rescues, 1 criminal activity, 1 weather emergency.

The following repeaters were involved (followed by the number of events): W2VL 40, WA2ZWP 15, WA3BXW 12, WA4AOS 6, WD6DIH/KA6EEK 216, WB6EKU 3, W6FNO 407, WB6LPZ 7, N6ME 89, WB6MKS 3, KA6ZRJ 5, K8DDG 15, W9PEV 25.

Strays



I would like to get in touch with...

anyone with a manual for a Heath Pawnee HW-20. Ronald A. Perkins, KC9MI, 7111 S Cardinal #2, Tucson, AZ 85746.

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.

CODE OR NO-CODE: THE GREAT DEBATE

□ I am not in favor of a no-code license. Being licensed for one year, I can certainly remember preparing for my Novice exam and the enjoyment in preparing for it. I, like most people, had a hard time getting the hang of CW. The goal of getting my ticket was more than enough to keep me going.

It seems to me that a lot of people believe the code is a deterrent to "undesirables." I also believe that the passing of the code test gives you a sense of pride. A person who is proud of achieving a goal is more likely to be a good operator and is more likely to upgrade and thus improve the hobby for all.

I really don't believe that a "no-code" license would bring that many more people into our hobby. I believe that people become interested in our hobby and that interest is enough to motivate them into getting their license. I also believe that the code doesn't keep out those who really want to get into the hobby and those who would benefit from a "no-code" license would mostly be those who won't stick with ham radio for too long. So, all in all, I think it would not make much of a difference if [it becomes a reality] and I don't think it would be for the good of the hobby.

I can say without a doubt that we need more young people in the hobby. I think a better way to do this would be to raise the awareness of ham radio. Until a year or so ago, I didn't know what ham radio was. Unless you know someone in ham radio or have it presented to you, you don't even know it exists. We should work more towards presenting ham radio to our youth and let them know how much fun it really is. We just *have* to make them aware of it.—*Bill Raab, KB0BSR, St Paul, Minnesota*

□ I am sure that you are getting bombarded by letters on Morse code, but I just wanted to drop my two cents in. I think that the time has come for the ARRL Board and membership to join the rest of the world in pushing for an entry-level, code-optional Amateur Radio license. It's time to put tradition aside and look to what is best for the future of Amateur Radio and the preservation of our radio spectrum.

I have been an amateur for 12 years and have operated from a number of foreign countries, have met with foreign amateurs face-to-face and have seen what the future will be like if we join our foreign brethren in embracing a code-optional license. First, I want to make it clear that I am not anti-

code. I hold the Extra Class license, I can receive code at 25 WPM, and I operate CW almost exclusively on the HF bands using a straight key, electronic keyer and keyboard. I operate CW on the satellites as well. I have taught code for years and I think CW is an important part—an integral part—of the Amateur Radio experience. Code is great and every amateur should have an acquaintance with the mode. It is time that we elevated code to its proper place as a communications mode like FM, SSB, AM or RTTY. An examination that places an understanding of the fundamentals of this mode can be substituted for a code proficiency examination. The code-optional license has not ruined Amateur Radio in other countries; quite the contrary. It has brought in individuals who do not care to learn the code and would otherwise be excluded from Amateur Radio. The codeless amateurs are accepted as fully licensed amateurs and are given full voting membership in the respective countries' radio organizations.

I can tell you from personal experience that CW does not keep the riffraff out of Amateur Radio. A sampling of the filth on 75 meter SSB is ample testimony to this. What the CW wall does is keep out individuals who either can't or won't learn the code. Computer hobbyists, engineers and individuals with more than adequate technical skills have asked me "Why should I learn the code?" My only answer is, "It's the government requirement." This outdated anachronistic CW barricade is keeping our population artificially encumbered at a time when we should be growing. The world economy is shifting into information interchange and telecommunications and we keep good people out with this unnecessary impediment. Amateur Radio is in a bizarre paradox. Technologically, things have never been brighter; packet, satellites, microcomputer controllers and all of the whiz-bang gadgetry of the 21st century is coming around the mountain and our ham population base is growing older each year. Every time I attend hamfests, there are more and more people on walkers and in wheelchairs. I pray for the day when there will be more of us with acne than with arthritis! With our mean age in the fifties, 25 years down the road we will be in serious trouble.

I am not merely altruistic. I know that Amateur Radio is for the good of the human family, but I have also invested many "kilobucks" into my hardware. I want Amateur Radio to be there in my old age too. That problem has a solution with

a simple and correct answer—get Amateur Radio growing again. Begin Novice classes, start a club in every high school in America and institute a code-optional entry level license. I do not want to see Amateur Radio crucified on a cross of code!—*Chuck Martin, AB4Y, Bowling Green, Kentucky*

□ I understand that the "no-code" license is once again being considered. I am very much opposed to any such license on the HF bands.

[I am a middle-aged housewife] and have just received my Technician ticket in the mail this week. I also work part-time as a waitress and my days are pretty full. It wasn't easy for me to find the time to study and learn the code. What makes the victory all that much sweeter is that I studied and studied and sometimes thought I'd never get anywhere. I did, though, and I'm glad I stuck to it... I am not especially talented, but you don't have to be to learn the code; all you need is the desire to learn and to stick with it and to *really* try. When you have learned it, you've done something you can be proud of; you did it yourself and nobody handed it to you. I say "keep the code"....

In closing, I would like to say that if I can learn the code, *anybody can*. Surely others [who want to be hams but have not learned the code] are as smart as I am, so why should they be given special privileges? Also, look at the CB band after all licensing was dropped there! It is now a mess which will never be brought into line again. Let us not bring these "computer people" into ham radio by easing the requirements. What we'll end up with is [a CB mentality] in our operators.—*Jean F. Eskridge, NØJZH, Gallatin, Missouri*

□ I like CW because it exemplifies a more careful form of communication than simply "open mouth without engaging brain." I also value it as a tradition and as a test of self-discipline. Whether it is still the best test of self-discipline for all hams is, however, open to question.—*Michael A. Covington, N4TMI, Athens, Georgia*

□ I have been an amateur for roughly two years and hold an Advanced ticket. I am president of our local ham radio club, editor of its newsletter and an avid fan of CW. Just like everyone else, I cursed the code for every one of those five words per minute while learning it for my Novice and, much to my surprise, I later found a lot of enjoyment in using it.

There's no disputing that CW has its place in amateur as well as professional communications. I certainly would scream to high heaven if the requirement of CW were to be dropped from our current

licensing system. I feel that most people (though admittedly, not all) can learn the code and passing a code test instills a sort of camaraderie among those who dedicate the time and effort required to learn it.

I read the many pro-code letters in January 1989 *QST* and agree with many of the points brought forth. But let's examine the real issues that need addressing.

No one is proposing the elimination of CW as a requirement for acquiring a ham ticket. No one is undermining this basic communication mode. There is no conspiracy here at work to turn amateur allocations into "the new and improved world of Citizens Band radio" (though a quick tune through some portions of the 75-meter phone band may convince you it is already working.)

In my opinion, the real question that needs attention is the creation of an entry-level, no-code license here in the United States. This license could give very restricted privileges in the VHF and UHF bands and would serve several functions.

The first and most important function should be to give someone a chance to "get their feet wet" in Amateur Radio. Sure, the Novice ticket offers this chance, but a no-code license would open the door to Amateur Radio to many who may need inspiration to spend time learning the code. Any additional privileges would have to be earned by upgrading [and this would mean] learning the code and theory, then passing the required test(s).

A second benefit would be that this no-code license would help populate some of our bands that are going to be closely scrutinized by commercial interests in the next decade. Most of our highly valued UHF bands are not amateur-only allocations, but are on a shared basis.

A third benefit a no-code license would bring is growth to our hobby. There's strength in numbers, and let's face it guys—after perhaps losing part of 220, we need to do something that will give us an increase not just in numbers, but in usage of our bands. *Would a no-code license provide all of these results?* Only time will tell us the real answer. I think that an honest study of other no-code licenses in use around the world would give us some answers and facts upon which we can base our opinions.

A no-code ticket would not cure all that ails Amateur Radio. It may even create the much dreaded "Citizens Band—Part Two" that no-code opponents have feared. Before writing the idea off however, I believe that it deserves serious consideration.

Throw code by the wayside? Not on your life! But let's take a serious look at what we can do today to ensure that Amateur Radio will be around for our children to enjoy tomorrow.—*Jim Brooks, Jr., N4SRT, Bardstown, Kentucky*

□ I read the "Why Morse Code?" editorial with great interest. Glossed over was the fact that Novice Enhancement is a failure since it has not generated any

significant increase in the number of new amateurs. The annual growth rate of ham radio in the United States has remained virtually constant in spite of new bands and modes offered by Novice Enhancement.

Having the packet [and voice] privileges which Novice Enhancement offered did not attract the numbers of young computer buffs to our hobby and why should it? It's cheaper to use a telephone than buy a radio. We also have lots of competition from cellular telephones. They have given "two-way" radio to anybody who can afford ham radio. No license, technical expertise or written examination is required to operate this equipment. It's no wonder they have the status and glamour that CB radios had over a decade ago.

I would suggest that even this dreaded "no-code" license will not generate significant numbers of new hams. The real problem is that we still don't know what attracts people to ham radio. Recruitment efforts and incentives are doomed to failure without this knowledge. So, when a "no-code" license fails to bring the desired growth to Amateur Radio, the next logical step will be the creation of a "no-theory" license.—*Brad Wells, KR7L, Port Orchard, Washington*

□ I would like to respond to the editorial entitled "Why Morse Code?" in January *QST*.

There is little with which to disagree in the belief that the future of Morse Code is assured in Amateur Radio. I certainly hope that this is so. It seems that a major underlying issue in the code versus no-code controversy may have been overlooked or elected not to discuss.

Amateur Radio has a long and very proud tradition of being on the leading edge of electronic communication technology. That position may be in jeopardy as a result of the Morse requirement. As the editorial points out, the sail was once on the forefront of transportation technology and is now relegated to recreation use. I believe that with few exceptions, Morse has become recreational.

It seems to me that the leading edge of electronic communications is well above 50 MHz and rising. The code requirement restricts the entry of a new breed of ham operators that we desperately need to remain in the technological forefront as well as to help preserve our spectrum allocations. There is little doubt that the VHF/UHF and higher frequencies, computer and digital applications have the highest potential for attracting new amateurs and potential amateurs who have no interest in HF or Morse code communication. We need to accommodate them. Our failure to fully utilize our higher frequencies can only result in frequency loss. The best and perhaps only way to do so is with a no-code license. The handwriting on the wall seems very clear.

What then about the January editorial? The issue, it seems to me, is not "Morse"

or "no Morse," "why Morse?" or "why not Morse?" The underlying issue is one of technology, growth and retention of our spectrum. These issues never seem to make it to the surface. I think it's inadequate to say ARRL is democratic ("let the membership decide"), without a full and complete discussion of the long-range implications of this decision. The question is, I suppose, whether or not you hold to this long-term view. Is Amateur Radio to remain largely grounded in the lower frequencies as it has been or do we reach out and take the high ground along with the future?—*Karl H. Muller, W3UBQ, Fort Meyers, Florida*

□ In the January issue of *QST*, I saw the usual flap about the code. For those operators who enjoy using it, more power to them, but this mode of communication is going the way of the dinosaur. Actually, the users are literally using candles for light when all around us, people are using flashlights. I know nothing about repairing an automobile, but this does not prevent me from acquiring and using a license to drive. This is what I have been doing for around 70 years without an accident so far. I have a Technician license, but in order to acquire a General class license, I must know 13 WPM of code in order to operate an apparatus on voice for communication. The fun and pleasure of operating such is to be able to cover the world and communicate with people of other nations, not to be held back by the bands assigned for the Technician license.

The following analogy is used to clarify my point. I am a retired dentist. I remember years back if a person desiring to become a dental laboratory technician took a recognized course in that field in a school for the same (which usually took around 8 to 10 months to complete) and if he applied for a job later in the laboratory, he was rejected—even though he was qualified. *Why? Because those laboratory technicians came up the hard way.* The attitude of the lab veterans was, "I came up the hard way, so must you." I believe, whether consciously or subconsciously, the seasoned ham operator feels the same. "Let's make the seekers of the General class license learn that code like we had to do, even if he never uses it with his General license."—*Dr Milton Cohen, WA3LBA, Potomac, Maryland*

□ I am heartened by the editorial and correspondence regarding the Morse code and its various implications (*QST* January 1989).

Morse code is like walking, skiing, jogging or anything else you do for the sheer joy of it. No electronic or mechanical device, sophisticated as they may be, can do it for you. It's nice to be able to "read the mail" without having to fire up the computer!

So let's enjoy telegraphy and the Morse code for its recreational value and the fun of it. Those who don't want it are welcome, but they don't know what they're missing.—*F. Paul Kosbab, NF4E, Tulsa, Oklahoma*

Clubs = People!



The Hampden County Radio Association, Massachusetts, hosted visiting Italian amateur Franco Castronovo, IK7CJV, recently. Castronovo was presented with an ARRL Certificate of Merit for promoting international goodwill during his visit. NC1B (r) (an Extra at age 13!) welcomes Franco at an HCRA meeting. (Tnx KA1KPH)

If you would like to see your club activities depicted in this column, send your brief stories and photos to K1CE at ARRL HQ.



A new 50-year ARRL Member! Honorary Vice President Robert York Chapman, W1QV (r), presents a 50-Year ARRL plaque to Earl Smith, W1BML, at a recent meeting of the Tri City Amateur Radio Club Connecticut. That's Earl's XYL looking on. Smith and Chapman are longtime TCARC members. (KA1BB photo)

Welcome New Special Service Clubs!

Delaware-Lehigh ARC, Easton, PA
Western ARA, Huntington Beach, CA
Yellowstone Radio Club, Billings, MT



The Hall of Science Amateur Radio Club, WB2JSM, New York, helped celebrate the Scout Jamboree On The Air last October by hosting Syosset Webelos Cub Scout Pack 168. The scouts contacted many other JOTA groups around the country, sharing accounts of their activities. (Tnx WB2JQD)



The Lakewood High School Amateur Radio Club, New Jersey, recently received a new Kenwood station, thanks to a grant from the state. Faculty member Norman Palmer, WE2J, teaches a Novice course as part of the regular curriculum. He believes that Amateur Radio is a good vehicle for educating and motivating students in other complementary disciplines, such as foreign language study and science.

The Lakewood High School ARC is League-affiliated. For information on how your school club can apply for ARRL affiliation, write to ARRL HQ, 225 Main St, Newington, CT 06111.

Welcome Returning Special Service Clubs!

Anne Arundel Radio Club
Davidsonville, MD
Anoka County Radio Club & Emergency Services, Coon Rapids, MN
Beaumont ARC, Beaumont, TX
Chautauqua County FM Assn,
Frewsburg, NY
Cubs ARS Of Sedro Woolley High School, Sedro Woolley, WA
D-CAT, Houston, TX
Denver Radio Club, Littleton, CO
East River ARC, Bluefield, WV
Edmond ARS, Oklahoma City, OK
Four Lakes ARC, Madison, WI
Goodard ARC, Greenbelt, MD
Jersey Shore ARS, Toms River, NJ
Knickerbocker ARC, Port Washington, NY
L'Anse Creuse ARC, Mt Clemens, MI
Miracle Strip ARC, Panama City, FL
Monroe County Radio Communications Assn, Monroe, MI
Mountain ARC, Cumberland, MD
Newington Amateur Radio League,
Newington, CT
Olympia ARS, Lacey, WA
Ozaukee Radio Club, Mequon, WI
PHD ARA, Liberty, MO
Platinum Coast ARS, Inc, Melbourne, FL
Squaw Island ARC, Canandaigua, NY
Steel City ARC, Carnegie, PA
Stamford ARA, Stamford, CT
Temple ARC, Inc, Temple, TX
Tippecanoe ARA, Lafayette, IN
Triple States Radio Amateur Club,
Adena, OH
Warminster ARC, Warminster, PA

Strays



QST Congratulates...

□ C. Travis Marshall, W3HPS, of Bethesda, MD, on his appointment as Chairman of the US Delegation to the 1989 Plenipotentiary Conference of the International Telecommunication Union which will be held in Nice, France on May 23-June 29. Marshall is a Senior Vice President of Motorola Incorporated.

□ The Rev Dr Harry Andersen, KA9CXE, of Lac Du Flambeau, WI, on being chosen bishop of the Great Lakes Synod of the Evangelical Lutheran Church in America.



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The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

SEAnet 88

One of the major social events on the Amateur Radio calendar in Region III took place in Bangkok, Thailand over the weekend of November 11-13, 1988.

It was the Sixteenth SEAnet Convention, a convention which has developed into one of the most friendly and informal gatherings of radio amateurs in Southeast Asia (hence the acronym SEA).

These days, Amateur Radio boasts many get-togethers on the air (nets), and the Southeast Asia net (SEAnet) is one of the oldest. It all started back in the '60s and it has run pretty much continuously ever since then. Nowadays the net meets at 1200Z on 14320 kHz, plus or minus QRM, and with Cycle 22 getting well into stride, worldwide check-ins should once again be possible.

In 1971, John van Lear, VE7IR/9M2IR/9V1OQ/etc/etc (the list of John's calls is too long to reproduce here!) suggested that the voices on the air meet face-to-face. And so they did in Penang over the holiday period December 30, 1971 to January 1, 1972.

The Convention has been held most years since then, with only two years (1986 and 1987) being missed. At the initiative of RAST, the IARU member society in Thailand, a convention was planned for 1988.

One-hundred-and-fifty-eight people registered, including amateurs, XYLs and families. Of these, 64 were from Thailand, 21 from Japan, 19 from Singapore, 16 from the US, 11 from Brunei and six from Malaysia. Other countries represented included Australia, Karen State (1Z9), Canada,

England, Germany, Hong Kong, Indonesia, Sri Lanka and Sweden.

RAST had set up a program for all attendees, who were kept fully occupied for the duration of the Convention. It was noteworthy that the opening ceremony on Friday evening was presided over by Thai Deputy Prime Minister Thienchai Sirisamphan, in the presence of the new Director General of the Post and Telegraphs Department, His Excellency Kun Sombat Uthaisang. Guests were entertained with a series of Thai classical and folk dance items. On Saturday, a visit to the Thai government earth satellite station at Sri Racha was undertaken. Two bus loads of eager amateurs plus families, together with a police escort, traveled approximately 170 km into the province of Chon Buri in double-quick time. The three big dishes at the station were a source of envy for most of the amateurs, but most had to agree the antennas wouldn't fit well on an average city lot.

The official banquet was held on Saturday evening, during which guests were entertained with Thai songs from Northern Thailand. In addition, a most skilled magician baffled all with his box of tricks and sleight-of-hand magic. He could be a useful person to have on-side at the next ITU WARC! A working plenary session was set for Sunday morning. In between all this, and if one could find the time, there was a most interesting exhibition of Amateur Radio equipment, featuring both imported and locally made Thai products. For the nonamateur attendees, there was al-

ways the magnetic attraction of the many and varied stores and markets of Bangkok.

The SEAnet organization, if it can be called that, is a very loose one indeed. It is not a formal part of either IARU or IARU Region III, but it does present an excellent forum for IARU officers to learn of grassroots problems within the area and also allows IARU, in a rather low-key way, to project its existence and image to amateurs who may otherwise never get to hear about the Union. And so it was that the recently concluded IARU Region III conference (Seoul, October 1988) was a major subject of discussion during the Sunday morning plenary working session. Such matters as packet radio, band plans, future frequency allocations and QSL cards were aired.

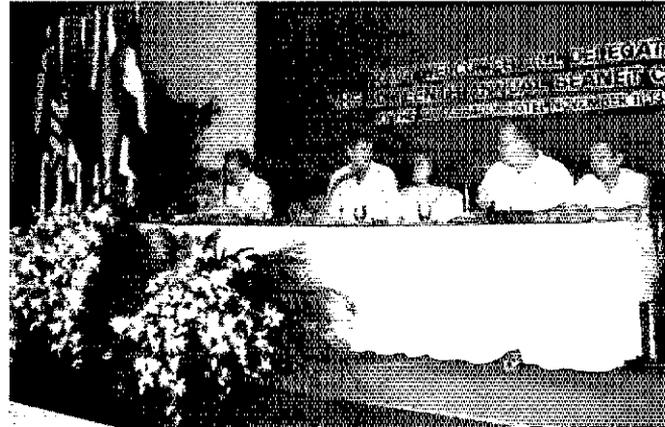
The date and venue for the next SEAnet Convention—the Seventeenth—was decided, and the offer by SARTS Singapore through its president Selva 9V1UV was unanimously accepted. Selva announced that the dates would be November 17-19, 1989 in Singapore. Details of hotels and events will be announced later.

SEAnet continues to meet every day on 14,320 kHz, ± QRM, at 1200 UTC. All interested amateurs worldwide, no matter what their QTH, are invited to check in, following the net controller's instructions. Then, the faces behind the voices can be met in Singapore in November 1989.

Join us sometime, both on the air and for an eyeball—you'll enjoy it.—David H. Rankin, 9V1RH/VK3QV



Fred Laun, K3ZO, ex-HS1ABD, demonstrating Amateur Radio to a group of young interested Thais at HS0SEA. Katu-san, JA1CMS, is keeping a watchful eye on Fred. (photo by Frank Aw, 9V1OK)



The Head Table at the Sunday morning plenary (l-r): D.H. Rankin, 9V1RH/VK3QV; Tony Waltham, G4UAV, ex-HS1AMH; Kun Mayuree, HS1YL; Hans Hollstein, KA3TDZ, ex-HS1BG; Chamlong, HS1AAM. (photo by Frank Aw, 9V1OK)

XE1CI Shows the World the Power of Human Kindness

Nellie Saltiel de Lazard, XE1CI, became interested in Amateur Radio in 1968 when the Olympic Games were held in Mexico City. "My brother, XE1SR, helped with communications for the games and for me it was a very emotional experience seeing the reaction of the young athletes when they heard the voices of their loved ones back home. Some would weep when they talked and listened to their families so far away." Sharing this wonderful experience with her brother and family was the turning point that made Nellie decide that "no matter what it would take, I would become a licensed amateur." In 1970, Nellie became XE1CI. Little did she know where Amateur Radio would take her.

Nellie was educated in the US at Bryn Mawr College, where she majored in liberal arts. After returning to Mexico, Nellie chose to follow her interest in medicine by becoming a volunteer at the Children's Hospital de Mexico. She was accepted immediately because she spoke both English and French, and the hospital needed a translator.

"That was the greatest experience I have ever had in my life. For three years nothing mattered to me more than to be able to see a sick child smile at me, instead of seeing a face full of fear, pain and tears. The children had so many kinds of problems—third-degree burns, stomach infections, malnutrition, physical handicaps, abuse and rare illnesses."

Each morning Nellie started her work day by serving breakfast to the children. "I had to be in every ward—surgery, orthopedics, contagious diseases, malnutrition and general medicine. I must admit that I had my favorite patients on each ward! After breakfast, we gave the children baths and arranged their beds. After the doctors made rounds, we took the children to the garden and played with them, then returned to the wards for lunch and their rest period." One of her fondest memories is of the chief physician at Children's Hospital who told Nellie she was "really spoiling most of the kids, and that they were going to suffer when they were out of the hospital for lack of attention and love!" She agreed with the doctor, but it seemed to her that once in their lifetime the children should have a moment that was going to be remembered by them with great satisfaction, and they would cherish it.

After a nine-month trip to Brazil to work at another children's hospital, she returned to Mexico. The first week after she returned, she met her future husband. A year later, they were married. Beginning a family of her own didn't stop Nellie from her work at the Children's Hospital. After her first daughter, Patricia (now XE1TX), was born, Nellie found time to spend two days a week working with hospitalized children. Six years



XE1CI's radio activities are public-service oriented, yet she takes time from her busy schedule to chat with friends around the world. (photos courtesy XE1CI)

later, Patricia's sister Deborah (XE1YW) was born, followed by Lorena (XE1XYV).

In 1970, Nellie's Amateur Radio license brought a new dimension to her work with the hospitalized children. After spending countless hours on the YLISSB, the International Missionary Radio Association Net as well as the Mexican Emergency System, XE1CI had the idea of "giving the children at the hospital something that would make them feel important and something to look forward to in life—something to make them feel they had blood in their veins." During this time, XE1CI was meeting regularly with a group of YLs on 20 meters who were from Guatemala, San Salvador, Venezuela, Argentina and Costa Rica. "We got to the idea that each of us would bring a sick or handicapped child to our individual stations once a week, and through radio, introduce them and let them express their feelings to each other."

Nellie received permission from the hospital to bring the children by ambulance to her home where they stayed for about an hour. "The first child was Maria, 12 years old, who had a tracheotomy. She had an opening in her throat and difficulty



XE1CI, the friend of children, in her nurse's uniform, talks with hospital colleagues.

speaking. At first she was reluctant to speak, but when she heard another little girl speaking to her on the radio, she decided to answer some questions. I gave her the microphone. It was difficult to understand what she was saying, but she kept repeating the answer and finally we all understood. She talked with a YL and two other young children for nearly 45 minutes! From then on she wanted to come to my house every week and say hello to her new friends. Of course I had to give other children a chance, and soon I brought Carlos, age 11, to my house. At first, like other children, he was very shy and hesitant; it took him much longer to become familiar with the microphone. The first time he sat at the station, I helped him with the answers, but the next time he had enough confidence and was able to take the microphone all by himself. As soon as he was asked to give his name, he started to cry.

"All the boys and girls who came to my house from the hospital had the chance to talk with someone on the other end of the radio at least twice a month. Luckily, these children were not at the hospital for long periods of time, but for the time they were here they felt they were special, which was the truth. When these children had the experience of meeting and talking with another child on the radio, they had wonderful and exciting stories to take back to the hospital to tell the children, nurses, doctors and their families."

Miguel, age 15, had many more opportunities to enjoy Amateur Radio than most of the other children Nellie befriended. Miguel had third-degree burns on his chest. He had multiple hospital stays because several skin grafts were necessary. During those times he looked forward to being in Nellie's shack and renewing acquaintances with his radio friends. "The children talked about everything. They asked each other about their illnesses, families, hobbies, schools, how they dressed and even the color of their eyes," recalls Nellie.

Sadly the day came when the hospital decided not to permit the children to leave the wards during their stay, and Nellie's "radio therapy" came to an end. Her work at the hospital continued as did her interest in Amateur Radio. Due to a series of tragedies, her life took another turn. That, however, is the story for next month.

YLRL 50th ANNIVERSARY CERTIFICATE

Looking to work YLRL members for the YLRL 50th Anniversary Certificate? Check 21.330 MHz and 28.733 MHz on Sundays at 1400 and 2100Z. YLs, come to those frequencies to help amateurs fulfill the certificate's required 50 QSOs with YLRL members. See YL News and View, Jan 1989.

It is with deep regret that we record the passing of these amateurs:

NIDTY, Joseph A. Goguen, Pittsfield, MA
K1GZP, T. Warren Loughlin, Sharon, CT
W1KMS, Francis K. Stevens, Sr, Brockton, MA
W1KYV, Earle F. Tracy, Portsmouth, RI
K1NXI, Albert J. Zins, New Durham, NH
W1OZ, Gerald M. Golden, Newton, MA
W1PHT, Merton F. MacGregor, Cheshire, CT
W1IUNJ, C. William Feher, Shelton, CT
K1YMV, Gerard Gentile, Newtonville, MA
AG2A, Meryll Weed, Rochester, NY
W2AGQ, C. Kenneth Taber, Milton, NY
K2CBD, William D. Landon, St Petersburg, FL
W2CHM, Ross Macaluso, Lady Lake, FL
W2ECP, Harry G. Peirano, Rahway, NJ
W2GQC, James M. Crump, Sr, Elmira, NY
KA2GVX, Elliott N. Sisco, Ruskin, FL
W2HIA, Charles A. Haas, Perth Amboy, NJ
W2HSM, Philip L. Snyder, Syracuse, NY
W2HUM, Bob Kuklinski, Mohawk, NY
K2HX, Donald Bleier, Red Bank, NJ
WA2LBJ, Raymond G. Wells, Shelter Island, NY
W2MFF, Frank G. Takacs, Sr, Elmwood Park, NJ
KA2MVI, Walter A. Christopher, Scotia, NY
KA2NRH, Norman E. Foster, Waretown, NJ
W2PKY, Daniel B. Murray, Scotia, NY
WB2RJK, Paul E. Treasure, Sr, Wolcott, NY
W2RLV, William P. Reilly, Honeoye Falls, NY
WB2SCL, Harry C. Doxsee, Schenectady, NY
KA2TGZ, William O. Lambert, Bedford, NY
W2UAP, John W. Brimmer, Camden, NJ
K2GVV, Joseph Schwartz, Staten Island, NY
WA2VTG, James Edward Goewey, Manasquan, NJ
WA2WLU, Howard B. Smith, St Simons Island, GA
K3CC, Ted O. Cromwell, Mt Jackson, VA
K3CVY, Earl R. Pinkston, Annapolis, MD
K3CYW, John F. Wise, Sr, Mansfield, PA
K3EO, Robert L. Pigford, Newark, DE
KA3JPL, Paul R. Kane, Timonium, MD
K3KSI, Leonard F. Shepard, Lake Grove, NY
WB3LGO, Richard T. Davis, Williamsport, PA
K3OYP, Raymond P. Robinson, Berwyn, PA
K3QHM, Robert S. Chapman, McKeesport, PA
W3UW, John O. Sponeybarger, Bedford, PA
W3WW, Wendell F. Jackson, Easton, MD

W4AZJ, Charles O. Whitney, Harrison, AR
K4CH, Deward G. Bell, Mobile, AL
WB4CUQ, Clarence E. Yockey, Jacksonville, FL
WB4EPA, John Jones, Mcintosh, FL
K4IFG, John V. Drougalis, Dania, FL
WA4JQK, Sam A. Eddins, Memphis, TN
W4KJ, John V. Heisch, St Petersburg, FL
K14LG, Ralph C. Cox, Palm Harbor, FL
N4LX, Flournoy E. Coble, Nashville, TN
WB4MJH, Fred Warren, Bailey, NC
W4MMD, Leroy S. Plyler, Raleigh, NC
KK4RJ, Eugene Rodin, Deerfield Beach, FL
W4TE, John F. DeBardeleben, McLean, VA
W5BBV, Derwin W. Langston, Salem, AR
W5DXD, Edwin E. Brod, Cameron, TX
WB5OMJ, Charles C. Mackey, Sr, Hot Springs, AR
W5QJ, Bruce R. Woodard, San Antonio, TX
WG5Y, Dale D. Langley, Clinton, OK
KH6EI, George H. Yamamoto, Honolulu, HI
W6EZZV, Charles Allen, Salinas, CA
W61JY, Morrison H. Jones, Los Altos, CA
W6JCX, Edward G. Cooper, Alameda, CA
K6MFI, George K. Burton, Red Bluff, CA
W6MGY, Jack R. Wagner, Sausalito, CA
K6F6C, William P. Parker, Tujunga, CA
KH6QG, Bruce E. Marsh, Carson City, NV
K6QP, Donald J. Dettinger, Fresno, CA
W6RAO, Richard G. Kaczmarek, Sr, Fair Oaks, CA
K6RC, Oscar F. Willey, Menlo Park, CA
K6RYI, Phillip K. Mendel, San Carlos, CA
WA6VBR, Charles E. Gramlich, Jr, Riverside, CA
KA6VZM, Ronald Mearns, San Jose, CA
WA6YJZ, Clarence A. Brown, Hunnewell, MO
AD6Z, Harriett Jane Rice, OceanSide, CA
W7BVH, Charles A. Robertson, Bonneville, OR
W7DWZ, Robert L. Wheeler, The Dalles, OR
KA7EAE, Rodney Giles, Milton-Freewater, OR
W7IYW, Sidney H. Broughton, Portland, OR
KA7JUN, Joseph R. Feaster, Seattle, WA
W7JVV, Ralph E. Maricle, Bellingham, WA
WA7RCO, Winfield O. Jones, Longview, WA
W8BCO, Howard T. Hart, Xenia, OH
W8BKR, W. W. Gilmour, Phoenix, AZ
WD8CRY, Richard A. Moran, Ann Arbor, MI
W8GPZ, Lester E. Huffman, North Olmsted, OH

N8GSR, David E. Moore, Washington Court House, OH
N8JJB, Steve P. Peters, Warren, OH
W8LPW, R. Donald Grunow, Clawson, MI
W8LX, Lester M. Bible, Vincennes, IN
W8MGC, Walter O. Dietrich, Cincinnati, OH
W8NUK, Lawrence K. Steinbrook, Chillicothe, OH
WA8PBZ, Phillip R. Beeler, Chillicothe, OH
K9KMH, Charles Knauel, Jerseyville, IL
WA9ONC, Robert K. Adams, Crystal Lake, IL
W9PBS, John Miller, Crown Point, IN
WB9RGY, Leo P. Peterson, Chicago, IL
WN9TJS, Donald A. Bassett, Monticello, IN
WB9UWZ, John R. Borter, Winfield, IL
K9WJR, Mary B. Galloway, Indianapolis, IN
W9WRL, William M. Scott, Fairfield Glade, TN
K0CHQ, Rex S. Owens, De Soto, KS
W0GLE, William Hornseth, Rochester, MN
W0GTX, George P. Lord, Alexandria, MN
WA0SUA, Robert Zeidlik, Minneapolis, MN
VK2DEG, Gordon J. A. Cassidy, NSW, Australia
GM3DAR, A. Walker, Galashiels, Scotland

*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 08111.

50 Years Ago

March, 1939

Continuing the intensive safety-for-amateurs program, G. Grammer covers precautions which should be taken when working around transmitters and methods of making the transmitter itself less dangerous in ordinary operation. QST additionally offers a \$25 prize for the best slogan to epitomize the campaign.

Alternate general coverage and bandspread ranges, acorn tube preselection, noise limiting and an antenna matching network are all features of W9PLM's modern bandswitching superhet. Bob (Parmenter) built Jim Lamb's original SS receiver back in 1932 for his stint as chief op at WIMK, then the League Hq. station, which credentials speak for themselves.

Some major staff changes at Hq.: Jim Lamb is retiring because of continuing illness; George Grammer, WIDF, becomes the Technical Editor. WITS and W1JPE are named Assistant Technical Editors. WIJEQ moves from lab technician to correspondent in the Technical Information Service. Former Illinois SCM W9KJY (now W1RW) joins the staff as Assistant Secretary. [Congratulations to John Huntton, W1RW, on 50 years of association with the League.—Ed.]

Think odd harmonics of a crystal are useless for ham band operation? So did we until W1LJI showed us an ingenious way to combine the third and fifth harmonics to get output in higher bands.

His two-tube exciter covers five bands using said technique.

W5EOW used bamboo poles for wire antenna element supports and a 2 x 2 rotating on a barn door hinge to produce an inexpensive beam structure for bi-directional rotaries.

Another economy trick is the use of pilot lights in series with power leads to measure currents in low-power rigs. W8QBW provides a chart of percentages of full lamp current resulting from several levels such as "just visible" up to "full brilliance."

And W5EGV hooked an electric clock across the output of his gasoline generator to insure adjustment to the desired 60-cycle frequency.

Long Island and Connecticut-shore hams are making 112-Mc. contacts up to 28 miles apart and urge others to get on this 2 1/2-meter band for further exploration of its usefulness.

Send an s.a.s.e. to Hq. to receive a bulletin on how to maintain and increase interest in and activity of your local club group.

25 Years Ago

March, 1964

"Vox in a Box" aptly describes the transistorized gadget created by W1CUT for voice-operated break-in. It goes between your mike and the transmitter audio input.

League prexy Herbert Hoover, Jr., W6ZH, has as one major objective the strengthening of the International Amateur Radio Union. A preliminary meeting in Miami was attended by reps of nine western hemisphere societies, and Mexico City next month will be the site for a larger assembly which hopefully will lead to the formation of a Region II (North and South America) division of I.A.R.U.

VU2NR describes the acquisition of parts and assembly of his sideband transceiver, a struggle which reminds us how lucky W/VE hams are in having an abundance of gear to choose from.

"Magnamatic" describes K1KLO's electronic-key paddle, which uses two fixed magnets (rather than springs or other devices) to achieve accurate centering and ease in adjustment to desirable finger pressure.

Annoyed (like most RTTYers) with the requirement for dual (including c.w.) identification, W4AWY found a way to use his t.d. unit to construct a punched tape for code output and thus an automatic identification system. Meanwhile, the League is asking FCC to modify the irksome rule.

The anniversary (League's fiftieth) section this issue relates participation in World War I—when the League recruited 500 operators for the Navy within ten days after the call! Fighting commercial (and government) interests to get back on the air postwar, and selling bonds to raise funds to resume QST, are other highlights of the era.

Having pretty well accomplished its purpose of promoting the technical and operating advantages of s.s.b., the Single Sideband Amateur Radio Assn. has turned to a new field—that of philanthropic awards to institutions which serve handicapped people.—W1RW

Coming Conventions

ROANOKE DIVISION CONVENTION

March 18-19, 1989, Charlotte, North Carolina

The Roanoke Division Convention will be sponsored by the Mecklenburg Amateur Radio Society. It will be held at the Charlotte Convention Center at 4th and College Streets in uptown Charlotte. Doors will be open on Saturday from 9 AM-5 PM and Sunday from 9 AM-2 PM. Features will include commercial exhibits, flea market, parking, refreshments, VE exams on Sunday. Talk-in will be on W4BFB/R 146.34/94. Admission will be \$5 in advance and \$7 at the door, children under 12 free. Tables will be \$12 in advance only, none sold at the door. Tickets and tables are good for both days. Reservations and inquiries may be made by writing Charlotte Hamfest, PO Box 221136, Charlotte, NC 28222-1136.

KENTUCKY STATE CONVENTION

March 25, 1989, Elizabethtown

The Kentucky State Convention will be sponsored by the Lincoln Trail ARC. It will be held at the Pritchard Community Center from 8 AM-4 PM. Admission will be \$4 in advance and \$5 at the door. Features will include refreshments, forums, VE exams (walk-ins only). Talk-in will be on 146.38/98, 146.52. For further information, contact Chuck Strain, AA4ZD, PO Box 342, Vine Grove, KY 40175, tel (D) 502-351-1715.

MIDWEST DIVISION CONVENTION

March 31-April 2, 1989, Kansas City, Missouri

The Midwest Division Convention will be sponsored by the PHD Amateur Radio Assn. It will be held at the Kansas City Convention Center at 13 and Broadway. Doors will open for setup Friday from 3-8 PM, exhibits will be on Saturday and Sunday from 9 AM-5 PM. Admission will be \$5 in advance

March 18-19
Roanoke Division, Charlotte, NC

March 25
Kentucky State, Elizabethtown

March 31-April 2
Midwest Division, Kansas City, MO

April 7-9
North Florida Section, Orlando

ARRL NATIONAL CONVENTIONS

June 2-4, 1989—Dallas/Fort Worth, Texas

June 8-10, 1990—Kansas City, Missouri

NORTH FLORIDA SECTION CONVENTION

April 7-9, 1989, Orlando

The North Florida Section Convention will be sponsored by the Orlando Amateur Radio Club. It will be held at the Orange County Convention Civic Center. Doors will be open on Friday from 6-9 PM (flea market only), Saturday from 9 AM-5 PM and Sunday from 9 AM-4 PM. Admission will be \$6 in advance and \$8 at the door. Features will include forums. Talk-in will be on 146.16/76. For further information contact Orlando Hamcation, PO Box 347811, Orlando, FL 32834-7811, tel 407-657-9052 prior to 10 PM.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance.

Attention Hamfest and Convention Sponsors

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You are encouraged to register your event with HQ as far in advance as your planning permits. Note that the hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register: Registering dates with ARRL HQ does not constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your Division Director. For conventions, approval must be made by your Director and, additionally, by the Executive Committee. Application forms can be obtained by writing to or calling the ARRL Convention Program Manager, tel 203-668-1541 ext. 283.

and \$7 at the door. Indoor flea market tables will be \$10. Features will include forums, workshops, DX, QCWA, packet, computers, ATV, ARRL, FCC, VE exams 8 AM Sunday (no walk-ins), ARRL breakfast Saturday morning \$4, QCWA breakfast Sunday morning \$4, banquet \$13.50 on Saturday evening, Wouff Hong Saturday at midnight \$1. Guests will include Midwest ARRL Director Paul Grauer, W0FIR; ARRL President, Larry Price, W4RA; Gerald Hall, K1TD, Associate Technical Editor *QST*; Larry Wolfgang, WA3VIL, Assistant Technical Editor *QST*; Alan Dorhoffer, K2EEK, Editor *CQ*; Art Reis, K9XI, Editor *220 Notes*; Robert Winn, W5KNE, Editor, *QRZ DX*; Bill Pasternak, WA6ITF, Producer "Westlink Radio News," and others. All preregistrations must be postmarked by March 20, 1989. Mail to PHD ARA, PO Box 11, Liberty, MO 64068, tel 816-781-7313, SASE for confirmation and information.

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.

Connecticut (West Hartford)—March 19. Sponsor: Insurance City Repeater Club. Time: 9 AM-2 PM. Place: American School for the Deaf. Talk-in: 146.28/88. Admission: \$2. Tables: \$10 (please register early; all tables are usually sold out in advance). Contact: Chuck Motes, K1DFS, 22 Woodside Ln, Plainville, CT 06062.

Florida (Ft Walton Beach)—March 18-19. Sponsor: Playgroup ARC. Time: Saturday 8 AM-5 PM, Sunday 8 AM-4 PM. Place: Ft Walton Beach Fairgrounds on Lewis Turner Blvd, across from City Golf Course. Features: flea market, commercial exhibits, forums, free parking, RV parking \$10 with hookups, refreshments, swap tables, banquet Saturday night. Talk-in: 146.19/79 and 146.52. Admission: advance \$3, door \$4. Tables: \$10 one day, \$15 both days. Contact: Playgroup ARC, PO Box 873, Ft Walton Beach, FL 32549.

†ARRL Hamfest

Georgia (Columbus)—March 25-26. Sponsor: Columbus ARC. Time: 9 AM Saturday and 8 AM Sunday. Place: Columbus Auditorium. Talk-in: 146.01/61. Admission: free. Contact: Gene Hunt, K4DOW, 2221 Wessex Dr, Columbus, GA 31904, tel 404-327-4516.

Illinois (Grayslake)—March 19. Sponsor: Libertyville and Mundelein ARS. Time: 8 AM-2 PM. Place: Lake Co Fairgrounds, north or south-bound I-294 exit Rte 120 W, right on Rte 45, the fairgrounds will be on the left. Features: large indoor electronic and radio swapfest, commercial exhibits, free parking, refreshments. Talk-in: 147.63/03, 146.52. Admission: advance \$2 by March 10, door \$3. Contact: LAMARS, c/o Bob Dick, PO Box 751, Libertyville, IL 60048, tel 312-362-9634.

Indiana (Columbus)—April 8. Sponsor: Columbus ARC. Time: 8 AM-2 PM. Place: Bartholomew Co 4-H Fairgrounds, located on State Rd 11. Talk-in: 146.19/79. Contact: David Mann, KA9UUP, 458N Country Club Rd, Columbus, IN 47201, tel 812-342-6302.

Massachusetts (Framingham)—April 9. Sponsor: Framingham ARA. Time: setup at 8:30 AM, public 9 AM. Place: Framingham Civic League Building, 214 Concord St (Rte 126), in downtown Framingham. Features: VE exams. Talk-in: 147.75/15 Framingham Repeater. Admission:

before 10 AM \$5, after 10 AM \$2. Tables: \$12, which includes one free admission. Contact: Jon Weiner, K1VVC, 52 Overlook Dr, Framingham, MA 01701, tel 508-877-7166; to register for license exams, send a completed Form 610, a copy of your license and a check for \$4.75, payable to ARRL/VEC to the Framingham Amateur Radio Assn, PO Box 3005, Framingham, MA 01701.

Michigan (Grosse Pointe Woods)—March 19. Sponsor: Southeastern Michigan ARA. Time: 8 AM-2 PM. Place: Grosse Pointe North HS, 2 miles E off I-94 on Vernier. Features: packet forum, DX forum, ARRL forum, VE exams, refreshments. Talk-in: 146.14/74. Admission: advance \$2, door \$3. Contact: SEMARA, PO Box 646, St Clair Shores, MI 48080, tel 313-323-4099.

