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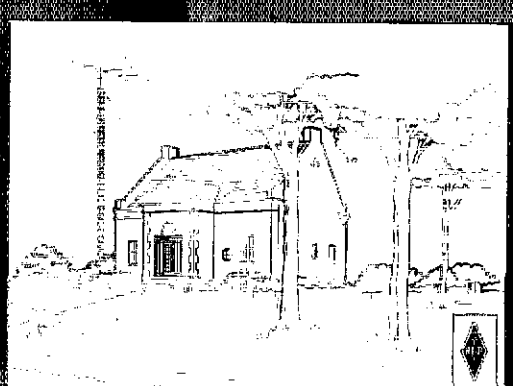

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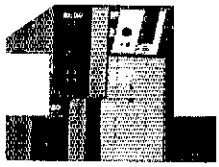
It's a fact, Henry amateur amplifiers are used and respected throughout the world ... and for some very good reasons



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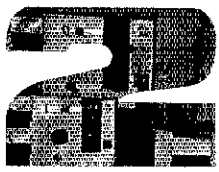

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Henry amplifiers are available from select dealers throughout the U.S. and are being exported to amateurs all over the world. In addition to our broad line of commercial FCC type accepted amplifiers we are providing special R.F. power generators for industrial, scientific and military uses. In the area of communications they go everywhere ... VHF, UHF, SSB, AM, FM, RTTY, packet, meteor burst, digital and marine shore stations. In addition to communications, Henry equipment is being used in plasma generation, sputtering and etching, thin film deposition, laser excitation, nuclear magnetic resonance (NMR), photo-emissions and mass spectrometry.

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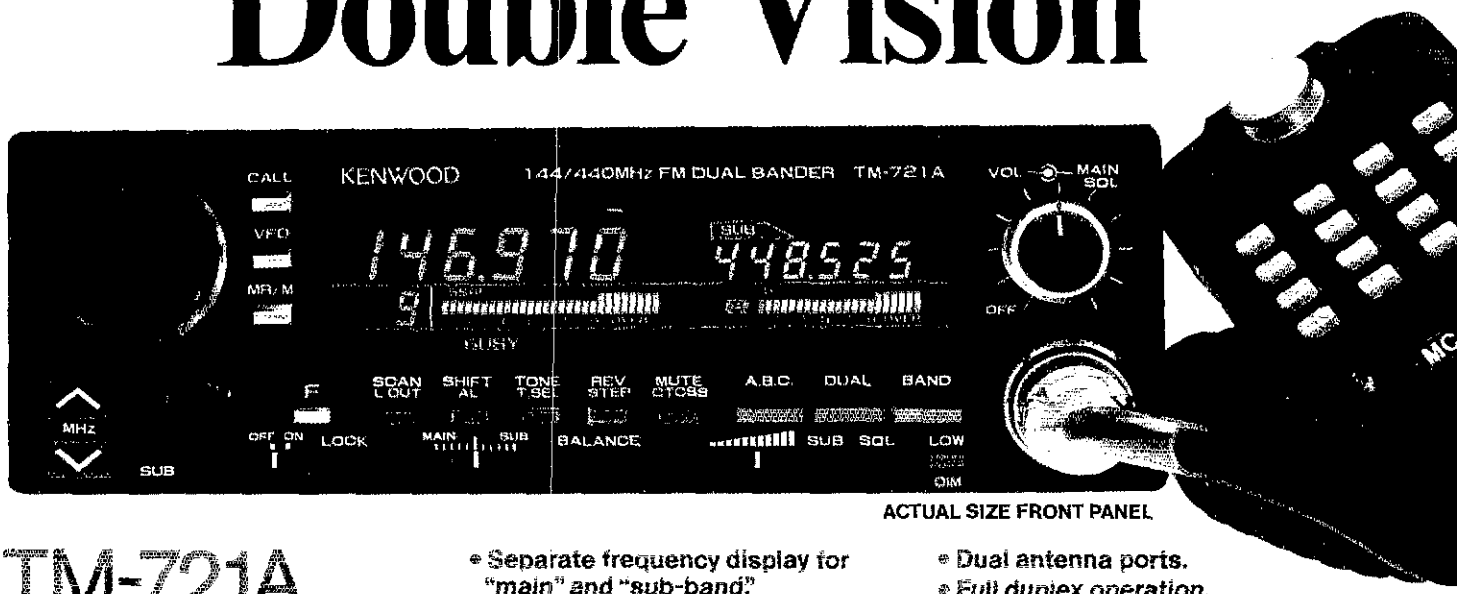
Double Vision



ACTUAL SIZE FRONT PANEL

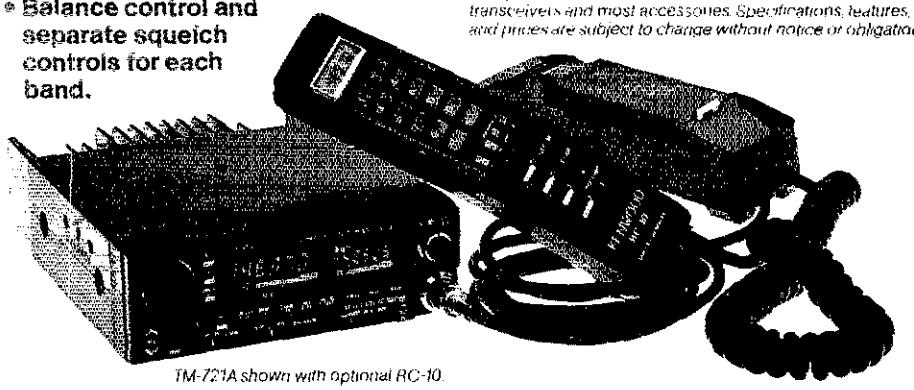
TM-721A

Deluxe FM dual bander

The Kenwood TM-721A re-defines the original Kenwood "Dual Bander" concept. The wide range of innovative features includes a dual channel watch function, selectable full duplex operation, 30 memory channels, extended frequency coverage, large multi-color dual digital LCD displays, programmable scanning, and more *with 45 watts of output on VHF and* 35 watts on UHF. TM-721A—Truly the *finest full-featured FM Dual Band* mobile transceiver!

- ***Extended receiver range*** (138.000-173.995 MHz) on 2 meters; 70 cm coverage is 438.000-449.995 MHz. (Specifications guaranteed on Amateur bands only. Two meter transmit range is 144-148 MHz. Modifiable for MARS/CAP. Permits required.)
- **30 multi-function memory channels.** 14 memory channels and one call channel for each band store frequency, repeater offset, CTCSS, and reverse. Channels "A" and "b" establish upper and lower limits for programmable band scan. Channels "C" and "d" store transmit and receive frequencies independently for "odd splits."
- **Separate frequency display for "main" and "sub-band."**
- **45 Watts on 2 meters, 35 watts on 70 cm.** Approx. 5 watts low power.
- **Call channel function.** A special memory channel for each band stores frequency, offset, and sub-tone of your favorite channel. Simply press the CALL key, and your favorite channel is selected!
- **Automatic Band Change (A.B.C.)** Automatically changes between main and sub-band when a signal is present.
- **Dual watch function allows VHF and UHF receive simultaneously.**
- **CTCSS encode/decode selectable from front panel** or UP/DWN keys on microphone. (Encode built-in, optional TSU-6 needed for decode.)
- **Balance control and separate squelch controls for each band.**
- **Dual antenna ports.**
- ***Full duplex operation.***
- **Programmable memory and band scanning, with memory channel lock-out and priority watch function.**
- **Each function key has a unique tone for positive feedback.**
- **Illuminated front panel controls and keys.**
- **Dimmer control.**
- **16 key DTMF mic. included.**
- **Handset/remote control option (RC-10).**
- **Frequency (dial) lock.**
- **Supplied accessories:** 16-key DTMF hand mic., mounting bracket, DC cable.

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



TM-721A shown with optional RC-10.

Optional Accessories:
• **RC-10** Multi-function handset/remote controller • **PS-430** Power supply • **TSU-6** CTCSS decode unit • **SW-100B** Compact SWR/power/volt meter • **SW-200B** Deluxe SWR/power meter • **SWT-1** 2m antenna tuner • **SWT-2** 70 cm antenna tuner • **SP-40** Compact mobile speaker • **SP-50B** Deluxe mobile speaker • **PG-2N** DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MA-4000** Dual band mobile antenna (mount not supplied) • **MB-11** Mobile bracket • **MC-43S** UP/DWN hand mic. • **MC-48B** 16-key DTMF hand mic.

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OUR COVER

The profile of W1AW—the Hiram Percy Maxim Memorial station—is known worldwide, and so are its popular code practice and bulletin transmissions. Your generous support is needed for W1AW to face the '90s and the 21st century. Please make your generous contributions to the W1AW Renovation Fund; for details, see page 11 of this issue and page 48 of April *QST*. *(Large photo courtesy K1CE; inset drawing by Sue Fagan)*

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May 1988
Volume LXXII Number 5

TECHNICAL

NEWS AND FEATURES

OPERATING

DEPARTMENTS

DX THAT STANDS OUT FROM THE CROWD

A3

10, 15, 20,*40 meters

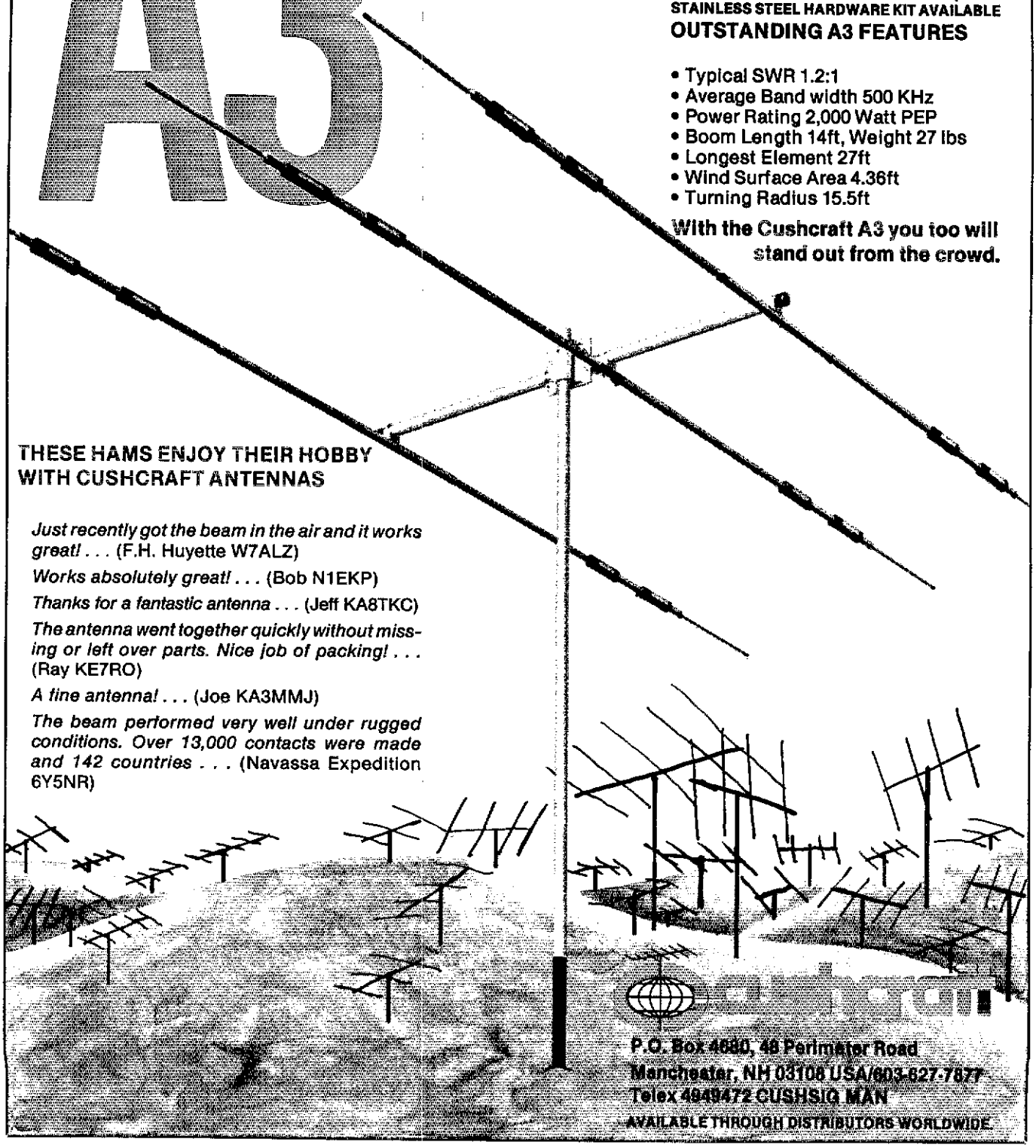
Whether busting pileups, rag chewing or hunting rare DX, the A3 stands out from the crowd with the perfect combination of easy assembly, the right size, rugged durability and great performance.

***40 METERS WITH THE A743 ADD ON KIT, STAINLESS STEEL HARDWARE KIT AVAILABLE**

OUTSTANDING A3 FEATURES

- Typical SWR 1.2:1
- Average Band width 500 KHz
- Power Rating 2,000 Watt PEP
- Boom Length 14ft, Weight 27 lbs
- Longest Element 27ft
- Wind Surface Area 4.36ft
- Turning Radius 15.5ft

With the Cushcraft A3 you too will stand out from the crowd.



THESE HAMS ENJOY THEIR HOBBY WITH CUSHCRAFT ANTENNAS

Just recently got the beam in the air and it works great! . . . (F.H. Huyette W7ALZ)

Works absolutely great! . . . (Bob N1EKP)

Thanks for a fantastic antenna . . . (Jeff KA8TKC)

The antenna went together quickly without missing or left over parts. Nice job of packing! . . . (Ray KE7RO)

A fine antenna! . . . (Joe KA3MMJ)

The beam performed very well under rugged conditions. Over 13,000 contacts were made and 142 countries . . . (Navassa Expedition 6Y5NR)

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NEW!

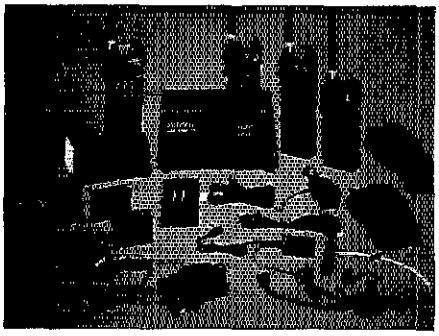
Compact Breakthrough!

TH-25AT/45AT

New Pocket Portable Transceivers

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

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



Optional accessories:

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

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Good for Satellite Digital QSOs

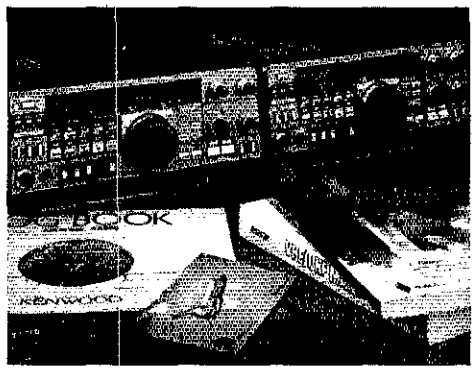
Matching Pair

Look for FUJI and PHASE III-C

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

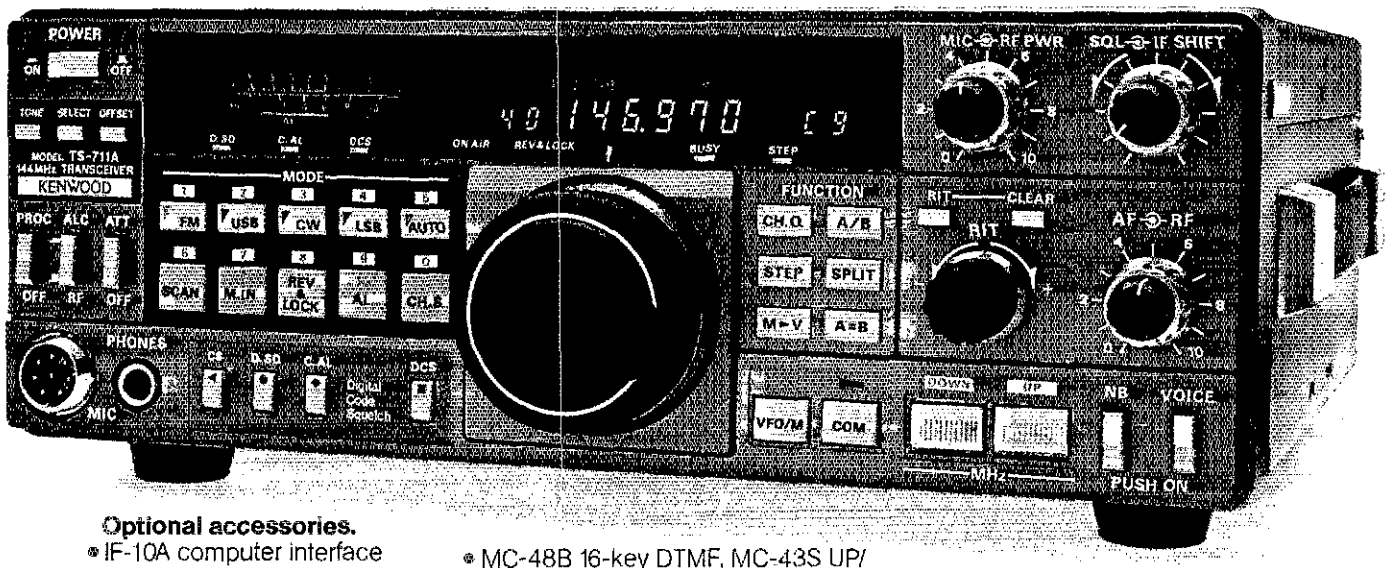
The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

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



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

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



Optional accessories.

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

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Utah — James R. Brown, NA7G, 865 Manchester Rd, Kaysville 84037 (801-544-0056)
Wyoming — James E. Raisler, N7GVV, 1102 East 9th St, Gillette 82716 (307-686-0794)

Southeastern Division
Alabama — James M. Spann, Jr, WO4W, PO Drawer X, Demopolis 36732 (205-289-1400)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave, Columbus 31909 (404-322-2856)
Northern Florida — Royal V. Mackey, N4ADI, 161 Shell Point W, Maitland 32751 (407-644-5905)
Southern Florida — Richard D. Hill, WA4PFK, 3800 SW 11th St, Fort Lauderdale 33312 (305-583-6932)
West Indies — Jose A. "Tony" Purcell, KP4IG, Urb Tomas Carrion, Calle 2, #95, Juana Diaz, PR 006 (809-837-2975)

Southwestern Division
Arizona — James E. Swafford, W7FF, 5906 W Miramar Dr, Tucson 85715 (602-298-7793)
Los Angeles — Phineas J. Icenbice, Jr, W6BF, 19323 Halsted St, Northridge, CA 91324 (818-349-3186
Orange — Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (714-687-8394)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (619-273-1120)
Santa Barbara — Thomas I. Geiger, W2KVA, 428 E Grant St, Santa Maria, CA 93454 (805-866-1359)

West Gulf Division
North Texas — Phil Clements, K5PC, 1313 Applegate La, Lewisville 75067 (214-221-8873)
Oklahoma — William E. Goswick, K5WG, 12717 S 124th E Ave, Broken Arrow 74011 (918-369-2115
South Texas — Arthur R. Ross, W5KR, 132 Sally La, Brownsville 78521 (512-831-4458)
West Texas — Amelia "Milly" Wise, W5OVH, 8516 Mt Scott, El Paso 79904 (915-751-4160)

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.

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

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

Membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA
Telephone: 203-666-1541 Telex: 650215-5052 MCI.
MCI MAIL (electronic mail system) ID: 215-5052
FAX: 203-665-7531 (24-hour direct line)

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

"It Seems to Us . . ."

Five Years of Volunteer Examining

In recent months, the Amateur Radio Volunteer Examiner program has achieved a number of significant milestones. The VE program has become such an important part of Amateur Radio, there are many hams who simply take it for granted that there should be professional-caliber license examinations administered at convenient sites and at reasonable cost.

But it wasn't always so. In fact, it wasn't so long ago that the amateur exam system was in serious trouble in this country. We'd like to take a moment this month to thank the people who bailed it out: the more than 10,000 Volunteer Examiners who have given up their evenings and weekends to make the program work.

As Amateur Radio entered the 1980s, its examination system was in bad shape. If you wanted any license other than Novice, you had to present yourself at a federal office in one of just a handful of cities. And you couldn't just go any time you felt like it; rare was the place where you could take the test on more than four days of the year, and weekdays at that. It wasn't unusual for people to miss a day or two of work or school, and to run up significant travel and lodging expenses, just for the chance to upgrade their ham ticket. Little wonder that lots of Novices never even tried to upgrade, and dropped out.

And that wasn't even the worst of it! When you did finally have the chance to sit for the exam, often at great personal expense and inconvenience, what you got was an exam you were more likely to fail than to pass—even if you'd done a lot of studying. Why? Because the guidelines provided by FCC as to what would be on the exam were so sketchy, the legitimate preparers of study material such as the League were hard-pressed to respond. And because the exam system itself was unfair, the feeling began to develop that it was okay to try to beat the system—for the integrity of the Amateur Radio Service, a recipe for disaster.

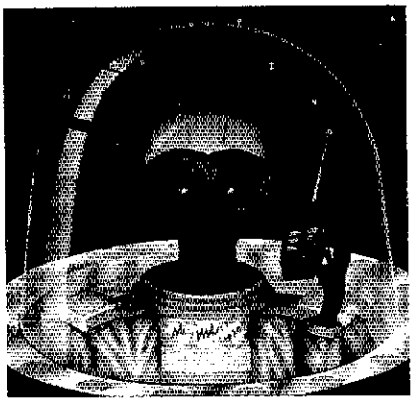
Enter Congress. With League backing, legislation was introduced in the 97th Congress to give the FCC authority to use volunteers in the preparation and administration of amateur exams. President Reagan signed the bill into law on September 13, 1982. The following April, the Dayton Amateur Radio Association provided assistance to Commission staffers that made it possible for some 600 people to be examined at the 1983 Dayton HamVention® —an indication of the pent-up demand for exam opportunities that existed just five years ago. Congress came to the rescue again in November 1983, when in the course of developing new rules it became apparent that FCC did not believe it had the authority to permit the recoupment of any expenses in the VE program. In just 15 days from introduction to adoption, an amendment to the Communications Act was guided through both Houses to provide that specific authority. It was recoupment of expenses, modest though the cost is on a per-exam basis, that made a full-scale VE program possible; without it, even the League would have found it difficult to bear the burden.

How well is it working? When measured against what would have happened without it, the VE program—and the volunteers who have made it work—is deserving of every superlative the English language can muster. According to FCC figures, the number of persons served by Volunteer Examiners went from 8,599 in 1984—when the program was in place for just a part of the year—to 41,439 in 1985, 42,422 in 1986 and 49,728 in 1987. Add to that the number examined so far in 1988 and we're well over 150,000—not quite as many as McDonald's has sold burgers, but an astounding figure nonetheless. The cost savings to both the examinees and the other taxpayers run well into the millions. The pass rate is a steady 61%, a far cry from the "bad old days." Best of all, the exams are almost universally regarded as fair—so much so, that it looks as if a three-year cycle for reviewing each question pool will be sufficient to keep them current. And best of all, the integrity of the Service has been preserved; problems with the conduct of exam sessions have been rare and isolated.

When the program began, some believed that the demand for exam opportunities would dry up quickly, leaving us with frustrated volunteers having nothing to do. Others predicted that the volunteers would soon grow tired of the heavy workload, and would disappear back into the woodwork. Neither scenario has come to pass. According to FCC figures, the average number of people served at an exam session was just slightly over 11 in both 1986 and 1987, suggesting a stable relationship between supply and demand.

Not long ago, in its capacity as a Volunteer Examiner Coordinator, the League accredited its 10,000th VE. Please join us in a tip of the hat to each and every one, and to the volunteers who work through other coordinators for the good of Amateur Radio. We owe them a lot.
—*David Sumner, K1ZZ*

Yaesu's FT-736R. Because you never know who's listening.



Why just dream of talking beyond earth?

With Yaesu's new FT-736R VHF/UHF base station, you can discover some of the best DX happening in ham radio. Via moonbounce. Tropo. Aurora. Meteor scatter. Or satellites.

You see, the FT-736R is the most complete, feature-packed rig ever designed for the serious VHF/UHF operator. But you'd expect this of the successor to our legendary FT-726R.

For starters, the FT-736R comes factory-equipped for SSB, CW and FM operation on 2 meters and 70 cm (430-450 MHz!), with two additional slots for optional 50-MHz, 220-MHz, or 1.2-GHz modules.

Crossband full duplex capability is built into every FT-736R for satellite work. And the satellite tracking function (normal *and* reverse modes) keeps you on target through a transponder.

The FT-736R delivers 25 watts RF output on 2 meters, 220 MHz, and 70 cm. And 10 watts on 6 meters and 1.2 GHz. Store frequency, mode, PL frequency, and repeater shift in each of the 100 memories.

For serious VHF/UHF work, use the RF speech processor. IF shift. IF notch filter. CW and FM wide/narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Preamp switch for activating your tower-mount preamplifier. Even an offset display for measuring observed Doppler shift on DX links.

And to custom design your FT-736R station, choose from these popular optional accessories: Iambic keyer module. FTS-8 CTCSS encode/decode unit. FVS-1 voice synthesizer. FMP-1 AQS digital message display unit. 1.2-GHz ATV module. MD-1B8 desk microphone. E-736 DC cable. And CAT (Computer Aided Transceiver) system software.

Discover the FT-736R at your Yaesu dealer today. But first make plenty of room for exotic QSL cards. Because you *never* know who's listening.

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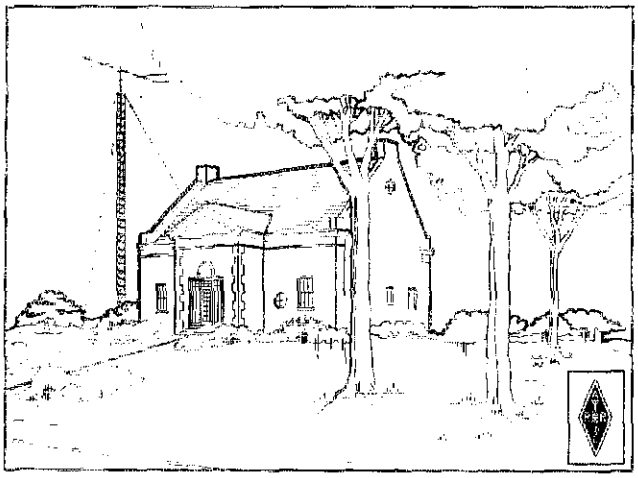
UP FRONT in QST



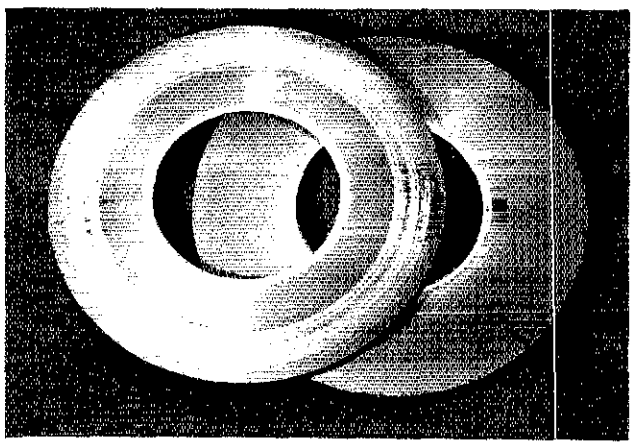
We need your support: Probably no ham station is more readily recognized by its building profile than the Hiram Percy Maxim Memorial Station, W1AW—beloved worldwide for providing code practice and bulletins to the amateur community. As announced in last month's QST (p 48), W1AW is about to undergo a facelift—just in time to coincide with the League's Diamond Jubilee celebration in 1989. We're asking for your support. If you haven't donated yet, it's not too late to become a W1AW Booster with a donation of up to $100...or a Century Club ($100), HPM Club ($500) or Kilowatt Club ($1000) member. All contributions will be gratefully acknowledged by ARRL, a 501(c)(3) tax-exempt organization. Send your tax-deductible contribution today to: W1AW Fund Drive, 225 Main St, Newington, CT 06111. Please make checks payable to W1AW Renovation Fund. Or call Jennifer at 203-666-1541 between 8 AM and 4 PM (EDT) weekdays with your credit card information. Please be generous! Thank you.

"What do you mean, the computer's down?"

Computer downtime can be caused by anything from a simple mechanical glitch to the dreaded "headcrash"—better known as the computer programmer's worst nightmare. Nobody likes computer delays, especially the customer who has to wait for information or services.

Since many readers may not have actually seen the results of a headcrash, we wanted to show you one that happened on our system several months ago. The disk on the right is "before," and the one on the left is "after." The effect is equivalent to repeatedly slamming your phonograph needle on your favorite album, with the same disastrous results.

A major improvement for HQ has been the installation of an IBM System 38 computer system this year. Data transactions process very quickly, and the system has a much larger memory than our old unit. In the unlikely event of a system crash, data recovery is as simple as a few keystrokes.



A headcrash turns a perfectly good disk, like the one on the right, into a useless one, like the one on the left. In the process, all data stored on the disk is lost.

Are You Ready?

Now that spring has finally arrived, it's time to start getting ready for Field Day. While you're checking out your Field Day gear, don't forget to check out the Field Day Rules on page 87 of this issue. See you in June!

Back on Earth: Shuttle astronaut Tony England, WØORE, who operated SSTV and 2-meter FM from the shuttle, visited HQ in late February. ARRL Executive Vice President David Sumner, K1ZZ (right), presented Tony with a copy of the *1988 ARRL Handbook* signed by the HQ staff. For more on Tony's visit, see this month's Happenings. (*photo courtesy WA2CCN*)

Phase 3C Launch Date Draws Near

The ESA (European Space Agency) launch facility at Kourou, French Guiana, is the scene of preparations for the launch of AMSAT's Phase 3C satellite in late May. (photo courtesy Arianespace)

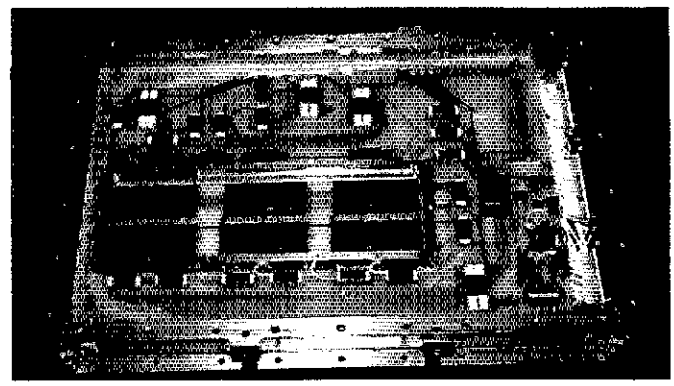
When this issue went to press, the scheduled launch date for AMSAT Phase 3C, the most ambitious and complex amateur satellite yet launched, was early June.

One aspect of Phase 3C that has been vastly improved is the Integrated Housekeeping Unit (IHU), the computer which controls the satellite's operation. The IHU's memory has been hardened so that it is 1000 times more resistant to radiation than the unit on AO-10.

The radiation of the Van Allen belts has virtually destroyed AO-10's memory, but this fate will not befall Phase 3C, thanks to the donation of special HS6564-RH CMOS memory chips by Harris Corp's Custom Integrated Circuit Division.

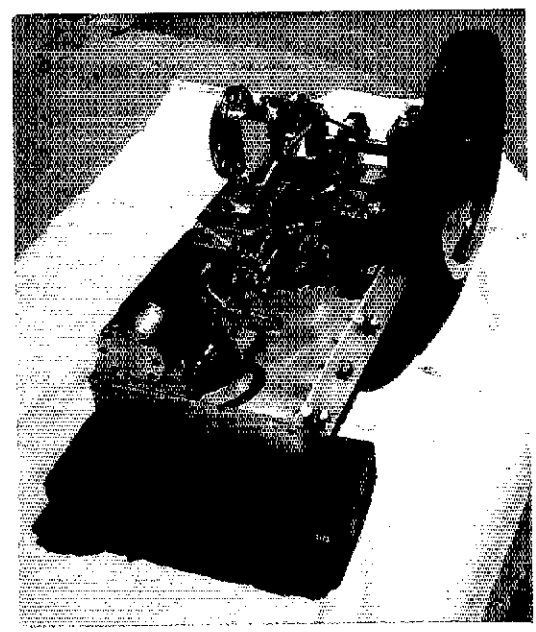
The memory chips are treated with tungsten to enhance their hardness; they are the large dark rectangles in the photo of the IHU. Each module is an 8-kbyte block, for a total of 48 kybte of error-correcting memory, yielding a net memory of 32 kbyte. The CPU is an RCA COSMAC 1802.

Check out ARRL and AMSAT bulletins for the latest information on Phase 3C. A number of stations, including W1AW, will carry the Phase 3C launch live. The June issue of *QST* will feature an article on Phase 3C by Vern Riportella, WA2LQQ.



Phase 3C's IHU, which was designed by W2FPY and built by KE3D. The donation of the radiation-resistant memory chips was arranged by KB2M. (photo courtesy W4PUJ)

W2FMI honored: During a visit to HQ in February, Jerry Sevick, W2FMI, was presented with a framed and matted copy of the cover of his book, *Transmission Line Transformers*, which is published by the ARRL. The second printing of the book is available and may be purchased from the ARRL or from Amateur Radio dealers. Jerry is shown with four HQ staffers who helped bring the book to fruition (l-r): KA1DYZ, Sue Fagan, WB1ENT and KA1MJP. (*photo courtesy WA2CCN*)



Boat anchor: There are a lot of "boat anchors" at hamfests and surplus outlets, but Lloyd Hanson, W9YCB, of Angola, Indiana, came up with one that's a bit off the beaten path—a steam engine with parts (*all of them!*) salvaged from electronic equipment. Among the engine's components are a cylinder made from the water control valve of a large transmitting tube, pulleys and bearings from old dial mechanisms, a flywheel from an old movie projector, a piston that was once an RF choke and an alcohol-powered boiler made from an SCR-268 radar tuning cavity. Actually, the engine doesn't fully qualify as a boat anchor—with its modified 12-V motor, it has sufficient speed and power to operate a small 2-meter transceiver. Amateur ingenuity strikes again! (*photo courtesy W9YCB*)

SKITREK Expedition in Progress

The Canadian-Soviet SKITREK expedition got underway on March 3. The first airdrop of supplies, at 0900 UTC March 14, was successful. The skiers had some problems with damp clothes and condensation in the tents, so they constructed an igloo at one stop and used it to dry clothing.

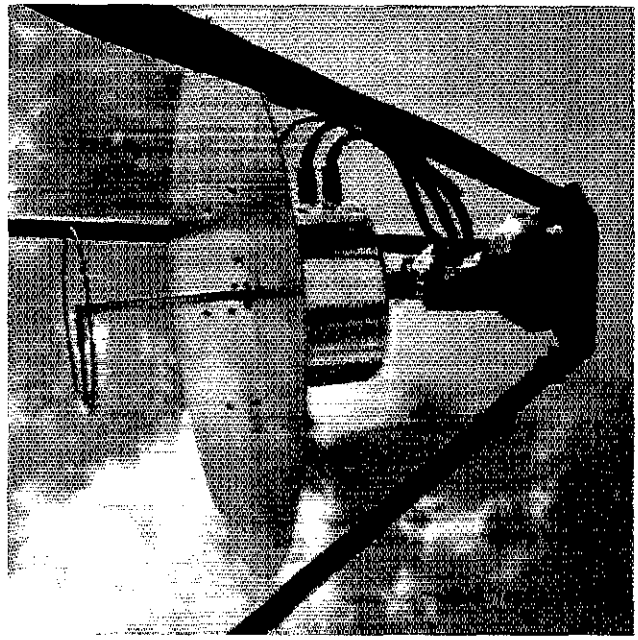
The team's position is reported on the OSCAR-UoSAT 11 digitalker, which can be heard on 145.825 MHz. The signal can be copied on a hand-held radio as the satellite passes overhead. Many schools are monitoring the satellite and tracking the skiers' progress.

CI8C, the Canadian communications-support station, has been monitoring the team, EXØVE, on 80 meters and relaying messages to the south to give listeners a chance to follow the Arctic expedition.

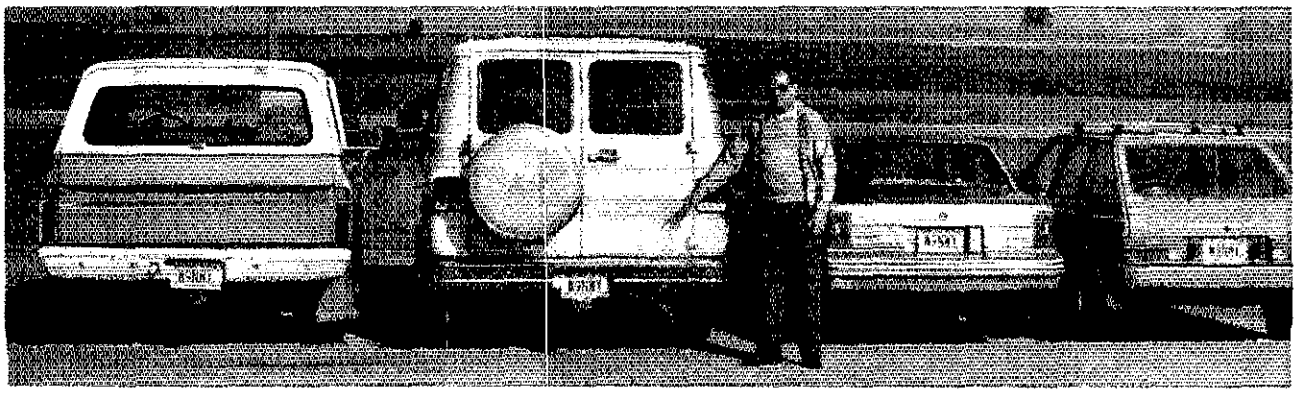
We'll keep you posted on the SKITREK team's progress. In the meantime, check out the OSCAR-UoSAT 11 digitalker and CI8C for further reports.

Canadian and Soviet amateurs met early this year at the headquarters of the Radio Sports Federation in Moscow to discuss plans for the SKITREK expedition. Seen here are (l-r) UW3EE, VE3CDX, UA3AF, VE3CDM, UA3-170-9, UA3CR and UA3AYT. CRRL President Tom Atkins, VE3CDM, and Barry Garratt, VE3CDX, were able to operate in Moscow under the Canadian/USSR reciprocal operating agreement which is in effect during the expedition. (photo courtesy VE3CDM)

EME closeup: Max Bachi, XE1XA, of Huizquilucan de Degollado, Mexico, used this circular-loop dish feeder to feed his 5-meter dish during the 11th ARRL International EME Competition. The sealed box on the rear of the reflector contains a preamp, relays and the polarity rotator. For more on the EME Competition, see the article on p 85 of this issue. (*photo courtesy XE1XA*)



More call-letter license plates: Some hams have their call on two of their vehicles, usually by having them registered in different states. But a ham with *four* plates, each bearing his call? David Boland, W9NWY, of Neenah, Wisconsin, has Wisconsin call-letter plates on each of his four vehicles! Wisconsin allows amateurs to have call-letter license plates on *all* of their vehicles. David reports that many people are not aware of this. Perhaps we'll be seeing more Amateur Radio license plates (parked in the same driveway!) in Wisconsin. (*photo courtesy W9NWY*)



League Lines

The FCC has established a rule-making proceeding with the objective of modernizing the Amateur Radio rules, Part 97. According to the FCC announcement, such a reorganization of the amateur rules has not been attempted since 1951, and the result of ensuing technological advances and operational changes is a patchwork quilt of rules that is often confusing. The Notice of Proposed Rule Making, PR Docket 88-139, an 87-page document, had not been issued before *QST* went to press. However, HQ understands the comment period extends to August 31. Copies of the document will be available at HQ upon receipt of an 8 × 11 SASE with $1.85 postage.

Further details appear in this month's Happenings column.

Postage increase: Not only has postage increased three cents per ounce for First Class mail, but the cost for delivering *QST* to members in the US has increased an average of 0.8 cent per copy. This seemingly small increase alone amounts to more than $13,000 per year!

For delivering *QST* to members outside the US, however, the increase is much greater: 30 cents per copy. This forces HQ to raise the postage surcharge on *foreign* membership rates from $8 to $11 per year, bringing the cost of basic *overseas* membership to $36.

Pacemaker wearers who are active radio amateurs: The ARRL needs your help with some information. We know there are many of you who have been able fully to enjoy Amateur Radio despite having to use a pacemaker. Will you share with us: date you got the device; its make and model number; your transmitter power; bands used; antenna type and its location relative to your operating position, and any other pertinent info. Please send all this to Perry Williams, W1UED, Pacemakers, ARRL, 225 Main St, Newington, CT 06111. Thanks!

220-MHz update: The FCC has now extended the deadline for filing Reply Comments in the TV Answer petition (RM-6196) to May 1, 1988; since this is a Sunday, the FCC will accept comments through May 2.

The Constitution Bicentennial celebration continues with special "200" prefixes from preregistered club stations in the following states:

April 30-May 6—Louisiana
May 7-13—Minnesota
May 14-20—Wisconsin
May 21-27—Rhode Island
May 28-June 3—Kentucky, South Carolina, Tennessee
June 4-10—New Hampshire

Open House: A reminder that W1AW and the ARRL HQ building will be open Sunday, June 5, from 10 AM to 4 PM. If your club or group wants to schedule a visit, please notify Membership Communications Services at HQ. Be sure to bring a copy of your license if you'd like to operate W1AW.

Attention Novices: HQ is looking for short articles about Novice experiences with Amateur Radio. If you have a story that deals with what it's like to be a Novice, we would welcome the opportunity to review it for possible use in *QST*. Good-quality black-and-white photos are needed as well. Send your story and photos to Assistant Managing Editor Joel Kleinman, N1BKE, at HQ. We're looking forward to hearing from you!

The Lake County (Indiana) ARC will again be cosponsoring the plaque for the reactivated Herb S. Brier Instructor of the Year Award. The club has cosponsored past Brier Award plaques and the Volunteer Resources Committee is pleased by the club's renewed support of this important award. Send your Brier Award nominations to ARRL HQ today to beat the May 15 deadline. For further information, contact the Club Services Department at HQ.

VHF/UHF Beacon Frequencies: The ARRL Membership Services Committee (MSC) met on March 26 in Torrance, California. Present were representatives of the VHF/UHF community, including the immediate past chairmen of VHF/UHF and VHF Repeater Advisory Committees, and representatives of the Digital Committee. At the meeting the MSC accepted and endorsed the earlier recommendation of the VUAC regarding beacon frequencies. Under this plan the new beacon segments (in MHz) would be: 144.275-144.300, 220.275-220.300, 432.300-432.400, 902.300-902.400, 1296.300-1296.400, 2304.300-2304.400, 3456.300-3456.400, 5760.300-5760.400 and 10368.300-10368.400. FCC would be petitioned to amend Part 97 to allow beacon operation on these frequencies in the 144, 220 and 432-MHz bands. Rule changes would not be required for frequencies above 450 MHz.

The next step in the process is final approval of this plan by the ARRL Board of Directors at its July meeting. MSC will meet again just prior to the Board meeting, so any additional comments on the plan should be sent to the MSC in care of ARRL HQ.

Pictures by Packet

Take a C64, some software, add some pictures, a pinch of packet—what do you get? A clever means of getting pictures from here to there!

By Corby B. Pratt, K4WV and Virgil L. Yarbrough, K4IEK
3811 14th St E
Ellenton, FL 34222
5007 Bimini Dr
Bradenton, FL 34210

The Commodore 64™ computer and AEA PK-64 packet-radio modem make an interesting and exciting combination. We got our PK-64s about the same time, and after spending some time on the bulletin boards, looked for a change of pace—something to spice things up. First, we exchanged computer-program files. Once we had the procedure down pat, up came the same question: Now what? That's when we started thinking about *sending pictures* by packet radio.

How It's Done

Initially, we faced two basic problems: First, we didn't know how to load the graphics information into the packet buffer. Second, we realized that in order to restore the picture file to its original condition, we'd have to find a way to edit out—at the receiving station—everything except the ASCII characters that make up the picture. That means removing all extraneous characters—such as packet-radio commands, connects, spaces and the file name (the spaces before and after the file name are used to delineate the picture information). Once we licked these problems, we were able to successfully send and receive pictures. The color and black-and-white photos shown here give you an idea of what can be accomplished. We're pleased with the results and thought you might like to know how the process works so you could join in on the fun.

In the picture-gathering process, we routinely use several readily available Commodore computer programs to create graphics. These programs include Micro Illustrator, Doodle, Koala Pictures, Graphic Aids, Jigsaw, Screen Maker and Hurricane Tracker.[1] We've also employed Computereyes™ and a VCR to capture pictures.[2]

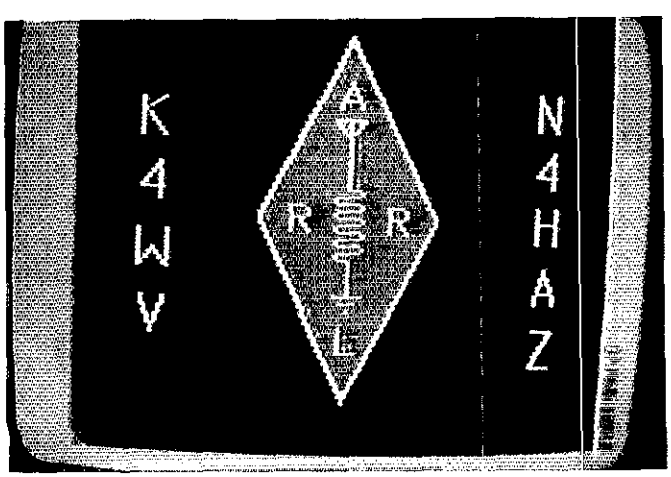
We won't give an account of how each program is used to generate graphics information, as this process varies from program to program and can be obtained from the documentation accompanying the software. However, the procedures used to load, send and receive pictures are the same for all the graphics produced by these programs, regardless of which program, or combination of programs, is used to generate them. Detailed information for the steps required in each procedure is provided in Tables 1-3.

The picture-transfer process involves three steps. First, the pictures are stored on disk. Then, they're loaded into the packet buffer and sent by packet radio using the transparent mode. At the receiving end, the picture is saved to disk. Then, the picture is displayed by loading it into the program used to generate it originally. ("Krunched" Koala pictures can be loaded and displayed using BASIC.)

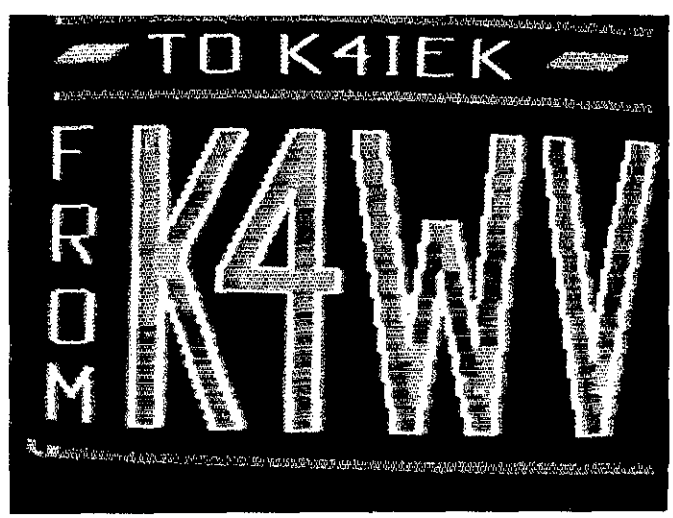
Some graphics programs prefix an inverse spade character to the file name. This character must be removed before the picture can be loaded into the packet buffer. This is easy to do. We use a simple BASIC program (included in the 1541 Disk Drive User's Guide) to rename the file and eliminate the inverse spade character prior to transmission. At the receiving end, the program replaces the inverse spade prior to the file being loaded by the graphics program.

One easy-to-use program is Micro Illustrator. We first experimented with it by drawing QSL cards. A couple of our efforts are shown in the accompanying photos.

[1]Notes appear on page 17.



K4WV generated this picture using Micro Illustrator.



Another K4WV Micro Illustrator drawing.

Table 1

To Load a Picture

1. Load the packet parameters.
2. Press RUN STOP to get the packet-program menu.
3. Insert the disk containing the picture to be transmitted into the disk drive.
4. Press L (load), Q (QSO buffer), D:filename, P, R and RETURN.
5. Press M (move), R for replace, Q (move from QSO buffer), 6 (move to buffer 6), Y (move all). Note: Any buffer from 0-9 can be used.
6. Press E (edit), 6 (buffer 6).
7. Mark the start and end of the picture as follows:
   - Press SHIFT INST DEL and type three spaces, D:filename and three spaces.
   - Use function key F3 to step to the end of the picture, which may be up to 13 pages long.
   - Type three spaces, press RUN STOP to view the menu and type P for packet.
8. You are now ready to connect and send the picture.

Table 2

To Send a Picture

1. Connect to the receiving station.
2. Both operators switch their stations to transparent mode by pressing function key F7, T (transparent) and RETURN.
3. The receiving operator then clears the QSO buffer by pressing F2 (SHIFT F1).
4. The sending operator should wait about 10-15 seconds to allow the receiving operator to perform step 3, then press CTRL 6. (Do not press RETURN).
5. The picture will be transmitted. Depending on the size of the picture, transmission time may be as long as three minutes. Once you're sure picture transmission is complete, disconnect.

Table 3

To Receive a Picture

1. After making the connect, go to transparent mode by pressing F7, T and RETURN.
2. Clear the QSO buffer by pressing F2 (SHIFT F1). At this point, the ASCII characters composing the picture will begin to appear on the screen.
3. After the disconnect prompt appears at the top of the screen, press RUN STOP (menu).
4. Press E (edit) and Q (QSO buffer).
5. The cursor should now be at the upper-left corner of the screen.
6. The received picture information will appear on the screen—mostly as inverse characters.
7. Use the INST DEL key to remove the extraneous characters (packet connect, spaces, and so on). The cursor should now be positioned over the first picture character.
8. Press F3 to step to the end of everything in the buffer.
9. Use the BACK ARROW key to delete all characters up to the picture information (including the three spaces inserted by the sending operator). The cursor should now be next to the last picture character.
10. Press RUN STOP (menu).
11. To save the picture to disk, press S (save), Q (QSO buffer), D:filename, P, W and RETURN.
12. To view the picture, return to BASIC
13. Krunched Koala pictures can be loaded and viewed in BASIC.
14. For other pictures, run the program used to create the picture and load the picture. Doodle pictures can be loaded using Jigsaw.

(But there are other uses to which this program can be put, as you'll learn later.)

A typical picture consists of 32,000 pixels (160 horizontal, 200 vertical). We've transferred pictures using 1200-baud packet on 2 meters and 300-baud packet on 10 meters. Pictures with greater detail take a little more than 3 minutes to send at 1200 bauds. By using Krunched Koala pictures, transmission times are shortened considerably.

Pictures from a VCR

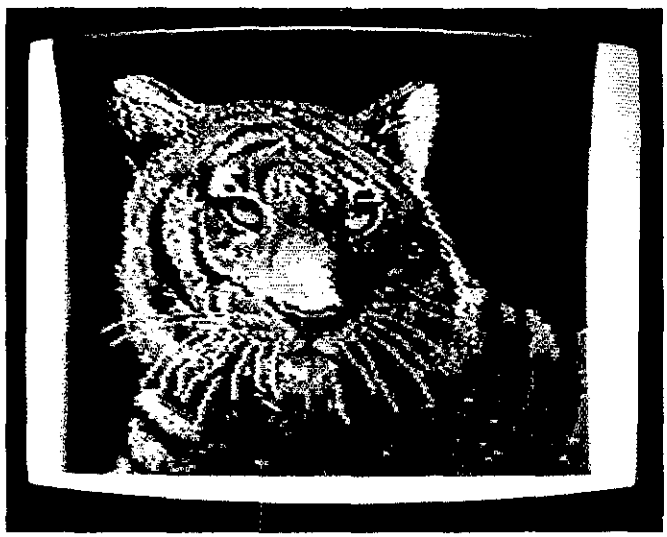
Using Computereyes, it's possible to capture pictures previously recorded on videotape. We tape-recorded pictures using a black-and-white surveillance camera. The taped pictures were then still-framed and scanned with the Computereyes equipment. Though the pictures processed this way lack the fine detail of pictures produced by means of the computer programs, they are quite legible. Our best results have been obtained scanning black-and-white photographs. Computereyes can display up to eight levels of gray.