Michigan (Marshall)—March 18. Sponsor: Southern Michigan ARS, Marshall High Photo Electronics Club. Time: setup at 6 AM, public 8 AM-3 PM. Place: Marshall High School, take I-69 to I-94 then E to exit 110, (Old US 27), then S and E to School following the signs. Features: VE exams start at 9:30 AM, preregistration requested, include Form 610, SASE and \$4.75, make check or money order to ARRL/VEC and send to License Exam, PO Box 2, Pleasant Lake, MI 49272 (walk-ins on availability basis). Talk-in: 146.06/66, 146.52. Admission: advance \$2 (SASE), door \$3. Tables: 50 cents per foot (min 4 ft), reserved until 8 AM, send SASE to Southern Michigan ARS, PO Box 934, Battle

Creek, MI 49016, tel Wes Chaney, N8BDM, 616-979-3433.

New Jersey (Dover)—April 1. Sponsor: Split Rock ARA, Inc. Time: vendors 6:30 AM, public 8 AM. Place: Dover Armory, Rte 15, just S of I-80, easy access from all of Northern New Jersey, New York and Eastern Pennsylvania. Features: tailgating (\$5), refreshments, dealers, VE exams (10 AM). Talk-in: 146.385/985, 146.52. Admission: \$3, nonhams and kids free. Tables: \$8. Contact: vendor preregistration to PO Box 610, Rockaway, NJ 07866, for general information contact Harvey Klein, WA2JHT, tel 201-538-1768.

New Jersey (Egg Harbor City)—March 11. Sponsor: Shore Points ARC. Time: dealers 7 AM, public 9 AM-2 PM. Place: Atlantic Co 4-H Ctr, Rte 50, between Rte 30 and Atlantic City Expwy, exit 17. Features: indoor space with ac, outdoor tailgating (weather permitting), free parking, refreshments. Talk-in: 146.385/985, 146.52. Admission: \$3. Tables: \$5. Contact: Shore Points ARC, PO Box 142, Absecon, NJ 08201.

New Jersey (Livingston)—March 10. Sponsor: Irvington RAC. Time: vendors 5:30 PM, public 7 PM-11 PM. Place: American Legion Post 201, 305 Eisenhower Pkwy, take Garden State Pkwy to exit 145, W on Rte 280, exit 4A, S 2 miles, turn right to parking lot, halfway between Rte 10 traffic circle and Eagle Rock Ave. Features: refreshments, parking. Talk-in: 146.52, 147.415/6.415. Contact: Walt Heineman, W2QR, 100 Llewellyn Ave, Bloomfield, NJ 07003, tel 201-429-0504.

New Jersey (Trenton)—March 12. Sponsor: Delaware Valley Radio Assn. Time: vendors 6 AM, public 8 AM-2 PM. Place: New Jersey National Guard, 112th Field Artillery Armory, Eggerts Crossing Rd, Lawrence Township, 2 miles N of the I-95 - Rte 206 interchange. Features: free parking, refreshments, indoor selling spaces \$10 (wall space) or \$7, outdoor spaces are \$6, parking, wheelchair accessible. Talk-in: 146.07/67. Admission: advance \$3, door \$4. Tables: bring your own. Contact: SASE to HAMCOMP 89, c/o Walter Sharpe, KB2ZY, RD 1, Box 259, Stockton, NJ 08559.

New Jersey (Upper Saddle River)—April 8. Sponsor: Chestnut Ridge Radio Club. Time: 9 AM-4 PM. Place: East Saddle River Rd at Weiss Rd. Features: refreshments. Talk-in: 146.355/955. Admission: no advance, door \$1. Contact: Jack Meagher, W2EHD, tel 201-768-8360.

New York (Poughkeepsie)—March 11. Sponsor: Mount Beacon ARC. Time: 9 AM-4 PM. Place: Arlington Middle School. Features: auction, refreshments. Talk-in: 146.37/97. Admission: no advance, \$4 at door. Tables: advance \$7, door \$9. Contact: Ron Phillips, KB2DVC, 8 Wilmont Court, Hopewell Jet, NY 12533, tel 914-221-4999.

North Carolina (Winston-Salem)—April 14-15. Sponsor: Antique Wireless Assn. Time: Friday registration in main lobby, seminars from 3 PM-4:45 PM, Saturday 8 AM-4:45 PM. Place: Regency Inns, for special AWA rates, tel 919-723-8861. Features: Saturday flea market, tour of 1753 Historic Bethabara Moravian Village, hospitality room open for both evenings, 6:30 PM Saturday social hour and banquet. Contact: Lewis Elias, W4DBT, 3919 Poindexter Dr, Winston-Salem, NC 27106, tel 919-924-2162.

North Dakota (West Fargo)—March 18. Sponsor: Red River Radio Amateurs. Time: 8 AM. Place: New Day's Inn at the intersection of I-94 and Hwy 75 in Moorhead, Minnesota. Features: commercial and computer exhibitors, flea market, SKYWARN banquet, forums, VE exams. Admission: \$3, \$2 for students. Tables: \$5. Contact: for VE exam reservations, Mike Beaton, KD8A, 2267 Flickertail Dr, Fargo, ND 58103, for other information, Tim Gooding, KD8YX, 1006 Sheyenne St, West Fargo, ND 58078, tel 701-282-6630.

Ohio (Circleville)—March 12. Sponsor: Teays ARC. Time: 8 AM-3 PM. Place: Pickaway Co Fairgrounds at 4H Grange Bldg, located #22 eastside of Circleville. Talk-in: 147.78/18. Admission: advance \$3, door \$4. Tables: advance table space \$5, door \$6. Contact: Tim Herron, NM8Y, 339 Walnut St, Circleville, OH 43113.

Ohio (Conneaut)—March 12. Sponsor: Conneaut ARC. Time: 8 AM-3 PM. Place: Conneaut Human Resources Center, 327 Mill St. Features: refreshments, free parking. Talk-in: 147.99/39. Admission: advance \$2, door \$3. Contact: Jim Schiavone, WD8BAD, tel 216-593-2442.

Ohio (Madison)—April 2. Sponsor: Lake Co ARA. Time: 8 AM-3 PM. Place: I-80 to Rte 528, follow signs N to Madison High School at corner of Middle Ridge and Burns Rd. Features: forums, refreshments. Talk-in: 147.81/21, 222.90/4.50. Admission: advance \$3, door \$4. Contact: Carl Lorman, KA8RLH, 7803 Skyline View Dr, Mentor, OH 44060, tel 216-953-9784.

Ohio (Maumee)—March 19. Place: Lucas Co Recreation Ctr, Key St. Sponsor: Toledo Mobile Radio Assn. Time: 8 AM-5 PM. Features: free parking, refreshments. Talk-in: 147.87/27. Admission: advance

\$3.50, door \$4. Contact: Ron Morris, WB8ZIM, 2814 Glenwood Rd, Perrysburg, OH 43551, tel 419-666-8063.

Oregon (Milton-Freewater)—April 2. Place: Community Ctr Bldg. Sponsor: Walla Walla Valley ARC. Time: 8 AM-4:30 PM. Features: refreshments. Talk-in: 147.28. Admission: free. Contact: Jack Babbitt, Sr, WA5ZAY, 1401 Pleasant, Walla Walla, WA 99362, tel 509-525-7003.

Pennsylvania (York)—March 5. Sponsor: York Springfest Committee. Time: 8 AM. Place: Dover Firehall, 6 miles W of York, PA. Features: refreshments, two floors inside, blacktop parking, VE exams. Talk-in: 146.37/97, 147.93/33. Admission: \$4, nonhams and under 12 free. Tables: inside \$10. Contact: York Springfest, PO Box 50, Shrewsbury, PA 17361-0050, tel 301-239-3878.

Texas (Midland)—March 18-19. Sponsor: Midland ARC. Time: Saturday 10 AM-5 PM, Sunday 8 AM-2:30 PM. Place: Midland Co Exhibit Building located E of Midland on the N side of Highway 80. Features: refreshments, VE exams. Admission: advance \$5, door \$6. Tables: \$6. Contact: Midland ARC, PO Box 4401, Midland, TX 79704.

Washington (Puyallup)—March 11. Sponsor: Mike and Key ARC. Time: setup on Friday 4 PM-9 PM and Saturday 6 AM-9 AM, public 9 AM-6 PM. Place: Pavilion of the Western Washington Fairgrounds.

Features: free parking, refreshments, VE exams, free overnight storage for self contained RVs. Talk-in: 146.22/82, 222.52/224.12. Admission: \$3. Tables: requests postmarked before March 1, \$15; after \$18, commercial space \$50. Contact: for table reservations write Mike and Key Swapfest, 13517 117th Ave NE, Kirkland, WA 98034, for VE information send SASE to 637 2nd Ave, S Kent, WA 98032.

Wisconsin (Appleton)—March 4. Sponsor: Fox Cities ARC. Time: setup 6 AM, public 8 AM. Place: Appleton East High School, 2121 Emmers Ln. Features: VE exams, preregistration by Feb 12 to Larry Siebers, KD9IA. Tables: \$5 by reservation only. Contact: Don Baker, NB9J, 621 W 7th St, Kaukauna, WI 54130, tel 414-766-3886.

Wisconsin (Madison)—April 9. Sponsor: Madison Area Repeater Assn. Time: vendors 7 AM, public 8 AM (special arrangements for early setup are available for commercial exhibitors and purchasers of 6 or more flea market tables on Saturday after 7 PM). Place: Dane Co Exposition Ctr Forum Building. Features: refreshments. Talk-in: MARA WB9AER/R 147.75/15. Admission: advance \$3, door \$4, children 12 and under are free. Tables: advance \$8, door \$9 plus admission. Contact: for table reservations or information on commercial exhibit space write to Madison Area Repeater Assn, PO Box 4007, Madison, WI 53711, tel 608-274-5153, leave message on answering machine (the deadline for mail orders of admission tickets and table reservations is March 31, 1989).

W1AW Schedule

October 30, 1988—April 2, 1989 MTWThFSSn = Days of Week Dy = Daily
W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0300, 1400; TThS: 0000; TThSSn: 2100; Sn: 0300
	Fast Code Practice	MWF: 0000, 2100; TTh: 0300, 1400; S: 0300; Sn: 0000
	CW Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Teleprinter Bulletins	Dy: 0200, 0500, 2300; MTWThF: 1600
	Voice Bulletins	Dy: 0230, 0530
EST	Slow Code Practice	MWF: 9 AM, 7 PM; TThSSn: 4 PM, 10 PM
	Fast Code Practice	MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM
	CW Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Teleprinter Bulletins	Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM
	Voice Bulletins	Dy: 9:30 PM, 12:30 AM
CST	Slow Code Practice	MWF: 8 AM, 6 PM; TThSSn: 3 PM, 9 PM
	Fast Code Practice	MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM
	CW Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Teleprinter Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Voice Bulletins	Dy: 8:30 PM, 11:30 PM
MST	Slow Code Practice	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM
	Fast Code Practice	MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM
	CW Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Teleprinter Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Voice Bulletins	Dy: 7:30 PM, 10:30 PM
PST	Slow Code Practice	MWF: 6 AM, 4 PM; TThSSn: 1 PM, 7 PM
	Fast Code Practice	MWF: 1 PM, 7 PM; TTh: 6 AM; TThSSn: 4 PM
	CW Bulletins	Dy: 2 PM, 5 PM, 8 PM, 8 PM; MTWThF: 7 AM
	Teleprinter Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Voice Bulletins	Dy: 6:30 PM, 9:30 PM

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.

Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz. Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

On Monday, Wednesday and Friday, 1400 through 2200 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.

Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

Code practice texts are from QST, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from July 1988 QST, pages 9 and 87," indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 87.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Tuesdays and Saturdays at 2330 UTC, Keplerian Elements for active amateur satellites will be sent on the regular teleprinter frequencies.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode. Baudot, ASCII and AMTOR (in that order) are sent during all 1600 UTC transmissions, and 2300 UTC on WThFSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 AM to 1 AM EST and on Saturday and Sunday from 3:30 PM to 1 AM EST. If you desire to operate W1AW, be sure to bring a copy of your license with you.

W1AW is available for operation by visitors between 1 and 4 PM Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on March 24.

Major reconstruction at W1AW is expected to begin soon. Some or all of the scheduled transmissions and visitor operating periods may be preempted at times. Check W1AW bulletins for up-to-date information.

Results, Third ARRL 10-GHz Cumulative Contest

"I have never had more fun in Amateur Radio than the past years on 10 gigs!"—W2TTM

By Billy Lunt, KR1R
Contest Manager

Fifty-four entrants set out for high spots and portable locations on the weekends of Aug 20-21 and Sep 17-18 for the third annual ARRL 10-GHz Cumulative Contest. Participation was about average as based on the "norm" set during the first two X-band contests. Southern California still boasts as the center of activity for this microwave event, but New England amateurs are organizing their efforts and are claiming to be the next active call area in the future. WA3ETD discloses, "Super organization by Bob, NI1W, gave one-land some decent scores. The core group of NI1W, W1XP, KA1CDZ, AF1T, K1KA and WA3ETD hit the slopes armed with Gunnplexers and SSB Electronics narrowband units and high hopes for winning scores. Great weather prevailed the first weekend, providing many contacts, but on the second weekend, a hailstorm that turned into driving rain 15 seconds later prevented long-haul QSOs."

Although Southern Cal led the way again this year with the most participation and highest scores, things were not all rosy. West Coast organizer W6OYJ explains: "Propagation was poor both weekends compared to the previous two years in which I had the top score nationwide. I still managed to better last year's score, but worked harder for the points. Local San Diego activity was still very good even though several of the locals missed both weekends. Contacts that I can normally make easily across the water to the Los Angeles area were very difficult and only made with those using larger dishes and good equipment."

With more equipment being made available, X-banders are perfecting their ability to make those long-haul multikilometer contacts. W1XP expresses, "The new 'high power' 100-mW rigs are bringing a new light to microwave activity. Nonoptical paths are now workable with big antennas." Many other participants remarked on the pleasure



N6XQ operating XE2GBO from DM12NJ (15 miles south of Tijuana) with a 2-ft home-brew dish and an 80-mW Gunnplexer.



Jim, W6ASL, had trouble with his home-brew "Penny" feed but still managed to work 112 km for his best DX.

of making QSOs on some of the obstructed paths by using "high power" narrowband rigs and large dishes. The narrowband modes are gaining in popularity and contributed to the many contacts made during this year's contest.

The XE2GBO DXpedition to rare grids DL29, DM11 and DM12 sure paid off for the 2-man crew. They almost doubled the old farthest-DX mark (335 km) with QSOs of 647 km with NN6W and WB6DNX—both from the same grid—and also share the new record with XE2GBO. A round of applause goes to W6CPL and N6CA for completing QSOs with XE2GBO of 512 and 485 km respectively for 2nd and 3rd places. Long-distance QSOs keep getting farther and more plentiful each year. During the 1988 contest, 18 stations made contacts at distances of over 200 km. Where will it all end?

Breaking his own "total-QSO record," WA6EXV finished first for the 2nd year in a row completing a total of 121 QSOs. Not far behind were fellow Californians W6OYJ with 85 QSOs and WA6QYR with 73 QSOs.

The XE2GBO group not only enjoyed giving rare grids to their 61 contacts, but tallied a score of 16,644 points to win first place among their microwave peers. Chuck, WA6EXV, scored 14,299 points for a well deserved second place finish and Ed, W6OYJ wasn't far behind with 12,048 points for 3rd place.

If you enjoy microwave contesting, especially on 10 GHz, invite a friend along next year to share in the fun. It will not penalize you, as there are no entry categories to wonder about. Everyone goes "head on" in this contest. With new blood in the game, maybe some new ideas will surface to improve your equipment or operating techniques. The 4th running of the ARRL 10-GHz Cumulative Contest will be on the weekends of Aug 19-20 and Sep 16-17, 1989. Good luck!



Jack, K16RF, hiking to the top of Cowles Mountain overlooking San Diego.

Soapbox

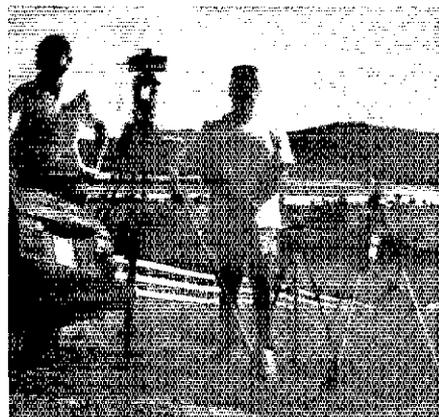
There was lots of activity in New England this year, sideband and CW contacts accounting for 65% of my score. I made 3 contacts over 100 km, breaking my former DX record by almost double! My first SSB contact with AFIT was a challenge since he was about 600 kHz off my frequency and was FMing so bad that his SSB almost sounded better on FM. I got a good physical work out by hauling 40 pounds of equipment up to the top of Mount Kearsarge. It is too bad that batteries only lasted 2 1/2 hours. It was nice to make some obstructed paths. Higher power (100 mW), 19-in dish and narrowband really helped (NI1W). I operated from Pack Monadnock (FN42BU) with battery-powered equipment and a 2-foot dish, fighting off fall tourists. For the second leg, I manned Mt Equinox in VT (FN33JC). The signals were S8 or better (WA3ETD). I didn't get to operate the second weekend. I have been in PA since Sep without any microwave gear! The SSB contacts were made with 100 mW out of a mixer that was

bolted to a 24-in dish (AFIT). All contacts were made with narrowband equipment on both ends. As usual, rain washed out the better of one day's operation. I made some of my contacts at sea level, but most were made in the hills. The shot to Mt Wachusett (MA) from Highlands (NJ) was my DX. I made contacts from 4 states and 4 different grids (W2TTM). While setting up on Mt Wachusett (FN42BL), a gust of wind blew over my antenna. I thought that I was out of operation until W1XP and his XYL, KAIJVU, unexpectedly appeared, making my day! Karen steadied the 3-ft dish and assisted me to move around the mountain top while Bob alerted several other stations that I was operational. It resulted in working five states with my best DX of 291 km (W2VC). Our team didn't get a chance to participate the first weekend and enjoy the great weather improvement over 1987. The foliage growth at a previously good site hampered communications signal levels the first day (a leaf must be about -1 dB), but the second day revealed sites that will lead to over 100-mile contacts in the future. I am looking forward to 1989 and hope to have additional participants from VA (KA4CKI). I operated from 10 locations. My low point of the contest was on Mt Soledad when a lady tourist engaged me in conversation while her dog lifted his leg on my tripod! Much of my credit goes to N6IZW for his continuing efforts to encourage 10-GHz activity and to WB6IGP for his circuit-board kits which most of us are using. This year, we missed very much the friendly contest activity of Red Truax, W6BLK, who is a Silent-Key (W6OYJ). Thanks to all the others that brought out their gear for this technical challenge (WA6QYR). Great contest! I worked VUCC from three different mountaintops (K6HLH). Great contest! I enjoyed it very much (W6HCC). Thanks again for the contest. It has provided a great gathering for all and gives us a common goal to peak equipment performance while having a great time outside our ham shacks (WB6IGP). I operated from my home QTH in the middle of Los Angeles on a 500-ft hill. Conditions to San Diego were virtually nil! (W6CPL). Murphy attended me often during both weekends. The first weekend saw transmitter problems coupled with poor receiver response. The crystal in the receiver died along with rain in the desert. Although the second weekend went quite well, I ran into a signal-eating smog bank over Los Angeles. The worst part was having to go into the smog at the end of the day (KA6AMO). K6GZA and I operated with 15-mW Gunnplexers. The first weekend our antennas were 17-dB horns. During the second weekend, we



Bob, W1XP, tuning for a contact from Pack Monadnock, NH.

operated with 19-in dishes and homemade "penny" feeds (Dec 1987 QST, p 64). Murphy struck! Our feeds had an SWR of 4:1. K6GZA corrected his to 1.25:1 SWR, but I didn't have time so I had to start with the high SWR. The second day of the last weekend I had to operate at ground level west of Sacramento due to a fire at my planned location (Mt Vaca). Tip: bring chairs, water and sunscreen (W6ASL). Had a great time from all the hill tops. I worked 20 stations and heard 5 beacons and 1 radar. There was poor weather the second weekend (WB6DTA). I went for "quality and experience" this time with a 15-mW Gunnplexer and snow coaster. I averaged 192 km (K2DNR). DX sure comes hard with no mountains! Lousy conditions. I enjoyed the contest as usual. There were several southern Ontario operators that were new to 10 GHz in this year's contest (VE3SMA). Didn't contact a single station in our country! I was happy to give out rare grids DL29 and DM11. We were able to tally 7806 points the first day, thanks to ducting and the 4 gents who drove to Santa Barbara. Most of the long-haul contacts had excellent signals (XE2GBO).



Mitch, VE6SM, and Terry, VE6CSO, are active on 10 GHz in Western Canada.

Scores

Score lines indicate call sign, total score, total QSOs, number of different call signs worked and best DX in kilometers. Example: NI1W had 1,890 points total from 20 QSOs with 10 different stations. His best DX was 135 km.

1	NI1W 1,890-20-10-135	4	K8RI 1,197-15-4-100	WA5BNH 4,361-26-20-188	VE
	KA1CDZ 1,341-12-7-114		KA4CKI 1,098-14-3-100	K6PVS 4,170-31-17-199	Ontario
	WA3ETD 1,335-12-6-135		K4HWG 458-8-3-21	K6GAM 2,903-22-11-241	VE3SMA 556-8-5-41
	AFIT 1,240-14-5-68			WB6BKR 2,437-18-12-171	VE3LPP 474-6-4-17
	W1XP 1,065-3-5-138	5		K6RF 2,424-14-12-178	VE3RKS 373-5-3-41
	WD4MUO 848-30-4-42		WBSLUA 1,485-18-4-335	K6GZA 986-14-1-112	VE3WCB 345-4-3-17
	KA1LMR 101-1-1-1		NOSK 535-9-2-65	W6ASL 986-14-1-112	VE3EZP 328-3-3-10
2			WASVJB 364-3-2-69	K6STO 790-8-8-29	VE3MWM 314-3-3-8
	W2TTM 4,044-33-6-291	6			Alberta
	W2VC (+KAIJVU) 2,742-12-8-291		WA6EXV 14,299-121-22-206	K2DNR/7 1,635-8-1-229	VE#CSO 103-1-1-3
	WB2ONA 2,147-15-5-263		W6OYJ 12,049-85-26-352	KB7CI 1,635-8-1-229	VE8SM 103-1-1-3
	KG2K 2,117-9-2-146		WA6QYR 9,184-73-15-171		DX
	NA2O 409-7-4-3		K6HLH 9,180-65-20-328	N8DGN 924-25-2-53	XE2GBO (WA5LIG,N6XQ,ops)
	WA2YTM 406-8-4-1		W6HCC 9,101-66-20-231	N8IRW 746-22-1-64	18,644-61-27-647
3			NN6W 8,578-49-21-647		
	WB3FGP 363-3-3-21		N6CA 8,531-49-23-485		
			WB6DTA (+K6DYD) 6,752-52-20-338		
			WB6IGP 6,412-90-22-258		
			WB6DNX 6,162-26-18-647		
			W6CPL 5,036-32-20-512		
				K6NG 1,152-22-6-38	
				WB9QIY 1,008-23-4-43	

MARCH

1

West Coast Qualifying Run, 10-35 WPM, at 0500Z Mar 2 (9 PM PST Mar 1). W6OWP 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 HQ 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.

4-5

ARRL International DX Contest, phone, Dec QST, p 103.

11-12

Iowa QSO Party, Feb QST, p 101.

12

WIAW Qualifying Run, 10-35 WPM, 0300Z Mar 13 (10 PM EST Mar 12). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Mar 1 listing for more details.

Classic Sprint, Feb QST, p 101.

Zero-District QSO Party, sponsored by the Davenport RAC, Mar 12 from 1800Z-2400Z. Zero-district stations may work anyone; all others work 0-district stations only. 80-10 meters only, phone and CW. Work each station once per band and mode. Mobile stations may be worked again as they change counties. Exchange signal report and state. Zero-district stations also send county. Suggested frequencies: CW—60 kHz up from lower band edges; phone—3.900 7.270 14.300 21.350 146.52 (no repeater QSOs); Novice—3.730 7.130 21.130 28.360. Count 1 point for phone QSOs, 2 points for CW QSOs and 4 points for Novice CW QSOs. Zero-district stations multiply QSO points by total of states, 0-district counties, provinces and DXCC countries worked. Others multiply QSO points by number of 0-district counties worked. QSO with W0BXR counts for 2 bonus multipliers, regardless of mode. Any station with over 100 QSOs must include dupe sheet. Club competition for 0 district only. Mail logs by Apr 30 and SASE for results to W0BXR, 5305 White Post Rd, Bettendorf, IA 52722.

18-20

BARTG Spring RTTY Contest, Feb QST, p 101.

Wisconsin QSO Party, Feb QST, p 101.

YL-ISSB QSO Party, phone, Dec QST, p 105.

Bermuda Contest, sponsored by the Radio Society of Bermuda, from 0001Z Mar 18 until 2400Z Mar 19. Operate 36 hours maximum. Off times must be clearly indicated and must be at least 3 hours each. Single operator only. All stations must operate from their own private residence or property. 3.5, 7, 14, 21 and 28 MHz, phone and CW. No cross-band or cross-mode QSOs. Exchange signal report and QTH (W stations send state; VE stations send province; UK stations send county; West German stations send DOK number; Bermuda stations send parish). W/VE stations work West German, UK and Bermuda stations only. A phone contact and a CW contact with the same station on the same band counts for score if the contacts are made at least 30 minutes apart. A multiplier counts only once per band. Count 5 points per QSO and multiply by the number of VP9 stations worked per band. Separate logs for each band and mode. Logs must be received by Jun 1. Include a dupe sheet if more than 200 contacts were made. See sponsor for awards. Mail to RSB Contest Committee, Box HM275, Hamilton HM AX, Bermuda.

Virginia State QSO Party, sponsored by the Sterling Park ARC from 1800Z Mar 18 until 0200Z Mar 20. Exchange QSO number beginning with 001 and

QTH (county for VA stations; state, province or DX country for others). Score one point per phone QSO; two points per CW, RTTY, SSTV and packet QSO. No cross-mode QSOs. VA stations multiply QSO points total by the sum of states, Canadian provinces, DX countries and VA counties worked. Others multiply total QSO points by number of VA counties worked. Work the same station on each band and mode for QSO credit. VA stations may contact in-state stations for both QSO and multiplier credit. Mobile stations may be worked in each county they operate for both QSO and multiplier credit. County-line stations count for only one QSO. CW frequencies are 60 kHz up from the low end of 80, 40, 20, 15 and 10 meters, anywhere on 160 meters and Novice CW bands. Phone frequencies are 3.930 7.230 14.285 21.375 28.375 28.575, and anywhere on 160 meters except DX windows. Other modes on usual frequencies. Follow ARRL standard contest logging guidelines. Mail logs by April 15 to Virginia QSO Party, c/o Richard Maylott, W4LMI, 200 Lake Dr, Sterling, VA 22170.

25-26

CQ World Wide Prefix Contest, phone, sponsored by CQ Magazine, from 0000Z Mar 25 until 2400Z Mar 26 (CW contest, May 27-28). Single ops are allowed a maximum 30 hours operating time; off-times must be at least 60 minutes in length and must be clearly indicated in the log. Multioperator stations may operate entire 48 hours. Phone only, 160-10 meters (excluding the WARC bands). Categories: single op, all band and single band; QRP (5W output maximum); multiop (multiband only) multi and single transmitter. Multi-singles must remain on a band for at least 10 minutes after making a QSO; multi-multis are allowed only one signal per band. All transmitters must be located within a 500-meter diameter circle or limits of property; no remote stations. Work stations once per band for QSO point credit, but prefix credit may be counted only once. Exchange signal report plus serial number starting with 001. Multi-multis use separate numbers on each band. QSO points: Contacts between stations on different continents count three points on 28, 21 and 14 MHz and six points on 7, 3.5 and 1.8 MHz. For North American stations, contacts between stations in different countries on the NA continent count two points on 28, 21 and 14 MHz and four points on 7, 3.5 and 1.8 MHz. For non-NA stations, contacts with stations in other countries but on the same continent count one point on 28, 21 and 14 MHz and two points on 7, 3.5 and 1.8 MHz. QSOs between stations in the same country count zero points but are permitted for prefix multiplier credit. Multipliers are prefixes, to be counted only once. A prefix is the two or three letter/number combination that forms the first part of an amateur call sign, as in W1, G4, DF3, 8P6, etc. Stations operating outside the call area indicated by their call signs must sign portable. The portable prefix counts as the multiplier; for example, AA1K/3 in Delaware counts as an AA3 multiplier. Final score is total QSO points times sum of prefixes worked. Awards and club competition. Mail logs by May 10 (Jul 10 for CW) to CQ Magazine, WPX Contest, 76 North Broadway, Hicksville, NY 11801.

28

WIAW Qualifying Run, 10-35 WPM, at 1400Z Mar 28 (9 AM EST). See Mar 12 listing for more details.

APRIL

1

Massachusetts QSO Party, sponsored by the Wellesley ARS from 0000Z Apr 1 until 2400Z Apr 2. 160-10 meters, CW and phone. No crossmode, crossband, packet or repeater QSOs. Work stations once per band and mode. MA-to-MA QSO are allowed. Work MA portables and mobiles again as

they change counties. Exchange RS(T) and state/province/country (county for MA stations). Count 1 point per phone QSO, 2 points per CW QSO, 5 points per QSO with WITKZ. MA stations multiply QSO points times total of states/provinces/countries worked for final score. Others multiply QSO points times total of MA counties worked (max 14) for final score. Certificates. Send logs by May 1 to Wellesley ARS, MA QSO Party, 211 Washington St, Wellesley, MA 02181.

4

West Coast Qualifying Run, 10-35 WPM at 0400Z Apr 3 (9 PM PDT Apr 4). See Mar 1 listing for more details.

8-9

North American QSO Party, CW, sponsored by the National Contest Journal from 1800Z Apr 8 until 0600Z Apr 9 (phone—1800Z Apr 15 until 0600Z Apr 16). Contests are separate. Single-operator and multioperator. Multiop may be multitransmitter, but only one signal per band. No spotting nets for single op. Single ops may operate any 10 hours. Rest periods must be at least 30 minutes long and noted in log. Multiops may work the entire contest. Use only one call sign per contest. Exchange name and state/province/country. 160-10 (no WARC bands). Work stations once per band. Suggested CW frequencies are 35 kHz above band edge; phone—1.865 3.850 7.225 14.250 21.300 28.600. Try 10 m at 1900Z and 2000Z, 160 m at 0430Z and 0530Z. A valid QSO is a two-way logged exchange between a North American station (as defined by CQ WW DX Contest, plus KH6) and another station. Multipliers are states (including KH6 and KL7), VE call areas (VE1-VE8, VO1, VO2, VY1) and other NA countries (do not count USA, VE, KH6 or KL7 as countries). Score 1 point per QSO. Multipliers times QSO points for final score. Awards. Send logs, summary sheet and dupe sheets before 30 days after the contest to Dave Pruett, K8CC, 2727 N Harris Rd, Ypsilanti, MI 48198.

QRP ARCI Spring QSO Party, CW, sponsored by QRP ARC International, from 1200Z Apr 8 until 2400Z Apr 9. Single band or all band. Operate no more than 24 hours. Work stations once per band. Exchange signal report, state/province/country and ARCI number if member or power out if non-member. Suggested frequencies: 1.810 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110 50.060. Count 5 points for QSO with ARCI member. Others count 2 points for same continent. Multiply QSO points by states/provinces/countries worked per band by power multiplier (1-5 W output X7; under 1 W output X10). More than 5 W output counts as checklog. If 100% natural power, multiply final score by 2; if 100% battery, by 1.5. Bonus points for using home-brew equipment (HB): add 2000 points for each band an HB transmitter is used; add 3000 points for each band an HB receiver is used; add 5000 points for each band an HB transceiver is used. Include description of home-brew equipment, commercial equipment and antennas used and indicate which equipment was used on which bands. Awards. Mail entry (SASE for results) before 30 days after the contest to Red Reynolds, K5VOL, QRP ARCI Contest Manager, 835 Surreys Rd, Lake Zurich, IL 60047.

MARAC County Hunters SSB Contest, sponsored by the Mobile AR Awards Club, from 0000Z Apr 8 until 2400 Apr 9. 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 (fixed, portable or mobile), signal report, county and state (for US stations), province or country. Suggested frequencies: 3.880 7.240 14.270 21.340 28.340 MHz. Portables and mobiles work below the suggested frequencies; others spread out above the frequencies. Count 1 point for QSOs with W/VE fixed stations, 15 points for W/VE porta-

bles or mobiles, 5 points for all other QSOs. 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 to be received by May 8 (include a large SASE for results) to WA5DTK, 85-A E Poinciana Dr, Satellite Beach, FL 32937.

10

ARRL Spring Sprints, 144 MHz.

WIAW Qualifying Run, 10-35 WPM at 0200Z Apr 11 (10 PM EDT Apr 10). See Mar 12 listing for more details.

15-16

North American QSO Party, SSB, see Apr 8-9 listing for more details.

18

ARRL Spring Sprints, 220 MHz.

22-24

Connecticut QSO Party, sponsored by the Candlewood ARA, from 2000Z Apr 22 until 0200Z Apr 24, with a rest period from 0500Z to 1200Z. Phone and CW. Work stations once per band and mode. CW QSOs in CW bands only. Work portables and mobiles again as they change county. No repeater QSOs. Exchange signal report, serial number and QTH (county for CT stations; state/province/country for others). Count 1 point per phone contact, 1.5 points per CW contact, 3 points per OSCAR contact. Club station W1QI counts 5 points per band/mode. CT stations multiply QSOs by states worked (DX only one multiplier), others multiply by CT counties worked. Suggested frequencies: phone—1.860 3.927 7.280 14.280 21.370 28.370 50.110 144.200 146.55; CW—40 kHz from low end; Novice—25 kHz from low end. Certificate to highest scorer in each state and WACC Certificate for working all CT counties. Mail logs by May 23 to CARA, PO Box 143, Bethel, CT 06801.

23

WIAW Qualifying Run

26

ARRL Spring Sprints, 432 MHz.

29-30

Helvetia Contest

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 Apr 1 to make the June issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Special Events

Conducted By Mark R. Burke, KA1MIS
Contest Assistant

Fairbanks, Alaska: KL7KC and KL7YQ will operate from Feb 18 until Mar 11 in celebration of the 6th running of the Yukon Quest. Suggested frequencies: phone—7.290 14.240 21.340 28.550; CW—7.030 14.030 21.030 28.030. For special QSL, send SASE to PO Box 81389, Fairbanks, AK 99708-1389.

Washington, Texas: The Brenham ARC will operate W5HTI 0000Z Mar 2 until 2400Z Mar 4 from Washington-on-the-Brazos State Park to commemorate the 153rd anniversary of the signing of the Texas Declaration of Independence from Mexico. Operation will be phone, CW and packet, 80-10 meters and VHF. For commemorative QSL, send legal-size SASE to BARC, PO Box 44, Brenham, TX 77833.

Gaithersburg, Maryland: The NBS BRASS will operate K3AA from 0000Z Mar 10 until 2400Z Mar 12 to commemorate the 76th anniversary of the establishment of the National Bureau of Standards, now renamed The National Institute of Standards and Technology. Operation will be 20 kHz up from the lower end of the General and Novice CW and phone bands on 80-10 meters. For commemorative certificate, send QSL and SASE to NBS BRASS, National Institute of Standards and

Technology, Gaithersburg, MD 20899.

Fairbanks, Alaska: The Arctic ARC and the Borealis ARC will operate Mar 10-19 in celebration of the Ice Festival. Operation will be 80-10 meters, both phone and CW. For special QSL, send QSL and SASE to the station contacted.

Springfield, Missouri: The Southwest MO ARC will operate W0EBE from 1500Z Mar 11 until 1500Z Mar 12 to celebrate the grand opening of the new Red Cross building. Suggested frequencies: 3.870 7.260 14.290 21.375 28.400. For certificate, send QSL and large SASE to KD0XJ, 831 S Kimbrough, Springfield, MO 65806.

Piscataway, New Jersey: The Piscataway ARC will operate member stations, signing /VOA, from 0000Z Mar 18 until 2400Z Mar 19, to commemorate the World War II operations of the Voice of America Relay station, WRCA. Suggested frequencies: CW—Novice bands; phone—lower third of the General 75-15 meter bands; Novice 10-meter band. For certificate, send QSL and 9- x 12-in SASE to KO2K via *Callbook* address.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preced-

ing the publication date. For example, your information would have to reach HQ by April 1 to make the July 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- x 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.

Exam Info

DODGING SOME RED TAPE

There have been literally thousands of new Novices who passed the Technician class test before their Novice licenses actually showed up from the FCC. Once the Novice tickets did arrive, these new hams had to send the VEC a copy of their tickets so that the VEC could forward their Form 610 applications for Tech to Gettysburg. (The FCC would not accept the 610s without copies of the licenses being upgraded attached.)

Prospective hams who believe that they may be ready for both the Novice and Tech tests within a short period of each other (say, two to four weeks) would save themselves as

much as two months of waiting time if they take the 5-WPM code test and Novice and Tech written exams at a single VEC-coordinated session. (The alternative is, of course, taking only the Novice elements under the two-examiner Novice testing program and then taking the higher element at a later session under the three-examiner VEC program.)

Assuming the applicant is successful, only the one Form 610 (for an initial license at the Technician class level, in this example) will need to go on to the FCC, thus sparing the applicant, VEC and FCC several weeks of waiting.—*Jim Clary, WB9IHH, Manager, ARRL/VEC*

Strays



I would like to get in touch with...

Anyone with a schematic, parts or info on a Klitzing UHF linear amplifier, model 70CM10W60A. Allen Fugelseth, WB6RWU, 4230 Trotter St, Capitola, CA 95010.

I would like to get in touch with...

anyone with an instruction manual (tube element settings) for a Lafayette tube tester model TE-55. Jock Fisher, VK1LF, PO Box 94, Lyons, Canberra, ACT 2606, Australia.

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WYV—ASM, Walt Dabell, KD3GS. The Delaware Hamfest will be held August 20 in Dover at the Kent Vo-Tech North. Contact KCARC at PO Box 1000, Dover, 19903 for more info. June 10 and 11 the Nanticoke ARC will sponsor the Delaware QSO Party. Awards will be given for in-state, out-of-state, and a plaque for best in-state club score. Official rules etc. will be distributed to clubs sometime this month. Mark Miller (WB3KIS) at Skyline Middle School is desperately seeking donations of equipment, funds, and control operators for the Skyline Middle School Amateur Radio Club. He has about 70 kids anxious to get on the air but has no source of equipment (since a previous benefactor backed out). Please leave a message for him at 302-454-3410 if you can help out. December net rpt: DTN stns 294 tlc 48 in 22 sessions, DEPN stns 50 tlc 17 in 5 sessions, SEN stns 118 tlc 0 in 4 sessions. Traffic: WB3DUG 95, W3QW 74, K3BYW 58, WA3WYV 35, KA3GRQ 24, W3FEG 19, K3JL 16, W3PVO 16, KD3GS 6. E71N

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KC3B. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO. STM: BM: KB3UD. PIO: W3ZV. TC: W3FAF. Hamfest season begins with the York Winterfest in Dover on the 5th. Delaware-Lehigh ARC is now a Special Service Club. Welcome Tri-State ARC, support group of the Delaware County 147.195/R, to the family of Affiliated Clubs. Fire the cannon, pop the cork, and dance on the tub! Murgas took the club trophy and Dauteriville DXers took the small club gavel in the '88 PA QSO Party. Reading and DLARC were hot contenders, too, while several other EPA clubs also have reason to celebrate. Special congrats to TC W3FAF on his QRP win. SEC KB3YS has announced recipients of the first ARES leadership awards. The DEC award for 1988 activities goes to N3ECL for service above & beyond in the Gettysburg extravaganza. The EC award goes to Chester County's WB3AAC for his many years of highly professional work through emergencies real and simulated. Congratulations to Ron Rich, and all our other ARES leaders. Official Bulletin Stations transmit news to the Amateur community. Our current OBS roster includes: WA3VJ, WA3ENE, W3PVE, W3TI, W3CL, WA3KFT, KC3BP, KC3M, K3EBZ, W3VA, KU3V, W3SMF, K3JLU, KC3B, KC3LM, KB3UD, WA3PZO, KD3SM, and WA3TSV. If your club's on-air bulletin station is an ARRL member, he or she can become an OBS by applying to the Section Manager or Bulletin Manager KB3UD. Happy 40th year to Phil-Mont Mobile RC and 25th to Westminster ARC. I enjoyed visiting the Mobile Sivers and the Lebanon Valley club meetings earlier this year. I'm looking forward to visiting Lehigh Valley this month; their 89 officers are: N3FDU, K3ZQF, N3FTD, K3PQW, and W3NXC. Susquehanna Valley's officers are: WA3JVP, NR3U, WB3AMO and KD3KR. NTS traffic on packet in EPA is routed to the PBBS closest to its destination for delivery or transfer to a local net. Messages for areas having no PBBS nearby go to a board elsewhere, monitored by ops who take the traffic and list it on an EPA Section phone or CW net. Please avoid taking NTS packet messages that are already in the Section and listing them back up on a Region Net. If you can't move the message within EPA, please leave it on the PBBS for someone else. Traffic (December): N3AZW 1221, W3JKH 458, N3DPM 429, KC3LM 180, W3KAG 159, N3CQY 147, W4UQ 133, KA3DL 124, N3CD 118, A33B 112, KD3AO 109, W3DP 94, KU3R 57, N3EFP 60, WB3KPE 49, W3KOD 47, K3TX 39, KA3RGF 36, K3WPI 33, WA3QAO 30, W3VA 24, KC3TD 20, W3GJC 17, W3BNR 15, WA3CKA 15, W3ADE 14, W3CL 12, K3NB 7, W3BAFL 4, W3HK 3. NETS (GN1Q/GCT): EPA 560/271, EPAEPTN 626/372, D6ARES 93/25, MARCTN 168/91, MARCARES 48/15, SC3EN 61/4, D8ARES 5/2, SEPATN 6/31. @PBBS: @K3R1L 563, @AG3F 408, @KB3UD 394, @WA3TSV 322, @WB3JOE 256, @WB3AFL 2, @K3R1L first EPA PBBS to make BPL.

MARYLAND-DC: SM, Philip E. Battey, W3FZV—Remember, nominations for the new SM must be made by March 10. NOMINATE—It's your right and privilege! Al, K3JE, is still pushing packet as a means of traffic handling. He sez that what we need are connections to local packet bulletin boards in order to upload and download NTS tlc. Packet goes where there's no other outlet. PVRC is big on packet, especially during contests. PVRC did well in the CQWW SSB contest. W3IWI continues packet traffic handling with another BPL award for Nov. Auto-Call magazine, organ of the Foundation for Amateur Radio, lists each month upcoming license exams and training classes. Note that the Atlantic Division Convention will be held in Rochester on May 20-21. Hams in the DC area provided ATV coverage of the Marine Corps Marathon on Nov. 6 using a repeater atop the Wash. monument. The efforts of radio amateurs involved with SKYWARR were recently recognized by the NWS Forecast Office. The Montgomery County Rec. Assn. offers ham radio classes, beginner's thru extra class. Call 301-217-6880. At the recent 1988 CARA banquet, Al, N3DUE, won the RACES "Man of the Year" award. CARA will provide support for the 1989 Columbia Triathlon on Sunday 21 May. As KC3Y suggests, the ARRL Net Directory is an FSB publication, available from ARRL for \$1, plus a large SASE, 85 cents. The Prince Georges Wireless Assn. provides comm. for cross-country school runners. KA3QYH, WJ2S, NR3Q, and KB4TEH are FB graduates of old MSN and checkers-in to NDD. The SMARC and the CBRA repeaters are back in biz. NF3X monitors LF radio on 185 kHz, in addition to his ARES/RACES work. KW3X and YXL took a trip "down under." Contact the St. Mary's County Area for recent and good data about "Dark Suckers." K3KL, Lester, has worked over 3500 counties on CW. Renee, KC3NG, will soon be leaving the area. Geoff, N1FJW/3, is a new ORS. In July,

17 meters becomes available! WITH THE NETS: NET/MGR QND/QTC/QNI: MSN/KC3Y 31/55/389, PON/WB3BFK 27/37/301, MDD/W3FA 62/350/516 (MDD TOP BRASS, WA3YLO/88, K3GHH/77, W3QQ/71, N3EGF/71, KC3Y/63) MEPN/K3R3K 30/249/764, HOCARES/WA1QAA 2/0/6, MAVEN/W3YVQ 1/0/2. Traffic: W3IWI 596 (BPL), NC3V 403, KN1K 316, WA3YLO 298, K3R3K 292, K3GHH 282, N3EGF 268, NB3P 252, KC3Y 178, K3F 107, KA3T 103, W3YVQ 95, KA3DXX 89, W3FA 86, W3LDD 76, K3NNI 74, K3JE 62, K1BGT 47, NC3Z 47, KD3JK 44, KD3ID 40, N1FJW 39, KX3J 36, WB3BFK 35, K2EB 25, W3DQI 20, W3FZV 17, WA1QAA 12, WA3GYW 10, WA3SCW 6, W3NZW 4, KC3DW 2, WA3WDT 1. PSHR: WA3YLO 119, W3YVQ 105, N3EGF 96, W3FA 83, K3R3K 73, KC3Y 73, K3GHH 66, NC3V 85.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HB—SEC: K2QJL. STM: WB2UJB. ACC: K2IXE. TC: N2QBT. PIO: K2ZRAF. SGL: Vacant. BM: WB2UJB. OOC: WA2HB. ATCs: K2JF, KA2RJA, and W2MNF. VE testing in Belmar on Mar. 16. See January, 1989, QST column for details. Congratulations are in order to our STMBM, WB2UJB on working all states using a W200 call sign during the "We the People" celebration. I'd like to recognize our section's Official Observers, K2RCG and W2MAS. OOs perform a sometimes thankless, but very useful service to the Amateur Service by listening for violations of Part 97 Rules and letting an amateur know about it in a constructive, but friendly, way before the FCC hears it. The notices that are sent actually carry no official weight, and they are only meant to inform—not criticize. These dedicated people deserve your support. If you are interested in this very useful program, you can contact me at the address listed on page 8 of this QST. Those of you up and about at 9 AM on Saturdays, please check into the SM ARES Net. We meet on the Burlington County Linked Repeater System; either 145.47 (-800 kHz) in Chatsworth, or 147.15 (+600 kHz) in Mount Holly. Until next month, very 73. Traffic: WA2UJB 73, WA2HB 19.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—Big traffic month of December—BPL to N2EIA, W2MTA, WB2OWO and N3JY. PSHR: N2ABA N2EIA N2EYG WA2JX W2FR W2GJ N2IKR K2YJL W2MTA WB2OWO WB2QJX KA2QOO KA2UBD N3JY K2YAI KA2ZKM KA2ZNNZ. Traffic: W2MTA 1220, N3JY 873, WB2OWO 596, N2EIA 531, KA2UBD 492, WA2JX 452, WB2JH 315, W2FR 262, K2YAI 258, KA2ZKM 193, WB2QJX 172, KA2ZNN 127, N2ABA 119, KA2UBD 103, KA2QOO 102, WB2OEV 81, W2UYE 78, KC2JW 70, KG2D 56, N2EYG 48, W2GJ 45, KE2EA 44, KA2TWY 36, N2IKR 12, WA2OEP 4. (Sept.) NA2B 418, (Oct.) NA2B 278. (Nov.) NA2B 357, W2GJ 28, KA2JXI 6, KA2TWY 10.

NET NAME	TIME	FREQ	MANAGER	MODE	QNI/QSP/QND
NYSEMO	0900	3993.5 Sn	N2AGQ	SSB	095/008/04
NYSIM*	1000	3677 Dy	N2EIA	CW	348/255/31
NYSR	0930	3530 Sn	W2MTA	CV	011/003/04
WDMN*	1100	04/64 Dy	WB2OWO	FM	420/246/31
NYP*	1300	3825 Dy	W2MTA	SSB	318/289/31
Pathfind	2100	7.15 Dy	KA2QAN	FM	311/003/31
NYPON*	1700	3913 Dy	KA2UBD	SSB	681/473/31
ORTN	2100	28375 Wd	KB2CRQ	SSB	030/000/04
ESS	1800	3590 Dy	W2WSS	CW	421/071/31
WDMN*	1830	5717 Dy	WB2OWO	FM	477/198/31
NYSPTEN	1800	3925 Dy	KA2Q	SSB	587/098/31
LCARES	1900	7.015 Sn	WA2OEP	FM	030/000/04
OCTENL*	1930	34/84 Dy	WB2HLY	FM	636/116/31
Q Net	1930	31/81 Dy	WB2RXO	FM	377/008/30
STAR*	1830	13/73 Dy	KA2SDB	FM	228/063/31
NYSR*	1900	3677 Dy	KU2N	CW	353/278/31
TIGARDS	2000	18/78 Sn	W2MTA	FM	033/004/03
BLJELINE	2000	9/33 Dy	WA2SEF	FM	185/013/30
VHF THIN	2000	04/64 Tu	WB2OWO	FM	045/001/04
BRVSN	2000	6.655 Dy	WB2OFU	FM	355/007/31
JCRACN	2000	10/70 Tu	NW2O	FM	213/009/28
CNYTN*	2115	9/30-3 Dy	WA2PUU	FM	200/159/31
OCTENL*	2130	28/88 Dy	WB2HLY	FM	271/068/31
WDMN*	2130	04/64 Dy	WB2OWO	FM	428/136/31
NYSL*	2200	3677 Dy	KU2N	CW	383/406/31

*NTS Net. All times are local Eastern Time. November reports: ORTN 24/0/5, JCRACN 191/3/24. SPNS reports: NA2B Sept. 5/413; Oct 1/277; Nov. 2/355; Dec. 3/347. WB2ACV Dec. 1/210. KA2JXI Dec. 2/8; Nov. 0/6. N2EZZG Dec. 48. NA2B Gateways on 145.01, 7.091, 10.149, 14.107, and 28.104 MHz. WB2ACV Gateways on 145.01 and 145.07 MHz. KE2DI beacon at Prattsburg FN12HI on 28.286 MHz at 2200 feet at 5 watts. Apts: (OBS) WA2MYG; (ORS) KA2DBD, N2DNL, KC2HJ, WB2IHL, WA2UJB, KA2QOO, W2UYE, KA2ZNN. Many thanks to KU2N who steps down as NYUS Net Manager after 30 months of top notch performance. CLUB OFFICERS: BARA WE2K WA3WKA K1MEO WF2A; CVARC KB2DVM KA2KJH KC2JO KA2MOO; N. Chautauque ARC WB2SNH W2ELH K2AOD WA0FTY; Ogdensburg ARC N2IMD KA2CEO WA2RXO; Oneonta ARC K2TNN WA2UXE KE2GH KA2HYH; SCDXA K2IKR W2VO NT2D KB2G; Skyline ARC WA2UFQ KE2DR WA2QQO NW2X; STARS N2GAO KA2RFT N2HPR WA2VER W2GH; Utica ARC K2BFR KA2CHX WA2FSU WA2AZA. Welcome to new affiliate Margaretville Amateur Radio Club! Several clubs recognized their Ham-of-the-Year this month. CONGRATS to GRAM's WA2HD; to PPOS great guy W2CRY; and to Skyline's December shindig and recognize Skyline, WA2TOL, WA2UFQ and WA2VAM for their public service efforts in 1987-88. Calendar 1989: New York State Traffic Spring Fling April 15 in Westchester County; Rookies Winter Hoopla Feb. 25; Drumline Feb. Mar. 25; Dayton Apr. 29, Owego May 6, Rochester May 19-20-21, Rome June 4, Cortland June 17; Field Day June 24-25; Batavia July 9; Traffic Picnic at Verona Aug. 12. U2MR QSOs were flying, even SM

talked to Musa. W2PHQ hit the big 86; congrats to Helen and Dryden! Hey look! Now the FCC is delegating printing of Form 610 to the VEC! Clinton Co. ARES gave FB service during 11/25 earthquake, TNX from KB2DVM; esp. WA2DAC and N2HJA. Keep an eye on them posies. They are popping up! Have an FB spring and repair the skyhook damages.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SME—SEC: WA3JFN. STM: N3EMD. BM: KC3ET. TC: N3EFN. OOC: KC3V. ACC: AK3J. SGL: KA3OEM. PIO & ASM: N3DOK.

Net	QNI	QTC	Sess	Hz	T/D	Manager
WPACW	285	184	31	3585	7:00 P/D	WA3JUNX
WPAPTN	515	185	31	3983	6:00 P/D	WA3HLN
KFN	278	153	27	3983	1:00 P/D	KA3OEM
PFN	228	185	31	3958	5:00 P/D	WA3HT
WPA2MTN	268	23	31	28/68	8:00 P/D	KA3BGC
NWPA2MTN	654	69	26	44.63/45.13		

Indiana ARC officers for 1989 are Pres. KD3FN, VP W3MAY, Sec/Treas. W3FVU, Newsletter Ed. W3FVU. Newsletter editors please send me and W3ABC Hugh Turnbull copies. We do read them and can keep abreast of your club's happenings. If your club is planning a hamfest or other large event, please notify our director or myself to get ARRL sanction for the event. Please send any news item for the column. Please understand the column is limited to 40 lines—this includes all necessary items. I will be here for two more years, barring any unforeseen problems. I would like to visit more clubs in the section if I am welcome. My XYL who travels with me most of the time tells her friends how nice they are. She has met very few she cannot like. One other item: my granddaughter is now an Extra (call N3QJ). Now I have someone to help get new equipment. She is attending the University of Pittsburgh and hopes to be a teacher. We hope she can get involved in science. One other event that will be calling for our help is NDMS. This is the National Disaster Medical System that would be called into action if a major disaster occurs and is a major project. More later. QST has this in an earlier issue. Dec. Traffic: N3EMD 684, W3OCH 594, KC3T 520, N3FM 274, WA3JUN 207, N3OM 173, N3AES 157, WA3DBW 137, W3MOG 130, KC3YE 122, KA3OEM 108, W3RUL 73, W3KJUN 51, WA3HJC 38, N3COR 34, KC3GO 32, N3GON 32, KC3HR 27, KA3E6 16, N3ST 18, W3SN 17, KD3AC 16, N3KB 11, W3AAH 6, K3LTV 5.

CENTRAL DIVISION

ILLINOIS: SM, Dave Carlson, AA9D—SEC: W9QBH. STM: K9CNP. OOC: W9TJ. BM: K9EUI. SGL: K9IDQ. PIO: N9EWA. ACC: W9SFT. TC: N9RF. DEC: W9EBQ Illinois Section Nets

NET	FREQ	TIME (LOCAL ILLINOIS)
ISN	3905	1800 DAILY
ILN	3690	1830 & 220 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	1545 M-F; 0830 SUNDAY
NCPN	3915	10:00 MONDAY-SATURDAY
NCPN	7270	1215 MONDAY-SATURDAY

There were several really big traffic totals in this month's list. Thanks to all those who handled traffic in the busy holiday season and especially to those who spent some extra time to be sure it all got delivered in time. It's time to begin thinking about the upcoming severe weather season, especially if you live in the southern part of the state. Ham radio is already a vital part of the severe weather spotting network in many counties. If it's not this way in your area, it's high time for a change! Your area's National Weather Service office can provide training in identifying dangerous storms, and this often becomes the beginning of a mutually beneficial relationship with your NWS office. Contact SEC W9QBH for more information. The idea of a no-code license has come up again. While I'm sure many hams would like the idea to go away permanently, there are others who are convinced that it is an absolute necessity for the future well-being of ham radio. I feel this issue should be considered without the emotion it generates being allowed to interfere. There are some compelling arguments on both sides, and the future of "no-code" should be decided on the logic of the arguments, not the volume. Traffic: KA9FEZ 808, WA9VLG 302, W9HLX 282, K9LWH 243, W9OBU 116, K9CNP 152, W9KR 100, KA9XJ 92, NC9T 87, KA9TWT/60, W9BCIR 57, W9BRFB 55, W9BT50 50, W9HBI 46, W9BJTK 37, W9SLT 34, W9DEBQ 22, WA9AXL 17, K9WMP 12, W9VEYIM 7, KA9JNE 7.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: W9D9A. STM: NX9I. ACC: K9ZBM. TC: WA9JWL. SGL: WA9VCO. BM: W9OCL. PIO: KA9WXT. OOC: KJ9G. Net Managers: ITN KA9EIV, QIN KJ9J, ICN KD9ER, VHF W9PMT, IWN KA9ERC. October Net Reports:

NET	FREQ	TIME DAILY UTC	QNI	QTC	QTR	SES
ITN	3910	1330/2100/2300	3428	805	2713	93
ICN	3856	1430/0300/0300	487	288	1181	60
ICN	3705	2315	123	33	608	29
IWN	3910	1310	1293	33	343	31
IWN VHF BLOOMINGTON			744	211	31	
IWN VHF KOKOMO			781	207	31	
IWN VHF LIGONIER			783	216	31	
HOOSIER VHF NETS (19)			5985	390	5023	157
D9RN for December 474	QTC 62 sss.	IN.	100%	by N9DWU,		
				K9ZLB, K9GBR, W9UEM, NX9I, WA9OCH, K9CGS, N9GRZ,		
				KA9EIV, KD9SU, CAND 1376 CTC in 31 sss.		D9RN 100 by

(continued on page 96)



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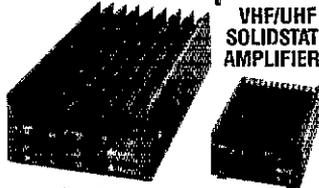
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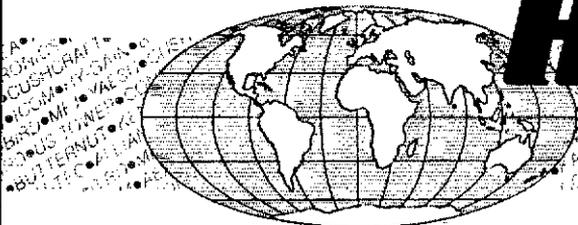
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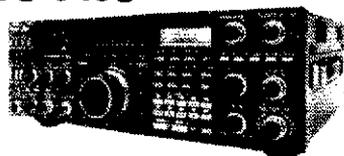
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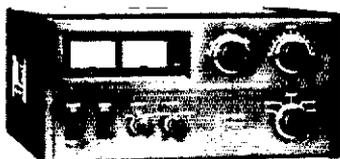
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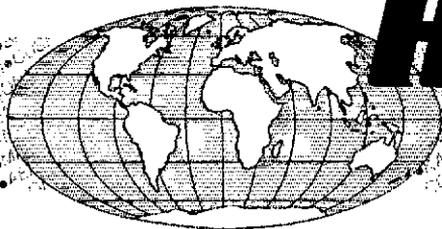
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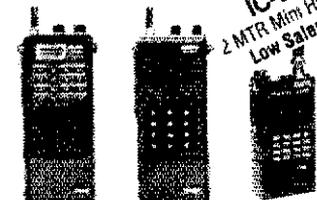
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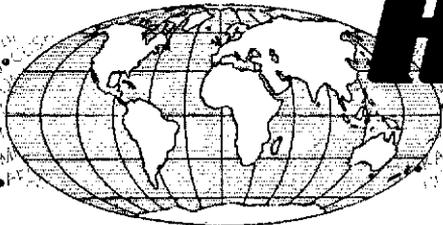
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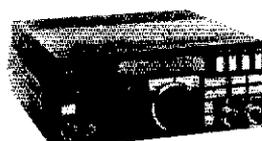


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WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9ZAG. STM: K9EP. ACC: KA9FOZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. TC: K9GDF. The 1989 Wisconsin QSO Party starts at noon on March 19th. Get on the air to meet Wisconsin amateurs. Give the Wisconsin QSO party a try, check QST Contest Corral or ask other amateurs for details. Milwaukee RAC amateur exams March 1st, 7 PM at Wauwatosa East High School at North 74th Street and Milwaukee Avenue, reservations with KE9JJ. March 4th, Fox Cities ARC Hamfest, Appleton East High School, with League booth and guest speakers forum including K9GDF. Fox Cities ARC now has 135 members and growing. Dunn County ARC walk-in exams at Credit Union Office Building March 18th. Info from KD9TT in Menomonie. March 19th Tri-County ARC Hamfest Jefferson County Fairgrounds on Highway 18 west of Jefferson. N9BDL was a Net Control Station (on WNA nets) 438 times and checked into 1,867 net sessions during last year. KC9CJ, busy with Apple IIE computer, has achieved 300,000 point score on Snake Byte game program. Traffic: WB9YPU 2280, KC9CJ 876, W9YCV 371, W9LKN 367, WA9WYS 232, W9CXY 230, K9GDF 180, N9BDL 169, W9UCL 159, N9BCX 127, KA9RII 125, KA9BHL 115, K9UTQ 107, KA9KLZ 101, AG9G 88, K9EP 85, KA9KG 78, WB9ICH 73, NZ9Z 61, W9NGP 61, K9JPS 46, KA9VIA 40, K9FHI 38, NS9Q 37, N9BYS 34, K9GB 31, W9ODV 30, K9EAX 19, W9PVD 16.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, K00T—Now that we all have had our share of "Mid-Winter Madness," (Feb 25th), we can all settle back in anticipation of spring and the return of the Snowbirds. December traffic total was a whopper with Ray, KA9ARP MN SEC, stealing the show with a traffic total of 6,557 traffic points having originated 3008 pieces of traffic, most of which resulted from the special Courage Handi-Hams Holiday Greetings program. Overall, with 24 stations reporting, we did reach 10,775 traffic points which exceeds that of a year ago. Congratulations and thanks to the entire Minnesota Section for the great work. Congratulations too, to Ken Spittler, N&P, of Winona as the Minnesota Section Amateur of the Month for December. This ties in with Ken having completed 20 years of being a regular NCS on MSN/1 (CW) Net. That's setting a real example for all of us. Thanks Ken, and keep up the great work! I was sorry to learn that long-time St. Paul Club member Art Holmberg, WB9WC, became a Silent Key December 8th at the age of 74. Among other positions, Art served many years as the club's Technical Coordinator. We also wish to thank Bob, WB9SYO and Lee, K9HIPY, who maintain both of the repeaters that link Forest Lake, the Twin Cities and the Mille Lacs lake area. These amateurs installed and maintain the 81 and 71 link, and at their own expense. Thanks to these devoted Amateurs for their service to Amateur Radio. Lou, K9QGI, also reports that ice fishing is well under way and that Wahkon Bay is minus one 2 1/2 lb Northern! Thanks Gang, and see you next time. 73 es GL. Jim Swisher, KA9EPY, STM.

NET	FREQ	TIME	ON/OT/C/SESS.	NET MGR
MSN/1	3685	8:30P	358/109/31	NR9S
MSN/2	3685	10:00P	337/92/31	KD9RH
MSP/NIN	3680	12:05P	458/275/31	WB9WVJ
MSP/NE	3680	5:30P	919/31/1/31	K00T
MSSN	3710	8:00P	433/48/31	KA9SBY
MAWN	3625	6:00P	310/194/22	KD9CI
PAW	3625	9:00A	2179/192/123	WB9BAC

* Additionally MSSN handled 75 training messages. Traffic: KA9ARP 6557, WB9WVJ 1267, WA9TF 475, KA9EY 470, WB9RW 389, KT9I 355, NR9FO 176, KA9SBY 128, WD9GUF 123, NR9S 96, KD9RH 87, K9QBE 79, N9BYE 75, KD9CI 71, K9QGI 60, W9CWS 54, KA9PDM 52, N9HWD 51, K00T 48, W9WVJ 43, N&P 42, W9DM 33, K9CSE 31, W9KYG 31. Total traffic: 10,775.

NORTH DAKOTA: SM, Bill Kurtz, WC9M—The Fargo Club is looking for a big turnout for their hamfest on Mar. 18 at the Days Inn in Moorhead, MN. Testing, flea market, and meetings: all the activities we have learned to expect at a hamfest. Also, the Fargo Moorhead Group is starting work on a club station project at Bonanzville. Paul, WA9QBN, received his new call, WQ9M. We have already received word from KD9YX Paul and I should not try to check into the net after one another. Looking forward to the Peace Garden Hamfest next July 7-9. Lots of fun camping in the new campground. Xmitter hunts, dance, children's and women's activities. For more info, contact WD9DAJ or VE4XN. Just got done digging

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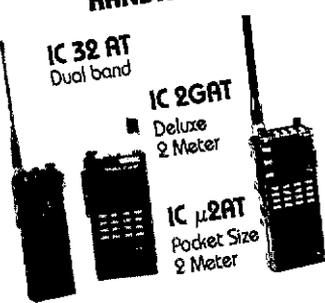
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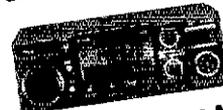
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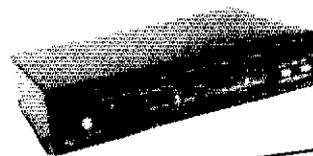
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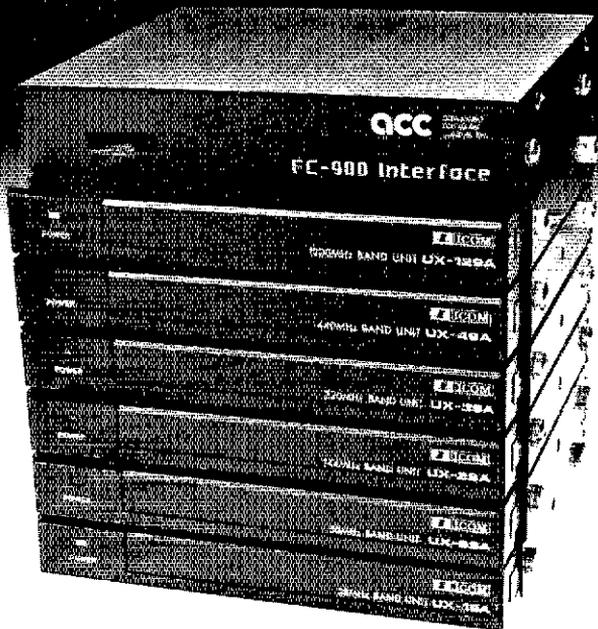
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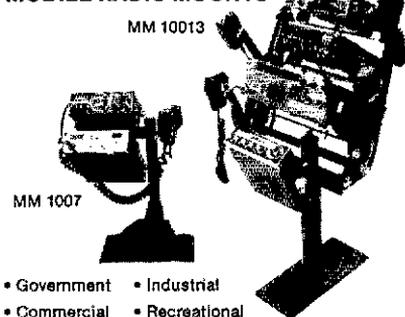
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out of a blizzard. Had about 15 inches or more of snow through the state with up to 25 in the Red River Valley. Congratulations to the Williams Family WD0ATI, WD0EUV & N0IKB for earning the Spotter of the Year Award for the Weather Service. Traffic: KA0FSM 148.

NET	FREQ	TIME	SESSION/QTC	MGR
GOOSE RIVER	1900 kHz	9 am su	4/15/70	WGDO
DATA	3885 kHz	6:30 da	3/1740/128	WGFE
WX NETS	3885 kHz	9 am; 12:30 pm	44/844/59	WGFE
		6 pm		

STORM NET 3885 kHz DURING STORMS ONLY WCOM
SOUTH DAKOTA: SM, R.L. Cory, W0YMB—Asst. SM: N0ABE, W0WFPY. SEC: K0KPY. STM: K0BYL. W1AW's first ever Satellite Mode L QSO was with Stan Burghardt, W0IT, Watertown, SD. The OSCAR 13 QSO occurred on Oct. 19. Our congratulations to Stan. On April 29, 1989, Hub City Amateur Radio Club will furnish communications for a disaster drill at the Aberdeen Airport. The drill will consist of a simulated crash of a large commercial passenger airplane. The club also planned to have their annual two-meter link to Santa Claus from children in the hospital. Starting Feb 1, ARRL outgoing Bureau QSL cards will be \$2 per pound, or \$1 for groups of 10 cards. Novice net meets at 8 PM MST or 7 PM CST every Sunday on 3725 kHz and the S. Dak. CW Net is Mon thru Friday at 6 MST, 7 CST on 3650.

DELTA DIVISION

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5DPG. SGL: K0SSL. TC: W5RWF. OOC: K5SQK. Packet: N5SS. The new officers for 1989 of the Amateur Radio club of Shreveport (ARCOS) are: Pres: John, KB5LE. VP: Clarence, W5MLK. Sec: Michael, W5ZWC. Treas: Dwight, W5WE. Now is the time to check your hidden stash of "Greenbacks," make a list of equipment you can't do without and drag out all that swap equipment you bought last year but haven't used because the Lafayette Hamfest on March 11 & 12 is just around the corner. Same location in the Lafayette Holiday and from past experience those Cajun folks know how to do it right. We certainly have to be grateful to some of our active hams, our state legislators and the officials of our motor vehicle division for providing vehicle call-letter plates at a very reasonable cost. This happened several years ago because our officials were aware of the public service and emergency communications that the amateurs have provided. Regrettably, the word "HAM" was selected for the top of the plate rather than some more descriptive and widely understood title of "Radio Operator," "Radio Station" or "Amateur Radio," as seen on the license plates of many other states. The problem is that many people don't know what "HAM" means or believe it's the name of a Parish (County) in Louisiana. Hopefully, there will be one more opportunity for the same active hams to negotiate a change and gain better recognition for the amateurs. 73 & GL de "Wondy"—K5KR.

MISSISSIPPI: SM, Jim Davis, K5Z—ASM: W5TRD. SEC: KA4PKA. SGL: KA5VRX. PIO: W5NSM. STM: KB5W. BM: W5EPW. TC: KF5DE. OOC: K5K5. ACC: N5CY. Mtn tnx to KB5AEZ, N5L0K, W5EPW, Webster and Oktibbeha Co Sheriff's Office, for assistance in transporting heart attack victim to hospital in Starksville on 7 Dec 88. The life of W. L. Bowie was saved due to the response and actions of the above. "Well done" to all. Gulf Coast Sideband Net (W5JHS) Sess 31, QNI 1332, QTC 17. DRN5 (W5YDD) Sessions 62, QTC. 1361. Miss rep 100% by KB5W, N5SM, W5HKW, KC5OB, N5HBB and W57CQQ. NE MISS WX NET (N5MD) Sess 5, QNI 156.

TENNESSEE: SM, Harry Simpson, W4M1—Eastern Assistant SM and PIO: W4TYU. Western Assistant SM and ACC: K4CXY. STM: NG4J. SEC: K4UVH. OOC: K4LSP. TC: W4HHK. The TN Phone Net is on 3980 kHz with early sessions at 6:40 AM Eastern, regular sessions at 7:45 AM Eastern Monday thru Friday, at 9:00 AM Eastern on Saturdays, Sundays and holidays. Evening sessions are Monday thru Saturday at 7:30 PM Eastern. W4FPF is longtime manager of the morning net, and W44HKU has the evening session. CW Net Sessions are 3635 kHz at 8 PM Eastern, Monday thru Friday, and I am acting as manager until someone else volunteers. Join us when you can. As this is being written, many new sets of club officials are getting their programs in order for 1989. In Memphis, MAF's Jim Larson, WB4KQQ, is planning an upgraded and enlarged Hamfest; in Chattanooga, Charlie Ann Curle, W4G4G, and her staff are making similar plans. Very frankly, I am looking forward to the hamfest season, and I hope that I will be able to attend even more this year! One thing that I must do this year is enlarge our base of ARRL appointees. For some reason, people just don't seem to want to volunteer for these positions. I am going to ask my own staff to make a special effort to sign up more members for OBS, OO, EC, and all the other ARRL appointments that mean so much to our organization. Remember, you only get out of an organization just what you put into it. The state officials are listed at the beginning of this column, but if you don't know whom to contact, let me hear from you. Hearty congratulations to our traffic nets for doing such an outstanding job handling the holiday traffic. There are some cities not covered, but generally, traffic was handled well, and without delay. Of course, there was one young lady who sent an ARL SIXTY ONE message to everyone in Memphis—I plan to ask her to use Christmas cards next year! Traffic: W4DDK 161, W44MFR 138, W4TYV 114, KA5KDB 107, WD4GYT 84, W4M1 62, WA4GZ 55, WB4LAL 39, WA4HKU 36, KE4LS 30, W4FPF 26, WD4EKA 26, K4CXY 24, W4EWR 5.

GREAT LAKES DIVISION

KENTUCKY: SM, John Themas, W4M4T—Asst. SM: KC4WN. SEC: WB4NH0. STM: KA4MTY. PIO: WA4SWF. (December) 1988 was a very Good Year For The Section. We now have more OO, Dec. EC, NM, AND ORS appointments than in a long time. I am going to replace the KEN with a club letter to all affiliated clubs so as to reduce costs while still reaching as many amateurs in the section as possible. I have been elected unopposed, for another two-year term as your SM. I will do the best job I can for you, but I need your input to make it work.

NET	QNI	QTC	SESS	MGR
MKFN	1538	287	31	W4RWU
KTN	960	118	31	W4RWU
KYN(both)	328	180	62	K4AVX/K2B0
TS1MM	496	49	31	K2AC
KNTN	213	75	40	W4EBN

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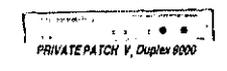
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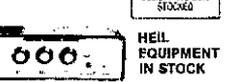
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Traffic: (Dec.) K4VHF 207, K14QH 141, N4PET 123, WD4RWU
 118, KC4WN 67, KB4JUA 50, WA4EBN 44, KA4MTX 40,
 K4AVX 35, K4MHL 35, WB4AUN 31, N4PEK 16, K4HOE 18,
 WA4NOG 15, WA4HLW 12, WD4CQF 3, PSHR: K14QH 75,
 KA4MTX 64, KC4WN 82.

MICHIGAN: SM, George E. Race, WB8BGY (@N8FTY)—
 ASM: WA1LRL (@WA1LRL), STM: WD8KQC (@NT8R), SEC:
 N8AYQ (@TVC), SGL: N8CNY, TC: WBVZ, OOC: WA2AJQ,
 ACC: N8JVA, FIO: N8KBA (ex KA8ZOV), BM: WB8W, Silent
 Key, with deep regret, Bill, KC8OF. Recognition for outstanding
 Public Service this month goes to Gilbert Elliott, KA8PTB,
 and Susan Peterson, KB8DSR. Gill encountered a motorist
 driving in an erratic manner on M-57. His call for assistance
 was answered by Susan. Gill followed the car while Susan
 contacted the Montcalm County Sheriff's Office. Greenville
 Police were notified as Gill continued to follow and report the
 position of the vehicle. Gill watched as the vehicle ran over
 a boy on a bicycle, and continued on through town. Gill gave
 assistance and directed traffic until the ambulance arrived.
 Meanwhile, the erratic driver continued through town, strik-
 ing several other cars, and injuring seven other people be-
 fore being stopped by the police. The driver, an 85-year old
 man, was charged with negligent homicide in the death of the
 boy, and leaving the scene of a personal injury accident. I am
 sure that the efforts of these two "Hams" prevented further
 death and injury and commend them for taking immediate ac-
 tion. 1989 Tuscola County Area Officers are: PRES-NBDPS,
 VP-KA8NKD, SEC/TRES-N8CFF, EDITOR-K8DU. Their net is
 each Monday at 8:30 PM on the 146.22-.82 Caro repeater.
 Don Boulanger, WA1EA, has accepted a new position in
 Pennsylvania. In the 5 years that Don was here, he has been
 involved in almost every MARR and CMARR activity. Don has
 served as Midland Co. EC, Asst. DEC for District 3, and was
 a member of the Local Emergency Planning Committee. Don
 has contributed greatly to Public Service and will be missed
 dearly. Good luck Don in your new job. PA ARES will certainly
 profit from all of your MI involvement. Happy Birthday to
 The Stu Rockett/after ARS of Plymouth, celebrating 28 years
 of Amateur Radio fellowship. Their Net meets each Wednes-
 day at 8:00PM on the "Stu Rock" 224.94 repeater, and the
 147.14 NBDJP 2 meter link. Andy, N8JVA, our ACC, reports
 the formation of a new Club in the Berkley area. More details
 as they become available. The Michigan Novice Net (MNN),
 is in full swing and the monthly totals are growing. My thanks
 to Ed, KA8QVH, for getting the MNN off and running in 1988.
 Congratulations to Dean, KA8BBY, named the new MNN
 Manager by our STM Skip, WD8KQC. Please support this MI
 NTS "Training Net." A great place to hone up on your traffic
 handling skills. Please support the following MI area Nets:

NET	FREQ	TIME/DAY	QNI	QSP	SESS	MGR
UPN*	3921	5:00PM Dy	1287	240	28	WA8DHB
MACS*	3953	11:00AM-M-Sa	353	82	31	K8OCP
MITN	3953	7:00PM Dy	637	370	31	WB8EB
QMN*	3963	6:00PM Dy	829	273	93	W8BIE
MNN*	3722	3:30PM Dy	78	6	69	KA8BBY
SEM7N	145.33	10:15PM Dy	357	240	29	N8HSC
GLETN	3932	9:00PM Dy	1292	65	31	KA8EJZ
WSSBN	3935	7:00PM Dy	649	34	31	WBNDI
VHF Net Activity			450	11	29	NO8Q

*QMN Fast-6:30PM Dy; QMN Late-10PM Dy.; MNN
 Late-8:00PM Dy.; MACS-1PM Sun.; UPN-12PM Sun. Traffic
 for December: WD8KQC 537, KA8CPS 531, WA8OOH/BBS
 228, NW8M 223, KA8BBY 210, WB8SYA 200, WB8YDZ 173,
 WA8DHB 146, N8IC 121, N8FPN 119, N8HSS 115, N8JS 93,
 WB8NQ 93, KB8DHB 89, KB8GXV 84, K3UWO 75, WB8YFG
 73, N8CNY 72, N8VW 71, WB8W 63, WB8R 56, WD8EIB 52,
 K8UPE 49, K8HAP 42, WB8E 40, WB8YU 40, K8EEO 40,
 N8HHH 36, WB8BGY 35, WB8EZ 35, N8JAT/BBS 34, KD8LZ
 29, K8OCP 26, N8IOS 24, NX8S 18, K1BQ 17, WN8H 16,
 N8XS 16, WB8CO 13, N8VIZ 11, KA8BYK 11, WB8YZ 7,
 WB8UW 4, KA8LAR 4, N8FIZ 3.

OHIO: SM, John Haungs, WA8STX Section: (513)
 363-7373—ASM: David Kersten, N8AUH, SEC: WD8MPV,
 STM: KF8J, ACC: KJ3O, BM: W8ZM, TC: K88MU, OOC:
 WB8ZCE, SGL: N8VCV, PIO: K8QOE.

NET	QNI	QTC	SESS	TIME(LOCAL)	FREQ	MGR
BNE(E)	282	163	30	1845	3.577	WD8C
BN(L)	189	168	31	2200	3.577	K8TVG
BNR	255	102	31	1800	3.805	WB8EK
BSSN	252	95	30	1900	3.873	K8OZ
OSN	294	97	31	1810	3.708	WD8KBW
OSSBN	2068	1431	83	1030 1815 1830	3.9725	KA8CGF
OSSN	188	139	31	0645 M-F	3.577	K8DHB
OSSN	—	—	—	0800 S-SN	3.708	K8DHB
O8MN	13	11	4	2100 WED	50.16	WD8CTX
OHIO SECTION AREA NET	1700	SUN	3.875	WD8MPV		

The OHIO SECTION IS ROLLING! The Station traffic count
 for December was 11971 compared with November's 7109
 (almost a 41% increase). The Holiday traffic from shopping
 center malls added a bulk of this increase. It was good public
 relations. The Cinti Enquirer published Radiogram message
 blanks for readers to send in if they wanted a Holiday mes-
 sage sent. Our new PIO, K8QOE had something to do with
 that service to the greater Cinti. area. Butler County ARES
 was called out to assist in a reported airplane down in the
 vicinity of Hueston Woods State Park. WD8PRH, the new EC,
 called for Amateur help and approx 30 hams were active in
 the search late into the evening. The search continued the
 following day by civil authorities, but nothing was found. Our
 SEC, Larry Solak, WD8MPV, reports that the Section ARES
 membership is 3362 and a total of 27 active local nets with
 a total of 176 net sessions, drills or tests. Larry says there
 seems to be a trend on the part of the leadership officials to
 want a higher level of preparedness. This is not however the
 feeling at the lower level where the feeling seems to be more
 apathetic. We are looking for ways to develop more interest
 across the board. All areas of emergency preparedness need
 improvement, both ARES and traffic. Some ideas are being
 worked on that will be shared with all. Dayton amateurs, Ray,
 KA8KTA, and Dave, K4WXJ, were instrumental in having a
 truck with a large boom on it stopped after it had caught in
 the trolley wires causing them to break and fall on cars at an
 intersection. The Sheriff's Dept. complimented the Dayton
 Amateur community for the quick response which was a
 primary factor in apprehending the vehicle so quickly. Con-
 gratulations to all the new officers of North Coast Amateur
 Radio Club, The Pres: Hank, WB8RNI; VP: Steve, NO8MI;
 Treas: Ray, WD8MHL; Sec: Chuck, K8RSH and the Trustees:
 NBILL, K4IMU, WB8UDA, NBIAA, KB8CCS and WB8ZZG.
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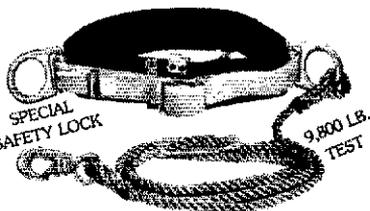
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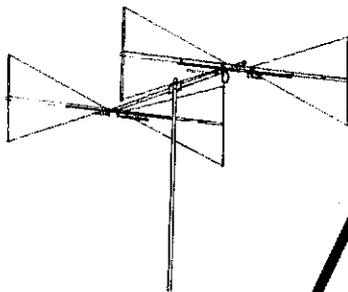


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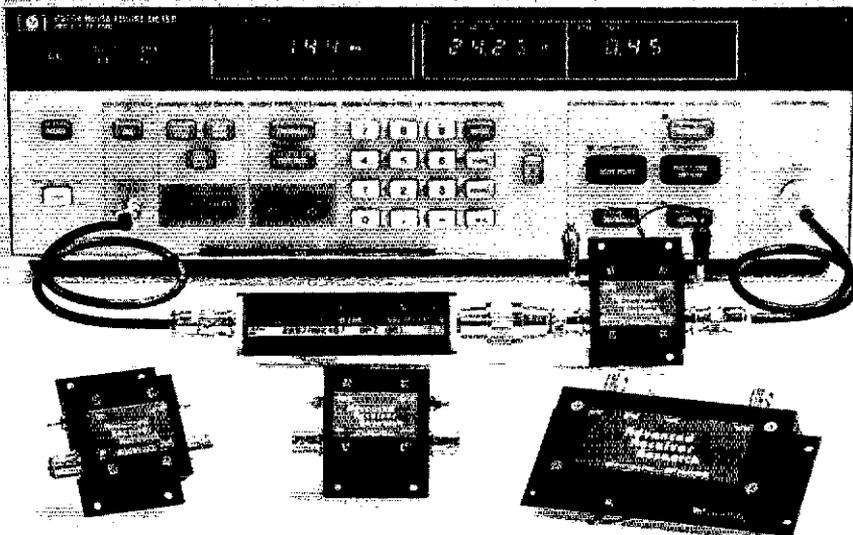
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Radio scene in 1980, its use has grown extremely rapidly and operating procedures and usage have changed so quickly that last year's valid information no longer applies. The bulk of packet operation is conducted on the VHF and UHF bands. The HF packet operation is moving a little slower, but is increasing. There will be packet forums at Dayton. We will see you at the Dayton HAMVENTION on April 28-30. The Ohio Section stations listed below handled the Holiday Season traffic with great spirit during the month of December 1988. KDBKU 696, WA8ERQ 624, WBZOL 615, KBJOI 614, W8PMJ 560, K8TVG 525, N8FWA 501, W8BO 499, KC8TW/BBS 464, W8BKF 304, WA8SSI 265, K8DHB 258, W8QZK 244, K8BYV 236, K8DHD 222, K8ALV 214, N8EX 198, KF8J 192, N8AUG 192, N8XX 185, K8BYT 172, K8ACGF 172, K8IOW 157, W8JUG 153, K8ARX 150, WA8HD 146, W8DRIB 141, W8DIK 140, W8JLW 140, K8ASO 135, W8BVV 128, W8ASTX 123, N8GEC 111, K8CMT 111, W8OXT 102, K8HBN 101, W8EK 96, W8SKP 88, W8KBW 84, N8CEI 77, K8BCV 73, W8ZOL 68, N8GPU 64, W8BHZ 61, N8CW 61, W8BHG 56, K8BYU 59, N8GOB 57, N8CQ 56, K8BNO 56, W8JAW 55, N8NIP 53, W8EYK 49, K8RC 48, W8BWC 46, N8JYV 42, K8ES 42, N8IDA 41, W8LOU 41, N8NS 37, W8DHL 35, K8CKY 35, K8SOM 35, K8LQM 34, N8BC 31, W8JYE 31, K8BABO 30, N8EFB 30, K8BRR 28, N8IIP 26, N8QE 26, K8BDEB 25, W8BGM 23, K8WZ 22, K8BJ 22, N8JDH 22, N8PPH 20, K8EMD 19, K8SZO 19, W8ZM 18, K8EUX 15, K8FSR 15, K8DLX 15, N8HRW 14, W8FTA 14, K8OQF 13, N8HJB 12, N8AJU 12, W8DCT 11, N8KAF 9, K8YLY 9, N8CJS 9, W8GQD 8, W8DPW 8, W8DNE 8, W8BKW 7, K8DXZ 7, N8GIO 6, K8BDC 6, K8VYT 6, K8BH 6, K8ES 5, K8DHC 5, W8BIBS 5, N8HBF 3, W8OFR 3, N8WC 2, W8RG 2, N8JLP 1, W8XT 1, N8JAF 0. (Nov.) N8IIP 89, W8OXT 59, N8WE 37, K8BTF 21, W8ZM 7, K8DHC 5.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM: K2ZM, STM: WB2EAG, SEC: WA2ZYM, BM: WB2IXR, PIO: KB2TM, OOC: N2DVQ, ATC: WA2VGM, SGL: KB2HQ, ACC: KV2A, ASM & NWSLTR ED: WB2NHC ASM/PACKET: N2FTR. Net Reports for December (ON/QSP): AESN 53/5 CDN 660/95 ESS 421/71 NYPON 681/483 NYS/E 353/278 NYS/L 393/406 NYS/M 349/255 SDN 315/128. CLUB NEWS: Albany ARA had a demonstration on packet on Jan. 13th. Cat-skill ARA had their Christmas party on Jan. 21. They congratulate KB2EMQ and KB2FEP on upgrading. KB2DYB/WA2ZNO won the fox hunt. Mt. Beacon ARC welcomes new members KA2PKM KB2FTZ N2IGV N2HDW WB2COY KB2FIM WJ2B KB2GEP/GEO KB2ECB/ECA/EDD. The Overlook Mtn ARC announce Pres-KD2NE VP-K2UR SEC-WC2CT Treas-WA3AFS Dirs-KY2J KU2Q K2IWW. They report the following assisted with Diabetes walkathon: WA2ZNU WJ2M N2HWV KB2GHW N3EYQ N2GQS WA2KPF W2DZ. They report WM2I as upgrade. PEARL viewed The New World of Amateur Radio and report upgrades KB2FPL KB2GJX WB2MKQ KB2FMA KB2FHL. Rip Van Winkle ARS learned about the Hazardous Materials Response Team in Columbia County. Schenectady ARA heard WA2AAU talk about "Line of Sight and Beyond." They welcome new member N2IUL. Yonkers ARC will hold elections in January. A bad fire on Dec. 10th involving propane tanks in Averil Park resulted in communications assistance under RACES by WA2ZYM KA2VJA KB2CDX WA2OQE KA2AXN WB2JE K2RBR KA2NMP KB2EPR KB2YX WB2JH. WB2EAG, STM, is planning a Spring Fling for April 15th. All those interested, traffic handlers especially, are invited to attend. Details are available from WB2EAG. DEC. PSHR WB2EAG WB2YUK WA2JBP NSMEA VE2G N2HIF K2ZVI WB1BTJ WB2NVR KB2EPU. DEC. Traffic: WB2EAG 384, WB2VUK 262, NSMEA 255, N2HIF 233, K2ZVI 144, K2LY 123, WA2BJO 119, N2FT 113, WA2GYV 106, KB2EPU 57, N2F5J 53, WB2IV 48, WB1BTJ 47, WB2NVR 47, WE2G 23, W2CJO 20, K2HNV 13.