Graphics Are More Than Fun

As we mentioned earlier, there are practical applications for the generation and transmission of graphics. One such possible use would be drawing a map of a disaster area and then transmitting the picture to an EOC (Emergency Operating Center). Storm-tracking information, including maps, can be sent simultaneously to several packet-radio stations set up at different locations.

Summary

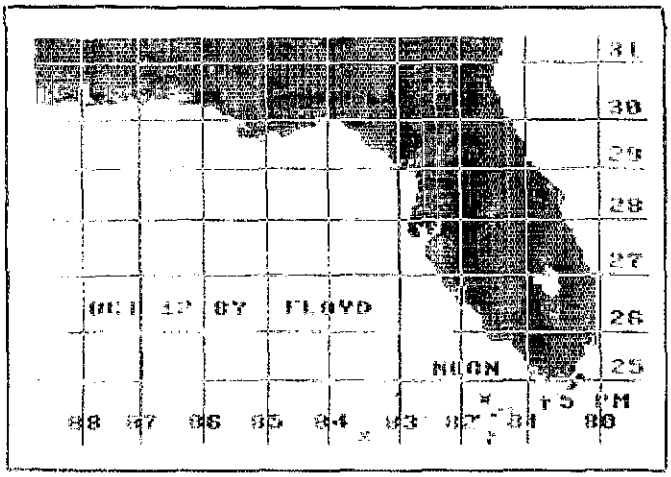
We hope the material we've presented here will generate some interest in sending and receiving pictures on packet radio. We'll be glad to answer any questions we can. Perhaps others will develop proce-



This beautiful tiger is from the Art Show collection.

An illustration from the Doodle program.

This picture was copied from a VCR tape using Computereyes. Pictures such as this can be captured directly with a camera using Computereyes. However, to obtain eight-level shading, the subject must remain motionless for well over a minute.



This map of the approach of storm Floyd was made using the Hurricane Tracker program. The storm track is indicated by the three asterisk-like symbols near the bottom of the map. The first appears between longitude 84 and 83 degrees, the next between 82 and 81 degrees, and the last indicator (in white) is shown at the southwestern tip of the Florida coast.

dures that can be used with other computers and TNCs. Let's hear from you!

Notes

[1]Micro Illustrator is a product of Island Graphics Corp, 1000 Civic Center Dr, San Rafael, CA 94903, tel 415-491-1000.

Doodle is produced by Crystal Rose Software, 109 South Los Robles, Pasadena, CA 91101-2417, tel 818-795-6664.

Koala Pictures is from Art Show, available from the Kansas City Commodore Users Group (address unknown). (Koala Pictures is not a product affiliated with Koala Technologies, Inc.) Graphic Aids, a collection of graphics programs, is offered by the Blue Mountain Commodore Users Group, 667 Canary Dr, Walla Walla, WA 99362. Koala Kruncher (offered by the Blue Mountain Commodore User's Group) compresses a Koala picture file and allows it to be loaded and run in BASIC.

Art Show and Graphic Aids are public-domain programs; try obtaining these from another C64 user or download them from a BBS. (Pictures made using the Doodle program can be converted to Koala format, then Krunched. Some horizontal detail is lost, but the resulting picture is still good.)

Jigsaw and Screen Maker are available from *Compute's Gazette*, PO Box 10957, Des Moines, IA 50340, tel 800-727-6937. (*Compute!* Publications, Inc, PO Box 5406, Greensboro, NC 27403, tel 919-275-9809.)

Hurricane Tracker Maps are available from Robert C. Bowden, 4907 22nd Ave W, Bradenton, FL 34209, tel 813-792-4876.

[2]Computereyes is available from Digital Vision, Inc, 66 Eastern Ave, Dedham, MA 02026, tel 617-329-5400.

Corby Pratt became interested in radio in 1928 and built some crystal sets and a two-tube receiver. He was first licensed in 1930. In 1937, Corby obtained a Radiotelephone First Class license and later did some part-time operating at radio station WING in Dayton, Ohio.

Corby graduated from Tri-State College (now Tri-State University) in 1938 with a BSEE, and in the fall of that year went to work for IBM in New York City. Later, he moved to the Endicott, New York laboratory.

In 1943, Corby worked on instrument landing and radio-range equipment at Wright Field. He was transferred to the Radar Laboratory at Rome, New York in 1952, where he worked on various radars and countermeasures equipment.

Corby retired in 1973 and moved to Florida. He got interested in computers about five years ago.

There are several other hams in Corby's family. His wife, Vera, is N4HAZ. Corby's son, Dr Donald Pratt, KC3VH, teaches computer courses at Bloomsburg University in Pennsylvania. Corby's daughter-in-law, Kathy, is N3EUP, and his nephew, Rodney Pratt, is K2AFK.

Virgil Yarbrough was licensed as W9YYW in 1936. Later, when the 10th call area was created after WW 2, his call was WØYYW. At that time, Virgil was employed by Kansas Gas and Electric (KG&E) in Wichita, Kansas, as a lineman and troubleshooter. After completing an International Correspondence Schools course and night studies at a local university, he obtained a Second Class Radiotelephone license.

In 1942, on leave from his job, Virgil became the Communications Officer for the CAP (Civil Air Patrol) at Pascagoula, Mississippi, and Rehoboth Beach, Delaware. When these bases closed, Virgil was drafted into the Navy and served as an Aviation Radio Technician for the duration of WW II.

After the war, Virgil returned to work for KG&E. Amateur Radio—mostly experimenting and equipment building—occupied his spare time. In 1972, Virgil retired from KG&E and moved to Florida, "...becoming a fugitive from a line gang and cold winters...," and pursuing his quest for an Advanced-class ticket. In addition to RTTY and packet radio, his interests include computers. Virgil has been a member of the ARRL since 1935, when, on December 28, Hiram Percy Maxim made him an Associate Member. Virgil's QST library is complete back to 1935. Virgil's wife, Catherine, is K4IFS (ex-WØZUY, the call she received in 1937). QST

New Products

UNIVERSAL RADIO AMATEUR-PRODUCTS CATALOG

☐ Universal Radio, a well-known shortwave equipment dealer, has introduced its first Amateur Radio equipment catalog. Universal carries ham gear and supplies from more than 40 manufacturers and publishers. The 44-page, 8½- × 11-inch catalog (no. 88-02) is available from Universal Radio, 1280 Aida Dr, Reynoldsburg, OH 43068, tel 800-431-3939 or 614-866-4267. Price, $1, refundable with purchase.—*Rus Healy, NJ2L*

SHORTWAVE RECEIVER REFERENCE MANUAL FROM UNIVERSAL SHORTWAVE

☐ Thinking about buying a used shortwave receiver? *Shortwave Receivers Past and Present* may help you find the one you want. Edited by Fred J. Osterman, this book covers over 200 recently manufactured receivers, including information on frequency coverage, circuit type, years manufactured, features and accessories. The book also details modes received, operating voltages, and size and weight of each model. Photographs of many receivers are also included. *Shortwave Receivers Past and Present* is available from Universal Shortwave Radio, 1280 Aida Dr, Reynoldsburg, OH 43068, tel 614-866-4267. Price, $5.95 plus $1 shipping in the US. —*Rus Healy, NJ2L* QST

How to Deal with Audio RFI Problems

RF energy can disrupt audio amplifiers. It may render an amplified mic useless. Simple fixes can cure these problems easily.

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

Have you agonized over the squeals and squawks that your transmitter output energy caused in hi-fi gear, amplified microphones and mic amplifiers within your transmitter? If so, you are one of a large group of hams who must deal with these annoyances while trying to enjoy Amateur Radio. RF energy can follow devious paths in a dwelling or ham shack to cause RFI. Tracking this RFI culprit is seldom an easy task. The alternative to confining stray RF energy is to treat the equipment to make it immune to the effects of RF currents. Some guidelines for providing a suitable ham-shack ground system should be followed as a matter of course. We will discuss these measures later. Suppression techniques for audio amplifiers are simple and inexpensive, but some precautions must be taken to avoid impairing the amplifier frequency response. We will treat this subject also.

The RFI Symptoms

A member of your family is listening to a favorite AM or FM station. You commence a 40-meter QSO with another amateur. You speak into your mic, someone from another part of your home shouts, "Hey, you're wrecking the stereo!" Is this a familiar scenario? I'll bet it is! Worse still, there may be an unwelcome knock at the door, or an unsolicited phone call to let you know in a positive manner that you're knocking out a neighbor's hi-fi system with your SSB signal. We've all been through this grind, and it can be frustrating.

It is unfortunate that a liability may be awaiting our efforts to operate on a neighbor's hi-fi system. Messing with the innards of someone else's radio, TV or stereo system invites problems. If the set fails later for some obscure reason, you may become the villain, at least in the eyes of your neighbor. This can happen even though your RFI-suppression efforts had nothing to do with the equipment failure. But you can dig into your own hi-fi equipment and I encourage you to do it if you have an RFI problem.

The Station Ground

The quality of the earth ground in your ham station may have little effect on RFI to electronics gear in your living room or at your neighbor's home. But it will have a marked effect on RFI within your radio room, especially if you're experiencing problems from RF energy getting into your mic amplifier, keyer or computer. It is wise to concentrate on developing a quality earth ground in your shack before you proceed with RFI-cure measures elsewhere.

A basement or ground-floor ham shack is the least prone to grounding problems. This is because the ground leads are usually short compared to those from a second- or third-floor location. The longer the lead to the main ground system, the more difficulty we experience in obtaining a "cold" ham station. This is complicated further if we use an end-fed half-wavelength (or multiple thereof) wire antenna. This places the high-impedance end of the antenna near the operating position. The high-voltage RF energy seems to get into and onto every piece of gear on the desk when this type of antenna is used. Try to avoid the use of end-fed wires. It is much better to use an antenna that is well removed from the shack. It should be fed with coaxial cable to help prevent unwanted RF energy from appearing in the ham station.

Ground straps from the transmitter, Transmatch and linear-amplifier cabinets need to be as short and wide as practicable. It is sometimes helpful to use short ground straps between the cabinets of these pieces of gear. This helps to break up troublesome ground loops that can cause problems. The equipment ground leads are connected to a central ground point or post. If you have a metal operating desk, ground it to the main system also. A desk, if not grounded, can become hot with RF energy, and this may cause problems with your mic or keyer.

The central ground may consist of the cold-water pipe system in your home, the well casing and a group of 8-foot ground rods driven into the soil near the ham shack. If your antenna includes a buried radial system, tie those wires to your central ground system also. Try to use large-area ground conductors, such as 1-inch wide copper strips or the shield braid from RG-8 coaxial cable. The greater the conductor area, the lower the inductance (reactance) of the ground lead. This allows it to be

more effective as a ground conductor, especially at the higher frequencies.

The Cause of Audio RFI

Audio RFI is observed as squealing, howling or chopping of the audio-output signal from a piece of hi-fi or ham equipment. Solid-state audio amplifiers are especially affected by stray RF currents. This is because the transistor junctions are, in effect, diode junctions. RF energy is rectified by these diodes, and the resultant dc voltage disrupts the amplifier operation. Excessive rectified RF voltage can shut down a transistor amplifier (saturate it) and silence it when you are sending CW or using SSB. In another example, your voice peaks may momentarily cause the audio amplifier to saturate. This leads to chopping of the amplifier output. RF feedback can occur within your transmitter and mic audio channel, and this results in squeals and motorboating of your transmitted signal. It's all because of unwanted RF energy reaching a critical point in the audio system. Obviously, the best cure is to keep the stray RF current out of the affected circuits, but this is not always an easy assignment. Good station grounding and the proper antenna system will help, however.

The Cure

Standard suppression methods call for the use of bypass capacitors on audio-signal leads within the affected piece of gear. These bypass capacitors should be located as close to the transistor amplifier as possible (generally from the transistor base or gate to ground). If an IC is the affected component, place the bypass capacitor between the IC input port and ground.

We must be careful to use a capacitor value that will have a minor effect on the frequency response of the affected amplifier. If the amplifier has a high-impedance input terminal (such as an FET or a vacuum tube), we must be especially careful about the capacitance value we choose. Too large a capacitor value will spoil the high-frequency response. Low-impedance audio amplifiers (bipolar transistors) can accommodate substantially more shunt capacitance without impairment of the high-frequency response than can FETs or tubes. For example, a typical mic amplifier has an input impedance of 500-600 ohms. Bypass capacitors from base to ground may be any value up to 0.01 μF before the audio highs start rolling off in a significant manner. On the other hand, 470 to 1000 pF is about the maximum C we should use when bypassing a tube grid or FET gate.

Bypassing may not, by itself, yield a cure. We may need to add a series reactance in the audio lead, such as an RF choke between a mic connector and the base or gate of the affected AF amplifier. A low-value resistor may be used in place of an RF choke for high-impedance circuits.

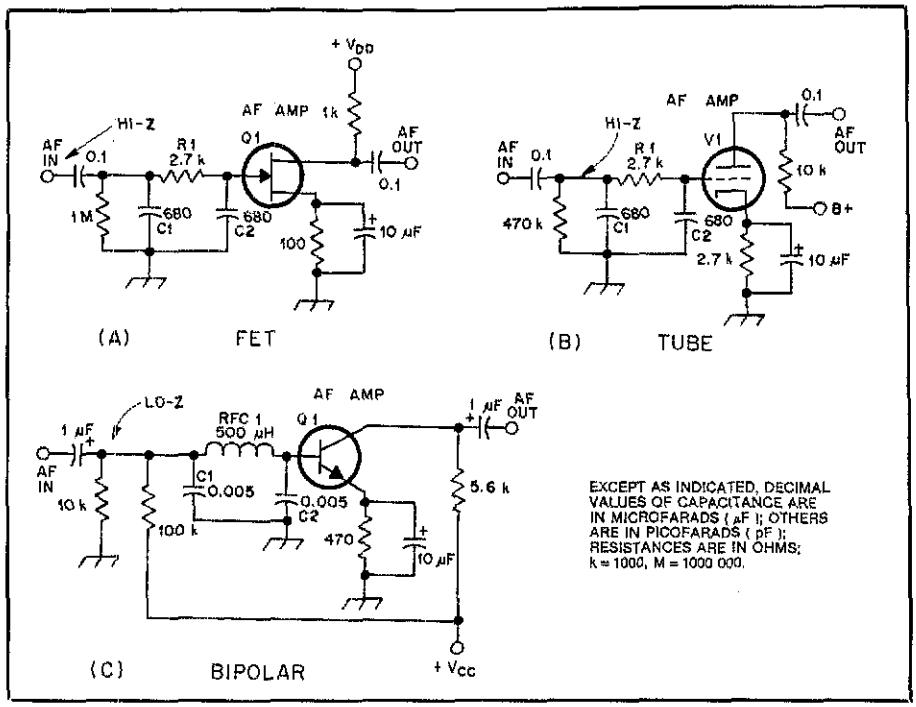


Fig 1—Schematic diagrams of typical audio input stages that may be found in hi-fi equipment or amateur transmitters. The circuit at A shows a JFET amplifier, and at B is an equivalent triode-tube amplifier. Both circuits have a high input impedance. This requires that C1 and C2 be fairly low in value in order to minimize high-frequency roll-off. The circuit at C has a low input impedance. Larger values of C may be used at C1 and C2 without sacrificing high-frequency response. R1 at A and B functions as an RF choke to form a brute-force RF filter with C1 and C2. An RF choke is used at C to help form the RF filter (see text).

Resistance values between 1000 and 3300 ohms are typical at the grid of a tube or the gate of an FET. This value of resistance is somewhat high for a low-Z input circuit, such as a 600-ohm bipolar audio amplifier. An RF choke, which has a low dc resistance, is better in the latter situation. Fig 1 shows examples of suppression measures for high- and low-impedance audio amplifiers.

It is seldom necessary to use suppression measures on secondary audio-amplifier stages. The majority of the problems can be associated with the first audio-amplifier circuit. This may not be true when RF energy enters a piece of equipment via the ac line cord or along cables that connect to external accessory units. In this situation, we must assume that these leads need to be bypassed where they enter the cabinet of the malfunctioning equipment.

Amplified Mic—A Practical Example

I have two amateur friends that bought Kenwood TS-430 transceivers. They both purchased Kenwood MC-80 amplified mics to use with these fine transceivers. Gary, W8GJH, uses a coaxial-cable feed line with his dipole antenna. Jean, N8JCQ, uses an end-fed 130-foot wire antenna. Neither of these hams were able to use their MC-80 mics, even on the low bands: RF energy getting to the internal mic amplifier, and presumably into the first audio stage of the transceiver mic amplifier, rendered the TS-430 transceivers useless. The unamplified, hand-held Kenwood mics worked fine with the transceivers. Experimenting with grounding techniques offered no solution to the RFI problem. The transmitted SSB signal was garbled and riddled with squeals and squawks.

Gary, who has impaired vision, asked me to work on his MC-80 in an effort to cure the RFI malady. I followed standard procedures for suppressing audio RFI. The original circuit of the MC-80 is presented in Fig 2. The circuit changes are shown in heavy lines.

You will note that the control lines (up-down and PTT) had no bypassing. Similarly, the audio voltage after the gain control (VR1) had no bypass capacitor. All of these lines pass through the mic cable to the rig. They can pick up stray RF in the shack and allow it to flow into the transceiver and into the mic circuit. I added 0.1-μF capacitors from each control lead to the PC-board ground foil in the mic amplifier. The audio lead from VR1 now has a 0.003-μF bypass value. This lower capacitance value is used to prevent roll-off of the audio highs. Values up to 0.005-μF are suitable at this point.

I added a 0.1-μF capacitor from R3 to ground, and another from D1 to ground. Although electrolytic capacitors are present at those points (C6 and C7), they are not

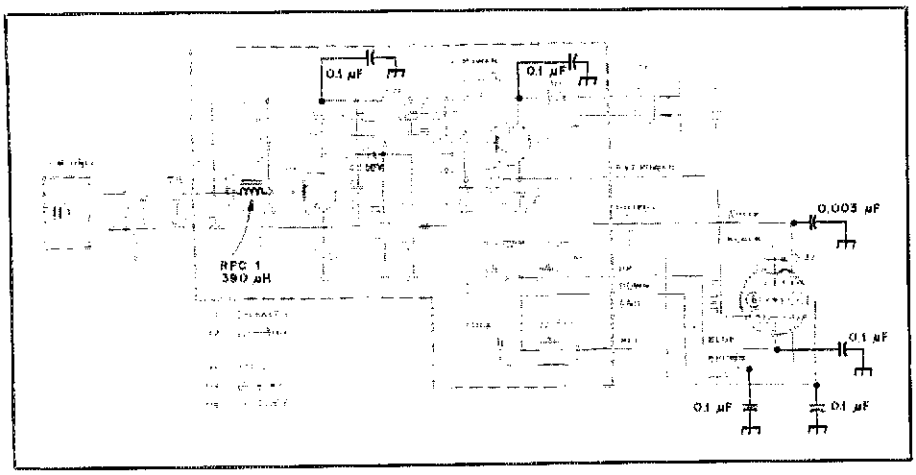


Fig 2—Schematic diagram of the Kenwood MC-80 mic. Part numbers are those of the manufacturer. The heavy lines indicate components that were added to rid the circuit of RFI problems. RFC1 replaces a ferrite bead that existed in that part of the circuit.

effective as RF bypass capacitors, and hence the two 0.1-μF units.

Kenwood included a ferrite bead (FB) near the base of Q1. Although a ferrite bead is effective at VHF as a series impedance, it offers negligible help in holding back HF-band energy. A single bead of 850 permeability provides only 1 μH of inductance (approximately) at HF, and this is of no value for HF and MF operation. I replaced the bead with a miniature 390-μH RF choke. It offers a fairly high impedance to RF, but is not a signal barrier at audio frequencies. The choke value isn't critical. You may use inductances between 300 and 1000 μH without affecting the audio frequency response of Q1.

You may want to try this cure if you have an MC-80 that is affected by RF energy. I feel obligated to say, however, that I know many hams who have TS-430 transceivers and MC-80 mics and have never experienced an RFI problem. No doubt they are without ground loops of consequence within their stations.

The PC board in the MC-80 has an insulating material on the PC-board elements. You will need to scrape away this film in order to solder the grounded ends of the bypass capacitors to the ground bus. I used an X-acto® knife for this job.

I had no way to test this mic with my transceiver, at least not without changing the mic connector, so I relied on my intuitive treatment of the mic and sent it back to W8GJH. Gary appeared on 75 meters a few days later and stated that he was using the MC-80. The audio quality was excellent and his RFI problem was resolved. I have since applied the same suppression methods in the N8JCQ MC-80.

Other brands of amplified electret mics are probably in need of similar treatment if RFI occurs. The measures I applied to the MC-80 should be generally applicable to any amplified microphone—home-built or commercial.

In Summary

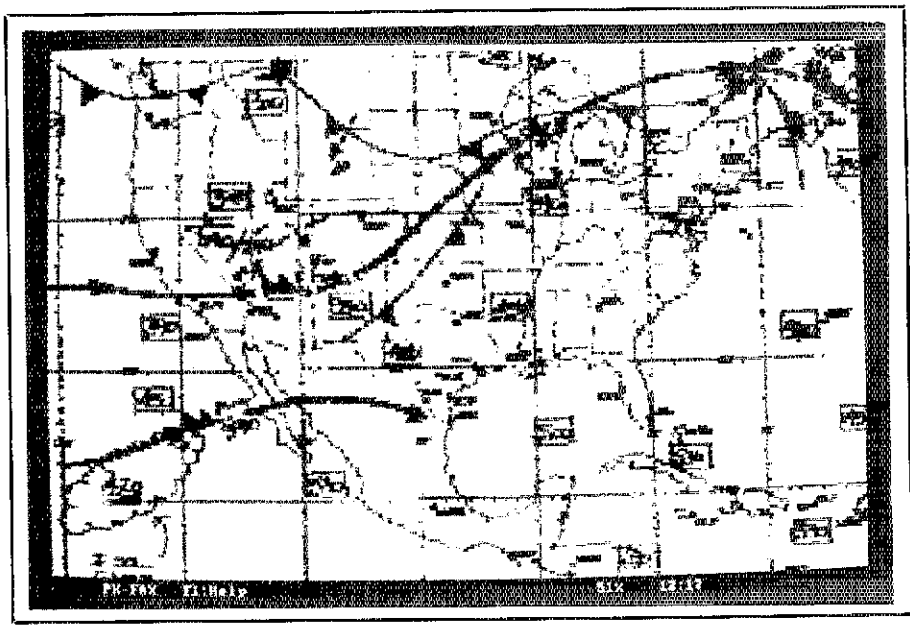
Experienced amateurs may consider the foregoing a "twice-told tale," but it is worth repeating from time to time for the benefit of newcomers or those who aren't comfortable with solid-state circuits. Certainly, it requires no special skill to install suppression components, and the art is by no means new!

Perhaps the most difficult modern gadget to deal with today is the VCR (video cassette recorder). Some of the fixes I mentioned here can be applied to VCRs, but complete treatment would require a complete *QST* article. I battled with my VCR for several days before I cleaned it up, and I plan to tell this story in a subsequent article. I do feel that there is no entertainment gadget or piece of ham gear that can't be RFI-suppressed if you have the patience and incentive to tackle the job. The basic guidelines are offered in this article. I hope you have found this material helpful.

New Products

AEA PK-FAX™ PROGRAM

☐ Using PK-FAX, AEA PK-232 multimode communications processor users can receive and transmit FAX pictures and weather charts. PK-FAX allows direct display of received pictures on the computer's monitor, and you can save images to disk for future use. Pictures saved on disk can be transmitted by FAX or packet radio. Images created by a "paintbrush" program can also be transmitted with PK-FAX. System hardware requirements include an IBM® PC or compatible with at least 256 kbytes of RAM, a serial port and two disk drives, a video graphics adapter and display, DOS 2.0 or above, a PK-232 or Heathkit® HK-232 data controller and a receiver capable of tuning FAX frequencies. PK-FAX operates with a wide variety of printers, but the use of a printer is optional. The program has an auto-save feature that allows you to automatically store on disk every picture you receive. The pictures are given sequential file names; auto-saving starts and ends at times you choose. PK-FAX is available from Amateur Radio dealers across the country. Suggested price, $24.95. PK-FAX is not copy protected. For more information, contact AEA, 2006 196th St SW, Lynnwood, WA 98036, tel 206-775-7373. —*Rus Healy, NJ2L*



The Great Sporadic-E Opening of June 14, 1987

Take a spectacular sporadic-E event, add thousands of stations on the air for a June VHF QSO Party, and you get record-breaking contacts and an unusual opportunity to closely study a rare mode of propagation.

By Michael R. Owen, W9IP/2
Geology Department
St Lawrence University
Canton, NY 13617

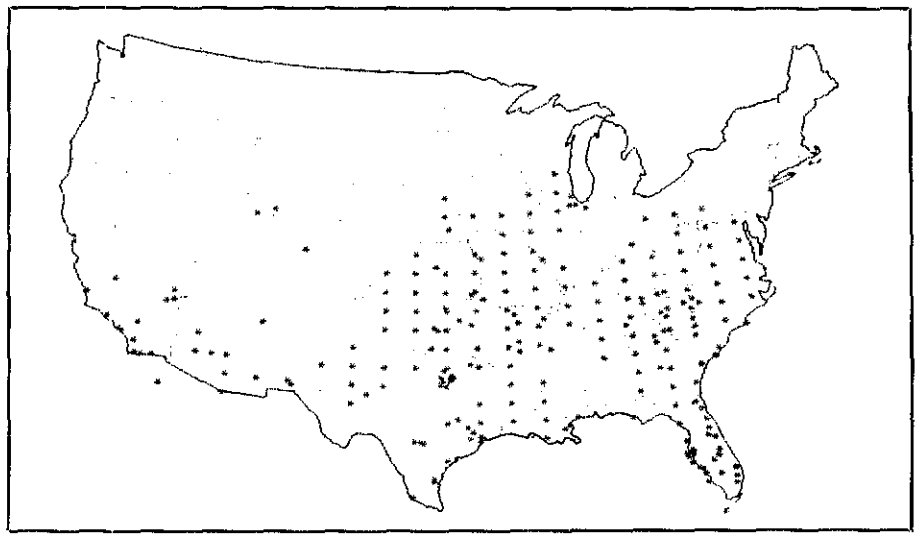


Fig 1—Locations of all the stations with contacts in the June 14 data base are represented by asterisks. Many stations were located exactly, and the rest were arbitrarily considered to be in the centers of the appropriate grid squares.

During the morning of June 14, 1987, a spectacular sporadic-E (E_s) event began over the southern half of the United States. The opening included the 50, 144 and 220-MHz bands; this article focuses on 144-MHz (2-meter) operation. On 2 meters, the opening was amazingly intense and lasted an unusually long time—more than three hours. It provided hundreds of 144-MHz operators with propagation covering distances of more than 1600 km (1000 mi). Signal strengths were often over S9, sometimes meter-pinning, and the band was described as sounding like 20 meters. Stations in Arkansas, Oklahoma and northern Texas reported working Florida off the front of their beams and W7s off the back! The North American overland distance record was broken on 2 meters, and the world's first documented Amateur Radio sporadic-E contact was made on 220 MHz. This was indeed a fantastic opening!

This E_s opening was special in another way: It occurred during the June 1987 ARRL VHF QSO Party. During this annual competition, an unusually large number of stations are active. Competitors keep detailed logs and later submit them to ARRL HQ. Consequently, the June 1987 Party offers an unprecedented opportunity for analyzing the birth and development of an E_s event. By examining contest logs, we can watch the E cloud appear, track its movement, and see it dissipate. And, equally exciting, there is clear evidence of double-hop E-layer propagation because of another E cloud present over the western USA at about the same time.

Data Collection

For this study, I examined the contest logs of 85 participants in the June 1987 VHF contest. I recorded contact information for 1865 log entries of 144-MHz QSOs. All of these contacts were between stations more than 350 miles apart, and they took place from 1430 to 1830 UTC on June 14. QSO data involved 595 different stations in 163 different grid squares. Of course, these are not all of the contacts that were made, nor are all open paths represented. Nevertheless, I feel that more than 50% of the opening's contacts probably are recorded in this data base.

Fig 1 shows that the opening was truly widespread. Stations all over the fourth and fifth call areas were involved, along with some southern W6s and W7s, some WØs and a few W9s. The opening covered mainly the southern USA. Although several stations were north of about 40° N latitude, relatively few contacts were made from that region.

Two E Clouds

The "opening" was actually two openings, one in the east and another in the west. The main eastern opening began at 1430 UTC and lasted until about 1610 UTC (Fig 2). It covered the South from Florida

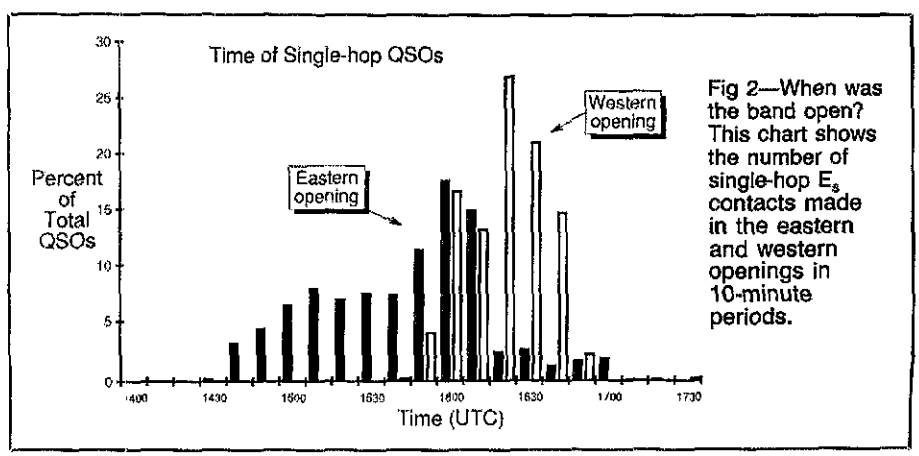


Fig 2—When was the band open? This chart shows the number of single-hop E_s contacts made in the eastern and western openings in 10-minute periods.

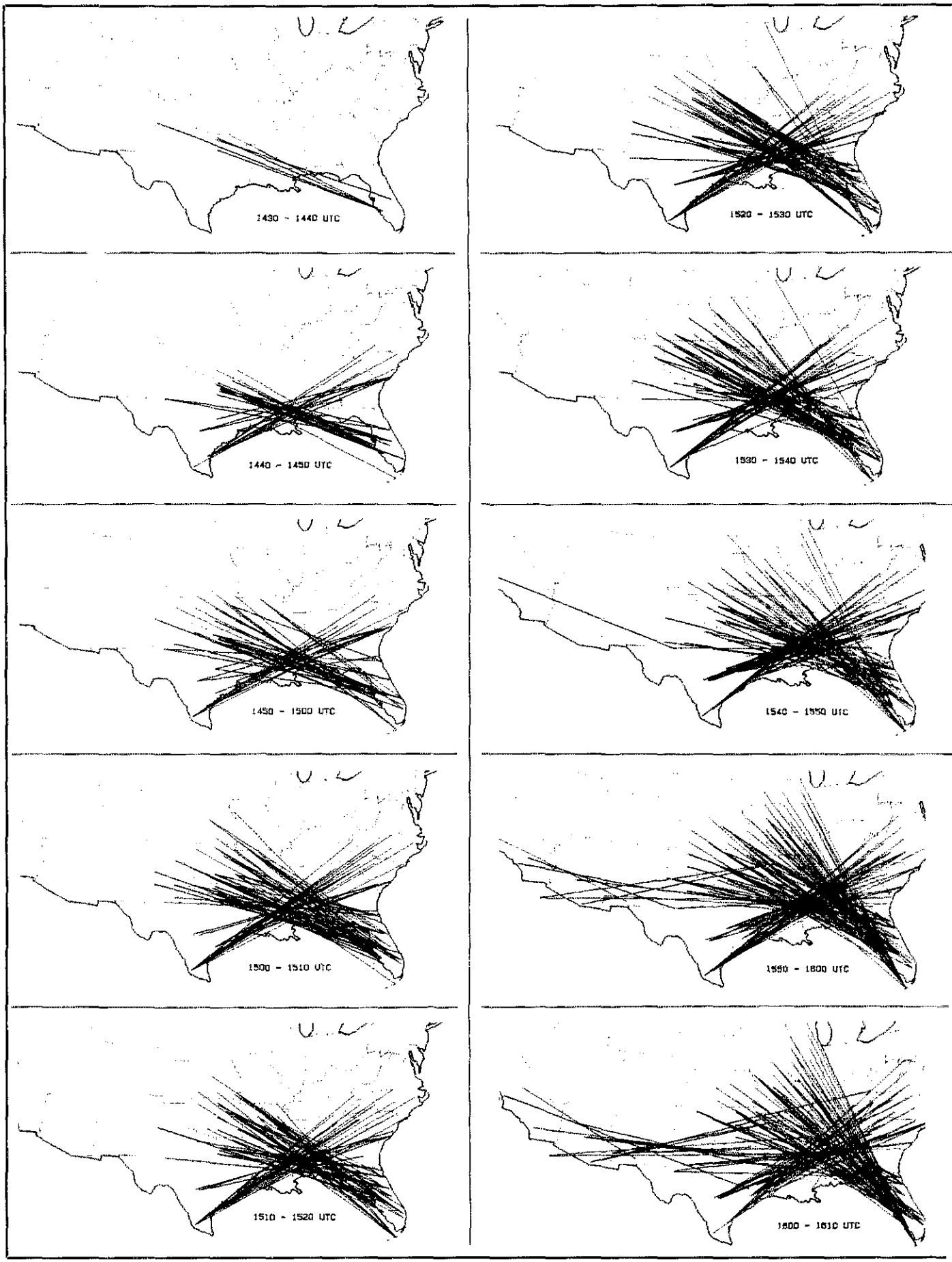
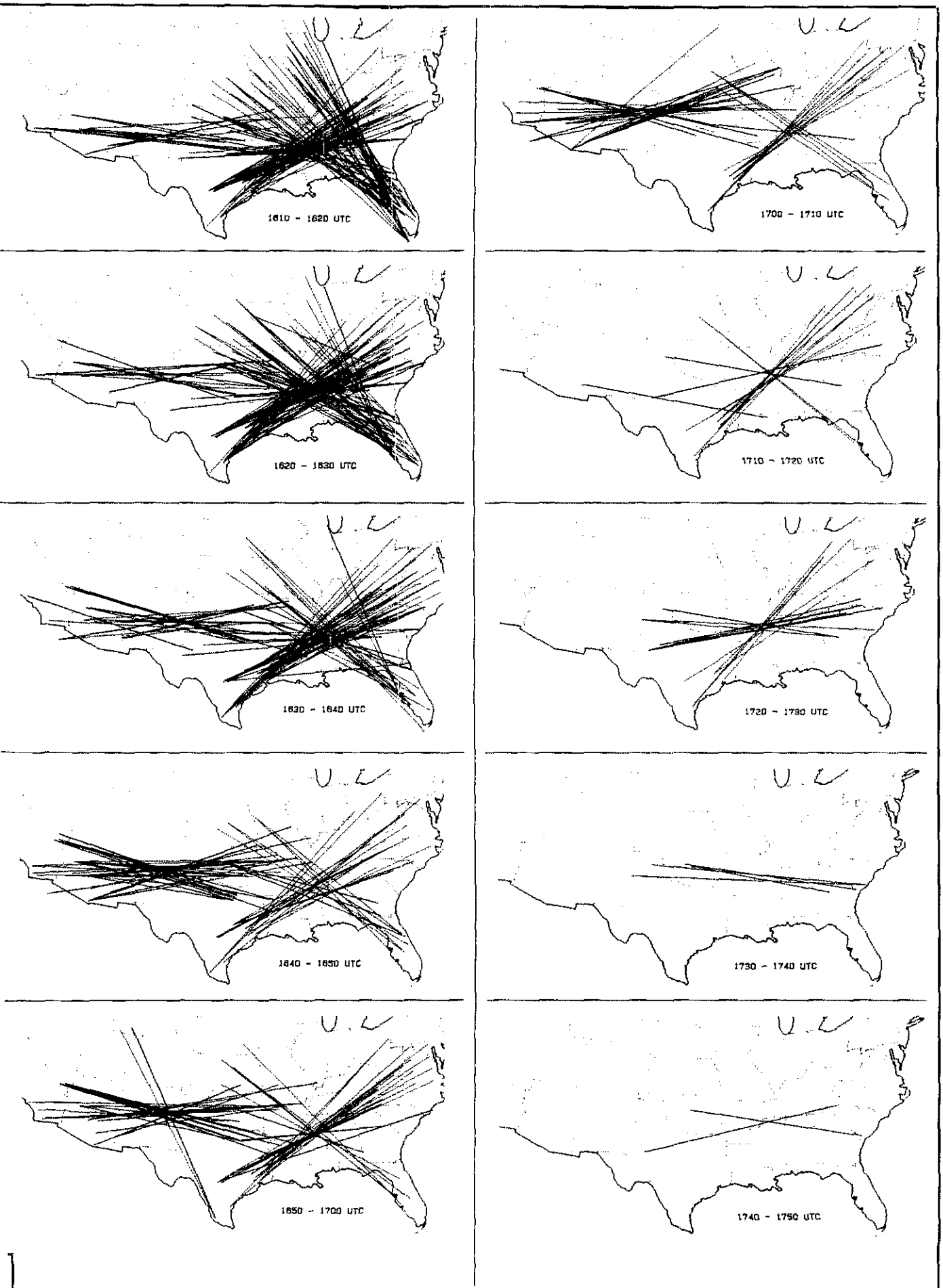


Fig 3—Where was the band open? This series of maps shows paths for each of the contacts included in the data base in 10-minute periods. Double-hop contacts are not included.


1610 - 1620 UTC
1700 - 1710 UTC
1620 - 1630 UTC
1710 - 1720 UTC
1630 - 1640 UTC
1720 - 1730 UTC
1640 - 1650 UTC
1730 - 1740 UTC
1650 - 1700 UTC
1740 - 1750 UTC

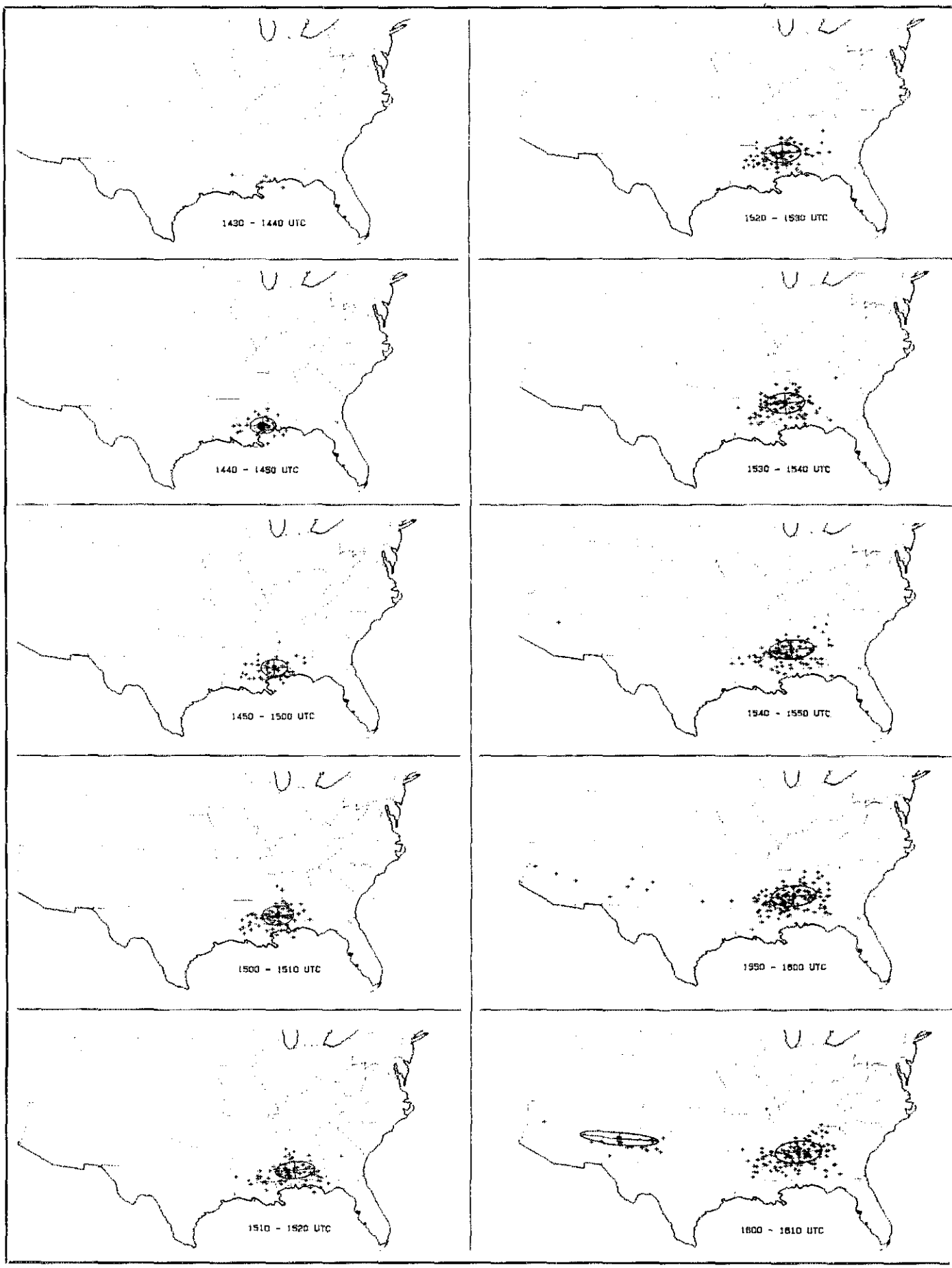
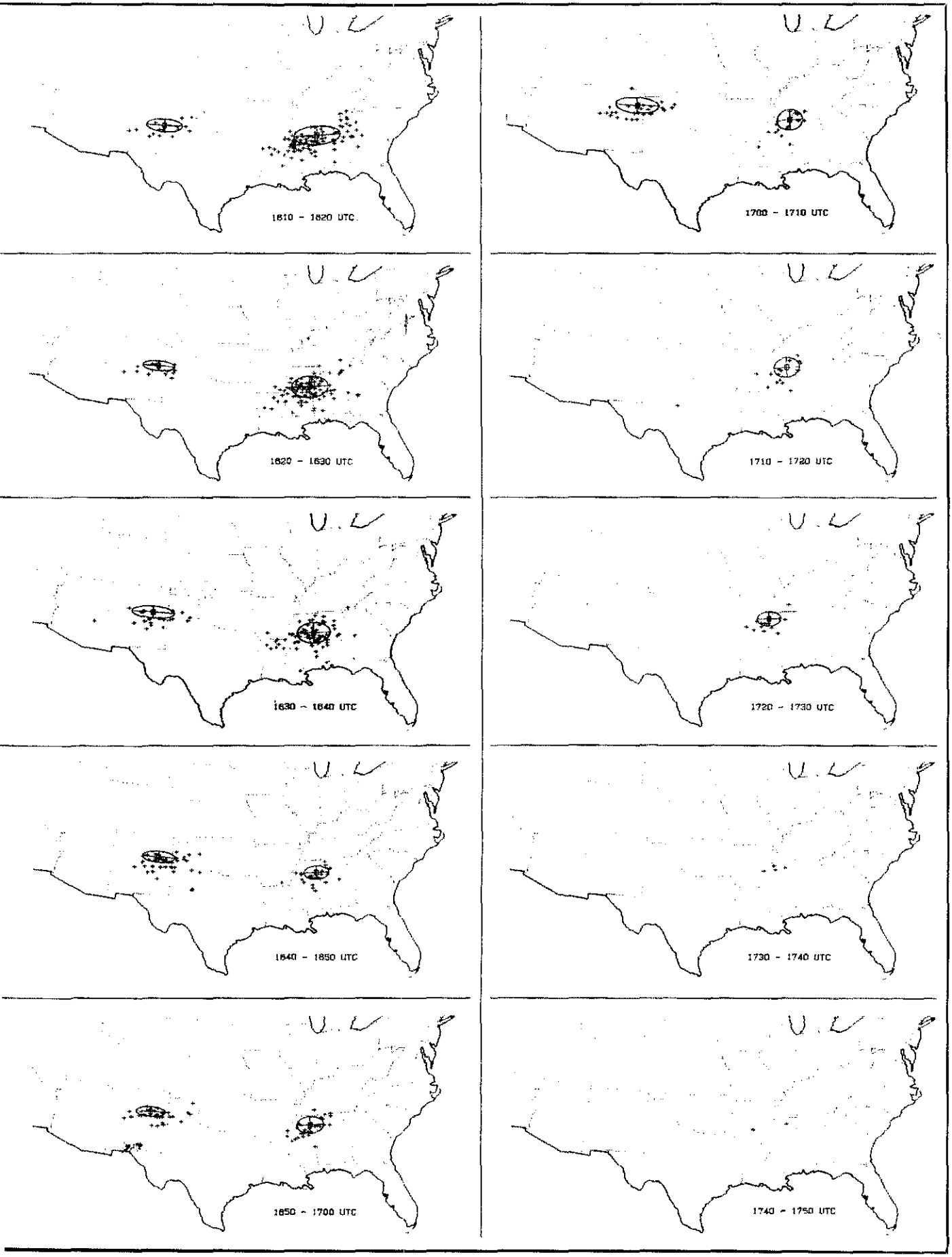


Fig 4—This series of maps shows the path midpoints for the contacts shown in the previous series of maps. These midpoints are based on the locations of both stations in each contact. The clustering of the points indicates where the E cloud was located



during each time period. Ellipses are drawn to include 68% of the points. The center of the ellipse is the most probable location of the middle of the E cloud.

to Texas and Oklahoma, and north into the Midwest. The main western opening began at about 1545 UTC and lasted until almost 1645 UTC. In both cases, a small number of contacts were made after the "end" of the opening—some as late as 1750 UTC ("it ain't over 'til it's over!").

Fig 2 suggests that the eastern opening began slowly, but in fact the band burst open suddenly. The gentle slope of the curve between 1430 and about 1600 UTC is actually the result of an increasing number of stations becoming aware that the opening was in progress. What is the evidence for this? Examination of the logs reveals that within 10 minutes of their first E_s contact, many of the larger multi-operator stations were making QSOs at their maximum rate, more than one per minute. As time passed, more and more single-operator stations joined the fray, having been alerted to the 2-meter opening via 6 meters or some other means. The curve in Fig 2 gives the impression that the opening built up gradually, when in fact propagation "popped open" over a wide area.

The western opening followed a similar trend, although its beginning rise was somewhat steeper. Apparently, many western VHFers were already waiting for the band to open. This is fortunate, because the two openings overlapped in time, permitting several double-hop contacts.

Both the eastern and western openings ended abruptly. Although a few contacts were made long after the band appeared to have folded, station logs clearly show that the openings collapsed quickly. For the eastern opening, this happened around 1600 to 1610 UTC, and for the western opening, around 1645 UTC. The few leftover signals that were present after the ends of the main openings probably mean that the E clouds were still present but that they were not sufficiently dense to support widespread 144-MHz propagation.

Cloud Movement

VHF signals are normally propagated into outer space because the Earth's atmosphere cannot bend or reflect them very well. Sporadic E is a rare situation in which ionized particles in the Earth's upper atmosphere are somehow packed together, forming a cloud that—temporarily—can reflect VHF signals back to Earth. This reflection is sometimes called *skip* or *short skip* on the HF bands.

Sporadic-E clouds are apparently shaped like thin sheets rather than the puffy clouds you might imagine. They are more-or-less planar, and only a few tens or hundreds of meters thick. From the point of view of a VHF radio signal, the E cloud looks somewhat like an imperfect "mirror" about 200 to 300 km in diameter, floating horizontally at about 110 km (70 mi) altitude.

E clouds are moved by ionospheric winds, which sometimes blow at several hundred km/hour. As an E cloud moves, the areas of the country from which it can be "seen" with VHF signals vary; the cloud supports propagation between different areas as time passes. By plotting the contacts that were made at different times during the band opening, you can get an idea of which areas could see the E cloud. The midpoint of a line drawn between two stations that made a QSO via the E cloud represents the approximate location of the cloud.[1] By plotting a large number of QSO paths and midpoints, it is possible to track the movement of the E cloud as an opening changes with time. To my knowledge, no scientific study has been able to track an E cloud in this manner before.

Fig 3 shows how the opening developed through time. Each map is a 10-minute slice of time—you can see why a computer was needed to handle the data! I have omitted the long-haul, double-hop contacts from this set of maps because they are difficult to see when plotted alongside the normal single-hop contacts.

In addition to the maps of actual contacts, I have included maps with just the midpoints of the contacts (Fig 4). Ideally, the midpoint of a contact represents the spot where the E cloud reflecting region was at that time. This assumes that the cloud is a flat, smooth plane (invisible, of course), exactly horizontal. In a moment, I will discuss why I think that this is *not always true*, but for now, it is a good starting place for discussion. If you have a large number of QSOs to work with, a cluster of path-midpoint marks is a good indicator of where the E cloud is located—and how big it is.

Several interesting features are apparent from the maps. Almost all of the contacts involving the eastern or western openings are centered on well-defined regions. These two regions are the sites of the E cloud at that particular time. By scanning through the maps, or following along in Fig 5, you can see how the eastern and western E clouds moved.

The eastern E cloud began to reflect 144-MHz signals just over southern Mississippi. Its path was almost due north for more than 2 hours, covering about 300 km in that time (about 150 km/hour). However, this northward movement was

[1]This subject is discussed in detail in E. Pocock, "Sporadic-E Propagation at VHF: A Review of Progress and Prospects," Apr 1988 *QST*, pp 33-39.

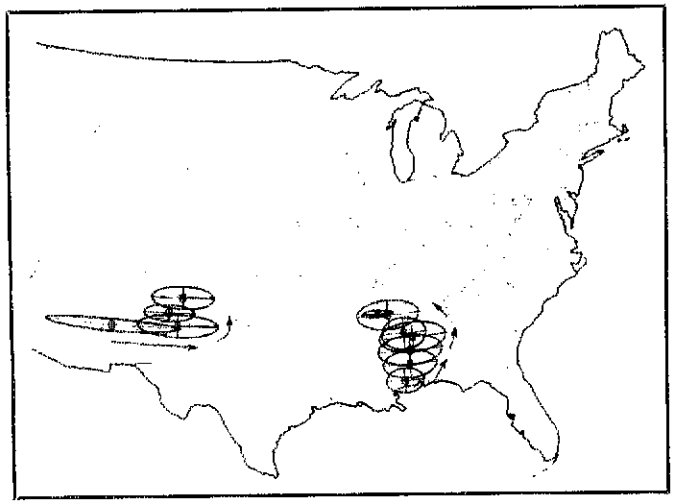


Fig 5—This map shows how the E cloud moved over time. Ellipses are drawn as in the previous set of maps, but for each half hour.

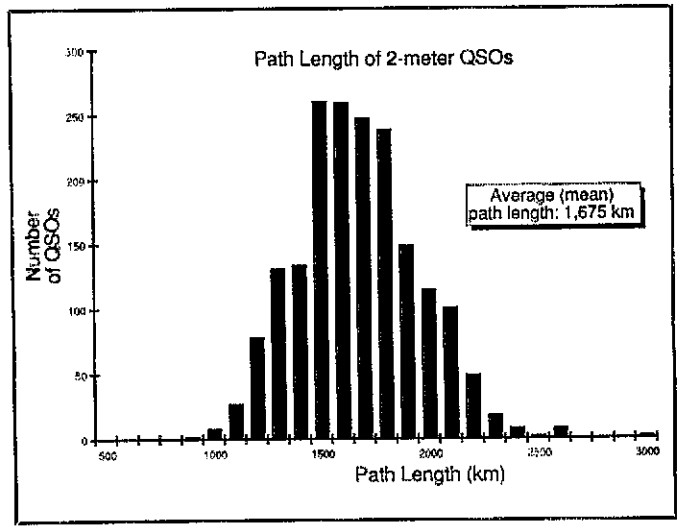


Fig 6—The distribution of contacts in the eastern opening by distance.

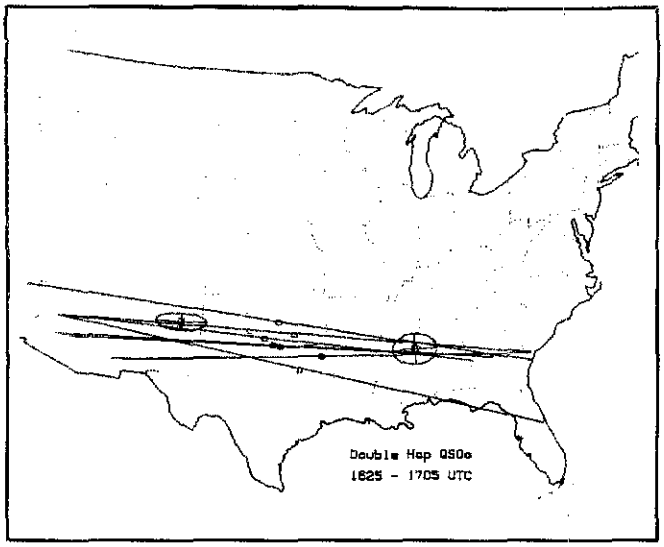


Fig 7—144-MHz double-hop contacts made during the opening. The circles represent the path midpoints for the contacts.