NEW YORK CITY-LONG ISLAND:

SM, Walter M. Wenzel, KA2RGI—ASM: N2GQR, NAL VE: W2NL, ACC/PIO: KA2L CO. SEC: WA2UJ, STM: K2ZM, OOC: NB2T, TC: WA2YNH, BM: W2JUP. The following are traffic nets in and around the section that handle NLI messages during December:

NET	FREQ	TIME	DAY	MGR	SES	CNI	OTC	QSP
BAVHF	145.350/R	2000	DLY	K2YOK	31	413	237	237
NCVHF	148.745/R	1930	M-F	N2IMP		N/A		
SCVHF	145.370/R	2000	S-F	KA2JMA		N/A		
NYPON	3913 khz	1700	DLY	KA2UBD	31	681	524	473
NYS/M	3677 khz	1000	DLY	N2EIA	31	349	278	255
NYS/E	3677 khz	1900	DLY	KU2N	31	363	304	278
NYS/L	3677 khz	2200	DLY	KU2N	31	383	444	406
NLT	28450 khz	2100	WED	N2IMP		N/A		
ESS*	3690 khz	1800	DLY	W2WSS		N/A		
PNS	145.01	24hr	DLY	A2Q-4	N/A			

*Independent Net, recognized by NTS, all times are local. **VOLUNTEER EXAM SESSIONS:** Please remember you are required to bring the following to the test session you plan to attend: Your current original licence document, a copy of the license, the original of any certificate of successful completion and a copy, \$4.75 in cash or check and two forms of positive legal 363 identification in addition to your calculator, pen, and #2 pencil. If you are a physically handicapped person and require a change to the normal testing procedures, please remember to bring down to the session a copy of a physician's certification indicating the nature of the disability so it can be attached to the 610 form. **VE LISTINGS:** LIMARC-second Saturday of each month at 9:30 AM at Salten Hall, NY Institute of Technology, Old Westbury, contact Joe, W2NL 516-541-2450; SUFFOLK COUNTY VE TEAM - second Saturday of each month at 9:30 AM at the Suffolk County Community College, Selden, contact George, WA2VNV 516-751-0894; GRUMMAN ARC-second Weds. of each month, until June, at 5 PM at the Bethpage High School, Bethpage, contact Howard W2QVU 516-354-6861; GREAT SOUTH BAY ARC-fourth Sunday each month at 12 Noon at the Babylon Town Hall Annex, contact Walter KA2RGI 516-957-5726. 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. Thanks to everyone for the well wishes and concern during January when my wife, Carol (KA2VYH), and I, along with the rest of the family came down with very severe cases of bronchitis. I know some of you out there probably enjoyed the time when I couldn't put in my two cents worth on some of the nets for a while there. Looking forward to the warmer weather and making more of the club meetings. It sure has been a long winter and now as we look toward the spring for the rebirth

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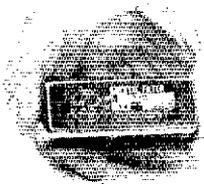
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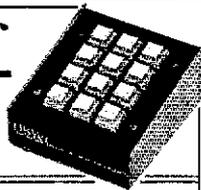
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MA-550MDP*	55'	22'1"	3	620	3" sq.	6"	\$2909.00
MA-770	71'	22'10"	4	645	3" sq.	8"	\$2509.00
MA-770MDP*	71'	22'10"	4	830	3" sq.	8"	\$3969.00
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TX-472	72'	22'8"	4	1040	12 1/2"	21 1/2"	\$2529.00
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TX-489	89'	23'4"	5	1590	12 1/2"	25 1/2"	\$4399.00
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*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-489MDPL comes with heavy-duty motor drive with dual level wind and positive pull down. (Both motor drive models include limit switch brackets).

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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
HDX-572MDPL*	72'	22'8"	4	1600	15"	25 1/2"	\$6049.00
HDX-589MDPL*	89'	23'8"	5	2440	15"	30 1/2"	\$7919.00

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TMM-433HD*	33'	11'4"	4	400	12 1/2"	20 1/2"	\$1319.00
TMM-541SS*	41'	12'	5	430	10"	20 1/2"	\$1429.00

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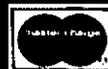
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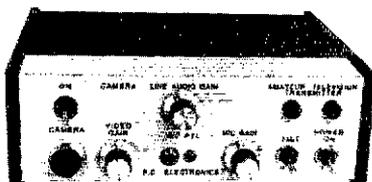


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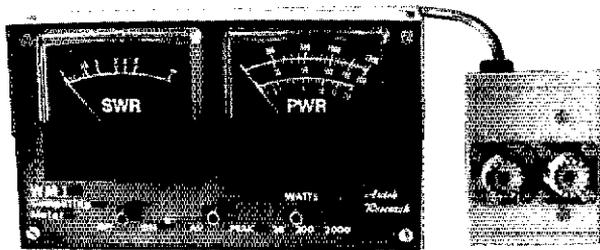
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of the flowers and the trees, let's not neglect our duties toward public service activities. Remember that next month, April 30, 1989 is the March of Dime Walk-a-thon and we need more people locally to assist with this event due to the increased areas of coverage this year. For more information please contact me or your local ARES Emergency Coordinator. Please remember to let me know of your Public Service Events in advance so we can help you plan for them and assist with passing on the information. Traffic: W2G 310, N2AKZ 304, K2YQK 303, N2GFA 234, N2IMP 217, N2BD 113, K2JLD 98, K2VZX 73, N2HLZ 63, N2HSP 56, WA2UJKM 52, KA2UIU 44, WA2YEI 31, K2MT 28, WB2ZIE 28, KA2JMA 15.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG. ASMs: NW2L (NE), N2CXX (SE), N2WMM (NW), WB2NQV (SW), N2XJ ((Cen) and VE), SEC: WB2HBZ, STM: K2VX. OO/AAC: KA2BZS. ACC: K2BJG, SGL: W2KB, TC: K2BLA. BM: WA2JPK and PIO: NW2L. NNJ Ham Radio Info Line 201-880-1595. At the section leadership level, SEC Halph Francavilla, N2BMN, having completed his term has resigned. He is to be commended for his outstanding effort in building the NNJ ARES roster to where it is today with 11 DEC, 63 EC and over 103 OES. It is my pleasure to announce the reassignment of James Dockery from ACC to SEC effective 01/89. Until further notice, I will act as the ACC. Other new appointments effective 01/89 are: OBS K2DLJ. This PBBS OBS is a welcome replacement of the former PBBS WB2GWD serving the Somerset County area. EC Secaucus N2ZT and EC N Brunswick W2CTU. NNJ ASM/PIO Rich Mesosen, NW2L, has been elected President of the Hudson Amateur Radio Council (HARC). Congratulations to the following who were newly licensed or upgraded during December sessions conducted by: Northeast NJ Testing Assoc. (4/4), Bergen ARA (5/2), Raritan Bay ARC (9/5), NNJ VE Board (23/11), Bergen ARA (24/14) and West Morris Wireless Assn (6/3). Novice (6): E. Carpenter, L. Eisen, K. Little, M. Reinheimer, H. Sproanski and J. Palm. Technician (16): KB2GOO, WB2GOV, KB2GOW, L. Rosenthal, O. O'Neil, KB2GUJ, KA2ZVT, K. Kaspar, B. Thorn, KA2QQQ, B. Mendelshon, J. Sung, R. Weiss, J. Barat, J. Bonnell and C. Frick. General (5): N2GRR, KB2GDU, KB2GJT, KB2FUQ and J. Ciccia. Advanced (5): N2JRL, WA2DUX, N3AGV, N2HXP and WA2HVF. Extra (5): K2OQA, WA2RAM, N2IPM, WA2QVI and KA2HZA. Total applicants (68). Total new or upgrade (37), 56%. Traffic nets and statistics for November and December 1988 follow:

NET	MGR	FREQ	TIME	SESS	SES	QSP	QNI
NJ/M	WB2ZJF	3695	1000	Dy	30	162	274
					31	191	299
NJ/PN	W2CC	3950	1800	Dy	34	107	279
					39	132	301
NJ/NE	W2QNL	3695	1900	Dy/P	30	108	232
					31	182	227
NJ/NL	WA2OPY	3695	2200	Dy/P	not available		
					31	60	226
NJ/SN	KA2INE	3735	1830	Dy	30		22143
					30		23165
CB/TN	W2RPX	147.12	2000	Dy	28		83207
					31		97217
NJ/TTN	N2DXP	223.88	2100	Dy	30		35226
					31	110	221
					31		89569

NJ/VNL N2FGG 146.49 2230 Dy/P not available
NJ/JPL W2QNL 145.01 24 hr via WA2SNA-1
Packet NTS activity for December, 1988: Total 314, WA2SNA-1 auto forward (122) plus liaison (192) by N2ZT (69), N2HQQ (12), W2QNL (103) and WA2EXX (8); SAR/PSHR for November 1988 are not available, for December 1988: W2RRX 245/115, K2VX 175/101, KB2BNW 41/62, W2QNL 698/156, W4CYC 15/49, N2XJ 416/108, N2DXP 289/63, KA2INE 113/81, W2QMP 359/75, WB2FTX 118/63, ND2K 10/0, W2XND 10/0, WA2EPI 33/0, and W2CC 25/0. BPL: W2QNL 698, WB2QMP 121 Orig and N2DXP 120 Orig.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, W0EJ—ASM: WB0AVW, SEC: KDBDG, STM: K00XL, ACC: NU0P, OOC: WA0QMU, BM: K0IIR, TC: K0DAS, PIO: W0EJM. The Constitution Bicentennial Celebration in Iowa was extremely successful. K200RW reported 1558 QSOs in all 50 states and 54 countries and AD200C reported 1738 QSOs in all 50 states and 43 countries. Superb effort! Recent Benton County ARC VE Exams resulted in 4 new Technicians and 3 new Advanced licenses. Recent Cedar Valley ARC Novice classes resulted in 8 new Novices. New call heard is W0QE. The Des Moines Radio Amateur Association is sponsoring Newcomers' Phone Net every Thursday evening at 8 PM on 28.350 MHz and the Cedar Valley ARC is sponsoring a slow-speed code practice net each Wednesday at 7 PM on 28.150 MHz. WA0O is the 1988 winner of the Winthrop M. Mager Award. Congratulations, John! N0HTZ is the new president of the Siouxland Amateur Radio Association. The 3900 Club has topped the 990 member mark and is still growing! The HAMBORÉE XI Convention, sponsored by the 3900 Club and Siouxland ARA is planned for May 5 and 6 in Sioux City. The Les DeForest Chapter of QCWA will meet at a noon luncheon on May 6 at HAMBORÉE XI. KN0G has a new QTH and K0DA and WB0T are sporting new rigs. I hope to see you all in the IOWA QSO PARTY on March 11-12! Traffic: KA0ADF 261, W0SS 257, K0GP 171, K0FT 141, WB0MCX 96, W0YLS 92, N0IXW 73, K00XL 54, WB0AVW 51, WB0OKA 32, KA0VA 29, KB0JQ 20.

KANSAS: SM, Robert M. Summers, K0BXF—SEC: N0BLD, STM: W0OYH, ACC: K00XF, TC: K00HEP, BM: K0JDD, SGL: N0BLD, Net Mgrs: CW-WB0ZNY, Voice-W0FFRC, RTTY-open; Slow Speed CW-W0WYM, WX Net-WB0YVZ, PIO: WB0VSG, DECS: W0OAG, W0EB, W0BYJ, W0FFRC, N0KV, WB0MDF & W0ACVY. Too much bad news this month. We have lost W0ZHH, now a Silent Key. W0OYH lost his father-in-law, K0QNO lost her husband, N0DWW lost his mother, W0IMX and W0KKS are in the hospital. What else could go wrong? Our sympathy is out to all who have suffered losses this past month. Winter is here and now is the time to think about spending a little more time in the shack operating. How about each of us thinking a little bit about our operating procedures. Are they top quality? If not, what could you do about cleaning up the nets of unnecessary QRM, the unneeded use of "Q" signals on the phone portions of the bands. We can always use alternate net controls, liaison stations that go to the National Traffic System Nets with all other time-value traffic. How about trying to zero beat the NCS and make his job easier? I am sure there are other infractions of rules and regulations

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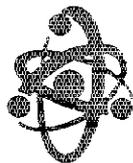
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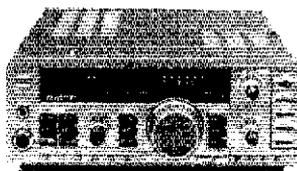
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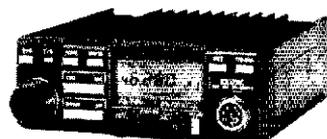


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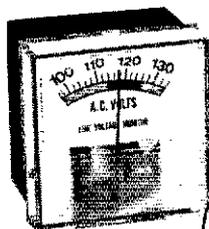
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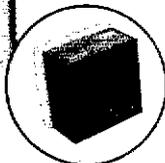
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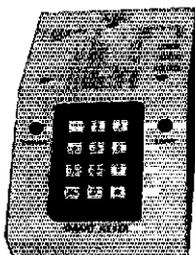
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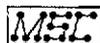
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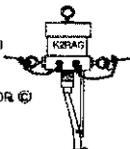
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that are made every day by many in a net including the correct way to check out. Let us all try and make our KANSAS nets a proud one to be a part of this next year of 1989. Net activity for November nets: KSBN QNI 1624, QTC 213. KPN QNI 392, QTC 32. KMWN QNI 761. QTC 573. KWN QNI 1098. QTC 762. CSTN QNI 1994. QTC 69. QKS QNI 376 QTC 73. QKS-SS QNI 38 QTC 12. Many happy returns for the coming year to each and everyone of you. Many thanks for making KANSAS as good as it is. Traffic: WBFHC 319, W0BFH 304, W0FIR 208, KSUJ 167, NZJM 153, KA8RCH 124, K0BYX 100, W0QMT 100, NB02 76, W0FDJ 68, W0BZNY 60, W0MYM 36, W0BYX 34, W0NYG 26, W0BE 22, NB0DD 19, W0RBO 7.

MISSOURI: SM, Ben Smith, K0PCK—The St. Louis Repeater Club at their December banquet honored Carl, W0B0ZP, by naming him "Ham of the Year." Several clubs have reported their 1989 officers, they are: Hannibal ARC: Pres. N0HYJ, VP. W0B9OZ, Sec. K0BDGY, Treas. NS0Z and Trustee K0K6P, Southwest Missouri ARC: Pres. K0DUD, VP W0B0ZCZ, Sec. N0BINJ, Treas. K0AYTL, and Director K0V0RW, St. Charles ARC: Pres. N0HMZ, VP K0DZ, Sec. K0A0UXQ, Treas. N0FQJ, Board Members, W0B0RAB, W0B0YDQ and Trustee K0A0UXQ, Suburban Radio Club: Pres. N0HLI, VP. K0B0ALC, Sec. N0HHU and Treas. K0A0WAS and Missouri Valley ARC: Pres. W0TKKP, VP W0D0CX, Sec. K0GW and Treas. N0HID. I hope these clubs and their new officers will have a very successful 1989. Amateurs in the Kansas City and Southwest Missouri areas participated in tornado watches this fall. On Sept. 28, 18 amateurs assisted the Clay County EOC track a storm front and on Nov. 15, 11 amateurs in Kansas City helped provide communications for the National Weather Service. Also on Nov. 15 amateurs in Barry and Taney Counties supplied communications for local emergency agencies as severe storms passed through those communities. On a very cold and snowy day, 22 members of the St. Charles ARC turned out to provide communications for the St. Louis Marathon. In last month's Missouri Section News, the call of the Experimental Station mentioned was printed as N0CAO/K02XAE. It should have been N0CAO/K02XAE. Sorry about that, Fred.

NET	SEC	QNI	QTC	Day	Time	FREQ	MGR
MON	62	291	181	D	7:45	3.885	A180
MOSSB	31	932	180	D	6	3.983	K0ORF
MEOW	31	762	137	D	5:30	3.963	W0B0LL
HBN	22	332	18	M-FR	12:05	3.680	K0R0Q
EMEN	8	144	21	W	9	146.76	K0PCK
HARC	3	50	18	TH	9	146.94	K00SKY
LOZCB	27	428	9	M-SA	6:30 AM	148.73	N0HVU
PHD	4	241	7	M	8	146.43	W0AKUH
SWMOSW	4	79	6	-	-	-	K0BUD
SLARES	4	240	3	M	8	145.91	K0WEX
ZAEN	4	43	1	-	-	147.24	W0B0LL
JCRC	4	138	0	W	8	147.00	W0R0I
LOZFM	5	69	0	F	9	146.73	N0HVU
ELDON	4	67	0	M	8	146.89	N0HIZ
MEKARES	4	58	0	TH	9	147.25	K0BAGC
CMEN	4	52	0	W	9	146.78	K0PCK
SEDAES	4	26	0	T	9	147.03	W0ENW
CARL	3	24	0	W	8:30	148.46	W0W0LU
HARC	-	-	-	TH	9	146.94	K00SKY
FRABN	-	-	-	D	9	145.29	K0BANP

Traffic: N0FBW 4444, W0BYX 670, A100 288. N0DN 238. W0AHTN 198, W0BTVV 138, K0PCK 82, K0ORF 66, K0B0J, B1, W0CUD 60, W0BCJB 48, K9OCU 26, K6BAH 22, W0AKUH 6.

NEBRASKA: SM, Vern Wirtka, W0B0QM—The Cheyenne County 2 Meter Net New Net Manager is Jim Paxton, W0AKNC, of Sidney, Thanks to Eugene Davis, K0ALUG, Former Cheyenne County 2 Meter Net Manager for his past service. Lancaster County EC, Bruce Colgrove, W0D0MS, of Lincoln, reports that a severe weather spotter training session has been scheduled for March 18, 1989, at the Lincoln Electric System Service in Lincoln. Contact W0D0MS for further details. Nebraska Cornhusker Net meets daily at 1830 UTC on 3.980 MHz. Newly elected officers of the Nebraska Chapter 25 of the OCWA are: President, Lyle Quinn, W0US, of Fairbury; Vice President, Mac, W0AP, of Grand Island; Secretary, Bob W0JQJ, of Bellevue; and Treasurer, Ivan, W0WVE, of Lincoln. 54 members and guests attended the annual OCWA Chapter 25 dinner meeting held in Grand Island. Our Section nets can always use more volunteers for net control stations, both as regular net controls and also as alternates to back up the regular ones when they are not available. Our traffic handling can be improved greatly on our section nets if more stations would pick up traffic, especially from the liaison stations that bring traffic to our section nets from the region nets. Reports are still being received that say liaison stations are being told to just keep checking into our section nets until a station at the destination point of the traffic checks into a net. This is not how it should be done. The traffic should be picked up by the section net and then relayed to its destination by whatever means are necessary. If you have questions about traffic, please contact our STM, Jerry Kohn, W0DEGK, of Lincoln, or your Section Manager. Also, when traffic is taken from a packet BBS, it is important that the messages are killed. Recently, here in Nebraska Section, a message was delivered three times because it was just left in a BBS and it kept getting picked up by different stations. Traffic: K0DKM 341, W0AP 170, W0K83, W0DEWH 45, K0MZV 36, K0EXQ 23, W0B0ED 20, W0B0QM 9, N0GA 7, W0C0 3.

NEW ENGLAND DIVISION
CONNECTICUT: SM, Caesar Rondina, N1DCS—ASM: KB1H. STM: K1EIC. SEC: N4GAA. OOC: N41L. ACC: NK1J. BM: N1EEE. PIO: W01CMF. TC: K01Q. SGL: K1AH. I would like to thank everyone in the traffic organization for their cooperation with many of the meetings we have had. It is in the interest of Amateur Radio and the benefit to all that we keep the traffic moving as smoothly as possible into and out of the state. By now, everyone is deep in planning for this year's Field Day. Glad to see K110N back on packet. WARC is looking for old call books to go to Russia. I was glad to see so many people at the New England Division Cabinet meeting. Congrats to the Menden ARC for renewing their Aff. Club status. Congrats to FARA members K1FYV, NM1P, NM1O, K1BR and N1AMC for their certificates of recognition from FARA's Pres. W1FDY. Congrats to the new slate of NARL officers for 1989. I will be looking forward to working with them. The WHARA is holding its annual cruise of Long Island Sound. Anyone wishing to participate can contact KB1WH for details. The WHARA is also celebrating its 4th year as an ARRL SSC.

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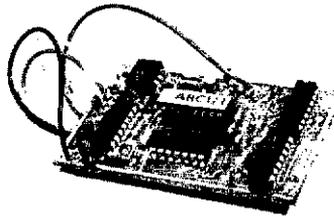
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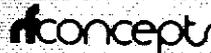
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- RFC 4-310, 30W in = 100 out
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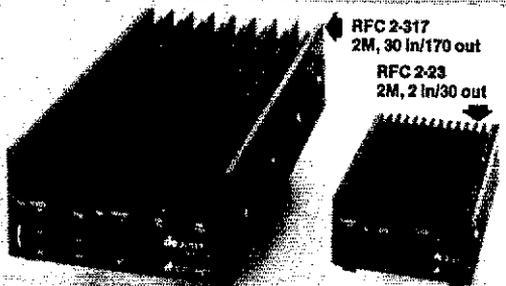
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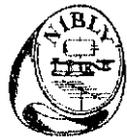


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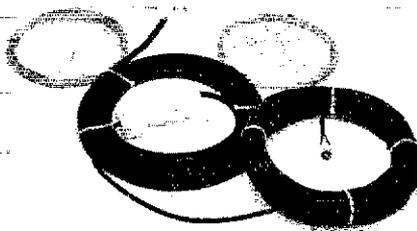
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22nd Central States VHF Society Conference Twenty-six papers cover computer-aided antenna and microwave stripline circuitry, uncertainty in noise figure measurement, receiver front end protection, 903 MHz hardware, UHF beacons, 6 meter EME, 3rd generation 902 MHz transverter, how to measure your own K-index, using hybrid rigs for high power and more. 178 pages. \$12.

7th Computer Networking Conference Some of the papers expected to be submitted for these proceedings cover: a high speed packet interface for the IBM PC, ARES/DATA — a packet database for emergency communications, 9600 baud modem design, Use of AX.25 for meteor scatter and tactical communications, A look at local and wide-area networks, DSP Hardware and more. \$12.

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200 METERS & DOWN by Clinton B. DeSoto. Chronicles the exciting evolution of Amateur Radio from the pioneers who perfected the "wireless art" up through the technical advancements of the mid-1930's. Tells first-hand how the ARRL came about and how the League saved Amateur Radio from certain oblivion during the early years. Copyright 1936 (reprinted in 1981). 184 pages \$4.00.

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We wish you well, and continued success to you and all other clubs in our section, as well as other sections. In closing, I have been asked many times why some club happenings are not mentioned in the section news. REMEMBER, I can only mention what is sent to me. If your group has something you would like to see in this column, mail it to Caesar Rondina, N1DCS, 5 Bailey Dr., West Haven, CT 06516. I will be more than happy to mention it. 73. Net reports: CN: 61 sessions, 261 stations, 332 traffic. WB1GXZ NM; WESCONN: 31 sessions, 404 stations, 146 traffic, KA1GWE NM; RASON Traffic Net: 31 sessions, 215 stations, 92 traffic, WA1FCA NM; CPN: 31 sessions, 404 stations, 186 traffic; KY1F NM; Nutmeg VHF Traffic Net: 31 session, 671 stations, 323 traffic; NM1K NM; Ten Meter Flag Chew Net: 5 sessions, 103 stations, 10 traffic; NM1K NM. Traffic: N1DMV 548, KY1T 534, W1EFW 503, NM1K 440, WB1GXZ 312, KY1F 150, K1E1C 143, N1FNN 142, KA1FVY 119, KA1GWE 115, KA1ROL 100, KA1JAN 100, KB1ZC 85, W1WP 69, N1FCO 60, N1GBP 51, K1HEJ 46, W1YOL 44, KA1KP 40, W1BDN 26, WA1NLD 22, WB1ESJ 12, KA1REQ 9, W1CUH 8, WB2SGI 4, N1API 2. Packet Bulletin Boards: N1API-4 106, N1DCS-4 34.

EASTERN MASSACHUSETTS: SM/SEC, Barry Porter, KB1PA—STM; KW1UJ, PIO; K1HLZ, BM; KB1AF, CO/AA; AG1F, SGL; K3HI, TC; KA1IU, ACC. Open, EMass Ham Info Line/Westlink Report: 617-395-KISS. EMass Hotline: 617-437-0111

Net	Mgr	Freq	Time	Dy	Sec	OTC	QNI
EMRIPN	N1AJJ	3658	1900/2200	Dy	80	185	258
EMRIPN	WA1FCD	3680	1730	Dy	31	184	168
EM2MN	KA1MDM	6323	2000	Dy	31	337	517
NEEPN	K1BZD	3945	0830	Sn	4	9	34
HHTN	NG1A	0464	2230	Dy	31	271	368
EMRSS	N1CVE	3715	1600/2030	Dy	26	19	42
OTN	KB1AF	7450/45	1930	Dy	30	117	355

Thanks to the effort of Al Carp, K1HLZ, The Multi-Line Ham Info Line is up and running, courtesy of WXXS Radio, on the "KISS Cityline." If you haven't tried it, give it a ring with a touchtone phone. After a brief system intro and a time check enter the letters "HAMS" and you will be in the Ham Section. Any suggestions for improvement will be appreciated. There are 6 sections, including the Westlink Report and a Club Calendar. Thanks to Charlie Ross, NC1N, the Ham Radio Computer Users Group has found a place to meet. It will be meeting on the First Tuesday of each month in the auditorium of GTE Labs in Waltham. Hopefully the group will be affiliating with The Boston Computer Society as well as the ARRL. This could be a source for many new ham radio operators. A ham radio section has been established on both the BCS MAC and BCS Apple BBS's. The phone numbers are: MAC 617-625-7531; Apple 617 246-4492. Also the "County Morgue" BBS carries the National Ham Radio Echo-Mail Conference. Its phone is 508-250-8098. If anyone has public-domain or shareware programs that they have written or have copies of that they would be willing to donate copies of, please bring them to one of the meetings, so the group can start a Ham Radio Software Library. Some other interesting happenings this past month-Ham Radio got a little publicity relating to use of repeater sites in the Boston newspapers, and The ARRL Public Info apparatus went into action to defend our interests, and the controversy seems to be over. Thanks to all who helped. Speaking of help, my hat is off to Jack Moran, W1ZLG and Dave Moran, KA1PHP (they are not related) for their work with the Armenian Earthquake relief effort. Their many hours of effort did not go unnoticed. Work continues to be done on defining the role Hams play in state and local emergency plans. Hopefully a state RACES plan will be approved soon. It seems the State doesn't have any formal written plans for Ham networks. The price for ham license plates is going up to \$70.00 per year. If you have an opinion, write your State Senators and State Representatives. With all the hams do for the state, these plates should not cost anything. Please let me know if we should go ahead and try to get legislation to this effect. The bands have been open and it seems this sunspot cycle will be better than any recorded. It will be an interesting time to be on the HF bands and truly enjoy our hobby. Have you done anything to enhance ham radio's reputation this month?? Please express your opinion on Amateur Radio issues to your section or division staff. We appreciate your input. Traffic: KW1UJ 679, WA1TBY 637, KA1MDM 398, KB1AF 365, W1CE 344, NG1A 314, N1CVE 202, K1ABO 113, N1BNG 100, KA1AMR 90, N1FLO 87, WA1FNM 78, WA1CRE 70, K1GGS 67, N1AJJ 60, W1TC 58, N1DUB 50, KA1DJV 49, KB1EB 44, KA1LIH 43, K1BZD 41, KA1EDY 40, N1FTD 34, K1LCQ 18, KA1NOI 16. BBS stations: K1UGM 803, N1BGG 287.

MAINE: SM, Bill Mann, W1KX—SEC; KA8UVQ, STM; WA2ERT, ASM (Packet); N1AHH, ASM; (MEMA Liaison); N1CBA, BM; W1JTH, SGL; K1NIT, TC; KQ1L, Need; Affiliated Club Coordinator & Public Information Officer, W1RWG has resigned as ACC because of his election as NE Div. Vice Dir. Aroostook ARA Christmas Party in Presque Isle well attended and enjoyed. W1KX has found it necessary to resign as Section Manager because of time problems. Thanks to all who have helped within the Field Organization in Maine during the past 7 months. Let's all work together with a common purpose to improve Amateur Radio in Maine under the new Section Manager appointed to complete the term. Silent Keys: W1AHM, W1DAY, Art, W1AHM, was SCM for Maine 1963-64. VE Exams: Mar. 4, Poland Hamfest (Community School), 12:30 PM (KD2EU); Mar. 23, Augusta (Cory H.S.), 6:30 PM (N1BCF). In Dec., 5 OBS sent 9 ARRL Bulletins and 2 Maine Bulletins.

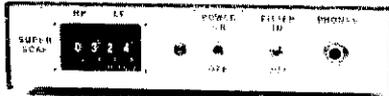
Net	Sess	Traffic	QNI	Mgr
AROOSTOOK Emerg Net	4	0	73	WA1VNZ
CENTRAL Me Emerg Net	8	12	133	N1EUK
Cumberland Co Ares	4	3	50	KA1ODT
Hancock Co Net	3	1	33	WA2ERT
Kennebec Co Ares/Races	4	1	59	KA1LPW
Me Public Service Net	4	4	38	KA8UVQ
Oxford Places Net	3	14	36	W1RWG
Pine Tree Net	31	99	289	WA2ERT
Sea Gull Net	27	274	338	N1DIA

Traffic: KA1REB 107, WA2ERT 102, K1KX 101, K1GUA 77, W1VEH 68, W1BMX 60, AK1W 58, W1JTH 51, W1RWG 46, W1OTQ 43, N1BCF 38, KA1ODT 32, K1UNG 25, N1BJW 23, NR1F 23, KA1UOJ 20, WA1VNZ 12, KA1ENM 5.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—BM; K1OSM, ACC; K1M. There are a couple of issues circulating around the ham community that deserve your attention and input. The

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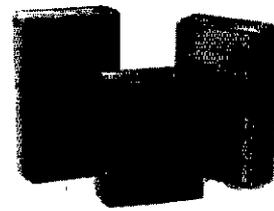
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no-code issue has returned in the wake of slower-than-expected growth following the implementation of Novice Enhancement. Many words and ideas are appearing and the ARRL directors have created a special committee to review and recommend on this volatile issue. Please make your opinions and ideas known to the NE Division Director, Tom, K1KJ. We need to keep the discussion visible and make it a two-way communication between the membership and the Directors! The second issue is the special Director's committee and the hoped-for result will be a new training plan and curriculum for the training of ham radio operators. Of particular concern is the Novice material and our ability to attract, train and license people from several segments of the population. If you are an instructor, they need input from you on what works and what doesn't work. We need input from the field to help insure that this effort will result in a quality package that will help both instructors and students. Take a minute to drop a line to Tom and let him know how you feel or provide him with any helpful data you might have. About a dozen people have given me input on the no-code issue so far, and it has been forwarded to our Director. On to the fun stuff—the Hosstraders have announced that the Deerfield Hamfest will be back at the Deerfield Fairgrounds on Sat, June 3rd. Put this one on the calendar and help the Hosstraders ensure that we stay in Deerfield! The Nashua club has a new slate of officers for '89 Chairman: AK1K, V-Chair: WA1UXA, Sec: KA1GOZ, Treas: NO1V, Activities: N1BKL, Programs: KA1QDL, Membership: KA1OKQ, and a change of location for Pete's repeater—KA1OKQ/R. (223.72) is now on the air in Concord. A nice profile on Meddy, KB1LL in the GBRA newsletter including the fact that he is one of only 14 people in the world monitoring solar flare activity for NOAA. Bob, W1HJT, reports live more new Novices out of his class who were anxiously awaiting their call! For all you ARES Packeteers: don't forget that our SEC, Fred, K1ACL, runs an "ARES packet evening" each Thursday with K1ACL-1 on 145.07. Check in and help Fred establish the roster of packet stations for use in emergencies. Also there are plans in the works to set up a packet station at the National Weather Service in Concord as an interface to the ARES organization. Welcome to the Souhegan Valley ARC as our latest ARRL Affiliated Club! NARC has another very busy VE session this month at the Nashua Library—which means that several vol examiners took the time on a Saturday during the busiest holiday shopping period of the year to help others get started and get upgraded in the hobby. I would like to express the appreciation of the Field Organization for all the effort all the volunteers put into the very successful exam program here in NH! Things to think about: Believe it or not, Field Day is just around the corner! Now is the time to get plans formulated and to locate a site, form committees, etc. Early planning helps to insure a successful test and this should be a very good year with the higher bands now being open. Also, various public-health organizations will be making contact soon soliciting communications and safety help for walk-a-thons, bike-a-thons, etc and this is a good chance to test your club's tactical net operation and to perform a good public service in your local area. I would like to announce that Lea, K1MNT, has been appointed the EC for Manchester for the Field Organization. Welcome aboard, Lea! The traffic report for this month indicates very heavy volume (no surprise) and the support of a lot of you in moving that traffic. In addition, we had 100% rep on FRN and 93.6% on 1RN, cycle 3. Traffic: Nets: G5FM 252, G5PN 133, NHN 59, NHNTN 32, Stations: W1PEX 1808, KB4N 1450, N1CPX 745, WA1FHB 882, K1TQY 489, W1FVR 201, KK1E 126, WA1YZN 83, KA1NXT W1ALE 69, N1ALM KA1LMR 62, KA1OU 61, NE1J 54, KA1ROH 49, K1M 45, WB1EAE 32, KB1LW 27, KA1HPO 26, N1BVI 20, W1HBB N1FYD W1KWE KA1GOZ 14, KA1JOU 8, N1COT 6, N1DOA 5, KA1PFS 4, KA1KFX 2. BPL: W1PEX, KB4N, N1CPX, WA1FHB, K1TQY. PSHR: N1CPX, KA1NXT, W1PEX, KA1HPO.

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RHODE ISLAND: SM, William M. Foss, KA1JXH—All ARRL VE exam sessions are \$4.75 for Technician Class and up. WRONE new VP is KA1JXV. KA1JNP has a 224.56 to 145.17 repeater link up in Cranston. BVARC moved its PBBS to 145.05. OSARG wants to thank WA1QCE, N1BED, W1EOF for the help in the November VE session. OSARG new officers are K1CVP Pres, N1DKF VP, WA1RBT Sec/Treas. OSARG held its meeting to elect officers and toured the WJAR-TV station in Providence. OSARG also provided com for first night. Traffic: KA1JXH 241 (PSHR 80), W1EOF 149, WA1CRY 83.

VERMONT: SM: Jonathan P. Maguire, N1CQE-ASM (RFI); W1CTM, ASM (Education); WB2CM, ASM (Packet); K1AUE, SGL; WB1AJG, STM; K1TQ, TC; W1ALM, PIO; WA1YOY, I'd like to take this opportunity to extend a special thanks to Joe Stevention, W1KRV, who has resigned as Section Emergency Coordinator and State Government Liaison. Joe has served the section for a number of years and has done an outstanding job. The ARES program here in Vermont is the strongest, best organized ever. This is due to Joe's untiring devotion and skills. We wish Joe all the best, and look forward to his wise and trusted counsel. Bob, WB1AJG has taken over as SGL, and his knowledge of State government will help the Amateur community maintain its excellent working relationship with Montpelier. The Twin State RC reports that its 220 repeater has been moved to 224.24. An autopatch is available. Congratulations to NB1A and YL on their new harmonic, Patrick. Twin State RC classes begin on March 6. Contact KA1OXS. Also, classes begin in Essex Junction on Feb 1st. Contact WB2JSJ. K1LEG reports that bill H.032 has been introduced into the legislature. This bill would provide for special plates for Amateurs at no cost. Sounds like one we should all push for. Contact your representative now. PSHR stations are WA2SPL, KT1Q, WA1JV, N1DHT. BPL was earned by WA2SPL, WA1VXW and KT1Q. WA1VXW's BPL is Emil's third, earning him the BPL Medallion. Congratulations! VT participation on 1RN/2 was 98% and 1RN/3 was 100%. Keep up the good work! I still need volunteers. Please call. Net reports: CN 27/80/749, CVFVN 4/98/10, V3SN 12/18/22, TwinSFMEN 4/38/7, TRiFM 4/48/10, VTN 31/137/120, VFN 4/63/5, GMM 27/519/36. Traffic: WA2SPL 1988, WA1VXW 820, KT1Q 519, N1DHT 215, KC1KI 205, WA1JV 166, W1KRV 7.

WESTERN MASSACHUSETTS: SM, Bill Voedsch, W1UD—OO/RFI: N1CM, PIO/ACC: K1BE, SEC: W1HIH, TC: KA1JJM, STM: W1KK. First of all, I want to congratulate the traffic handlers in WMA. During the past holiday season, you did an exceptional job. Check the total and you will see what

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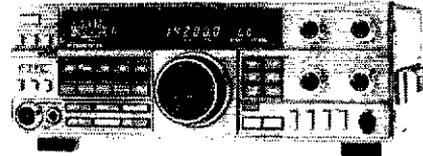
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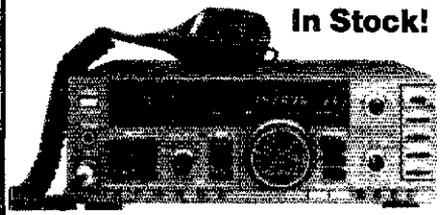
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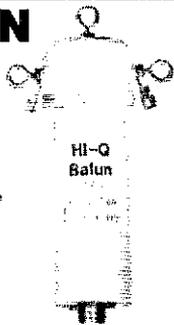
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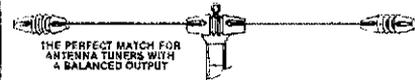
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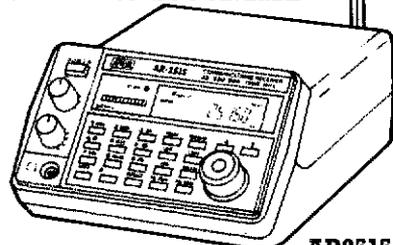
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I mean. All of the clubs in the section had their annual Christmas party, and from the comments that I received, everyone had a great time. I hope that Santa dropped everyone exactly what they wanted. Jack, WA1YYK, has done it again. Two new hams in the Springfield area. Congratulations to Adam Olson, who is 9 years old, and Roy Sero. They are both waiting for their licenses. Gee, 9 years old. I know some kids that have a tough time tying their shoes at that age. The CW competition, sponsored by the Wellesley ARC, started Jan. 1, 89, and will end May 15, 89. The purpose of the competition is to maximize the on-air CW experience for First Region amateurs who need to take a Morse code exam in 1989. There are a number of categories involved and prizes will be awarded by the Wellesley club. A copy of the rules for the contest may be obtained by writing the WARS, 211 Washington St., Wellesley, MA. Traffic: KA11FC 1037, KA1EXJ 178, KA1MEW 135, WB1HIH 21, KB1TH 60, WA1YYK 57, K1JHC 20, W1SJV 66, KA1QFV 91, W1KK 97, W1UD 578, WA1OPN 12, W1ZPB 22, KB1TH 51, KA1RVN 76, NM1U 40, AC1T 7, W1GQP 6, NU1S 21, KC2IU 59, KA1OFC 41.

NORTHWESTERN DIVISION

ALASKA: SM, Dianne Marshall, AL7FG—SEC: KL7AF. DEC Interior: KL7VK. DEC Kodiak: KL7JBV. STM: KL7VY. OBS Kodiak: NL7Y. The Yukon Quest has finished and the Iditarod about to begin. Thanks to the great many hams who volunteered their time and equipment to these great sled dog races. The dogs wouldn't do it without you. It is with great sadness that I report the passing of Bert Curwin, KL7IRT. Bert was known and respected by a great many hams around the world as contest extraordinaire having won the granddaddy of them all—the CQ WPX in the multi-multi category. He was also involved with many of the local club activities and served as President of the Arctic Amateur Radio Club. An Elmer and a friend to many of us, we miss you, Bert. 73 and 88.

IDAHO: SM, Don Clower, KA7T—ASM: K7REX. OOC: WB7CYO. STM: W7GHT. ACC: N7BI. PIO: W7GE. Lem, W7JMH, is giving ham radio exams in Boise at Borah HS at 0900 the 2nd Sat. of each month. WA7GSM was re-elected mng'r of the Farm net and N7LMA is the new mng'r of the NWTN. Congratulations to both and thanks for your hard work. The Twin Falls ARES repeater 146.06/66, is working great with their new antenna. Doug, WA7PYO, is now publishing the Eagle Rock ARC newsletter and it is a good one. Traffic: W7GHT 405, W7SU 47, KA7WZM 168, K6QT 8, WB7CYO 3.

MONTANA: SM, Ken Kopp, K0PP—Go for ARRL Diamond Jubilee Award this year. See Oct. QST for info. New extra in Ronan is 12-yr old N7LOZ. KY7I is new MT House of Rep for Dist #53.00T W7CK SK late Dec. Bozeman YL WB7NBT is Sci/Fi author Kathy Tyras. CCAARC (Helena) elected K7CCZ/P, N7RB/V/P, N7KFE/S-T, SEC KC7HP in TV news again with Armenia "quake info. Have amateurs got good press coverage for fast response to TV problem. New Glasgow club meets 3rd Tues—N7PFR for info. YPC (Billings) elected N7AT1/P, KB7ADL/V/P, K7AEZ/S-T. WB7QWB honored as their Ham-of-the-Year. GFAARC chose N7KOR/P, N7HKU/V/P, KF7LUS, W7NBB/T. Traffic: W7TGO 440 (PSHR).

NET	SESS	QNI	QTC	MGR
IMN	30	242	141	KAYEE
MSN	4	60	2	K0PP
MTN	31	2104	188	KF7R

OREGON: SM, Randy Stimson KZ7T—ASM: KM7R. STM: W7VSE. SEC: W7FBP. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. OOC: WN7W. BTC: N7ENI. It looks like Klamath County had a great Simulated Emergency Test, thanks to Matt, KA7WGW, Ed, KF7KE and Fred, ND7V, the Klamath County Emergency Coordinator. They got the Fed Cross involved and a lot of other hams. As Fred said this is a great way to stay tuned up during the winter months and be ready for the forest fires that seem to happen almost every summer. I went to the Central Oregon Radio Club meeting this month in Bend Oregon. They are almost ready to put a repeater on top of Mt. Bachelor, at 9000 ft, which will cover most of Oregon. The only shadow will be to the Portland area. The Oregon Tualatin Valley ARC has finished their Public Service for the year and there was 33 hams that worked 1218 hours and drove 7814 miles. The Hoodview ARC had 35 hams that worked 350 hours and drove 1080 miles. Great job both clubs. I would like more clubs to send me information about their activities regarding Public Service and Emergency Service or any thing that they feel would be of interest. The K7IFG BBS Station had 82 hours 18 minutes in connect time with 70 users and handled 925 messages with 187 NT8 traffic. Traffic (P) = Packet. WB7VMS 305P, K7AEE 299, N7BGW 288, W7VSE 280, WB7VSN 185, W7TA 175, K7EFG 187P, W7IFB 161, W7LRB 82, W7LNE 80, WB7EMO 69P, KV7F 61, W7ODG 57, KA7AID 47, KZ7T 47P, KA7SYG 31, N7IXS 38P, W7BDO 11P. (OCL) W7TA 164, N7APC 23.

WASHINGTON: SM, Brad Wells, KR7L—STM: KD7ME. SEC: KA7INX. TC: W7BUN. OOC: N7DVR. SGL: KD7AC. BM: N7CAK. PIO: N7FKV. ACC/ASM: KC7PH. ASM: KD7C. ASM: KA7CSP. ASM: W7UOF. ASM: K7CILL. The phone portion of the ARRL DX contest is this month. Good conditions mean this will be one of the best in years. It's a chance to quickly snag the remaining few for 5BDXCC or get over the hurdle of the first 100 for your DXCC certificate. Contesting is simply DXing speeded up. Your chances of a QSL are enhanced, since most DX stations readily provide confirmation for contest contacts. There was a great deal of holiday traffic generated this year. A very special thanks to all who made the speedy delivery of these messages possible. Traffic handling, particularly during special occasions, is some of the best possible public relations for our hobby. Section traffic net statistics for 1988:

NET	QNI	QTC	QNS	TIME	FREQ	MGR
CW7N	775	589	428	1750/2130	149.84	
NTN	15585	1488	355	1200	39.70	W7TVA
NWSSB	5848	319	325	1830	38.45	KD7C
PSTS	1276	488	721	1730/2230	148.82	KD7ME
WARTS	36892	2408	385	1800	38.70	N7GB
WSN	5898	1757	723	1845/2145	35.90	K7UQH

Several other nets worthy of your interest and participation

NET	TIME(local)	FREQ	MGR
Washington Information Net	0930	3987	W7GNZ
Traffic Handlers Net	2220	3985	NBEQZ
Columbia Basin Net	1900	3960	WB7RUB
West Coast Slow Speed Net	1900	3700	W7GTH

NBEQZ reports THN QNI 2351 and QTC 4428 for 1988. A special thanks to the Mike & Key Club for allowing the Puget

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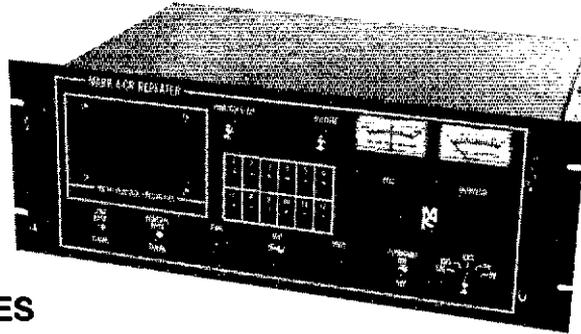
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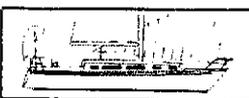
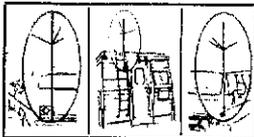
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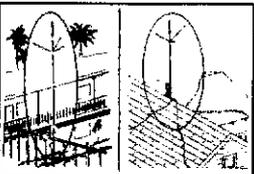
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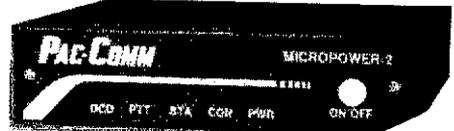
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Sound Traffic System to use their 146.92 repeater. M & K swapfest is March 11 from 9 AM-5 PM at the Puyallup Fairground. VE testing will be available. Copies of the ARRL filing in PR Docket 88-139 are available from League HQ for a 9 x 12 SASE with \$1.25 postage attached. This is the proposed "Part 96," the plain language rewrite of Part 97. New officers for the Radio Club of Tacoma: Pres. N7DRT, VP W7BUN, Sec. K7JF, Treas. WQ7H. The Yakima ARES put in 1105 hours and 4074 miles in 1988 on search-and-rescue efforts. Using the approved county reimbursement figures of \$3.35/hr and \$0.21/mile, this equals a donation of \$4514.87 to Yakima County. Other ARES groups might make similar computations on their annual efforts for the enlightenment of their local and county officials. This type of documentation drives home the real value of our efforts in terms that will impress any elected official. Congrats to NU7D and K7CLL on their OES appointments. New officers for the Western Washington DX Club: Pres-K7HBN, VP-K7LXC, Sec- W7YF. Treas-W7E. Don't forget that you can still make a tax-deductible contribution to the W7PHO Memorial Scholarship Fund. Remit your donations to ARRL HQ. Frank Bacon, WA7CBN, became a Silent Key on December 27. Frank was the past manager of the Washington Section Net and an active, respected traffic handler. Our State Government Liaison, KD7AC, is developing a set of guidelines for the involvement of the ARRL in section and local-level legislation. We have been working, for the past three years, at developing a strong rapport with our elected state officials in Olympia. In the near future, we will have a SOP for individuals or groups desiring official ARRL section support for proposed legislation. I can be reached on packet via SEAW or WOLVJ BBS. ARES Public Service Hours: Benton 38; Franklin 20; King 122. Traffic: K7CLL 24, N6EQZ 405, KR7F 205, KF7FF 87, W7GB 189, N7GGJ 111, K7GXZ 263, W7GCG 339, W7LJK 87, KA7PMD 27, W1PRT 52, K7SUX 228, KA7TTY 87, K7UOH 28, WB7WOW 114, WA7YEN 221, KD7ME, KR7L. PSRR: N7GGJ, KD7ME, WB7WOW.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallo, W6RGG—ASMs: W6ZF, WB3FCV, SEC: W6LKE, STM: K6APW, OOC: NY6Z, TC: N6AMG. Section Traffic Manager, K6APW, says he could use some help on CWI Try the Northern California Net (NCN) each night on 3630 kHz at 7:00 PM or, if you're a little rusty, there is a low-speed session at 8:30 PM. I'm sure Joe or any of the net members will be pleased to help you with getting started. HRC welcomed new members N6IHU, KB8SSD and Garth Edwards, who is waiting for his Novice license to arrive. BARC participated in SET, and discovered that Murphy was not on holiday! The participants - KE8IA, KA8BPR, KA6VVJ, KA6NQJ, N6ERR, K6GSH and KJ8FY uncovered numerous items to correct in their Net Control Center. LARK RACES members KA6DX, K6TS, WB8ZKN and WA8SDA participated in the City of Livermore and Valley Memorial Hospital joint earthquake drill. Who hid the coax in the ER suspended calling? MDARC's new officers N8KLS/P, K78X/VP, N6NVA/S, AA8DLT, K78Y/BOD and N6CUK/EC all celebrate the club having reached its goal of 300 members. FBI The COCC welcomes new members KB6RSM, KB8RSN, KB5CUI, KB8SEI and N6TIQ. EBARC's new officers are N6JNKP, K6MM/1VP, KB8LHR/2VP, K66AOH/3VP, W680/6 and NU6WT. December ttc: WB6DOB 376, W6VOM 302, K6APW 285, K7VA 40. Late November ttc: K7VA 28.

NEVADA: SM, Joe Lambert, W8IXD—ASM: K7HRW. New NSARS officers are N7GXJ, Chairman; K7HRW, Vice-Chairman; N7ZG, Treasurer; N7EVL Secretary, KB7AXQ, N7GTX and WA1WSX, Board Members. If you can help with the April Special Winter Olympics, contact WA7UJB at 825-7808. FARS reports new officers: NW7S. Pres: N7CFC, VP: WB5RQY, Secty: W7UZU Treas. FARS also reports the Nevada QSO Party will be May 13 and 14, 1989. Congrats to SIERA on their first year as a club; they have been very successful with their VE exams. LVRC reports W7D, Pres.; KF7GB, VP; NS8OB, Secty; K7AXT Treas. Board Members: W6GANF, W6HXT, KB7HN, The L.V. Swap Meets are now the 1st Sat of EVERY MONTH in the AES parking lot on Rancho. LVRA reports 1989 officers are W8IXD, Pres.; KE7JX, VP; W7D, Secty; KD7QY, Treas. All of the clubs report a very successful 1988. We wish you an even better New Year!

PACIFIC: SM, Wayne Jones, NH8GJ. Greeting to all from the land of Aloha! I had the privilege of attending the BIARC annual banquet and helping to install their 1989 officers. Quite an honor to be asked to participate. At the banquet, KA2IXG received a special award from the Ironman Triathlon Committee for his support to that annual event. Congratulations to the new officers and to Satoshii! The EARC provided support to the Honolulu Marathon with 22 Hams participating. KH6NJ and KH6KL coordinated the event. The MARC on Guam was also very busy during the month, providing support to the Pan Pacific Triathlon and the Plumeria 10K Race, both held on the same day. Thanks to all who give their time to support these public-service events. During the last few months, the repeaters on Mt. Haleakala have been struck by lightning several times. They are all back on the air now, and thanks to all who have helped in keeping our statewide links open. Traffic: KH6GMP 81, KL7VQ 50, KH6S 34, KH6H 21. Aloha from all of us to all of you!

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—The Winter Section meeting in Orville was one of the best we have had. Thanks to Walt, KE8EP, the DEC for the Northern Counties for arranging the meeting location and to the Butte ARC for furnishing coffee. Several of the senior Section staff gave reports on activities in their fields. Especially notable was the description of the activities of the Official Observers given by OO Coordinator John Canaris, WY6O. We normally hear so little of the OO activities that it was a welcome change. Perhaps some of the clubs would like to have John give a presentation at their meeting. Try asking him. I think he could be persuaded to accept. With regard to the 220-MHz band, Ron Murdock, WB5FIX, our Bulletin Manager advised everyone that all may not be lost and to keep writing to our lawmakers. Also introduced to the meeting in a new position was Jack La Fleish, KF8KJ, former DEC for the Northern Counties, who has agreed to be Assistant SM in the North providing closer contact with the Northern Counties which are a long way from my QTH. Cass Tressl, K06Z, the new DEC for Metro Sacramento did more listening than talking and as usual STM Al Belger assured us that the Section Traffic was being well handled. Finally, good material to take to the Director's Cabinet meeting was collected including an almost-unanimous



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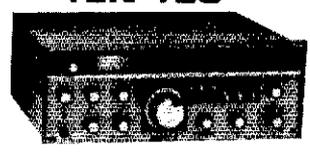
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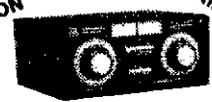


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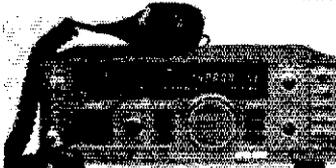
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SAN FRANCISCO: SM, R. C. "Dick" Wilson, K6LRN, Acting SM—By the time you read this, I will have contacted all clubs and appointees. If you haven't heard please contact me at P.O. Box 4212, San Rafael, CA 94913. Time to start planning for Field Day. The ARRL is going to operate at the Marin Rod & Gun Club. The REDXA will once again challenge/be challenged by the Sonoma County ARC. The ACS (147.33/93) has new gear installed at various sites in Marin. PL for main rpt system is 203.5—contact the ACS at Box 3594, San Rafael, 94912 for further details. Bob Fajardo, WA6VOI, has been chosen RACES Officer for Marin Co. Many clubs are collecting dues for 1989. Make sure your dues are paid. SUPPORT YOUR LOCAL CLUB, IT IS THE BACKBONE OF AMATEUR RADIO!

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WC8U, STM: N6AWH, TC: WA6EXU, Asst. SMs W6TRP and K6YK. With much regret, I report that the following Amateurs have joined the Silent Keys: K6PPI, K6JHA, W6ZKU, KF6QL, and KA6JAO. Technical Coordinator WA6EXV has a number of both technical and non-technical programs suitable for your club meeting. Contact WA6EXV at the Callbook address to schedule his visit to your club. Congrats to KDBQA on her election as president to WPSS. 1989 officers of the Tulare County ARC are Pres KB6ABW, VP K6YDW, Sec N6QHE, and Treas W6FM. 1989 officers of the Lodi ARC are Pres K6PJV, VP WA6OKR, S/T KB6SLE, Editor WNSGNZ. 1989 officers of the Stockton-Delta ARC are Pres N6ZU, VP N6MWB, S/T AA6FA, Editor AA6CD. 1989 officers of the Fresno ARC are Pres WB6ITM, VP K6PKO, Sec KB6LBS, Treas KA6LAC, N6PDE is Advanced. KB6ABY, KB6ZTJ, and KC6APM are Tech. N6SIX has a TS 940, K6IFL, has a TS 440. Traffic: N6AWH 322, WA6YAB 46, K6RAU 7, K6PMG 1.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W, SEC: WA6OCV, TC: WA6PWW, STM: N6JLJ, PIO: WB6OML, ASM: N6JGJ, ACC: WB6MKM, BM:(vacant) OOC: KA6S DECEMBER - First, a reminder. There is a telephone number that has information on Amateur Radio License classes, (408) 971-1424. Well...it only has the info that I put on it, and I can only put on what I know about. PLEASE, let me know about any classes your group or club is sponsoring so that I may include them on the recording. My phone number is on page 8 of this issue of QST... Congratulations to Rod NRYE on becoming the RN8 NTS region net mgr... The Naval Post-graduate School ARC continues to be a very active and vital group in the Monterey area, with classes and many other club activities... The IBM ARC saw a video on Digital TV and HDTV. They also support the Gold Hills run on their 220 repeater... The Ames ARC had their annual Winter pot-luck dinner... The AMES ARC continues to make both audio and video from Space Shuttle flights available. They are also planning a Novice class sometime in '89... Congratulations to Edgie WA6VZZ on his appointment of ARES/RACES EC for the City of Mountain View... the F.O.R.M. group won the Pacific Division and the San Francisco Section in the June VHF contest. I didn't know that San Benito county was now in the SF section... the Galibair ARC also had a Christmas dinner & election of officers... congrats to KB6GV on his upgrade to Extra... the Villages ARC, a very active group, is in the process of applying for SSC status, and also for an Official Emergency Station appointment... that's it for now. Traffic (Dec): WB6W 36 (36), KA6SXW 34 (4), KB6IWG 14 (0). Phone numbers: Amateur Radio Classes (408) 971-1424. License Exams (408) 984-8353 (ARRL VEC) or (408) 255-9000 (Sunnyvale VEC).

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W—ASM: AB4S, SEC: N4MYB, STM: K4NLK, BM: K4IWW, ACC: WC4T, TC: K4ITL, SGL: KE4ML, PIO: AB4FV, Mary Waddle, WC4T, is our section's Affiliated Club Coordinator (ACC) and acts as liaison between NC's radio clubs and our League. She feels that ARRL affiliation offers many advantages and encourages club members to contact her for information about services available to clubs. Mary is active in several clubs and, along with her husband Clyde, KF4WY, is co-editor of the SARC News, contributing co-editor of the Southeastern Repeater Association's "Repeater Journal" and co-chair of the Charlotte VEC. Daughter Karen, WD4CYM, and son-in-law Steve, WB4PRE, round out this Amateur Radio oriented family. [BT] WA4BPW, Cleveland, NC, EC activated ARES on Dec. 13 to assist Red Cross with communications at a hazardous materials spill. A number of Amateurs (and a few of their XYL's) helped for 7 hours. Their efforts earned a letter of appreciation from ARC and (more important) demonstrated their capabilities to the over 100 local disaster workers at the scene. This will certainly lead to increased ARES involvement in their county. Congratulations to WB4BPW and asst. EC KJ4YJ for not letting this opportunity slip by. [BT] The Mecklenburg Amateur Radio Society sponsored Charlotte Hamfest is scheduled for March 18 & 19. See you there. [BT] Congratulations also to the traffic nets for handling the Christmas traffic load. [BT] Quarterly traffic report, Oct-Dec 88:

NET	QNI	QTC	TFC	QND	SES	NM
NCEN	1896	694	494	1759	92	WB4WII
NCMN	1123	558	470	1616	92	WD4MRD
CN	2244	1136	1024	4294	184	K4IWW
CSN	567	132	125	2025	92	AA4MP
CNCTN	2787	442	343	1713	92	WA4MNR
PCTN	1504	682	533	1748	90	AB4EO
RARS	738	62	61	1125	89	K4ABJ
M2MEN	1012	68	65	838	89	KF4MZ
CFARS	1649	87	87	1777	92	W4EHF
PETN	1103	137	121	1028	79	WB4HRR
THEN	885	90	72	847	88	N4LUO
ACAN	117	14	14	74	14	N4JRE
Totals	15,475	4,110	3,409	18,842	1,093	

Traffic for December: K4NLK 805, KA4TLC 525, K4IYV 430, KB4HJQ 415, KA4OJN-0 387, KA4EYF 341, K4IWW 284, N5CGD 248, AA4TE 245, WB4HRR 191, WD4HTE 176, WB4TOP 187, WA4LPD-1 163, NAUE 180, W4FMM 153, KB4IVP 142, W4LWZ 130, KC4PFS 104, WD4MRD 98, KA4KGZ 90, WA9NEW 88, NAJRE 81, NT4K 78, WB4WII 72, WD4LOO 57, WA2EDN 57, N4RRG 51, N4LST 46, WD4LSS 44, WA4MNR 40, N4SYZ 38, AB4EO 36, W4EHF 34, N4TNB 31, W4WXZ 31, WD4BCX 22, KC4BJZ 17, KA4KZ 16, AB4W 15, NA4UJ 12, N6LHE 10, W2JDB 10, WB4WOP-1 8, N4TCH 4, AJ5F 3 [AR]

SOUTH CAROLINA: SM, Charles Moeller, N4FVU. It may be too late to attend the Feb. 25 Charleston Hamfest. We will be at the March 18-19 Roanoke Div. Convention & Hamfest in Charlotte. "Fritz" Nitsch, W4NTO, received the 1988 Roanoke Div. Service Award. The presentation was made at the Spartanburg ARC December Christmas dinner. Vice Director WD4HLZ, Asst. Director, W4PED & N4FVU made a presentation. Resident hams of Goose Creek have become united in their opposition to a proposed city ordinance restricting the height of antennas. We welcome our newly affiliated club, the Charleston ARC. Packet Radio Clubs are eligible. Clubs that have active training classes, highly-visible publicity programs, and members who actively pursue technical projects are eligible to become Special Service Clubs. SSCs receive additional benefits & advantages. Contact me, my packet address is N4FVU @ WA2GYM. Traffic: NAMEJ 212, WAANK 114, KA4LRM 38, W4DRF 22.

VIRGINIA: SM, Claude Feigley, W3ATQ—STM: KB4WT, SEC: N4EXQ, ACC: NT4S, OOC: W4HU, BM: AB4U, TC: WX4C, PIO: AA4VP, SGL: W4UWC.

VTN	1 PM	3907	KB4NGO
VBSN	6 PM	3947	K14BR
VSN	6:30 PM	3680	N4KSO
V(NEARLY)	7 PM	3680	N4GHI
V(NLATE)	10 PM	3680	WB4KSG
VLN	10:15 PM	3947	W4JLS
SVEN	7:15 PM	148.82	N4TS
STAPES	9 PM	148.97	KJ4VT
DEC/EC	9:45 (3rd Wed)	3947	KA4NWK

Please note the change in frequency for the DEC/EC Net from 3910 to 2947 kHz. This net meets the 3rd Wednesday of each month for the purpose of passing info between the Section's DEC and EC appointees. WOW!!! December was a record breaker for the Section. We had 53 stations reporting a total traffic count of 22,878. This is by far the largest t/c total in the history of the Section. Major contributor to this total was the t/c generated by the Special Event station, WA4TGF, sponsored by the Virginia Beach club. Also, the t/c count reflects the packet activity of WB0TZX, N4HOG and WB4D. Sins making BPL were: WA4TGF, K4DOR, WB0TAX, N4GHI, K44FV, WD4MIS, K4MTX, N4EXQ, AA4AT, N4HOG, W3ATQ, KB4WT and K44NN. It is with deep sorrow that I report WA4CCK and W4TE as Silent Keys, both of whom were stalwarts in the annals of Amateur Radio. Warren, WA4CCK, was well known in NTS activities having served as a Member at Large of the Eastern Area Staff, as NCS for Section, Region and Area traffic nets, and as Manager of the 4th Region Net. Many of us owe our traffic handling training to Warren. He will be missed by all. Tex, W4TE, became a Silent Key, Nov. 24th. He was one of the founding members of the SOWP and in the past was an avid traffic handler until his illness in 1977. In WW-II, he served in the Radio Intelligence Division of the FCC. W4TE was the OM of Ethel, K4LMB. Upcoming VE exams are: Mar. 4, College Park contact NF31, 301-963-4008, also South Peninsula ARC, contact N41C, 804-851-5573—Mar. 11, Harrisonburg, contact KB4WOM, 703-867-5428—Apr. 1, contact NF31, 301-963-4008—Apr. 8, Williamsburg, contact WJ4X, 804-253-2811. Thanks to those clubs who have put me on their newsletter mailing list your newsletters are invaluable to me in keeping abreast of the club activity in the Section. Keep 'em coming. It was nice talking to many of you at the Frostfest. Will be looking forward to seeing you at the Winterfest in Vienna, Feb. 28th. Traffic: WA4TGF 5234, K4DOR 2277, WB0TAX 1997, N4GHI 1649, K44FV 999, WD4MIS 966, K4MTX 965, N4EXQ 733, AA4AT 688, N4HOG 658, W3ATQ 630, KB4WT 588, K44NN 538, WA4ONG 410, KJ4VT 335, AA4GL 285, WD4MIO 229, K4OJH 218, W4JLS 216, K4BGZ 215, N4TJT 206, WD4MIS 197, WB4EDB 193, WB4PNY 183, W4ZNB 170, WD4LY 158, WB4K5G 150, WA4OHX 144, K4MLC 141, KJ4VU 118, WB4QJQ 118, K14BR 111, N4KSO 109, N8ANQ 105, WB4D 100, K4JM 97, K14W 87, K4L 70, N4SMB 65, WB4ZTR 65, KB4PW 55, W4TZO 53, WB4KIT 48, KB3RM 48, W4HU 30, WA4TVS 26, NT4SO 17, K4BUE 12, KA4XF 10, K4GR 7, KB4OPR 6, K4JST 5, N4FNT 4, W4YE 4, K4VWK 2, KA4IUM 2, WA1VRL 2.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW, STM: N8FXH, SGL: K8BS, TC: K8LG, Rpt. Coordinator: WB8GDY. Fayetteville Hamfest will be Sun, Feb. 26, at Fayetteville High School. Contact WB8QCQ for details. Huntington Hamfest will be Oct. 7 at the Civic Center. Contact N8IKP for details. New officers for TARA are: Pres-K8BCJ, V Pres. WB8NFZ, Sec-N8IKP, Treas-K88BP. WB8CW has been appointed an ORS station. Thanks to all from whom I received Holiday Greetings.

NET	FREQ	TIME	QNI	QTC	SES	NM
WVFN	3885	6:00	1197	211	31	WB8DHC
WVW	3567	7:00	276	171	31	KZ8Q
WVMD	7235	11:45	857	113	31	WB8V
WVRN	3640	6:30	252	39	31	K8LG
WVNN	3730	7:30	124	10	31	WB8D
HILLBILLY	14290	NOONS	169	14	4	W8YP

Traffic: KA8WNO 1215, K8TPF 162, W8YP 577, WD8W 481, KA8ZXP 190, KE8F1 152, WB8ZF 131, WB8DHC 123, N8FXH 87, WB8LY 78, K8QEW 63, K8KT 33, W8JWX 30, KA8OFG 30, N8JTR 17, NC8G 9.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Edith Sheffield, KA8MOA—SEC: WB8TUB, STM: KB8Z, ACC: WB8DUU, SGL: WB8FO, TC: WJLJF, OOC: KB8CDN/WJLR. A report from the T/C, WJLJF indicates that the 450 backbone packet network is working extremely well up and down the Front Range. K8J-3 (Kre) the hub digi for linking the Western Slope to the Front Range has been down since Mid Nov. The overabundance of snow in the Rockies this year will not allow even snow mobiles up to the site. Look for April or early May to have the system up and running again. The CCARC semi-annual meeting will be held March 11th in the Greeley area, hosted by NCARC. Talk-in for the Colorado Council Meeting will be on 148.25/85. Bob Fedde, KA8EFM, is once again coordinating the communications for the Health Fair on April 8-14. This annual event involves most of the communities in the State. If you can help out contact Bob at (303) 937-1393. Many of the area clubs have been in the process of electing new officers. Congrats to all and good luck in your future endeavors. If your club has a newsletter, please make sure that the SM is on the mailing list. KA8MOA, NETS: Col: QNI 1288, QTC 92-154, QNF 1133, 31 sess. CWN: QNI 54, QTC 30, QNF 24, 24 sess. HNN: QNI 2084, QTC 331-814, QNF 1114, 31 sess. NCTN:

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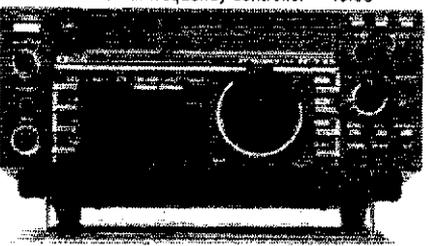
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 - AT-100 100W 8-band auto. antenna tuner 445.00 389⁹⁵
 - AT-500 500W 9-band auto. antenna tuner 589.00 519⁹⁵
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 - IC-47A 25w 440 FM/TTP mic... (c/o) 549.00 399⁹⁵
 - PS-45 Compact 8A power supply ... 145.00 134⁹⁵
 - UT-16/EX-388 Voice synthesizer ... 34.99
 - SP-10 Slim-line external speaker ... 35.99
 - IC-28A 25W 2m FM, TTP mic 469.00 409⁹⁵
 - IC-28H 45W 2m FM, TTP mic 499.00 439⁹⁵
 - IC-38A 25W 220 FM, TTP mic 489.00 349⁹⁵
 - IC-48A 25W 440-450 FM, regular mic 459.00 369⁹⁵
 - IC-48A 25W 440-450 FM, TTP mic ... 509.00 449⁹⁵
 - 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 449⁹⁵
 - IC-228H 45W 2m FM/TTP scan mic... 539.00 479⁹⁵
 - UT-40 Pocket beep function 45.00
 - IC-900A Transceiver controller..... 639.00 569⁹⁵

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- UX-129A 1.2GHz 10W band unit ... 549.00 499⁹⁵
- IC-1200A 10W 1.2GHz FM Mobile... 699.00 549⁹⁵
- IC-3200A 25W 2m/440 FM/TTP (c/o) 695.00 499⁹⁵
- UT-23 Voice synthesizer 34.99
- IC-3210A 25w 2m/440 FM/TTP 739.00 649⁹⁵
- AH-32 2m/440 Dual Band antenna ... 39.00
- AHB-32 Trunk-lip mount 35.00
- Larsen PO-K Roof mount 20.00
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- Larsen PO-MM Magnetic mount 22.00
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- RP-2210 220MHz 25W repeater 1649.00 1469
- RP-3010 440MHz 10W FM repeater... 1299.00 1149

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. All prices shown are subject to change without notice.

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- IC-2A 2-meters 289.00 259⁹⁵
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- IC-4AT 440 MHz, TTP 349.00 299⁹⁵
- IC-02AT/High Power 409.00 349⁹⁵
- IC-03AT for 220 MHz 449.00 289⁹⁵
- IC-04AT for 440 MHz 449.00 389⁹⁵
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- IC-12GAT Dlx 1/7W 1.2GHz FM HT/TTP 529.00 469⁹⁵
- Aircraft band hand-helds Regular SALE
- A-2 5W PEP synth. aircraft HT 525.00 479⁹⁵
 - A-20 Synth. aircraft HT w/VOR 625.00 569⁹⁵
- Accessories for all except micros Regular
- BP-7 425mah/13.2V Nicad Pak - use BC-35 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 Regular
- BP-2 425mah/7.2V Nicad Pak - use BC35 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
 - 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
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 - SS-32SMP Commspec 32-tone encoder 27.95

- For other HT Accessories not listed please CALL
- Receivers Regular SALE
- R-71A 100kHz to 30MHz receiver..... \$999.00 869⁹⁵
 - RC-11 Infrared remote controller.... 79.99
 - 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 159⁹⁵
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 - CK-70 (EX-299) 12V DC option..... 12.99
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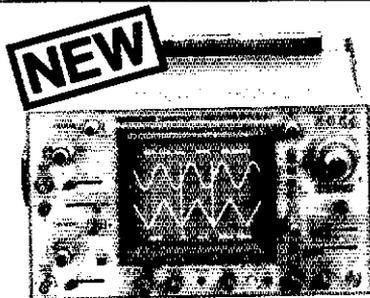
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QNI 173, QTC 72, QNF 242, 30 sess. SCTN: QNI 264, QTC 75, QNF 362, 30 sess. Traffic: NHFZ 491, K8HOA 195, KE8WC 123, KA8WIE 110, WB8FV 76, KB8Z 54, N8CYR 37, W8NFW 7.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K8YEJ. DEC: W5HCB. 8TM: ND5T. NM: WASUNO, KA5NNG, W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net meets daily, 3583 @ 0230 UTC, handled 142 msgs with 182 checkins. NM Roadrunner Net meets daily, 3939 @ 0100 UTC, handled 113 msgs with 1354 checkins. NM Breakfast Club meets daily, 3939 @ 6:30 AM, handled 171 msgs with 1071 checkins. Yucca 2-mtr Net, 78/18 handled 122 msgs with 488 checkins. Caravan Club 2-mtr Net, 66/06 with 107 checkins. SCAT Net, 68/06 handled 5 msgs with 515 checkins. Info Net 12/72, with 87 checkins. ZIA Packet net with 40 checkins. So very sorry to report the passing of Art Raymond, W1CVD. He will certainly be missed since he was always there to lend a helping hand with any project. Also sorry to report the passing of WA5ECK of Animas. KD5TU, WB9ERE, WB5EKP & W8GY have done an outstanding job on the new Upper Rio FM Society linking system. ARES has already put the new system to work on several SAR Missions. Great work gang!!! Traffic: W6DAD 8

UTAH: SM/STN, Jim Brown, NA7G—SEC: Rich Fisher, NS7K. Current ECs: Box Elder, N7JWL, Cache, AC7O, Carbon/Emery, KA7LEG, Davis, NS7K; Duchesne/Juintah, KA7BPB; Kane, N7BQE; Morgan, KC7MS; Salt Lake, KD7OD; Topele, KR7H; Utah, KE7AU; Weber, WA7BV1. N27V is DEC for SL, Utah, Davis Cos. New club officers: OARC Pres, KE7WI; Bridgerland, AE7T. Bruce, N7CLH, is setting up an AR class of students at Syracuse JHS. 73 de NA7G. Traffic: WA7KHE 89, N7UJN 77, N7JLC 59, WA7MEL 53, NS7K 24, N7ASY 23, NA7G 21, N7BOE 3.

WYOMING: SM, Jim Raiser, N7GVV—ASM: Steve Cochran, WA7H. SEC: Jim Anderson, W7TVK. 8TM: Dan Ransom, K7MM. Traffic: NN7H 247.

NET
FREQ TIME QNI QTC SESS NM
Cowboy 3923 5:45PM-F 904 18 22 KCTAR
Pony Ex. 3923 800A Su 189 0 4 W7MZW
K7MM is conducting a hands-on type net for Packet on 3923 following the Cowboy net on Thursday evenings. The hope is to better educate us all in packet operation from the beginner to expert. Still time to make it to Casper for their annual banquet on Feb 24. Check with Cowboy net for details. 73 till next month.

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, WD4W—ASM: W4XI. SEC: KB4GDN. 8TM: N4RT. PIO: KB4KCH. ACC: AA4BL. OOC: KF4VS. SGL: N4FRQ. BM: KA4ZXL. Alabama' spring tornado season is here. When was the last time your club or ARES group organized a National Weather Service SKYWARN class? Congrats to new ATNN manager WA4RNP, who replaced WO4E on Jan. 1. Thanks for a great job, Bob. Remember, the AENB is now ASN—The Alabama Section Net on 3575 kHz nightly—come join the fun! Amateurs were called for help when more than 70 cars of a freight train derailed near Bangor in Blount County in November. Evacuations were ordered after a car carrying sulphuric acid began leaking. The US Army's use of the 70-cm band in the Huntsville area has concluded. Several north Alabama 440-MHz FM repeaters and packet nodes were affected by this—but all is back to normal now and no cases of interference were reported during the period. The East Alabama ARC has a new controller for their 147.12-MHz repeater with the ability to join our section link project when it gets rolling. A new repeater is on 220 MHz in the Birmingham area with the output on 223.94 MHz. A reminder—packet messages for me may be left @ N4OH-2. BPL: WA4JDH. PSHR: WA4JDH, W4CK5, W4PIM, W4ZJY. Traffic: WA4JDH 1583, W4CK5 420, W4PIM 356, W4ZJY 43, WB4TVY 16, W4DGH 12, W4OW 9.

GEORGIA: SM, Eddy Kosobucki, K4JNL—SEC: NC4E. STM: WB4WQL. Packet: WA4Q. ACC: KM4IH. BM: WB4ZQJ. OOC: W4TG. PIO: WB4DEB. SGL: WB4UJW. TC: WD4FAH. First of all, the Columbus ARC had to skip its HAMFEST on March 25 & 26 or else lose the last week-end in March. This is the Sat & Sun of EASTER. They are going to have an EASTER SUNRISE SERVICE right on the grounds, or if it's inclement weather, it will be inside the auditorium. Hope to CU at there. SILENT KEYS in the section during Dec. are: KA4YKQ, WA4MYP & KE4HY. Our sympathy to their families. Liberty County ARC (LECA) rpts new officers: Pres: N4PUJ. VP: N4OOZ. Sec: KC4HAV. Treas: WB4JGH. NM: KB4SXN. Trustee: Jasup AWS (JAW5) elected N4SGH as Pres. VP: N4RRP. ST: N4JFA & Act Mgr: WD4MEM. Coastal Area Rpt Soc (CAR5) elected KD4WF as Pres. VP: NB4K. VP Ed: KB4RMN. Sec: KC4BAZ. Treas: N4MBU. Dir: AB4B. Photog: KC4GBJ. Past Pres: N4LLX & Ed: KC4AWZ. Colquitt County HRS installed W1BPP Pres. K4HAV VP, AA4P Sec/Treas. KARC (Kennehoochee) HAMFEST in Marietta on tap for April 4th. DEC PSHR honorees are: WB4DVZ, KJ4NK, WB4WQL, WA4TCT, WD4COL, KA4HFE, KM4LS, K4ZUY, W4RWB & W4HON. This is March & the month that starts with bad weather. If ur needed, P5E get on the local repeater or on 3975 & see what u can help with. LET'S ALL REMEMBER WE EXIST BECAUSE OF THE PUBLIC SERVICE WE PERFORM. If u desire to be an ARRL INSTRUCTOR for ur club or group or just to help in ur community, pse contact Rosalie White, WA1STO, at ARRL HQs. Once agn at all Hamfests this year, we will have the ARES forms available for u to fill out. It costs u nothing, don't even have to be a League member, but we'd love to have u or ur friend. EASTER is just around the corner so may the GOOD LORD BLESS YOU AND YOUR FAMILY. 73, Eddy. Traffic: WB4DVZ 292, WD4COL 172, WB4WQL 148, KC4BHX 128, WA4TCT 103, KA4HFE 94, K4ZUY 79, KJ4NK 75, N4UZ 45, W4HON 34, W4RWB 20, N4MWR 16, K4JNL 13, K4BAI 8.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—ASM: Bill, KB4LB. OOC: John, AB6I. TC: Ed, W8RAO. BM: Dave, N4GMU. PIO: Peley, WA4PUO. SEC: Rudy, WA4PUP. SGL: John, KC4N. STN: Rip, AA4HT. Officers for 1989 for DBARA are Paul, AA4ZB. Pres: John, N4EE. VP: Jim, N4NKK. Secy: and Bill, W4MPU. Treas. LMARS has Bruce, KL7IV, for Pres; Fred, W4FI, as VP; Carol, N4OWW. Secy and Ginny, KJ4HS, for Treas. Sky High ARC, Pres is Ron, KK4HS; VP Bill, KB4ZUG; Sec, June, KB4SLT, and Treas. Cotton, KB9LT. We wish all these officers and clubs the strength to grow in 1989 and years to come, to keep our hobby alive and well!! As I am notified of other elections, you may watch for them, here.

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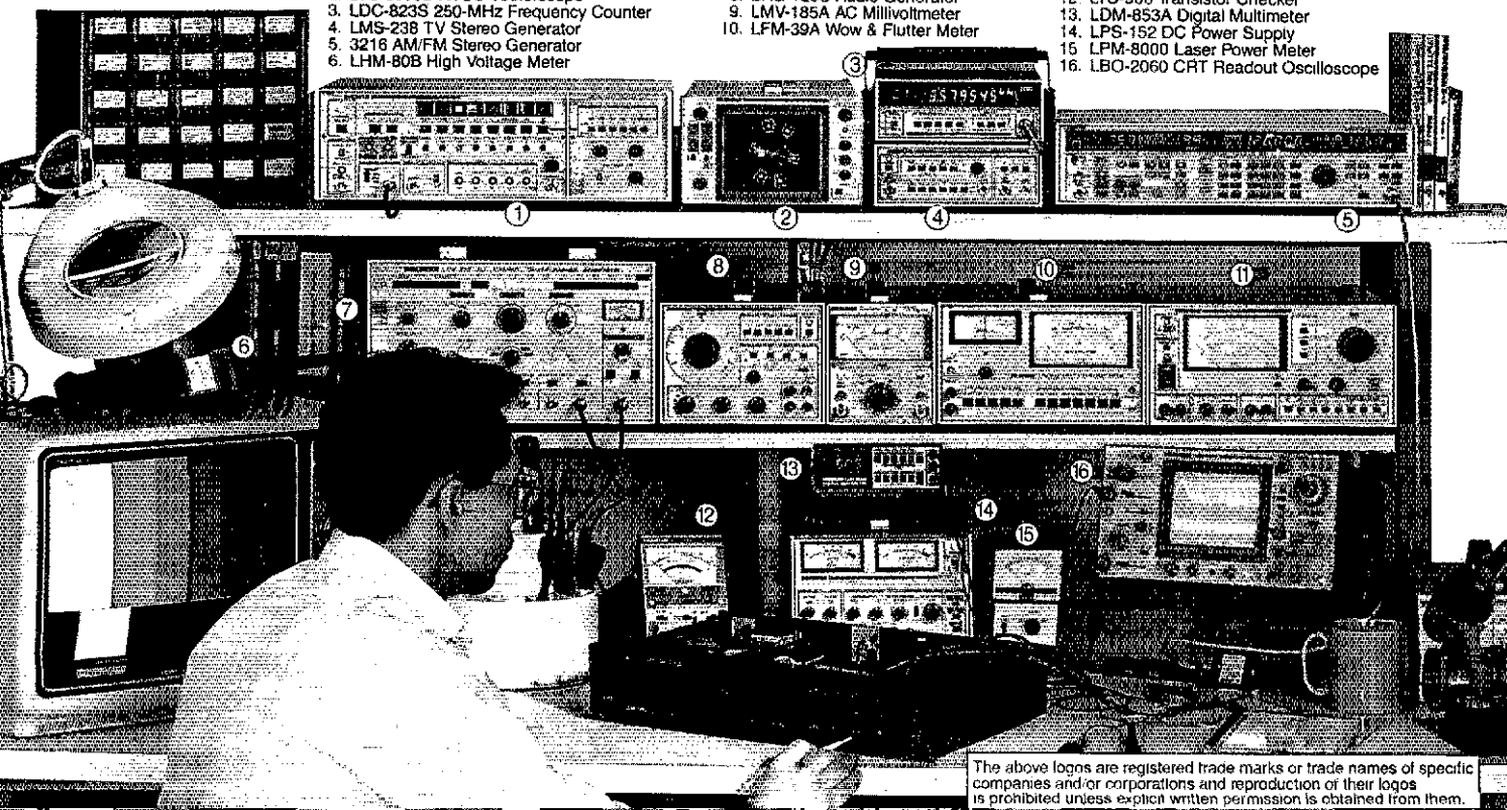
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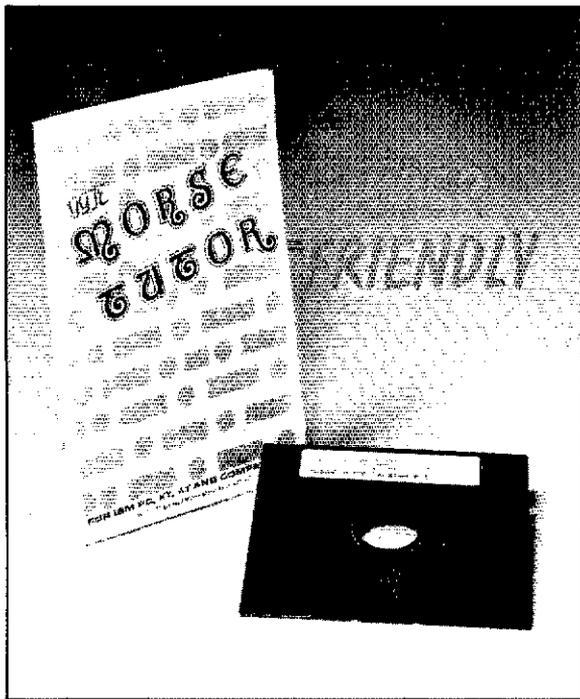
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We are still trying to locate a person to be our ACC. It is with a position which brings contacts with all the clubs in the Section, to help them become affiliated with ARRL and also to be included in the Special Service Club Roster. So if you know of someone who would do this, please let me have their names for further contact. Our Official Observer Corps is growing with the addition of several new calls. We now have a written Local Memorandum of Understanding between our Florida Sections and the three Florida FCC Field Offices. We also have available the services of a Southeast Regional Monitoring Station for the SMs and OOCs to pass along details of events which are in violation of Part 97 Rules. If you want to join the group, drop me a line and I'll see that the proper OOC gets the data. You must pass a written test to qualify! But don't let that stop you. 73, Roy, N4ADI. Traffic: WD4II 1841, AA4HT 954, WX4H 882, WA4QXT 816, KB9L 743, WC4D 494, N4SS 469, KB4B 440, W7YWF 410, N4UAV 359, AA4FG 340, N4GMU 217, N4DY 167, W4KX 160, N2AOX 132, W4MGO 128, WA4EYU 123, K14CQ 98, WB4TZR 90, WB3AVZ 89, N4JAO 80, N4JHI 79, N4QYB 77, WD4EQB 46, W4DTV 43, N17GV 43, N4ADI 39, WD4FYJ 35, K14NN 30, N4NKI 28, K4CY 24, WA4SKW 24, WA4PUP 21, KA4KAH 20, KB4KFH 19, KB4WUK 19, KJ4HS 18, W4AT 16, W8IM 15, WB4JUH 10, N4OZD 7, W4ILE 6. (Nov.) WA4PUP 25, KK4VK 12.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK. SEC: W4SS. STM: K4ZK. TC: K14T. EM: WD4KWB, PIO: N4PBF. SGL: KC4N. OOC: W4TAH. ACC: K4EUK. Packet Mgr: K4CY. WD4KWB reports 67 bulletins received and 133 sent by W4DL 59, WA4EIC 65, WT4F 31, WD4KBW 24, and WA9VND 22. W4V5Z reports that a recent exercise at Port Everglades involving the USS Wisconsin resulted in 100 man hours in a 48 hour period and that 201 messages were sent for the crew, as well as 26 for civilian visitors. N4KNP, EC for Collier County, sent information relative to a hazardous-chemical spill caused by an overturned tractor-trailer in the Golden Gates Estates about 18 miles east of Naples. Phone patches provided communication between the firemen and Chemtrac, the Miami Weather Bureau as well as the shipper in North Carolina. Hams assisting were WB2WPA, WD4AQW, N4KNP, KA4EGP, N8DIQ, WB8RAZ, W9OAO, WD4FLY, K1JBL, KC6YD, N5EVE, KA4YWC, and WB4FUS. The Tampa ARC QRM had an article by AB4EC regarding the startup of a CW net for fun as well as practice - AB4EC is also active on QFN5, the All Florida Slow CW Traffic Net. The Manasota Repeater Assoc. reports new officers for 1989 are: President K4WV, Vice President KB4EXI, Treasurer KB1ZO. The Secretary position remains unfilled. The Palmetto ARC's Bug Juice reports that the main repeater came back from the factory damaged and so it went back. The amplifier also failed and is temporarily out of service. The Englewood ARS newsletter reports that the Novice class at the Lemon Bay High School had three students pass—Nancy Nees, Bo Saunders and Steve Beimer. New officers for 1989 for the Everglades ARC are: President WD4MRT, Vice President WD4PWC, Secretary AL7HW and Treasurer WB4JFA. K4OQ spoke at the Gator Chapter CQWA about the Russian satellite that is in orbit with a Soviet amateur aboard. The South Brevard ARC had an excellent program consisting of both rocket and shuttle launches from the Space Center presented by Mr. Gatha Cottee. The Martin County ARA in cooperation with the Martin County Adult Education Dept plans to offer both Technician and General ham courses starting in January. K4FQU reports that the Southwest Florida Traffic Net is continuing their "Traffic Day" as a way to encourage more participation in traffic handling on the net. Congrats to KM4LP ex N4SDS who is now advanced class. AA4CH reporting for WASVI said that the Everglades ARC operated a special event station at the Everglades National Park with 12 operators, 6 stations and 350 contacts on 6 bands. The ARRL Information Net meets on 7235 each Saturday morning at 9AM—it you handle formal traffic using the packet mode this is certainly a good net to participate in. 73 de WA4PFK. Traffic: W3CUL 3135, WA9VND 1339, W3VFR 1221, K4SCL 1150, KB4KXV 741, AL7IN 736, K4ZK 645, WA4PFK 600, WA4EIC 561, W4NFK 536, AA4BN 482, K4IA 461, K4EUK 452, KJ4L 397, N4HAP 360, W4MVP 308, W4V5Z 303, WA4RUE 303, KA4FZJ 289, WD4KBW 242, WA4NBE 242, WB4WYG 214, KD4GR 212, W4DL 202, KY4U 193, WD4CHO 168, N4MML 156, K4FQU 144, WT4F 133, N4ET 128, W1JUN 125, N4HAS 104, KC4VK 89, W4DWN 87, K14WJ 85, KY8Y 83, KB4MON 80, WA4HXU 80, KA4YHS 76, KM4LP 73, N4ORZ 69, KA4NFX 69, KB4UHC 64, W4TLV 61, N4OIA 59, KA4SIH 52, KA4AJR 49, N4KFU 44, K4JL 43, KB4UIA 41, AA4CH 37, W1KAM 36, W3JIR 36, KF4RL 35, WB4GCK 28, K14ZW 26, N1EGN 25, K9EHP 24, K4GHT 24, WD9AEP 23, KF4JA 22, KA9AKY 22, N4RHJ 21, W4UIO 18, WD4NXX 14, W4VQE 13, N2COJ 13, KB4LPL 12, N4ILN 10, KA9YF 10, W4MPV 7, WA4PI 6, KA4GDU 6, K3KT 5, KB4TIU 5, W4LLC 4, KC4HJ 4, N4BAC 4, KA2KNZ 4, N4TGV 3, N4PSV 3, W4MFD 2, W4NSY 1. (Nov.) KC4VK 44, W4MPV 6, AA4IF 1.