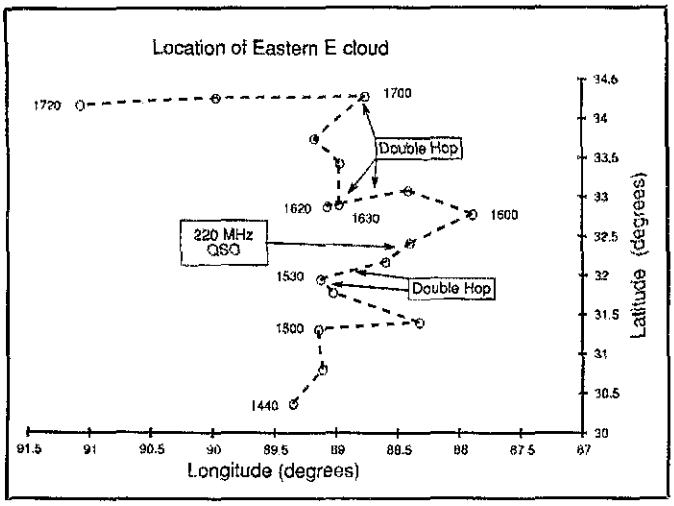


Fig 8—How did the eastern E cloud move? This graph shows the E cloud's position each 10 minutes for the main part of the opening. Notice how the cloud moved in an erratic path, changing direction several times.

not straight. The E cloud changed direction several times and almost stopped moving from 1620 to 1630 UTC. From 1700 UTC until the end of the opening, the eastern E cloud traveled due west at over 200 km/h. The cloud was apparently caught in a due-west ionospheric wind that may have torn it apart and caused it to dissipate.

The western opening is harder to track because fewer QSOs were made (mainly because there are fewer VHFers in the west and they are more scattered), but it also appears to have moved generally northward after a brief trend eastward. I think that the long, skinny shape of the ellipse for 1600 UTC is not "real" because relatively few contacts were available to draw it. Instead, I think that the cloud moved rather rapidly eastward at first, then slowed, turned, and moved northward. Interestingly, the western E cloud moved at about the same speed as the eastern E cloud during the main part of the opening. Is this speed (about 150 km/h) typical of intense E clouds, or is it just a result of the particular ionospheric winds on June 14?

Earlier, I said that I think that E clouds are not entirely smooth and flat. Based on these plots of contacts, I think that E clouds are sometimes curled or bumpy at the edges. Why? On almost every QSO map, there are a few contacts that do not seem to cross the main center of E layer reflection—their path midpoints are far away from most of the others. For example, look at the 1630-1640 UTC map. One contact from north Florida to central Texas, and three contacts from western Florida into Kentucky and northern Illinois do not seem to follow the pattern of all the other contacts. These unusual contacts probably used the same E cloud as the other QSOs because there is no other evidence for a separate cloud. One explanation for these unusual QSOs is that their signals were reflected from parts of the E cloud that were tilted and provided some oblique reflection. These tilted areas were probably small and did not last long; otherwise more QSOs would have been made along the unusual paths. I visualize an E cloud shaped somewhat like a sheet of paper, mainly flat but with corners curling in the wind.

Scientific studies of E clouds, using rockets, have attempted to determine whether the clouds are horizontal or tilted. Unfortunately, the absence of north-south paths (no VHFers out in the Gulf of Mexico) makes it impossible to estimate this cloud's tilt, if there was any.

Double-Hop Propagation

The distance covered by a single-hop VHF signal propagating via an E cloud at 110 km altitude is limited to about 2300 km (1450 mi). If you add another 100 km at each end of the path for tropospheric bending, a maximum range of 2500 km is expected for single-hop E-layer propagation. Virtually all E_s contacts cover ranges less than this, averaging about 1675 km (1040 mi). See Fig 6. QSO distances significantly longer than this have been reported several times in the past, suggesting that double-hop propagation has occurred.

During the June 14 opening, there is clear evidence of double-hop propagation for at least 19 contacts. Included in this total is the record-breaking 3176-km (1973-mi) QSO between Jim Frye, NW7O/7 (grid DM25gv) and Jim Poore, KD4WF (grid EM92kb).

What is the evidence that double-hop propagation occurred? At the time of these QSOs, both stations were, or had been, working stations in north Texas and southern Oklahoma. Fig 7 shows the path midpoints and average positions of the two known E clouds for the period 1625-1705 UTC. Also shown are contacts with path lengths exceeding 2500 km, along with their path midpoints. If these long-distance contacts had been single hop, they would have required ionization over north Texas and southern Oklahoma. Furthermore, if this ionization had existed, other contacts would have taken place between southern Texas and Iowa/Nebraska. No such contacts took place at this time, indicating that no E cloud was present midway between the eastern and western clouds discussed previously. The fact that stations at both ends of the long-distance contacts were also working stations in the middle confirms that the geometry of the two clouds was adequate for double-hop propagation.

Signal strengths for these double-hop contacts were about equal to those of single-hop QSOs. For example, NW7O and KD4WF both reported S9-plus signals during their record-breaking QSO. Both stations were running about 150 watts output to single Yagi antennas at about 30-40 feet.

Considering how rare single-hop E_s is at 2 meters, it is a wonder that double-hop ever occurs. The location of the two E clouds in double-hop propagation is critical. Each cloud has to be in the right spot, and both clouds have to be capable of reflecting 2-meter signals at the same time. Nevertheless, double-hop contacts took place at several times during the June 14 opening. These times were around 1525-1535 UTC (3 QSOs), 1610-1620 UTC (3 QSOs), 1625-1635 UTC (9 QSOs) and 1655-1705 UTC (4 QSOs). Note that the

last three sets of double-hop contacts occurred when the majority of the eastern opening was already finished.

On June 14, double-hop propagation occurred when the average distance between the two E clouds (shown by ellipses on the maps in Fig 4) was about 1300-1400 km (800-875 mi). When they were farther apart, no double-hop propagation occurred. The E clouds were a little farther apart from each other during intervening times, when there was no double-hop propagation. During the 1525-1535 UTC double-hop period, no western E cloud can be plotted because no single-hop contacts were made.

Fig 8 shows that the times of double-hop propagation did not correspond to any unusual movement of the eastern E cloud. They occurred when it was traveling straight, as well as when it was changing direction. Similarly, double-hop propagation did not correspond to any unusual shortening or lengthening of average path distances (Fig 9). Double-hop propagation must be the result of two intense E clouds in exactly the right places at the same time.

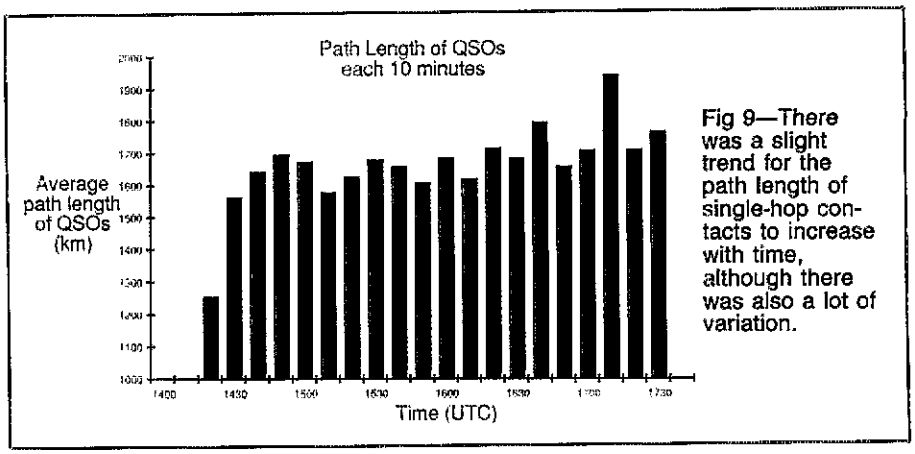


Fig 9—There was a slight trend for the path length of single-hop contacts to increase with time, although there was also a lot of variation.

The 220-MHz Contact

VHFers have long known that lower-frequency E_s propagation can indicate whether higher frequencies might open up. For example, unusually short skip distances on 6 meters often signal an impending 2-meter opening. Therefore, VHFers might expect 2-meter propagation conditions to tell whether 220 MHz might open.

The world's first documented Amateur Radio 220-MHz E_s contact took place at 1544 UTC between Bill Duval, K5UGM (near Dallas, Texas) and John Moore, W5HUQ/4 (near Jacksonville, Florida), a distance of 1497 km (931 mi). Signals on 220 MHz were heard at both ends of the path for several minutes by these stations or others nearby, confirming that the contact was not made via meteor scatter. At the time, 144 MHz had been open between Florida and Texas for more than an hour and would remain open for another hour.

What indications were present at 144 MHz that 220 MHz might open? Apparently, none. Skip distances on 2 meters were approximately the same throughout this opening (except for the double-hop contacts discussed previously). Not only was the average distance of all 144-MHz QSOs about the same, but there were no abnormally *short* QSOs recorded in the logs, either. Furthermore, K5UGM and W5HUQ/4 set up their 220-MHz attempt on 144 MHz—in other words, the 2-meter band was open along the same path. Consequently, it appears that the only way to tell if the 220-MHz band is open is to try it and see. If K5UGM and W5HUQ had not "given it a try" we would still not know if E_s propagation is possible at 220 MHz.

If the eastern E cloud did not exhibit the normal pattern of gradual intensification and rise of MUF, what accounts for the propagation of 220-MHz signals during that record-breaking QSO? I think it has to do with the relationship between ionospheric winds and the E cloud.

Remember that the eastern E cloud apparently stopped moving, or nearly did, between 1600 and 1630 UTC. Perhaps this slowing was caused by the northbound E cloud running into ionospheric winds blowing from the northeast, causing the cloud to slow down and ultimately turn to the northwest. As the cloud slowed, it became suddenly more dense as a result of compaction. This sudden and short-lived concentration of ions permitted 220-MHz propagation. If my hypothesis is correct, VHFers should look for other 220-MHz E_s opportunities when 2-meter openings seem to stabilize briefly or stop shifting.

What Caused This E_s Opening?

A lot of scientific and amateur effort has gone into determining the cause (or causes) of E_s at VHF. A vast literature exists in professional journals concerning the effects of geomagnetic activity, seasons, sunlight, meteoritic particles and other phenomena on the occurrence of mid-latitude sporadic E. It appears that the seasonal, daily and hourly patterns of intense E_s are not *directly* related to any of these causes, although they all affect E_s in some way. No single cause-effect relationship has been discovered despite enormous scientific effort. The jury is still out, and the verdict may not be in for decades.

Among radio amateurs, there seem to be two main theories of the cause of sporadic E: weather and geomagnetic activity. Some VHFers believe that severe thunderstorms (tops greater than 40,000 feet) somehow cause sporadic-E clouds to form, despite the fact that thunderstorms occur at altitudes of less than 16 km and E clouds are formed at over 100 km altitude. Others believe that geomagnetic activity influences mid-latitude E_s, perhaps because geomagnetic storms do cause E_s at polar latitudes.

Was the June 14th opening caused by thunderstorms or unusually high or low geomagnetic activity? I think not. Examination of the National Weather Service's Radar Summary Charts for June 14, 1987, issued hourly, shows a band of weak to moderate thunderstorm activity along the Gulf Coast and extending up the East Coast to about Cape Hatteras, North Carolina. Only a few thunderstorms were present in the region of southern Louisiana to southern Alabama, where the eastern E cloud formed. None of those storms had tops exceeding 40,000 feet. Over west Texas and New Mexico, where the western E cloud formed, there was no thunderstorm activity at all.

Regarding geomagnetic activity, the Earth's field was generally quiet to unsettled. According to the NOAA *Preliminary Report and Forecast of Solar Geophysical Data* published June 16, 1987, the Fredericksburg K index was 2 for the period of the openings, and the A index was 8 for June 14. These conditions are not unusually quiet or disturbed.

I feel that the perceived association between E_s and thunderstorms is caused by the fact that mid-latitude E_s and thunderstorms both happen to occur during the summer. Although they coincide sometimes, plenty of intense thunderstorms happen without any sporadic E, and many E_s events (including wintertime E_s) occur far from any unusually intense storms. Similarly, some mid-latitude E_s events may coincide with unusually low levels of geomagnetic activity. In either case, I think most of these "associations" or "causes" are just coincidences.

Summary and Conclusions

I have described how the June 14, 1987, 144-MHz sporadic-E opening developed through its nearly three hours of existence. By using information from nearly 2000 contacts, it has been possible to track the

movement of the two E clouds responsible for the opening. Their movement probably resulted from the effects of ionospheric winds. The eastern cloud, in particular, was buffeted about and traveled in an erratic path, changing direction at least three times.

These sporadic-E openings began and ended suddenly. As many VHFers have noticed, however, an E_s opening can hang on for quite a while after the main excitement is over. It pays to keep tuning after the opening has apparently ended because double-hop propagation may occur at this time.

Propagation via E_s on 220 MHz *is* possible! During this opening, 220-MHz E_s occurred at about the peak of 144-MHz activity—when the E cloud was at its greatest density. I believe that the intensification of the E_s opening was the result of temporary compaction of the E cloud caused by a shift in ionospheric winds. Whatever the cause, it pays to check 220 MHz whenever a strong 144-MHz opening is in progress, *even if there is no unusual path shortening on 144 MHz.*

Is coast-to-coast 2-meter propagation possible? I think so, but it will be very rare. Both E clouds will have to be slightly to the west of where the June 14 E clouds were, slightly higher in the ionosphere, and help from tropospheric bending will be needed on at least one end of the path. I predict that when (or if) the East Coast works the West Coast, stations in Virginia/North Carolina and in southern Nevada/California will also be working Oklahoma City, Oklahoma or Dodge City, Kansas. We'll see if I'm right!

Dr Michael R. Owen, W9IP, was first licensed in 1969 at age 16. He became interested in VHF/UHF activities while a student at the University of Illinois, Urbana, in the late 1970s. He is active in 432-MHz EME, 144-MHz meteor scatter and VHF/UHF contests. He is a co-editor (with Emil Pocock, W3EP and Curt Roseman, K9AKS) of the VHF/UHF Contesting! column in the National Contest Journal *and has authored many papers on VHF and UHF propagation. Mike is currently an assistant professor of geology at St Lawrence University in Canton, New York, and he continues to enjoy VHF+ operation from FN24, one of the rarer grid squares on the East Coast.*

New Books

HISTORY OF QRP

By Adrian Weiss, WØRSP. Published by Milliwatt Books, 833 Duke St No. 83, Vermillion, SD 57069. First edition, 1987. Soft cover, 5½ × 8½ inches, 11 chapters, 199 pages. $10.95 (First Class postage paid).

The joy of being a QRPer results not only from building little rigs and bucking the QRM while operating. QRP purists extract satisfaction and pleasure from studying the history of low-power operating and the related challenges. *History of QRP* provides extensive coverage of the QRP movement in the US from 1924 to 1960.

As a writer of books and articles, I cannot help but view Adrian's research efforts in awe. His dedication to the objective while gathering archival data is obvious as you read the spellbinding chapters of this book. Certainly, Adrian would make a great curator of some future QRP museum. His grasp of the historical aspects of our flea-power pastime is impressive, to say the least.

The chapters are (in order): The K8EEG (now WØRSP) Story; Prologue to Exploration; QRP Pioneers on the Frontier, 1923-24; 1925—QRP Takes the Spotlight; 1926-27—Newcomers and DXers; 1930-1941—Grass Roots vs High Power QRM; QRP Gains Ground, 1930s; QRPers' Story in Their Own Words; The Uprising of '37—The Flea Power Association; 1945-1960—Before the Transistor; and, 1954-1960—Milliwatts and Miles.

This book is sprinkled with black-and-white photographs of old-time operators and equipment. My nostalgia was heightened by many of these illustrations. For example, Weiss shows a picture and schematic diagram of a WW II surplus mini plug-in unit, the BCR-746-A tuner. The diagram shows Byron Lindsey's (W4BIW) circuit adaptation that called for the addition of a 1S4 battery-radio tube, which was used to convert the tiny tuning unit to a QRP transmitter. When the ARRL staff tested this transmitter in 1947 ("A Bantam 1-Watter," January 1948 *QST*) they worked 22 stations in 10 states during a 12-hour period! How well I remember the excitement I felt when I bought my first BCR-746-A unit in 1946 for only 50 cents! Reading about it in Weiss's book brought back fond memories indeed.

History of QRP is filled with similar interesting tales about QRP operation in bygone days. Weiss makes considerable mention of such pioneers as Kruse, Hatry, Schnell, Handy and Battey. Numerous other QRP experimenters are given credit in the volume, along with photographs and circuit diagrams of their creations.

This book should serve as a guidepost to what QRP operation is about, especially with regard to the thrills that accompany the use of homemade equipment. This part of Amateur Radio is missed by many of today's hams who operate only with store-bought rigs. I recommend this book for your Amateur Radio library, even if you never become a member of the fast-growing QRP fraternity.—*Doug DeMaw, W1FB*

Strays

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☐ anyone who has used a BC348 or R392 receiver. Alan Mark, PO Box 372, Pembroke, MA 02359.

QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

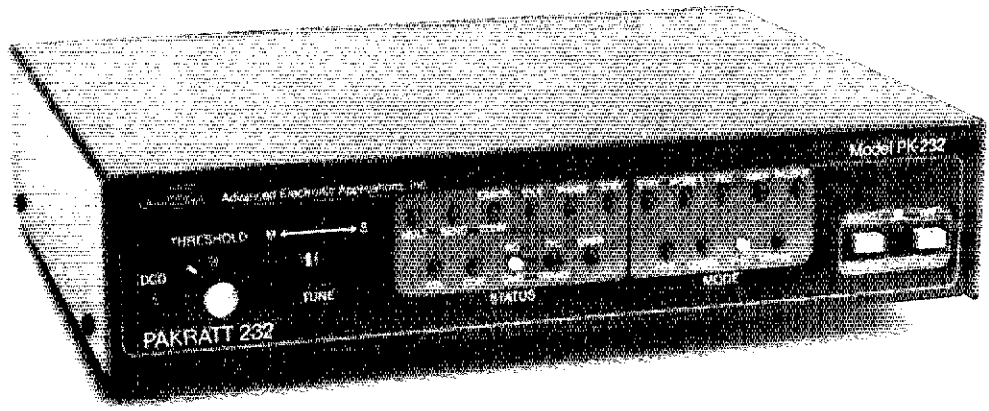
In 1970 a new amplifier design allowed many amateurs to enjoy good success on 1296 MHz. Modified construction makes this amplifier suitable for operation on 903 MHz. Using a paralleled pair of 7289 planar triodes in grounded grid, its output is more than 125 W. Following the mechanical details given in the April issue of *QEX*, you too can get this amplifier up and running on 903 MHz!

The April issue of *QEX* includes articles on:

- "Parabolic Paradox," by H. Paul Shuch, N6TX
- "Two 7289s on 903 MHz," by Ken Schofield, W1RIL
- "Components," by Mark Forbes, KC9C

QEX is edited by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ, and is published monthly. The special subscription rate for ARRL/AMSAT members is $8 for 12 issues; for nonmembers, $16. There are additional postage surcharges for mailing outside the US; write to Headquarters for details.

The Inside Story of the PK-232



How is a product such as the PK-232 multimode data controller born? Here's a peek at the people and procedures that are involved in bringing a new product to life.

By Mike Forsyth, KB7DCJ
Sales Manager, Amateur Division
Advanced Electronic Applications, Inc
PO Box C2160
Lynnwood, WA 98036-2160

Consider the variety of different products offered for sale to Amateur Radio operators today. A quick check of the ads in any issue of *QST* will show you dozens of products you can buy. Some are simple kits put together by a few hams trying to make a little money in a hobby they enjoy. Other products have behind them years of research and development, input from dozens of engineers, and a marketing budget that would make your head swim. But no matter how small or large the company, or the cost of the product, each of them is created for your enjoyment of Amateur Radio.

Who makes these special Amateur Radio products? How does an idea become a finished product? How difficult is it for a company to design, manufacture, and market a product for radio amateurs? This article is a look at how a small company goes through the process of creating a new product; it's an inside look at how the Advanced Electronics Applications (AEA) team defined, designed, manufactures, markets and supports the PK-232 multimode data controller.

Product Definition

The first—and many times the most difficult—step in creating a new product, is to define *what* the new product will be. Product definition requires a good understanding of the existing market and the ability to forecast what new product will be accepted by the Amateur Radio community. Keeping up with the desires of radio amateurs requires a clean and accurate crystal ball. Mike Lamb (N7ML), George Buxton (N7EZJ), Dr Alan Chandler (K6RFK), John Gates (N7BTI), Steve Stuart (N6IA) and I—as well as several others—are called upon to offer ideas concerning the existing and future trends in Amateur Radio. (A list of the AEA team members is presented below.)

Five factors are considered in product definition:

- Market Desires—What product features are radio amateurs looking for?
- Technology—What new technology can be applied to Amateur Radio products?
- Competition—How will this new product fare against existing and future competitive units?

The AEA Team

No individual could possibly design and support a project like the PK-232. The team effort of many AEA staff members makes each new product possible. Here is a listing of the radio amateurs who contributed to the PK-232 project.

Mike Lamb, President, N7ML*
George Buxton, Executive Vice President, N7EZJ*
Dr Alan Chandler, Vice President of Engineering, K6RFK*
John Gates, Commercial Division Sales Manager, N7BTI*
Steve Stuart, Senior Software Design Engineer, N6IA*
Mike Forsyth, Amateur Division Sales Manager, KB7DCJ
Andy Madsen, Engineer, KB7B
Pat Hartley, Design/Drafter, KB7DDM
Larry Stanley, Purchasing Agent, N7KFX
Audris Skuja, Industrial Designer, KB7DDI
Norm Sternberg, Documentation Specialist, W2JUP
Rich Perdue, Service Manager, KA0VXO
John Downing, Service Technician, N7GMF
Cliff Wells, Service Technician, KA7TVC
Paul Vujovich, Service Technician, KB7DCN
Darrin Foster, Production Supervisor, KB7DDO
Glenn Waggoner, Production, KA7ENP
Alicia Johnson, Production, KB7DDP
Tracy Nord, Production, KA7ILD
Norma Levell, Production, KB7DDA
Sharon Elliot, Data Entry, KB7DDN
Sherry Denney, Office Manager, KB7DDK
Sharon McMullen, Order Entry, KB7DDH
Laura Osburn, Receptionist, KB7DDB

*Member of the new-product planning group.

• *Price*—*What price will make the product affordable?*

• Timing—How soon should this new product be available?

Market Desires

In 1985, AEA built the first multimode data controller that included the ability to send and receive Morse, Baudot, ASCII, AMTOR and packet-radio data. The PK-64 made multimode operation easy for any radio amateur who owned a Commodore 64® or 128 computer. With the success of the PK-64, many radio amateurs came to AEA and asked for a similar unit that would function with different computers.

Existing customer comments and wishes are very important in the product-definition process. AEA uses warranty card comments, correspondence, telephone conversations and face-to-face hamfest discussions to learn the needs and desires of current and potential customers. The new-product-planning staff has the difficult job of deciding which new product is most important, and what features should be included in new products. Although several projects can be in some stage of production simultaneously, a small company like AEA must constantly prioritize, juggling a limited staff and numerous new-product ideas.

In the case of the PK-232, a few requirements became evident almost immediately. With the popularity of the IBM® PC and the IBM-clone computers growing dramatically, a multimode controller for non-Commodore computers was needed.

While the popularity of packet radio continued to grow, most PK-64 units sold included the optional enhanced HF modem for operation of all modes on the low bands. Therefore, the new unit would need to include superb HF and VHF modems. With input from thousands of radio amateurs, the planning staff began to sketch out the initial demands for the PK-232.

Technology

Both Dr Chandler and Steve Stuart were involved in the PK-64 design project. So the successor project, the PK-232 (see the sidebar, "What's in a Name?"), would again call on their skills for hardware and software design. Tying the PK-64 directly to the Commodore computers made software and hardware designs very specific, but this new product had to be more versatile. This created major headaches for both hardware and software engineers. The new product would also need some additional features not found in the PK-64. Competitive factors demand that each new product must be an improvement, not just a rehash of existing technology.

Competition

The Amateur Radio market is very competitive. Several other manufacturers were marketing packet-radio controllers at the time (including Japanese manufacturers), but none had followed the lead of the PK-64 by combining packet radio and other modes in a single controller. It was only a matter of time. So, AEA had to consider not just the products available at the time, but what the competition would be selling in the future. The goal was to develop a product that could be price competitive worldwide. Again, the crystal ball becomes very important.

What's in a Name?

Why would AEA call a new product *PK-232*? Actually, PK-232 is the nickname for the Pakratt Model PK-232 Multimode Data Controller. With a name that long, you'd use a nickname too! Pakratt is a contraction of *packet/radioteletype*, and was first used with the PK-64, the first unit to combine radioteletype and packet radio operation. *PK* is short for Pakratt. The *232* part of the name comes from the fact that the PK-232 is compatible with any computer or terminal equipped with an RS-232-C interface port.

One of the reasons for dubbing the new unit the Pakratt Model PK-232 Multimode Data Controller was that the name should describe the features the unit offered. Of course, as soon as the unit was advertised, radio amateurs picked the shortest nickname—PK-232—and it made no difference what AEA called it! Everybody knows: Nicknames are the ones you remember.

Price

The PK-64 was designed to give radio amateurs the choice of buying a VHF-only version for just over $200, or adding an optional modem to bring the total price to just over $300. Part of this decision was based on the apprehension that radio amateurs would not be willing to spend $300 for a data controller. But the PK-64/HFM (with the optional HF modem included) was much more popular than the VHF-only PK-64! This fact, and several other considerations, set a price target for the new unit at just over $300. Once the amateur net price is set, a formula is used to calculate the design-cost parameters, parts cost, labor budget, advertising budget and all other factors of cost involved in the product. George Buxton is responsible for making all the numbers balance. With assistance from Sherry Denny (KB7DDK) and Sharon McMullen (KB7DDH), George monitors all financial aspects of the company, including new-product costs.

Timing

Timing the market arrival of a new-product release can be a major factor in whether the product will fail or succeed. Other projects within the company, the engineering time necessary to complete the PK-232 and the effect on existing product sales were just a few of the factors involved. In this case, "the sooner the better" turned out to be the right answer.

Taking all these factors into account, the new-product planning staff arrived at the following product definition for the PK-232: Build a multimode data controller that can interface with almost any computer and be used for Morse code, Baudot, ASCII, AMTOR and packet radio. Give it a high-performance internal modem for both HF and VHF operation and try to include some new advancements not found in the most competitive unit, the PK-64. Don't forget—this new unit must sell for just a little over $300, and be ready for shipment as soon as possible. While the definition was still somewhat vague, it was time to start the ball rolling.

Project PK-232

Until now, the PK-232 was no more than ideas and desires. Now it's time to put pencil to paper and start the design process. Dr Chandler begins by deciding that the new unit must use the RS-232-C serial standard for computer interfacing. This will make the unit compatible with almost all computers and even dumb terminals. By adding this versatility, additional work is placed on the software designer, Steve Stuart. Now the command format of software control must be used. This format is commonly used in packet-radio controllers, but the multimode operation of the PK-232 will require a tremendous programming effort combining the packet radio AX.25 protocol with previous decoding software used for all the other modes.

Although the PK-232 will be compared to the PK-64, and in some aspects they are similar, the PK-232 hardware and software designs are completely new. For example, the main CPU changed from the internal Commodore 6502 to a Z80® for the PK-232. For several weeks, Dr Chandler and Steve Stuart worked together, with help from Andy Madsen (KB7B), to define how their independent work of hardware and software design can be made compatible. The complex design of the PK-232 will require months of work. (For those of you who are interested, a discussion of the hardware and software design of the PK-232 is available in the PK-232 Technical Reference Manual.)

Once the initial hardware design is sketched out, the breadboarding process begins. A complicated project like the PK-232 can require months of testing and refining to see what combination of components is needed to perform the task of transmitting and receiving several digital-mode signals. Rear-panel connections are defined, and initial front- and rear-panel sketches are made. The "look" of the PK-232 starts to take shape.

The Team Effort Takes Over

Now the project begins to require

assistance from those outside the new-product planning group. Board layout is handled by Pat Hartley (KB7DDM), and the graphic design of the front panel is prepared by industrial designer Audris Skuja (KB7DDI). Both jobs require special talents and the patience to withstand numerous revisions. Dr Chandler supervises the layout while continuing to look for ways the PK-232 can offer more.

Purchasing agent Larry Stanley (N7KFX) begins to place orders for a sufficient number of components to cover the initial production run. With almost 400 components on the PC board, planning is essential. Some parts will require up to eight weeks of lead time. I get involved by forecasting how many units will be required to fill opening orders from over 65 dealers nationwide. Mike Lamb and George Buxton are questioned for input concerning international sales potential for the new unit. Again, the crystal ball is put to use.

As the project begins to snowball, several new questions arise. How will we produce the unit when the design is complete? What about packaging and documentation? What kind of support hardware (cables and connectors) needs to be included in the final package? Should a power supply be included? These are just a few of the questions that must be answered before a single PK-232 can be sold. Don't forget: All this work is being done while AEA is selling and providing customer support for several other products.

The Sixth Digital Mode

As the PK-232 started to take shape, Mike Lamb and Dr Chandler hit on the idea of adding a sixth digital mode to the controller: facsimile. A few key modifications to the hardware and software design would make the PK-232 usable for facsimile operation. While the PK-232 design was nearing completion, the hardware modifications necessary to incorporate this mode were fairly simple to implement. By dividing the DB-25 connector planned for RS-232-C interfacing into both a parallel port for printer operation and a serial port for computer interfacing, the PK-232 could be connected simultaneously to the computer and printer. This would allow for direct printing of received FAX signals. A new mode could be added without slowing the hardware design of the project.

Unfortunately, adding the ability to receive and transmit facsimile to the software program would require months of additional work. The decision was made to offer the PK-232 without the facsimile feature and add that capability later. Competitive factors were pushing the AEA team to bring the project to completion as soon as possible. The goal of displaying the PK-232 at the 1986 Dayton HamVention® was locked in place.

How Many? How Soon? What Cost?

By now, the PK-232 project is several months old, and a single unit does not exist. The first working prototype is still weeks away, and production questions become paramount. Seeing the potential in the PK-232, Mike Lamb and George Buxton decide that normal production techniques used by AEA on earlier products will not be acceptable. For example, the PK-64 circuit boards were "stuffed" and soldered at a local assembly jobber. Final assembly and quality control of the PK-64 was completed at AEA. The PK-232 design is much larger, requires many more components, and is more complicated than the PK-64. To be price competitive with the PK-64, the PK-232 will require lower assembly costs. For the first time, AEA began to investigate building a product offshore.

After months of searching for a quality assembler, a suitable US-owned and operated factory was identified in Hong Kong. As always, final quality control of each unit would remain at the AEA factory. To ensure the first PK-232 units were ready on time, and to provide a cushion for the first offshore experience, an initial run of 500 units was scheduled to be produced in the same fashion as the PK-64. This would also allow us to compare the costs of producing the PK-232 locally and offshore.

Another factor involved in the decision for offshore production was the potential for high-volume sales. The further the PK-232 project progressed, the more it looked like the perfect product at the perfect time. Mike Lamb and George Buxton faced the difficult decision of ordering several thousand units before one unit was sold. This decision required a tremendous confidence in the work of the AEA designers and belief that the PK-232 would be a successful product.

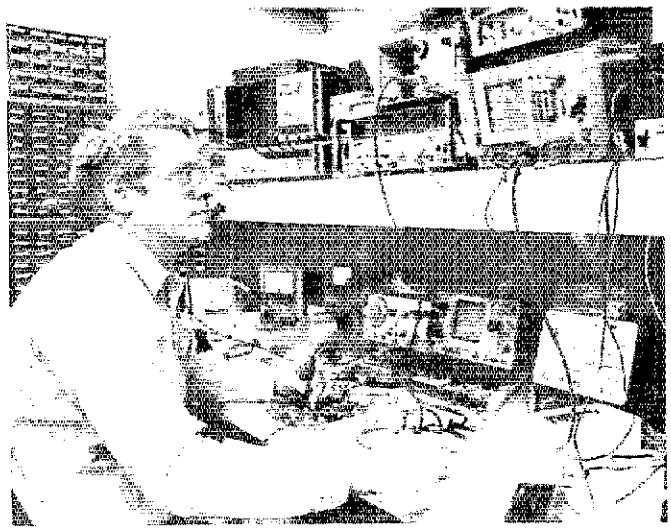
A Sneak Preview

Although the prototype PK-232 is physically complete, the internal software is capable of providing only two modes of operation. But, the decision to show the PK-232 at the Dayton HamVention was made. The goal of this sneak preview was to gauge customer demand for the new unit. With even limited performance and a proposed shipping date several months in the future, the PK-232 was the most popular AEA product shown.

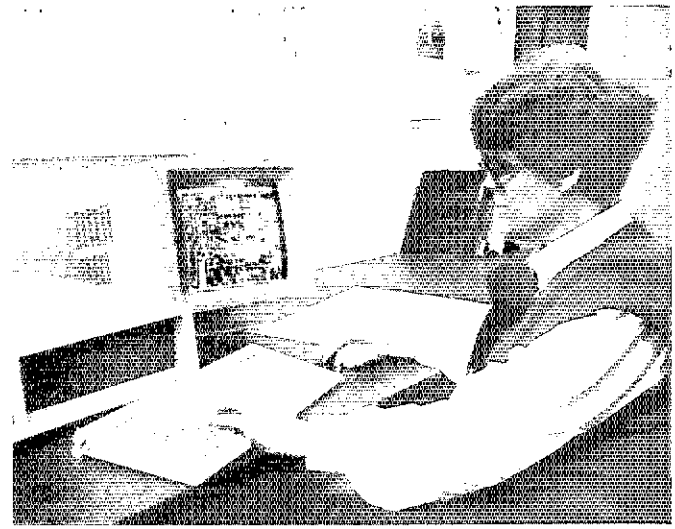
The HamVention also gave AEA the opportunity to show the new PK-232 to Amateur Radio product dealers. This first showing was combined with a mailing of new-product releases to all the authorized AEA dealers. Orders for the PK-232 were placed immediately by many of the AEA outlets. Seeing the excitement of the customers helped the dealers realize the potential for this new product.

Prototypes, Beta Tests and the FCC

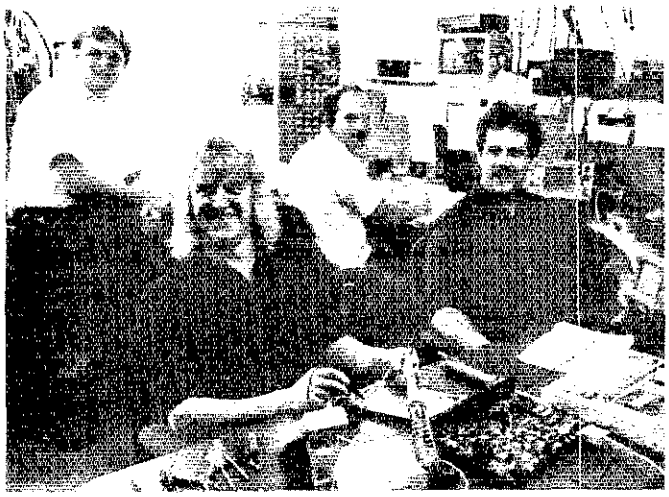
Shortly after the HamVention, the



Dr Alan Chandler, K6RFK, uses a myriad of test instruments to prove new-product designs. The painstaking work of design requires countless calculations for each circuit.



The AEA computer-aided design (CAD) system is operated by Pat Hartley, KB7DDM. This system allows for quick revisions of existing designs and changes to products under development.



Service Manager Rich Perdue, KAØVXO (far right) heads a service staff that assists AEA customers by phone and mail. The rest of the group includes (from left to right): John Downing (N7GMF), Paul Vujovich (KB7DCN) and Cliff Wells (KA7TVC).

Mike Forsyth, KB7DCJ, does some on-the-air testing of the new PC Pakratt program with the PK-232. On-air testing is an important part of the final stages of new-product development.

finished prototype of the PK-232 and first draft of the complete software program were combined. With additional combined tests and minor alterations, the PK-232 was ready for beta tests and FCC certification. Because the PK-232 uses an internal microprocessor, it must comply with Subpart J of Part 15 of the FCC regulations. The process of certification can be time-consuming and expensive, but without certification, the PK-232 could not legally be sold in the US.

A dozen amateurs around the country were enlisted to test the new PK-232. Each was mailed a PK-232 prototype with a first draft of the operator's manual and a letter asking that they put the PK-232 through its paces. Part of the beta test also involved a user response to the operator's manual written by Norm Sternberg, W2JUP. Containing over 275 pages, the manual could be considered a substantial project by itself. Response from the beta testers was enthusiastic—with some constructive criticism. Again, input from users helped AEA better define the final product. After final field testing, the first 500 PK-232s were produced.

Build and Ship

Finally, all the pieces of the puzzle came together. Larry Stanley had all the necessary parts in-house, Pat Hartley had completed the final board layout, Audris Skuja put the final touches on the front-panel design and Darrin Foster (KB7DDO) supervised the initial production run.

Each new unit must pass a detailed electronic and cosmetic quality check before it goes to final boxing. Technicians Alicia Johnson (KB7DDP), Glenn Waggoner (KA7ENP), Tracy Nord (KA7ILD) and others carefully screen each unit. Norma Level (KB7DDA) makes sure the manual, warranty card, hardware pack and proper unit are packaged for shipment. The combined effort of the team makes the PK-232 become a reality.

Sell, Sell, Sell

Following the initial announcement at Dayton, full-page advertisements are prepared for the Amateur Radio magazines. I'm responsible for telling the story of the PK-232 and convincing all interested radio amateurs that the PK-232 is the perfect interface for their computer and radio. Initial reaction is very strong and dealer orders continue to increase. With several hundred units on back order, the first production run is quickly exhausted. Following a short waiting period, the first offshore versions of the PK-232 arrive. After complete quality control by the AEA technicians, these new PK-232s are shipped to anxious dealers.

The last mile of the long walk from idea to product sold is walked by the AEA dealer. By stocking the PK-232 on his shelf, the dealer gives the buying customer the opportunity to take the unit home from the store, or have it shipped to him or her immediately. Many of the dealers even take the effort to provide an operating setup to display the PK-232 so customers can "try before they buy."

Customer Support

After a customer buys a new PK-232, opens the box, glances at the manual and tries to interface the radio and computer to the PK-232, he or she may need the assistance of the AEA service team. With direction from Service Manager Rich Perdue (KAØVXO), Service Technicians John Downing (N7GMF), Cliff Wells (N7TVC) and Paul Vujovich (KB7DCN) work hard at making all the new technology make sense. Without the extra effort of the Service Department, the customer might not be able to use all the capabilities of the PK-232.

The Story Continues

Once the PK-232 was shipped to customers, the new-product design team started plans for several new products and features designed to support the PK-232. The first was to complete the facsimile software to expand the PK-232 to work with six digital modes. When the software was completed and tested, it was added to all new PK-232s as a standard feature and offered to existing customers as an upgrade at cost. The facsimile option is made available for $40, including the two EPROMS, a special computer/printer cable and a new manual.

A series of special terminal programs written to support the PK-232 in the exclusive "host mode" was also created. PC Pakratt is designed for PK-232 operation with IBM and IBM clone computers. Com Pakratt works with Commodore computers. PK-Fax gives screen display of facsimile signals, and Com-Fax (scheduled release in May 1988) does the same for the Commodore computers. Each new program gives PK-232 owners and potential customers another reason to buy the AEA PK-232.

The never-ending cycle of new products continues as long as radio amateurs are actively asking for more and creative people can work together to fulfill their requests. So, the next time you buy a new product designed for Amateur Radio operation, take just a moment to consider the time and effort of all those people behind that new product who work hard at making Amateur Radio exciting.

Postscript

With over 20,000 units manufactured, AEA continues to market and support the PK-232 in the US and around the world. The PK-232 is also being accepted in military and commercial applications as an inexpensive, yet highly reliable, multimode data controller.

RX Noise Bridges

Is it better to build your own RX noise bridge or buy one of professional quality? These performance results will help you decide.

By John S. Belrose, VE2CV
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Tadoussac Dr
Aylmer, PQ J9J 1G1, Canada

The accuracy of an RX noise bridge has been questioned by Clifford J. Appel, WB6AWM/5.[1] Cliff proposed an alternative method of measuring the impedance in an antenna system; however, it apparently did not provide an improvement in accuracy for him. Although it is clear that these little bridges are not intended for accurate measurement, they are useful devices for measuring the resonant frequency of antenna systems. This article compares the expected performance of various bridges, and comments on operational experience with two of them.

General Description

Fig 1A is a diagram of the RX noise bridge. It contains a wideband noise generator and an RF impedance bridge. Two arms of the bridge are driven equally by the noise generator through a trifilar broadband ferrite transformer. One transformer winding couples noise energy into the bridge circuit. The remaining two windings are arranged so that each is an arm of the bridge. C1 and R1 complete one arm; C2 and the unknown compose the remainder of the bridge. The terminals labeled RX connect to a detector—any communications receiver tuned to the frequency of interest. Fig 1B shows another noise bridge configuration, with emphasis on the trifilar winding.

The value of C2 is chosen so that at balance (when a non-reactive load is present) C1 tunes at about midscale. The unknown reactance can be capacitive or inductive, within a certain range of values. This is true because the reactance of the unknown element effectively adds or subtracts from the capacitive reactance of C2.

C1's dial is calibrated in terms of the difference in capacitance. Calibration is in picofarads, and plus or minus with respect to the setting that nulls with C2. For example, assume we are using a Palomar RX bridge where C1 = 140 pF, C2 = 70 pF, and our unknown is a pure resistance. The bridge will balance at midscale, and the effective capacitance range is ±70 pF.

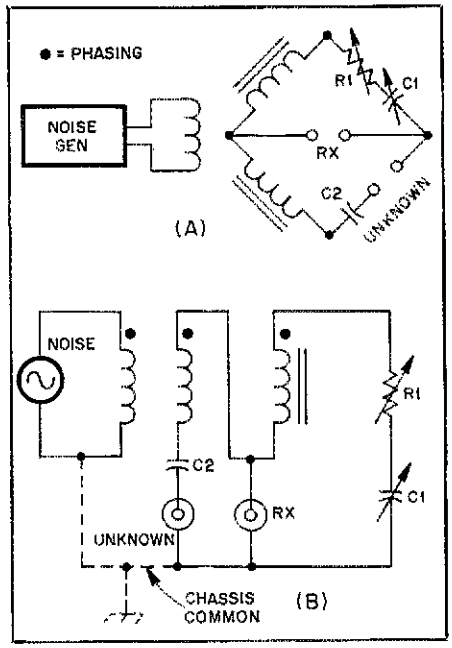


Fig 1—At A, the RX noise bridge comprises a wideband noise generator and an RF impedance bridge. B is a noise bridge redrawn to show the trifilar winding.

The effective capacitance values are read from the dial. Capacitive or inductive reactance is obtained from a curve that can be calculated from the equations below:

$$X_C = \frac{1}{2\pi f C_2} - \frac{1}{2\pi f (C_2 - C_d)} \quad \text{(Eq 1)}$$

$$X_L = \frac{1}{2\pi f C_2} - \frac{1}{2\pi f (C_2 + C_d)} \quad \text{(Eq 2)}$$

where C_d = x dial reading.

If C_d is calibrated in picofarads, and frequency is measured in MHz, the appropriate equations for the Palomar RX noise bridge are:

$$X_C = \frac{2273.6}{f} - \frac{159{,}155}{f (70 - C_d)} \quad \text{(Eq 3)}$$

$$X_L = \frac{2273.6}{f} - \frac{159{,}155}{f (70 + C_d)} \quad \text{(Eq 4)}$$

Comparing Expected Bridge Performance

Several bridges are commercially available, and a homemade one is described in *The ARRL Antenna Book*.[2] Each bridge employs different values for C1 and C2. The reactance-measuring precision of the bridge is a function of the bridge used and the accuracy of its calibration. Suppose we can adjust the reactance dial and read it to a precision that is better than ±5 degrees in dial rotation. The null is much sharper than this. The results of my calculations, listed in Table 1, show what this means in terms of reactance variation for a frequency of 1 MHz. The sensitivity of the bridges to measure reactance near resonance can be compared.

Clearly, the MFJ bridge should be able to measure reactance near resonance with the best accuracy, but the maximum value of inductive reactance for which the bridge balances is less than that of the other bridges. This is particularly a problem when the bridge is used at higher frequencies, since the reactance values in Table I are calculated for a frequency of 1 MHz. For other frequencies, these values are divided by the frequency in MHz. At 15 MHz, the maximum inductive reactance that can be measured using the MFJ bridge is 20 ohms. This bridge, however, has a "range expander," which, in effect, shunts the unknown with a 200-ohm resistance. This has the effect of increasing the maximum range of impedance values that can be measured. A better way to measure large values of inductive reactance is to place a known-value capacitor in series with the unknown. This procedure helps to preserve the inherent accuracy of the bridge.

Practical Use of RX Noise Bridges

Since the null of a noise bridge is very sharp, some skill is required to use the bridge. When tuning for a null, listen with earphones and tune carefully. It is better to start with low receiver gain. Switch the

[1]Notes appear on page 39

Table 1

Comparison of Calculated Bridge Sensitivity

RX Noise Bridge	C1 (pF)	C2 (pF)	Reactance change for small dial change about midscale (±5°)	Maximum Reactance (approx) X_C	X_L
ARRL Antenna Book	250	120	−81.4/+72.5	6630	690
Palomar	140	70	−133.5/+119.4	5684	1150
MFJ	10-300	180	−42.8/+39.0	7073	300
Heathkit	7-120	68	−120.5/+109.25	5617	1014

RF attenuator into the circuit if your receiver has one. Because the R and X controls interact, they must be adjusted alternately until a deep null is obtained. The best way to do this is to tune the R dial in small increments starting from zero. For each increment of R, slowly rotate the X dial over its range. Repeat until a null is found, then fine-tune the bridge for a very deep null at normal receiver gain. The bridge noise level of S9 can be reduced to S1. From my experience with the bridge, I find it is trickier to use than a professional impedance bridge.

Table 2 compares measurements made with two commercial RX noise bridges. Two 75/80-m antenna systems were used: a drooping dipole and a half-delta loop. The impedance at the input of the feeder coaxial cable was measured at three frequencies: at resonance and one frequency on each side of resonance. From these measurements, the SWR was calculated from Eq 1 and 2 of *The 1988 ARRL Handbook*, and compared with the measured SWR.[3]

The Palomar bridge seemed to be the easiest to use. The null was more easily found, and the controls felt more positive. The box in which the Palomar bridge is housed is solid (compared with the more flexible mini-cabinet that houses the MFJ bridge). The difference in bridge sensitivity for measurement of small reactance values is evident from the data in Table 1. The impedance values marked with an asterisk (*) in Table 2 for the Palomar bridge were clearly a reactive load, but the reactance values measured by the MFJ bridge are too small to measure with the Palomar bridge.

In effect, the bridge signal source is a noise generator. Antenna impedance cannot be measured if the received level of noise and interference is high. There is, however, a method to make measurements under such conditions, providing an antenna matching system is available. Preferably, the matching network is a T match with a roller inductor, so an *exact* match can be obtained. Adjust the tuner for an SWR of 1:1, then disconnect the network without touching the dial settings. Next, terminate the tuner input port (transmitter) with a 50-ohm load, and connect the bridge to the tuner output port (antenna) using the shortest possible leads (coaxial couplers). Now, measure the impedance seen by the bridge. Recall that a matching network is a conjugate matching device. Therefore, if the bridge, connected as above, indicates $R + jX$, the antenna impedance is $R - jX$. This is a somewhat tedious way to measure antenna impedance, but accurate results are obtained because the bridge is nulled under no-noise conditions.

Measuring Antenna Impedance

So far, we've discussed how the RX noise bridge works, and commented on operational use of the bridge. We've also observed some measured values of antenna system impedance. These values, however, represent the impedance at the feeder input (Z_{in}), and not the antenna impedance (Z_a). To determine Z_a, we must know the characteristics and electrical length of the feeder coaxial cable. Then, a Smith Chart can be used to determine the antenna (or load) impedance. Alternatively, a ½-λ feed line can be used; a half-wave transmission line reflects the load impedance to the input. In practice, however, feed lines are rarely exactly ½ λ.

Another way to determine Z_a is to use standard transmission-line equations and a calculator. Transmission-line equations, in general, are designed to calculate the input impedance (Z_{in}) for a known load impedance (Z_L). We are interested in finding the inverse, that is, we measure the input impedance and we want to determine the load (or antenna) impedance. There is a trick to using the standard transmission-line equations to get what we want without having to derive new equations or write a program for the calculator. For example, my HP41CV calculator contains a firmware program to calculate input impedance for a known load impedance. This program takes into account a lossy line. For the reverse procedure, do as follows:

1) Suppose the measured input impedance is $Z_{in} = Z_m \angle\theta m$, where m designates *m*easured values;

2) Calculate Z'_{in}, the input impedance of your feeder coax, if it had been terminated, by $Z_L = Z_m \angle\theta m - 180°$;

3) If this calculated input impedance is $Z'_{in} \angle\theta'_{in}$, then the real load impedance Z_L (or since our load is an antenna, Z_a) is $Z_L = Z_a = Z'_{in}$, and $\theta_L = \theta_a = \theta'_{in} \pm 180°$, so that θ_a is between minus 90° and plus 90°.

Let's use this method to obtain the impedance of my half-delta loop, which is fed by a short length of Belden 8214 coaxial cable, at 3650 kHz. First, determine the length of the feeder, if it was not previously measured. To do this, short the antenna end of the feeder and measure the input impedance. Recall that a ½-λ transmission line reflects the load impedance to the input. Therefore, at the ½-λ resonant frequency, the input impedance (Z_{in}) will be a very low pure resistance (zero reactance).

To determine this frequency, estimate the feeder length and calculate what this frequency might be. For this calculation, the phase velocity factor for the coaxial cable must be known ($V_r = 0.78$ for Belden 8214 coax). Use the RX noise bridge to measure the input impedance of the shorted coaxial cable. If the frequency is too low, the input impedance will be a capacitor in series with a low resistance. If it is too high, the input impedance will be an inductor in series with a low resistance. At the resonant ½-λ frequency, the input impedance will be a very low pure resistance. For our circuit, this frequency was found to be 15.9 MHz. Therefore, the length of coax is:

$L = 150/15.9 \times (0.78) = 7.36$ meters
$= 7.36/0.3048 = 24.15$ feet

The impedance of our half-delta loop at 3650 kHz is determined by:

Z_{in} (measured) $= 45 - j14$
$= 47.13 \angle -17.28°$

To use the transmission-line program with an HP41CV calculator, we need to know the impedance of the coaxial cable

(continued on page 39)

Table 2

Comparison of Measurements By Two Commercial RX Noise Bridges for 75/80-m Antenna Systems

Freq (kHz)	Impedance Palomar	Impedance MFJ	SWR Calculated Palomar	SWR Calculated MFJ	SWR Measured
Dipole					
3650	85 + *j*0	95 + *j*0	1.7	1.9	1.6
3750	55 + *j*0*	53 + *j*10	1.1	1.2	1.1
3900	50 + *j*60	45 + *j*60	3.1	3.3	2.4
Half-Delta Loop					
3550	30 + *j*0*	21 − *j*8.6	1.6	2.5	2.6
3650	45 − *j*0*	45 − *j*14	1.1	1.4	1.5
3800	70 − *j*46	72 − *j*56	2.3	2.6	2.9

Product Review

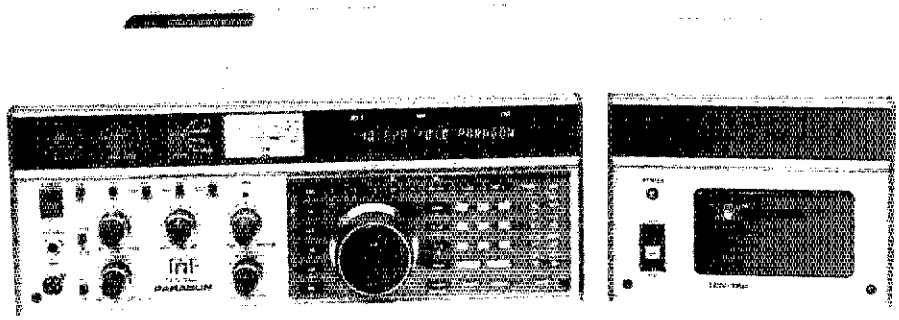
Conducted By Mark Wilson, AA2Z
Senior Assistant Technical Editor

Ten-Tec Model 585 Paragon 160-10 Meter Transceiver

Reviewed by Mark Wilson, AA2Z

"When are you going to review the Paragon?" We often are asked about upcoming reviews, but no piece of equipment in recent history sparked as many inquiries as Ten-Tec's latest 160- to 10-meter transceiver. Although the previous top-of-the-line Ten-Tec (the Corsair II) is a fine performer, the Paragon makes the leap from VFO to frequency-synthesizer technology. It's the first Ten-Tec transceiver with memories, scanning features, keypad frequency entry and a general-coverage receiver. In addition, the Paragon offers AM, FM and FSK operation in addition to the usual SSB and CW, selectable IF filters, passband tuning, notch filter, audio filter, selectable AGC, QSK, clock/calendar and much more.