VIRGIN ISLANDS: SM, Ron Hall, KP2N—ASM: KV4JC. SEC: NP2B. STM: NP2E. NM: VP2VI. Winter brings many ham visitors to our islands. New calls are heard via the repeaters with many attending the weekly VIARC lunch on St. Thomas. Welcome to our guests. Drew, NP2E, has agreed to become the STM and "give it a go." We are all behind you, Drew. Anyone wishing a section appointment contact SM, ASM, SEC & STM. 11 new Novices passed exams on St. Thomas and 3 on St. Croix. Upgrades: N6THG & KC4ALE to Advanced, WP2AGA, to Tech. 48 attended the VIARC potluck on Christmas day at Megans Bay beach. Lots of good food & eye-ball QSOs. Participating in ARRL 10 meter test were: WP2ABM, NP2CM, NP2E, KP2A & KP2N. St. Croix ARES check-ins for Dec. 5 & QNI 26. St. Thomas/St. John Sec 4 QNI 18. W21BJ reports the 10M repeater 29.56/66 in good shape with plenty of use. NP2BO back with new Paragon. Invite all VI hams to check in 1984 VIN at 0001Z daily. 73 from "America's Paradise."

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NMs: K7POF, K6LL, K16ZB. ARCA will sponsor two events this year: So. Mtn. Swapmeet 12 March, and Ft. Tutthill hamfest July 28-30. Mark your calendars. Geo, W1RGH, was elected to Sun City West Sheriff's posse for outstanding service in communications. Congrats. WC7R reports that ARES

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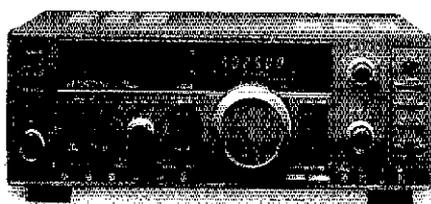
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members responded to emergency call from Yavapai Co. Emergency Service Director for communications during a gas leak at a local hotel in Prescott. Art, NN7A, planning another trip to Belize Feb 17. Will operate in ARRL DX test as V33JZ. London Bridge ARC requested info on forming an ARES net in Lake Havasu City area. Contact is N7JIG, K7CO, Tucson, became a Silent Key in Dec. West Valley 2-Meter Net meets on Del Webb repeater (145.29 out/144.69 in) Wednesdays at 7 PM. Visitors welcome to check in. DXers note that effective Feb 1, ARRL fee for outgoing QSL bureau will increase from \$1 to \$2 per pound. (Still a bargain.) Package of 10 cards or less will remain at the \$1 rate. Your SM will visit the Superstition ARC at their Feb. meeting on Feb. 21. I have been re-elected as your SM for a new term beginning 1 April. I am delighted to serve you, but do need some help. Those of you holding Station Appointments and wishing to renew them should get in touch with me. Regular activity reports and ARRL membership are required. For those appointees who have not reported during the past year, unless you request renewal by 1 May, I shall take this as an indication that you do NOT want to renew and shall cancel the appointment. Thanks. W7GAQ passed his Extra Class exam in Dec., and is now awaiting his new call sign. Congrats, John. 73 to all and keep those cards and letters coming in! Jim.

NET	QNI	Traffic	Ses	Liaisons
South West Net				TWN
Arizona Cactus Net (HF)	581	169	31	TWN
Arizona Cactus Net (VHF)	281	107	31	ACN (HF)
Arizona Tlc & Emerg Net	1025	357	31	TWN

Traffic: W7AMM 691, W7EP 338, W7KCM 241, W1FJL 233, N7ETP 92, W7OIF 86, W7GAQ 76, K7VVC 74, W7KXE 40, K7POF 24.

LOS ANGELES: SM, Phineas J. Icenbice, W6BF—Congratulations to K6AIZ, Maurice Rotheiser who was elected president of the Al Malaikah Amateur Radio Shrine Club for 1989. The Sec/Treas is KA6PYT, Bill Harder (213) 684-2908. The Al Malaikah AR Shrine Club runs a forty meter net every Sunday morning for the patients of the Shriners Hospital for Crippled Children in LA—W7KSA was heard telling a DL station that he would have a clear channel if he held his schedule with a VE down below the American phone band on 20 meters. Someone said we should let foreign hams visiting the US use only the frequencies that are off limits to the US hams so that they could talk back home, since most visitors have as their first priority the desire to call home anyway. It is said that Poncho called a group of business men together to find out why his phony money was being devaluated. He told them that his picture was on the paper, and that should make it good. He said after a pause that the bills were lithographed and that should make them good. Finally after a long pause, a quiet businessman spoke up to inform Poncho that it must be the "Law of supply and demand" that caused the devaluation. Poncho turned to his aide and said repeat that law. The moral of the story is that you too can repeal some law if you try. Anyway, that is one version of how the law of supply and demand was repealed.—Some people are re-writing our FCC laws, and if you don't get your comments in now, it may be too late.—According to the TRW ARC bulletin, you should organize a trip to see the Voice of America radio station—250 kW on SSB into 28 dB gain antennas. Bill Dews, K6AWO, author of the article says that you should plan to visit a station like this at least once in your lifetime.—The TRW bulletin has an excellent FULL RELEASE OF ALL CLAIMS on one page that some clubs may want to use. (Dec. 88 issue)—Congratulations to N6RO, Jim Hoff, who was elected president of the Associated Radio Amateurs of Long Beach. (W6RO, the club station is on the Queen Mary) Joann Thill, KA6UMX, is the Secretary of this great club.—According to the San Gabriel Valley Radio Club bulletin, TORRA (Tournament of Roses Radio Amateurs) were scheduled three meetings in December to make certain that everyone knew that the Rose Parade was scheduled for Jan 2nd. An excellent one page report of TORRA hams working the Rose Parade was published in the LA Times with over one million circulation—N6MAD, Kathleen reports traffic on W6FNR/R for Dec 88 as 367 pieces of traffic handled by 20 operators. The top traffic handlers were N6NYK, 154, N6LTQ 46, KB6GGX, 40, KB6DDV 26, N6AHT 24, N6MJY 18, K8IDU 17, KG8ZD 14. Yes, we do have an AWARDS MANAGER in Los Angeles County. His call is K18BU, Henry De Kastrozza, 7523 Calvin Ave., Reseda, CA 91335. (818) 993-7736.—73 & GOOD DX. See u on 14,160 kHz or 21,299.5 kHz or on almost any good, clear frequency that is loaded with DX. STM News: Well we are starting a new year. It's been pretty good these last few months. By the way, received our first packet traffic this month from Bob Poole with a large total. Seems that we may have some new check-ins from now on. W6INH is no longer manager of Region Six traffic net. He is taking a well-needed rest, but will still be active as time dictates. K6UYK has big Christmas total also. Looks as though packet will be the big one next year. Traffic: K6UYK 939, AJ6F (PBBS) 849, W6INH 357, W6TH 162, N7CZF 154, W6SAN 134.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Riv. Co. Bob, W6LKN. (714) 686-3823. ASM: Org. Ralph, W6BJI (714) 779-9272. ASM: San Ber. Co. Ken, W6ZEF. (714) 983-1272. ARC activity, WARA. Congratulations, Gene, KB6CMO, "Ham of the Year" for WARA. From CNARC "Ham of the Year" goes to Fred, W6TKV (good now, Mr. Roberts). The RCARA "LEJO" award went to Jeff, N6FRW (at the right place, wrong time.) Yucaipa VARC, new pres, Don, W6RTM, VP Fred, KG8QN, Sec Jim, N6PUH, Treas Anns KB6BLT, 220 SMA Officers. Pres Karl, N6BVU. VP Frank W6BELF, Sec. Spud, K6KH, Treas Marshall, W6IYZ. This group has done a fantastic job, not only in 220 freq coordination matters, but has set the pace for our 220/FCC confrontation. World-famous ARS W6AM Don Wallace Ranch Foundation, a non-profit group needs assistance in memorabilia and station restoration. For further info, contact Don Wallace Museum, 30930 Hawthorne Blvd, Rancho Palos Verdes, CA 90274. Public Relations. On Dec 9th, Art, W6EA, gave a talk on amateur radio at Braille Institute Anaheim. His audience handled electronic components and hand key, with a CW demo. The talk went over so well that Art has been asked to come back again. Nice going, Art. Leo Myerson, W6GFC, has appeared on both local TV stations, been the subject of many news programs, and featured in a news article. What did Leo do? What Ham Radio is all about, assisting the public with comm in a time of need. Leo has been passing traffic, seeing H/W

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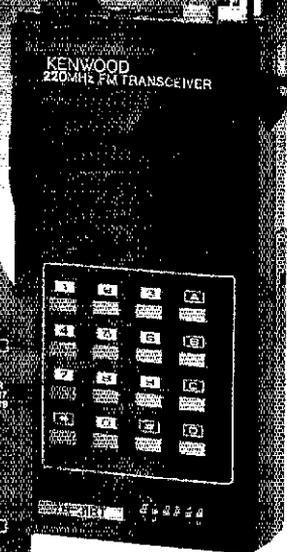
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Satellite Experimenter's Handbook

This 208-page classic book on amateur satellites was written by Dr. Marvin Davidoff, K2UBC and published by ARRL in 1984. Under one cover is what the Amateur Radio Operator needs to know in order to communicate through the OSCAR satellites. Thousands of ham radio operators, scientists, educators, and satellite enthusiasts have used these "birds" for pleasure, education and experimentation. \$10.00.

AMSAT Space Symposium

This conference was held in conjunction with the 1987 Amsat Annual Meeting in Southfield, MI, Nov. 6-8, 1987. 11 papers are presented with topics on: trends in spacecraft technology, and space science education. FO-12 mailbox, QRP EME, Phase III-C and Phase IV developments in orbital determination and attitude control. Over 100 pages \$12.

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MRF151G	170.00	MRF660	10.75	MRF901	1.25
MRF153	395.00	MRF663,F	22.50	MRF911	2.00
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MRF171	34.50	MRF1946,A	15.00	N41137/35K124	3.25
MRF172	58.75	PT9847	21.00	J310	1.00
MRF174	80.00	RF120	22.00	U309	1.75
MRF208	14.50	SD1229	12.00	U310	1.75
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MRF260	8.00	2N3771	3.50	M57110A use SAV6	
MRF261	9.00	2N3866	1.25	M57113	49.50
MRF262	9.00	2N4048	11.95	M57126	57.75
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MRF316	64.50	2N5591	13.50	M5737 148	48.50
MRF317	59.75	2N5641	12.00	M57745	87.00
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MRF421	24.00	2N6080	7.50	SC1027 use SAU4	
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into relating to the Armenian earthquake. In doing this, he has not only helped those needing the info, he has given ham radio much needed positive publicity. Keep up the good work, Leo, de CVARC. OOC Nick, KA6GUY. Several interference problems under investigation, some resolved, others still active. Orange/La Section OO's skills were activated to assist TORA (Rose Parade) with possible interference problems. The OO action was concluded a success. NTS Dan, WF60, 8TM. A good year for NTS, packet developed more and complemented CW/voice nets. Relations with ARCS/RACES developed as formal liaison was established in Oregon. Co. Hope this process develops in other counties of the Section. In TX traffic people, PSHR, WF60 144, W6QCBZ 77, KA6TND/T 5X, KA6HJK/T 41, BP, WA6YNT 1 and WF60. Traffic totals: WF60 1277, WA6YNT 1-838, W6QCBZ 245, KA6HJK 183, K6DD 152, N6GOT 144, ADPA 139, K6ZCE 101, KA6GND 72, N6OKS 68, WA6QCA 62, W6CPB 60, W6SX 23, W6NTN 16, K6BBP 14, W5TZR 7, K16X 2.

SAN DIEGO: SM, Arthur R. Smith, W6INI—SEC: W6INI. STM: N6GW. PIO: N6PKY. TC: N6JZE. New OOs: W16B, W6WE6. New OOS: N6VFO. N6NJK continues to represent El Cajon ARC as ARRL Asst Dir and K6QM for South Bay ARS. K6SJA is member of South Bay Red Cross Disaster Action Team. Attn clubs: new members for ARRL and renews thru club benefit club's treasury. 1988 club officers: PALOMAR ARC Pres W9FQJ, VP NH5EW, Sec W6HCD, Treas W6AB; NORTH SHORES ARC Pres W6SAX, VP K6OBS, Sec N6QD, Treas N6OVR, K6BPCF now edits North Shores ARC BEAM. Upgrades: N6CDA to Extra, N6RKP to Adv, K6CBST to Tech. Call sign changes: K6ZIM to AA6KY, W6ISV to N6TUR, K6BOXS to N6TRS. Potter Jr HI club (Fallbrook) has new tri-band beam thru efforts of WF6I and W6APFD. Personal computer meets Wednesdays at 2100 on W6WNG, 146.73 (-). K65MU cautions that transmission of copyrighted computer software by packet violates Part 97.116 as well as copyright laws! Santa Ana winds continued into Dec and ARS members provided Red Flag Patrols on Dec 6 & 9. NCTN: 30 sessions, 220 msg, 457 ck-ins. Traffic: K16X 597, W6K 207, N6GW 124, K6BPCF 123, K16ZM 71, N6RVO 48.

SANTA BARBARA: SM, Thomas J. Geiger, W2KVA—ASMs: N6MA/W6AKF/W6B8YU. ACC: K6BAH. BM: K16XG. STM: N6WP. OOC: W6AKF. PIO: N6GUL. TC: W6KJV. SEC: W6BIIY. DEC: W6B6R/V/K6GK/K16XG/W6BIIY. Our Section Technical Coordinator, W6KVF, has accepted an LIC appointment... perhaps the first such in the country without a concurrent Official Observer appointment. (We DO try to do things differently here!) With John working in the northern part of the section, and Mike, W6AKF in the southern realm, we should have things rolling along pretty soon. If you'd like to help, would like to learn more, or have interest in forming a LOCAL Local Interference Committee (under the umbrella of the Section LIC), please contact W6AKF, W6KJV or me. Remember that what affects one of us ultimately affects us all. (If you have seemingly "insurmountable" RFI problems we can try to help resolve them, too.) Congratulations to the newly elected officers of the Conejo Valley ARC, installed at their banquet on 12/03/88: Pres: Tom Richie, N6FBH; V.P.: Brad Ormsby, W6AGLE; Sec/Treas: Marjorie Larson, K6BYGD and Field Day Chairman: Ron Feldstein, K6ZGM. Congratulations also to the new officers of the Ventura County ARC: Pres: Dick George, W6JLOX; V.P.: Denney Pistole, W6FFPX; Sec: Mac Shroyer, K6VMN; Treas: Bob Bond, W6BNCN and "KEYER": Editor, Steve Noll, W6AEJO. SPECIAL FELICITATIONS TO THE VENTURA COUNTY ARC (K6MEP) ON COMPLETING THEIR FIFTIETH YEAR AS A ARRL AFFILIATED CLUB! That is an achievement to be proud of. More about Ventura Co. ARC next month, when K6MEP will be the first of the Section's clubs to be profiled in this column. Speaking of achievements, one of our own was involved in another remarkable story of hams getting the message through. Seems that N6CQJ in Dayton, OH, had just gotten back on the air, and into packet radio, when an acquaintance asked him to send some emergency traffic to the Philippines. He relayed the traffic via 2 meter packet to N6GTC in Brookville, IN, who forwarded to W6AKF-10 (10 meters) in Newbury Park. Mike happened to be watching, and immediately forwarded to W6CUS-1 (Richmond, CA, Red Cross) via 40 meters. From Richmond the traffic went to DUGEH via 20 meter packet, and was delivered. Elapsed time from origination to delivery... 2 hours! A hearty "WELL DONE" to all involved! Incidentally, Mike reminds us that he has all the W1A/W Gateway, ARRL, and AMSAT Bulletins available on W6AKF-1 (access direct or via W6AZSN-3). Those living in the southern part of the Section can reach me by logging on to W6AKF-1 and "sending" traffic to me (W2KVA). Mike will auto-forward it W6WQCP-1. Related congratulations to W6AGVNO, whose call somehow got lost from the August upgrade listings. Mel got his Extra at the Santa Barbara VEC session, and is now busily raking in those DXCC counters in the low end of the bands. Congrats also to Lucy Mau, whose new Novice call is WH6CAU and to all those who upgraded in November and December. (Your calls will be listed next month.) That's all we have room for this time. 73 for now.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC—Asst. SM: K5MXQ. STM: W5VMP. BM: W5QXX. PIO: K5HGL. OOC: W5JBP. SGL: N1CWP. TC: W5LNL. ACC: W5UPL. Congrats to our traffic handlers here in our Section for a job well done in spreading holiday cheer via amateur radio during the past two months. Special kudos to K5JFN and K5SBL, who handled well over 1000 pieces of traffic each during this time, earning the coveted BPL (Brass Pounder's League) Medallion. The nets were loaded with traffic in December, with TTN reporting QTC of 363; 7290 with 1,088; and GAN-1 with 1,378. PSHR for December: K5BL W5YQZ K5UPN K5MXQ W5BCPY and N5KGL. Traffic: K5UPN 833, K5BL 698, W5YQZ 469, W9OYL 281, K5MXQ 264, W5VMP 233, N5KGL 136, K5SRC 134, W5BCPY 106, W5ZN 71, W5XO 65, K6BVG 62, W5E2T 17. (Nov.) W5ZN 75.

OKLAHOMA: SM, Joe Lynch, N6CL—It is with deep sadness that I report the passing of Raymond Willis, W5ATO. Raymond will leave a void in the many lives he touched. Raymond, we will always miss your salutation, "W5ATO, on the rock in Granite." This is the fourth Silent Key during 1988 for QCWA Chapter 63. This chapter has created an award honoring the passing of its members and giving recognition to an Oklahoma amateur. Nominations for an outstanding Oklahoma amateur are now being taken for the award. Contact W5FLO for further

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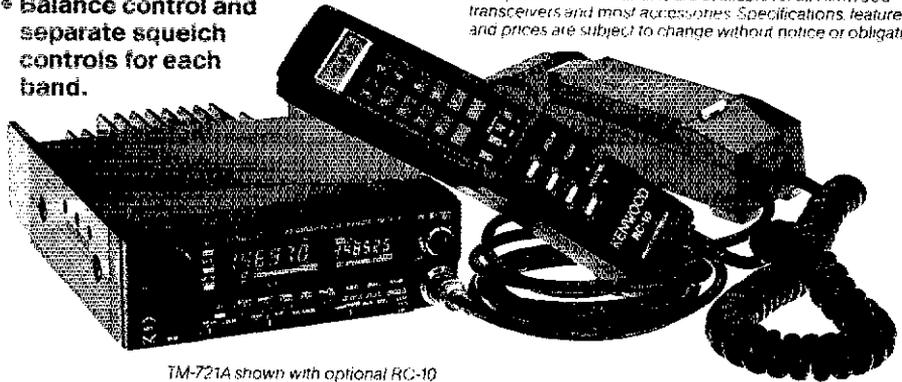
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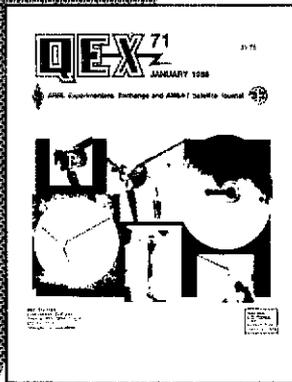
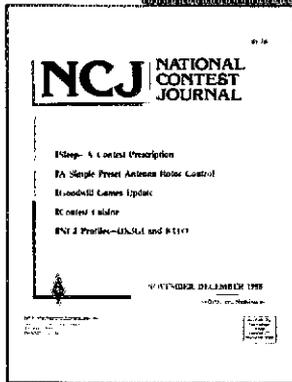
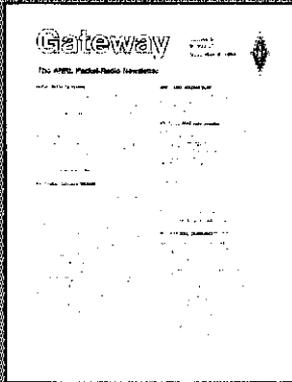
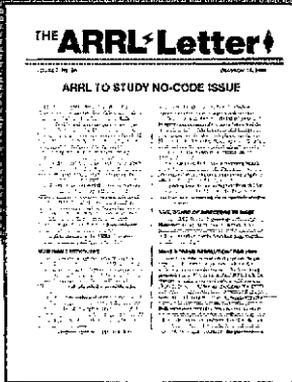
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- **SWT-1** 2 m antenna tuner
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Gateway, the ARRL Packet-Radio Newsletter, has the latest in what is happening in modern Amateur Radio digital communication: hardware, software, LANs, PBBS, and HF gateways. Biweekly for 25 issues by first class mail to ARRL members: US, \$6; Canada and Mexico, \$11; elsewhere by airmail, \$14. Non-members add \$3 to these rates.

QEX, the ARRL Experimenters Exchange, provides a medium for the exchange of ideas and information between Amateur Radio experimenters in order to document advanced technical work and support efforts to advance the state of the Amateur Radio art. Monthly. For 12 issues to ARRL members: US, \$10; Canada and Mexico by first class mail \$18; Elsewhere by airmail \$38. Non-members add \$10 to these rates.

NCJ, the National Contest Journal, features articles by top contesters, letters, hints, statistics, scores, NA Sprint and QSO Parties. Big gun or small, the **NCJ** provides a valuable source of information on the active world of competitive radio. Bimonthly for 6 issues (one year): US, \$10; Canada and Mexico by first class mail, \$11; elsewhere by airmail, \$12.

Payment must be in US funds and checks must be drawn on a bank in the US. Because of the uncertainty of postal rates the maximum term for any of the above subscriptions is 12 months, and rates are subject to change without notice.

details. Enid ARC celebrated 50 years of affiliation with ARRL at their Christmas banquet. KV5X, the new Vice-Director, presented the club with a fine plaque. Tnx to W4REC, the club received excellent publicity in the Enid newspaper. ODC, K5WG, has an excellent answer to the temptation to "jam the jammer" when being bothered by malicious interference. He says: "Never wrestle with a pig; you will only get filthy and the pig will love it." (Tnx Neon ARC for the above). Your section leaders continue to look for many good volunteers. 73. Traffic: N5IKN 250, W5RB 225, KV5X 154, KF5RD 93, K5GBN 88, K5CXP 86, W5OCHK 76, WA5OUV 64, WA5GCG 30, W5VLW 28, AA5GI 12, K5CPZ 9, NQ5Y 3.

SOUTH TEXAS: SM, Art Ross, W5KR—SEC: K5DG. PIO: WA5UZB. ACC: W5YDD. TC: NZ5U. STM: WR5O. BM: K5CVD. OOC: K5SBU. SGL: K5KJN. ASM, all of above and N5TC. KA200UVY, San Benito, reports 368 contacts on 10 and 15 mtrs. worked 36 states plus Mexico and Canada. WA2VJL rpts Texas QSO party had good results; W5NR took first place TX CW; K8EZJ, first place TX SSB; WA5DTK/4, first place non-TX, mixed SSB/CW, FL; KV4F, first place non-TX in TN, CW/SSB. The TEXAN, super bulletin of the Texas CW Traffic Net (3697kHz, 0100Z daily) rpts CW alive and growing; NMWBSJ says TEX passed 3922 msgs, had 7885 ck-Ins in 1988, with Dec traffic going more than 250 pieces above the monthly average; check in on TEX and meet a great gang and maybe Bobbie will put you on the bulletin mailing list; the actual DEC count was 546 msgs in 62 sessions. PIA NZ5J, Seguin, busy with new 621A dual bander rpts N5NAV passed General exam; EC NQ5E installed 442.5 machine in Wimberly; W5FFG installed 223.16/224.76 rptr on WR5XR for cross band operation. OBS W5KLV rpts 4 propagation fcsts, 10 bulletins given 31 readings on 7 nets in DEC. ACC W5YDD requests clubs and individual Amateurs submit their ideas to him on conduct of meetings, program planning, recruiting and anything else; he has plans for an All-Clubs Bulletin to spread the ideas. RN5 ANM W5VZ rpts RNS Dec total 509 msgs in 75 minutes; STX represented 100% by WBSJ, W5CTZ, N5GKN, WR5O, NV5L, W5D5GKH, W5TFB. OES KASQAP continues his work in AREC; glad to have him. ORS/OES W5D5GKH rpts his traffic over 500 msgs in Dec; it is his 2nd 500 + month. DRN5 NM W5YDD rpts 1381 msgs in 80 Dec sessions; STX represented 100% by K5SKQ, W5KLV, W5CTZ, W5SHZQ, W5S8KM, KESZV, W5SEPA, W5FQU, W5YDD. San Antonio ARC elected officers for 1989: KA5AWP, pres; AASHI, vp; W5NOC, treas; W5EDZ, secy; WASQZI, director; W5YQC, W5SDKK Sgts-at-Arms. 7290 Tlc Net NM W5YQC rpts 1088 msgs passed in 51 Dec sessions; 3508 check-ins; 2 NTS liaison stations per session. Brazosport ARC working on ARRL affiliation (hang tight!); the club rpr has new location, thanks to Morgan Point City Council and help from 272nd Army National Guard (La Porte); that is real community cooperation!! PIA KA5EEG, Bronham ARC, rpts 3 new Technicians: N5NMX, N5NMV, K5SHOE; clubs 1989 officers are KA5EEG, pres; W5HTI, vp; N5GCU, secy; W5RFG, treas. C.H.A.R.L.O., Brownsville, officers for 1989: KA5RTV, pres; KA5LOO, vp; KA5PXS, secy/treas.

WEST TEXAS: SM, Milly Wise, W5OVH—On 12-15-88 the West Texas Connection was linked into San Antonio via a dedicated wireline. The Freq. is 146.46 simplex and will eventually link into 147.24 San Antonio and Eunice, NM. The counties that went with the NTX section are Willbarger, Baylor and Throckmorton. W5ES, El Paso ARC, started a new radio class Sat. Jan 21—EPARC announces the competition in the WAE (Worked All El Paso) contest was terrific as 217 WAE certificates were awarded to out of town hams, two WAE station seals and four 75-station seals were awarded. On Jan. 5th, the Section Manager's Net of the West Texas section was called by Milly Wise, W5OVH, Section Manager. The net will be held every month on the first and third Thurs. at 0100 Zulu on 3931 plus or minus 5 kHz for rough conx. Gordon Howard, W5GDD is net manager for the WTX SM Net. Alt. NCS is Les Bannon, W5FE. ASM Glen, KA5PTG, reports the third annual North Pole Net was a success at the NW Texas Hosp. Also that father, N5AE, and son, N5IFA, with Mom graduated from the same college together. Paul Gilbert, KE5ZV, West Texas PIO advises a 75 foot tower has been donated to Snyder ARC, but it is currently in vertical storage, and they hope to have it up soon. Two members of the Big Bend Emergency Net deserve a big hand. 1. KC6RP made all the national papers as the first black to become a member of the real Texas Rangers, and has been a member of the BB emerg. net since 1978. Living in Eagle Pass with the call of W5UYV. 2. San Angelo ARC has picked KE5EI, Jim Robert Lee, as "Ham of the Year." Panhandle ARC of Amarillo elected as Pres., Jim Ogle, W5UDX. The Big Spring ARC have new club officers, K5SECU. Jim is Pres. The Sun City ARC K5WPH of El Paso has now become affiliated with ARRL again, and we welcome them back. Ray Colbert, W5XE is pres. Traffic: W5GF 1208, A5I 211, W5ERT 54, K5KKO 33, KE5VH 30.

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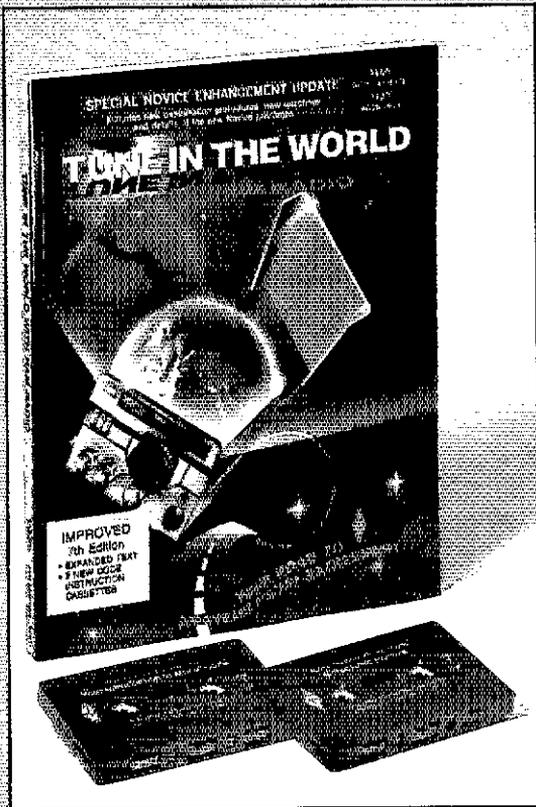
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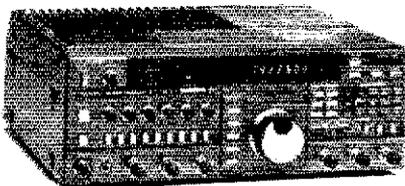
something about their new privileges and that's where the expanded *Tune in the World with Ham Radio* text comes in. You'll find what you need to know explained in clear, concise bite-sized chunks of information. You'll find all 300 possible questions on the Novice exam with their distractors and answer key. Besides improving the text, we've added almost three times the code practice material to the package in the form of two C-90 tape cassettes. One tape teaches the code, the other provides practice. They are recorded in stereo so you can switch off the voice portion for even more practice. These new tapes make learning the code a snap!



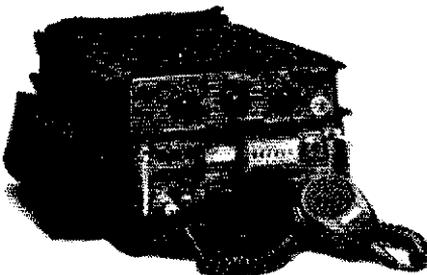
The *Tune in the World with Ham Radio* package including the text and both tapes is available for \$15. The text alone is \$12 and the set of tapes is \$10. Add \$3.50 for shipping and handling.



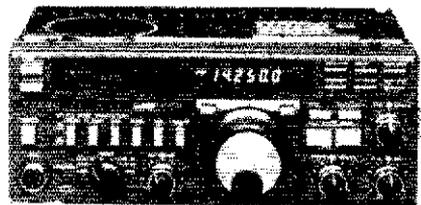
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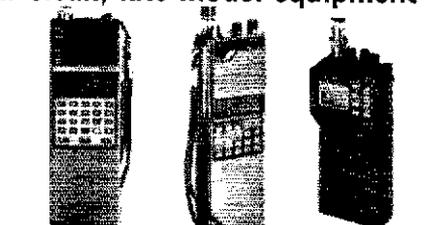


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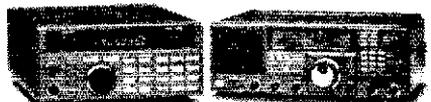
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ICOM's Helpful Hints on Grounding & Lightning Protection

ICOM's technical representatives receive a number of questions concerning station grounding techniques and lightning protection and, since their information is beneficial to all amateurs, this *Tech Talk* shares those views. **Customer support is a major part of the ICOM package.** That is one reason ICOM continues this Tech Talk series and continuously maintains a customer service hotline for your assistance. Would you expect less from today's leading manufacturer of top-line equipment?

A good ground system is important to all fixed, mobile and portable setups because it assures maximum antenna radiating efficiency. In many cases, an effective ground is also good shock and lightning protection. Low resistance grounds are especially desirable when using vertical and/or longwire antennas, as they create a vital mirror image of the emission section. In several respects, this low resistance ground can be analogized to an auto's battery connections. We clean them to a shiny finish when an auto fails to start, and Bingo...success! By removing a mere tenth of an ohm resistance during that 100 ampere current flow, full power was directed to the engine for starting.

Applying this same concept to your antenna illustrates that a greater amount of your rig's RF power will be radiated rather than dissipated as heat when an effective ground is used. Conversely, a poor ground encourages undesired radiations that causes TVI and/or RF feedback. The latter condition is recognized by a mic, key or rig cabinet that is hot with RF energy when transmitting. It may also appear as growls on your transmitted signal, an erratic meter reading, or a power supply that seemingly overloads without reason. RF feedback is usually more noticeable on one band than

another. A good ground, however, puts improperly directed power to use and noticeably improves your transmitted signal strength (and quality!).

While you can install 100-plus half wavelength radials or continuously drench your yard with saltwater, a basic yet very effective station ground can be implemented quite easily. You can later expand its design to fit personal desires. Your ground system should interconnect the metal cabinets of all items like transceiver, AC supply, antenna tuner, etc. to an indoor "tie point." That point, in turn, connects to your outdoor ground system via a short and large size cable.

A convenient way to make your indoor tie point involves tacking a long copper strap or a strip of large metal braid to your desk's rear edge (the shield removed from an excess piece of RG-8 coax works well). Short jumpers fitted with alligator clips are then used to connect each station item to the ground strap. ICOM transceivers include a rear post with a wing nut especially for this purpose. A heavy cable of the shortest possible length is then connected to your outdoor ground system, which is assembled as follows.

Install four 6- to 8-foot long copper rods placed roughly one-foot apart in the earth near your station. Less than a foot of each rod should extend above the earth. Clean the rod ends with steel wool, then use heavy cable to interconnect the rods. Finally, securely connect the heavy cable from the outdoor ground system to your indoor tie point. If an outdoor cold water pipe is nearby, make sure that most effective ground point is also connected to your copper rods. Periodically check all connections, as only a couple of ohms resistance creates heat and energy losses (remember our previous auto battery analogy).

Ground cables longer than 15 or 20 feet occasionally act like undesired miniature

antennas, and support RF feedback or TVI. That effect can be minimized by wrapping three or four turns of cable through two- or three-inch diameter toroid cores installed every three to four feet along the ground cable's length.

ICOM's previous notes on common point grounding are also very important to good HF mobile performance. Your transceiver's cabinet, antenna tuner, and antenna's ground lead (that is, its coax shield) should all be solidly connected to your auto's steel frame via thick straps. After their installation, use your Volt-Ohm Meter to assure low resistance and good DX effectiveness.

While grounding your antennas during storms is always sound advice, ICOM also adds the following suggestions. Adopt a standard operating procedure of unplugging both the AC power cord and antenna lead to your rig after each operation. If an "always plugged-in" clock or lamp sits atop your prized transceiver, relocate it. Lightning charges from either of those inlets are less apt to damage equipment merely sitting on a desk.

Need more information on equipment grounding or transceiver installation? ICOM's exclusive **customer service hotline at (206)454-7619** stands ready to serve you with guiding information from today's most knowledgeable technicians. We request keeping your calls brief so everyone can get assistance. ICOM also has an informative pamphlet on grounding available upon request. Why is ICOM giving you helpful advice on station assembly rather than advertising equipment on this page? Simple. ICOM Service and customer support are, like ICOM equipment, tops in the industry. Together they are your winning team for long-term amateur radio enjoyment. Don't settle for less!

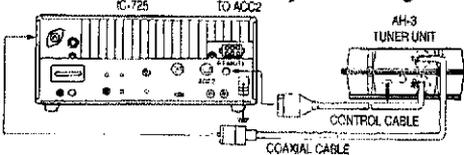


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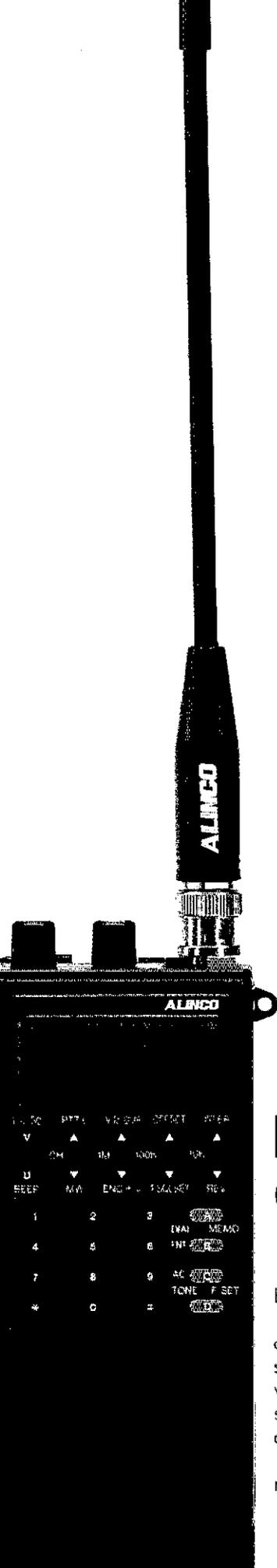
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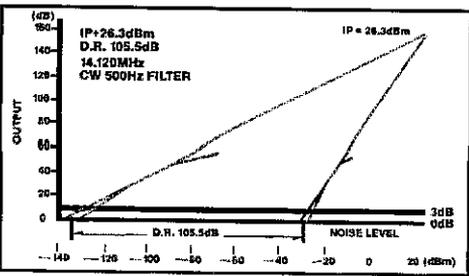
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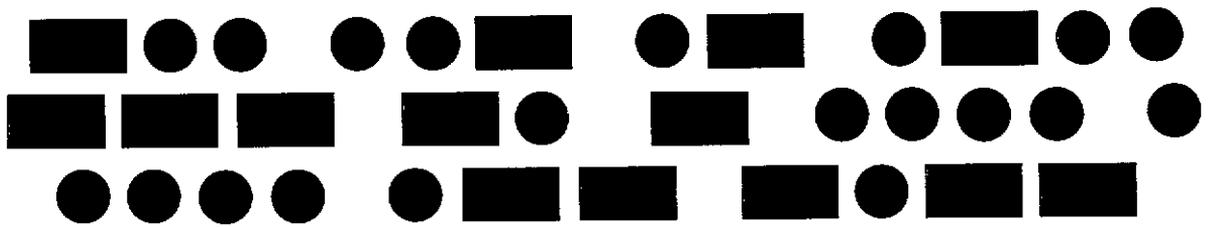


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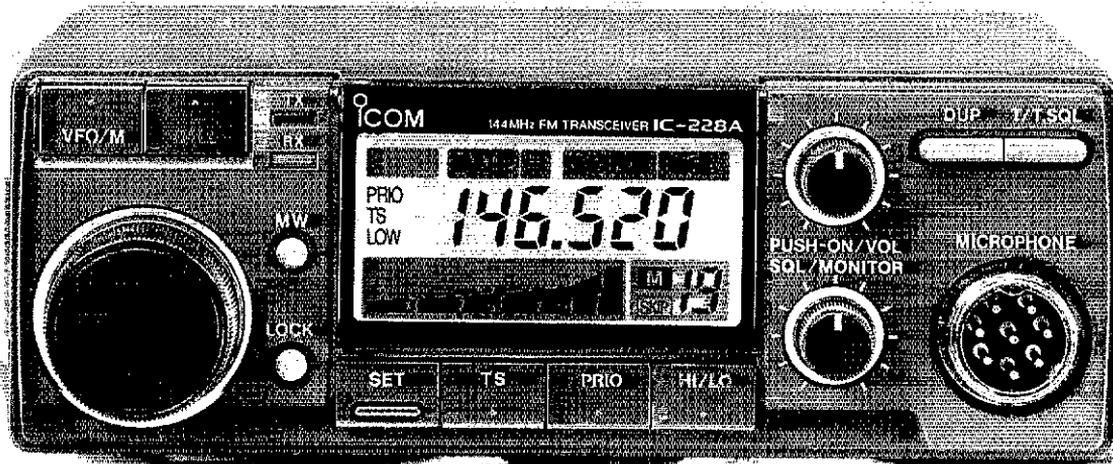
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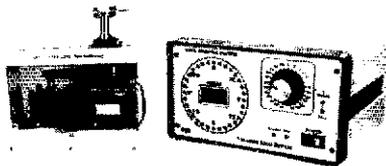
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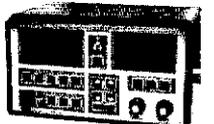
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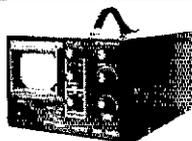


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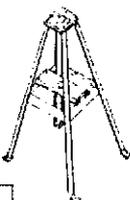
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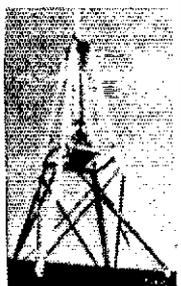
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MODEL	HEIGHT	MAXIMUM ANTENNA WIND LOAD IN FT 2	BASE WIDTH	MAX. VERT. LOAD LBS.	TOWER WEIGHT LBS.	PRICE
CR-18	5'10"	21 @ 90 MPH	31-173"	440	28	129.00
CR-30	9'10"	27 @ 90 MPH	39"	1322	39	224.00
CR-45	14'9"	23 @ 90 MPH	39"	981	50	328.00
CK46	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2"					52.00

*GUYING IS REQUIRED ON ALL ROOF TOWERS. UPS SHIPPABLE

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ALLIANCE HD73 --- CALL!

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TH5MK2S	5 el triband	C	
EX-14	4 el triband	A	P
TH3JRS	3 el 750N pep	L	R
18AV1S	5 band trap vert	L	I
14AV0S	4 band trap vert	L	C
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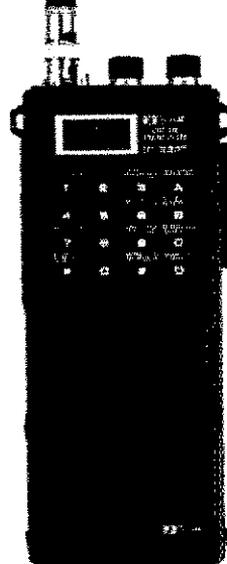
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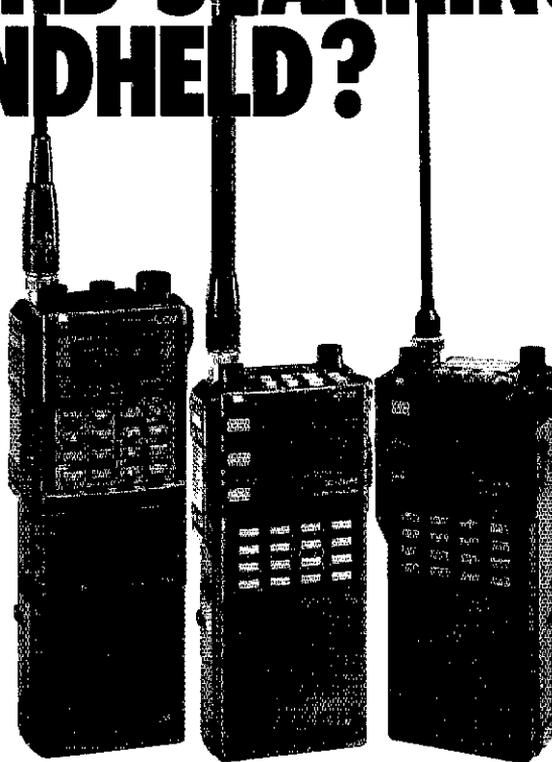
IC-4GAT: 6 Watts 440-450MHz

IC-32AT: 5 Watts Rx 138-174MHz/440-450MHz
Tx 140-150MHz/440-450MHz

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- **Additional Features.** Battery saver, call channel, all subaudible tones, multi-function LCD readout and DTMF pad.
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- **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.



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2 Meters and
440MHz

IC-2GAT
2 Meters

IC-4GAT
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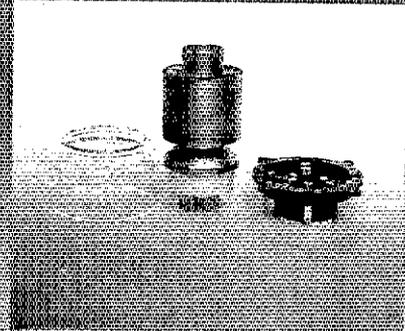
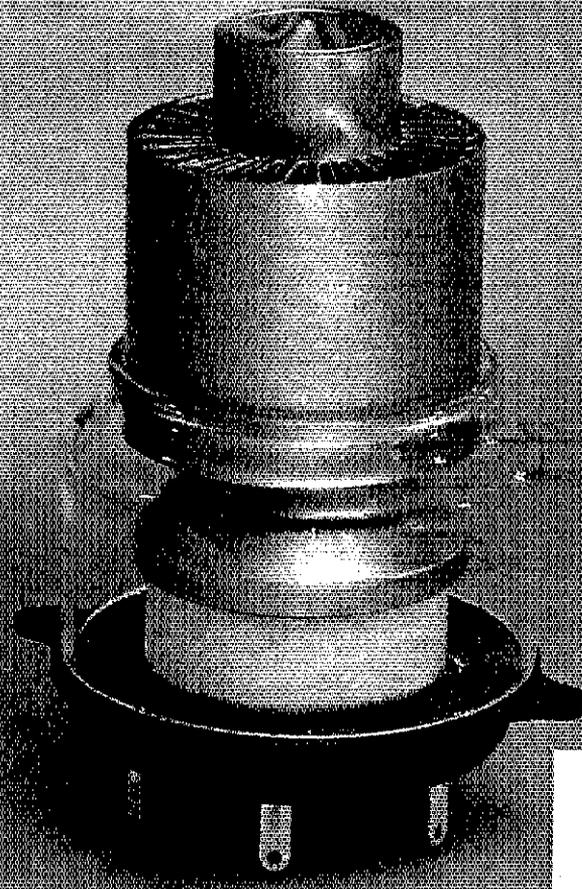
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The EIMAC 3CX1200A7 is a high-mu, compact, forced air cooled triode for zero-bias class AB2 amplifiers.

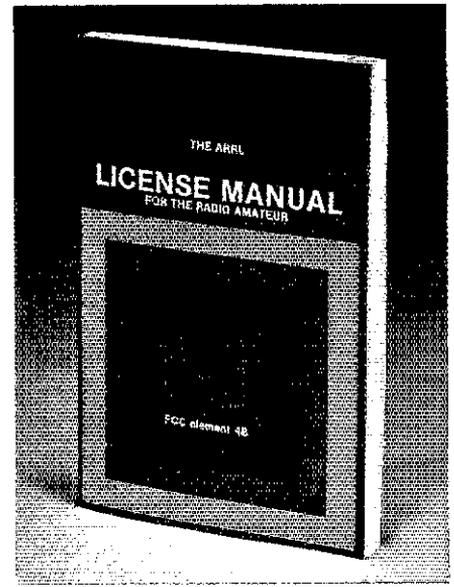
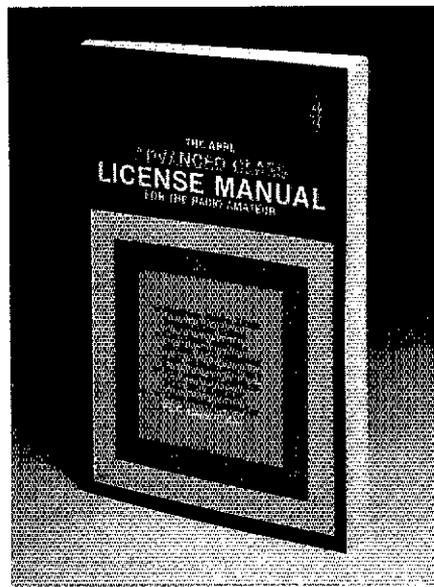
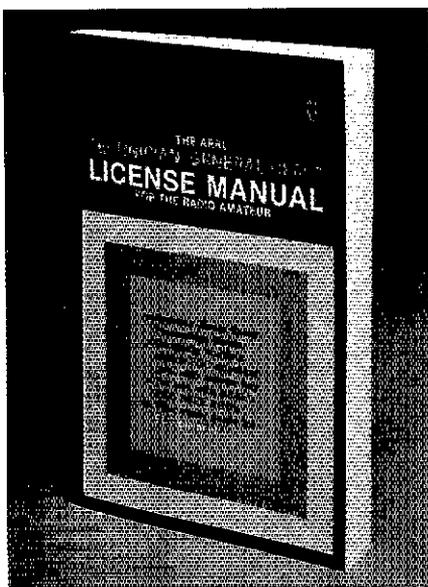
- 2.9" dia. x 6.0" long
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- Standard EIMAC SK-410 socket available

More information is available on the new EIMAC 3CX1200A7 tube from Varian EIMAC, or any Elec-

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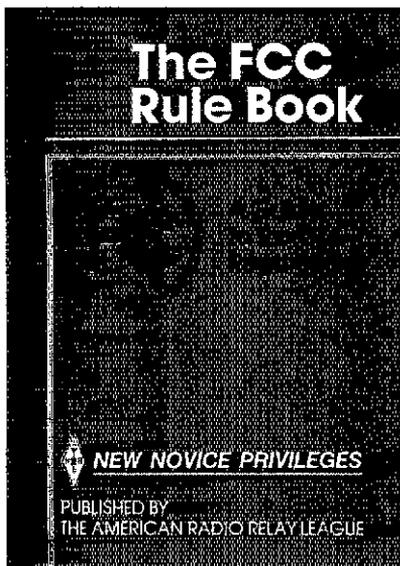
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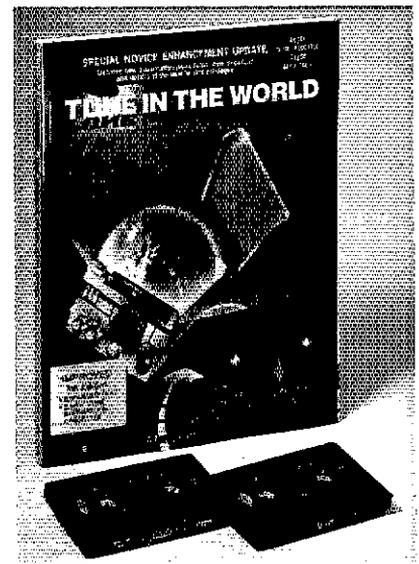
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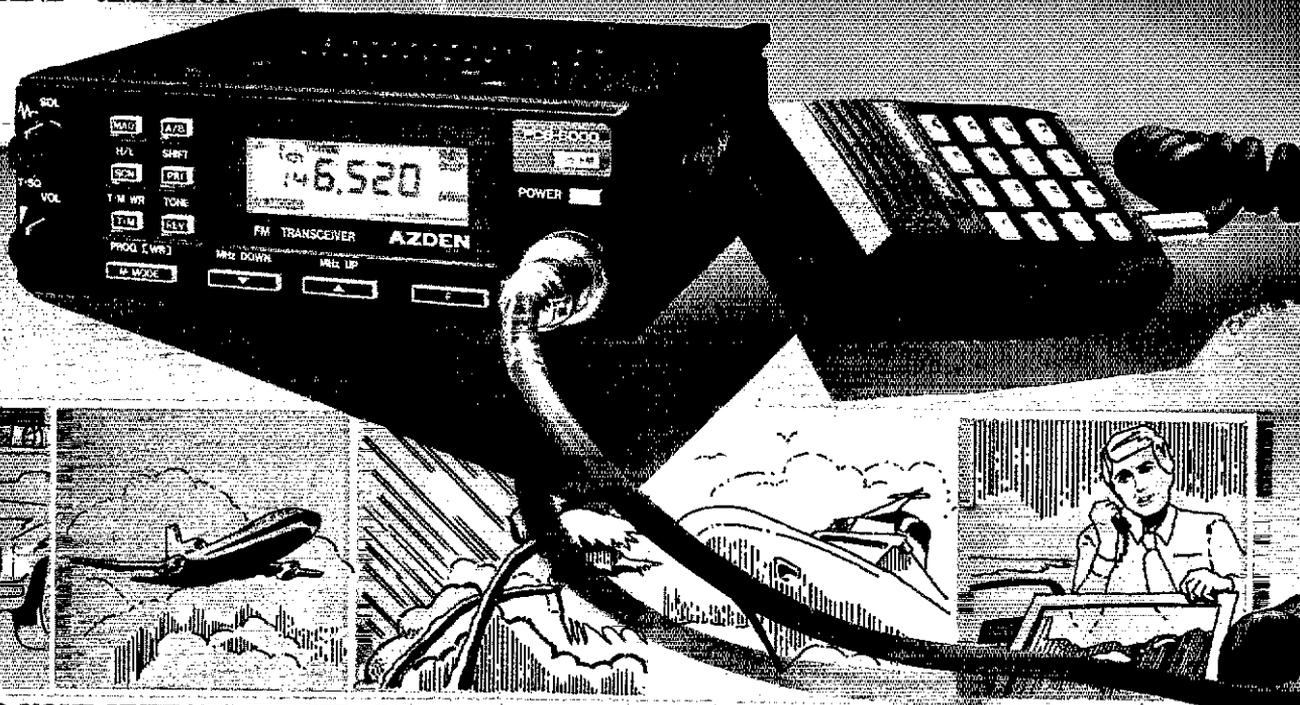
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MODELS: PCS-6000/PCS-6000H (25W/45W). Also coming soon PCS-6200 220MHZ, PCS-6300 70CM and PC-10 10 Meter FM Handheld. CMOS AND ADVANCED SURFACE MOUNT TECHNOLOGY PROVIDE UNPRECEDENTED COMMERCIAL QUALITY AND RELIABILITY.

UNPRECEDENTED WIDE FREQUENCY COVERAGE: The PCS-6000 receives 118.00 to 135.995 MHZ AM Aircraft/136-173.995 MHZ FM and transmits 140.100 to 150.000 MHZ. Modifiable to ALL MARS and CAP frequencies (proof of authorization/license required)

TINY SIZE: Only 2 inches high, 5 1/4 inches wide and 7 1/4 inches deep!! Easily fits anywhere, even in the smallest car!

20 CHANNEL MEMORY IN TWO BANKS PLUS 1 TEMPORARY CHANNEL (TM): Two memory banks, A and B have 10 memory channels each. The memories store frequency, shift width, offset information, and PL tone frequency as programmed. An extra memory channel (that we call TM-temporary memory) is provided to allow you to store any operating condition instantly again and again!!

UP TO 21 NONSTANDARD SPLITS: Program any split in any channel.

VERSATILE SCANNING FUNCTIONS: Dual memory scan, programmable band scanning, hold scan and delay scan functions are provided, with selectable delay time. ALL memory channels are tunable independently.

PRIORITY CHANNEL MONITORING: Memory Channel B0 (the first channel in memory bank B) is monitored every four seconds regardless of any operating condition. When a signal is received, a beep is heard.

DISCRIMINATOR CENTERING (AZDEN EXCLUSIVE PATENT): Always stops on frequency desired when scanning.

PROGRAMMABLE FREQUENCY STEPS: In memory, frequency steps can be set at 5KHZ to 20KHZ in any increment.

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instant programming of PL tones into memory channels and microcomputer. Tone frequency can be entered independently in RX and TX. A tone decoder is available as an option.

LITHIUM BATTERY BACKUP: Memory information can be stored for up to 3 years even if power is removed.

FREQUENCY REVERSE: Allows you to listen to repeater input frequency.

FEATHER-TOUCH TUNING CONTROL KEYBOARD: The LED backlighted light touch keyboard performs all tuning operations simply by pushing the key(s) and key actuation is audibly verified.

LARGE LCD (LIQUID CRYSTAL DISPLAY): The LCD display shows the operating frequency, S/R/F, memory channel in use and various other operating functions. The LCD is back-lighted by green LEDs, making it possible for you to read the display even in total darkness.

FULL 16 KEY TOUCHTONE PAD MICROPHONE: DTMF Microphone functions as auto-patch when transmitting.

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All mode versatility and a transmitted signal you will be proud of. A receiver that has set new standards for sensitivity and quietness. Receives from 100 kHz to 29.999.99 MHz. 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 are selectable independent of mode. Two selectable tuning rates. Passband tuning, notch filter, audio bandpass filter, tone control, squelch and more!

Sixty-two programmable memories that store

frequency, mode, filter selected, channel number and a 7 character alpha-numeric "tag" for entering channel I.D. Scan rate is selectable and as each memory is scanned all of the stored information is displayed (what a light show!). 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 with optional synthesized voice board installed.

Rear panel controls are provided to adjust the VOX, cw monitor level and tone, and SSB

sidetone monitor level. Switching is provided to control conventional linear amplifiers and of course, high speed switching for QSK linears, such as the Titan or the Hercules II. Other rear panel inputs and outputs for transverters, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc jack and provision for the optional RS-232 control interface. An absolute delight for the all mode operator.

The Paragon is the result of a three year engineering effort. 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.



The Classic CORSAIR II...

Unique in all the world, the CORSAIR II is the only ham transceiver available that uses a crystal mixed, permeability tuned oscillator. The ability of this scheme to reject strong adjacent signals and to dig out weak signals under the most adverse conditions is legendary. The 95 dB of dynamic range is all useable!

Frequency tuning is also unique. The main tuning is 18 kHz per turn. Dual range offset tuning

can control transmit, receive or transceive. Selectivity is enhanced with a 16 pole crystal ladder filter and pass band tuning. The 50+ dB notch filter virtually eliminates carrier type interference. An eight pole audio filter is standard and the I-F filters are selectable independent of mode for superior operation on the digital modes.

The transmitter is well known for outstanding audio quality on SSB and QSK CW performance is

simply beyond comparison. All ham bands are covered, 160 through 10 meters with WWV at 10 MHz. The front panel is a thoughtful and spacious arrangement with only the controls that you need.

If your number one priority is outstanding performance on the ham bands, and simplicity is still a virtue, you may be the kind of purist who deserves the classic CORSAIR II.

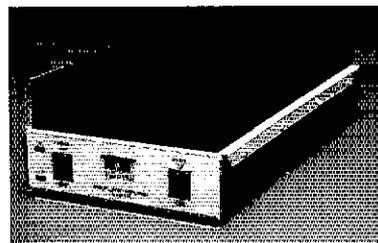
Add Satellite Communications To Your HF Station



Model 2510 B

The Model 2510 B, mode B, satellite station is a 70 cm, 10 watt SSB and CW transmitter with a super-sensitive, low noise, 2 meter to 29 MHz receive converter. The receive conversion idea takes advantage of the excellent selectivity and sensitivity that you already have in your HF station. Frequency tuning is with the PTO in the 2510B and the transmitter automatically tracks the receive frequency for "transceive" operation. "Split" operation is also provided. Two bands are included for full coverage of Oscar 10 and Oscar 13.

The Model 2410 is an all mode, broadband, 100 watt, 70 cm amplifier that adds 10 dB of gain to your up-link signal. Tx/Stby control can be hard-wired or automatic when the drive signal is present. Primary power is 12 to 14 Vdc at 20 amps.



Model 2410



TITAN: A Gallon And A Half Out! (5.68 Liters)

The TITAN has it all! 1500 watts output with ease, all legal bands 160 through 15 meters including MARS frequencies (10 meters after owner mod), lightning fast QSK for full break-in CW or the digital modes and a two speed blower for quiet operation on SSB. This awesome performance from a 17 lb desk top amplifier is made possible by a pair of Eimac® 3CX800A7 ceramic triodes and an external 45 lb power supply that is an absolute "horse."

The heart of the power supply is our own tape wound, four core Hypersil® transformer that weighs in at an impressive 41 lbs. The

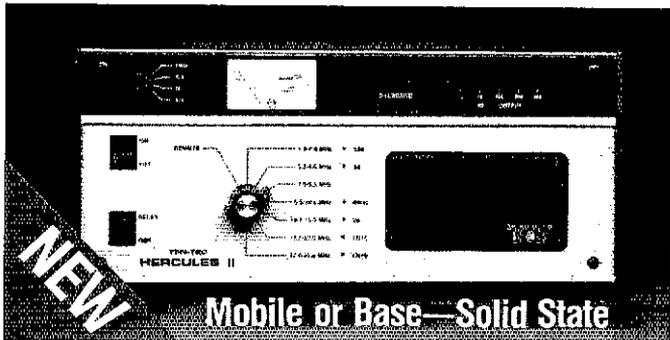
transformer is conservatively rated at 2.5 kva CCS. (9.5 kva IVS.) The power supply is housed in a separate utility enclosure and is nearly noiseless even at full power.

Front panel features include a ten element LED bargraph that displays peak power, a multi-meter selectable to read plate voltage, forward or reverse power and grid current. A matching meter is dedicated to display plate current. The TUNE and LOAD controls use 3:1 vernier drives which, in combination with a great RF deck design, make the TITAN a real "pussy cat" to operate.

The low drive requirement of the TITAN (65 watts for 1500 watts output, typical) makes life much nicer for your exciter too. This is especially comforting when operating keydown modes such as RTTY. Two product review articles have been published, see QST April 1986, CQ February 1986.

If you are ready to choose your dream amplifier the TITAN has everything but the highest price. Check it out!

THE TITAN IS BACKED BY A THREE YEAR LIMITED WARRANTY.



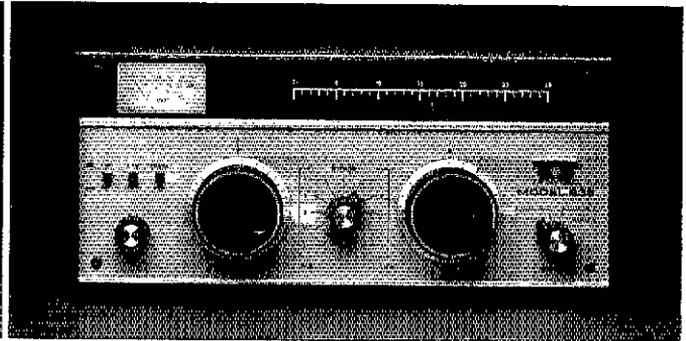
Mobile or Base—Solid State

Hercules II No Tune 550 Watt HF Amplifier

The HERCULES II, Model 420, is an amplifier design that offers a combination of unique features that can only be achieved using modern solid state technology. Instant on, 12 - 14 Vdc operation, no-tune broadband final and compact size. General coverage operation from 1.8 to 22 MHz (to 29.999 MHz with authorized modification). Add to that lightning fast QSK cw, remote control, superb linearity and a low drive requirement. Outstanding!

The HERCULES II will interface nicely with virtually all transceivers. The front panel includes an analog multi-meter for collector current, voltage, forward power and SWR. A 10 element LED bar-graph display indicates peak output power. Band selection is made from the front panel switch or remotely controlled through a rear panel connector. Accessories are available for mobile remote control and automatic band tracking when using a Paragon. A front panel speaker is built-in.

The Model 9420 115/220 Vac power supply is in a separate utility enclosure and connects to the RF deck using a 6 foot power cable. It provides 80 amps to the amplifier plus 20 amps at 13.8 Vdc to power a 100 watt output exciter.



Two KW Antenna Tuner

The latest version of the highly regarded Ten-Tec antenna tuner is now the Model 238. The 238 has been re-styled to match our transceivers and looks great in your shack, whether you layout is "look alike" or "mix and match." This tuner adds a great deal of versatility. It will load virtually any unbalanced (coax fed or long wire) antenna. The high power balun is built in as standard which allows the use of balanced feeders also. Full coverage from 1.6 to 30 MHz. The modified "L" network will tame an SWR of at least 10:1, any phase angle, without false load problems. The lighted slide rule dial and calibrated tuning knob skirts make it possible to log settings and quickly QSY to the same frequency and antenna, without going through the tuning process again. Lighted multi-meter reads power in two ranges, plus SWR. A great way to operate all bands, including WARC and MARS, with something less than a world-class antenna farm.

ONE OF OUR BEST FEATURES IS ONE THAT YOU MAY NEVER NEED ... FAST, EFFICIENT AND CARING SERVICE.

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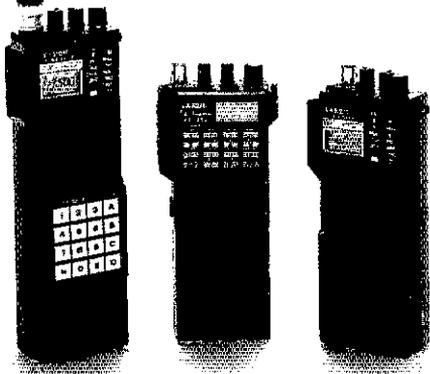
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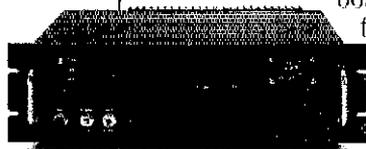


1 Maximum singleband HT performance. Yaesu's compact, 2-meter FT-411 gives "sophisticated HT operation" a whole new meaning. With 49 memories. Dual VFOs. Keyboard frequency entry. Automatic repeater shift. DTMF autodialer (10 memories, 15 digits each). Built-in PL encode/decode. Extended receive. "Do-re-mi" audible command verification. Backlit display and keypad. Battery saver. Automatic power-off feature. Rotary channel selector. 2.5-watt battery pack (optional 5-watt pack available). Much more.

2 Mini HT packs big performance. Choose Yaesu's miniature FT-233R Series for serious pocket-size performance. 2-meter, 220-MHz, and 440-MHz models. Includes 10 memories (7 store odd splits). Memory scan at 2 frequencies per second. High/low power switch. LCD power output and "S"-meter display. Lots of PL features. Auto battery saver. Aluminum-alloy case. Water-resistant seals. Variety of battery packs available, from 2 to 5 watts. More.

3 Interchangeable HT options. To help save you a bundle of money, many HT options are interchangeable throughout Yaesu's HT line. Choose the FNB-12 12-volt, 500-mAh battery pack. The miniature FNB-9 7.2-volt, 200-mAh battery pack. FBA-9 battery case for 6 AAA-size cells. FBA-10 battery case for 6 AA-size cells. DC car adapter/charger. Mobile hanger bracket. External speaker/microphone. Battery chargers. More.

4 FM Repeaters. Looking for a repeater? Look no further. Our 2-meter and 440-MHz models feature 10 watts output. Glass-epoxy circuit boards. Plus they're FCC type accepted and ready for 19" rack mounting. Yaesu repeaters are the perfect building block for a complete repeater station.



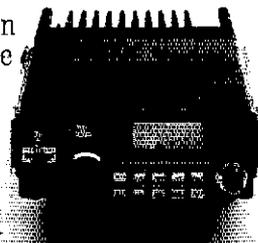
5 Space Station. Work satellites, moonbounce, troposphere, aurora, and meteor scatter with our FT-736R VHF/UHF base station. SSB, CW, and FM on 2 meters and 70 cm (430-450 MHz!) standard. Slots for optional 50-MHz, 220-MHz, or 1.2 GHz modules. Crossband full duplex capability. Satellite frequency tracking function. 25 watts on 2 meters, 220 MHz.

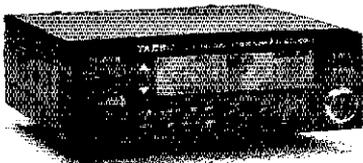


and 70 cm (10 watts on 6 meters and 1.2 GHz). 100 memories. RF speech processor. IF shift. IF notch filter. CW and FM wide/narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Much more.

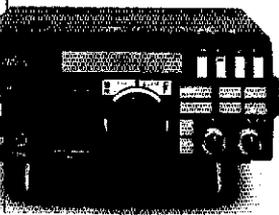
6 Mobiles that double as answering machines. Our FT-212R Series mobiles take messages just like an answering machine (with DVS-1 option)! 2 meter and 440-MHz models. 45 watts output (35 on 440-MHz). Auto-dialer DTMF mic with 10 memories (22-digit memory each). 18 memories. Multiple scanning routines. "Do-re-mi" audible command verification. High/low power switch. Oversize amber display. Much more.

7 Mobiles you can take on foot. Our FT-290R Mark II Series (2-meter, 430-450 MHz, and 6-meter models) come standard as mobiles. But remove the heat sink and snap-on the optional battery pack, and you're ready to take your operation on foot! Mobile operation: 25 watts output (10 watts, 6 meters). Battery pack: 2.5 watts output. With SSB, CW and FM. 10 memories. Dual VFOs. LCD display. Offset tuning. Relative power-output/S meter. More.



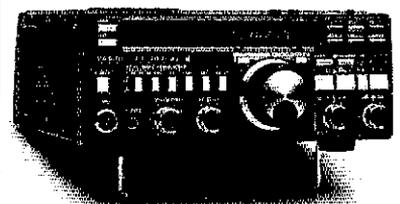


8 Dual-band mobile with remote control head. The FT-4700RH mounts almost anywhere—the “brains” on your dash, visor, or door, the “muscle” under your seat. 50 watts output on 2 meters, 40 watts on 70 cm. Full crossband duplex. Simultaneous monitoring of each band. Volume balance control for dual receive operation. 9 memories (each band). Extended receive coverage. Reverse repeater shift. Bright dual-band display. 10 memory autodialer mic (option). More.

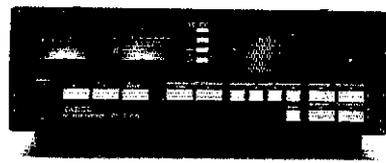


9 HF price/performer. Don't let the FT-747GX's affordable price fool you. This rig really works the DX! 100 watts RF output on 160 to 10 meters. Continuous receive from 100 kHz to 30 MHz. LSB, USB, CW, and AM. Slot for optional FM unit. 20 memories. Split-frequency operation. CW and AM filters. Plus one-touch noise blanker. All-mode squelch. RIT. 20-dB attenuator. Great receiver with superb overload protection. More.

10 HF field-day favorite. Contesters appreciate the portability and performance of Yaesu's FT-757GX Mark II. 100-watt output. 10 memories. Dual VFOs. Slow/fast tuning selection. IF notch filter. Iambic keyer. 600-Hz CW filter. AF speech processor. 500 kHz to 30 MHz receive. 10 to 160 meters transmit, including WARC bands. All-mode coverage. QSK operation. Continuous RTTY operation up to 30 minutes. More.



11 Flex your RF muscle. Cut through pile-ups with our FL-7000 power amplifier. 160 to 15 meter coverage. Built-in power supply. Automatic tuner. Fast turnaround for break-in (QSK) CW, HF packet, and AMTOR. 70 watts excitation for full output, 1200 watts PEP input. More.

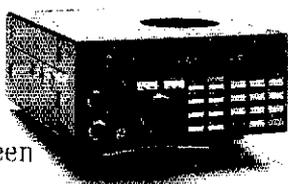


World's first HF/VHF/UHF base station. Talk about complete. The FT-767GX gives you 160 to 10-meter transmit standard. Optional plug-in modules for 6-meter, 2-meter and 70-cm operation. 100 kHz to 30 MHz

12 receive. AM, FM, SSB, CW, AFSK modes built in. 10 memories for frequency, mode, and CTCSS info. Dual VFOs. VFO tracking. Digital display in 10 Hz steps. Slow/fast main dial tuning. Synthesizer step programming at up to 99.99 kHz per step. Digital RF power/SWR meter. Built-in RF preamplifier. And these are just a few highlights!

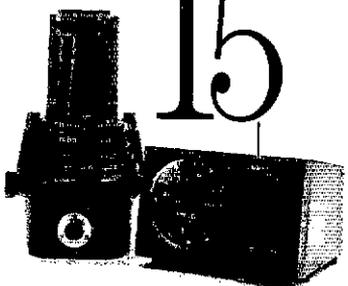


13 Serious VHF/UHF Receiver. Our FRG-9600 is a smart way to monitor. 60 to 905 MHz coverage. USB, LSB, CW, AM, FM wide and narrow. Optional NTSC video module. Scanning steps of 5, 10, 12½, 25 and 100 KHz. 99 memories store frequency and mode. Memory scan (also scans between memories). Keyboard frequency entry. 24 hour clock. Multiplexed output. Fluorescent readout. Signal strength graph. AC power adapter. Much, much more.



World-class HF receiver. The FRG-8800's perfect for keeping up with the world. Continuous coverage from 150 KHz to 30 MHz. Expanded coverage with optional 118-174 MHz VHF converter. USB, LSB, CW wide/narrow, AM wide/narrow, FM. 12 memories. Also programmable scanning routines. Keyboard frequency entry. LCD display. SINPO signal graph. Computer interface capability. Two 24-hour clocks. Recording functions. Much more.

14 **Antenna rotators for your application.** Our G-1000DX, G-800SDX/G-800S, and G-400RC models feature 360° “radio compass” control heads, and are compatible with most tower-plate configurations. Plus G-1000SDX and G-800SDX models feature 450° rotation and presets.



16 AZ-EL rotators for space applications. Into OSCAR or moonbounce? Choose our G-5400B or heavy-duty G-5600B AZ-EL rotator. Each is compatible with many vendors' tracking software. And for stand-alone elevation control, choose our G-500A elevation rotator.



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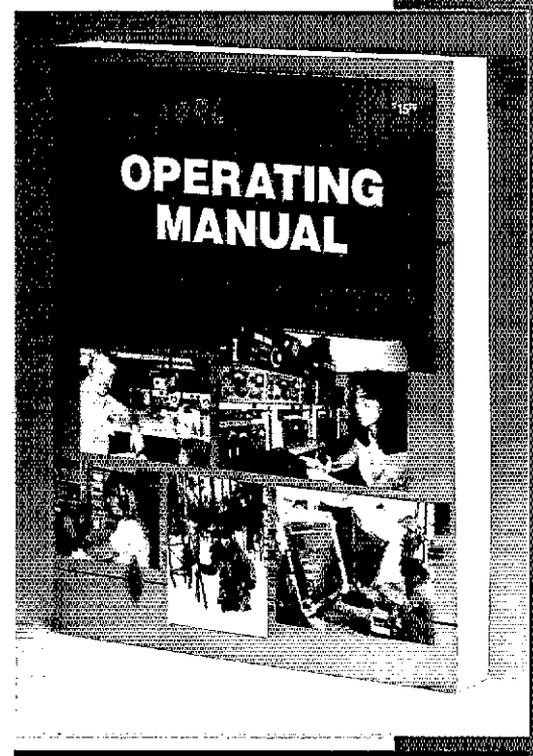
No one has ever called Amateur Radio boring. There's so much to do in this multi-faceted hobby and it is all described in the big 688-page *ARRL Operating Manual*! The book proved so popular that we had to go back on press for a second printing in less than a year.

Why is this League publication a smash hit? We gathered together the efforts of talented writers who are experts in each of their Amateur Radio specialties:

Basic Operating by Bill Jennings, K1WJ and Carol Smith, AJ2I; FM and Repeaters plus the chapter on Packet Radio by QST columnist Stan Horzempa, WA1LOU; DXing by Bob Locher, W9KNI, Overseas DXing/DXpeditions by Carl Henson, WB4ZNH; Traffic Handling by Maria Evans, KT5Y; Emergency Communications by Richard Regent, K9GDF; Image Communications by Bruce Brown, WA9GVK; VHF/UHF Operating by Michael Owen, W9IP; Satellites by Dick Jansson, WD4FAB and Contests by Clarke Greene, K1JX.

The chapters on Shortwave Listening, The Amateur Radio Spectrum, Antenna Orientation, and RTTY Communications were written by HQ staffers: AK7M, W4RI, K1TD and WA3VIL. Bob Halprin, K1XA was the editor of the *Operating Manual* and was responsible for the popular Operating Awards chapter where more than seven dozen awards are described and illustrated in full color.

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by a host of world-class operators

Radio operating today, you need a copy of the third edition of the *ARRL Operating Manual*. Available at your dealer or directly from ARRL for \$15. For postage and handling add \$2.50 (\$3.50 for insured mail or UPS—please specify.)

ARRL, 225 Main Street, Newington, CT 06111

Huge pileups, big city QRN, no spare parts, and a long way to anywhere. You probably couldn't find a better test of the new SB-1400 All-Mode Transceiver than Heath's expedition to Taipei in the Republic of China.

When working DX, you need sensitivity to dig for the weak ones, but still need dynamic range so the guy down the block doesn't clobber you in the middle of a QSO. Sure, the SB-1400 worked the S9 + 30 signals, but out of the pileups it also worked a number of stateside stations running 5 watts or less! And that's not bad for a short path distance of 7600 miles!

SB-1400

A proven transceiver.

The technology that worked the world can work for you, too, in your own ham shack. The SB-1400 is a fully assembled all-band, all-mode (FM optional), continuous duty, 100-watt transceiver. It incorporates an impressive general coverage receiver with dual VFOs for split operation and 20 memories to store your favorite frequencies. The unit includes standard SSB filter plus a narrowband 500 Hz CW filter and wideband AM filter. It also

features clarifier (RIT), front panel AGC, noise blanker, all mode squelch, 20 dB attenuator, computer interface, and a clean, "operator preferred" front panel layout.

The transmitter's PA is cooled by a quiet, thermostatically controlled internal fan and is enclosed in its own diecast aluminum heat-sink chamber, which allows for full power operation in CW, SSB, FM and RTTY, AMTOR, SSTV, and Packet.

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K3YGU, Maryland

Heath offers you more.

In addition to the SB-1400, Heath offers a full line of pre-assembled or build-it-yourself amateur radio equipment to completely outfit your ham shack or upgrade your system.

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For more information on the SB-1400 or Heath's complete line of amateur radio equipment, call for a FREE catalog: **1-800-44-HEATH**
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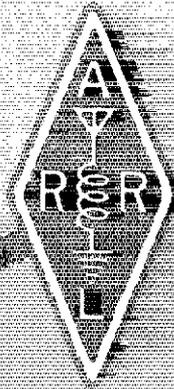
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"A terrorist agent, representing an unknown foreign power or an internal subversive group, is bent on crippling or destroying America's space program by operating an illicit radio station from somewhere inside our Lost Padres National Forest wilderness area. A terrorist who has somehow gained access to our secret digital codes, launching schedules and classified radio frequencies required to cause our birds to self-destruct, during or after launch." And so begins a new adventure for Tommy Rockford, K6ATX.

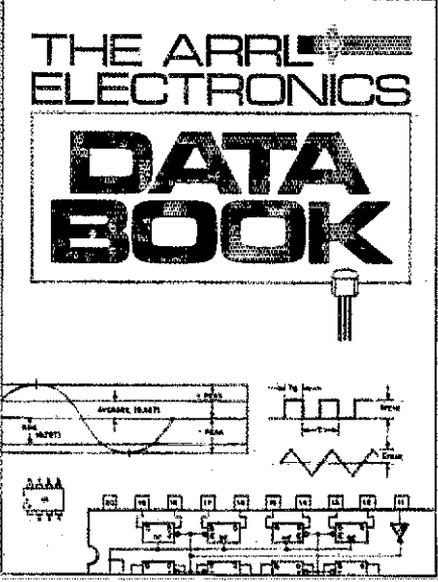
Murder by QRM is packed with action. Join K6ATX on an ill-fated search using motorized hang-gliders and then as he backpacks through the wilderness in search of the hidden transmitter site. With the launch of the space shuttle *Conquistador* only hours away will Tommy be able to ferret out the culprits before the fatal destruct signal is sent?

This is the sixth and final ham radio adventure by Walker Tompkins (the real K6ATX) who became a silent key just before the book was published. 194 pages, \$5.00*

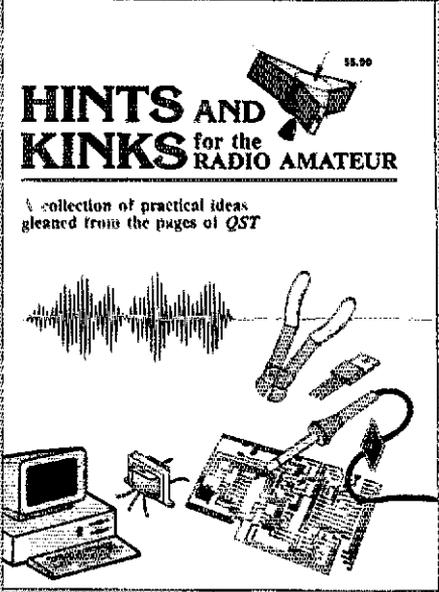
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The ARRL Data Book is back by popular demand! Doug DeMaw, W1FB has completely revised and expanded the material in this handy reference for the RF design engineer, technician, radio amateur, and experimenter. This one source has all of those regularly used tables, charts, and those hard-to-remember formulas. You'll also find hundreds of popular circuit diagrams of oscillators, mixers, amplifiers, other active devices and their operating



parameters. This book can be used alone or to complement *The ARRL Handbook* and belongs in every technical library. Here's a brief summary and chapter lineup: **Symbols, Conversion Factors and Tables; Components and Materials** includes color codes, standard values, toroid selection charts; **Inductors and Transformers; Time and Frequency Measurement; Networks and Filters** covers attenuators and matching network design information; **Digital Basics** is 88 pages of logic, TTL Circuits, specific device descriptions, linear ICs, op-amp applications, and regulators; **Antennas and Transmission Lines; Catalog of Circuit Building Blocks** including audio amps, RF and IF small-signal amplifiers, mixers, FM detectors, oscillators, dc switches and amps, and frequency doublers; **Workshop and Lab Practices**. 234 pages, \$12.00*



"Gimmicks and Gadgets, Tricks of the Trade." Since 1933, those words have been used to describe *Hints and Kinks for the Radio Amateur*, but it has been almost seven years since the last edition appeared. Well, H&K fans, the long wait is over. The 12th in the series of the most popular QST "Hints and Kinks" contributions is now available, and hams like yourself share their innovations and wizardry. Like its predecessors, this edition has been said to be almost like having a radio club meeting on your bookshelf!

Here's just a sample: **In and Around the Station:** A Universal Equipment Stand, Safe Power Wiring Practices, Stop the Fire, Not Your Gear. **Transmitting and Receiving:** A Two-Transistor Transmitter for 30 Meters, Improvements for the HW-8, FT101ZD, TS830S, SB200, and SB220. **CW Hints:** Magnetic Switch for CW Tune Up, The Sneaky Knee Key for Mobile CW. **Computers and Digital Modes:** A Message-Waiting Indicator for TNCs. Tips for the VIC 20, TRS80 and Apple II. **Antennas and Feedlines:** Inexpensive 30 and 12-Meter Arrays, Retuning Traps for the WARC Bands, Baluns, Tower and Rotator tips. **Shop Secrets:** Tips on soldering and making PC Boards and more! **Tips on Testing:** Simple Logic Probe, plus 11 pages of test equipment and tips. **Portable and Mobile:** Power supplies, antennas, mobile installation tips. **VHF and UHF:** Antennas, amplifiers, CTCSS Tone Generator and more. **Power Supplies:** Power Supplies from Old Battery Chargers, High-Voltage Supply for Mobile Amplifiers. **Taming Interference:** Telephone RFI, TVI, CATV cures. **Miscellaneous:** COR and Timer Circuit, World-Time-Finder Slide Rule, AFSK System for FAX and more. 160 pages, \$6.00*



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Whatever your interest, you'll find the All Mode™ from Kantronics at the top of the pack. CW, Radioteletype, AMTOR, ASCII, WEFAX and Packet, "KAM"™ handles them all." HF and VHF simultaneous operation? You bet! The KAM can operate RTTY or AMTOR on HF while communicating Packet on VHF. Believe it. *It's the only true dual-port on the market.*

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TV—STEREO—RADIO—POWER LINE—TELEPHONE

INTERFERENCE HANDBOOK

How to locate and cure RFI:
Radio Frequency Interference

Amateur Radio, CB Radio, Power Line
RFI problems analyzed and solved

TV & stereo owners: the causes
and cures of annoying interference

WILLIAM R. NELSON, WA6FQG
Former RFI Investigator, Southern California Edison Company
Editor: William I. Orr, W6SAI

TRANSMITTER HUNTING

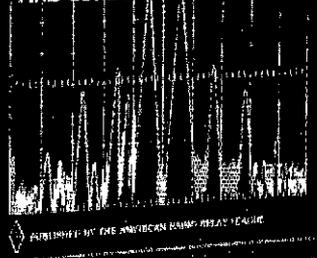
RADIO DIRECTION FINDING SIMPLIFIED

WERNER MAYER, ARRL, AND THOMAS A. CURLEE, WB6UZZ



RADIO FREQUENCY INTERFERENCE

HOW TO IDENTIFY AND CURE IT



3 STRIKES AGAINST INTERFERENCE

INTERFERENCE HANDBOOK by William R. Nelson, WA6FQG, Edited by Bill Orr, W6SAI. WA6FQG is a former RFI investigator for Southern California Edison Company. This 250-page book is written from an RFI sleuth's perspective and is a diary of his experiences in solving interference problems. His experiences run the gamut from the common (arcing thermostats) to the bizarre (loose metal sheathing in a temporary building next to a 250kV transmission line and a certain brand of 25-watt light bulb) Besides all sorts of power line interference causes and solutions this book covers electrostatic discharge (rain or snow static), grounds and grounding, vehicle noise suppression, RFI from nonlinear devices, how the power company locates RFI, how to RFI proof your transmitter, how some receivers suffer from self-inflicted RFI and solutions to RFI in various electronic devices. Radio Publications, Second Edition, 1988, \$12 plus postage and handling*.

TRANSMITTER HUNTING by Joseph D. Moell, KØOV and Thomas N. Curlee, WB6UZZ. You'll find out how direction finding (DFing) can be both fun and practical. Combine the techniques taught in this 323-page book with those used by search and rescue teams and you can learn how DFing can even save lives! Explore the challenge of hidden transmitter hunts (fox hunting) and locating causes of both accidental and malicious interference to Amateur Radio communications. Find out about the history of RDF, how to get started, directional antennas, doppler DF units, all about S-Meters, commercial and military direction finding systems, direction finding from fixed sites, VHF mobile hunting techniques, T-hunting from orbit, hunting below 50MHz, how to be the "Fox" and triangulation using two BASIC programs. Copyright 1987 by Tab Books. \$18 plus postage and handling*.

RADIO FREQUENCY INTERFERENCE What causes RFI? What are your responsibilities under FCC regulations to solve RFI problems? Are all RFI problems difficult, expensive and time consuming to cure? You'll find the answers to these commonly asked questions about RFI in this 82-page ARRL publication. Tells you how to understand why RFI occurs and to learn how to eliminate it. Chapters include: RFI: Problem of Opportunity, Survival in an RF-filled World, Interference from Transmitters, Interference from Electrical Devices and Power Lines, Cable Television: Friend or Foe?, How to Identify and Resolve Radio-TV Interference Problems, Consumer Products RFI Assistance List, Interference Filter Test Report. Copyright 1987. \$4.00 plus postage and handling*.

* For postage and handling add \$2.50 (\$3.50 for insured parcel post or UPS, please specify)



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WOULD THIS ALPHA 86 HAVE RUN 1.5 KW RF OUTPUT FOREVER?



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point in going
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P4ØV PROVED THE SAME POINT:

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THE ARRL ANTENNA BOOK Written by members of the ARRL Technical Department staff and sixteen well-known outside authors, all of whom have done much to contribute to the state-of-the-art in antenna and transmission line theory and practice. The recently published 15th Edition presents the best and most highly regarded information on antenna fundamentals, propagation, transmission lines, Yagis and quads, as well as all of the popular wire antenna designs. You'll find antennas for limited space, portable, mobile, VHF, UHF, microwave and space communications. Contains over 700 pages and 987 figures. **Chapter lineup:** Safety First, Antenna Fundamentals, The Effects of Earth, Selecting Your Antenna System, Loop Antennas, Multielement Arrays, Broadband Antennas, Log Periodic Arrays, Yagi Arrays, Quad Arrays, Long Wire and Traveling Wave Antennas, Direction Finding Antennas, Portable Antennas, Mobile and Maritime Antennas, Repeater Antennas Systems, VHF and UHF Antenna Systems, Antennas for Space Communications, Spacecraft Antennas, Antenna Materials and Accessories, Antenna Supports, Radio Wave Propagation, Transmission Lines, Coupling the Transmitter to the Line, Antenna and Transmission Line Measurements, Smith Chart Calculations, Topical Bibliography on Antennas, Glossary and Abbreviations. Edited by Gerald L. Hall, K1TD, QST Associate Technical Editor. Copyright 1988. #2065 \$18*.

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YAGI ANTENNA DESIGN is based on the series in *Ham Radio Magazine* by the late Dr. James L. Lawson, W2PV. Jim designed and built a highly competitive and successful Amateur Radio contest station. 210 pages cover the following subjects: Performance Calculations, Simple Yagis, Performance Optimization, Loop Antennas, Ground Effects, Stacking, Practical Designs, Designs for 7 through 28 MHz. Hardcover, Copyright 1986. #0410 \$15*.