The Paragon's rear panel has all sorts of jacks for using the Paragon with external power amplifiers (with or without QSK capability), separate receiving antennas, VHF/UHF transverters and RTTY gear. There's even a 13.8-V, 2-A output for powering accessories such as a keyer or RTTY/packet box.



Frequency Control

The Paragon features a microprocessor-controlled, synthesizer-based VFO system. All the bells and whistles are here, including 62 memories that store information on frequency, mode, VFO selection and filter bandwidth. An interesting twist on the memory feature is the TAG function. You can label each memory with a 7-digit alphanumeric "tag" at the right-hand side of the main display. The tag can be any combination of letters and numbers, and this feature is handy for remembering what you've stored in memory. For example, I used the tag AUSTRLA for Radio Australia on 9580 kHz. Another novel feature is a front-panel switch to turn the last (10-Hz) digit on the frequency display on and off.

Storing and recalling memories is uncomplicated, just as it should be. The memory controls are grouped to the right of the main tuning knob. Because the microprocessor does all the work, these controls are momentary-contact pushbuttons. To keep the number of pushbuttons to a minimum (and the front panel to a reasonable size), most pushbuttons have two functions. The less-often-used functions are selected by first pressing the SHIFT switch. This is similar to using function keys on a scientific pocket calculator. A beep sounds each time you press one of the switches, and the beep loudness is adjustable by a rear-panel control.

In the memory mode, you can tune through the memories manually, or you can scan through them. Scanning rate is adjustable in 10 steps. The slowest rate dwells on each memory channel for about two seconds; the fastest leaves your head spinning! You also have the option of locking out any of the memory channels.

A useful memory feature is the "scratch pad," or temporary memory. To enter the current VFO frequency in the scratch pad, just press the STO button twice. To recall the scratch pad memory, press RCL twice. This feature is handy for DX or contest operators who want to store a pileup frequency and come back to it later.

The digital frequency display shows the *receiver* frequency. It does not take into account the offset between transmitter and receiver frequencies during CW operation. Actual transmitter frequency during CW operation is about 750 Hz higher than the frequency shown on the display.

The Paragon offers selection of A and B VFOs. It has the usual switches for making the VFO frequencies the same, selecting A or B or operating split. If you're operating split and want to monitor your transmit frequency, press SPOT. SPOT switches you to the transmit VFO so you can listen to what's happening on the transmit frequency and adjust your transmit VFO accordingly.

Receiver and transmitter offset tuning have a range of ±99.9 kHz. There is no separate offset-tuning knob; the main frequency-control knob becomes the offset-tuning control when the RX OFF. or TX OFF. buttons are pressed. This system, similar to the RIT on the Collins KWM-380, takes some mental retraining if you're accustomed to operating Japanese transceivers. I got used to the RIT system after a few hours of operation. One real drawback is that you can't use the receiver and transmitter offsets at the same time. Many contest operators like to use the receiver and transmitter offsets to monitor adjacent frequencies during runs. They might want to hunt and work nearby stations without moving the VFO, or they might want to ask the guy who just opened up 200 Hz away to please move.

To change frequency, you can use the main tuning knob or the keypad. The Paragon has no bandswitch, as such. There are several ways to change bands, but I found them all to be inconvenient—they require using more than one switch. (1) There are "arrow up" and "arrow down" pushbuttons to move up or down in frequency in 100-kHz or 1-MHz steps (step size depends on the setting of the FAST tuning switch). Pressing SHIFT and one of the arrow buttons moves you to the next ham band (including the WARC bands) up or down in frequency. (2) You can enter the new frequency on the keypad. If you want to go to the bottom edge of a band, this way isn't too bad. For example, to go to 40 meters, press 7 ENTER. If you want to go to the 20-meter phone band, though, you'll have to make at least five keystrokes (1 4 . 2 ENTER). (3) Enter your favorite frequencies for each band into the memories. In my opinion, the ideal combination is a set of switches for the ham bands (a separate switch for each band) *and* a keypad for forays into the many frequencies outside the ham bands that are available on the general-coverage receiver.

Tuning rate is adjustable. Tuning steps of 10 Hz (about 5 kHz per knob revolution) and 20 Hz (about 10 kHz per revolution) are available in the CW, SSB and RTTY modes. Step size is selected with the FAST button. The slower tuning rate is great for tuning around when using the narrow CW filter. The band seems a lot bigger than it would with a faster tuning rate. During AM and FM operation, tuning steps are 50 Hz and 100 Hz.

The tuning knob is weighted and has a

rubber grip around its circumference. The feel is a bit light, though. More weight and more flywheel action would be a nice addition.

Receiver

The Paragon's receiver is a multiple-conversion design with IFs at 75, 9 and 6.3 MHz. (For FM, the third IF is 455 kHz.) Signals enter the receiver through switched low-pass filters (also used on transmit) and high-pass filters. The front-end RF amplifier consists of four paralleled JFETs (J310s) in a broadband circuit. (The RF amplifier is not used below 1.6 MHz.) The first receive mixer is a singly balanced design using two more J310s. There is some crystal filtering at each IF. The 75-MHz IF has a 2-pole crystal filter; the 9-MHz IF features a pair of 8-pole crystal filters with bandwidths of 6.0 kHz for AM operation and 2.4 kHz for SSB and CW operation. Passband tuning and additional crystal filtering occur at the 6.3-MHz IF. The 6.3-MHz crystal filters have bandwidths of 2.4 kHz, 1.8 kHz, 500 Hz and 250 Hz and are selected by front-panel switches. Only the 2.4-kHz third-IF filter is standard; the others are available as options.

During ARRL lab testing, the Paragon's receiver turned in some impressive numbers. Blocking dynamic range, at about 136 dB, is fantastic. In this receiver, the limiting factor when listening to very weak signals adjacent to very strong signals is receiver phase noise, not dynamic range. Phase noise is very audible at the onset of receiver blocking. (Blocking signal levels were in the 0 to +5 dBm range—much higher than you would expect to find at your antenna terminals under normal circumstances.) Sensitivity is more than adequate, and the two-tone, third-order IMD dynamic range is excellent as well.

Mode selection is accomplished with a series of momentary-contact pushbuttons arranged vertically to the left of the main tuning knob. Choices are CW, USB, LSB, AM and FM. FSK is selected by pressing the SHIFT and CW keys.

Receiver bandwidth selection is handled by a horizontal row of pushbuttons above the main tuning knob. Choices are 6.0, 2.4, 1.8, 0.5 and 0.25 kHz. (The last three work only if the optional third-IF filters are installed.) Filter selection is independent of mode (except for FM). This is a great feature. For example, if you operate AFSK RTTY using the LSB mode, you can switch in any of the narrow filters to eliminate adjacent-channel interference. Also, there are times when a narrow CW filter is a hindrance, rather than a help. It's nice having a couple of wider filters available.

The Paragon has several QRM-fighting controls. The most useful of these is passband tuning, which allows you to shift the passband response to effectively reduce interference from nearby signals. Less effective are the BP/FADE audio filter controls. Perhaps *subtle* best describes the effects of these two controls. Notch filter depth is about 40 dB; this control is helpful at times, although the notch is sharp and adjustment is critical.

The Paragon's variable-pulse-width noise blanker works great on Soviet over-the-horizon radar ("woodpecker") interference, although its use noticeably degrades the receiver's strong-signal-handling performance—an effect common with noise blankers. The noise blanker didn't do much for my power-line noise, though.

Pressing the front-panel attenuator switch substitutes a 10-dB pad for the front-end RF amplifier. The net effect is that signal levels

Table 1

Ten-Tec Model 585 Paragon 160-10 Meter Transceiver, Serial no. 084

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: Receiver, 100 kHz to 29.9999 MHz; transmitter, 160-10 meter ham bands.	As specified, except transmitter coverage extends ≈10 kHz above each amateur band.
Modes of operation: USB, LSB, CW, AM, RTTY (FSK or AFSK), FM (optional).	As specified.
Frequency display: 7-digit blue fluorescent.	
Frequency resolution: 10 Hz.	As specified.
Power requirement: 13.8 V dc at approx 1.5 A on receive and 20 A on transmit.	13.8 V dc at 17 A at 110 W output.
Transmitter	*Transmitter Dynamic Testing*
Transmitter output power: 25 to 100 W adjustable. 100% duty cycle for 20 min; continuous with auxiliary air cooling.	Typically 110 W max, 16 W min; power output varied slightly from band to band.
Spurious signal and harmonic suppression: Greater than 45 dB below peak power output.	See Fig 1.
Third-order intermodulation distortion products: Not specified.	See Fig 2.
CW keying waveform: Not specified.	See Fig 3.
Transmit-receive turnaround time (PTT release to 90% audio output with an S9 signal): Not specified.	35 ms.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity SSB, CW and RTTY: (2.4 kHz bandwidth) 0.5 μV for 10 dB S/N from 0.1-1.6 MHz; 0.15 μV for 10 dB S/N from 1.6-29.999 MHz.	Minimum discernible signal (noise floor), with 500-Hz filter: 1.0 MHz: −117.0 dBm 3.5 MHz: −139.5 dBm 14 MHz: −137.0 dBm
AM: (6.0 kHz bandwidth) 3.5 μV for 10 dB S/N from 0.1-1.6 MHz; 1.0 μV for 10 dB S/N from 1.6-29.999 MHz.	1.0 MHz: 4.2 μV 3.5 MHz: 0.27 μV 14 MHz: 0.34 μV (Test signal 30% modulated with a 1-kHz tone.)
FM: (15 kHz bandwidth) 1.0 μV for 12 dB SINAD from 0.1-1.6 MHz; 0.3 μV for 12 dB SINAD from 1.6-29.999 MHz.	Not tested; FM option not installed.
Receiver dynamic range: 100 dB typical; third-order intercept point +18 dBm.	Blocking dynamic range (dB)†: 3.5 MHz, 136.5 14 MHz, 136 Two-tone, third-order intermodulation distortion dynamic range (dB)†: 3.5 MHz, 101.5 14 MHz, 101.0 Third-order input intercept (dBm): 3.5 MHz, 12.75 14 MHz, 14.5
S-meter sensitivity (μV for S9 reading): 50.	88 at 1.9 MHz; 44 at 14 MHz; 70 at 28 MHz.
Squelch sensitivity: AM, CW, SSB, FSK (1.6-29.999 MHz), less than 1 μV. FM (1.6-29.999 MHz), less than 0.4 μV.	SSB/CW, 0.6 μV min; FM not tested
Notch filter: 50 dB notch typical.	Max notch 40 dB.
Receiver audio output: 1.5 W at 8 ohms with less than 2% total harmonic distortion (THD).	2.3 W at 2% THD
Color: Gray.	
Size (height, width, depth): 5.75 × 14.75 × 17 in.	
Weight: 16 lb (not including power supply)	

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

are reduced about 20 dB. (The net reduction is 10 dB below 1.6 MHz because the RF amplifier is not used there.)

The front-panel PHONES jack is designed for 4- to 16-ohm headphones with a standard (monaural) ¼-inch jack. If you use stereo headphones, you'll need to rewire the plug or use an adapter.

A welcome surprise is the Paragon's excellent AGC. Its action is smooth, and there are no noticeable pops. (Anyone who has owned a Ten-Tec OMNI, as I have, will notice the improvement immediately.) Best of all, the AGC slope allows loud signals to sound louder than weak signals, and this makes it easier to pull call signs out of a pileup. AGC release times are about 0.2 second with the switch in the FAST position and 2 seconds in the SLOW position. The manual details a modification to increase the SLOW release time by 1 second, but I didn't make this modification. The original SLOW release time is just about right for casual operation.

Transmitter

The front-panel DRIVE control varies power output from about 15 W to 110 W, with slight variations from band to band. Ten-Tec rates the transmitter at 100% duty cycle for up to 20 minutes with no additional cooling. The review unit passed a 20-minute key-down test with flying colors. As Fig 1 shows, the transmitter low-pass filters do their job well. The spectral output of this unit is exceptionally clean on all bands. The two-tone IMD products (Fig 2) are acceptable. The CW keying waveform (Fig 3) is well shaped, and the on-air signal sounds good. Rise and fall times are about 4 ms. If you want harder or softer keying, the manual shows how to set the rise and fall times in the range of 1-5 ms.

The Paragon's full-break-in CW (QSK) feature gets an A+. It works well, even at speeds of 40 WPM and higher. With some radios, the transmitted characters are noticeably truncated in the full-break-in mode; you have to adjust your keyer weighting to get an acceptable-sounding signal at higher speeds. Not so with the Paragon. I spent a lot of time monitoring the Paragon's transmitted signal with a second receiver in my shack; the full-break-in signal sounded great at all the keying speeds I tried from 10 to 50 WPM. I made no adjustments to the keyer weighting control.

The CW offset is factory aligned at 750 Hz. Some operators prefer lower offsets, on the order of 300-400 Hz. According to Ten-Tec, you can retune the BFO for a lower offset; I did not try this. Rear-panel controls are provided for adjustment of sidetone pitch and level.

On SSB, I got a number of good audio reports, even with the speech processor on. The rear-panel MONITOR LEVEL permits listening to the Paragon's transmitted audio in your headphones. The monitor is useful for setting up the speech processor. I adjusted the speech processor while listening with a second receiver. The processor adds punch, but its adjustment range is narrow.

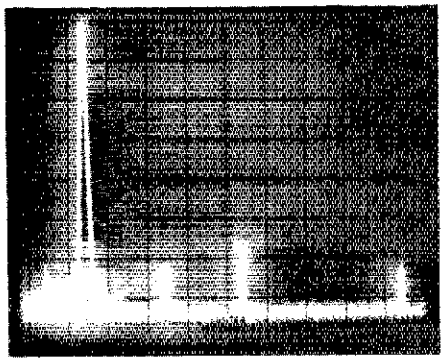


Fig 1—Worst-case spectral display of the Ten-Tec Paragon. Horizontal divisions are each 2 MHz; vertical divisions are each 10 dB. Output power is approximately 105 W at 3.5 MHz. All harmonics and spurious emissions are at least 56 dB below peak fundamental output. The Paragon complies with current FCC specifications for spectral purity.

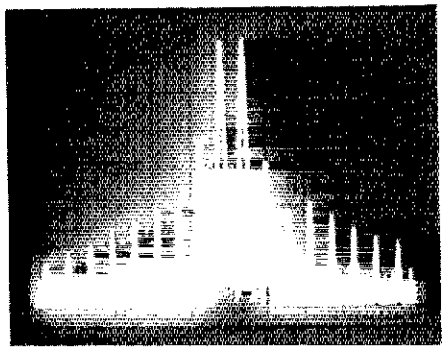


Fig 2—Spectral display of the Ten-Tec Paragon during two-tone intermodulation distortion (IMD) testing. Third-order products are approximately 33 dB below PEP output, and fifth-order products are approximately 49 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The transceiver was being operated at 100 W PEP output on 3.8 MHz.

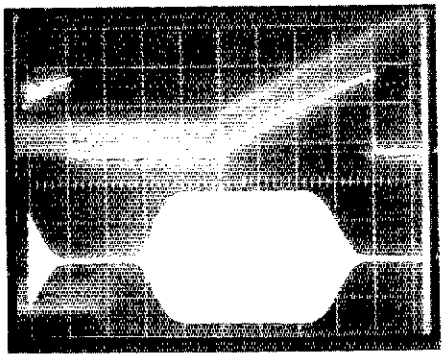


Fig 3—CW keying waveform for the Ten-Tec Paragon. The lower trace is the RF envelope; the upper trace is the actual key closure. Each horizontal division is 5 ms.

This is good; the signal is intelligible even with the processor and mic gain controls turned way up.

On SSB, you have the choice of PTT or VOX operation. The choice is just that—the microphone PTT switch has no effect when VOX is selected. I was disappointed that the VOX controls are on the Paragon's rear panel. I tend to adjust the VOX delay control quite often, and it's not convenient to get at.

Phase-Noise Measurements

With this review, we introduce transmitter phase-noise testing as part of the standard Product Review testing. March and April 1988 *QST* carry a two-part article describing phase noise, along with a complete discussion of ARRL laboratory phase-noise measurements.[1] The March/April article also shows results of ARRL lab testing of the phase-noise characteristics of other popular HF transceivers for comparison. Fig 4 shows two spectral photographs of the Paragon transmitter during phase-noise testing. This photograph was taken with the latest version (as of February 1988) of Ten-Tec's PLL board.

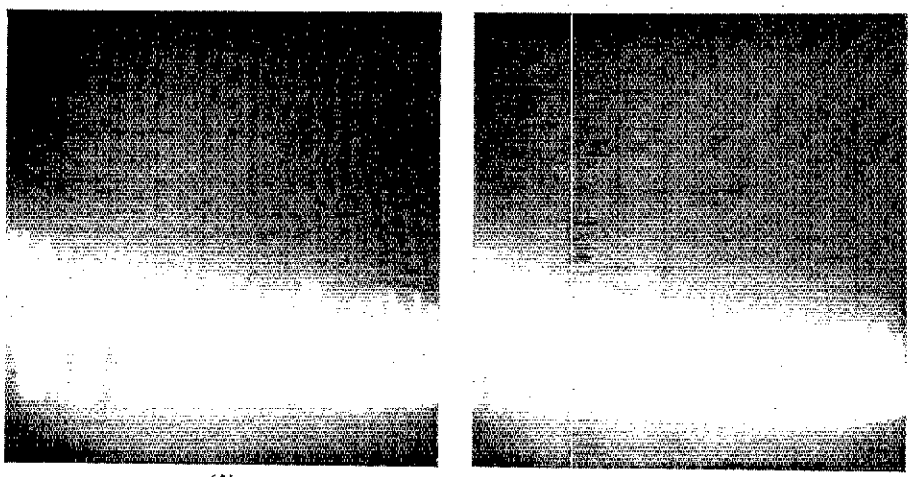
Initial tests made last fall indicated that the Paragon had very poor phase-noise characteristics. After ARRL lab engineers discussed the test results with Ten-Tec engineers, Ten-Tec provided a modified PLL board with improved filtering on the 723 voltage-regulator IC. Additional testing showed that the modified board greatly improved overall phase-noise performance, but close-in noise was much worse. Another modification resulted in much-improved phase-noise performance—both close in and far away from the carrier. These modifications are incorporated in current production boards. If you have an early Paragon, contact Ten-Tec about updating your PLL board.

Manual

The 22-page manual we originally received with the Product Review Paragon last fall contained all of the information needed to put the transceiver on the air, but it was skimpy. In February, Ten-Tec sent a copy of the final manual—what a difference! The new manual is more than 130 pages long. In addition to complete operating information, it features complete technical information usually found in service manuals that are available at extra charge. If you want to know how a modern transceiver works, you'll love the Paragon manual. More than 100 pages are devoted to circuit descriptions, schematics, PC-board layouts and parts-placement diagrams for *each PC-board subassembly in the radio*.

I especially liked the page of Condensed Operating Instructions, which shows initial control settings and tells you enough to get started. This page is sort of like the TV news version of how to operate the rig—short and to the point. It's a good idea because most hams don't like to read instructions anyway. After the initial thrill of using your new toy

[1] J. Grebenkemper, "Phase Noise and Its Effects on Amateur Communications," *QST*, Mar 1988, pp 14-20; and Apr 1988, pp 22-25. Feedback, May 1988 *QST*, p 44.



(A) (B)

Fig 4—Spectral display of the Ten-Tec Paragon transmitter output during phase-noise testing. Power output is 100 W at 3.5 MHz (A) and 14 MHz (B). Each vertical division is 10 dB; each horizontal division is 2 kHz. The scale on the spectrum analyzer on which these photos were taken is calibrated so that the log reference level (the top horizontal line on the scale in the photos) represents −60 dBc/Hz and the baseline is −140 dBc/Hz. Phase-noise levels between −60 and −140 dBc/Hz may be read directly from the photographs. The carrier, which would be at the left edge of the photographs, is not shown. These photographs show phase noise at frequencies 2 to 20 kHz offset from the carrier.

has worn off, you can take time to go over the Detailed Operating Instructions section to find out the function and proper use of each front- and rear-panel control and jack.

Hookup

The Installation section of the manual gives a brief description of what you need to hook up the Paragon. It's pretty straightforward. For starters, you need a 13.8-V power supply capable of delivering about 20 A. Wiring information is given in case you don't use Ten-Tec's matching Model 960 power supply. The Installation section recommends a low-impedance dynamic or electret microphone (high-impedance mics—above 25 kΩ—won't work), although text accompanying the mic connector wiring diagram later in the manual says that the microphone circuit has been designed for high- or low-impedance mics with at least 5-mV output.

Before using the Paragon, you are encouraged to hook up a 9-V battery to back up the microprocessor and RAM when power is removed. The battery backup allows the Paragon to retain memory and frequency information, as well as clock/calendar time and date. Battery installation requires removing the top cover and plugging in a connector. Batteries not included...

According to the manual, the battery backup is not needed if you leave the Paragon connected to a 13.8-V dc source (even with the power switch turned off). This means leaving your power supply turned on all the time. The original manual indicates that an alkaline battery will provide about 150 hours (6.25 days) of backup if power is removed. (This 150-hour rating is very conservative. I unplug my radio equipment when I'm away from the shack, and my first 9-V alkaline cell lasted months.) The new manual includes information on a modification for using a 9-V NiCd battery for backup. According to the manual, you can keep the NiCd battery adequately charged if you use the Paragon at least 3-4 hours per week. This modification, which is factory installed in Paragons with serial numbers higher than 395, requires a soldering iron, a 2.2-kΩ, ¼-W resistor, and about 15 minutes of your time. It's well worth doing.

Operating Impressions

I enjoyed using the Paragon over a period of several months. In addition to casual CW and SSB operating and DXing, I used it in several SSB and CW contests—including the phone ARRL November Sweepstakes. I like the panel layout and the way most of the features work.

I initially had trouble getting on the "right frequency" during CW operation. The instructions on using the SPOT switch are confusing, and the peak S-meter reading does not correspond to zero beat. In fact, the manual suggests using the wide filter in conjunction with the SPOT switch; this is not acceptable on a crowded band. After some experimenting and after "working myself" on a second transceiver in the shack, I discovered how to get on frequency. Don't ask me to try to put it into words!

The receiver held up well except during peak phone-contest periods when there were many strong signals on the band. During those periods, I had difficulty finding open spaces on the band and had difficulty copying weaker signals. The problem seems to be receiver phase noise, rather than front-end overload. Use of the attenuator made a noticeable improvement in signal copy. The general-coverage receiver works fine. AM selectivity is good, thanks to the 6-kHz crystal filters.

All in all, Ten-Tec has a fine radio in the Paragon. It does some of the basics—like AGC and CW keying—very well. Most of the things I didn't like are subjective. The Paragon is certainly worth your consideration if you're in the market for a high-performance transceiver. It's also worth considering Ten-Tec's well-deserved reputation for excellent customer service.

Manufacturer: Ten-Tec, Highway 411 East, Sevierville, TN 37862, tel 615-453-7172. Price class: Paragon, $2245; Model 960 power supply, $230; Model 285 500-Hz CW filter, $70. QST

RX Noise Bridges

(continued from page 35)

(Z_o = 50 ohms), the velocity factor (given above), and the loss parameters, where

R = resistance/unit length
= 3×10^{-4} ohms/cm; and
G = conductance/unit length
= 8×10^{-8} S/cm.

These values are for a frequency of f = 3650 kHz. They were provided by Belden. Hence, using the program we can calculate Z'_{in} for a load impedance Z'_L:

$$Z'_L = 47.13 \angle -17.28 - 180° \quad \text{(Eq 5)}$$

$$Z'_L = 67.2 \angle 174.13° \quad \text{(Eq 6)}$$

and so

$$Z_a = 67.2 \angle 174.13 - 180° \quad \text{(Eq 7)}$$

$$= 67.2 \angle -5.9° = 66.8 - j7 \text{ ohms} \quad \text{(Eq 8)}$$

This impedance is close to that expected for a half-delta loop.

Notes

[1]C. J. Appel, "How to Measure Antenna Impedance," *QEX*, Jan 1987, p 3.
[2]J. Hall, ed., *The ARRL Antenna Book* (Newington: ARRL, 1983), 14th edition, p 15-10.
[3]M. Wilson, ed., *The 1988 ARRL Handbook*, (Newington: ARRL, 1987), p 16-2.

John S. (Jack) Belrose received his BASc and MASc (EE) degrees from the University of British Columbia in 1950 and 1951, respectively, and his PhD in Radio Physics from Cambridge University while in England on an Athlone Fellowship. From 1951 to 1953, he was employed by Canada's Defense Research Board, and worked in LF communications at the Radio Propagation Laboratory in Ottawa. Since 1957, Jack has been with the Communications Research Centre, Dept of Communications, in Ottawa, where he is currently Director of the Radio Propagation Laboratory. Dr Belrose is Canadian Panel Coordinator for the AGARD Electromagnetic Propagation Panel and is Chairman of an Interim Working Party of the CCIR (Study Group 6). He is an ARRL Technical Advisor and has been a licensed amateur since 1948. His former call signs were VE7QH, VE3BLW and VE2SA. He has been licensed as VE2CV since Nov 1961.

Jack and his wife, Denise, have three children. Jack's hobbies are Amateur Radio (particularly antennas and radio communications technology), photography, canoeing, swimming, touring/camping by tent trailer and exercising his dog, Rufus. QST

Hints and Kinks

Conducted By David Newkirk, AK7M
Assistant Technical Editor

MODIFIED 300-OHM HIGH-PASS FILTER REDUCES TV FUNDAMENTAL OVERLOAD

☐ If you have TVI, your first inclination may be to install expensive low-pass filters in your transmission lines and power cords. In some cases, however, the interference may be caused by fundamental overload—not by harmonics—against which low-pass filtering offers no protection. Thus, it's a good idea to eliminate the possibility of fundamental overload first, if possible.

Inexpensive *high*-pass filters are available from many electronic supply houses and department stores, but the fundamental-overload reduction afforded by such filters is sometimes disappointing. A simple filter modification may make a substantial improvement in such cases. Fig 1 shows the schematic of a typical 300-Ω high-pass filter. The inductors serve to block VHF television signals and pass lower frequencies to ground; the capacitors pass VHF and tend to block lower frequencies. When the filter is installed *without* a ground connection, however, the inductors form a low-frequency path around the capacitors!

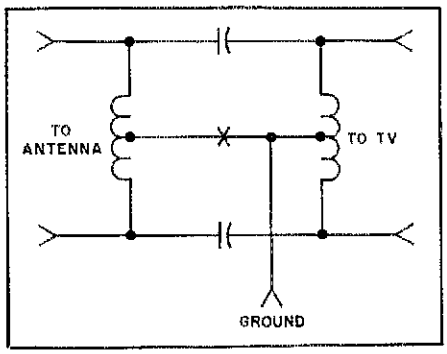


Fig 1—A typical 300-Ω high-pass TV filter isn't much of a filter unless its GROUND terminal is connected to that elusive commodity known as "a good RF ground." Where unavailability of an RF ground renders such a filter ineffective against fundamental overload, KO3D suggests cutting the common connection between the filter's input and output inductors at X. The text tells why this may help.

Obviously, this problem is best solved by connecting the filter GROUND terminal to a good RF ground. But "a good RF ground" is not always available. As an alternative, break the connection between the input and output inductors (at X in Fig 1). This destroys the filter action, but leaves the relatively high reactance (at ham frequencies below 30 MHz) of the capacitors in series with the TV transmission line.

Open the filter case (usually plastic) and break the connection between the input and output inductors. Be sure there is no dc path between the coils. Complete the modification by closing the filter case. (If the case breaks, a little tape and glue can repair it.)

Try the filter and note the results. If the interference lessens, fundamental overload is at least part of the cause. If the improvement is substantial but not complete, try cascading two modified filters.—*James Pentland, KO3D, York, Pennsylvania*

Editor's Note: *Many* variables are involved in TVI cases, including the band(s), powers, TV channels, antenna gains, equipment types and grounding techniques employed. If you clear up a case of TVI with a filter modified as KO3D suggests, fundamental overload was almost certainly the sole interference culprit. *Lack* of success with such a filter, however, does not necessarily prove that fundamental overload is *not* the primary interfering agent. Also, in cases where fundamental overload and harmonic interference occur simultaneously, elimination of the fundamental at the TV antenna terminals is only half of the cure. To learn more about elimination of interference to and from TVs and other electric/electronic devices, see ARRL's *The ARRL Handbook* (Chapter 40) and *Radio Frequency Interference*, and Radio Publications' *Interference Handbook*. These books are available from your dealer or ARRL HQ.

PIN MARKINGS FOR COMPUTER CONNECTORS

☐ DB25 and similar computer-cable connectors have molded-in pin numbers, but the labels are difficult to read. You can increase the visibility of the numbers by rubbing a pencil or ballpoint pen over them. [A fine-tip, permanent marker works well, too.—Ed.] This hint was suggested to me by Tom Gilmer, my system manager and occasional "Elmer."—*John V. Hedtke, KD7WS, Seattle, Washington*

SPEED ANTENNA REPAIR WITH AN APEX TEMPLATE

☐ I have two inverted-V (drooping-dipole) antennas: one for 80 and one for 40 meters. They must be taken down periodically for maintenance. Before I took them down the first time, however, I decided to develop a means of ensuring that I could reinstall them at their original apex angles. Here's the technique I use. For clarity, I'll discuss the installation of *one* drooping-dipole antenna.

After the antenna is initially installed and pruned, and has proven to be satisfactory, stand about 50 feet away from the antenna and determine its apex angle by means of a clear-plastic protractor held at arm's length. Then, transfer that angle to a 5- × 8-inch file card. The apex of the trace should just touch the top border of the card. Cut off the card sections *above* the trace. On the remainder of the card, record details of the antenna's construction for future reference, such as installation date, height at apex, apex angle, length of each dipole leg, frequency of adjustment and so on.

If the antenna must be taken down later for maintenance, you can reinstall it, or build a new one, by referring to the information recorded on the card. Obtain the original apex angle by standing at the same spot as before and holding the cut card at arm's length. Even if you need to build the antenna again from scratch, the apex template can help you to duplicate the original antenna closely.—*Anthony De Vito, K2OV, Medford, NY*

MODIFIED WORK GLOVES

☐ Did you ever suffer from frosty fingers during tower climbing and antenna work in cold weather? Not only is cold metal uncomfortable, but numb fingers make it easy to drop small parts. Gloves just seem to get in the way.

Try cutting the fingertips from a pair of inexpensive work gloves. (Cheap cotton gloves are fine.) Cut off the glove fingers midway between the first and second joints. Gloves modified in this way will protect your hands for grasping and holding while keeping your fingertips free for delicate work.—*Ray Lustig, KD3A, Washington, DC*

Editor's Note: Rus Healy, NJ2L, of the ARRL HQ staff, adds that cycling gloves can also serve this purpose. These gloves have padded leather palms and no fingers, and usually cost from $10 to $20. They are available from most bicycle shops and mail-order suppliers of cycling equipment.

RESISTOR SUBSTITUTION FOR BEGINNERS

☐ While repairing an instrument that had a burned-out 10-kΩ, 1-W resistor, I found that I did not have a single replacement part of that resistance and wattage. I did, however, find two 5-kΩ, ½-W resistors in my parts box. Wired in series, their resistance would total 10 kΩ—but would they provide the necessary power dissipation?

Using the formula $P = I^2R$, we can solve for I to find that 10 mA (0.010 A) of current results in the dissipation of 1 W in the 10-kΩ resistor:

$$I = \sqrt{\frac{P}{R}} = \sqrt{\frac{1}{10{,}000}} = 0.01 \text{ A}$$

where

P = power in watts
I = current in amperes
R = resistance in ohms

Each of the 5-kΩ resistors must then dissipate

$$P = 0.01^2 \times 5000 = 0.5 \text{ W}$$

Yes, the two ½-W, 5-kΩ resistors are a suitable substitute for the 10-kΩ, 1-W resistor.

Because the power dissipated in each resistor depends on current *and* resistance, this "½ W + ½ W = 1 W" substitution is only valid for two resistors of *equal* resistance. If one were 7.5 kΩ and the other 2.5 kΩ, the larger resistance must dissipate

$$P = 0.01^2 \times 7500 = 0.75 \text{ W}$$

This much power would overheat a ½-W resistor quickly.

A parallel combination of two 20-kΩ, 0.5-W resistors would also work as a substitute for a 10-kΩ, 1-W resistor. I leave the proof of this one to you! (Hint: In this case, the current through each resistor is 5 mA, rather than 10 mA.)—*Joe Rice, W4RHZ, Covington, Kentucky*

Editor's Note: W4RHZ has taken proper care to refer only to resistor *substitution* in his hint and not resistor *specification*. In his substitution of two "seriesed" 5-kΩ, ½-W resistors for a 10-kΩ, 1-W unit, Joe makes the safe assumption that the equipment designer's specification of a 1-W resistor was sound. Joe's replacement of a 1-W resistor with two ½-W resistors of equal value should do the trick, assuming that the cause of failure of the 1-W resistor has been identified and cleared.

Ohm's Law and the power formula don't give us the last word in resistor specification because sound engineering practice dictates that power-dissipating components be *derated*—run at levels significantly below their maximum ratings—as a matter of routine. On paper, a 5-W resistor is capable of dissipating 5 W of power. In practice, however, the resistor will last longer if it is allowed to dissipate no more than, say, ½ to ⅔ of that power at room temperature. If the surrounding air will be warmer than room temperature, the resistor should be derated further.

When specifying resistor power ratings, it's a good idea to choose *the next higher value* when your calculations suggest that a resistor may have to dissipate anything near its maximum rating. For example, if your calculations indicate that a 2-W resistor will dissipate 1.75 W in your circuit, use a 5-W resistor instead. When replacing a resistor, you need only duplicate the power rating of the original part—unless your investigation reveals that the original part was routinely overloaded to begin with!

QUIETING EQUIPMENT FANS BY SERIES WIRING

☐ Muffin® and similar small 120-V ac fans are readily abundant at flea markets, surplus stores and so on. They are, however, quite noisy when run at their rated voltage. Although a series resistor may reduce the speed of a fan motor (and, hence, the noise it generates), wiring two fan motors in series yields considerable airflow, reduced power consumption and blissful quiet, with no power wasted in a resistor. The fans I've tried start without difficulty at 120 V ac when wired in series (60 V across each fan). Two fans, strapped together side by side with fiberglass tape, can serve as a handy fan for cooling final amplifier tubes, a heat sink or a person (I'm using such a fan to keep cool as I write this hint!). By connecting the fans in series with long leads and separating them physically, you can use a pair of fans in "push-pull"—one to blow cool air into a rig and the other to exhaust the hot air.

For safety, screen the fan blades with commercial fan guards or screening attached to the fan frames. Also, be sure that the fans' ac terminals cannot accidentally be touched under any conditions.

These fans are best connected to ac by means of slide-on power cords designed specifically for the purpose. If you decide not to use fan power cords, here's another word of caution: Be careful when soldering to the fan terminals. I had one terminal break loose from the motor lead and the surrounding plastic. I successfully excavated the lead, soldered on a piece of wire for use as a terminal, filled the cavity with epoxy glue, and voilà: the fan was as good as new! Use a heat sink or a low-power soldering iron to lessen your chances of damaging the fan terminals.

Considering the price (I've paid as little as $7.50 for two at a flea market) and the necessary work (only five minutes with a soldering iron), I find these fans to be the coolest deal in town!—*Mort Slavin, K3FGB, West Palm Beach, Florida*

A CHEAP, CRUSHPROOF CARRIER FOR DXPEDITION ANTENNAS

☐ A recent trip to the Caribbean forced me to come up with an inexpensive solution to transporting an antenna. A dipole and coax fit nicely into a suitcase, but taking a multiband trap vertical or small tribander requires a different arrangement.

Airlines seem to consider anything over six feet long as oversized baggage, and sometimes charge extra for special handling of such items. Ideally, then, a DXpedition antenna should be less than six feet long, broken down. If an antenna is shippable via United Parcel Service, its longest component *will* be less than six feet long, but its shipping carton *will not* be suitable for travel on airport baggage trucks. (Watching from my plane seat at a Caribbean airport, I saw a cardboard box on a baggage truck literally fall apart in the rain.)

The solution to this problem can be found at your local building-supply store. Buy a 10-foot piece of 4-inch-diameter solid (not slotted) PVC pipe and two end caps. Cut the pipe to the size you need (remember that 6-foot baggage limit!). Put the end caps on the pipe and drill two ¼-inch holes, 180° apart, through the caps and pipe at each end of the pipe. Pass no. 14 (or so) steel wire through one of these assemblies to secure the cap to the pipe. (See Fig 2.) (Once you've loaded your antenna into the pipe, of course, you'll need to wire the other end shut, too.)

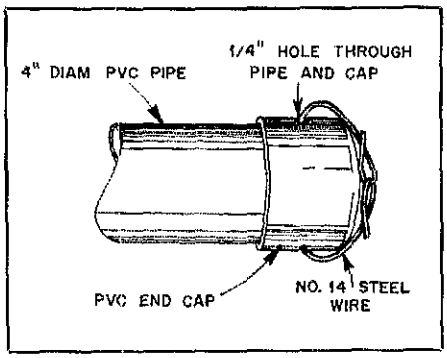


Fig 2—K1KI's crushproof carrier for DXpedition antennas consists of less than $6 worth of PVC pipe, end caps and wire. This drawing shows one end of the assembly.

You may need to experiment to get everything to fit into one of these containers. For example, a Hy-Gain 18AVT multiband vertical with an extra five-foot mast fits fine except for the base bracket (I carried the bracket in my suitcase). Next time, I'll try a small tribander! Hint: Don't forget to take a photocopy of the antenna manual and the tools you'll need to assemble and disassemble the antenna.

The PVC pipe I purchased carries the message "2000 LBS MIN CRUSH," so even the airlines aren't likely to damage it! The total cost for all materials: under $6.—*Tom Frenaye, K1KI, Unionville, Connecticut*

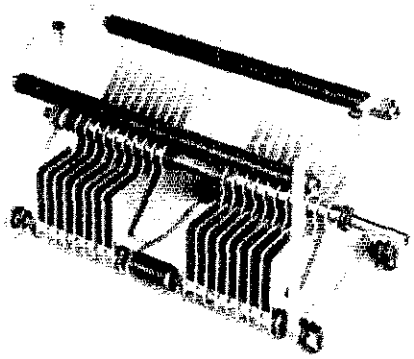
KNIFE-SWITCH RESISTANCE FIX

☐ If you're using a knife switch in your station—I use one at RF—check the resistance between the blade and its pivot. Erratic switch performance puzzled me until I checked the resistance of my switch: *4 ohms!* A flexible jumper (braid is suitable) from blade to pivot solved this problem. —*Jack Nelson, W2FW, Schenectady, NY*

New Products

NEVADA HIGH-VOLTAGE VARIABLE CAPACITORS FROM KILO-TEC

☐ High-quality components are a must for antenna tuners, amplifiers and transmitters. Kilo-Tec has available Nevada variable capacitors that meet this description. The capacitors are constructed of brass, high-grade gold-anodized aluminum



and acrylic. Rated RF voltage is 7.8 kV. Two capacitors are available: the TC-250 (250 pF), and the TC-500 (500 pF). Price class: TC-250, $29; TC-500, $40. Available from Kilo-Tec, PO Box 1001, Oak View, CA 93022, tel 805-646-9645.—*Rus Healy, NJ2L*

Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Senior Assistant Technical Editor

METER-PROTECTION CIRCUIT

☐ The meter-protection circuit that appeared in the Nov 1987 *QST* Hints and Kinks column, p 41 ("Plate-Current Meter Overload Protection") is a step in the right direction. One concern remains, however. With a direct short between the +3-kV supply and ground, the full potential will momentarily appear across the series/parallel combination of the potentiometers, diode and meter—most of it across the 10-kΩ potentiometer, R1 of Fig 2 in the original article, shown here as Fig 1. Although R1 may momentarily dissipate the power from the +3-kV application, it's doubtful it would withstand the voltage without breaking down and possibly destroying the meter.

A better implementation of the circuit would use a combination of four or five series-connected, 1-W, fixed-value resistors in series with a potentiometer. The potentiometer should have a value that would provide the required total series resistance. This arrangement would limit the voltage across each component to no more than 500 V or so, within the recommended limits of readily available composition or film resistors.—*Ralph Fowler, N6YC, Rte 1, Box 253R, Pearl River, LA 70452*

Mark Mandelkern responds: The resistor string seems like a good idea. However, composition resistors would likely result in calibration drift, so I would use only wirewound types.—*Mark Mandelkern, KN5S, 5259 Singer Rd, Las Cruces, NM 88005*

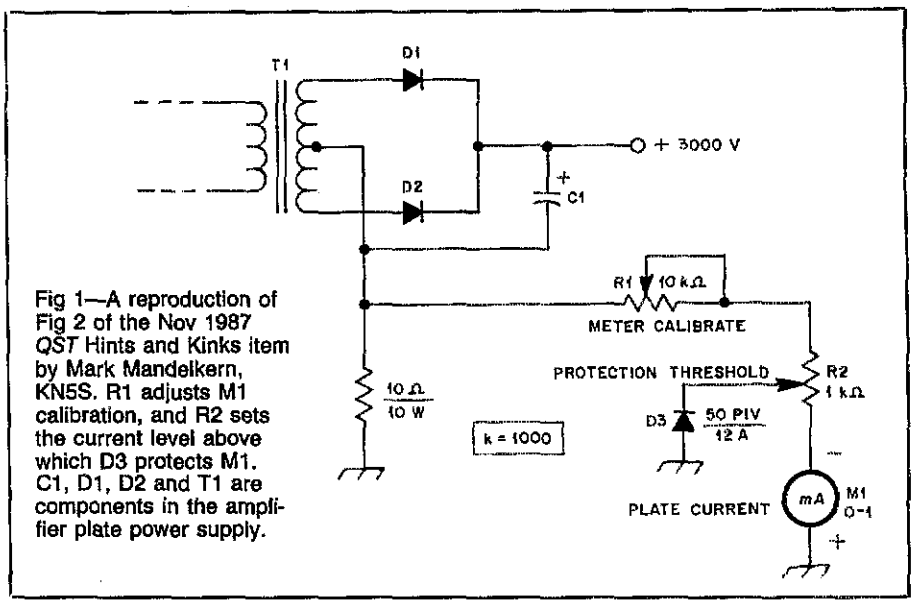


Fig 1—A reproduction of Fig 2 of the Nov 1987 *QST* Hints and Kinks item by Mark Mandelkern, KN5S. R1 adjusts M1 calibration, and R2 sets the current level above which D3 protects M1. C1, D1, D2 and T1 are components in the amplifier plate power supply.

PC BOARDS REVISITED

☐ In Doug DeMaw's excellent article dealing with the making of PC boards,[1] he mentions use of the Meadowlake TEC 200 process. I would like to focus attention on an alternative method for transferring the pattern to the copper-clad board.

Instead of using a hot iron, use a rubber roller (obtainable from photographic or arts and crafts suppliers) to transfer the film to the board while heating the board, which is placed on a hot plate. The results I've obtained are outstanding! Even patterns consisting of very narrow lines are beautifully transferred. Here's how to do it (see Fig 2):

• Place the film with the photocopied pattern onto a piece of copper-clad board and fix the film in place at one end with a piece of adhesive tape.

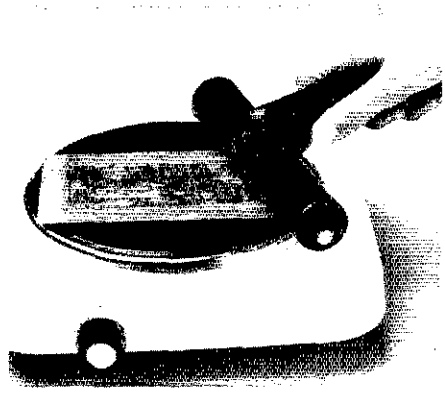


Fig 2—An alternative method of using the Meadowlake TEC 200 process for producing PC boards employs the use of a hot plate and rubber roller.

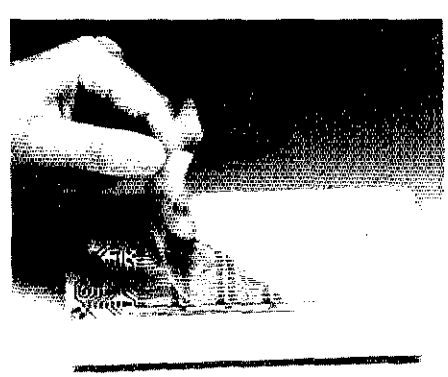


Fig 3—Once the board has cooled, slowly and carefully remove the film from the board.

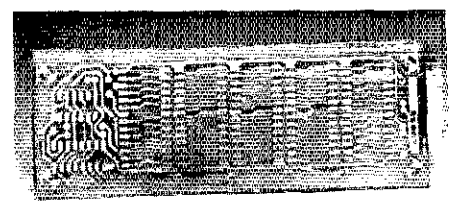


Fig 4—This photo shows what you can expect from using this process for making PC boards. Even the fine traces between the pads have been faithfully reproduced.

• Place the PC board on a heating plate and heat the board to a temperature of 260-280 °F (130-140 °C).

• Transfer the circuit pattern to the PC board with the aid of the rubber roller, using a slight amount of pressure.

• When the board has cooled, remove the film slowly and carefully (see Fig 3). The board is then ready for etching.

The quality of the finished board obtained using this method (see Fig 4) speaks for itself.—*Dr Roland Milker, DL2OM, Finkenweg 14, 5457 Oberhonnefeld, West Germany*

CORDLESS PHONE DXING

☐ Wireless telephones operating just below 160 meters have been a minor irritant to the ham for some time, even though modern wireless units no longer operate in that region. A phone operating on 1750 kHz next door to an ungrounded radio amateur's multiband vertical was heard on

[1] D. DeMaw, "Homemade Circuit Boards—Don't Fear Them!", *QST*, Aug 1987, pp 14-23.

the low end of 80, 40 and 20 meters at distances of up to 10 miles! Listeners were not convinced that a wireless phone was involved as the signal did not drift during four days of continuous operation. Of course, hanging up the phone solved the problem. But this occurrence also points out the necessity for grounding antennas not in immediate use.—*Cliff Buttschardt, W6HDO, 950 Pacific St, Morro Bay, CA 93442*

SCHOTTKY DIODE UPDATE

☐ In a recent Hints and Kinks column, there was an item continuing the discussion of the use of Schottky diodes in ring detectors.[2] Since my Schottky diode item appeared in the Hints and Kinks column,[3] I've had a chance to quantify the results of my original experiments. To measure the distortion produced by germanium point-contact diodes (1N60s) and Schottky diodes in the ring (product) detectors of a Kenwood TS-830S and a TS-711A, I used a Singer FM-10 service monitor (the output of which has a distortion of 0.8%) and a Heath model IM-58 harmonic distortion analyzer. At 1 kHz, both radios produced a distortion level of about 1.2%, whether or not they had Schottky diodes in them. At 400 Hz, however, the distortion percentage changed. With 1N60 diodes, the distortion went up to more than 30% on both radios. When the germanium diodes were replaced with Schottky diodes, the distortion decreased to 2.4%—more than a tenfold improvement!

As predicted by the data, distortion increases dramatically below 1 kilohertz. Because the distortion is caused by an inherent characteristic of the diodes, distortion on any signal passed through them at frequencies below 1 kilohertz should show a dramatic increase when germanium diodes are used, and only a slight increase with Schottky diodes.

I've a couple of comments in answer to questions I've been asked about the use of Schottky diodes. First, just using a Schottky diode in lieu of a germanium diode is more important than determining which Schottky diode to use. The typical Radio Shack® microwave types will do nicely. [Radio Shack used to stock such diodes (HP 5082-2835), but the 1987 and 1988 catalogs list only a 40-V, 1-A Schottky diode (RS 276-1165).—Ed.] Second, although it does not have a dramatic performance effect, balancing a detector is important. You can balance a detector by connecting an oscilloscope to the last IF transformer and adjusting the detector trimmers for minimum deflection, with no signal applied to the receiver. (You'll probably have to use a 10-mV/division sensitivity setting.)—*The Rev Douglas B. Millar, K6JEY, 1500 Hickory Ave, Apt 201, Torrance, CA 90503*

USING A COAX TRANSMATCH WITH OPEN-WIRE LINE

☐ Many radio amateurs would like to have a feed-line system that offers the convenience of coaxial cable and the low loss of open-wire line. That goal is achievable, but there are some things you must consider.

The idea I offer is to terminate the coaxial line with a choke balun. This balun can take the form of coaxial cable wrapped through a large toroid, threaded through ferrite beads, or simply a coil of coaxial cable. By using such a balun, a large impedance is created that prevents RF currents from flowing along the outside of the coaxial-cable shield. With the balun, coaxial cable can be run from an unbalanced (coaxial) antenna tuner to wherever it's convenient to begin the run of open-wire line.

Will this approach cure TVI and/or RFI? In some cases, this method will make things worse by increasing the intensity of the field radiated by the antenna. Some radio amateurs mistakenly believe that better grounding and shielding throughout the station will help, even when the interference is caused by the proximity of the antenna to the device being interfered with. This system should, however, reduce the amount of RF in the shack, compared to poorly installed open-wire systems.

If you intend to try this feed-line system, there are several things to keep in mind. Most importantly, the coaxial connectors must be able to withstand high voltage levels if the impedance at the Transmatch is high. Amphenol rates the UHF family of connectors at 500 V peak. High-quality connectors with Teflon™ dielectric are recommended. The coaxial cable should be a low-loss type and capable of handling the desired amount of power with the mismatch taken into account. It is conceivable that someone running 1500 W output could damage RG-213 if a high SWR exists on the line. Losses in mismatched coaxial cable can be quite high (see Fig 23 on p 16-13 of the 1986 through 1988 *Handbook*), so keep the coaxial cable run as short as possible.

QRP operators are unlikely to overstress standard feed-line components. Still, it's a good idea to keep the losses low. (So I can hear you from my noisy Newington apartment!)—*Zachary Lau, KH6CP, ARRL Lab Engineer*

RESURRECTING NiCd CELLS

☐ Battery-operated hand-held radios have proliferated amazingly in recent years; so has the use of rechargeable batteries. Over the past year, I've received phone calls and letters from hams who have heard that I know of a way to "fix" NiCd batteries that are in trouble. I direct their attention to the February 1980 issue of *QST*. My article in that issue describes an effective treatment for certain NiCd battery problems.[4] —*George P. Schleicher, W9NLT, 1535 Dartmouth Ln, Deerfield, IL 60015*

[4]G. Schleicher, "Zapping Life Back into a Nickel-Cadmium Cell," *QST*, Feb 1980, p 35.

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

Strays

DID YOU EVER WONDER...

How the D, E and F layers in the ionosphere got their names? They were named by the man who discovered them, Sir Edward Appleton, in a striking example of scientific foresight. Responding to a question from J. H. Dellinger about the names in 1943, Appleton wrote: "In the early work with our broadcasting wavelengths, I obtained reflections from the Kennelly-Heaviside layer, and on my diagrams I used the letter E for the electric vector of the down-coming wave. When therefore in the winter of 1925 I found that I could get reflections from a higher and completely different layer, I used the term F for the electric vector of the waves reflected from it. Then about the same time I got reflections from a very low height and so naturally used the letter D for the electric vector of the return waves. Then I suddenly realized that I must name these discrete strata and being rather fearful of assuming any finality about my measurements I felt I ought not to call them layers A, B and C since there might be undiscovered layers both below and above them. I therefore felt that the original designation for the electric vector D, E and F might be used for the layers themselves since there was considerable latitude for the naming of any layers that might come to light as a result of further work. I am afraid that that is all there is in the story."†

†Nos. 3/4, Vol 13, (1959) *Journal of Atmospheric and Terrestrial Physics*, p 382

TALK ABOUT 100% LICENSING!

☐ Amateur Radio has definitely made inroads in the home of Stephen Sala, K7AWB, of Spokane, Washington. Not only is his wife Peggy a ham (WB7NTK), but so are all of his children, who range in age from 11 to 20! Carina, KA7DFK; Steve, KA7DFJ; Scott, KA7FYP; and Mike, KB7DKF. Can anyone top the Sala family's record?

[2]D. Mack, "Schottky Diodes Do Improve Product-Detector Performance—But What About AM Detection?", Hints and Kinks, *QST*, Oct 1987, p 37.

[3]D. Millar, "Diode-Ring Product Detectors," Hints and Kinks, *QST*, Nov 1984, pp 55-56.

Feedback

☐ Please refer to "Phase Noise and its Effects on Amateur Communications," *QST*, Apr 1988, pp 22-25. In the sidebar entitled "Transmitter Phase-Noise Measurement in the ARRL Lab" on pp 24-25, the captions on the four phase-noise photographs (Figs B through E) were inadvertently intermixed. The photos are shown here with the correct captions, using the same figure letters as in the article.

☐ See "A UHF Amplifier—from Scratch," *QST*, Aug 1987, pp 24-27. In Fig 1, the schematic diagram of the amplifier on p 24, an RF choke (RFC) should be shown connected between the base of Q2 and ground. The choke should take the same form as that from the base of Q1 to ground (see the caption). The missing RFC is visible in the lead photo, as well as in the parts-placement diagram (*tnx Ralph Hertzler, WA8WBP*)

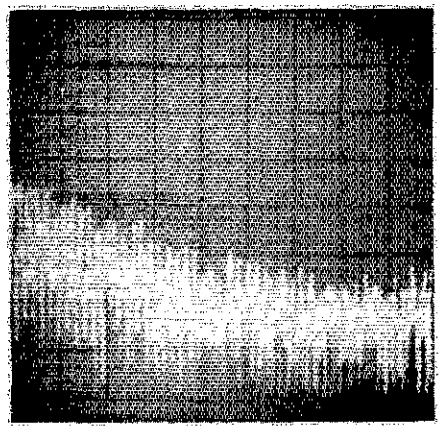


Fig B—Kenwood TS-940S (serial number 7050361) phase-noise characteristics. Measurement frequency: 3.5 MHz, power output: 127 W.

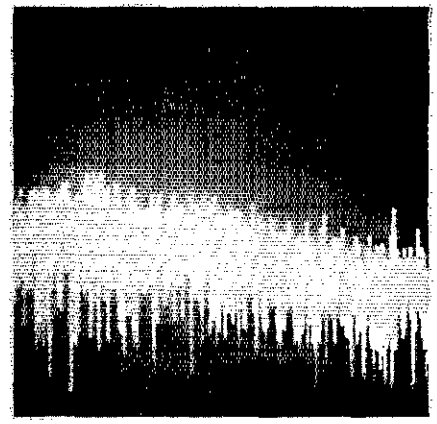


Fig D—Kenwood TS-440S (serial number 7051669) phase-noise characteristics. Measurement frequency: 3.5 MHz, power output: 104 W.

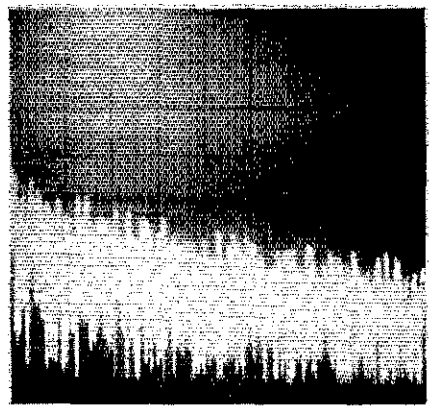


Fig C—ICOM IC-745 (serial number 03101) phase-noise characteristics. Measurement frequency: 3.5 MHz, power output: 100 W.

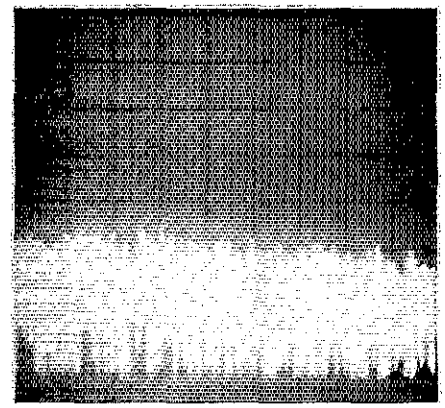


Fig E—Ten Tec Corsair II (serial number 58001721) phase-noise characteristics. Measurement frequency: 14 MHz, power output: 103 W.

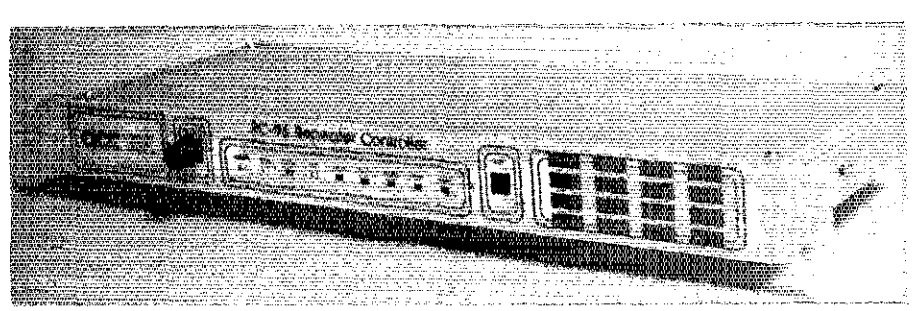
New Products

NOVICE CLASS VIDEO TRAINING COURSE

☐ Jerry Ziliak, KB6MT, of Amateur Radio School, has introduced a package of training materials that approach teaching Novice class theory through two 2-hour VHS-format video cassettes, one 90-minute audio cassette and a study guide. The first video cassette contains theory only, the second an hour of theory and an hour of Morse Code instruction. The audio cassette contains 45 minutes of code practice with verbal interjection of questions and answers, and 45 minutes of reinforcement code practice. The video tapes address many practical aspects of Amateur Radio necessary for Novices, such as installing antennas, using antenna tuners, measuring SWR, and using different kinds of transmission lines. Contents of the study manual include the Novice class question pool and a chart of frequency privileges by license class. Price, $39.95 plus $5 shipping and handling. Available from Amateur Radio School, 2350 Rosalia Dr, Fullerton, CA 92635, tel 714-990-8442.—*Rus Healy, NJ2L*

ACC RC-96 REPEATER CONTROLLER

☐ Advanced Computer Controls has added a new repeater controller to its well-known product line. The RC-96 features nonvolatile storage of control codes, ID messages and up to 200 auto-dial telephone numbers. The controller also has a talking S meter, allowing users to determine the strength of their signals at the repeater input. According to the manufacturer, the RC-96 is at minimum risk to lightning damage through the use of a gas-discharge tube across the telephone line and transient suppressors on each I/O line. For more information, contact ACC, Inc, 2356 Walsh Ave, Santa Clara, CA 95051, tel 408-727-3330.—*Rus Healy, NJ2L*



Bill: The Pirate Who Touched Our Hearts

"I *can't* be a ham," he sobbed. No ham radio! We could hardly comprehend such a fate.

By Rod Newkirk, W9BRD
7862-B W Lawrence Ave
Norridge, IL 60656

Postmeeting small talk down at the club turned to the old five-meter bootleg bunch and wireless impostors of other ilk. "That's one thing I like about CW," remarked one gossiper. "No 'Captain Midnights.' What intruder would make the code commitment?" Good question. Not many people learn radiotelegraphy without gaining respect for its proper application. Oh, a few clowns do go around signing bogus call signs, but they're rare exceptions to the rule.

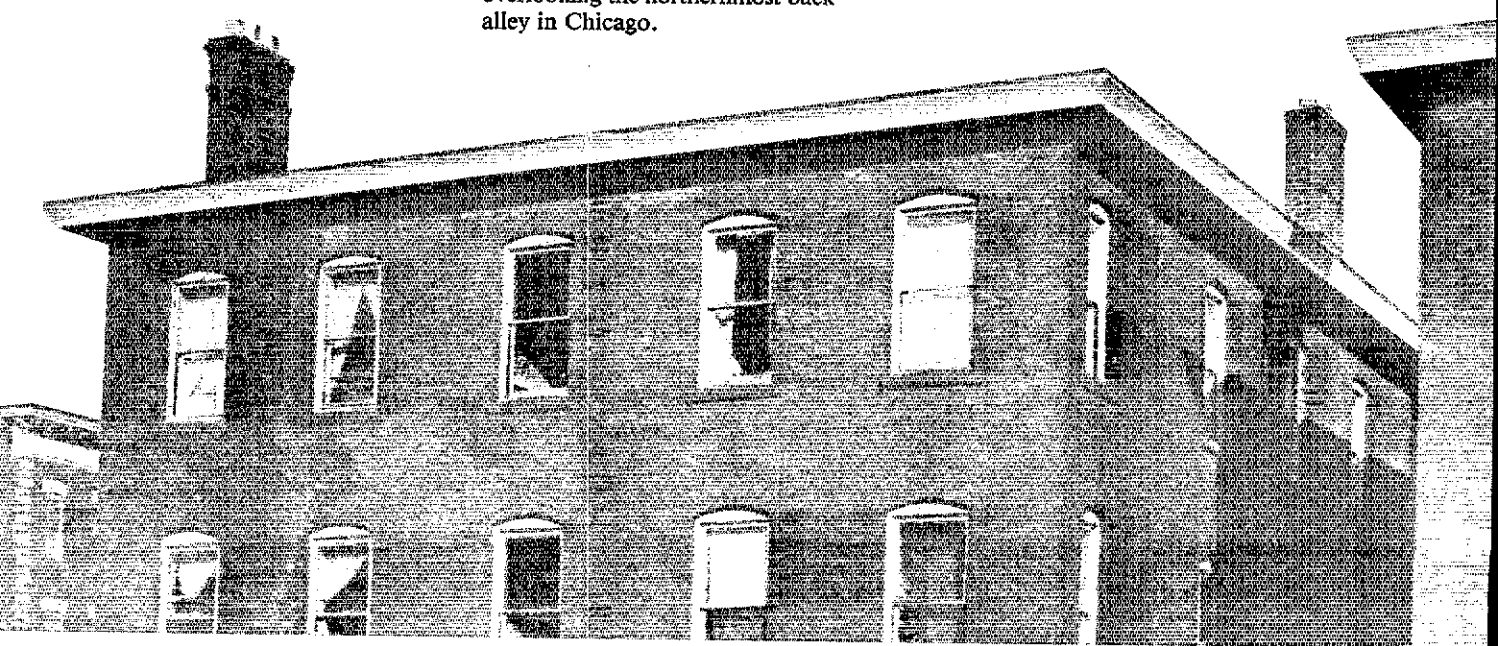
The discussions triggered memory of one sultry summer afternoon in 1941 when W9BRD answered someone on 7 Mc. calling CQ CQ DE W9BRD. Wispy signal, good bug fist. The bootlegger nibbled at ?? but clammed up tight at my W9BRD DE W9BRD K—not very bright on my part, but FCC ever frowns on fighting fire with fire. I vowed that if I ever heard him again I would risk garbling my call to see what ensued. In a few days, I got the chance. There he was, boldly signing the call of my future brother-in-law, Phil Simmons, W9VES. I became "W9DUL," raised him, called him a silly jerk, threatened him with dire consequences, and that was that. Phil and I mulled over the episode at length. Very puzzling. Of all the exotic identities he could have assumed, why just a lowly W9? The answer came later that summer.

Ham shacks prior to World War II were ruggedly individualized affairs: lots of home-brew breadboard rigs that varied widely between clumsy and clever, simple or elaborate, and were always of great pride to the owners. We bicycling hams of high-school age often visited each others' stations round-robin style for "show and tell." Sometimes, one of us would lag behind at somebody's rig to let the builder hear how it sounded at the next QTH. And we made occasional spur-of-the-moment detours to other hams along the route, descending on some unsuspecting amateur's household like a swarm of juvenile bees. Good exercise, fun and fresh air.

Well, one sweaty Saturday we finished our ritual at W9VES, five or six of us, all admiring Phil's high 80-meter Zepp, which stretched between apartment buildings overlooking the northernmost back alley in Chicago.

Mrs Simmons' lemonade went great in the 100° sunshine. We were about ready to split for home when a skinny blond kid, half dead from the heat, rode up on an old Columbia. "Hi, fellas!" he gasped. A quick glass of juice did wonders. We all waited for an introduction by someone. After an awkward pause, we realized that none of us knew him. He must have heard our 7100-kc. goings-on and wheeled over to meet the gang. And if he could copy our motley CW he was, of course, a fellow ham. Phil said, "Hi, pal. What's your call?" To our utter amazement, the unexpected visitor burst into tears. "I don't—I *can't* be a ham," he sobbed.

That's how we all met Bill, the melancholy pirate. And he was right. His parents, who were not US citizens, had brought him from Denmark as a toddler. No ham ticket was possible for an alien in those days, even if he mastered CW to 80 WPM and could completely paraphrase Terman. No way, kid. Eat your heart out. Each of us, hopelessly smitten by our hob-



by, was aghast at his predicament. No ham radio! We could hardly comprehend such a fate. Bill told how he had discovered the treasure of radio on his own, built simple receivers and other gadgets, and quickly conquered the code. He also sadly learned that he was ineligible for a license. Bill had collected no transmitter parts; he never really intended to get on the air. His first QSO was a total accident.

Like so many would-be hams of the era, Bill liked to tune in strong carriers on his oscillating-detector receiver and key the antenna lead for sending practice. This made for real-sounding signals in the phones, QSB, backwave and all. You can imagine his thunderstruck consternation one night when a 7-Mc. local responded to his bug-twiddling! That was how it began: a career in crime that made a good start toward Worked All States. His outfit was far ahead of its time, too—a QSK QRP transceiver.

Thereafter, he entered our logs more often than we'll ever know. But such clandestine activity was foreign to Bill's honest nature. The strain quickly wore him down. Eventually, he just *had* to meet some real radio amateurs, confess his sins and beg mercy. We were that catharsis. Sweeping away the inner mountain of guilt he had assumed, Bill could love radio again. And that he did: no more QSOs. Despite several hearty invitations to join our group, however, he remained a loner. Our doings were too tantalizingly close to paradise, perhaps.

As you should expect, this ham horror story has a happy ending. The abrupt onset of WW II forced every one of us into Bill's shoes: QRT. Years later, in a bright post-war Amateur Radio renaissance, those of us who made it back to the old neighborhood were delighted to find that Bill had reached his goal at last. He had even outgrown his youthful reticence and was tutoring a generation of spirited ham locals. Now, 40 years later, we see he's *still* in the *Callbook*. Way to go, OM! Wonder if he remembers the assurance Phil, W9VES, offered him in that steamy Chicago alley of long ago: "Hang in there, buddy. Plenty of time to enjoy the game."

Rod Newkirk, W9BRD, conducted QST*'s "How's DX?" from 1947 to 1978. "Bill: The Pirate Who Touched Our Hearts" first appeared in the September 1986 issue of* Enjoying Radio.

New Books

THE RADIO COLLECTOR'S DIRECTORY AND PRICE GUIDE

By Robert E. Grinder and George H. Fathauer. Ironwood Press, PO Box 8464, Scottsdale, AZ 85252, tel 602-483-9762. Softbound, 5-3/8 × 8-1/2 inches, 321 pages, $15.95.

It could happen to you this weekend: You emerge from the dusty depths of a garage, attic or basement clutching the old, long-forgotten family radio. You deposit it on the kitchen table with a thump. After a few swipes with your dust cloth, in the bright light of day the radio looks much more like a work of art than a piece of junk. But how old is it? When was it manufactured? Who made it? And how much is it worth? *The Radio Collector's Directory and Price Guide* can help you find the answers. (The directory covers broadcast receivers only, so you won't find your National HRO listed in its pages!)

Part I of the book, "Radio in America, 1921-1941"—about one-quarter of its 321 pages—covers the early history of radio broadcasting and manufacturing in the United States. The radio in your attic looks and works the way it does—or the way it did if it's no longer working—because of well-documented technical, regulatory and style considerations. *The Radio Collector's Directory and Price Guide* acquaints you with these forces.

The first mass-produced broadcast receivers were crystal sets, but these were used mainly at the beginning of the broadcasting boom. Authors Grinder and Fathauer also introduce you to TRF ("tuned radio frequency") receivers, regenerative sets and superheterodynes. You'll learn about cathedral and tombstone radios, airplane dials and tuning-eye tubes. Does the old radio sport AVC (automatic volume control)? If so, it probably wasn't produced any earlier than 1929, when the Philco 95's ability to receive weak and loud signals without readjustment of its volume control made it an instant success in the marketplace.

You'll also learn how you can tell a radio's vintage merely by determining the latest vacuum tube type on its chassis:

> Consider, for example, how tube type serves to date the RCA model 120 radio broadcast receiver. The set employs tube types 2A7, 2B7, 2A5, 58 and 80. The type 58 was introduced in 1932 and the type 80, a few years earlier. The types 2A5, 2A7 and 2B7 appeared in 1933. Our directory shows that the model 120 was, in fact, manufactured in 1933.

Part II of the book is what you probably thought of when you first saw the book title: "The Radio Directory and Price Guide." Here, radio receivers are listed by manufacturer and model number, including information such as year of manufacture, power source (battery, ac or dc), cabinet style, special features (shortwave, longwave, and so on) and, where possible, market value. The directory leads off with a discussion of each of these information categories and what goes into determination of market value.

Part III of *The Radio Collector's Directory and Price Guide*, "The Trade Directory," comprises a two-section listing meant to help you sort out manufacturers and trade names. This is more important than you might imagine. The Crosley Radio Corporation, for instance, used over 80 trade names for its receivers, running the gamut from "Ace" to "Wigit"! At least, that's the kind of information you find in the list of trade names keyed to manufacturer, Section 2 of the list. If you had already looked up "Ace" in Section 1, however, you would have learned that "Ace" was used as a trade name by the Ace Radio and Radio Circular companies as well!

For radio historians, media buffs, antique collectors and attic-cleaners alike, *The Radio Collector's Directory and Price Guide* is a wow. Who knows what values lurk in the heart of the basement? The Directory knows...—*David Newkirk, AK7M*

Strays

I would like to get in touch with...

☐ anyone with a schematic/service manual for a Tennelec Memory Scan Model MCP-1 scanner. Joseph Koval, W3IVG, 705 W 12th St, Hazleton, PA 18201.

☐ anyone with interest in a microwave attempt in Alaska. Mike Williams, KA1MNB, 3550 Sharron Gagnon Ln, Anchorage, AK 99508, 907-786-7600 (nights).

☐ anyone with info on where to get parts for a Raytrack Co Model DX-2000L linear amplifier. Sam Martinez, N3SM, PO Box 11043, Macon, GA 31212, 912-474-6117.

☐ anyone with schematic and specs on a Microwave Cavity Labs, Inc UHF power amp, Model No. 01-32224B02, FSN 5820-702-0318, S/N 2260. Ruddy Ellis, W4LNG, 2936 Arden Rd NW, Atlanta, GA 30305.

☐ anyone with a schematic and info on where components may be obtained for a World Systems Engineering Co, Ltd 2-meter DC Power Booster, model 3200, SN 01064571. Emerson Stewart, VE7FWB, 212-1355 Winter St, White Rock, BC V4B 3Y2, Canada.

Hams and Public Service: NWS Wants You!

Most NWS offices are aware of Amateur Radio's competence, are anxious to liaise with our networks, and require only a show of interest from the local Amateur Radio population—a golden opportunity for our public service capabilities to shine!

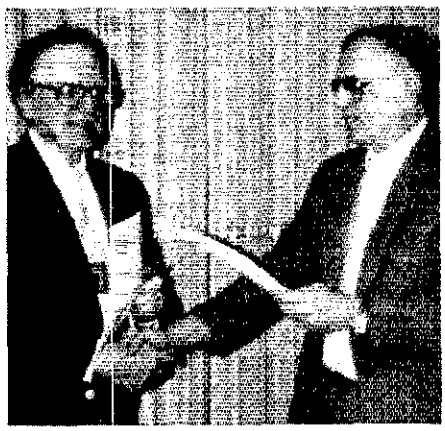
By Ron Ochu Jr, KØØZ
1914 N 5th St
St Charles, MO 63301

Spring is the time of the year when newly forming leaves begin to bud, hatchlings emerge for their first glimpses of the sun, and the wonderful smell of damp earth from occasional showers greets the nostrils. Spring is also the time for southwesterly winds, falling barometric pressure and watching the sky for threatening severe storms.

Monitoring the nation's skies for severe weather is a 24-hour job for the National Weather Service. In the past, the NWS maintained low media contact and relied on relatively slow phone networks to aid in severe weather spotting. In the past 10 years, however, big improvements in internal/external communications, combined with AFOS (Automation of Field Observation and Services), have upgraded the weather bureau's ability to forecast the approach of severe weather.

In spite of the National Weather Service's increased ability to forecast impending severe weather, the problem still exists of when to notify the public of a severe weather warning. According to NWS meteorologist Dennis McCarthy, "People don't pay attention to warnings because they may not have ever experienced the worst part of a storm." For the forecaster on duty, the dilemma exists of whether to limit the severe weather warning until absolutely certain of the storm's potential for damage or to go ahead and issue a warning, thereby giving the public ample time to be prepared. It is in this exact situation that Amateur Radio is most able to assist the local NWS meteorologist!

Amateur Radio operators in St Louis, Missouri are fortunate to have a local branch of the National Weather Service that trains local clubs in its Weather Spotter Network. Upon request, NWS meteorologists visit any Amateur Radio club within the watch area of the St. Louis office and provide one or more meteorological observation training sessions. In general, this course trains amateurs to assist the forecaster properly in recognizing and accurately reporting wind speed and direction, wall clouds and the amateur's relative position to both the storm itself and the weather service office. The course consists of slides, a film and a question-and-answer session; a quiz is often given at the conclusion of the session.



Dr Richard E. Hallgren, Assistant Administrator of the National Oceanic and Atmospheric Administration and National Weather Service Director (right), and Perry Williams, W1UED, ARRL Washington Area Coordinator, signed a Memorandum of Understanding on January 19. The Memorandum makes official the close cooperation that has long existed between the National Weather Service and the League.

The St Charles Amateur Radio Club (SCARC), serving the St Louis area in times of weather emergency, maintains a modest Amateur Radio station at the local NWS office. In turn, NWS provides SCARC with office space to keep their equipment. In addition, the St Peters Amateur Radio Club, in conjunction with SCARC, has installed a 2-meter packet station, which is invaluable to NWS for unattended reception of observations. Important liaison to the ARRL National Traffic System is provided with the help of an 80-meter dipole draped beneath the NWS radar tower.

Is your club interested in setting up a local Weather Service net? SCARC suggests that responsible club representatives contact the local NWS meteorologist to set up an appointment and explain what the club can do to assist. It is important that both groups recognize that even with the installation of Doppler radar systems, Amateur Radio equipment, networks and operators are still very much needed because, in essence, Doppler recognizes only high wind velocity; accurate human

Videotapes Available

Interested in severe-weather-related videos for your presentation to served agencies? ARRL HQ's audiovisual library continues to stock limited numbers of videos such as "Terrible Tuesday" (NOAA, 23 minutes, VHS), and "Hurricane" (NWS 28½ minutes, VHS). Contact the Club Services Department for the AV catalog and a CSD-20 AV request form. (Enclose an SASE).

ARRL, NWS Sign Memorandum Of Understanding

At a January 19 ceremony in Washington, ARRL Washington Area Coordinator Perry Williams, W1UED, and National Weather Service Assistant Administrator Dr Richard E. Hallgren affixed their signatures to a formal Memorandum of Understanding setting forth principles of cooperation between the two organizations. The MOU formalizes the cooperative efforts that have existed between amateurs and NWS personnel over the years:

I. PURPOSE. The purpose of this document is to state the terms of a mutual agreement (Memorandum of Understanding) between the National Weather Service (NWS) and the American Radio Relay League, Inc (ARRL), that will serve as a framework within which volunteers of the ARRL may coordinate their services, facilities and equipment with NWS in support of nationwide, state and local early weather warning and emergency communications functions. It is intended, through joint coordination and exercise of the resources of ARRL, NWS and federal, state and local governments, to enhance the nationwide posture of early weather warning and readiness for any conceivable weather emergency.

II. RECOGNITION. The National Weather Service recognizes that the ARRL is the principal organization representing the interests of more than 400,000 US radio amateurs and because of its Field Organization of trained and experienced communications experts, can be of valuable assistance in early severe weather warning and tornado spotting.

The American Radio Relay League recognizes the National Weather Service with its statutory responsibility for providing civil meteorological services for the people of the United States. These services consist of:

1. Issuing warnings and forecasts of weather and flood conditions affecting the nation's safety, welfare and economy; and,
2. Observing and reporting the weather of the US and its possessions.

To perform these functions and many related, specialized weather services, NWS operates a vast network of stations of many types within the US; it cooperates in the exchange of data in real time with other nations, including obtaining of weather reports from ships at sea.

III. ORGANIZATION OF THE AMERICAN RADIO RELAY LEAGUE. The American Radio Relay League is a noncommercial membership organization 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. A primary responsibility of the Amateur Radio Service, as established by the Federal Communications Commission, is the rendering of public service communications for the general public, particularly in times of emergency. Using Amateur Radio operators in the amateur frequency bands, the ARRL has been serving the public, both directly and through government and relief agencies, for more than 50 years. To that end, the League created the Amateur Radio Emergency Service (ARES) and the National Traffic System (NTS). The League's Field Organization consists of sixty-seven administrative sections managed by elected Section Managers. A Section is a League-created political boundary roughly equivalent to states. The Section Manager appoints expert assistants to administer the various emergency communications and public service programs in the section. Each section has a vast cadre of volunteer appointees to perform the work of Amateur Radio at the local level, under the supervision of the Section Manager and his/her assistants.

IV. ORGANIZATION OF THE NATIONAL WEATHER SERVICE. The National Weather Service consists of a National Headquarters in Washington, DC and six regional offices in the United States: Eastern, Southern, Central, Western, Alaska and Pacific. An NWS Public Information Office is located at Weather Service Headquarters. Fifty-two Weather Service Forecast Offices and 209 Weather Service Offices provide warnings and forecasts to the Nation.

SKYWARN is the spotter program sponsored by the NWS. Radio amateurs have assisted as communicators and spotters since its inception. In areas where tornadoes and other severe weather have been known to threaten, NWS recruits volunteers, trains them in proper weather spotting procedures and accepts the volunteers' reports during watches and episodes of severe weather. By utilizing the SKYWARN volunteers, the NWS has "eyes and ears" throughout the affected area in conjunction with NWS sophisticated weather monitoring equipment.

V. PRINCIPLES OF COOPERATION.

A. The American Radio Relay League agrees to encourage its volunteer Field Organization appointees, especially the Amateur Radio Emergency Service, to contact and cooperate with Regional Weather Service Headquarters for the purpose of establishing organized SKYWARN networks with radio amateurs serving as communicators and spotters.

B. ARRL further agrees to encourage its Section management teams to provide specialized communications and observation support on an as-needed basis for NWS offices in other weather emergencies such as hurricanes, snow and heavy rain storms, and other severe weather situations.

C. The National Weather Service agrees to work with ARRL Section Amateur Radio Emergency Service volunteers to establish SKYWARN networks, and/or other specialized weather emergency alert and relief systems. The principal point of contact between the ARRL Section and local NWS offices is the Meteorological Services Division of the appropriate NWS Regional Office.

weather spotting and relay of data are still required by the meteorologists.

Dennis McCarthy of NWS can't stress enough the importance of the contribution of Amateur Radio to the NWS. "I can list several cases where severe thunderstorm warnings were issued, but no tornado warnings. However, Amateur Radio operators were able to accurately spot and report tornadoes."

NWS and SCARC both hope that similar groups nationwide will make contact with each other in an effort to provide communities with valuable public service communications—via the Amateur Radio Service! QST

Strays

I would like to get in touch with...

☐ anyone with connections and operating info for an iRL 300 300-baud adaptor for iRL FSK-500 computer adapter. John Davison, WØZFN, 316 N Taylor Ave, Kirkwood, MO 63122.

☐ anyone with a schematic and/or operating manual for a Realistic DX150A. Kent Greaver, N6GLT, 2716 Derringer Pl, Escondido, CA 92027.

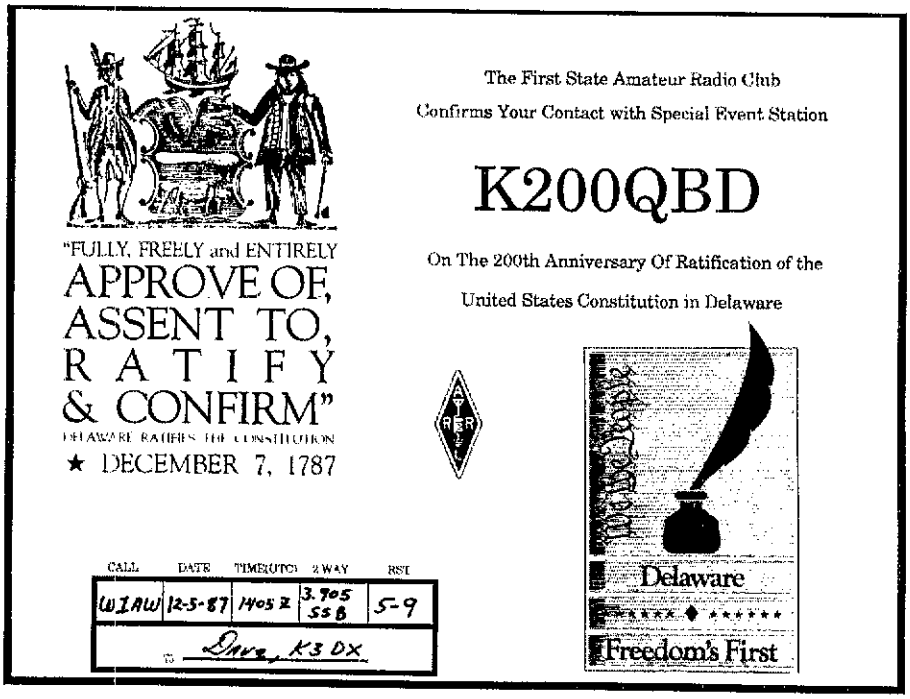
☐ anyone with manual, schematic and parts list for Motorola L51GA8-1 with TX type TA 194; can this be converted to VCO operation? Also documents and schematics on updating a Heath HW-29A 6-meter XCVR and a Drake TR-4 SSB XCVR. Eugene Hecker, WB5CCF, PO Box 940, Magdalena, NM 87825.

☐ anyone interested in a 10-meter net to discuss unidentified flying objects and related phenomena. Send suggestions for frequency, day and time for weekly net. Dave Dobbs, K8NQN, 6612 Pleasant St, Cincinnati, OH 45227.

Delaware: The First State Signs "200" ☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

Have you wondered what it's like to operate a Bicentennial special-event station? Here's a firsthand account from one of the first "200" stations!

By Robert J. Pegritz, KC3TI
ARRL Delaware Section Manager
PO Box 7921
Newark, DE 19714



Amateurs who contacted K2ØØQBD can receive this certificate, an attractive addition to any shack's "wallpaper." This one was received by ARRL HQ station W1AW.

It was a very close race involving three other states, but it's important to remember that Delaware was first." The words of Chief Justice Warren Burger, President of the Bicentennial Commission of the US Constitution, were very complimentary as well as timely. Instead of hearing these words on the nightly television news, Amateur Radio operators across Delaware and around the country were hearing them live on 3905 kHz.

The celebration of the 200th anniversary of the signing of the United States Constitution has raised a considerable awareness not only in the general public but also in thousands of ham shacks all over the world.

From the outset of the special ARRL "We The People" Worked All States program, certificate hunters, contesters and rag chewers alike have been eagerly pursuing this award, with new check-ins from most of the Eastern United States on the nightly Delaware Traffic Net. We have always enjoyed the reputation of being a rare state in various operating activities, so our net controllers allowed time each night for stations looking for an exchange of signal reports for the "We The People" WAS.

Preparations Begin

In November 1987, clubs in Delaware were beginning to discuss the application for the special "200" call signs. At first we took the whole matter lightly, until someone pointed out, "We get first shot at this event nationwide!"

Discussion of special call signs went from first gear to overdrive as each club started to arrange a suitable location that would be of historical significance and, of course, support a triband antennna. Also, as in most other states, our club representatives learned that matching funds from the state's Bicentennial Commission would be available for this type of event.

The First State Amateur Radio Club of Wilmington chose the Old Court House Museum in the historic town of New Castle as its operating location. When the Constitution was signed, this courthouse was the capitol of Delaware and remained so until 1797, when Dover became the capital. Neighboring clubs to the south also chose locations in government buildings and historic mansions. Delaware ARC, Dover ARC, Nanticoke ARC and Sussex ARC all received "200" calls, and plans for "Delaware Weekend" were in full swing, to provide not only a historical background but a means by which these clubs could offer to the public their own special brand of "downstate" hospitality.

Most plans were coordinated through Dean Nelson of the state capitol's Bureau of Museums and Historic Sites. The support provided by Mr Nelson and his staff made a lasting impression on all the organizations requiring operating sites. Other plans included invitations to high-ranking government and ARRL officials to visit these stations during the period of operation. An opportunity to operate or send a message was clearly mentioned.

The Big Day Arrives

Experience in past ARRL Field Days was evident when First State ARC "took to the air" on the morning of Saturday, December 5. A beam and dipole for HF and a suitable VHF-packet antenna were erected in less than 90 minutes. New state-of-the-art equipment was donated by a local Amateur Radio dealership and K2ØØQBD was in operation by 10 AM, less than two hours from initial startup.

W1AW First Contact

A schedule with W1AW, the Hiram Percy Maxim Memorial Station at League HQ, was made and planned as our first contact. We had decided that because of propagation and the fact that 3905 kHz was the Delaware Traffic Net frequency, it would be appropriate to use this as our primary contact point. A 40-meter backup was scheduled, but never used. At 10 AM on Saturday, December 5, K2ØØQBD worked W1AW as our first contact in this special event. Jeff Bauer, WA1MBK, was at the controls in Newington for this brief but important QSO. Signals never dropped below 15 dB over S9.

As an added surprise, John Lindholm, W1XX, Membership Services Manager at League HQ, was our second contact.

W2ØØAW Operation Draws Attention and Many QSOs

HQ staff members and other local and visiting amateurs were invited to participate in the W2ØØAW operation during Connecticut's "2ØØ" call-sign week. Regular code practice and bulletin schedules were preempted during these operating stints.

The big event began at 0001 UTC on January 9, when staffer N1CIX had a 20-meter SSB contact with K1ZZ. Seven days and 4767 QSOs later, it culminated with a contact between N9GWT and visiting op KA1ION on 75-meter SSB at 2359 UTC, January 15. In between, W2ØØAW worked huge pileups on SSB and CW, including many Europeans and other DX stations. We even made a few contacts on 2-meter FM! All 50 states were worked, as well as some 85 different DXCC countries.

One of the more notable contacts was with GB75RS, the Radio Society of Great Britain's own special call, celebrating the RSGB's 75th anniversary.

[Another part of the League's participation in the observance of the Bicentennial of the Constitution was the use of the Constitution as code practice. This began August 1 and ran through November. It took eight fast practices or 20 slow ones to run the complete text!]

The 1200 QSLs received to date from those who worked W2ØØAW have been answered, and the next few packages received from the QSL bureau will probably include a couple of thousand more. If you worked W2ØØAW and would like the special QSL card that is available, please send an SASE to W2ØØAW, c/o W1AW, 225 Main St, Newington, CT 06111 USA.

Thanks to the following amateurs who kept the W2ØØAW transmitters on the air and workable during the week: NO1C, N1CIX, WA4CMS, WB1CRH, KA1CU, WB1DWR, WB4FDT, WB9IHH, KA1ION, NM1K, KJ4KB, KY1T, K1XA, KA1YP, AA2Z, K5ED, N9AML and WD9JLE.—*Chuck Bender, W1WPR, Chief Operator W2ØØAW*

Contact number three was NN3SI, the historic Smithsonian Institution Amateur Radio station.

Priority Traffic

Through some plannning with the Governor's office, we were fortunate to have Governor Michael N. Castle as a guest of K2ØØQBD early Saturday afternoon. Since Delaware was hosting a gala celebration later that day in Dover, Governor Castle had to limit his visit and move on to his next appointment. Before he left, however, he arranged for a message to be given to Chief Justice Burger. At 3:10 PM Saturday, Chief Justice Burger, using a phone patch provided courtesy of US Senate Station W3USS in Washington, DC, received the Governor's message and commented on the Bicentennial celebration and Delaware's role in the signing of the Constitution.

During the three-day operation of K2ØØQBD, many people filed past and listened to the more than 650 contacts that were made. Hugh Turnbull, W3ABC, ARRL Atlantic Division Director, paid the station a visit and lent his expertise on several CW contacts. Director Turnbull was delighted to see the activity and public reaction from this event.

An Asset to Amateur Radio and the Community

Special-event stations such as K2ØØQBD have been calling important milestones in American history to the attention of millions for decades. These stations are a perfect opportunity to show the general public yet another facet of Amateur Radio and to generate interest in all levels of government. Combining government involvement with the interest and cooperation of League officials, special-event station K2ØØQBD has been helpful in generating renewed interest in all levels of Amateur Radio, including packet, one of our newest modes of communication. Careful planning, interaction with all areas of the ARRL Field Organization and letters directed to influential third parties resulted in an extremely successful event.

Those of us here in the "First State" look forward to contacting as many "200" stations as possible. We are interested in how each individual state plays its unique role in the molding of our nation's Constitution. It is because of this document that "We The People" in the United States can send this message of freedom and independence worldwide.

Celebrating the US Constitution at the *USS Constitution*

When the Wellesley Amateur Radio Society heard about the special "200" calls being issued, we wanted to be a part of this historic occasion. We thought the operation should reach many people, so we started brainstorming about how to achieve this. We were looking for something to catch the public's eye yet still be symbolic of the Bicentennial of the United States Constitution. We tossed around ideas such as operating from the Massachusetts State House or Boston City Hall, but none of us really had any political connections. Finally, Bill Hanlon, N1ADY, thought out loud, "Why not from the *USS Constitution*?"

Why not? We began the process of finding out who to approach about getting space on or near the *USS Constitution*. In the meantime, we got approval to operate the club station, W1 , as W2ØØTKZ from two specific locations: the club station site in Wellesley and "near the *USS Constitution*, Boston, Massachusetts."

The *USS Constitution* is the oldest commissioned ship in the US Navy. First launched in 1797, she served in the War of 1812, where she earned the nickname "Old Ironsides" by virtue of the cannonballs which bounced off her sides.

Approval arrived from the FCC (via ARRL) and that part of the operation was all set. Finally, just three weeks before the event was scheduled, we received permission to operate from the Visitors Center on Constitution Wharf.

We were located on the second floor of the building in an area that was formerly an officers' club for the Navy. Six massive bay windows looked out on the snowy pier where the *USS Constitution* was docked. Boston Harbor and the Boston skyline also graced the view.

On the historic site where the British last touched American soil, after the battle of Bunker Hill, the Wellesley ARS operated W2ØØTKZ to celebrate the 200th anniversary of the United States Constitution. It was no accident that exactly 200 years ago to the day, on February 6, 1788, the Commonwealth of Massachusetts ratified the US Constitution on the condition that a Bill of Rights be passed to guarantee additional freedoms. Massachusetts was the sixth state to ratify the Constitution.

Using a complement of dipoles and mobile antennas, W2ØØTKZ operated SSB, CW, RTTY, AMTOR and SSTV on 40, 20, 15 and 10 meters, taking time to chat with each station worked and explain where we were and why. W2ØØTKZ operated the rest of the week from the club station in Wellesley, primarily on 75-meter SSB.

W2ØØTKZ was a real coming together of the Amateur Radio community. We had as many members operate W2ØØTKZ as we had operate our W1TKZ 15A Field Day last year. Of course, all amateurs were invited to help out, and many nonmembers did. Our next task is to send QSLs to those who worked W2ØØTKZ.

The connections we made with the National Park Service in the planning of this event are likely to have other benefits. The Park Service wants to let people know what can be seen around the Charlestown Navy Yard, so look for future operations from Constitution Wharf in Boston.
—*Tom Kinahan, N1CPE*

Moved and Seconded ...

MINUTES OF EXECUTIVE COMMITTEE
Meeting No. 429
Arlington, Virginia
March 19, 1988

AGENDA

1. Approval of Minutes of December 4-5, 1987 Executive Committee meeting.
2. International affairs:
   2.1. IARU matters
   2.2. Progress report on planning for the Region 2 Conference, Orlando, Florida (1989).
   2.3. Planning for ARRL representation at the Region 3 Conference, Seoul, Korea (October 1988).
   2.4. Report on ARRL participation in U.S. CCIR preparations.
3. Review of the ARRL's response with respect to FCC General Docket 87-389, the proposed rewrite of Part 15 Rules governing incidental and restricted radiation devices.
4. Presentation by the ARRL's consultants on Congressional relations.
5. Matters Regarding the 220 MHz Band:
   5.1. Review of the ARRL's continuing response to FCC proposals in General Docket 87-14, Amendment of Part 2 of the Commission's Rules Regarding the Allocation of the 216-225 MHz band, including recent developments in the NTIA position.
   5.2. Consideration of ARRL responses to United Parcel Service and TV Answer, Inc. proposals involving 216-222 MHz.
6. Discussion of mutual concerns with Evelyn Garrison of ICOM America, Inc., representing the Amateur Radio Industry.
7. Miscellaneous FCC matters.
8. Local antenna/RFI matters.
9. Review of progress on Board directives:
   9.1 By the vice presidents and/or chairmen for the committees.
   9.2 By the Executive Vice President, on Board directives affecting Headquarters.
   9.3 By the Executive Vice President, on W1AW renovations.
10. Review of special recruiting projects by the Executive Vice President.
11. Recognition of new Life Members.
12. Affiliation of clubs.
13. Convention matters:
   13.1 Approval of division, state, section and operating-specialty conventions
   13.2 National Convention matters. Report on the 1988 National Convention, Portland.
14. Date and place of next meeting.
15. Other business.

Pursuant to due notice, the Executive Committee of the American Radio Relay League met at 8:15 AM, Eastern Standard Time, Saturday, March 19, 1988 at the Crystal Gateway Marriott Hotel, Arlington, Virginia. Present were President Larry E. Price, W4RA, in the Chair; First Vice President Jay A. Holladay, W6EJJ; Executive Vice President David Sumner, K1ZZ; and Directors Tom Frenaye, K1KI, Paul Grauer, WØFIR, Leonard M. Nathanson, W8RC, and Rodney J. Stafford, KB6ZV. Also present were Secretary Perry Williams, W1UED, Director Rush Drake, W7RM, and Counsel Christopher D. Imlay, N3AKD.

1. On motion of Mr. Grauer, the Minutes of the December 4-5, 1987, meeting were adopted as printed.

2. International affairs:

2.1. The President reported on the status of consultations by ARRL as the International Secretariat with the IARU Administrative Council, regarding the nomination of officers for the International Amateur Radio Union (IARU) for the upcoming term.

2.2. The President commented on progress in planning for the Region 2 IARU Conference, Orlando, Florida in October, 1989. The week of October 16-20 has been selected, with the exact location to be determined in the coming weeks.

2.3. The official notice and Call for Papers of the Region 3 IARU Conference, to be held in Seoul, Republic of Korea, October 10-14, 1988, have been received. The President observed that the ARRL would have some papers to present, on the frontiers of Amateur Radio technology.

2.4. The Executive Vice President reported on ARRL participation in U.S. preparations for the Interim Meeting of the International Radio Consultative Committee (known by its initials in French as CCIR). Paul Rinaldo, W4RI, Publications Group Manager at ARRL Headquarters, has been nominated as a participant in the United States delegation to the CCIR meeting, which begins April 20 in Geneva. The CCIR is one of four permanent organs of the International Telecommunication Union. Five papers have been submitted on behalf of the Amateur Service and the Amateur Satellite Service for inclusion in the United States' presentations to the Interim Meeting.

3. Counsel Imlay reviewed the comments filed by the ARRL in response to FCC General Docket 87-389, the proposed rewrite of Part 15, Rules governing incidental and restricted radiation devices. Without objection, it was agreed that in its reply comments the League would be consistent with its previously adopted positions, including that adopted in General Docket 85-301. During this discussion, at 8:45 AM, Atlantic Division Director Hugh Turnbull, W3ABC, who is also Chairman of the ARRL RFI Task Group, joined the meeting.

4. At the invitation of the President, two consultants to the ARRL joined the meeting at 9:10 AM and presented an extensive report on Congressional relations as regards the 220-MHz issue.

5. Matters Regarding the 220 MHz Band:

5.1 A review of the ARRL's continuing response to FCC proposals in General Docket 87-14 followed. The docket proposes amendment of Part 2 of the Commission's rules regarding the allocation of the 216-225 MHz band. At 10:29 AM, the consultants departed from the meeting.

5.2. Counsel Imlay summarized recent FCC filings by the United Parcel Service and TV Answer, Inc. involving 216-222 MHz. On motion of Mr. Grauer, the Committee unanimously voted to file Reply Comments vigorously opposing the proposals of both the UPS and TV Answer.

6. At this point, Evelyn Garrison of ICOM America, Inc., representing the Amateur Radio Industry, joined the meeting at 10:57 AM at the invitation of the President. There followed an extensive discussion of the philosophies to be followed in encouraging the further growth of the Amateur Service beyond Novice Enhancement. Discussions continued informally through luncheon, from 11:45 AM to 12:25 PM. Mrs. Garrison departed from the meeting at 12:57 PM, with the warm thanks of the Committee for her contributions.

7. The committee turned next to miscellaneous FCC matters.

7.1. Counsel Imlay reported that two requests for rulemaking, designated RM-6274 and RM-6275, had been filed, with public comments accepted until March 21. Both petitions seek expansion of the repeater segment of the 6 meter band to cover 51-54 MHz. The Counsel noted that, in anticipation of these petitions, the Executive Committee at its December 1987 meeting had asked the ARRL Membership Services Committee to study the matter. Accordingly, it was agreed no further formal action was required unless and until there was a Notice of Proposed Rulemaking by the Commission.

7.2. Consideration of volunteer examiner accreditation matters was next. On motion of Mr. Nathanson, the committee authorized Counsel to withdraw a petition for amendment of Sections 97.31 and 97.515 of the Amateur Rules filed by the League on September 9, 1987. It was agreed that inasmuch as there are alternative means of solving problems arising from disaccreditation of volunteer examiners accredited by more than one Volunteer Examiner Coordinator, more flexibility in arriving at satisfactory solutions would be afforded without a formal petition on file.

7.3. Regarding multiple repeater coordinators in the same area, Secretary Williams reported that in accordance with Minute 91 of the 1988 Annual Meeting of the Board, the Chief of the Private Radio Bureau has been asked by letter to use his good offices in resolving the situation.

8. In discussing local antenna and radio frequency interference (RFI) matters, Counsel Imlay presented copies of a new free pamphlet for the public, *Something About Interference*, produced by the Electronic Industries Association in cooperation with the Federal Communications Commission and the General Services Administration. The legal case of *Bodony v. Incorporated Village of Sands Point, N. Y.* has now been cited in Pike & Fischer; it is the first case wherein PRB-1 was cited in a decision by a Federal District Judge. The ARRL will file Friend of the Court briefs in cases involving Burlingame, California and Curry County, Oregon. Mr. Sumner reported briefly on discussions between the ARRL Hudson Division Director and the FCC District Engineer in Charge at New York City concerning RFI problems there.

9. Review of progress on Board directives:

9.1 By the Vice Presidents and/or chairmen for the committees

9.1.1 First Vice President Holladay reported for the Special Study Committee for Advisory Committees; some work on implementation of changes affecting Advisory Committees remains.

9.1.2 Mr. Nathanson reported briefly for the Legal Strategy Committee, regarding an exploratory meeting held the previous day with staff of the National Association of Broadcasters, and in reference to surveys of covenants restricting amateur antenna structures.

9.1.3 Mr. Stafford, as Chairman, mentioned that a meeting of the Membership Services Committee would be held on Saturday, March 26 in Torrance, California, at which a principal topic would be band planning. The committee would also discuss the proposals to expand the 6 meter repeater segment.

9.1.4. Mr. Frenaye, as Chairman, presented a written report for the Education Task Force. The chairmen of the working groups and selected members of the main task force have been invited to meet in Newington on March 26 to sort out the material developed to date and to put together a schedule to complete the work assigned by the Board.

9.2 The Executive Vice President presented a summary of action on Board directives affecting Headquarters and answered questions about certain programs.

9.3 Next, the Executive Vice President presented a written report on the program for W1AW renovations, including plans for fundraising, RF equipment, and building alterations and repairs. Samples of solicitation material to be used in fundraising were also presented.

10. Mr. Sumner reported briefly on the ARRL New-Ham Pilot Recruitment Project in the Tampa Bay area of Florida; the project seeks to foster the attaining of Amateur Radio licenses by people over fifty years of age. Guided by a team of four at Headquarters, the program relies heavily on amateur volunteers in the target area.

11. On motion of Mr. Grauer, the names of the 32 newly elected Life Members were recognized, and the Executive Vice President was directed to list their names in *QST* (Applause).

12. On motion of Mr. Nathanson, the following clubs were declared affiliated, in Category I unless otherwise noted:

Amateur Cross Link Repeater, Chicago, IL
American Legion Amateur Radio Post 380, San Jose, CA
Butte Amateur Radio Club, Chico, CA

Clairemont Repeater Association, Westminster, CA
Clear Lake Amateur Radio Club, Houston, TX
College City Radio Club, Northfield, MN
Dust Bowl Amateur Radio Club, Guymon, OK
False River Repeater Assn., Inc., New Roads, LA
Fisherville Amateur Radio Club, Eads, TN
Hardin County Amateur Radio Club, Lumberton, TX
Healing Springs Mountain VHF Society, Inc, Lexington, NC
Hub City Amateur Radio Club, Aberdeen, SD
Illinois Valley Amateur Radio Club, Inc., Browning, IL
Land of Grant Amateur Radio Club, Bethel, OH
Mohawk Amateur Radio Club, Orange, MA
Mountain Amateur Radio Assn., Inc., Franklin, WV
Novi Area Radio Club, Novi, MI
Ocean State Amateur Radio Group Inc., Cranston, RI
Old Friendly Amateur Radio Telegrapher's Society, Fountain Valley, CA
Olney Amateur Radio Club, Olney, TX
Sierra Intermountain Emergency Radio Assn., Minden, NV
Silicon Gulch Amateur Radio Club, Santa Clara, CA
South Florida FM Association, Inc., Miami, FL
Tri-City Amateur Radio Club, Copperas Cove, TX
Warren County RACES, Lebanon, OH
Washington County Amateur Radio Club, Chipley, FL

Category II

Caltrans RACES Club, Sacramento, CA

Category III

Capital City Amateur Radio Youth Service Assn., Inc., Washington, DC
Ft. Riley Jr. High Ham Club, Ft. Riley, KS
Gannon University Wireless Society, Erie, PA
George Washington University Amateur Radio Club, Washington, DC
Hampden-Sydney College Amateur Radio Club, Hampden-Sydney, VA
Sno-Isle Skills Center High School Radio Club, Everett, WA

With the election of these clubs, the League has 1702 clubs in Category I, 18 in Category II, 125 in Category III and 14 in Category IV. Without objection, the committee ratified a system by which the Secretary will call for a mail vote by the Executive Committee on prospective affiliated clubs each month that there is not an in-person meeting so as to reduce the waiting time for these groups.

13. Convention matters:

13.1 On motion of Mr. Nathanson, the following conventions were approved:

West Virginia State, July 2-3, 1988, Jacksons Mill, WV
DXPO, October 8-9, 1988, Falls Church, VA
Oklahoma State, October 28-30, 1988, Kingston, OK

In addition, the committee approved the holding of a Midwest Division Convention in Kansas City, MO on March 31-April 1-2, 1989 in place of the Missouri State Convention previously approved for April 7-9, 1989 in the same city.

13.2 Mr. Drake, as host director, reported at length on programs and plans for the 1988 National Convention, to be held in Portland, OR, September 9-11. On motion of Mr. Nathanson, the committee thanked Mr. Drake for the presentation, and approved the interim program as required by ARRL Convention rules (applause).

14. The next meeting of the Executive Committee was tentatively set for May 14, with the place to be determined.

15. Other business:

15.1. On motion of Mr. Grauer, the committee ratified changes to the ARRL Pension Plan, effective June 1, 1985 and January 1, 1987, adopted in accordance with changes in the Employee Retirement Income Security Act (ERISA).