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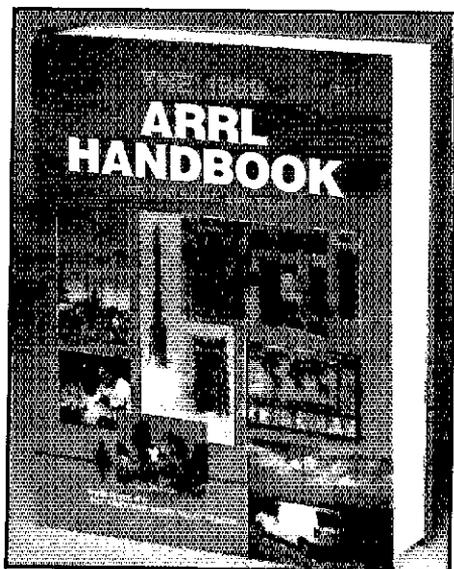
The 1200-page sixty-fifth edition contains over 2100 tables, figures and charts. The new Handbook is better than ever with revised information on phase noise measurement, direct frequency synthesis and spread spectrum communication techniques. The section on repeaters has been updated including a new CW identifier circuit. You'll find new spectrum analyzer and oscilloscope material, as well as several new projects in the test equipment chapter.

As always, we've added a host of new construction projects to this new edition. Just some of the new projects include: A 500-MHz frequency counter, 160 through 10 meter legal limit amplifier, simple CMOS keyer project, digital audio memory keyer and a L/Q meter for measuring coil inductance.

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The Handbook has always been famous as a reference for component data and you will find an entire chapter devoted to everything from transmitting tube and transistor specifications to aluminum tubing sizes. Satellite enthusiasts will find that the digital TR sequencer will add operating convenience to your station. Of course, you'll find the most up-to-date information on digital techniques, and the video communications chapter is packed with information not only on SSTV, ATV and FAX but Weather FAX as well. QRP enthusiasts will find the famous "Cubic incher" transmitter; not much bigger are the QRP SWR indicator and QRP Transmatch. There is also a VXO-controlled 6-watt CW transmitter for your favorite band between 80 and 15 meters. There are a number of useful station accessories that you can build like DTMF encoders and decoders, PIN-diode TR switch, digital PEP wattmeter and SWR calculator, Transmatches and dummy loads.

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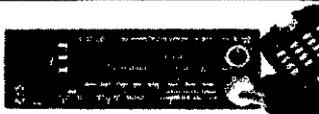
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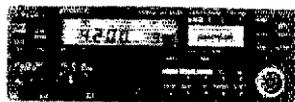
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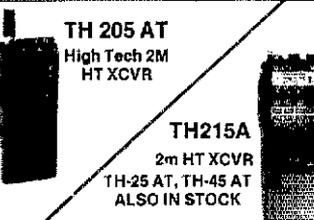
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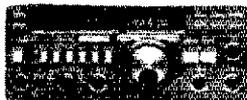
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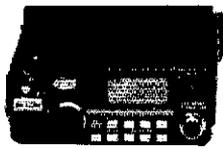
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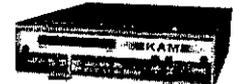


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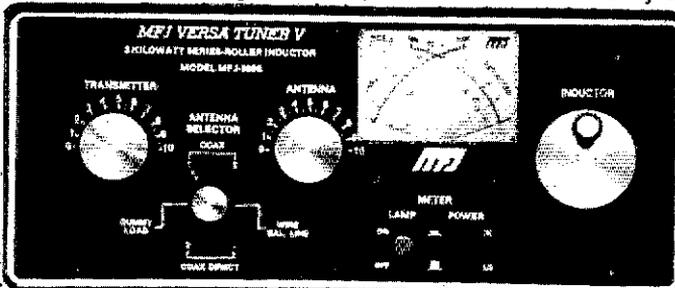
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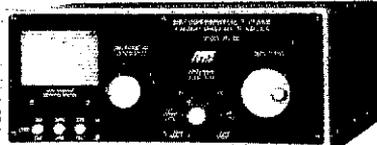
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feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise. The MFJ-931 also lets you electrically place a far away RF ground directly at your rig -- no matter how far away it is -- by tuning out the reactance of your ground connection wire.

Barefoot/1.5 KW Linear Tuner



For a few extra dollars, the MFJ-962C lets you use your barefoot rig now and have the capacity to add a 1.5 KW PEP linear amplifier later. Covers 1.8-30 MHz.

You get two husky continuously variable capacitors for maximum power and minimum SWR. And lots of inductance gives you a wide matching range.

You get MFJ's new peak and average reading Cross-Needle SWR/Wattmeter with a new directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp is front panel switched and requires MFJ-1312, \$9.95.

Has 6-position antenna switch and a teflon wound balun with ceramic feedthru insulators for balanced lines. 10 3/4 x 4 1/2 x 14 7/8 inches. Add \$10.00 s/h.

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MFJ's smallest Versa Tuner

MFJ-901B

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The best of all CW worlds - a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

This MFJ Keyer is small in size but big in features. You get iambic keying, adjustable weight and tone and front panel volume and speed controls (8-50 WPM), dot-dash memories, speaker, sidetone and push button selection of automatic or semi-automatic/tune modes. It's also totally RF proof and has ultra-reliable solid state outputs that key both tube and solid state rigs. Use 9 V battery or 110 VAC with MFJ-1305, \$9.95.

The keyer mounts on a Bencher paddle to form a small (4 1/8 x 2 5/8 x 5 1/2 inches) attractive combination that is a pleasure to look at and use.

America's favorite paddle, the Bench, has adjustable gold-plated silver contacts, lucite paddles, chrome plated brass, and a heavy steel base with non-skid feet.

You can buy just the keyer assembly, MFJ-422BX, for only \$79.95 to mount on your Bencher paddle.

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You can create an artificial RF ground and eliminate RF "bites", feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise. MFJ-931 also lets you electrically place a far away RF ground directly at your rig - no matter how far away it is - by tuning out the reactance of your ground connection wire. 7 1/2 x 3 1/2 x 7 in.



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MFJ-1024 **\$129.95** MFJ-1312, \$9.95.

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\$21.95 MFJ-1702



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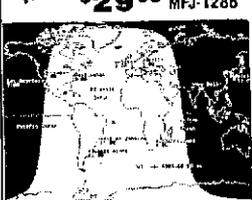
MFJ-260
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MFJ-262
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MFJ-264
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New MFJ-1286 Gray Line DX Advantage



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For Kenwood, Icom, Yaesu, Satec

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You get a wide range speaker and first-rate electret mic element for superb audio on both transmit and receive.

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MFJ-284 fits Icom, Yaesu, Satec. MFJ-286 fits Kenwood.



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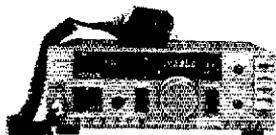
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THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

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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, Aome, PA 15610.

JOIN The 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.T.C., 20933 Brant Avenue, Long Beach, CA 90810.

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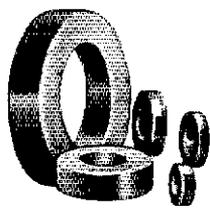
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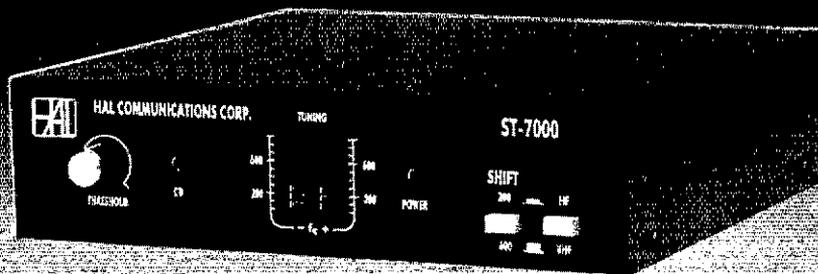
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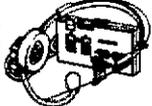
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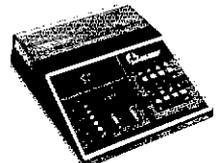
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AC powered Turbo Scan, pre-programmed by state to receive any type of police transmission plus tire & weather, scans at 50 channels per second, digital display, instant weather.

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50 Ch 7 band Turbo Scan, instant weather, bank scanning, priority, delay, AC only

R1090 \$112.90

45 Ch 6 band, programmable, Ch lockout, dual scan speed, AC

RADAR DETECTORS

BEL 976	\$164.90
Tri band Vector 3, sequential LED's, muting, volume control, with 2 power cords and travel case 3x4 1/2x1 1/2	
MAXON RD25	\$74.90
Delexe mini X & K band, dual conversion superhet, sequential LED's, audible alarm, 2 1/2x4 1/2x1 1/2	
RDZA	\$45.90
Dual conversion superhet, X & K band, audible & visual alarm, 3 1/2x4 3/4x1 1/2	

UNIDEN

RD9	\$114.90
MINI, dual conversion superhet, sequential LED's, audible alarm with volume control, w/2 power cords & carry case.	
TALKER	\$139.90
Record your own message, sequential LED's, audible alarm, superhet, X & K band, cpr/hwy, with 2 cords and carry case.	

ASTATIC

D104 Silver Eagle \$69.90
Chrome plated base station amateur microphone, factory wired to be easily converted to electronic or relay operation. Adjustable gain for optimum modulation



ETS D104 SE \$84.90
Same as above with end of transmission Roger Beep

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10 meter transmitter, 25 watt, can be programmed to split transceive, 55B CW, 4M, FM, programmable scanning, fully automatic noise blanker 2 1/2H, 7 1/2xW 11D



AR3500 \$299.90

uniden

25 WATT 10 Meter Transceiver all mode operation, backlit multi function LCD meter, frequency lock, auto squelch, NB, R-gain, PA, external speaker jack, 7 1/2xW 9 1/4xH 2 1/2xH



HR2510 \$249.90

HR2600 \$299.90

Available for April delivery.

THE 20TH Annual B*A*S*H will be held on Friday night of the Hamvention, April 29, 1989 at the Conference Center (Madison Room) of the Hara Arena and Conference Center, (the same location as the Hamvention), starting at 7:00 PM. There is no admission charge, and free continuous entertainment. Hot dinner, sandwiches, snacks and beverages are available. Two exciting top awards, and many others. Stay right at Hara when the Hamvention closes on Friday evening and meet your friends and join us for an evening of fun and entertainment. Sponsored by the Miami Valley FM Association, P.O. Box 263, Dayton, OH 45401.

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CANADIAN QSL Cards, send \$1 for samples refundable with your order, M. Smith, VE7FI, 18610 - 62nd Avenue, Surrey, BC CANADA V3S 4N9.

BE SURPRISED—get a variety of cards—100 for \$9 or 200 for \$13. Samples \$1 refundable. Add \$2 S&H. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

ENGRAVING: Callsign/Name Badges by W0LQV, SASE for price sheet. Box 4133, Overland Park, KS 66204.

CADILLAC of QSLs—Completely different! Samples \$1. (refundable). Mac's Shack, P.O. Box 43175, Seven Points, TX 75143.

EMBROIDERED Emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

POST CARDS QSL Kit—Converts Post Cards, Photos to QSL's! Stamp brings circular. My Type Shop, P.O. Box 172, Leeds, NY 12451.

FULL Color—3,000 \$350; 6,500 \$425; 12,500 \$600; 25,000 \$750. WABCZS, 1-614-452-6375.

QSL Samples—25 cents. Samcards, 48 Monte Carlo Drive, Pittsburgh, PA 15239.

BROWNIES QSL Cards since 1939. Catalog & Samples \$1 (refundable with order). 3035 Lehigh Street, Allentown, PA 18103.

PHOTOS, Postcards—Become QSLs. Clear stick on labels. New! "Kall Cards". Stamp brings details. K-K-L, Box 412, Troy, NY 12181-0412.

QSL's—Quality for less is back! See our display ad in this issue of QST. Harry A. Hamlen, P.O. Box 1, Stewartville, NJ 08886.

QSLs Samples \$1 (refundable) (stamps okay). M. Dakin, Winzj Press, P.O. Box 285, Revere, MA 02151.

QSLs & RUBBER Stamps. Top quality QSL samples and stamp information \$1 (refundable with order). Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

QUALITY QSLs. Samples \$.50. Olde Press, WB9MPP, Box 1252, Kankakee, IL 60901.

LOW Cost QSL's Samples SASE. Koepke, 6 Katherine Road, Albany, NY 12205.

GAIL'S QSL'S, \$6 first 100, \$4 thereafter, stamp for samples, KA0YZT, 1150 Muenz, Wright City, MO 63390.

QSL's by Northwest Imagery. Distinctive quality, affordable prices. 50 cent business size SASE for samples. N7HJM, 11969 Tioga Street, Boise, ID 83709.

QSL CARDS—Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSL's, Dept. B, 310 Commercial, Emporia, KS 66801.

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RUSPRINT QSLs. Working to help you look good and log that hard earned contact. Several card themes. (Cartoon, Patriotic, Mike & Key, Contesting, Others.) Prices? Low as 2.5 cents each! Quantities? Start at 100. Plastic card holders. Display 20 cards, 3- \$3.95, 4 and up \$1.20 each. More information? #10 SASE with 2 stamps. Rusprint, RT 1, Box 363QST, Spring Hill, KS 66083.

COLORFUL QSLs by WA7LNW—High quality craftsmanship using unique printing process that combines brilliant rainbow colors and sparkling metallic inks. Samples \$1 (refundable). Colorful QSLs, P.O. Box 5358, Glendale, AZ 85312-5358.

QSLs: Quality at a reasonable price! Satisfaction guaranteed. Send \$1 for samples and coupon worth \$2. Sugarloaf Print Shop, P.O. Box 563, Sugarloaf, PA 18249.

FULL Color QSL Cards made on Kodak paper from your negative, slide or print. \$32.95 per 100. Request samples (enclose \$1). Bizcard Co., Box 191-T, Stevensville, MI 49127.

DON'T Buy QSL Cards until you see my free samples. Also I specialize in custom cards and QSL business cards. Write or call for Free Samples and custom card ordering information. Little Print Shop, Box 1160, Pflugerville, TX 78660, 512-990-1192.

QSL Samples—SASE. Eric, WA6FOS, Box 2275, Culver City, CA 90231.

FREE Logbook with first order. QSL samples cost 3 stamps. Gazebo Press, 4148 Mimosa Lane, La Plata, MD 20846.

RAISED Printed QSLs. Very unique. You can feel the type! Our new laser technology produces exotic callsign type effects. Super high quality. Standard designs or use your own artwork/computer graphics to create a really personal QSL. We now offer state outlines in 3-D. \$1 for samples & information. Dennis, WA5QMM, Network QSL, P.O.B. 13200, Alexandria, LA 71315-3200, 318-443-7261, FAX: 318-445-9940.

QSL SALE! 100 QSL cards, plus bonus, \$8. \$3 thereafter. Shipped postpaid within two weeks. Guaranteed correct! Free samples. Sheff Printing, KD9KW, Box 50, Rockton, IL 61072.

DAYTON Hamvention

April 28, 29, 30, 1989

Early Reservation Information

• General Chairman, Bill McNabb, WD8SAY

• Asst. General Chairman, Ed Hillman, NBALN

**Giant 3 day flea market • Exhibits
License exams • Free bus service
CW proficiency test • Door prizes**

Flea market tickets and grand banquet tickets are limited. Place your reservations early, please.

Flea Market Tickets

Maximum of 3 spaces per person (non-transferable). Tickets (valid all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. Vendors MUST order registration ticket when ordering flea market spaces.

Special Awards

Nominations are requested for "Radio Amateur of the Year," "Special Achievement" and "Technical Achievement" awards. Contact: Hamvention Awards Chairman, Box 964, Dayton, OH 45401.

License Exams

Provice thru Extra exams scheduled Saturday and Sunday by appointment only. Send FCC form 610 (Aug. 1985 or later) - with requested elements shown at top of form, copy of present license and check for prevailing ARRL rates (payable to ARRL/VEC) to: Exam Registration, 8830 Windbluff Point, Dayton, OH 45458

1989 Deadlines

Award Nominations: March 15

Lodging: April 7

License Exams: March 26

Advance Registration and banquet:

USA - April 4 Canada - March 31

Flea Market Space:

Spaces will be allocated by the Hamvention committee from all orders recieved prior to February 1. Express Mail NOT be necessary! Notification of space assignment will be mailed by March 15, 1989.

Information

General Information: (513) 433-7720

or, Box 2205, Dayton, OH 45401

Lodging information: (513) 223-2612

(No Reservations By Phone)

Lodging

Please write to Lodging, Dayton Hamvention, Chamber Plaza, 5th & Main Streets, Dayton, OH 45402 or refer to our 1988 Hamvention program for lodging information which includes a listing of hotel/motels located in the surrounding areas of Dayton. Reservations for the surrounding area will then become the responsibility of the individual.

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

Advance Registration Form

Dayton Hamvention 1989
Reservation Deadline - USA-April 4, Canada-March 31
Flea Market Reservation Deadline: February 1

Enclose check or money order for amount indicated and send a self addressed stamped envelope.

Please Type or Print your Name and Address clearly.

How Many

Admission (valid all 3 days)	_____	@ \$10.00*	\$_____
Grand Banquet	_____	@ \$20.00**	\$_____
Women's Luncheon (Saturday)	_____	@ \$7.00	\$_____
(Sunday)	_____	@ \$7.00	\$_____
Flea Market (Max. 3 spaces)	_____	\$25/1 space \$50/2 adjacent	\$_____
Admission ticket must be ordered with flea market tickets	_____	\$150/3 adjacent	\$_____
		Total	\$_____

* \$12.00 at door ** \$22.00 at door, if available

Name _____

Address _____

City _____ State _____ Zip _____

Make checks payable to - **Dayton HAMVENTION**

Mail to - **Dayton Hamvention
Box 2205
Dayton, OH 45401**

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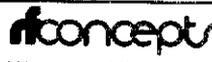
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2-217	2 in/170 out	2-211	2 in/110 out
2-117	10 in/170 out	3-312	30 in/120 out

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QUALITY QSL Cards, rubber stamps, envelopes and printed letterheads. Send 45 cents postage or SASE for samples. Large selection at attractive prices. Sandollar Press, P.O. Box 30726, Santa Barbara, CA 93130.

CAR WINDOW Call Sign... 2 inch x 8 inch plastic suction cup mountings! Transfer car to car! Call lettering is white. Choose black, blue or red background. Magnetic signs available. Select black, blue or red lettering on white background. \$8.50 each. Two for \$15 ppd. Club Discounts! Sign-On, Dept. T, 1923 Edward Lane, Merrick, NY 11558.

LICENSE Display Mount—add the "Crowning Touch" to your radio shack by displaying your Amateur Radio License with an enhancing 8 x 10 Paragon License Mount. Price \$4 or send SASE for descriptive literature. Paragon Mounts, K4VUQ, Box 21992, Lexington, KY 40522.

THE BEST of both worlds... Economy Vellum Bristol stock for the volume user and Lustre stock for the discriminating Ham. Either choice top quality. QSLs By W4MPY, 705 Audubon Circle, Belvedere, SC 29841.

ANTIQUE-VINTAGE-CLASSIC

WANTED: Old microphones for my mic. museum. Also mic-related items. Write Bill Paquette, 107 E. National Avenue, Milw., WI 53204.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: Radio, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201, 818-242-8961.

WANTED: QST VOLUME 1. W6ISQ, 82 Belbrook Way, Atherton, CA 94025.

SCHEMATICS: Radio receivers 1920's/60's. Send Brand-name, Model No., SASE Scaramella, Box 1, Woonsocket, RI, 02895-0001.

WE MAY HAVE the tubes you need. (Thousands in stock). Send SASE for our list. Fala Electronics, P.O. Box 1376-1, Milwaukee, WI 53201.

BUY, Sell, Collect and Restore early tube equipment? Early receivers, tubes and telegraph gear? Join the Antique Wireless Association which sponsors old-time "meets", flea markets, museum and journal with technical articles and free want ads. Membership and annual dues only \$10. Write for information and Museum hours: Bruce Kelley, W2ICE, Route 3, Holcomb, NY 14489.

WANTED: Hallicrafter silver panel Skyriders and other very old or unusual Hallicrafter equipment, parts, etc. Chuck Dachis, "The Hallicrafter Collector", 4500 Russell Drive, Austin, TX 78745.

MICROPHONES and related memorabilia used in radio/TV broadcasting prior to 1980 wanted. Cash paid; trade terms available. Write: James Steele, 160 West 77th Street, New York, NY 10024-6942.

MANUALS For most hamgear made 1935-1970, plus Kenwood. No quotes. Our current catalog "J" at \$1 required to order. Over 2,000 models. Hi-Manuals, P.O. Box J-502, Council Bluffs, IA 51502.

WANTED: WWII Military Radios and Accessories. Need ATD Tuning Units, DY43 Dynamotor, BC 222/223 Manuals, ART-13 Connectors, ARRU41/MT-1518 Mount, ATB, GRC 106 Receiver, Hallicrafters HT20. Charlie, 501 Mystic Valley Pkwy., Medford, MA 02155.

WANTED Books: Pre-1900 Electricity and Telegraphy, Pre-1925 Radio, Pre-1940 Television. Books, Magazines or any other related literature. Jim Kreuzer, N2GHD, 6270 Clinton Street, Elma, NY 14059, 716-681-3186.

WANTED: Pre-WW2 Pan American Airways aircraft transmitters/receivers and schematics/manuals for same; Pre-WW2 Speed-X bugs. Conly, 819 Henrietta Avenue, Sunnyvale, CA 94085.

WANTED: Old Hi-Fi Gear, Manuals, Literature, Etc. For my collection. Life ARRL Member. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53220-0803, 414-545-5237.

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I PAY CASH for new and used vacuum tubes, especially vintage and transmitting types. Randy Nachtrieb, WA6GJA, 6392 Park Avenue, Garden Grove, CA 92645, 714-897-9351.

WANTED: The entire 1934 "Z" and "H" line of Silver-Marshall Radios, any condition. Chuck Dachis, W5EOG, The Hallicrafter Collector, 4500 Russell Drive, Austin, TX 78745.

CODE/CIPHER Machines Wanted! Historian buys code/cipher devices, manuals, books, etc! All periods! Melton, Box 5755, Bossier City, LA 71171, 318-798-7319.

WANTED: Telegraph Keys and Bugs that are old or unusual, other early telegraph instruments, telegraph signs, related items. Telegraph collector will pay premium prices for rare items. Larry Nutting, W06DTC, 4025 Slate Court, Santa Rosa, CA 95405, 707-539-1883.

WANTED: Old CW Keys. Jon, 814-226-9565.

I PAY CASH for vintage audio equipment by Western Electronics, Altac, McIntosh, Marantz, Westrex, etc. Randy Nachtrieb, WA6GJA, 6392 Park Avenue, Garden Grove, CA 92645, 714-897-9351.

I HAVE some old equipment you may want. Send legal size SASE to Bill Ussery, P.O. Box 40, Pearl River, LA 70452-0040.



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2-117	2m	10-170	315
2-417	2m	45-170	279
3-22	220	2-20	118
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VS-52	10/15/20/40/80	2	49"	64.95
VS-53	10/15/20/40/80	3	42"	74.95
VS-64	10/15/20/40/80/160	4	73"	94.95

*Can be used without radials

Feedline can be buried if desired

*Permanent or Portable Use

ALL TRAP ANTENNAS are Ready to use - Factory assembled - Commercial Quality - Handle full power - Comes complete with: Deluxe Traps, Deluxe center connector, 14 ga Stranded CopperWeld ant. wire and End Insulators, Automatic Band Switching - Tuner usually *not* required. For all Transmitters, Receivers & Transceivers - For all class amateurs - One feedline works all bands - Instructions included - 10 day money back guarantee!

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Model	Band	Length	Price
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D-15	15	22"	18.55
D-20	20	33"	19.95
D-40	40	66"	22.55
D-80	80/75	130"	25.95
D-160	160	260"	34.95

Includes assembly instructions, Deluxe center connector, 14ga Stranded CopperWeld Antenna wire and End Insulators.

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- Reduces overall length over 40%
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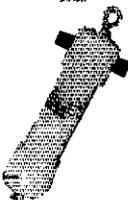
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Type	Length	With antenna purchase	Separately
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RG-8X	100'	18.95	20.95

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WANTED: Amateur TV Equipment from late 1930s, early 1940s QSTs. Nagle, 12330 Lawyers, Herndon, VA 22071.

TELEGRAPH Keys, Vintage Amateur Station, Photographs sought for private non-profit collection. Contact: John Hensley, WJ5J, 5054 Holloway Avenue, Baton Rouge, LA 70808.

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WANTED: Crystals in FT-243 Holders. I collect manufacturers, frequency unimportant. Glenn, K3SWZ, 23 Carriage Road, New Cumberland, PA 17070.

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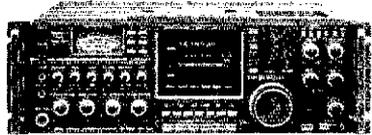
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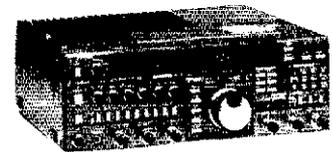
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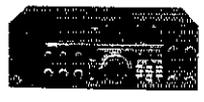
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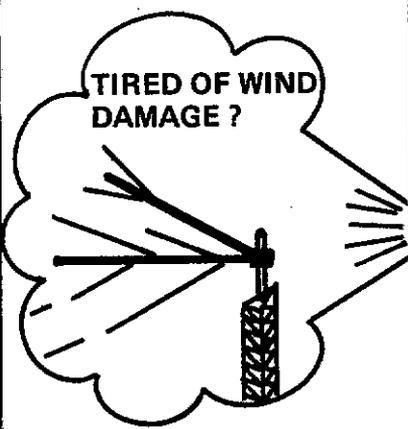
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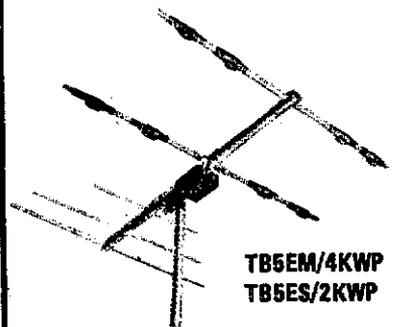
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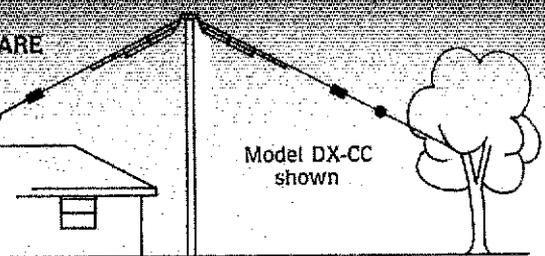
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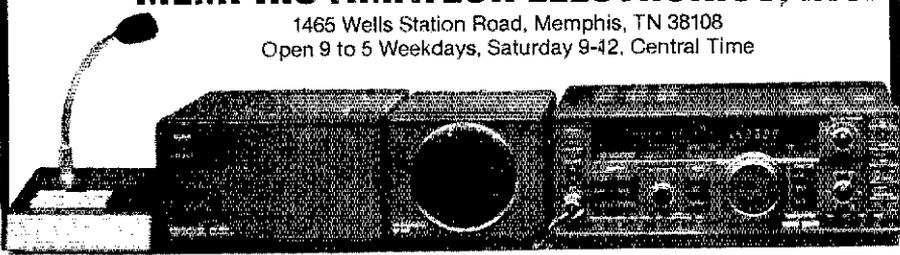
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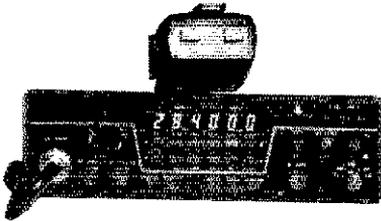
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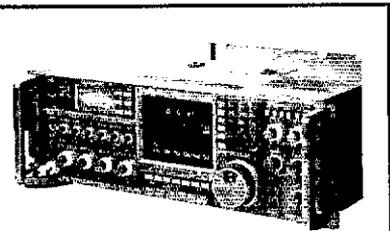
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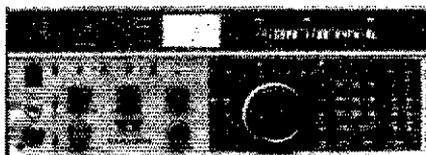


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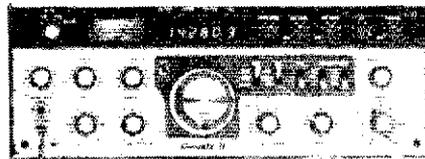
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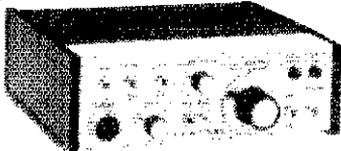
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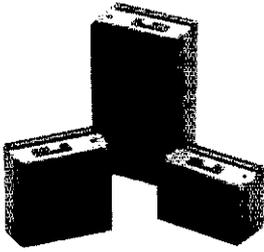
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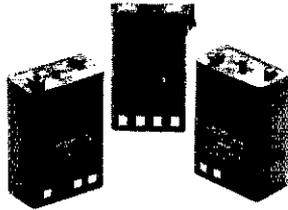
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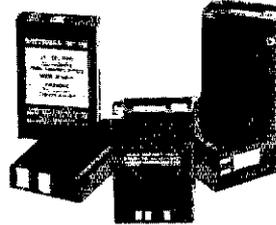
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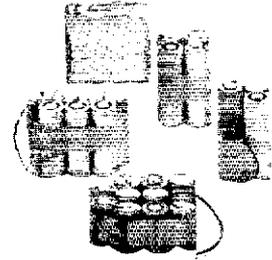
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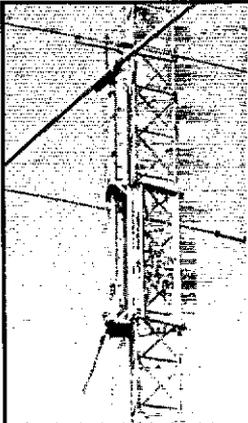
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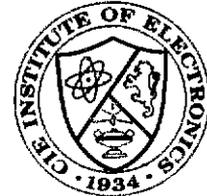
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SELL: MFJ 989 3 KW Roller Inductor Antenna Tuner, \$189; Wanted: Kenwood TS-120S or TS-130S Transceiver. Ron, WK9N, 614-774-2233 evenings.

WANTED: Collins 30K, 310A and 75A. I arrange transportation. Contact: R.W. Parker, Box 6020, Lawrenceville, NJ 08848.

ESTATE SALE: Collins 51J4, R390A, R390/URR, Teletype 5, F5 Converters, Diversity, Equipment, TMC, Military Test Equipment, Servo Corp. Model R5200 Receiver. Would like offer for all. Due to health I'm selling all my amateur and broadcast radios, radio tubes, etc. 12 page list in large envelope \$1 stamps. R. Olmsted, K4LJZ, 608 W. Thompson Lane, Murfreesboro, TN 37129, 615-893-5344.

SLEP SPECIALS: Military USM-207 Frequency Counter, Solid State Portable 0-500 MHz, eight digit readout, high stability oscillator, lab quality \$185; Plate Transformers for amplifier builders or replacement, Gonset P/N 271-107 for models 903, 913A Linear Amplifiers 115VAC/1850V at 500MA, size: 5 1/4 L x 4 1/2 W x 4 1/2 H, wt. 18 lbs, new \$37; HP606A Signal Generator 50 KHz thru 65 MHz \$295; HP616A Microwave Signal Generator 1.8 GHz thru 4.2 GHz \$245; TS-510A/U Signal Generator, 10 MHz thru 420 MHz, Mil/Spec Version of HP-608D \$195; URM-25D Signal Generator 10 KHz thru 80 MHz \$145. All lab tested, have quantity, satisfaction guaranteed, Visa/MC or Check, add shipping, write or phone Bill Slep, 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763.

ICOM IC-R71A For Sale. Receiver with remote control. Mint condition with manual and original shipping carton. \$500 firm. Includes UPS shipping. Mike, W4CYJ, 912-685-6707. Call anytime, leave message on machine. I will return your call usually within two hours.

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SIGNAL/ONE CX-11A Transceiver \$2,995. Alpha 77DX Amplifier \$4,195, Alpha 78 \$2,195, Alpha 76PA \$1,695. Kenwood TS-711A Transceiver \$750, SM-220 \$325. KLM 2M-16LBX (new) \$135. Drake MN-2000 \$285, MN-2700 \$385. A. Emerald, 8956 Swallow, Ftn. Vly., CA 92708, 714-962-5940.

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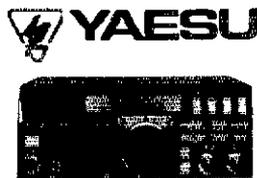
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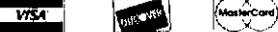


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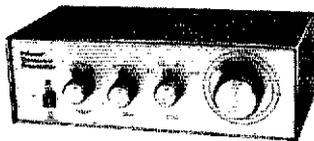
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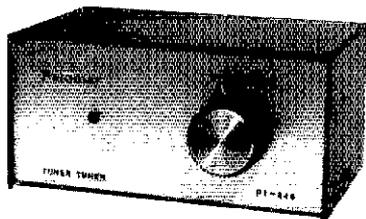


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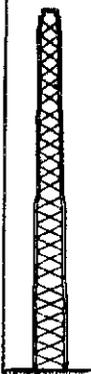
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4218 XL 18-el 2 mtr Beam	\$129
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424B 24-el 432 MHz Beam	\$ 89
ARX2B 2 mtr Vertical	\$ 45

Hy-gain

Discoverer 2-el 40-mtr Beam.
Discoverer 3-el Conversion Kit.
EXPLORER-14 SUPER-SPECIAL
QK710 30/40 mtr. Add-On Kit.
V2S 2-mtr Base Vertical.
V4S 440MHz Base Vertical.
TH5MK2S Broad Band 5-el Triband Beam.
TH7DXS 7-el Triband Beam.
TH3JRS 3-el Triband Beam.
205BAS 5-el 20-mtr Beam.
195BAS 5-el 15-mtr Beam.
105BAS 5-el 10-mtr Beam.
204BAS 4-el 20-mtr Beam.
64BS 4-el 6-mtr Beam
12 AVQ 20-10 mtr vertical.
14 AVQ 40-10 mtr vertical.
18 AVT/WB 80-10mtr Vertical.
18HTS 80-10 mtr Hy-Tower Vertical.
23BS 3-el 2 mtr Beam.
25BS 5-el 2 mtr Beam.
28BS 8-el 2 mtr Beam.
214BS 14-el 2-mtr Beam.
28DQ 80/40 mtr Trap Dipole.
58DD 80-10 mtr Trap Dipole.
BN86 80-10 mtr KW Balun W/Coax Seal.

HUSTLER

6BTV 80-10 mtr Vert	\$149	5BTU 80-10 mtr Vert	\$129
4BTU 40-10 mtr Vert	\$99	G7-144 2-mtr Base	\$129
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

Bumper Mounts - Springs - Folding Masts in Stock!

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Accessories:
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STR II Stub-Tuned Radials \$35
TBR160 160m Coil Kit \$65
30m Add-on Kit \$35
17/12m Add-on Kit \$35

FREE UPS on ACCESSORIES when purchased with antenna

HF5B "Butterfly" 20-10m Compact Beam \$229.95

- Unique Design
- Turns w/TV Rotor
- Reduces Size
- Boom Length 6 Feet
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- Element Length 12.5 Feet

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KT34A 4-el Broad Band Triband Beam	\$399.95
KT34XA 6-el Broad Band Triband Beam	\$599.95

ROTORS

Alliance HD73 (10.7 sq ft rating)	.....	\$119.95
Alliance U110 (3 sq ft rating)	.....	\$49
Telex CD 45II (8.5 sq ft rating)	.....	\$CALL
Telex HAM 4 (15 sq ft rating)	.....	\$CALL
Telex Tall/wister (20 sq ft rating)	.....	\$CALL
Telex HDR300 Heavy Duty (25 sq ft rating)	.....	\$CALL

ROTOR CABLE

Standard 8 cord cables \$.22/ft.
(vinyl jacket 2-#18 & 6-#22 ga)

Heavy Duty 8 Cord cable \$.39/ft.
(vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

28G	.....	\$49.50	45G	.....	\$139.50
25G	.....	\$59.50	55G	.....	\$179.50

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	\$1129
FK2558	58 ft.	13.3 sq. ft.	1199
FK2568	68 ft.	11.7 sq. ft.	1239
FK4544	44 ft.	34.8 sq. ft.	1489
FK4554	54 ft.	29.1 sq. ft.	1599
FK4564	64 ft.	28.4 sq. ft.	1699

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/BUY HARDWARE

3/16 EHS Guywire (3090 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 7 x 7 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 Thimble (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
1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle)	.....	\$10.95
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	.....	\$17.95
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
9901LD Cable End (for 2100/4000 cable)	.....	\$9.95
9902LD Cable End (for 6700 cable)	.....	\$11.95
Socket/last Potting Compound (does 6-8 ends)	.....	\$16.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 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
24 in Wall	\$69	\$129	\$189	\$249

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- All Band, All Mode Transceiver
- Direct Keyboard Entry
- Engineered for the DX-Minded and Contesting Ham
- Its Got It All!

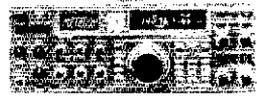
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FT-767GX HF/VHF/UHF BASE STATION

- Add Optional 6m, 2m & 70cm Modules
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- 160-10M/General Coverage Receiver
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uniden



HR-2510

- Mobile 10 Meter Transceiver
- SSB/AM/FM/CW
- 25 Watts PEP
- Computer Controlled Operation

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TS-140S AFFORDABLE DX-ing!

- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
- Compact, Lots of Features

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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
- 10 Watts Output on 6 Meters and 1.2 GHz • 100 Memories

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IC-781 NEWEST SUPER RIG

- 5 Function Display Screen
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ASA CP-100



Complete Terminal Unit for Morse, Baudot, ASCII, AMTOR

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- 2 Meter, 70cm & Optional 1200 MHz
- 45 Watts (10W on 1200 MHz)
- 59 Memories
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- Rx: 138-174 MHz
- Tx: 144-148 MHz
- 45W Output
- Digital Voice Recorder
- FT-712 RH for 70cm

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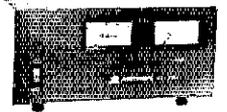


IC-2GAT IC-4GAT

2 Meter & 440 Handhelds

- IC-2GAT RX 138-174 MHz TX 140-150 MHz 7 Watts
- IC-4GAT 440-450 MHz 6 Watts

ASTRON



- RS7A . . . \$50
- RS12A . . . \$72
- RS20A . . . \$92
- RS20M . . . \$109
- VS20M . . . \$129
- RS35A . . . \$139
- RS35M . . . \$155
- VS35M . . . \$175
- RS50A . . . \$199
- RS50M . . . \$225
- RM50M . . . \$245
- VS50M . . . \$239

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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

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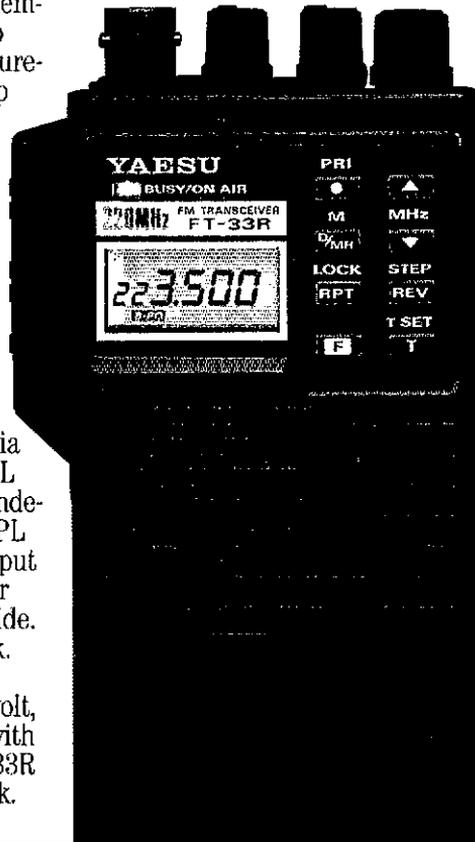
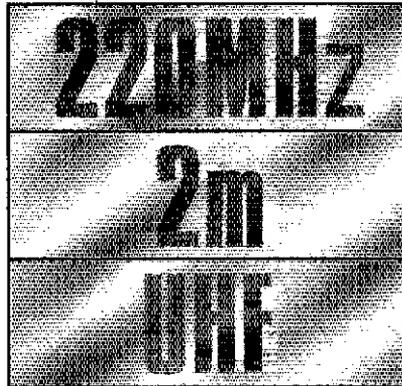
To begin with, you'll find a model that's right on your wavelength. The 2-meter FT-23R. The 220-MHz FT-33R. Or the 440-MHz FT-73R.

Whichever you choose, you benefit from incredibly small packaging. (Take a look at the actual size photo.) Aluminum-alloy cases that prove themselves reliable in a one-meter drop test onto solid concrete. And moisture-resistant seals that really help keep the rain out.

But perhaps best of all, each radio blends sophisticated, micro-processor-controlled performance with surprisingly simple operation. In fact, it takes only minutes to master all these features:

Ten memories that store frequency, offset and PL tone. Memory scan at 2 frequencies per second. Tx offset storage. Priority channel scan. Channel selection via tuning knob or up/down buttons. PL tone board (optional). PL display. Independent PL memory per channel. PL encode and decode. LCD power output and "S"-meter display. Battery-saver circuit. Push-button squelch override. Eight-key control pad. Keypad lock. High/low power switch.

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.

And consider these options: Dry cell battery case for 6 AAA-size cells. Dry cell battery case for 6 AA-size cells. DC car adapter/charger. Programmable CTCSS (PL tone) encoder/decoder. DTMF keypad encoder. Mobile hanger bracket. External speaker/microphone. And more.

Check out the FT-23R Series at your Yaesu dealer today. Because although we can tell you about their incredible performance, toughness and small size, seeing is really believing.



YAESU

Yaesu USA 47210 Edwards Road, Cerritos, CA 90701. (213) 404-2700. Repair Service: (213) 404-4884. Parts: (213) 404-4847.

Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc. FT-33R shown with optional FNB-9 battery pack.

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Warp Drive!



TS-790A Satellite Transceiver

The new Kenwood TS-790A VHF/UHF all-mode tri-band transceiver is designed for the VHF/UHF and satellite "power user." The new TS-790A is an all-mode 144/450/1200 MHz transceiver with many special enhancements such as Doppler shift compensation. Other features include dual receive, automatic mode selection, automatic repeater off-set selection for FM repeater use, VFO or quick step channel tuning, direct keyboard frequency entry, 59 memory channels (10 channels for separate receive and transmit frequency storage), multiple scanning and multiple scan stop modes. The Automatic Lock Tuning (ALT) on 1200 MHz eliminates frequency drift. Power output is 45 watts on 144 MHz, 40 watts on 450 MHz, and 10 watts on 1200 MHz. (The 1200 MHz section is an optional module.)

- **High stability VFO.** The dual digital VFOs feature rock-stable TCXO (temperature compensated crystal oscillator) circuitry, with frequency stability of ± 3 ppm.
- **Operates on 13.8 VDC.** Perfect for mountain-top DXpeditions!
- **The mode switches confirm USB, LSB, CW, or FM selection with Morse Code.**
- **Dual Watch allows reception of two bands at the same time.**
- **Automatic mode and automatic repeater offset selection.**
- **Direct keyboard frequency entry.**
- **59 multi-function memory channels.** Store frequency, mode, tone information, offset, and quick step function. Ten memory channels for "odd split."
- **CTCSS encoder built-in.** Optional TSU-5 enables sub-tone decode.
- **Memory scroll function.** This feature allows you to check memory contents without changing the VFO frequency.

- **Multiple scanning functions.** Memory channel lock-out is also provided.
- **ALT—Automatic Lock Tuning—on 1200 MHz eliminates drift!**
- **500 Hz CW filter built-in.**
- **Packet radio terminal.**
- **Interference reduction controls:** 10 dB RF attenuator on 2m, noise blanker, IF shift, selectable AGC, all mode squelch.
- **Other useful controls:** RF power output control, speech processor, dual muting, frequency lock switch, RIT.
- **Voice synthesizer option.**
- **Computer control option.**

Optional Accessories:

- **PS-31** Power supply • **SP-31** External speaker
- **UT-10** 1200 MHz module • **VS-2** Voice synthesizer unit • **TSU-5** Programmable CTCSS decoder
- **IF-232C** Computer interface • **MC-60A/MC-80/MC-85** Desk mics • **HS-5/HS-6** Headphones
- **MC-43S** Hand mic • **PG-2S** Extra 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.

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