There being no further business, on motion of Mr. Grauer, the meeting was adjourned *sine die* at 4:30 PM.

Respectfully Submitted:
Perry Williams, W1UED
Secretary

Life Members Elected

Diana R Beckner, KB4NLF; Paul E Belton, WA9CDY; Gerald W Boyd, KG6LF; Wilfred W Brush, WA7EJY; John S Burger, KBØES; Hilton Carvalho Uchoa Cavalcanti, PY1BVG; C Clair Claiborne, KC3WJ; Roderick B Davis, WB4SXF; Jim Day, WA6BJE; Richard Eugene Dennis, KL7IOL; Jeanette Drennon, NØHZD; Clifford J Frescura, Jr, K3LL; Herb Gehring, N5FHR; Albert E Harrison, N4CHB; Joel M Harrison, WB5IGF; Jon K Jones, NOØY; Jim Junkert, KØJUH; Ron Lowrance, NE4S; Daniel J Marcella, KA2DVK; Louis Marotta, N1EHI; Michael L Martin, AA4SG; Donald L Mazak, NR2H; Chris Peterson, KB9YT; L Ann Peterson, WA8HJO; Leroy D Peterson, WA8FNY; Steven A Rainey, N6MVX; Jacob F Ringwald, KB1LO; Ruth Sager, KA1QWV; Peter Sears, WB2ULI; Emily L Smith, KB5EFJ; Ronald C Urban, KA2NVW; Frank C Westphal, KF6E.

Strays

RSGB DATA SYMPOSIUM TO BE HELD

The Radio Society of Great Britain is calling for papers and presentations for a data symposium which will be held on July 22 and 23. The symposium, which will cover packet radio, RTTY and AMTOR, will be held at the Harrow School near London.

The symposium is the third of five events scheduled for July 15-31. The RSGB National Convention will be held July 15-17 at the National Exhibition Centre in N Birmingham, followed by RSGB HQ at Potters Bar being open to visitors from 10 AM-4 PM July 19-21.

RSGB will host an International Satellite Meeting near Guildford, Surrey on July 28, and the AMSAT UK Satellite Colloquium will be held July 29-31 at the University of Surrey.

For further information on the Data Convention, contact T. L. Lundegard, G3GJW, Saxby, Botsom Ln, West Kingsdown, Sevenoaks, Kent TN15 6BL, England. Contact the Secretary, RSGB, Lambda House, Cranborne Rd, Potters Bar, Hertfordshire EN6 3JE, England, for information on other scheduled events.

HAVE A GOOD PHOTO THAT MIGHT BE OF INTEREST TO FELLOW AMATEURS?

☐ *QST* is always on the lookout for interesting or unusual Amateur Radio-related pictures for use as Strays or in Up Front in *QST*; here's your chance to bring your club or individual activities to the attention of fellow League members. Or perhaps you have a humorous or offbeat photo that will bring a smile to *QST*'s readers. Whatever the case may be, send your photos, along with any relevant information including photo credit, to HQ, attention Editorial Supervisor.

CALL FOR *QST* TECHNICAL ARTICLES

☐ Do you have a yen for modifying commercial equipment to serve some special Amateur Radio function? The mail we receive at headquarters tells us that there is a lot of interest in equipment modification among hams today. For instance, many hams have adapted surplus FAA aircraft beacon amplifiers for operation on the 144, 220 and 432-MHz bands. What have you modified lately? *QST* pays for feature articles. Submit outlines and articles to Technical Editor, *QST*, American Radio Relay League, 225 Main St, Newington, CT 06111, tel 203-666-1541.

CHECK YOUR LABEL

☐ Are you a League member and FCC-licensed, but your call sign doesn't appear on your *QST* mailing label, and your membership certificate says "Associate Member"? Then you're missing out on the chance to vote for League Directors, Vice Directors and Section Managers. Help us correct your membership records by sending your name, address and call sign (and, if possible, the seven-digit number that appears on your mailing label) to ARRL Circulation Dept, Dept C, 225 Main St, Newington, CT 06111.

QST congratulates...

☐ the following radio amateurs on 60 years as ARRL members:

- Clifford M. Rigsbee, W9AKI, 4430 Lakewood Blvd, Naples, Florida
- George L. Graveson, K4JI, 332 East Acre Dr, Plantation, Florida

☐ the following radio amateurs on 50 years as ARRL members:

- Orion M. Arnold, W2HN, of Ho Ho Kus, New Jersey.
- Everett C. Lindquist, WØCSU, of Cannon Falls, Minnesota
- John E. Hoffer, W8CWY, of Wellsburg, West Virginia
- William A. Lippman Jr, W6SN, of Mar Vista, California
- Robert S. Reynolds, WØRFP, of Waterloo, Idaho
- C. H. Merrell, W4FX, of Anderson, South Carolina

I would like to get in touch with...

☐ anyone with a manual/schematic (or source address) for a Monsanto Model 8530 frequency counter. John Henderson, VE3HFT, 170 Thornton Ave, London, ON, Canada N5Y 2Y8.

☐ anyone with a schematic or info on wiring an APX-6 transmitter. Steve Risinger, NØIAX, 3825 NE 92nd St, Kansas City, MO 64156.

☐ anyone with a schematic and/or manual for OS-34/USM-32 oscilloscope. W2WOE, 996 Bonnie Brae, Lake Geneva, WI 53147.

Happenings

Conducted By Phillip Sager, WB4FDT
Manager, Regulatory Information Branch, ARRL

FCC Part 97 Rewrite

On March 24, the FCC acted to establish PR Docket 88-139, a proceeding which looks toward the modernization of the rules governing Amateur Radio in the United States. A Notice of Proposed Rulemaking will be issued shortly, but is not yet available; it is said to be an 87-page document, and comments will not be due until August 31 in order to permit careful review and study.

This is the so-called "Part 97 rewrite." According to the Commission's news release on its action, a reorganization of the amateur rules has not been done since 1951 and the result of ensuing technological advances and operational changes is a patchwork quilt of rules that is often confusing, particularly to the prospective licensee.

Because of unfortunate experiences with a "plain language" rewrite proposal of a few years ago, there is considerable sensitivity in the amateur community to any proposal for sweeping changes in Part 97 despite the laudable objective of making the rules easier to understand. At a press briefing following the Commission's action, FCC staff identified the following as highlights of the proposed rules:

1) References to emissions will be simplified. Permitted modes will be grouped into nine categories with one-word descriptions, with a one-time listing of the emission designators in each category. For example, a reference to "phone" in the rules will incorporate all of the voice emissions now permitted.

2) The following longstanding interpretations will be codified in the rules:

A) Swap nets
B) What hams can do in disasters, and to protect the immediate safety of life or property
C) What hams can do in support of public gatherings (eg, "-athons")
D) The four-prong "rule of reason" test for newsgathering
E) The philosophy that amateur frequencies are shared equally by all amateur stations
F) The circumstances under which FCC personnel can inspect station records
G) What can and cannot be appended to call sign as a "self-assigned identifier"

3) The following rules, we understand, are proposed to be eliminated:

A) The entire section governing alien operation, inasmuch as it defines administrative procedures that do not need to be in the body of regulations
B) The Amateur-Satellite-Service rules, insofar as they repeat the International Radio Regulations
C) Prohibitions against damaging radio apparatus, which are said to overlap local law
D) Requirements that examination papers be retained by volunteers for a specified period

4) The "basis and purpose," Section 97.1, is untouched.

At this time there is insufficient information available from which to draw any firm conclusions about what is being proposed. It appears that the Commission is allowing sufficient time for review and comment, assuming that the NPRM is released within a reasonable time. Copies of the NPRM will be distributed to any interested members at cost when it becomes available.

Based upon the information conveyed during the press briefing, it would appear likely that the ARRL may be able to support the overall effort to reorganize Part 97, but that the League will be taking exception to at least some of the substantive changes being proposed.

ARRL AND LMRE MEET

The presidents of the national Amateur Radio organizations of the United States and Mexico, the American Radio Relay League (ARRL), and Liga Mexicana de Radio Experimentadores (LMRE), met on February 20 to discuss matters of mutual concern to the amateurs of the two countries. The meeting was held on South Padre Island, Texas, in conjunction with STARFEST International 88, a hamfest in nearby Harlingen sponsored by the South Texas Amateur Repeater Society. ARRL President Larry E. Price, W4RA, and LMRE President Guillermo Nunez, XE1NJ, were joined by a number of other officers and Board members of the two organizations.

The leaders of ARRL and LMRE reviewed the status of Amateur Radio in the two countries, and pledged continuing close cooperation as sister societies in the International Amateur Radio Union. The topics discussed included the following:

• The possibility of an ITU allocations conference in the 1990s, and the need for IARU societies to work together to ensure effective preparations for Amateur Radio worldwide.

ARRL President Larry E. Price, W4RA, (left), looks on as LMRE President Guillermo Nunez, XE1NJ (right), presents Mayor Bob Pinkerton, Jr, of South Padre Island (Texas), with a Spanish edition of *The ARRL Handbook*.

• A multilateral agreement between countries in the Americas which, when acceded to by Mexico, will result in reciprocal operating privileges being available to the amateurs of both countries. Mexican amateurs have a number of legitimate concerns about the possible impact of such an agreement, but after discussion it was determined that these can be effectively addressed through administrative procedures. Accordingly, LMRE announced that it will support Mexico's signing of the multilateral agreement.

• Procedures for determining frequency use within established IARU band plans were also discussed, and frequency coordination efforts by amateurs in the border areas were supported.

The meeting participants expressed satisfaction that solid channels of communication, befitting national organizations in neighboring countries, are now established. On behalf of their respective Leagues, W4RA and XE1NJ promised to maintain this close contact for the betterment of Amateur Radio in both nations.

FCC ACCEPTS UPS COMMENTS

The FCC has decided to accept the late comments filed by United Parcel Service in the proposed reallocation of the 220-222 MHz band, Docket 87-14. In the UPS motion for the FCC to accept its comments, UPS argued that it had only recently developed plans to design and implement a nationwide private land mobile system which could operate in the 220-222 MHz band and that the knowledge of this net-

work and equipment plans would assist the Commission in reaching its decision.

The ARRL had filed a motion to strike the comments on the grounds that, in addition to being six months late, the UPS argument "adds nothing to the record in this proceeding, as there are already comments from land mobile interests which discuss equipment to be designed and built." ARRL also argued that UPS had not afforded to all the opportunity to submit reply comments and should the FCC accept these comments, it must reopen the Docket to accept reply comments concerning them.

In its Order to accept the UPS comments, the FCC said that the late-filed comments did provide new and relevant information, and in order to develop as complete a record as possible, the FCC would accept them. As requested by ARRL, the FCC did agree to accept reply comments for a three-week period, which ended March 31.

TONY ENGLAND, WØORE, VISITS ARRL HQ

NASA astronaut Tony England, WØORE, visited ARRL HQ February 26 while on a trip to New England. In August 1985, England operated amateur SSTV and 2-meter FM aboard the Space Shuttle *Challenger*, making more than 100 QSOs.

Meeting with HQ staff, England was asked how he felt when he made his first QSO from space. He replied "I was relieved the equipment worked," and went on to say he knew many volunteers had spent a great deal of time building the special equipment and that he then knew their efforts were not in vain.

England mentioned that interest in Amateur Radio remained high among technicians and astronauts at the Johnson Space Center, but that the lack of launches had somewhat dampened follow-through on obtaining Amateur Radio licenses. Tony saw the return to the launch phase as producing a quick upturn in those at the JSC getting their Amateur Radio tickets.

Tony's main interest continues to be interfacing Amateur Radio into the curriculum of the nation's schools. On his last flight he had schedules with a number of schools, sending SSTV pictures directly into science and social studies classrooms.

England was presented with a copy of the *1988 ARRL Handbook* signed by the HQ staff. He said he hopes to fly again once Shuttle missions are resumed, but that his age, 45, might be a factor.

NEW-HAM RECRUITMENT GROUP VISITS FLORIDA

ARRL HQ staffers involved with a pilot project aimed at recruitment of new hams age 50 and over in Hillsborough and Pinellas Counties (Florida) recently visited the Orlando Hamcation and metropolitan Tampa/St Petersburg area. The program was discussed briefly at the ARRL Forum by HQ staffer Mike Riley, KX1B. The program has the full support of many local radio clubs.

Along with gathering information from interested amateurs at the Hamcation, the group met with several representatives of senior-oriented organizations and several local governmental agencies in the target area asking their support of the program. The three-day fact-finding trip was helpful and the pilot recruitment program will begin later this year. Members of the HQ task group are Mike Riley, KX1B, Chairman; Mary Schetgen, N7IAL; Rosalie White, WA1STO; and Larry Wolfgang, WA3VIL.

ARNS PUBLICATION CONTEST

Proud of your club newsletter? Undoubtedly, a well-done newsletter promotes club activities and keeps up interest in the club. The Amateur Radio News Service, ARNS, an organization of Amateur Radio publications and club newsletter editors, is conducting its annual publications contest. The contest is designed to reward superior performance in Amateur Radio journalism, and is open to Amateur Radio organizations worldwide.

One club newsletter published between July 1987 and July 1988 must be submitted and will be judged on the following criteria: general format, overall interest, technical coverage, club activity, editorials, membership contributions and recruitment/training of potential new amateurs. Newsletters will be judged compared to other entrants from like-sized clubs and will be placed within the categories of "Superior," "Excellent," or "Good." Each entrant will receive a critique listing both noteworthy points and suggestions for improvement.

For further information, or to obtain entry blanks, send an SASE to Lee Knirko, W9MOL, 11 S LaSalle St, Suite 2100, Chicago, IL 60603.

FCC UPHOLDS W4UWH FINE

The Commission has affirmed the imposition of $1450 in fines levied against David G. Ackley, W4UWH, of St Thomas, US Virgin Islands, for improper operation of his Amateur Radio station.

Ackley, according to an FCC news release, was assessed the fine after FCC Field Operations Bureau (FOB) personnel determined he was operating on unauthorized frequencies and failing to identify his station.

In other FCC enforcement news, a Brooklyn, New York man, Nachman Brach, was sentenced to five years probation and 300 hours of community service for importing illegal CB radios and linear amplifiers, according to an FCC news release.

The smuggled CB transmitters and linear amplifiers were not authorized for sale in the US. The radios operated on unauthorized frequencies outside of the CB bands with excessive power and unauthorized emissions, potentially causing interference to essential public safety and emergency services.

ARRL/AMSAT SPACE STATION PROPOSAL

More hams in space? A joint proposal has been submitted by the ARRL and AMSAT to NASA for Amateur Radio participation in the space station to be built in the 1990s.

The proposal informs NASA of Amateur Radio interest in such a venture and of some of the contributions that could be made by radio amateurs in space. There are already several NASA astronauts who are hams.

Some of the proposed contributions are: the promotion of favorable public awareness of both the space station and the US space program; experiments using voice, data and video communications techniques; providing a means of recreation for crew members; and as a back-up means of communication.

One of the most important topics covered was the ability of the Space Station to hold two-way communications "seminars" in real time with selected school classrooms and civic gatherings, with the ground facilities to be manned by local volunteer amateurs.

ARRL and AMSAT emphasized that a key element to the proposal's success will be the Phase 4 geostationary satellite now in the planning stages. The proposal also suggested that all users of the SSAR station would be required to be licensed radio amateurs.

PAUL RINALDO, W4RI, NAMED IEEE SENIOR MEMBER

Congratulations are in order for ARRL Publications Manager Paul Rinaldo, W4RI. He has been elected as a Senior Member of the Institute of Electrical and Electronic Engineers (IEEE). According to the Institute, only about 10% of their 280,000 members have attained this grade.

AMATEUR RADIO SCHOLARSHIPS

The Atlanta Radio Club has announced two $1000 scholarships for young Amateur Radio operators to be awarded in 1988.

Requirements include being a licensed radio amateur and a graduating senior in 1988 entering college for the first time. Candidates are judged on their high school grades, Amateur Radio achievements and citizenship/leadership qualities. Special consideration will be given to residents of Georgia and adjacent states. For further information and applications write to Phil Latta, W4GTS, 259 Weatherstone Pkwy, Marietta, GA 30068.

FCC FORT LAUDERDALE OFFICE MOVES

The FCC Fort Lauderdale, Florida office has relocated to Vero Beach. The new address is: Federal Communications Commission, PO Box 1730, Vero Beach, FL 32961-1730.

League Advisory Committee Members

This list contains the names and addresses of the members of the ARRL's five advisory committees:

DX ADVISORY COMMITTEE

Atlantic Division—Tony Gargano, N2SS 32 Bryant Rd, Turnersville, NJ 08012

Central Division—Steve Lamb, W9NUF 143 Willow Ave, Deerfield, IL 60015

Dakota Division—Robert G. Parlin, WØSFU 1507 Kaltern Ln, Minneapolis, MN 55416

Delta Division—Richard A. Roderick, K5UR PO Box 1463, Little Rock, AR 72203

Great Lakes Division—Theodore Pauck, Jr, K8NA 2820 Lennox Rd, Troy, MI 48098

Hudson Division—David Beckwith, W2QM 151 Whitney Ave, Pompton Lakes, NJ 07442

Midwest Division—James L. Spencer, WØSR 3712 Tanager Dr NE, Cedar Rapids, IA 52402

New England Division—William C. Poellmitz, K1MM, 44 Sunset Dr, Framingham, MA 01701

Northwestern Division—Jack Bock, K7ZR 7317 S Jewett Rd, Clinton, WA 98236

Pacific Division—James A. Maxwell, W6CF PO Box 473, Redwood Estates, CA 95044

Roanoke Division—John Parrott, W4FRU Chairman, Box 5127, Suffolk, VA 23435

Rocky Mountain Division—Ron Stockton, NØRR Bonanza Star Rte, Nederland, CO 80466

Southeastern Division—Robert R. Beatty, III, W4VQ, 11 Heritage Cove Ct, Casselberry, FL 32707

Southwestern Division—James T. Rafferty, N6RJ Vice Chairman, 5693 Grandview Ave, Yorba Linda, CA 92686

West Gulf Division—John Hawkins, III, K5NW 1723 Shuford Ct, Lewisville, TX 75067

CRRL—Dr Roland Suran, VE3EJ, 7 Corona St Toronto, ON Canada M6B 3N3

Board Liaison—Rush Drake, W7RM, Rte 2, Box 372 AC, La Center, WA 98629

Staff Liaison—John F. Lindholm, W1XX, ARRL HQ, 225 Main St, Newington, CT 06111

Administrative Liaison*—Lisa Clark, ARRL HQ 225 Main St, Newington, CT 06111

CONTEST ADVISORY COMMITTEE

Atlantic Division—John Carioti, K2ZJ 6893 Peck Rd, Syracuse, NY 13209

Central Division—Gerald Brunning, K9BG 15 Tilipi Ct, Schaumburg, IL 60192

Dakota Division—Ron Dohmen, NØAT 125 Magnolia Ln, Plymouth, MN 55441

Delta Division—Bill Rayburn, K4CXY 289 Taraview, Collierville, TN 38017

Great Lakes Division—Randy H. Farmer, W8FN 8115 S Palmer Rd, New Carlisle, OH 45344

Hudson Division— Bill Inkrote, K2NJ, RD 10, Box 294, Crofton Quakertown Rd, Flemington, NJ 08822

Midwest Division—Richard Barnette, KBØU PO Box 4798, Overland Park KS 66204

New England Division—Doug Grant, K1DG 144 Kendall Pond Rd, Windham, NH 03087

Northwestern Division—Dale Jones, K5MM/7 Rte 2 Box 468, Bald Peak Rd, Hillsboro, OR 97123

Pacific Division—Gary Caldwell, WA6VEF 1830 Polk St, Concord, CA 94521

*Administrative Liaison for all ARRL Advisory Committees

Roanoke Division—David Siddall, K3ZJ 9763 Oleander Ave, Vienna, VA 22180

Rocky Mountain Division—Walt L Stinson, WØCP 4150 East Quincy Ave, Englewood, CO 80110-5051

Southeastern Division—Robin A. Gist, NE4L PO Box 975, Auburn, AL 36831-0975

Southwestern Division—Marty Woll, N6VI Chairman, 17780 Ridgeway Rd, Granada Hills, CA 91344

West Gulf Division—James Eppright, K5RX, 3123 Tower Tr, Dallas, TX 75229

CRRL—Bob Nash, VE3KZ, 5260 Fourteen Sideroad, RR 6, Milton, ON Canada L9T 2Y1

Board Liaison—John C. Kanode, N4MM RFD 1, Box 73-A, Boyce, VA 22620

Staff Liaison—Robert Halprin, K1XA, ARRL HQ 225 Main St, Newington, CT 06111

PUBLIC SERVICE ADVISORY COMMITTEE

Atlantic Division—Bob Josuweit, WA3PZO 9 Derwen Dr, Havertown, PA 19083

Central Division—Richard Regent, K9GDF 5003 S 26th St, Milwaukee, WI 53221

Dakota Division—Ray Munger, KAØARP 2172 Pequaywan Lake Rd, Duluth, MN 55803

Delta Division—Dale Temple, W5RXU, Chairman 1620 Tarrytown Rd, Little Rock, AR 72207

Great Lakes Division—James Wades, WB8SWI 1952 Traver #202, Ann Arbor, MI 48105

Hudson Division—James Dockery, WB2HBZ 420 Grave Hill Rd, Kinnelon, NJ 07405

Midwest Division—Larry Staples, WØAIB 425 W 49 Terrace, Kansas City, MO 64112

New England Division—Joseph Steventon, W1KRV, RFD 1 Box 21, Rochester, VT 05767

Northwestern Division—Gene E. Sprague, KD7G 10716-23rd Dr SE, Everett, WA 98204

Pacific Division—David B. Tyler, N6DRT PO Box 6017, Albany, CA 94700

Roanoke Division—Charles Moeller, N4FVU 116 Willow Winds Dr, Columbia, SC 29210

Rocky Mountain Division—Joe Knight, W5PDY 10408 Snow Heights Blvd NE, Albuquerque, NM 87112

Southeastern Division—Joel I. Kandel, KI4T 5463 SW 92nd Ave, Miami, FL 33165

Southwestern Division—Jerry Boyd, KG6LF 345 B Ave, Coronado, CA 92118

West Gulf Division—No appointee at this time

CRRL—Jack Strangleman, VE3GV 512 Pinetree Dr London, ON Canada N6H 3N1

Board Liaison—Paul Vydarney, WB2VUK 259 N Washington St, North Tarrytown, NY 10591-2314

Staff Liaison—Luck Hurder, KY1T, ARRL HQ 225 Main St, Newington, CT 06111

VHF REPEATER ADVISORY COMMITTEE

Atlantic Division—Willem Van Aller, K3CZ 7623 Old Washington Rd, Woodbine, MD 21797

Central Division—Bob Heil, K9EID, PO Box 68 Marissa, IL 62267

Dakota Division—Eric Foss, KDØZ 4615 Oakview Ln N, Plymouth, MN 55442

Delta Division—Jean Giesler, W4TYU 4544 Lyons View Pike, Knoxville, TN 37919

Great Lakes Division—James Brooker, NI8E 696 Graefield Ct, Birmingham, MI 48008

Hudson Division—Phil Bradway, KB2HQ 1119 Hedgewood Ln, Schenectady, NY 12309

Midwest Division—No appointee at this time

New England Division—Mitch Stern, WB2JSJ 14 Kimberly Dr, Essex Junction VT 05452

Northwestern Division—Robert Moore, W7JNC 15811 NE Broadway, Portland, OR 97230

Pacific Division—William L. Walters, WA2IBM 542 Papac Way, San Jose, CA 95117

Roanoke Division—A. Carter Cogle, K4ARO 1667 Varina Ave, Petersburg, VA 23805

Rocky Mountain Divison—Robert Q. Fugate, W8GY, 8820 Delamar Ave NE, Albuquerque, NM 87111

Southeastern Division—James C. Vice, WD4KTY Rte 1, Box 462, Alexandria, AL 36250

Southwestern Division—Karl Pagel, N6BVU PO Box 6490, Orange, CA 92613-6490

West Gulf Division—Eilene G. Spiegel, WA5WDW, 2812 Pritchett, Irving, TX 75061

CRRL—Dr David Toth, VE3GYQ 499 Bobbybrook Rd, London, ON N5X 1G8 Canada

Board Liaison—William R. Shrader, W7QMU 2042 Jasmine Ave, Medford, OR 97501

Staff Liaison—Bart J. Jahnke, KB9NM, ARRL HQ 225 Main St, Newington, CT 06111

VHF/UHF ADVISORY COMMITTEE

Atlantic Division—Robert Bennett, W3WCQ 1006 Green Acre Rd, Towson, MD 21204

Central Division—Joseph Schroeder, W9JUV Box 406, Glenview, IL 60025

Dakota Division—Terry Van Benschoten, WØVB 2326-11th Ave NW, Rochester, MN 55901

Delta Division—R. A. "Bob" Taylor, WB5LBT 10715 Waverland, Baton Rouge, LA 70815

Great Lakes Division—David Smith, W8YZ 530 Hollywood Dr, Monroe, MI 48161

Hudson Division—Douglas A. Sharp, WB2KMY 24 Walnut Hill Rd, Poughkeepsie, NY 12603

Midwest Division—Jim McKim, WØCY 1404 S 10th, Salina, KS 67401

New England Division—Thomas Kirby, W1EJ Chairman, PO Box 455, Pelham, NH 03076

Northwestern Division—Rick Beatty, NU7Z 23115 84th Ave W, Edmonds, WA 98020

Pacific Division—H. Paul Shuch, N6TX 14908 Sandy Ln, San Jose, CA 95124

Roanoke Division—Ted Mathewson, W4FJ 1525 Sunset Ln, Richmond, VA 23221

Rocky Mountain Division—Lauren Libby, KXØO 6166 Del Paz Dr, Colorado Springs, CO 80918

Southeastern Division—Ronald E. Monk, W4ODW 103 Keller Ct, Niceville, FL 32578

Southwestern Division—S. Keith Thompson, K6PVS, 15130 Fir, Hesperia, CA 92345

West Gulf Division—James D. King, W5LUU 7335 Wild Eagle Rd, San Antonio, TX 78255

CRRL—Dana A. Shtun, VE3DSS, 500 Willard Ave Toronto, ON M6S 3R6 Canada

Board Liaison—Wayne Overbeck, N6NB 14021 Howland, Tustin, CA 92680

Staff Liaison—Bart J. Jahnke, KB9NM, ARRL HQ 225 Main St, Newington, CT 06111

WASHINGTON STATE HAMS GET A RENT BREAK

The Washington State Department of Natural Resources (DNR) has reduced rent charged to Amateur Radio repeaters located on state land. For the first repeater placed at the site, the rental rate will be 50% of the DNR-established rate, and subsequent units will be at 25% of the established rate.

This legislative rent reduction was in recognition for the service provided by Amateur Radio operators in emergency and public service communications, while still providing the DNR with full market rental for state-owned property because of the supplemental funding appropriated by the legislature.

KITTY HEVENER, WB8TDA, NOMINATED FOR AWARD

Katherine "Kitty" Hevener, WB8TDA, a former ARRL employee in the

Regulatory Information Branch, and Editor of the ARRL Program for the Disabled booklet, has been selected as a candidate for "Handicapped Woman of the Year" in greater Cincinnati, Ohio.

Hevener is a 1981 cum laude graduate of Vanderbilt University's Peabody College for Teachers, and holds a BS in elementary education and special education for the visually impaired. She teaches students adaptive techniques for doing everyday tasks, as well as the use of specialized equipment that converts print into synthesized speech and Braille.

Kitty is active in emergency communications and public-service events in the Cincinnati area. She also teaches Amateur Radio classes. Best of luck, Kitty, and keep up the good work!

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Connecticut, Idaho, Minnesota, North Dakota, Ohio, Oklahoma, Southern Florida, Western New York, Puerto Rico and Virgin Islands sections:

You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more Full ARRL members residing in the Section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. It is advisable to have a few more than five signatures on each petition.

Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. The following wording is suggested:

(Place and date)

Field Services Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned Full members of the...ARRL Section of the...Division, hereby nominate...as candidate for Section Manager for this Section for the next two-year term of office.
(Signature...Call...City...ZIP).

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher, and a Full Member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination. Petitions must be received at Headquarters on or before 4:00 PM Eastern Local Time June 10, 1988.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before July 1, 1988. Returns will be counted August 22, 1988. SMs elected as a result of the above procedure will take office October 1, 1988.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning October 1, 1988.

If no petitions are received for a Section by the specified closing date, such Section will be resolicited in October *QST*. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by the Field Services Manager.

You are urged to take the initiative and file a nomination petition immediately.

Richard K. Palm, K1CE
Field Services Manager

SECTION MANAGER ELECTION RESULTS

The following Section Managers will begin a two-year term of office July 1, 1988:

Uncontested

Illinois	David Carlson, AA9D
Maine	William Mann, W1KX
Northern Florida	Royal Mackey, N4ADI
Oregon	Randy Stimson, KZ7T
Santa Clara Valley	Glenn Thomas, WB6W
Vermont	Peter Drexel, AE1T
Wisconsin	Richard Regent, K9GDF

Strays

SAFETY FIRST

☐ There are reasons for accidents involving radio gear, but never *good* reasons. Take no chances with electricity. Even a low-voltage shock can be serious—sometimes fatal.

Heed the ARRL safety code: While there's no reason for you to be involved in a ham-related accident, that possibility always exists if you are not thinking safety. Following the ARRL safety code will make your ham experience more enjoyable. Read it and practice it.

1) Kill all power circuits completely before touching anything behind the panel or inside the chassis or the enclosure.

2) Never allow anyone else to switch the power on and off for you while you're working on equipment.

3) Don't troubleshoot in a transmitter when you're tired or sleepy.

4) Never adjust internal components by hand. Use special care when checking energized circuits.

5) Avoid bodily contact with grounded metal (racks, radiators) or damp floors when working on the transmitter.

6) Never wear headphones while working on gear.

7) Follow the rule of keeping one hand in your pocket.

8) Instruct members of your household how to turn the power off and how to apply artificial respiration. (Instruction sheets on the latest approved method can be obtained from your local Red Cross office.)

9) If you must climb a tower to adjust an antenna, use a safety harness. Never work alone.

10) Do not install antennas at levels that permit humans or animals to come in contact with them. Not only might the victim sustain a severe RF burn, he or she could run into the antenna and be injured.

11) Do not operate high-power UHF or microwave gear that has inadequate shielding against radiation. Similarly, do not look into or stand near microwave antennas when transmitter power is being fed to them.

12) Do not install antennas near electrical power lines.

13) Don't drink alcoholic beverages when working on equipment or installing antennas.

Take time to be careful. Death is permanent.

QST congratulates...

☐ Frank Bates, AA6C, of Washington, DC on being selected Security Engineering Officer of the Year for 1987 by the US State Department. Ken Crosher, W6BCC, of Santa Rosa, California received the award in 1986.

☐ William Goswick, K5WG, of Broken Arrow, Oklahoma on being promoted to Chief of Research and Development of the Tulsa Fire Department. Bill is the Oklahoma Section Manager.

☐ Roger Lausen, KA9FGD, of Palos Hills, Illinois on his recent appointment as Vice President of the Palos Township Democratic Organization.

☐ Tom Niedermier, W8EF, of New Washington, Ohio on being elected to a third term as Mayor of New Washington.

I would like to get in touch with...

☐ anyone interested in starting an informal net of professional and educational theatre personnel. Jim Thomas, N9GGN, 5004 Tallow Point Rd, Tallahassee, FL 32308.

☐ anyone who collects QSL stamps or can assist with research material for a handbook on QSL stamps. Yarl Lundstrom, SM6FJY, Borgaregatan 11, S-416 66 Goteborg, Sweden.

☐ any amateurs who are rock & roll album collectors. Bill Wilson, WA8YTM, PO Box 228, Oak Hill, WV 25901.

☐ any hams who are also in the antique car hobby. George Stringos, N1ELC, 5 Robinson Rd, West Woburn, MA 01801.

AUDITED ARRL FINANCIAL STATEMENTS RELEASED

The audited financial statements reprinted below set forth the League's financial condition as of December 31, 1987, as compared to a year earlier. The statements show an after-tax net gain of $195,089 on total revenues of $8,066,278 for the calendar year 1987.

The financial statements and supplementary financial information will appear in the 1987 *Annual Report*, which will be available in June. Affiliated clubs that return the request form sent to them in April will be receiving a copy of the *Annual Report* as soon as it is received from the printer; members may obtain a copy for a $1 postage and handling fee.

One Financial Plaza
Hartford, CT 06103

Telephone 203 240 2000

Price Waterhouse

March 11, 1988

To the Board of Directors of
The American Radio Relay League,
Incorporated

In our opinion, the accompanying balance sheet and the related statements of revenues, expenses and changes in fund balance and of changes in financial position present fairly the financial position of The American Radio Relay League, Incorporated at December 31, 1987 and 1986, and the results of its operations and changes in its fund balance and financial position for the years then ended, in conformity with generally accepted accounting principles consistently applied. Our examinations of these statements were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

Our examinations were made for the purpose of forming an opinion on the basic financial statements taken as a whole. Schedules I - III are presented for purposes of additional analysis and are not a required part of the basic financial statements. Such information has been subjected to the auditing procedures applied in the examinations of the basic financial statements, and in our opinion, is fairly stated in all material respects in relation to the basic financial statements taken as a whole.

Price Waterhouse

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
BALANCE SHEET

	December 31, 1987	December 31, 1986
Assets		
Current assets:		
Cash (including time deposits of $404,791 and $300,000 in 1987 and 1986, respectively)	$ 968,511	$ 578,547
Accounts receivable (less allowance for doubtful accounts of $26,500 in 1986)	483,461	413,710
Accrued interest receivable	66,638	49,995
Inventories	476,081	288,694
Prepaid expenses	33,334	65,398
Total current assets	2,028,025	1,396,344
Life membership assets:		
Marketable securities, at cost	3,331,274	3,656,770
Due from current operations	653,174	313,642
Accrued interest receivable	40,753	65,235
Life membership plaques	13,100	11,415
	4,038,301	4,047,062
Regular portfolio marketable securities, at cost	2,148,929	2,137,400
Land, buildings and equipment, net of accumulated depreciation	1,193,055	902,591
Other assets	55,969	66,784
	$9,464,279	$8,550,181

	December 31, 1987	December 31, 1986
Liabilities and Fund Balance		
Current liabilities:		
Payable for publishing	$ 110,432	$ 184,963
Accounts payable - other	417,728	116,191
Accrued liabilities	426,084	413,483
Deferred membership fees and subscriptions - current portion:		
Life members	335,610	331,668
Term members	1,431,788	1,425,371
Mortgage note payable	-	5,477
Total current liabilities	2,721,642	2,477,153
Deferred membership fees and subscriptions - non-current portion:		
Life members	3,702,691	3,646,475
Term members	337,375	267,189
	4,040,066	3,913,664
Due to life membership assets	653,174	313,642
Borrowings under life insurance policy	36,500	36,500
Contributions restricted by donors	83,468	74,882
	773,142	425,024
Total liabilities	7,534,850	6,815,841
Fund balance:		
Designated -		
Amateur Radio Artifacts and Visitors' Center	94,359	85,000
Defense of Amateur Radio Frequencies	105,000	-
Undesignated	1,730,070	1,649,340
Total fund balance	1,929,429	1,734,340
	$9,464,279	$8,550,181

See accompanying notes to financial statements.

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
STATEMENT OF REVENUES, EXPENSES AND CHANGES IN FUND BALANCE

	Year ended December 31, 1987	Year ended December 31, 1986
Advertising revenue	$2,057,131	$1,933,345
Publications sales	2,440,545	1,975,664
Less: Sales, returns, allowances, discounts and credit card collection charges	78,314	64,898
Net sales of publications	2,362,231	1,910,766
Membership dues and subscriptions to QST magazine:		
Term members	2,749,033	2,637,435
Life members, including net investment income of $206,324 and $189,995 in 1987 and 1986, respectively	331,668	312,804
Total membership dues	3,080,701	2,950,239
Interest, dividend and royalty income	206,435	177,526
Membership supplies sales	157,551	139,872
Examination fees	107,417	99,676
Contributions	6,418	97,419
Gain on sale of investments	12,682	42,552
Overseas QSL service income	25,051	21,242
Other	50,661	11,587
Total revenues	8,066,278	7,384,174
Expenses:		
Operating expenses	7,499,229	6,998,053
Administrative expenses - other expenses authorized by the Board of Directors	371,960	377,445
Total expenses	7,871,189	7,375,498
Excess of revenues over expenses	195,089	8,676
Fund balance beginning of year	1,734,340	1,725,664
Fund balance end of year	$1,929,429	$1,734,340

See accompanying notes to financial statements.

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
STATEMENT OF CHANGES IN FINANCIAL POSITION

	Year ended December 31, 1987	Year ended December 31, 1986
Cash and time deposits were provided by (used for):		
Operations:		
Excess of revenues over expenses	$ 195,089	$ 8,676
Items not (requiring) providing cash:		
Net gain on sale of investments	(12,682)	(42,552)

Depreciation	186,017	209,376
Change in other assets	10,815	(10,083)
Increase in receivables	(86,394)	(25,012)
Change in prepaid assets	32,064	(19,714)
Change in inventory	(187,387)	52,446
Change in current liabilities	249,966	(210,484)
Change in deferred membership fees and subscriptions - non-current portions:		
Term members	70,186	(146,154)
Life members	56,216	112,124
Net increase in contributions restricted by donors	8,586	16,819
	522,476	(54,558)
Financing activities:		
Repayment of debt	(5,477)	(32,428)
Investing activities:		
Increase in other life membership assets	(316,735)	(75,315)
Increase in due to life membership assets	339,537	79,561
Net proceeds (purchases) of investments:		
Regular portfolio	1,153	129,055
Life Membership Portfolio	325,496	(114,396)
Purchase of furniture and equipment	(476,481)	(92,873)
	(127,035)	(73,968)
Increase (decrease) in cash and time deposits	389,964	(160,954)
Cash and time deposits, beginning of year	578,547	739,501
Cash and time deposits, end of year	$ 968,511	$ 578,547

See accompanying notes to financial statements.

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
NOTES TO FINANCIAL STATEMENTS

NOTE 1 - ORGANIZATION AND SIGNIFICANT ACCOUNTING POLICIES:

The American Radio Relay League, Incorporated (The League) is a not-for-profit, tax-exempt organization formed to promote interest in amateur radio communication and experimentation. The League publishes documents, books, magazines, newspapers and pamphlets necessary or incidental to its purpose.

The following is a summary of significant accounting policies consistently followed in the preparation of the League's financial statements.

Income Recognition - Revenue from term membership fees and subscriptions is recognized to the extent of acquisition costs when memberships and subscriptions are received. The remaining portion is recognized in revenues on the straight-line basis ratably over the applicable membership or subscription period.

The League recognizes income on donated capital based on the fair market value of the item at the date of donation.

Deferred Life Membership Fees - The by-laws of the League provide for a paid-up life membership in the League for a fee of twenty-five times the annual dues rate. Life membership dues are invested in assets segregated from the regular portfolio. The dues and interest earned on these segregated investments are deferred and recognized in income over the estimated life expectancy of the respective members (approximately 34 years). The amount recognized over the estimated life expectancy is representative of the cost to the League of servicing the life memberships.

Income Tax - The League is exempt from federal income taxes under Section 501(c)(3) of the internal revenue code. The League is subject to any federal income tax due as a result of unrelated business income arising primarily from advertising revenues in the QST Magazine.

Investments - Marketable securities are carried at cost. The League intends to hold fixed income securities until maturity, and as a result does not provide for a reduction in the carrying value of the investment portfolio for any excess of book value over the estimated market value unless such difference represents a permanent impairment of value.

Inventories - Inventories are carried at the lower of cost or market, cost being determined using the first-in, first-out method.

Land, buildings and equipment - Land, buildings and equipment are recorded at cost. Depreciation is computed on the straight-line method for assets purchased prior to January 1, 1981. For assets purchased after that date, an accelerated depreciation method is used. Buildings are depreciated over a 40 year life. Furniture and equipment are depreciated over their estimated useful lives ranging from 3 to 20 years.

NOTE 2 - INVENTORIES:

Inventories are comprised of the following:

	December 31, 1987	December 31, 1986
Booklets	$300,119	$138,863
Standard Handbooks	97,858	75,943
Membership supplies	24,879	54,854
Tune in the World booklets	53,225	19,034
	$476,081	$288,694

NOTE 3 - INVESTMENTS:

Investments restricted to life memberships are comprised of the following:

	December 31, 1987		1986	
	Cost	Market	Cost	Market
Corporate bonds	$2,338,545	$2,272,196	$1,778,205	$1,772,519
U.S. Government and Government agency	459,578	448,875	659,578	671,235
Common stocks	176,688	270,541	399,404	636,094
Preferred stocks	156,342	123,001	206,549	190,750
Certificates of deposit	175,121	175,121	416,312	416,000
Other investments	25,000	28,150	196,722	200,664
	$3,331,274	$3,317,884	$3,656,770	$3,887,262

Investments in the regular portfolio are comprised of the following:

	1987		1986	
	Cost	Market	Cost	Market
Corporate bonds	$ 929,388	$ 910,000	$1,325,223	$1,330,708
U.S. Government and Government agency	121,113	119,736	121,113	124,138
Common stocks	324,121	296,506	284,285	312,413
Certificates of deposit	774,307	774,307	199,375	200,000
Other investments	-	-	207,404	200,832
	$2,148,929	$2,100,549	$2,137,400	$2,168,091

The decrease in unrealized appreciation in the market value of investment securities for the year ended December 31, 1987 was $322,953. The increase in unrealized appreciation in the market value of investment securities for the year ended December 31, 1986 was $154,667.

NOTE 4 - LAND, BUILDINGS AND EQUIPMENT:

Land, buildings and equipment and related accumulated depreciation are comprised of the following:

	December 31, 1987	December 31, 1986
Land and buildings	$1,130,134	$1,130,134
Furniture and equipment	1,664,908	1,211,116
	2,795,042	2,341,250
Accumulated depreciation	(1,601,987)	(1,438,659)
	$1,193,055	$ 902,591

NOTE 5 - DEBT:

On March 1, 1977 the League signed a $225,000 mortgage note payable bearing interest at 9.25%, the proceeds of which were used to finance a building addition. The note was fully paid by March 1, 1987.

The League is the owner and beneficiary of a $100,000 life insurance policy donated by a member. The cash surrender value of the policy is $49,969 and $49,287 at December 31, 1987 and 1986, respectively. The League has a $36,500 policy loan against the cash surrender value of this policy as of December 31, 1987 and 1986. The loan bears interest at an annual rate of 6% payable twice a year.

NOTE 6 - PENSION PLAN:

The League has a noncontributory group annuity retirement plan which covers full-time employees. The League's policy is to fund *pension cost accrued. The total pension expense for 1987 and 1986* was $189,966 and $186,354, respectively, which included amortization of past service cost over a 30-year period. Accumulated plan benefits as of the most recent actuarial valuation reports dated June 1, 1987 and June 1, 1986, are as follows:

	1987	1986
Actuarial present value of accumulated plan benefits:		
Vested	$588,575	$456,422
Non Vested	80,554	115,096
	$669,129	$571,518

At June 1, 1987 and June 1, 1986, net assets available for plan benefits at contract value (as reported by the insurer, including $185,146 in 1987 and $190,848 in 1986 payable to the insurer by the League) are $1,005,245 and $768,679. The assumed rate of return used in determining the actuarial present value of accumulated plan benefits was 7.5% in 1987 and 1986.

Financial Accounting Standards Board Statement No. 87 "Employers' Accounting for Pensions" establishes the financial reporting and accounting for pension benefits. This statement requires that the financial statements reflect a liability if the pension cost exceeds amounts contributed to the plan or an asset if pension cost is less than amounts contributed to the plan. The League will adopt this statement in 1988.

NOTE 7 - DEFERRED LIFE MEMBERSHIP FEES:

The following is a summary of deferred life membership fees and subscriptions activity:

	December 31, 1987	December 31, 1986
Current portion	$ 335,610	$ 331,668
Non-current portion	3,702,691	3,646,475
Total	$4,038,301	$3,978,143

Beginning balance	$3,978,143	$3,857,351
Additions:		
Membership fees received	85,697	101,540
Investment income earned	310,206	335,885
	395,903	437,425
Deductions:		
Net transfer to revenue:		
Life members	125,344	122,809
Investment income	206,324	189,995
	331,668	312,804
Administrative expenses	4,077	3,829
	335,745	316,633
Ending balance	$4,038,301	$3,978,143

NOTE 8 - DESIGNATED FUND BALANCES:

During 1986, the League received a $85,000 unrestricted bequest to be used pursuant to the approval of the League's Board of Directors. This contribution was designated by the Board for future costs related to the proposed Visitors' Center; however, during 1987 the Board decided that the Visitors' Center would not be built. Additional funds of $9,359, including interest, were received and designated in 1987. Expenditures related to the Visitors' Center of $10,243 were deferred in 1986 and charged to operations in 1987. The remaining fund balance of $94,359 has been designated by the Board to be used for the purpose of acquiring, restoring and preserving amateur radio related artifacts. The League received $3,001 of restricted contributions for the Visitors' Center. Management plans to request from each donor permission to use their contribution for the renovation of the WIAW radio building.

During 1987, the Board designated $105,000 to be used for the Defense of Amateur Radio Frequencies. This fund will be used to defend the use of radio frequencies by amateur radio operators. Restricted contributions of $500 were received during 1987 for this project.

NOTE 9 - RELATED PARTY:

The Canadian division of the League is incorporated as the Canadian Radio Relay League (CRRL). The CRRL, whose Board of Directors is independent from the League's, collects Canadian membership dues, purchases publications from the League at a discount and resells them to its membership. During 1987 and 1986, the League provided grants to CRRL of $5,000 and $10,000, respectively. At December 31, 1987 and 1986, CRRL owes the League $8,500 and $9,500, respectively, under a non-interest bearing loan.

NOTE 10 - CONTRIBUTIONS RESTRICTED BY DONORS:

The League receives contributions from donors which are restricted for specific purposes as specified by the donors. These restricted contributions are administered by designated officials of the League in accordance with the directions of the donors. Unused contributions aggregated $83,349 and $74,882 at December 31, 1987 and 1986, respectively. Following is a summary of activity relating to these contributions:

	H. P. Hazle Award	T. Mullen Foundation	Visitors' Center	Promotion of Radio Overseas	Colorado Convention Fund	Project Goodwill	Amateur Radio Artifacts	Exceptional Merit	Legal Defense Fund	Frequency Defense Fund	Other	Total
Balance 12/31/85	$22,514	$ 5,000	$ -	$5,027	$5,471	$19,956	$ -	$ -	$ -	$ -	$ 105	$ 58,063
Contributions		5,000	1,451					10,000			10,000	26,451
Income Earned	2,325											2,325
Expenditures	(1,000)			(108)		(744)					(20,105)	(21,957)
Board designated contribution											10,000	10,000
Balance 12/31/86	23,839	10,000	1,451	4,909	5,471	19,212	-	10,000	-	-	-	74,882
Contributions			1,550						9,765	500		11,815
Income Earned	2,325				969							3,294
Expenditures	(1,165)			(4,909)		(649)						(6,723)
Balance 12/31/87	24,999	10,000	3,001	-	6,440	18,563	-	10,000	9,765	500	-	83,468
Board designated contribution							94,359			105,000		199,359
Total	$24,999	$10,000	$3,001	$ -	$6,440	$18,563	$94,359	$10,000	$ 9,765	$105,500	$ -	$282,827

SCHEDULE I

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

REVENUES

	Year ended December 31, 1987	1986
Advertising revenue:		
QST magazine	$2,033,327	$1,883,429
Tune in the World	-	24,578
QEX	12,569	10,190
Booklet	11,235	6,491
Other	-	8,657
Total advertising revenue	$2,057,131	$1,933,345
Publications sales:		
Booklets	$1,198,380	$ 916,452
Standard Handbooks	646,203	606,247
Tune in the World	376,152	242,985
QST newsdealers	122,082	133,920
QEX publication	54,190	39,027
Newsletters	33,924	37,033
Other	9,614	-
Total publications sales	$2,440,545	$1,975,664

See accompanying notes to financial statements.

SCHEDULE II

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

OPERATING EXPENSES

	Year ended December 31, 1987	1986
Publications:		
QST magazine	$1,275,116	$1,222,160
Booklets	505,668	417,926
Standard handbook	200,416	203,397
Tune in the World production costs	185,835	114,544
QEX production and other costs	65,836	46,592
ARRL Letter	18,998	18,640
Packet radio newsletter	20,447	19,922
Advertising production costs, net of credits of $14,027 and $16,395 in 1987 and 1986, respectively	1,478	2,053
	2,273,794	2,045,234
Forwarding expenses:		
QST subscriptions	335,224	321,766
QST newsdealers	7,281	6,479
Other publications	245,194	222,893
	587,699	551,138
Salaries	2,460,149	2,333,871
Postage	155,737	193,033
Membership supplies	90,521	59,407
Employee insurance and pension costs	303,103	310,282
Stationery, printing and forms	211,428	206,716
Office supplies and expenses	163,181	160,510
Legal and professional fees	147,605	108,727
Promotion and support	132,154	61,756
Light, heat and water	58,852	59,707
Telephone and telegraph	46,789	50,108
Insurance	32,921	23,719
Temporary employees	10,868	21,583
Laboratory expenses	18,829	20,737
	3,832,137	3,610,156
Travel expenses:		
Business	58,336	43,268
Membership contacts	35,877	32,503
Overseas	30,168	28,091
	124,381	103,862
Depreciation	186,017	209,376
Payroll taxes	171,686	164,152
Building maintenance expenses	76,051	87,774
Property taxes	62,691	54,000
Computer supplies and maintenance	30,817	35,403
Dues - Region 2 and 3	29,906	26,713
Overseas QSL service	19,871	18,302
Awards	15,898	11,685
House advertising preparation	2,793	8,909
Distribution of films	4,252	6,793
Product review	3,652	4,005
Headquarters station expenses	4,205	2,447
Other	73,379	58,104
	681,218	687,663
	$7,499,229	$6,998,053

SCHEDULE III

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

ADMINISTRATIVE EXPENSES - OTHER EXPENSES AUTHORIZED BY THE BOARD OF DIRECTORS

	Year ended December 31, 1987	1986
Division Directors expenses:		
Atlantic	$ 8,105	$ 9,424
Central	5,363	8,210
Dakota	2,465	3,546
Delta	1,285	2,670
Great Lakes	7,983	7,759
Hudson	5,782	4,467
Midwest	5,535	6,481
New England	7,868	7,601
Northwestern	11,351	13,000
Pacific	9,363	9,457
Roanoke	6,668	7,978
Rocky Mountain	3,529	4,318
Southeastern	9,578	7,465
Southwestern	12,015	10,937
West Gulf	5,095	7,441
	101,985	110,754
Section level expenses	81,969	80,648
Board of Directors meetings	84,777	64,114
Executive committee	26,883	18,462
President's expenses	11,357	16,708
Officers' expenses	8,593	15,368
National traffic system	6,801	10,175
Grants to CRRL	5,000	10,000
Comic Book expense	-	10,000
Digital Communication Committee	6,582	7,661
QSL manager expense	7,316	7,525
Volunteer resources	5,032	5,946
Blue Ribbon Committee	-	3,250
Legal Strategy Committee	2,505	2,113
Strengthening CRRL	2,723	2,838
Administration and finance	9,580	2,076
Ad hoc committee on biological effects	18	2,100
Publications	1,813	1,422
Membership services	3,535	1,476
Other committees	1,172	819
Advisory committees	3,277	720
Other	1,042	3,270
	$371,960	$377,445

See accompanying notes to financial statements.

Correspondence

Conducted By John Hennessee, KJ4KB
Regulatory Information Assistant, ARRL

FM AND PHONETICS GO TOGETHER

☐ In the article entitled "Traffic Topics de KR7L" in March *QST*, the writer has many good lessons for better message handling. However, the advice to skip phonetics on FM misses a point. While the QRM/QRN that necessitates phonetics on sideband doesn't exist on FM, other reasons for using phonetics apply to any voice mode: indistinct speech, regional accents and imperfect hearing. It takes more than a quiet channel for rapid, accurate copy of spelled-out, unfamiliar words.

Few of us have the diction of a Shakespearean actor when we say letter names. For instance, "F," "X" and "S" often blur, as do "M" and "N," and "C" and "Z." Even if a person speaks clearly, a different regional accent can throw us off. After 20 years around the Philadelphia area and with a background in linguistics, I still can't reliably distinguish an "eow" that's an "O" from an "eow" that's an "L." In addition, some people have some hearing disability.

Avoiding phonetics entirely on FM causes mistakes. These errors lead either to time-wasting fills or to trashed messages. Overdoing phonetics (such as Juliett-Oscar-Hotel-November for "John") wastes time and irritates people. Sending and receiving stations should use common sense and courtesy in the use of phonetics on any voice mode.—*Kay Craigie, KC3LM, Devon, Pennsylvania*

[Kay is ARRL Section Manager of Eastern Pennsylvania.—Ed.]

UP 10, DOWN 10—WHO KNOWS?

☐ In his article "Traffic Topics de KR7L" on page 78 of March 1988 *QST*, the writer states, "it is the station who is receiving a piece of traffic who sets the frequency when two stations move off the net." This statement can be confusing to newcomers to traffic handling.

It has long been common practice that the net control station (NCS) advises the two stations where to go: down 5, up 10 and so on. It is the receiving station who does the "calling" on a frequency as close to the NCS-assigned frequency as possible, having made slight adjustments for interference. The net control station must know where the stations have gone in the event that there is additional traffic which either of them can handle. A good NCS knows who can handle what traffic and can send additional stations to the "off-net" frequency to await completion of the original traffic.

I do wholeheartedly agree with his comments regarding the use of Q signals on phone nets and the misuse of phonetics.—*Harold C. Chapman, WB8JGW, South Vienna, Ohio*

NEOLOGISMS—NEW "OLD" WORDS

☐ In the March column, a correspondent defended the use of the word "destinated" to mean "arrived at a destination," saying that it is a "legitimate word and has been since the 15th century."

That's a little misleading. The word never meant "arriving at a destination," but meant "appointed, predetermined, fated." It hasn't been used in years and no current dictionary lists it. As long ago as 1895, the Oxford English Dictionary listed it as "obsolete and archaic."

Of course, there's nothing to prevent people from resurrecting an old word and giving it a new meaning. There's a word for such words: neologisms.—*Allan M. Lazarus, K5FYM, Shreveport, Louisiana*

FCC PART 15 REWRITE

☐ The item in the January *QST* Happenings column concerning FCC's proposed changes to Part 15 should concern all radio amateurs. The present Part 15 radiation limits are high enough to permit interference with sensitive communications receivers by computers and other intentional emitters. At my location, stray radiation from computers in the neighborhood sometimes produces S-9 birdies on the calling frequencies of 144.200 and 50.110 kHz, rendering these frequencies unusable. Worst still, the birdies are spaced at 5 to 15 kHz intervals around these frequencies, making it necessary to operate "between the cracks" of the interference. At least one cordless telephone [in my area] has wandered to 50.12 MHz, where it produces S-9 signals.

In addition to interference to the amateur, the proposal to permit a general class of RF devices with greatly increased frequency ranges poses another problem—what happens if legal amateur or commercial transmissions produce interference to the operation of the unlicensed Part 15 equipment? The rules specifically state that there is no protection for Part 15 devices. This can be difficult to explain to a nontechnical person who has spent money in good faith to purchase the latest gadget! Will the manufacturer be required to replace the device with another unit operating in a different frequency range to alleviate the interference? Will the packaging or the instructions for the device explain that interference may occur and also what can be done about it? Unlike the classic TVI/RFI problems where the interference can be minimized by filtering and other techniques, there is nothing that can be done to solve interference between equipment operating on the same or adjacent frequencies.

I think the FCC should continue Part 15 approvals on a "device-specific" basis. Otherwise, it will be left to the equipment manufacturers to decide how the spectrum will be used—and the next generation of consumer devices may show up in a more heavily populated band.—*Joe Fleagle, W0FY, Chesterfield, Missouri*

[The Part 15 rewrite is FCC Docket 87-398. The comment deadline was March 7 and the deadline for reply comments is May 9. See p 54 of March 1988 *QST* for further details.]

ROTTEN RTTY

☐ If TOM [The Old Man—Hiram Percy Maxim, W1AW—Founding President of ARRL] were still around, he would surely be writing about "ROTTEN RTTY." The proliferation of computers and commercial terminal units has made it very easy to get on RTTY and has brought great changes to the RTTY bands. They are not for the better. It's bad enough that large manufacturers flood the market with terminal units using a nonstandard 200-Hz shift. This means that those of us using sharp filters for the standard 170-Hz shift either can't print those stations or we have to go to wide filters, thereby defeating the selectivity of our receivers. The number of stations transmitting "upside down" tones (reversing the normal mark/space relationship) is remarkable.

Most distressing to those of us who have loved this mode for many years is that some RTTYers bring their "SSB bad habits" with them. For example, not listening before transmitting, not checking the frequency with a QRL? [Is the frequency in use?], sending a screen full of "CQs" with no call sign and jumping in on top of DX QSOs with their call sign just like they shout it on SSB.

DX on RTTY has always been different. As long as the DX station wants to "chat" with the stateside ham, nobody interferes. When he finally signs his last "goodbye," it is fine to jump in with everybody else and call him, but not before. Now we have "pileups" on top of DX QSOs, and most DX RTTY stations simply won't operate that way, so everybody loses.

RTTY is a friendly, easygoing mode with experienced RTTYers always willing to help someone get started. If you don't know the procedures, don't take for granted that they are like SSB. Ask someone for guidance and you will get it. This mode is too rewarding for us to let it become "ROTTEN RTTY."—*John Beckman, W4BTX, Atlanta, Georgia*

respectively

How's DX?

Conducted By Ellen White, W1YL/4
19620 SW 234 St, Homestead, FL 33031

Your contributions to this DX column have been heavy, and greatly welcomed. However, since rubber type still isn't available, your editor has to forego lead material this issue to bring you up to date.

LA DX GROUP INTERNATIONAL DX WEEKEND

June 4-5 is the time, and south central Norway the place, for the 10-year Anniversary Weekend of the LA DX Group. ON4UN will present a program on low-band DXing, OH2BH with the SØRASD story, the 3Y2GV/3Y1EE video, LA4LN/LA5NM Arctic slides, LA6VM re antenna safety/hazards, etc. The Geilo Hotel og Turisenter is reputedly economical, located less than 4 hours by car or train from Oslo, in the direction of Bergen. If you can make this delightful-sounding event, contact Bjorn-Henning Bergtheim, LA4DCA, Nebbejordet 34, N-1266 Oslo 12, Norway. Check pronto by phone: +47.2.617385.

CHINA TRAVEL

The Chinese Radio Sports Association, Suzhou Branch, cordially invites foreign radio amateurs to visit China, take tours, give lectures and attend BY4SZ activities. Permission to use the "BT" call will be given to those who apply. Suzhou is a famous city, with a cultural history going back 2500 years. Major attractions include ancient gardens, scenic and historical sites, embroidery and jade-and-wood carvings. Suzhou cuisine is highly regarded. Suzhou's hams would welcome your visit and make every effort to help you economize on traveling expenses, make local arrangements, etc. Contact the International Tour Office of the Chinese Radio Sports Association, Suzhou Branch, PO Box 51, Suzhou, China. There is a Chinese saying that "up above there is heaven and down below Suzhou and Hangzhou" comparing Suzhou to paradise. (A special thanks to K8PYD for forwarding the flyer.)

WORKED ALL BRITAIN ISLANDS AWARD

The Northamptonshire Expedition Group will be active April 30-May 6 from the island of Sark (GU) around 14.28/21.32 MHz using GBØIOS. From May 4-6 some of the group will be active from Guernsey (GU) and Jersey (GJ). They also hope to activate Alderney & Herm using GUØING/P and GJØING/P, providing ferry/plane crossings can be worked out. Cards via Dave Rogers, G4VID, 171 Havelock St, Kettering, Northamptonshire NN16 9QB, England.

MARIANAS

The peripatetic DK7PE operated from Saipan in the Marianas (Zone 27) January 13-17, using DK7PE/KHØ. During that short period Rudi made 2000 CW contacts, particularly on 80-40-160, using a FT-757GX and FL-2100 amplifier. Antennas were slopers tied from about 22 meters down to the sea. Rudi said none of his CQs were unanswered!

PJ8DFS

Last December, PJ8DFS suffered a devastating house fire, destroying everything except the clothes on the backs of his family. Yet two weeks after the fire, he was back on the air from a motel room on Sint Eustatius in the Netherlands Antilles, thanks to the heartwarming support of many hams. For a number of years David had been in daily contact with NK4B, G4PKP, KI4TI, KD4IV and PA3CXC. When word got out about David's loss, K4GDR gave NK4B a complete Heath station to send to PJ8DFS. Coincidentally, W2GBX was coming to Sint Eustatius and brought all that equipment with him, representing an outstanding morale booster! KI4TI followed up with a vertical and PA3CXC with an all-band trap vertical. NK4B has been the undercurrent force in coordinating all of the donations. PJ8DFS comments very aptly, "What more can I say for the brotherhood of Amateur Radio!"

SOVIET PERIODICALS

Two Russian-language periodicals regularly carry news about Amateur Radio: *Radio*—a monthly magazine published jointly by the USSR Ministry of Communications and DOSAAF (Voluntary Society for Assistance to the Army, Air Force and Navy), and *Sovetskiy Patriot*—a newspaper published on Wednesdays and Sundays by the Central Committee of DOSAAF.

Radio covers what in the West would be considered Amateur Radio, plus other electronics pursuits. Most issues contain a 2-page column entitled "CQ-U" (Calling all Soviet Amateurs.) "CQ-U" includes regular sections on specific Amateur Radio topics. *Sovetskiy Patriot* contains less, but often "fresher," Amateur Radio news, most of it in a serially numbered column known by the initials "NLD" ("On the Amateur Bands") and edited by UW3AX.

The following firm accepts orders for both periodicals. Details from: Victor Kamkin Bookstore, Inc, 12224 Parklawn Dr, Rockville, MD 20852-1724, 301-881-5973. *(Thanks, W4KM)*

10-METER BEACONS

28-MHz beacon reception is certainly a good indicator of the rising MUF. That old VHF pro W4HHK, of Collierville, TN (Grid EM55), supplied a list of those he identified the last quarter of '87. Some of the interesting DX-type beacons received included:

28,204.0 DLØIGI,	28,257.1 DKØTEN,
28,220.3 5B4CY,	28,262.0 VK2RSY,
28,230.0 ZL2MHF,	28,269.9 ZS6PW,
28,235.4 VP9BA,	28,277.2 DFØAAB
28,250.0 Z21ANB,	28,299.9 PY2AMI,
28,254.8 LU1UG,	28,300.7 ZS1LA

A BROTHER'S LOVING TRIBUTE

Just recently this column noted the passing of veteran DXer Al Drake, W8MPW, who along with brother Ted, W8JBI, was widely known as one of The Drake Twins. Through Ted's recent letter to this column editor are revealed some insights into the binding force of family, our world of Amateur Radio and friendship.

W8MPW (standing) with brother W8JBI.

On December 6, 1987, after a fairly short period of illness, I lost my brother and best buddy, Al, W8MPW, while at the same time the Amateur Radio world lost a highly respected fellow DXer. Al had come to be known as "W8 Mama Papa Whiskey," cultivating a host of close friends over the years while climbing to the top of the DXCC Honor Roll at 361 countries confirmed.

We started our hamming as teenagers in 1933, financing our first breadboard transmitter by buying parts with saved lunch money and by mowing lawns. We not only started together, but somehow managed 54 years of continuous play-together relationship, through college, a lifetime of employment and into retirement status. His QTH, with favorable elevation, gave him a good long-path advantage into India, Africa and the Far East. (In fact, some of our top Indian DXers have said that they began using the W8MPW signal as a sort of "beacon" to check propagation to this part of the US.) He was a meticulous QSLer, and his files of tens of thousands of cards reflect this, many carrying the notation of "thanks for my first USA contact." He would delight in listening for the weak signal and working the QRP DX station. He had a kind and understanding approach in helping others to work a needed DX station. He was invariably described as a gentleman with a warm, friendly and considerate personality for working DX, as well as rag chewing.

From the many communications received from around the world, I'm convinced that W8MPW will long be remembered by many as an outstanding DXer and will be missed for his friendly conduct and great QSO personality within the ham world. I personally miss him more than words can tell. As Father

Harry Houlihan, S83H, wrote from the Transkei, "If Al is not in heaven by now, there's little hope for the rest of us."

THE CIRCUIT

☐ **FM:** K1FJM's recent 6-meter foray resulted in a particularly handsome QSL with special text thanking all those on Martinique who proved so helpful to him (a good tip to island hoppers).

☐ **GB400A:** This July's operation by the Plymouth Radio Club will help to celebrate the 400th anniversary of the routing of the Spanish Armada by Sir Francis Drake. Hams in Plymouth, Devon will attempt to contact the 38 other Plymouths in the world on July 28.

☐ **Mayan Awards:** The Yucatan Club offers the Worked All the Mayan Area Award for contacts with three XE3 stations, one V3, two TG, two YS and two HR; any mode combination. The 100% QSL Award is for 100 cards (regardless of countries) clearly showing QSL TNX. Certified lists and 10 IRCs for each to Award Mgr David Perez-Loria, XE3DPL, Box 4-108, 97101 Merida, Yucatan, Mexico.

☐ **KH6BZF:** Propagation pundit Lee recently noted that the suspected peak of Solar Cycle 22 may yield greater levels than previously expected, leading to wonderful signs of life on 10-12-15 meters.

☐ **5H1HK:** Mas, in Zanzibar, likes 40 now but is planning high-band contesting soon. Cards via Junichi Tanaka, JH4RHF, 1-4-6 Kotobuki, Hattori, Toyonaka, Osaka 561, Japan. (Note that Jun operated FK/JH4RHF with several others last October. All cards for the New Caledonia operation go to JHG4RHF.)

☐ **Saba:** The 6 Meter DX Society will be exploring 6-meter multihop paths to the UK and EU this coming July. QRP low-band operation will also take place. The PJ6 operation goes via K2MUB (SASE please!).

☐ **V31HQ:** The Albuquerque DX Association operated ARRL phone from Belize last month; cards to WS5O.

☐ **TP2CE:** CERAC, the Council of Europe Radio Amateur Club, will use TPØ mid-June (as well as last month), and later in the year on occasion of the Pope's visit to the Council of Europe HQ Oct 8 (look for TPØPAX). Station Manager is Francis Kremer, F6FQK, 31, Rue Louis Pasteur, 67490 Dettwiller, France.

Troster's Tips for Easy Listening

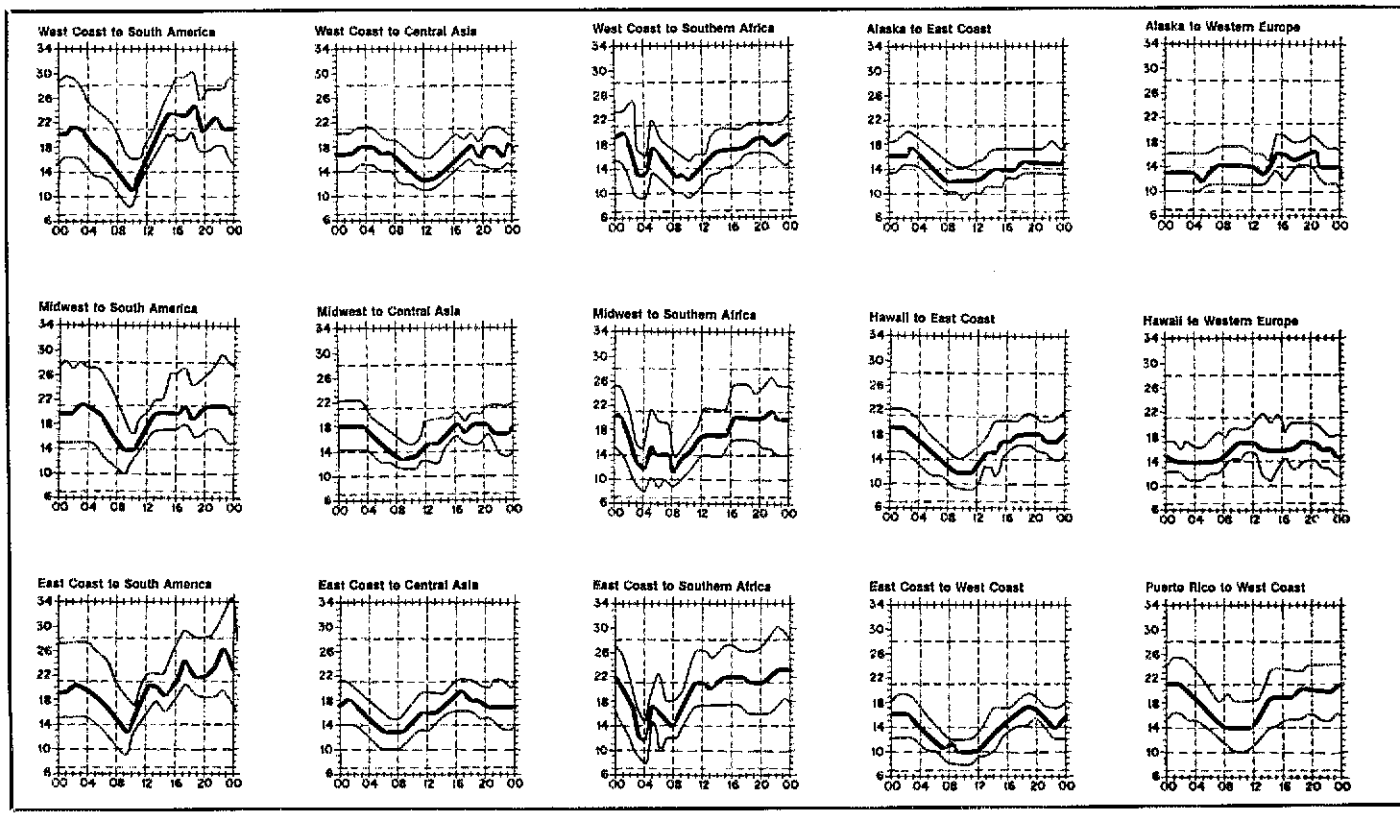
Nets and List Operations III

There is a gray line of choice between working or not working DX stations from a list on a DX net. Probably a majority of DXers who would rather not work from a list might still hedge that bet and say, "Well, if it is for a new country (or a new something), ahhhh, I'll get on the list." But you may have problems getting on the list for the rare ones. (This writer has been frustrated by not being able to break through the QRM caused by everyone trying to call the MC to get on the list!) Note: Many DX stations and DXpeditions do indeed check into nets from time to time as a courtesy to friends on the net.

Many times there isn't any really "formal" net operation. A well-located operator who can hear both the DX station and the callers may assist in identifying the station being called. (This often happens when both stations are very weak or there is a big pileup, or both.) The helpful operator might just call out the suffix of the station being called, but *not* run a list. (ie, each caller is on his own, but might get an assist to know that he is being called by the DX station.) Operators who object to lists usually do not turn down such an assist. The well-located operator is out there calling out calls, anyway. There isn't much the caller can do about it. Actually it is quite helpful!

Very few lists are ever run on CW. CW ops are most often maverick diehards who hate lists and love the wonderful world of pileups, one-upmanship and King-of-the-Hill DX tournaments.

(More soon from W6ISQ)



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

YU1AB (ex-YU1DZ) started chasing DX in 1973 and now has 323 confirmed with 7 deletions. Toma uses a TS-510 and home-brew 400-watt linear.

RC2CB is active from Minsk on 10 MHz.

QSL Corner

Administered By Joanna Hushin, KA1IFO

Here is some information for those of you who would like to QSL a QSL manager or direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

AT0NRO	(VU2APR)	T30ZK/	(JJ1TZK)
BV0RY	(JG1RVN)	T32	direct only
CI8HO	(VE3EUP)	VP2KAA	(WA4WIP)
FO0MWA	(N7NG)	V44KAA	(WA4WIP)
HC8D	(NE6K)	VP2KT	(WA4WIP)
HD8G	(KT1N)	V44KT	(WA4WIP)
HL9BK	(K2KSY)	VP2MDC	(K1TN)
HL9TU	(K2KSY)	XX9CT	(KA6V)
KH9AC	(WK6T)	ZK2MB	(NM7N)
OH6XY/		ZL9BQD	(ZL1BQD)
4U	(OH3TY)	ZL0AFZ	(N7NG)
PJ2/		ZL0AGE	(K7WF)
W1BIH	(W1AX)	6W100NQ	(DL1HH)
P42J	(W1AX)		
P40GD	(N2MM)		
T32ZK	(JJ1TZK)		
	direct only		

SPECIAL NOTES

W1RG is not the manager for anyone.
KC3EK is not the manager for HK1AMW.

QSL 5H3RB at PO Box 9534, Dar Es Salaam, Tanzania, E Africa. QSL NM2R at his 1987 *Callbook* address.

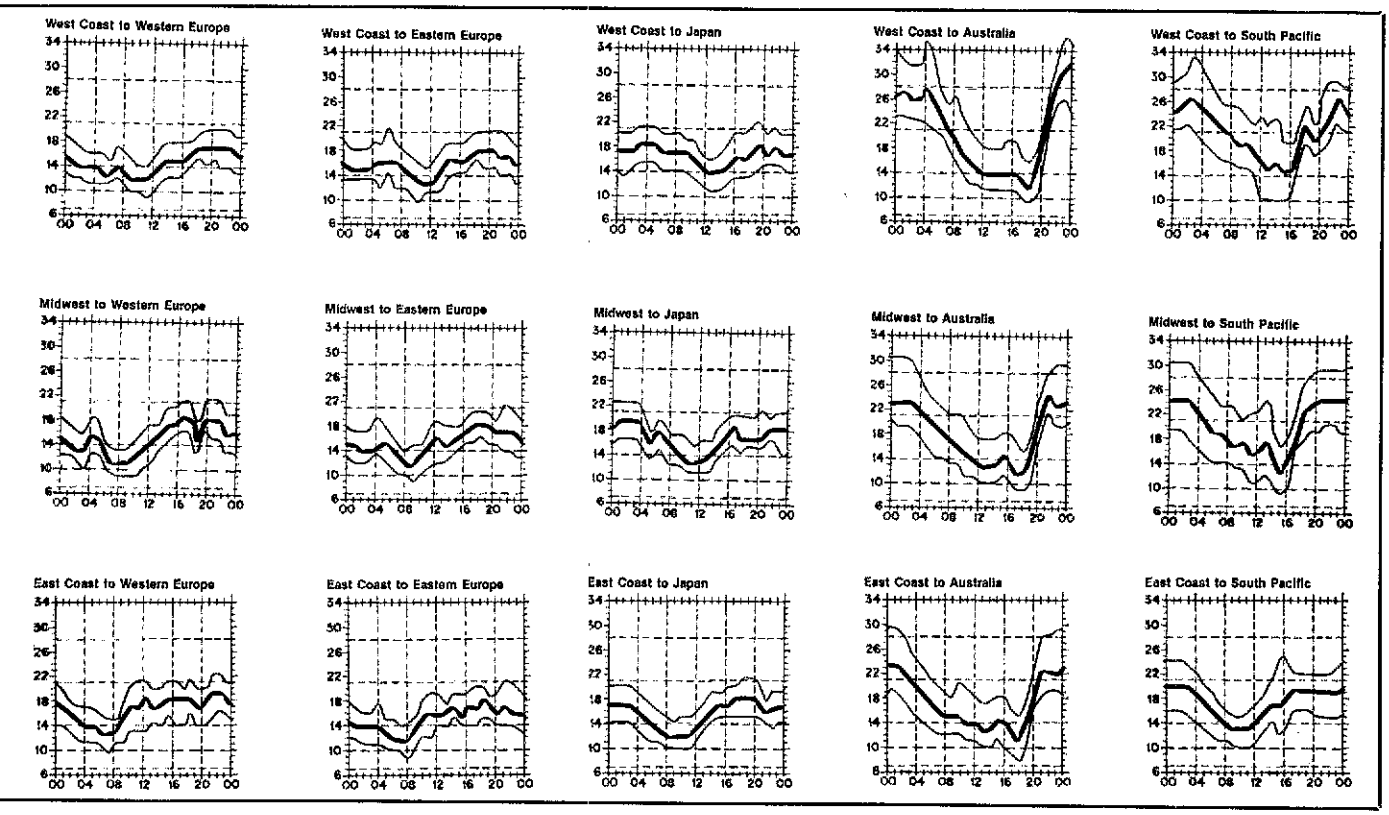
☐ QSL Corner, December 1987 *QST*, page 57, contains information and addresses for the ARRL Incoming Bureau. QSL Corner, March 1988 *QST* page 59, contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.

9N7YDY, Japan UNICEF Ham Club, made 5000 contacts from Dec 23-28, including 160 meters and packet, for the first time in Nepal. (l-r) JA7BOB JA6XBG 9N1MC (head of licensing) W6KG JN1XWO JA8RUZ (who is managing the 9N7YDY cards).

☐ **Help:** WB2TKY is looking for a clue for CR7HC, op Carlos, Nov 1974. WB1EXP is on the lookout for a QSL route for BY2BR. NV8N is searching for KZ5KB, operator Ken, July 1979 CW (NV8N is also volunteering his QSL manager aid.)

☐ **XE2GCK:** Cards for last fall's CQWW CW and this spring's ARRL DX Contest go via AA6EE.

☐ **Clubs:** The Virginia DX Century Club has elected AA4CK as President, W4EEU VP and WI4K as Secy-Treas. The National Capitol DX Association, 75 active members and a 100% ARRL affiliated club, has elected K6IR Pres, W4PBC VP, KZ3H Secy and W3UJ Treasurer.



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 May 16 to June 15, 1988, assume a sunspot number of 96, which corresponds to a 2800-MHz solar flux of 145.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300 and 5-country increments above 300. The totals shown below are exact credits given to DXCC members from January 27 through February 29, 1988. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

CO7JC/101 JD1AMA/161 JA7QFU/164 RB5WA/300 YC4FRX/105 N2ZZ/104 AA4OV/118 KB6FIW/108 NF9Z/109
DK6WL/281 JQ1DFS/110 JF7UNG/128 SM5GSH/142 7S5SAA/102 NA2H/108 K4DRL/102 KI6VR/104 WB9COP/110
DL8HAZ/177 JA2GGX/107 JA8GMZ/278 SP2JKC/212 KB1WR/102 NA2R/205 N4JVS/107 N6BIS/101 AAØA/108
I1GUG/115 JA3LUK/321 JA8GTA/287 TF6PS/117 KC1DQ/101 WA2ICE/183 WA4MXD/101 NV7J/108 NØGXA/114
IK2GXH/109 JL3TWE/110 LA9MB/133 VE3ECH/102 KZ1M/101 WB2TUU/123 WZ4F/233 KD8NO/102 NZØR/104
IV3YYK/247 JN3DRB/110 OE2DAN/141 VK7AE/300 NF1P/131 KY3T/100 KQ5G/109 W8KKB/103 WAØPTV/109
IK8EFA/166 JA5TJH/105 PAØPES/174 XE1ALH/152 W1JQ/113 NG3Q/134 WO5D/105 W8WEJ/125

Radiotelephone

DK6WL/266 IC8JAH/118 JE7RJZ/104 PAØPES/153 YB4FNN/124 W1KKG/109 WB3CQA/102 KA5KRI/112 KD8NO/100
DU1DBT/101 IKØAYV/148 JA8GMZ/143 RB5WA/181 YCØEFC/107 N2BL/149 AA4OV/123 KB6FIW/106 WB8BMX/103
EA5BD/204 IKØDNP/111 JA8GTA/286 SM4DHF/307 YV2EMR/108 NA2R/197 K4ODL/133 W6QON/125 NF9Z /109
GØDNV/100 IKØEIE/105 JAØDWY/285 VE2ME/107 KB1WR/102 NN2Q/100 KC4MK/177 W6UVJ/111 NO9G/205
GMØBCI/110 JA1HO/110 LU1FLY/105 VE3LDT/281 KC1EL/102 NG3Q/109 WA4ILQ/100 K7EHI/T32/102 NØGXA/111
IK2HTW/158 JN3DRB/110 LU2DKT/106 XE2AFK/161 NF1P/128 WA3WWA/102 WZ4F/214 NV7J/104 WØGLG/104
IV3YYK/242

CW

DK6WL/144 JF7UNG/111 OH4OJ/200 VK2EXW/105 KQ2L/178 K3YGU/139 WZ4F/167 W6JTI/150 WB9COP/101
DL3SCG/120 JA8GMZ/125 RB5WA/126 AI1N/100 NA2H/101 KI4UZ/105 AB5X/108 WD8RWU/104 KØWWX/101
JA2APA/225 JAØDWY/221 SM4DHF/245 W1FJ/217 NN2F/109 N4TL/113 KQ5G/101 K9ZXG/100 KR0I/112
JG2UUS/120 SP2JKC/202 SMØGJD/110 KA2JNV/102

RTTY

GØATX/107 OE2DAN/134 W2FCR/100

160 Meters

IT9ZGY/124 W1ENE/101 K2FL/107 W2TA/102 K8OQL/102

5BDXCC

K4ICH JA9JFO NXØI KAØCDN HB9AIB K3SEW ISØWOW W3WFM G4CNY
W2KKZ SM6AHS JA5EXW WØIJR DJ6GK N6VF LAØCX DK7SU DK6WL
SP2FWC OH3KN FD6ITD

Endorsements

Mixed

DF2PW/275 I2EOW/285 JE7RJZ/128 YU7DR/251 K3EW/250 N4DBJ/205 KD5UQ/177 WA6BXV/252 WB8RJX/312
DJ2MN/320 I2PJA/323 JH7NRE/280 4X4JO/263 K3KA/316 N4EAH/156 KF5MY/274 WA6TLA/321 K9BSL/125
DJ6DU/300 I2PTE/211 JAØCAK/317 5B4TI/261 K3NN/326 N4FKZ/HR/280 N5DC/310 WB6RSE/311 K9IJ/322
DK1IO/155 I2RFJ/305 JAØDWY/301 AK1E/255 K3NW/260 N4HOH/263 N5IH/304 WB6ZUC/318 K9JPI/199
DK3FD/323 I2TZK/283 JAØGZZ/321 K1SF/311 K3OTY/321 N4SR/324 N5IIT/154 WK6E/305 KE9F/279
DL7AET/158 I2VGU/325 KL7KJ/279 K1VKO/313 K3QMX/267 N4ZQ/134 N5JR/314 K7MO/332 KV9V/225
DL8UP/323 I2XIP/313 LZ2DF/305 KA1EKR/159 K3SEW/267 NK4L/300 W5ASP/278 WA7AUH/314 NK9X/150
DL9TW/301 I3EVK/336 OE1UZ/335 KC1GN/200 K3ZO/290 NN4Q/313 W5CWQ/315 KY7M/280 NJ9Q/229
EA5AR/230 I7HH/331 OK1ACT/332 KX1T/147 KA3LHP/127 W4BRE/339 W5EHY/299 NN7T/149 NJ9X/184
F1HWB/182 IT9JLA/316 ON7EJ/310 N1WR/137 W3BTX/326 W4KA/320 W5OG/296 W7DQ/322 NK9Y/151
F2VX/328 IT9TQH/300 OZ3KE/223 W1ACB/314 W3FGS/176 W4OMQ/336 W5UCQ/332 W7KSK/225 W9GRF/346
F6BLP/301 JA1BRK/346 PT7CQ/231 W1DQH/333 W3NV/324 W4RA/300 W6VX/300 W7LFA/334 W9JOP/202
F6BWJ/317 JA1FHK/336 PY2DBU/293 W1HOF/271 W3TEF/270 WA4CTC/231 W6YON/179 W7TE/328 W9NTU/250
F9IE/338 JA1FNA/326 SM3CBR/177 W1HSB/313 W3UJJ/313 WA4TBH/155 WD5IQA/293 WA7TNE/176 W9OKL/309
G3RTE/305 JA1IFP/334 SM5FUG/243 WA1UDH/270 WB3JRU/295 WA4TLI/322 AB6R/300 AB8K/320 WA9AEA/225
G3SJH/325 JA1IOA/307 SM6CWK/338 K2PEQ/242 AA4CM/306 WA4YLD/210 AI6Z/251 K8DB/310 WB9IWN/200
G3SWO/152 JA1KRW/184 SM6LIF/281 K2YGM/315 AA4V/324 WB4MAI/303 K6WD/322 K8NW/317 KØJW/318
G4DYO/316 JF1KKV/307 SMØAJU/355 KA2AOT/200 K4FW/267 WB4OSN/313 K6ZH/201 K8UNP/267 KA0BKR/177
G4EDG/280 JH1OCC/175 TR8JLD/282 KA2DYB/201 K4LW/282 WC4B/270 KE6LT/291 KA8T/311 KR0I/158
G4IJW/272 JH1QOJ/326 VE2GHZ/226 KQ2L/311 K4RZ/323 WS4E/279 KG6AM/250 KG8K/227 KU8A/152
G4MZF/W4/180 JR1AIB/319 VE3JGC/228 KS2M/230 KA4JNB/131 WS4G/199 KI6AN/150 W8AD/332 KWØA/325
GM3CIX/308 JA2AH/331 VK2EXW/177 W2AAN/283 KB4Q/178 K5GKC/259 NQ6E/227 W8CT/343 NØJW/280
GM4KLO/230 JF2JRC/209 VO2GD/275 W2HAZ/327 KC4B/306 K5GL/281 W6EL/348 W8HN/344 NA0Y/351
HA9RE/237 JA3RRN/299 XE1VIC/292 W2MT/315 KC4ZH/270 K5YCP/326 W6ET/355 W8LU/318 ND0F/278
HB9KU/323 JA4CQS/323 YU1SZ/285 W2SE/199 KD4S/313 KB5GL/312 W6TPJ/339 W8YMB/279 NS0B/175
HB9NU/315 JA4LXY/322 YU2CDO/296 W2TA/321 KE4VU/280 KC5M/307 W6VUN/252 WA8CAJ/149 WØRRY/311
HK1HHX/202 JA7AER/170 YU2RVF/225 AE3S/312 KI4LP/220 KD5SP/226 W6YFW/257 WA8RXI/122 WØYVA/257
I1ZXT/252

Radiotelphone

CP5LE/150 I1CAW/320 JN1WQZ/128 SM6LIF/281 K2BQW/150 KI4LP/213 K5YCP/324 W6HXW/320 K9ZZU/306
DJ1TC/258 IK1AOD/279 JR1AIB/316 SMØAJU/343 K2PEQ/158 KK4HD/177 KB5GL/309 W6NAT/235 KD8KX/225
DJ2MM/233 I1JS/314 JA3LUK/311 TI2CC/318 KQ2L/308 N4BHJ/254 KB5IW/307 W6YFW/255 W8CNL/330
DK8JB/126 I2KYM/234 JA3RRN/275 TR8JLD/259 N2AMI/300 N4ONI/225 KC5M/305 WB6RSE/289 W8LU/315
DL5SBA/177 I2LG/204 JA7AER/170 VE2GHZ/226 WA2ICE/183 N4SR/320 KC5NO/255 WB6UBR/275 WA8YTM/260
EA2SG/232 I2VGU/325 JH7NRE/278 VE3EGO/176 WA2MIS/128 N4ZQ/128 N5BCL/227 WB6VIN/287 K9ZXG/200
EA4JF/331 IK2AGN/251 JAØCAK/299 VE4AS/322 K3KA/315 NI4Y/276 N5FTR/138 WK6E/185 KC9YX/250
EA7LM/283 I3EVK/333 JAØGZZ/317 VE7XO/185 K3OTY/321 NN4Q/312 N5IH/301 K7GEX/309 KE9F/278
F1HWB/182 I3FOM/178 KL7KJ/277 VK2EXW/128 K3QMX/267 W4BRE/336 N5JR/282 KA7AUH/313 W9OKL/309
F2VX/325 IV3VER/314 LU3MCJ/295 XE1ALH/152 K3SEW/267 W4KKP/223 N5ITG/206 N7GMT/229 WA9AEA/223
F9IE/336 I4WZK/314 LU4MEE/303 XE1J/325 W3NV/324 W4RA/294 W5EHY/181 W7DQ/322 WB9IWN/200
G3MCS/328 I7HH/331 LU8DWN/180 XE1NJ/214 WB3JRU/269 WA4DPU/272 W5SZ/339 W7LFA/334 KK6L/159
G3TJW/332 IT9TQH/298 LU9DBK/226 XE1VIC/292 AA4V/322 WA4SNU/124 W5UCQ/318 W7QN/228 KU8A/152
G3SJH/325 I0OLK/329 LZ2DF/293 XE1XM/282 AA4ZK/153 WA4TLI/319 WD5IQA/290 WA7DRP/322 NØAMI/286
G4DYO/316 JA1BN/336 ON7EJ/308 5B4TI/261 K4ONF/290 WB4LND/251 WX5X/177 K8DB/307 NA0Y/345
G4IJW/265 JA1BRK/338 OZ2RM/166 AK1E/250 KC4ZH/270 WB4MAI/280 AI6Z/216 K8MDU/179 ND0F/183
GM3CIX/285 JA1FNA/323 OZ3KE/222 K1SF/302 KD4HO/271 WD4PBF/158 KE6LT/290 K8NW/316 WØRRY/282
HB9KU/276 JA1IFP/322 PP5UG/337 KA1EKR/159 KD4S/313 K5GKC/254 N6EBU/263 K8UNP/236 WA0ARS/200
HB9NU/315 JA1KRW/181 PY2JY/311 N1AIS/203 KE4VU/280 K5PQK/262 W6EL/345 K8YVI/152 WB0CHS/176
HC1HC/279 JH1OCC/166 PY5GA/331 W1NM/301

CW

DF2PW/261 G4IJW/201 JA2IU/177 OH3RF/259 SMØLJF/202 AA4CM/297 W4JTL/275 W5OG/284 WB6ZUC/306
DK5PR/290 IT9TQH/279 JA3CSZ/303 ON7EJ/308 K2PEQ/187 AA4DO/177 WB4MAI/274 AI6Z/218 WK6E/250
DL7AET/154 IK0GGW/160 JA3RRN/197 PY2KP/206 K3KA/303 AA4V/265 WB4OSN/300 K6ATV/150 NR7F/260
EA5AR/215 JA1BN/301 JA4LXY/293 SM3CBR/160 K3SEW/164 K4TEA/272 WC4B/225 K6WD/267 K8NW/310
F6CRT/288 JA1FNA/303 JA8EAT/314 SM5FUG/220 KE3A/201 KA4YAE/127 WS4G/183 NQ6E/178 K8PXG/253
F9QI/147 JA1IFP/308 JAØCAK/304 SM6CVX/297 NM3V/151 NK4L/262 N5JR/310 WA6TLA/314 W8LU/289
G3SWO/142 JA1IOA/256 LZ2DF/179 SMØAJU/316 WB3JRU/280 NN4Q/296 W5ASP/255 WB6RSE/310 WB8RJX/288
G4EDG/270 JF1KKV/289

RTTY

I5FLN/257 SM5FUG/144 K2PEQ/129 KA2BHD/125

160 Meters

LZ2DF/152 K4TEA/125

DXCC Notes

Western Sahara Country Status Clarified

On February 12, the ARRL Awards Committee unanimously accepted the ARRL DX Advisory Committee's recommendation that Western Sahara, SØ, be added to the current active ARRL DXCC Countries List. However, further consultation between the two committees was required to resolve whether SØ was to be a brand-new listing or a reactivation of Rio de Oro, EA9.

The ARRL DX Advisory Committee and the ARRL Awards Committee jointly announced on March 4 that Western Sahara will be a reactivation of the deleted Rio de Oro (Spanish Sahara) listing. Thus, Rio de Oro is removed from the list of deleted countries and returns to the current active ARRL DXCC Countries List under the name Western Sahara. Recent and continuing SØRASD operations are creditable for DXCC, but cards will not be accepted before June 1, 1988. Please hold SØRASD cards for submission beginning June 1.

FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

How to Establish Your Repeater's Identity

Each repeater has its own identity. Tune across the 2-meter band and you will discover a variety of identities: rag-chewing repeaters, DX repeaters, techie repeaters, Trekkie repeaters, traffic repeaters, emergency repeaters, drive-time repeaters, company repeaters, club repeaters, RTTY repeaters, paper repeaters, linked repeaters, autopatch repeaters, etc. Although the identity of these repeaters may be different, there is one component of their make-up that is common to all: They all must identify themselves according to a set of rules that has been promulgated by the FCC.

The Rules Are Simple

Voice repeaters have a choice. They may be identified using voice or international Morse code. If voice is the identity of choice, it is accomplished by announcing the repeater's call sign in English followed by the word "repeater." For example, my voice repeater would be identified as "WA1LOU repeater."

If Morse code is used to identify a repeater, identification is accomplished by sending the repeater's call sign followed by a fraction bar (/) and the letters RPT or just R. For example, if Morse code identification was used, my voice repeater would be identified as WA1LOU/RPT or WA1LOU/R. In addition, if Morse code identification is generated automatically, which is typical, then the code speed must not exceed 20 words per minute.

Auxiliary stations (repeater links, repeater remote controls, etc) follow the same rules except that /AUX or /A is appended to the call sign of the auxiliary station if Morse code identification is used and the word "auxiliary" is appended to the call sign if voice identification is used. The identification of the associated station (for example, the repeater) may also be used.

The rules for digital communication repeaters are similar. /RPT or /R follow the repeater's call sign, but instead of using voice or Morse code, the repeater may identify using the digital code that is used for normal communications. A radioteletype (RTTY) repeater uses ASCII or Baudot, an AMTOR repeater uses AMTOR. Packet-radio digipeaters use standard AX.25 protocol which specifies identification.

Amateur television (ATV) repeaters may identify their A5 emissions with video using readily legible characters, as long as the US standard 525-line video system is used.

Certain rules apply to all repeaters. Identification must occur every 10 minutes or less during a transmission and the identification must be modulated at a level that is intelligible through any repeated transmissions. For example, Morse-code identification on a voice repeater must be transmitted "loud enough" to be heard over any voice transmissions that may be repeated during the identification.

What's Your Sign?

The call sign used to identify the repeater must be "legal." Some repeaters are still using the old repeater call signs with a "WR" prefix (WR1LOU, for example). In the FCC's Second Report and Order, adopted March 22, 1978, it was ordered that licenses for such amateur repeater stations not be renewed. Since the licenses of all such repeater stations have long expired, any repeater still using a call sign with a WR prefix is doing so illegally.

And while we are on the subject of call signs, it is recommended that whenever a repeater call sign (or any major component of the repeater) is changed, the frequency coordinator be notified. A call-sign change can confuse an uninformed frequency coordinator. He may believe that the repeater with the changed call sign is a pirate repeater trying to usurp the frequencies coordinated to the repeater with the old call sign!

While you are in there tweaking the repeater's identification circuits, you might as well be aware of a couple of other rules that might end up in an additional tweak or two. All remotely controlled stations (including repeaters) must have provisions to limit their transmissions to no more than three minutes. This is to prevent a runaway repeater transmitter that cannot be turned off if the control link malfunctions. Also, a repeater's transmitter must cease transmitting within five seconds after actual communications are transmitted through the repeater, so check the length of the repeater's carrier trail.

And now we pause for station identification.

220-MHz RFI SOURCE

Are you experiencing a buzzing, humming or hacksawing type of noise that seems to move up and down in frequency? I was plagued with this type of problem on my 220-MHz repeater on two different occasions. I would like to share with you what I found.

The problem was almost impossible to find because the noise could not be heard on the input frequency of my repeater with a beam antenna connected to my radio on the roof of the repeater site, while the noise could be heard at the repeater antenna approximately 20 feet higher. Also, the noise was intermittent and seemed to appear for no reason. It varied in frequency, moving up and down the band.

The first time the culprit was the cable connection at the output of a condominium master antenna amplifier. The connector was corroded and loose. The amplifier was on the fourth-floor laundry room of a condominium approximately two miles from my repeater. The noise could not be heard until we were two blocks away, although we used an ICOM IC-37A transceiver with a 10-dB preamplifier.

The second occurrence was 18 months later. This time the building was an apartment complex over eight miles from my repeater. The problem was a loose cable on the input fitting of another master antenna amplifier. All I did was tighten it and the signal disappeared. The amplifier was a different brand than the first culprit and was located in the ground-floor utility room.

I have heard the same noise on UHF, 2 meters and even on 10-meter FM. I do not know if it is being caused by a similar source, but if you live in a building with a master antenna and amplifier, it might be wise to have the maintenance man clean and tighten the cables connected to the master antenna system.—*Lee Gross, KI4FF*

REPEATER LOG

According to January 1988 reports received, repeaters were involved in the following public-service events: 734 vehicular emergencies, 33 medical emergencies, 17 fire emergencies, 10 drills, 5 criminal activities, 4 public-safety events, 1 power failure and 1 weather emergency.

The following repeaters were involved (followed by the number of events): W2VL 63, WA2ZWP 3, W3LIF 5, WD4COL 2, W5FC 52, K5OS 2, WA6BJY 7, WD6DIH 106, KA6EEK 67, W6FNO 347, N6ME 137, WA7RPS 9, K8DDG 4, K9MMQ 1.

Strays

QST congratulates...

☐ Colonel Craig W. Nickisch, WØWN, of West Point, New York on receiving the Federal German Cross of Merit, First Class, for his contributions to understanding between the Federal Republic of Germany and the US. Colonel Nickisch, who has been licensed as DL4CN, DJØGF and DA1NC, is an instructor at the United States Military Academy at West Point.

The World Above 50 MHz

Conducted By Bill Tynan, W3XO
Send reports to PO Box 117, Burtonsville, MD 20866,
or call 301-384-6736 to record late-breaking information.

A 6-Meter DX Window—Let's Give It A Try

The January column introduced the concept of a "DX window" for 6 meters and offered points in favor of establishing such a window. The February column continued the discussion, concentrating on arguments against carving out a small portion of the band for working foreign stations free of domestic ragchews, CQs and rapid-fire contest exchanges.

Response to these presentations has been considerable. Most, but certainly not all, have been in favor of some form of agreement to provide everyone with a better chance of working foreign stations on 50 MHz. Some who were against the idea did not really oppose it, but contended that it won't work—so why try.

Several were dead set against the idea. None of them were what might be termed "active 6 meter DXers," although I am sure that they do operate the band. One, who identified himself as an operator at one of the East Coast multi-op contest stations, categorized my presentation of the arguments against the proposal as "yellow journalism." I admit to being in favor of the idea and acknowledge that I find it difficult to defend points of view in which I do not believe. I guess I would make a poor debater. This same gentleman went on to assert that "DX is relative," especially on the VHF bands. I contend that this belief is one of the reasons the problem on 6 meters has become so bad. Especially on 6 meters, DX, by the rarity definition, *is* relative. During the winter months, at least in years of low solar activity, a 1000-mile contact is notable, and the participants think of it as DX. However, during the summer E_s season, such QSOs are as commonplace as they are on 20 meters. Few of us seem to be able to adjust our thinking, and hence our operating practices, to these great, and often rapid, changes in propagation conditions. Hence one of the arguments for carving out a small niche where, when working stations outside the country is possible, all of us will have a better chance. During other periods, we just don't use it. Who knows, when we call CQ or rag chew with a local on what seems like a dead band, where our signal might be going. Suppose that W3XO, running in the vicinity of a kW, had been working a station a hundred miles to the west on 50.110 at 1708Z February 23, and unknowingly had E_s propagation to Kansas at the time. Look in the ON THE BANDS section and see if you think that 10-W station KAØKUY would have been able to report a contact with Argentina!

One or two expressed the opinion that the DX window proposal is being pushed by the few high-power stations, to the detriment of the "little guy." I don't quite know how to refute this contention, except to cite the above illustration. It is certainly true that those who originally offered the concept of a DX window are generally accomplished 6-meter DXers with a number of countries to their credit. Obviously, they would like to work more. This writer is certainly among the ranks of such 6-meter DXers, but the DX window idea did not originate with me. I sincerely believe that a DX window, if supported by the majority of 6-meter operators, will benefit everyone in terms of countries worked, without significantly impacting those who wish to follow other pursuits. In fact, I am convinced that low-power stations will benefit more than those of us with more elaborate installations. A high-power station can often blast everyone else off a frequency, rag chewers and contesters alike, and hence have a relatively clear channel on which to listen. A 10-W 3-element beam station has difficulty doing this.

Some who are in favor of the idea went even farther than the proposal. They contend that US and Canadian stations should not be allowed to transmit in the DX window—they should use split-frequency operation to work DX stations operating in the window. Another version of this would allow us to respond to DX in the window but not to call CQ within its confines. My view is that this is asking too much and insisting on it would probably lead to the whole concept breaking down. Besides, it is often the calls of well-equipped stations that alert DX operators that the band is open.

The most consistent argument I received against the proposal is that it results in two calling frequencies. Indeed, this is the aspect of the idea that bothers me the most. Therefore, I propose a modification of the DX window, as presented in January. Rather than retaining 50.110 as an established "DX calling frequency" and some other frequency, such as 50.130 or 50.200, as the "domestic calling frequency"—let's establish one calling frequency for general use. I propose that we try 50.125 as the universal calling frequency, retaining the concept of the DX window of approximately 25 kHz.

Thus, if a DX station answers our call and we want to do more than conduct a 15-second contact, exchanging quick reports and grids, we QSY down to complete the QSO. If, on the other hand, a US or Canadian station responds, we move up the band. This is the way any calling frequency is supposed to be used, but the procedure seems worth reiterating at this time. Of course, there is nothing wrong with calling anywhere. If one wishes to call CQ DX on 50.110, feeling that many DX stations will continue to hang out in that area, that's fine. But we should move above 50.125 to complete a QSO with an answering US or VE station—unless, of course, the participants want to continue on CW, in which case they can slip below 50.100.

I believe that this approach responds to most of the criticisms of the DX window proposal made in January, and is a reasonable approach to try. Like some have said, it may not work. Therefore, let's not attempt to cast any scheme in stone at this time. Maybe a wider DX window will be called for. Maybe none at all. But this seems like an opportune time to attempt to make an improvement in our operating habits which can benefit a great many 6-meter operators without materially harming anyone. We are just entering a new Sporadic-E season in which we have even more in the way of potential DX stations to work. This fall should see the beginning of F2 DX for many parts of the US and Canada.

Therefore, for a one-year trial period, let's establish a gentleman's and lady's agreement that we will not engage in any contacts with US and lower-tier Canadian stations—even when the band is not open—between 50.100 and 50.125. And further that, when we make contact on 50.125, we will QSY in the appropriate direction to complete the QSO. At the end of the trial period, we can all assess the results and reach a consensus as to whether the experiment has been a success and/or our agreement requires modification.

There's no better time to begin than right now. Naturally, not everyone who operates 6 meters reads this column. It will take a little while for the word to spread, but you can help in accomplishing this. Whether or not you like the idea, please try to support it for the trial period. Who knows, after that time you might change your mind. It's also quite possible that those of us who think the DX window is a good idea may change ours.

Incidentally, some of us still believe that 50.2 is the logical place for domestic calling during openings. W3XO, for one, will continue to be found there a good bit of the time. [To see how this concept may impact on this year's June Contest, see the sidebar in the VHF QSO Party announcement elsewhere in this issue—Ed.]

ON THE BANDS

The only significant propagation-related news this month concerns the aurora of Feb 23. While it was nowhere near the magnitude of the event of Feb 8, 1986, it produced its share of surprises. The first word of the event came via a call to the answering machine from DK2ZF at 1815Z Feb 22. Rolf said that auroral signals had been present in Europe since 1200Z.

As to this side of the Atlantic, K1RZ/3, a few miles north of Washington, DC, passes along a report summarizing his 2-meter results.

EME Annals

Figures are number of different stations (not total QSOs), number of US states, number of DXCC countries, all worked via EME. Compiled March 9, 1988. Deadline for next update is March 1, 1989. Those not heard from over a two-year period are subject to being dropped from the list. They will be reinstated upon submission, in writing, of expression of continued interest in moonbounce on the particular band(s) along with a summary of current figures including all needed information, ie stations, states and countries worked. It is not necessary that additional EME contacts have been made over the past two years to be reinstated.

The Beginnings

January 27, 1953: First reception of amateur signal echoes from the moon—W4AO and W3GKP. Frequency 144 MHz.
July 27, 1960: First amateur two-way contact via the moon—W1BU and W6HB. Frequency 1296 MHz.
April 11, 1964: First 144 MHz two-way moonbounce contact—W6DNG and OH1NL.
May 20, 1964: First 432-MHz two-way moonbounce contact—W1BU and KP4BPZ (followed shortly by a number of other contacts by KP4BPZ using the 1000-foot dish at Arecibo, Puerto Rico.)
March 15, 1970: First 220-MHz two-way moonbounce contact—WB6NMT and W7CNK (followed by a contact the next day between WB6NMT and K2CBA.)
October 19, 1970: First 2304-MHz two-way moonbounce contact—W3GKP and W4HHK.
July 30, 1972: First 50-MHz two-way moonbounce contact—K5WVX (now K5CM) in conjunction with W5WAX (now K5SW) and WA5HNK in conjunction with W5SXD.
April 7, 1987: First 3456-MHz two-way moonbounce contact—W7CNK/5 in conjunction with KA5JPD and WA5TNY in conjunction with KD5RO.
April 24, 1987: First 5760 MHz two-way moonbounce contact—W7CNK/5 in conjunction with KA5JPD and WA5TNY in conjunction with KD5RO.
January 22, 1988: First 902-MHz two-way moonbounce contact—K5JL and WA5ETV.

6 Meters (No minimum)

WA4NJP	5	2	2
W6JKV	2	2	1
K6MYC	1	1	1
K6MYC/KH6	1	1	1
K6HCP	1	1	1
KH6HI	1	1	1
K7KV	1	1	1

2 Meters (20 minimum)

W5UN*	778	50	64
VE7BQH*	557	50	61
K1WHS*	430	47	43
DL8DAT	411	49	68
WA1JXN/7*	344	50	43
KB8RQ*	339	—	50
W7FN*	330	50	42
SM7BAE*	306	50	65
OH7PI	289	44	44
WA6MGZ*	276	50	45
W7HAH	274	50	42
OZ1EME*	274	44	44
W7IUV*	248	46	34
WA4NJP	235	—	36
N4GJV*	233	49	40
KD8SI*	233	43	38
Y22ME*	230	46	44
SM2GGF	222	—	31
OK1MS*	215	46	42
SM4GVF*	214	43	—
UA1ZCL	200	—	25
VE1UT*	194	48	36
HG1YA*	193	33	34
KB7Q*	170	40	36
YU3USB	170	—	42
WD9ACA*	168	40	37
W5LUU*	166	43	35
WA4LYS*	159	43	46
JA6DR	138	—	25
SM2CKR*	127	22	27
HG1W*	126	32	36
WA4MVI*	120	37	20
ZS6ALE	119	31	27
F6CJG	118	—	62
SM4IVE	110	—	45
UA3TCF	110	—	40
HB9CRQ*	108	16	27
K2OS*	107	27	28
WB8PAT*	104	39	28
WA1JXN/C6A*	102	32	26
W5SUS*	102	—	34
K6HXW	100	27	25
F6BSJ	99	—	55
W7ID	97	39	23
YU32V	97	—	52
SM2CEW*	94	21	37
OZ4MM	92	18	27
LZ2US	90	—	23
WB2NPE	87	29	23
PA0VST	87	28	24
WD4DGF	87	26	24
W5UWB	86	36	25
KG6DX	83	22	27
DL8DAT	82	—	52
W4ZD	79	24	27
K2UYH	72	16	11
KF0M	68	29	18
KI3W*	65	41	24
SM3LBN	65	15	22
W1JR*	62	25	20
WD5AGO*	61	22	18
LU7DZ	61	12	16
JA9JCJ	61	—	—
GM4JJJ	60	17	25
K6MYC/KH6	60	—	14
WA7KYM	59	28	13
G3NAQ/P	59	17	16
ON7RB	50	—	36
K9SR	48	15	14
DK1PZ	48	—	12
W5FF	47	26	11
KC3LZ	44	17	12
WA7TDU*	43	22	13
AF1T	41	23	11
SM2ILF	40	—	25
I2MBC	39	19	11
PA3DZL	37	7	17
DJ5MS	37	—	—
W0VB	35	16	14
N8AXA	35	10	8
W0RT	34	19	9
SP5CJT	34	11	14
SM2JAE	34	—	19
SM0MXR	33	8	15
SM5CFS	33	—	—
OH5IY	30	—	29
K5FF	29	21	9
WA5VJB	29	14	7
SM0PYP	29	7	14
VK3UM	28	9	14
4U1ITU	27	7	11
KB3PD	26	16	10
DL8GP	26	—	—
UA3MBJ	26	—	—
WA1OUB	23	10	10
OZ1GFX	23	7	9
W8WVM	22	12	7
I4EAT	21	12	7
DL6LFU	20	2	13

1¼ Meters (No minimum)

K5FF	55	40	5
W5FF	47	38	4
W1JR	27	27	2
K9XY	16	16	3
WB5LUA	16	14	3
K2UYH	12	6	1
WA4MVI	10	7	2
W0VB	6	5	1
WB6NMT†	3	3	1
N6AMG	3	2	1
K7NII	2	1	1
W4WD/7	2	1	1
K2CBA	1	1	1
WB2BYP	1	1	1

70 cm (minimum 20)

K2UYH*	316	50	42
DL9KR*	282	50	40
I5MSH*	231	41	39
N4GJV*	215	45	40
N9AB	194	—	—
W1JR*	187	49	36
JA6CZD	177	—	—
G3LTF	171	38	33
W7GBI*	152	39	29
W0HHE	150	37	9
K1FO	144	40	30
FD1FHI*	135	30	38
W0RAP*	133	43	30
K5AZU	133	30	21
SM3AKW	132	—	—
F9FT*	126	12	48
JA9BOH*	124	28	20
YU1AW	121	—	26
JA1BLC	120	22	23
OK1KIR	120	—	32
F2TU*	112	30	23
W5FF*	109	48	19
DL7YC	109	—	—
K8WW*	106	30	24
FC1FHI	106	24	—
WA4MVI*	104	35	15
SM6CKU	102	24	26
SM0PYP*	102	23	27
HB9AB	100	—	—
YU2RGC	98	25	23
OE5JFL	98	—	22
GW3XYW*	97	—	23
OE9XXI	97	—	—
K5FF*	95	47	21
G3SEK	92	20	23
HB9G	89	—	24
KL7WE*	87	35	18
N7ART	86	39	18
W3IWI/8	85	26	22
JA4BLC	84	—	—
ON4DY	83	25	20
I2COR	81	—	31
VK3UM	73	16	29
WA4ZTK	72	26	12
SM6EWP	71	21	23
W7HAH	68	35	15
ZL3AAD	67	—	21
DF7VX	66	16	18
Y22ME	62	49	22
DF3RU	62	13	17
DK5AI*	61	18	22
W0MDL*	59	29	16
DL6WU	59	14	21
VE3CRU	57	28	16
YV5ZZ	55	—	—
SM0OJW	50	—	—
G2LQR	49	14	17
DL7APV	48	13	16
OE5EFM	48	8	16
DJ9DL	48	—	—
DK1PZ	48	—	—
XE1XA	44	16	16
SP5CIC/SM0	41	12	14
DL7QY	39	—	—
W9IP/2	38	14	10
DL2CJ*	38	6	13
G4HUL	37	—	14
JA3AJF	36	—	—
OH2DG	33	9	14
LA1K	32	11	13
KD9GT	30	10	9
HB9CRQ	27	4	10
DL7VX	27	—	—
WA9FWD	26	19	6
DF9CY	24	—	—
HB9BM	23	—	15
DJ4AU	22	—	14
WD5AGO	21	10	3
JH0YSI	21	7	12

33 cm (No minimum)

K5JL†	2	2	1
WA5ETV†	1	1	1
WB5LUA	1	1	1

23 cm (No minimum)

K2UYH	52	7	21
OE9XXI	50	7	21
G3LTF	41	8	18
SM6CKU	40	4	17
OK1KIR	39	7	11
F2TU	34	5	17
WB5LUA	33	6	18
GW3XYW	31	—	16
SM0PYP	26	4	15
ZS5JJ	26	—	13
OE5JFL	24	—	13
G3WDG	22	5	13
SM6FHZ	19	2	11
W3IWI/8	18	6	7
VK3AMW	17	3	12
DF0EME	16	—	11
G4CCH	13	2	12
JH3EAO	13	1	11
SP5CIC/SM0	12	2	10
I2COR	12	—	11
HB0BM/P	11	—	9
N6CA	9	4	5
YU1AW	9	—	8
ZL3AAD	9	—	6
DL7YC	7	—	—
K5JL	6	—	6
PA0SSB	4	2	3
W1BU†	4	2	2
HB9RQ	2	2	1
W6HB†	1	1	1
WD5AGO	1	1	1
W1JR	1	0	1

13 cm (No minimum)

W3IWI/8	11	2	6
OE9XXI	8	—	5
W4HHK†	4	3	2
DF0EME	2	1	2
F2TU	2	1	2
OK1KIR	2	—	2
W3GKP†	1	1	1

3456 MHz (No minimum)

W7CNK	2	2	1
WA5TNY	1	1	1
KD5RO	1	1	1
K0KE	1	1	1

5760 MHz (No minimum)

W7CNK	1	1	1
WA5TNY	1	1	1
KD5RO	1	1	1

*Worked all continents
†Participated in first EME contact on the band.
—Information not provided.

Dave says that he caught the opening late, about 0035Z Feb 23, but nevertheless managed to work K9VGE, EN52 Wisconsin, W3HQT/1 FN54 Maine, W9BOZ EN61 Illinois, WA8B EN82 Michigan and VE3FGU FN04. It was all over for him about 0110Z. He adds that the WWV data at the time was an A of 70 and a K of 4. This compares with the event two years ago when the K Index reached 9.

Most of the propagation surprises for the Feb 23 affair took place in the vicinity of 50 MHz. W2CAP/1 on Cape Cod reports hearing video at 49.75 between 2225 and 2320Z Feb 22. This has to be the R1 Channel used in the Soviet Union and in Eastern Europe. Steve says that at about 2310 the signals reached S7. Although he made some noise on 6 meters, he was not able to wrestle up any takers from across the pond. Another interesting reception report tells of K1JRW hearing the OX3VHF beacon the same evening. VY1CW reports from Whitehorse that he heard KL7s, W7s and W0s on 6 meters about 0435Z on the 23rd, as well as a few signals on 2 meters. Unfortunately, Bill, being a rare catch on any band, was occupied with a pile-up on 10 meters at the time and failed to get on to work anyone on either of the VHF bands.

Over the years, we have been advised to look south the day following a big aurora. During his stewardship of this column, in the late 40s and well into the '50s, W1HDQ cited many instances of openings into Central and South America the morning after. This event was no exception. W5FF, near Albuquerque, says that the band was open to the south for him for

(continued on page 69)

Conducted By Bob Atkins, KA1GT
103 Division Ave, Millington, NJ 07946

PIN Diodes as RF Switches

PIN diodes offer several advantages over coaxial relays for RF switching. They can be easily used in microstrip circuits, are often cheaper and smaller than relays and can switch faster. PIN-diode switches range in complexity from simple single-diode SPST designs to multiple-diode designs that use the diodes as filter-tuning elements! In amateur equipment, simple designs are often adequate; fortunately, the performance of such switches is easy to estimate.

Two diode parameters are important in the simplified analysis of PIN-diode switches: R_s, the series resistance when forward biased, and C_j, the junction capacitance when reverse biased. In the absence of other effects (such as lead inductance and other package parameters) the insertion loss and isolation of simple switches may be approximated from R_s and C_j. There are two basic types of simple switches: the series switch (Fig 1A) and the shunt switch (Fig 1B). For the series switch, the insertion loss can be found by

$$\text{Insertion loss (dB)} = 20 \log \left(\frac{R_s}{2Z_0}\right) \quad \text{(Eq 1)}$$

where Z_0 is the impedance of the transmission line (usually 50 Ω).

The isolation can be found by

$$\text{Isolation (dB)} = 10 \log \left(1 + \left[\frac{X_C}{2Z_0}\right]^2\right) \quad \text{(Eq 2)}$$

where X_C is the capacitive reactance at the frequency of operation of the switch, given by

$$X_C = \frac{1}{2\pi fC} \quad \text{(Eq 3)}$$

where

f = frequency in GHz
C = capacitance in nF

Thus a series switch using a diode with R_s = 2 Ω and C_j = 0.2 pF should show an insertion loss of 0.17 dB and an isolation of 18 dB at 1 GHz. Note that the insertion loss is frequency independent, but the isolation drops rapidly with increasing frequency.

For the shunt switch shown in Fig 1B the corresponding equations are:

$$\text{Insertion loss (dB)} = 10 \log \left(1 + \left[\frac{Z_0}{2X_C}\right]^2\right) \quad \text{(Eq 4)}$$

$$\text{Isolation (dB)} = 20 \log \left(1 + \left[\frac{Z_0}{2R_s}\right]\right) \quad \text{(Eq 5)}$$

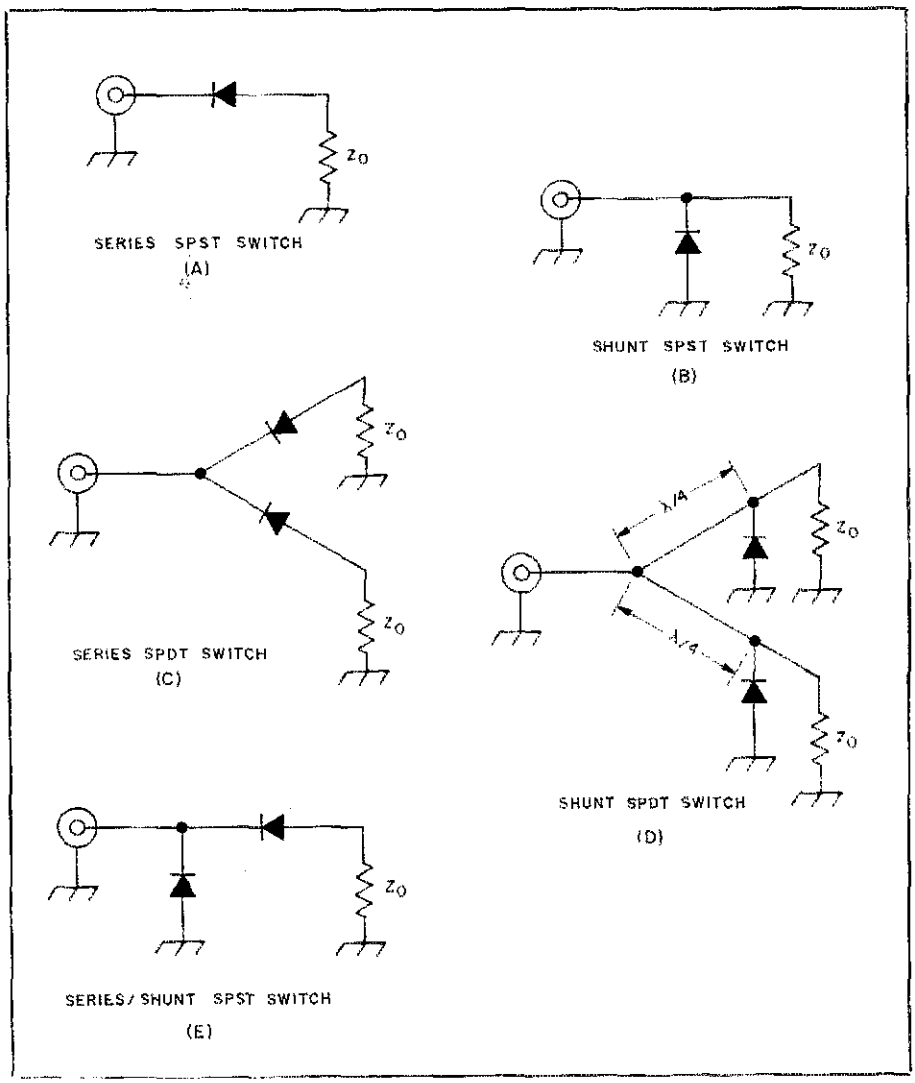


Fig 1—Series and shunt PIN-diode switch configurations. Bias circuitry is omitted for clarity. See chapter 4 of *The 1988 ARRL Handbook* for additional information.

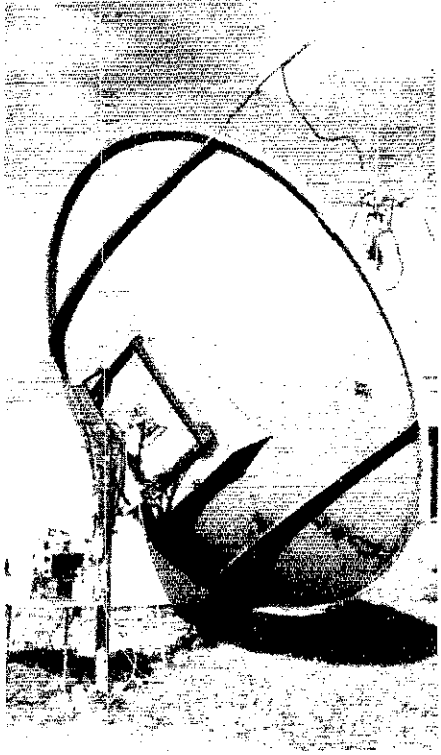
For the diode in the previous example used here as a shunt switch, the isolation is 28.3 dB and the insertion loss is 0.26 dB at 1 GHz. In this configuration, the insertion loss is frequency dependent and the isolation is independent of frequency. Depending on the application and frequency, simple switches such as these may be adequate. They can be used in multiple-pole switches as shown in Figs 1C and 1D. Fig 1C shows a simple SPDT switch using series diodes; Fig 1D shows an SPDT switch using shunt diodes. Note that the shunt diodes in this switch are placed ¼ λ away from the switching point. When either diode is forward biased, this presents a shorted ¼-λ stub (very high impedance) to the switching point, and the switch consumes virtually no power from the source.

Better switch performance than the earlier examples can be achieved using diodes in a series-shunt diode configuration, as shown in Fig 1E. Using diodes of the same R_s and C_j as described above, a switch of this type shows an isolation of 45 dB and an insertion loss of 0.15 dB. Both insertion loss and isolation are now frequency dependent, though not as much as in the single-diode configuration.

Similarly, a switch composed of two series diodes or two paralleled shunt diodes can be constructed. The performance of

switches using two shunt or series diodes (with no spacing between them) may be approximated by assuming that their R_s and C_j values are combined (in series or parallel, as appropriate) and using these values in the equations given earlier. When the diodes have electrical spacing between them, things are more complicated. Quarter-wavelength spacing is usually optimum for maximizing isolation, but as frequency increases, phase shifts in the diodes require spacing reduction to less than a physical ¼ λ.

One final word of caution: PIN-diode switch performance may be approximated by R_s and C_j characterization, but this is not the whole story. Package characteristics, lead inductance and phase shifts in the diodes may seriously affect switch performance at the higher frequencies. This is especially true in multiple-diode configurations and filter-type switches. Parasitics may be tuned out at any given frequency using external components, but things can get quite complicated; without good test equipment, attempts to tune out these parasitics can easily lead to *worse* performance rather than better!



The 10-GHz EME setup at WA5VJB in Texas. Kent used this station to attempt contact with W7CNK, Oklahoma, in January.

IR LASER COMMUNICATION, ANYONE?

Heinz Steinboeck, OE6HS, would like to get in touch with anyone experimenting with infrared laser (diode) amateur communications. Heinz can be contacted at Klosterwiesgasse 64, A-8010 Graz, Austria.

10-GHz EME ACTIVITIES

Members of the North Texas Microwave Society made their first 10-GHz EME attempts in January. The initial tests were run between Carl, KA5JPD, and Rich, WA5TNY, in Texas, and Les, W7CNK, in Oklahoma. KA5JPD and WA5TNY transmitted for 30 minutes on 10.3681 GHz using a 12-W TWT amplifier and a 10-ft dish (0.5 MW ERP), while W7CNK listened using his 16-ft dish and a receiving system with a noise figure of less than 2 dB. W7CNK was able to copy T-level signals (parts of the transmissions) from the Texans. From another location, Kent, WA5VJB, and Terry, W5ETG, attempted to contact W7CNK using Kent's 26-W amplifier and a 12-ft dish (2 MW ERP). Because of high winds, the Texans had a difficult time keeping the antenna aimed at the moon, and no contact was made. Power-supply problems with the 23-W TWT amplifier at W7CNK made two-way contact impossible with the Texans, but more attempts are planned. (tnx Kent Britain, WA5VJB)

The World Above 50 MHz

(continued from page 67)

about 6 hours on Feb 23, beginning around 1725Z. Fred reports contacts with a new 6-meter station, CX4HS, at 1948Z and LU8DIO at 2002, LU9AEA at 2012, LU9EHF at 2022, CX4HS again at 2045, TI2HL at 2104, HC5K at 2150, HC5T at 2202 and TI2NA at 2219. Heard were the TI2NA, LU2FMO and HC2FG beacons as well as a good picture from XHY-TV Merida on the Yucatan Peninsula. Fred did not hear the HC8VHF beacon in the Galapagos, which leads to speculation as to its status. The only other signals for W5FF consisted of backscatter exchanges with N5TX and W5SFW.

A similar report comes from N5JHV Las Cruces, NM who notes working many of the same stations. The farthest-north report of south-of-the-border DX comes from KAØKUY Anthony, KS. John says that he hooked up with LU9AEA at 1708Z. His 10 W produced a report of 5 × 1 while he responded with a 5 × 3.

The event also brought WA5IYX reception of quite a few TV and FM stations from Key West FL, Mexico and Central America, as well as the 6-meter beacons mentioned earlier. Incidentally, Pat says that 1987 represented the most productive year for him in terms of the number of minutes of sporadic E, as well as the best December using that criterion. As regular readers of this column know, WA5IYX maintains extensive records of E_s, as well as of F2 propagation.

That constant mode, EME, provides the rest of the propagation news this month. WA4NJP calls to report a further extension of the 6-meter moonbounce record set between him and K6MYC/KH6 on the Island of Hawaii. The new record comes as a result of an EME contact Feb 15 between him and KH6HI near Honolulu on the Island of Oahu. Rays says that signals were good, and that both antennas were elevated above the horizon.

In 70-cm EME news, I5TDJ writes that he has been able to complete eight contacts using only a single elevatable 24-element DL6WU Yagi. Piero runs only 700 W!

In 6-meter allocation news, we have something of a breakthrough. The French government has recently announced limited amateur 50-MHz privileges. Those beyond a 200 km (120 mile) radius of TV stations on nearby channels may operate from 50 to 51 MHz with 10-W ERP. Those between 160 km (96 miles) and 200 km from such stations are limited to 3 W. No 6-meter operation is permitted within 160 km of the TV stations. The French move now means that some kind of 6-meter operation is permitted in France, the UK, Ireland, Norway, Iceland, The Netherlands, Portugal, Gibraltar and Malta. Other European countries have either not made any official announcement, or the situation is cloudy.

WD4AFY reports on a fun grid-expedition the evening of Jan 6. In about three hours of 2-meter operation from EM91, just south of Savannah, GA, under the Savannah club's special call sign W2ØØHBB, Andy was able to make 29 contacts in 15 grids from EL94 in the Florida Keys to EM86 in western North Carolina. Equipment was a TS-751A to a 170-W RF Concepts solid-state amplifier to an 11-element Cushcraft beam at 40 feet.

WEST COAST VHF CONFERENCE

Too late for the April column, preliminary word has reached me regarding plans for the West Coast VHF conference. This year's affair will be held May 14 and 15 at the Buellton Holiday Inn, which is offering special rates for attendees. Buellton is in the Santa Barbara area not far from the quaint village of Solvang. This should provide the rest of the family with something to do while the hams are occupied with the conference. Additional details may be obtained from Chairman Al Soenke, WA6VNN, at 805-968-0873.

TWO ARRL PUBLICATIONS OF INTEREST TO VHFers

As most of us have observed, *QST* cannot possibly devote as much space as most of us would like to our favorite facet of Amateur Radio. Everyone—DXers, experimenters, contesters, VHFers, you name it—wants more articles, columns etc included within the covers of our League's flagship publication. In an attempt to meet the needs of many of these specialized interests, ARRL has been establishing sister publications aimed specifically at particular facets of the hobby. One of the oldest and best-known of these is *QEX*. It is aimed at the experimenter and has recently become a joint venture with AMSAT. *QEX*'s technical articles are of high quality but are the sort of thing that might not be of interest to many average *QST* readers. While most VHFers will find a number of *QEX* articles of interest, they should also be aware that the publication carries a regular column edited by Bill Olson W3HQT and another entitled VHF+ Technology authored by Geoff Krauss, WA2GFP. Annual subscription is $8 for League members.

For those especially interested in VHF contests, the new ARRL *National Contest Journal* may be just the ticket. In addition to interesting articles about contesting in general, *NCJ* includes a regular VHF contest section edited by three well-known VHFers: Mike Owen W9IP, Emil Pocock W3EP and Curt Roseman K9AKS. *NCJ* comes out every two months and has a subscription rate of $10 per year.

Depending on your particular bent, why not give one or both of these League publications a try. Write Headquarters for further information.

On Line

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

Inexpensive Software for the C64 and IBM PC

If I was a betting man, I would wager that the two most popular computers used for Amateur Radio applications are the Commodore 64™ and the IBM® PC and compatibles (the results of the On Line Mini-Survey below will determine whether mine would be a wise bet). Because these computers are so popular, hams write a lot of software for the C64 and PC, and a lot of that software gets sent to On Line. This month we'll look at some of the more recent software offerings that are free, or nearly so.

Commodore 64 Duet

• Packet Radio TNC Emulator

Barry Kutner, W2UP, is currently shipping version 2.0 of "Digicom64," a TNC emulator for the Commodore 64 computer. Version 2.0 supports multiconnections and several new disk functions that facilitate remote or mini-PBBS operation and permit 8-bit program (PRG) file transfers. The software, documentation and modem schematic may be obtained by sending Barry a blank disk, $1 to cover photocopying costs and a self-addressed disk mailer with sufficient postage. Write to Barry at 286 Leedom Way, Newtown, PA 18940. In response to many requests, Barry is now in the process of producing a circuit board for the interface that is required in order to use Digicom64 (send an SASE to Barry for board price and availability information).

• RTTY Transceiver

Roy Dancy, N4AN, has converted the WA9BVS VIC-20™ RTTY program for the Commodore 64. "RTTY64.ML" is a machine-language program (that is loaded with a single line of BASIC code) that sends and receives Baudot at 60, 67, 75 and 100 WPM (45, 50, 57 and 74 bauds). The program features type-ahead and receive memory buffers, brag and CQ message storage, automatic call-sign insertion and a 24-hour clock. A copy of the software (in LADS format) and documentation may be obtained by sending a blank 5¼-inch disk and a self-addressed, stamped disk mailer to Roy at 518 Rosemont Dr, Dothan, AL 36303.

IBM PC Quartet

• Antenna Analyzer

The "MN" antenna-analysis software for the IBM PC by Brian Beezley, K6STI, allows you to model almost any antenna employing wire or tubing elements for any frequency. You will be able to create a new design, modify an existing design for better performance or evaluate commercial or published designs. MN will calculate the forward gain, front-to-back ratio, beamwidth, maximum sidelobe level, input impedance, element currents, far-field patterns and near-field values. This software will evaluate antennas in free space or over realistically modeled ground and has enough computing power to evaluate your entire antenna system as a whole. The basic MN antenna analysis program is available without charge on many ham-oriented landline BBSs or may be obtained by mail from K6STI by sending $10 to 507½ Taylor St, Vista, CA 92084.

• Contest Logger And Duper

Dick Bass, K9RFW, has revamped and compiled his BASIC contest logging and duping program for the IBM PC (originally PX program number 116). The new program can dupe 3500 contacts in two seconds, as opposed to the old version that took 8 to 10 seconds to dupe 2000 contacts! The new software is contained in four .EXE files and is capable of logging and duping 3500 contacts per disk or 3500 contacts per band if a separate disk is used for each band. Dick will provide his software to anyone who sends him $5 to cover the cost of disk, postage and mailer. Dick's address is 1786 Concord Dr, Princeton, IN 47670.

• CW Tutor

"CWTUTOR" is an IBM PC program written by Don Babcock, N5DP, as part of a formal college curriculum which included training from Novice through Advanced-class licenses. The program has been used by many students to master code reception. Of note is the automatic generation of plain-language QSO practice material with a subsequent written VEC-style test. This valuable program is free and may be downloaded from DL6 (data library 6) of CompuServe's HamNet.

• Logbook

Dave Myers, KD2MT, has written a public-domain logbook program for the IBM PC called "KD2MT Logger." It is intended to allow you to maintain a general-purpose logbook (as opposed to a contest log) on your computer. Patterned after the ARRL Logbook, the program works best on a color system with a hard disk, but it can be run on other systems. The program may be downloaded from the RTA BBS at 919-471-8048 or the C:DOS-RBBS at 919-361-2638. The program may also be obtained by sending a blank 5¼-inch disk and a self-addressed, stamped disk mailer to Dave at Box 9861, Duke Stn, Durham, NC 27706.

On Line Mini-Survey

I am seeking your input concerning On Line. What do you like? What don't you like? What do you want to see more of and less of? As I said in the first installment of this column back in 1981, "...this is your column. It is 'full-duplex.'" Let me know what you want!

In the past, some of you have written to let me know your opinions concerning On Line, but I know many of you do not have the time to sit down and compose a letter. Here is a painless way to accomplish the same thing. It will only take a few minutes of your time to fill out the survey and mail it to Survey, c/o Stan Horzepa, WA1LOU, 75 Kreger Dr, Wolcott, CT 06716-2702. Do it today!

1) Are you active on packet radio? (circle one) Yes / No / Soon to be

2) Would you like to see On Line devoted exclusively to packet radio? (circle one) Yes / No / Don't know

3) Have you ever requested a program listing from the On Line Program Exchange (PX)? (circle one) Yes / No

4) Do you favor dropping or retaining the On Line Program Exchange (PX)? (circle one) Drop PX / Retain PX / Don't know

5) Would you like to see On Line published more or less often (the column is now published eight times per year)? (circle one) More often / Less often / Stay the same / Don't know

6) What kind of computer (manufacturer and model) do you use most often for ham radio applications?

7) What topic(s) would you like to see covered in On Line?

(cut out or copy)

Strays

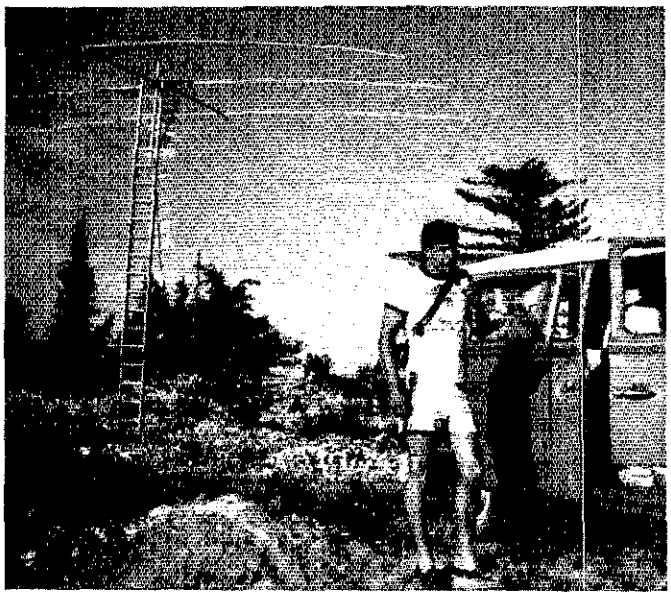
I would like to get in touch with...

☐ anyone with info on CW/RTTY/AMTOR/Packet/SSTV/FAX software for Genie II computer (equivalent to Tandy TRS-80 Level II). Doug Wheile, G3AKJ, 4 Portland Park, Ilfracombe, N Devon EX34 9HS, England.

Club Spectrum

Conducted By Lee Hayford, AH2W
Club Services Manager, ARRL

Field Day Frolics Attract Young Hams



Field Day fun comes for a GPHRC member with that first 5 x 9 signal report! Kurt Kromholtz, KC7FJ, Club Supervisor, Gonzaga Prep Ham Radio Club, Spokane, Washington, submitted photographs and wrote parts of the following article.

Small in Numbers Doesn't Necessarily Mean Small in Spirit

The Gonzaga Prep Ham Radio Club of Spokane, Washington reports that since last year their club has grown from 15 to 20 members. But Gonzaga Prep's strength lies in the quality of its membership, not just its quantity. Teenagers exude enthusiasm and respond well to Amateur Radio clubs focused on activities. Field Day is a tailor-made ham radio activity that attracts young hams. Club Supervisor Kurt Kromholtz, KC7FJ, explains why.

"After a multitude of abortive attempts to attract some likely youths with various staple ham radio activities, we stumbled upon one apparent winner: ARRL Field Day. Fortunately, we secured a terrific location, a state-maintained campground near the summit of a local mountain almost 3000 feet higher than the metropolitan area.

The Three Cs

"Teenagers love to *camp*, they love to *compete*, and they love *camaraderie*. Field Day provides it all. Additionally, we have gotten excellent media coverage (TV and newspaper), which subsequently inspired the news-hungry staff of the school newspaper to do a series of feature articles on the club's exploits. After eight years of Field Day participation, our club has begun to score with the best in this event. In 1984, and again in 1986, we were the top scoring high school club in the nation. This is no easy job for teams in our remote (Pacific Northwest) location.

A Consistent Field Day Effort Breeds Success

"All this success has been a real boon to the program. We've moved from weather-vulnerable tents to two large vans and a plush RV. We've developed natural and portable power sources and high-performance home-brew monoband beam antennas, all with alumni help and donations from local hams. We now are confident that if an emergency situation arises, Gonzaga Prep club members will be successful in providing community officials with necessary communications."

Field Day is an Amateur Radio Publicity Opportunity

The public service aspect of Amateur Radio is sometimes overlooked by community officials, simply because they don't know how Amateur Radio operators can assist them during an emergency. Field Day is a perfect time to raise their awareness of Amateur Radio's potential. Your club will also probably get plenty of curious stares and inquiring looks from people if you set up a station in a public place. Your club will automatically receive a Field Day Publicity Packet when writing in to League HQ for Field Day Contest Forms. The Club Services Department also has brochures—like "Amateur Radio: A National Resource" and "Ham Radio: A Community Resource"—and "prospective ham package" stuffers; ie, Novice Enhancement information sheet, W1AW schedule and simplified ARRL Publications List for just Novice publications, cover letter explaining the different Amateur Radio license classes, basic information on the types and cost of equipment, etc. Write or call for more information, today!

IARU News

Conducted By Richard L. Baldwin, W1RU
HC 60, Box 60, Waldoboro, ME 04572

CEPT Licenses—Will They Spread Throughout the World?

Last month in this column we had some thoughts from DJ7ZY about CEPT licenses. This month he shares some further ideas with us on how the concept might be encouraged in other parts of the world. To a considerable extent, the success of his suggestions lies in the hands of individual Amateur Radio societies and how persuasively they approach their administrations with the concept of a Common License. The year 2000 is only 12 years away—wouldn't that be a good target date for worldwide implementation of a Common License?

Thoughts on the geographical extension of CEPT regulation

1) *The implementation of CEPT Recommendation T/R 61-01 by additional CEPT administrations.* Amateur Radio societies of those CEPT countries not yet applying the CEPT Recommendation should approach their administrations in this respect. If the application of the Recommendation cannot be envisaged for the near future because of jurisdictional reasons, the Amateur Radio societies should at least apply for CEPT license-class certifications being issued to their radio amateurs. Such documents issued in conformity with the requirements of the CEPT Recommendation would enable their radio amateurs to operate in other CEPT countries without applying for individual visitor licenses.

2) *Possible participation of non-CEPT-member countries in the CEPT regulation.* (A) When in CEPT some years ago efforts were made towards achieving a common license, I had the opportunity to propose the inclusion of provisions for the participation of non-CEPT-member countries. However, it is understandable that at that time such a wide scope did not materialize because the concerned CEPT sub-working group did not even know if and how the whole matter would work out within the CEPT community. So this idea was dropped. This was a pity, because CEPT is a relatively small community compared with our sphere of interest—namely, the whole of Region 1 or even the whole world. But in my opinion the good experience gained meanwhile in CEPT now allows new efforts to be made towards an expansion of the CEPT regulation to non-CEPT countries. I see two possible ways to achieve this.

(A) A non-CEPT country could ask a CEPT country to apply Recommendation T/R 61-01 in the two countries on the basis of a bilateral agreement. This could work, because similar bilateral operational agreements have been in force for a number of years. Even two non-CEPT countries could come to such bilateral agreements on the basis of CEPT Rec T/R 61-01. The German PTT administration is very much in favor of such procedures.

(B) Another, and, in my opinion, better way of opening the CEPT regulation to non-CEPT countries could be tried along the following lines. Some non-CEPT countries could approach the CEPT with their desire to participate in the CEPT Recommendation. At this stage, I judge the readiness of CEPT to discuss this topic as being good. The German PTT administration, for example, certainly would support such ideas. Of course, some additional provisions would have to be agreed upon. These additional rules for "newcomers"—that is, new countries—preferably could form a new Appendix III of CEPT Rec T/R 61-01. One important part of this new Appendix then would have to be a list of equivalences of the national license classes as compared with the two CEPT classes.

Without going into detail, I would like to point out another fact which should be recognized by every participating non-CEPT country as well as by every radio amateur of any participating country. Although from the expression and its general meaning a "Recommendation" seems to be something noncompulsory, within CEPT it has the meaning of being absolutely binding. Within CEPT all rules for the harmonization of technical, operational or administrative matters are laid down in the form of "Recommendations." The rules have to be observed by all administrations which implement the respective recommendation.

(3) While up to now the Amateur Radio societies of non-CEPT countries perhaps have not been too interested in this whole issue of common licensing, because the first step in this respect was organized within a small group of Region 1 countries, hopefully this lack of interest will be overcome now. DARC will of course continue its efforts to extend the area of validity, but it is now necessary for other Amateur Radio societies not within CEPT also to participate actively in the work of the IARU Region 1 Common License Group (CLG).

The terms of reference of this CLG were laid down in 1981. At this stage, one may probably summarize the necessary action in the shortest way by calling...

"CQ DX for countries wishing to participate in the Common License."
—*Norbert Gabriel, DJ7ZY*

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*.

Canadian NewsFronts

Conducted By Harry MacLean, VE3GRO
500 Riverside Dr, London, ON N6H 2R7
Tel 519-473-1668

DOC Proposes New Licencing Structure

On February 20, representatives of CRRL and CARF participated in the first meeting of a DOC-Industry Working Group (in this case, the "industry" was Amateur Radio) dealing with Restructuring of the Amateur Service. At that meeting, DOC indicated it was strongly committed to a new structure based on four classes of certificates, including a no-code VHF-UHF entry-level certificate, to be implemented by late summer 1989. Details of the DOC proposal are in the table at right.

Certificate	*Proposed Requirements*	*Proposed Privileges*
A (entry-level level certificate)	no code; 100-question technical exam based on 40 hours of study of (1) basic electronics; (2) Amateur Radio systems, (3) antennas and and propagation, (4) interference and suppression, and (5) regulations and operating procedures	all modes, all amateur bands above 30 MHz, maximum 250 watts input, "commercial" transmitting equipment only
B (to be used in conjunction with Certificate A)	5 WPM code exam	privileges as for Certificate A above, *plus* all mode, 3.5-4.0 MHz, maximum 250 watts input, "commercial" transmitting equipment only
C (to be used in conjunction with Certificate A)	12 WPM code exam	privileges as for Certificate A above, *plus* all modes, all amateur bands below 30 MHz, maximum 250 watts input, "commercial" transmitting equipment only
D (to be used in conjunction with Certificate A or a combination of certificates above	advanced 50-question technical exam	band and mode privileges as for other certificates held *plus* the right to use maximum legal power and homebuilt transmitting equipment, and be a licensee of a repeater or remote base station

While DOC is strongly committed to a four-certificate structure, DOC members of the Working Group reiterated that nothing was "cast in stone" and that many details of the proposed structure were still open for discussion. These included (1) names of the various certificates, (2) operating privileges associated with each certificate, (3) relative difficulty of the two technical examinations, (4) requirements to use "commercial" equipment, and (5) accommodation of holders of the present Amateur, Advanced Amateur and Digital Amateur certificates.

How does the new DOC proposal differ from the joint CRRL-CARF proposal submitted 23 months ago? (See 1986 August *QST*, pp 66-68.) There are superficial differences having to do with number of certificates, code speed requirements and the like. The most important difference is that the proposed DOC structure gives more operating privileges before a second technical exam. This could reduce the incentive to upgrade. This could also place a burden on the first technical exam to be more comprehensive—and possibly more difficult—than the first technical exam for the structure proposed by CRRL and CARF. Whether this would make it difficult for the restructured Amateur Service to attract more and younger amateurs will require careful study.

At this time, opportunity for comment from the Amateur Radio community directly to DOC is probably past and will not reappear until a notice appears in the *Canada Gazette*. If you have comments that would be helpful, they should be directed to your national Amateur Radio organizations. CRRL particularly solicits such comments. Please send them to CRRL Headquarters, with a copy directed to your nearest member of the CRRL Board: VE1ASJ, VE2ZZ, VE3CDM, VE3FN, VE3GRO, VE6ABC or VE7EWI.

SECTION MANAGER ELECTION RESOLICITATION: SECOND NOTICE

To all amateurs in the Maritimes-Newfoundland Section: You are hereby resolicited for nominations pursuant to an election for Section Manager. Because of space limitations, a full election notice is not reproduced here. Please check this column in 1988 April *QST*, p 77, or contact CRRL Headquarters for complete details on how to prepare and submit a nominating petition.

NOTES FROM ALL OVER

☐ Those who doubt the need to attract more and younger amateurs to the Canadian Amateur Service should ponder these figures provided by DOC: At the present time, only 4.6% of all Canadian amateurs are under 30, 15.1% are between 30 and 40, 20.0% are between 40 and 50, 20.6% are between 50 and 60, 22.2% are between 60 and 70, and 17.5% are 70 years of age or over. Some simple arithmetic shows that just over 60% of all Canadian amateurs are over 50; their present mean age is probably 55.

☐ A number of amateurs have contacted CRRL to ask "What is CRRL's official position regarding the placement of the AES Wind Profiler Doppler-shift radars on 441.0 MHz?" CRRL's official position is that the radars are in the METEOROLOGICAL AID SERVICE, which is defined by ITU as "a radiocommunication service used for meteorological observations and explorations." CRRL believes that they are not in the RADIOLOCATION SERVICE which is a part of the RADIODETERMINATION SERVICE not used for navigation. RADIODETERMINATION is defined by ITU as "the determination of the position, velocity of an *object*...by means of radio waves." Now, "object" is defined by most dictionaries as something that can be *seen* or *touched*, and the AES Windprofiler radars will be looking

for weather disturbances and not "objects." For this reason, CRRL believes that the Windprofilers have no business in the 430-450 MHz band where stations in the RADIOLOCATION, AMATEUR and AMATEUR SATELLITE SERVICES are the only legitimate users of the band. CRRL believes that the Windprofilers should be assigned to the METEROLOGICAL AID SERVICE on 404.37 MHz, as they are in the US. This official position is on file with DOC.

☐ DOC has advised its District Offices that it has no objection if amateurs holding an Advanced Amateur Certificate or an Amateur Certificate with a "six-month endorsement" operate packet radio on frequencies recommended by the ARRL Committee on Amateur Radio Digital Communications. (The list of these frequencies appears in 1987 September *QST*, p 54; additional information appears in 1988 March *QST*, p 51. The committee responsible for choosing these frequencies had two Canadian members: Doug Lockhart, VE7APU, and David Toth, VE3GYQ.) DOC has routinely given individual amateurs special authorization to operate packet radio on these frequencies. The present DOC initiative, which was not requested by CRRL or believed to have been requested by any other Amateur Radio group, appears to be aimed at encouraging packet-radio activity and eliminating what has come to be viewed as an unnecessary administrative procedure.

☐ At press time, the joint Soviet-Canada Polar Skitrek was going well. Many amateurs were following the skiers' progress by copying UoSAT OSCAR 11's digitalker on 145.825-MHz FM, and many amateurs had made contact with Skitrek's Canadian base station, CI8C. A commemorative QSL card is available for working CI8C. QSL through Box 313, Don Mills, ON M3C 2S7.

☐ This is probably the last "Canadian NewsFronts" column that will appear in *QST*. We have enjoyed preparing these columns for the past eight years. To our many US readers, significant items of news from "north of the border" will make their way into "League Lines," "Happenings" and other columns in *QST*. To all our Canadian readers, unless Murphy intervenes, we should have a surprise for you next month. We hope you like it.

Strays

IS YOUR EVENT ACCESSIBLE?

☐ I would like to urge all radio clubs who sponsor flea markets, auctions, club meetings, hamfests or any other event to include in their announcements whether they are wheelchair accessible. It is very discouraging to travel great distances in anticipation of fun and be greeted by stairs or other stumbling blocks to us hams who are real mobile stations on wheels.—*Steve Rich, WA1DFL*

AMATEUR RADIO TECHNICAL SESSION

The IEEE International Conference on Communications '88 will feature a technical session on recent developments in Amateur Radio. The conference will be held June 12-15 at the Wyndham Plaza Hotel in Philadelphia, Pennsylvania. The session, from 12:15-1:45 PM on Wednesday, June 15, is open to all radio amateurs as well as ICC '88 participants.

Kay Craigie, KC3LM, ARRL Eastern Pennsylvania Section Manager, will chair the program and speak on "Amateur Radio in the Delaware Valley." Tom Teel, KB3UD, Third Region Packet Manager for NTS, will present "Packet Radio: Past, Present and Future." Ron Cohen, K3ZKO, and Jack Smith, K3AFK, leading Philadelphia-area ATV exponents, will demonstrate "Amateur Television."

Jim Metzger, KA3HWD, will guide a tour of the Liberty Bell ARA's club station, located two blocks from the hotel at the Bell of Pennsylvania building, after the session. Visiting amateurs are welcome to operate the club station and use the repeaters located at the Liberty Bell site (145.25—KA3HWD/R, 224.52—K2PM/R and 443.10—K3QFP/R).

The general theme for ICC '88 is "Digital Technology Spanning the Universe." Other scheduled technical sessions include optical technologies, intelligent networks, data communications techniques and radio systems. The conference is co-sponsored by the IEEE Communications Society and Philadelphia Section IEEE.

Attendance at the Amateur Radio session is limited to 50 and pre-registration is necessary. For more information, write ICC '88, c/o ATT Network Systems, 1800 John F. Kennedy Blvd, Ste 1300, Philadelphia, PA 19103, or call 1-800-ICC88PH (in the continental US) or 215-972-1308 (outside US) weekdays between 8 AM and 4:30 PM EDT.

OSCARLOCATOR UPDATE

OSCARLOCATOR ground track and range circle overlays for the FO-12 and RS-10/11 satellites are available from HQ. Send $1.00 to:

Technical Department
OSCARLOCATOR Update
ARRL
225 Main St
Newington, CT 06111

Welcome SSCs!

The following clubs have demonstrated their zeal for enhancing enjoyment of Amateur Radio and going the extra mile in serving their local communities. These clubs were granted Special Service club status after demonstrating effective programs in six areas: (1) Public Relations, (2) Emergency Communications, (3) Training, (4) Technical Advancement, (5) Operating Activities and (6) ARRL Membership Recruitment. The number in parentheses is the number of club members. Welcome aboard!

Alliance ARC, Alliance, OH (37); Blue Valley ARC, Inc, Beaver Crossing, NE (44); Hellgate ARC, Missoula, MT (55); Jersey Shore ARS, Lakewood, NJ (169); Packet and Repeater Klub, Libby, MT (11); Penn-Mar RC, Hanover, PA (63); St Louis ARC, Inc, St Louis, MO (22); South Shore ARC of Suffolk, Deer Park, NY (55); Temple ARC, Inc, Temple, TX (74); York RC, Villa Park, IL (35).

The following renewing Special Service Clubs have reaffirmed their commitment:

Ausable Valley ARC, Fairview, MI (45); Central Kansas ARC, Inc, Culver, KS (55); Central Missouri RA, Columbia, MO (52); Clover Leaf ARC, Inc, Brooksville, FL (30); Coconino ARC, Flagstaff, AZ (56); Cubs ARS of Sedro Woolley HS, Sedro Woolley, WA (28); Cumberland County ARS, New Kingston, PA (19); Downey ARC, Inc, Downey, CA (93); Evergreen Amateur Radio Services, Port Ludlow, WA (54); Granite State ARA, Manchester, NH (54); Great Bay RA, Dover, NH (93); Great South Bay ARC, Babylon, NY (92); L'Anse Creuse ARC, Mt Clemens, MI (145); Lake County ARA, Mentor, OH (104); Maury ARC, Hampshire, TN (78); Mountain ARC, Cumberland, MD (150); Mid-Atlantic ARC, Villanova, PA (160); Motor City RC, Wyandotte, MI (89); Nashua Area RC, Nashua, NH (223); Northeastern Indiana ARC, Auburn, IN (47); Northwest Arkansas ARC, Inc, Prairie Grove, AR (220); Oregon Tualatin Valley ARC, Inc, Portland, OR (257); Paul Bunyan Wireless Assn, Pequot Lakes, MN (25); Pilot Knob ARC, Leavenworth, KS (56); Raleigh ARS, Inc, Raleigh, NC (165); Reservoir ARA, Celina, OH (35); St Paul RC, Inc, N St Paul, MN (316); San Antonio RC, San Antonio, TX (329); Sierra Foothills ARC, Auburn, CA (139); Steel City ARC, Inc, Carnegie, PA (125); Suffolk County RC, Bayport, NY (86); Tippecanoe ARA, Inc, Lafayette, IN (43); Top Of The Panhandle ARC, Booker, TX (10); Virginia Beach ARC, Virginia Beach, VA (200); West Haven Amateur Repeater Assn, West Haven, CT (73); Westchester Emergency Communications Assn, Inc, N Tarrytown, NY (150); Worthington ARC, Worthington, MN (29).

Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

Iowa's Tall Corn and Abundant Hospitality Greet SSBers

What better way for WAØAVW to celebrate his own 25 years in Amateur Radio than to host a convention for his friends and fellow members of the YL International Sideband System? It seems to have started at the Seattle convention in 1986 as members were trying to decide where the 1987 gathering would be held. "I started to give some thought to a solution and came up with the idea of hosting the group in Des Moines," recalls Rex. "At the time, Marilyn and I were a bit apprehensive but soon we agreed that it would be a great idea. Our excitement increased at the thought of showing off our great state and the lush green cornfields to all of our YL System friends."

With the help of the Iowa Convention Bureau, the Whites put together a packet of tourist information for the members and nothing was spared in the selection of the Fort Des Moines Hotel as the convention site. The hotel boasts a prestigious listing on the National Historic Register and members were fortunate to have a hospitality room set up in the hotel's famous Presidential Suite. Being located near the top of the hotel, there was no problem in setting up the appropriate antennas for the convention's radio station.

N4DDK receives some expert advice about Iowa corn from WAØAVW.

The first scheduled activity of the convention was a barbecue, Iowa-style. The Whites opened up their home (and cornfields) to the Sidebanders and, with the help of local corn-farmer families, put on an outdoor banquet complete with tempting home-cooked food.

The Sidebanders were bused to the Living History Museum, where they toured the facility and learned about life on a prairie farm from the 1900s to the present. The exhibit included several examples of farm buildings, equipment and activities typical of specific periods. When the guests weren't visiting Des Moines' local attractions, including the Sky Walk and Botanical Garden, they were privileged to hear from XE1CI and WD9GQV about their participation in DXpedition activities.

The 1987 convention's highlight was the annual awards banquet where the System's loyal members were acknowledged for their outstanding dedication and contributions to the efforts of YLISSB. For more information concerning the 1988 convention, to be held in Orlando, Florida, contact N7SD, Box 4613, South Daytona, FL 32021.

Rex, WAØAVW, and Marilyn White earned praise from Sidebanders for their warm hospitality and for making the Iowa convention a memorable event. (*photos courtesy KB9OC*)

YLISSB members relax in the convention's hospitality room at the Fort Des Moines Hotel.

XE1CI made the trip from Mexico to renew acquaintances with YLISSB members.

SSBers arrive at the home of WAØAVW and his XYL. All gathered for a barbecue hosted by local corn farmers.

Conducted By
Vern "Rip" Riportella, WA2LQQ
PO Box 177, Warwick, NY 10990

Phase 3C: What Do You Need To Work It?

AMSAT's new Phase 3C satellite will be launched soon. As you know from previous columns, the spacecraft carries four transponders: Modes B, JL, S and RUDAK. This month, we'll look briefly at the ground station capabilities required to operate Modes B, JL and S.[1]

Beginning satellite users may be surprised to find that much of the basic ground station equipment is already in the shack or, with a little prudent shopping, can be found at a springtime flea market. Mode B operation on Phase 3C should be the easiest to achieve for the newcomer.[2] To work Mode B, you transmit to the satellite on 70 cm and receive signals from the satellite on 2 meters.[3] Table 1 provides suggestions for the minimum recommended equipment for working Phase 3C, Mode B.

Let's walk through the uplink requirements. The operating frequency is self-explanatory. "EIRP" is Effective Isotropic Radiated Power. You calculate this by adding the gain of your antenna (in dBi) to the power (in dBW) at the antenna feed point.[4] The recommended value of 21.5 dBW corresponds to 141 W EIRP. This can be obtained by feeding 10 W to an antenna having 12 dBic gain.[5] As shown, the polarization should be right-hand circular (RHC). As a compromise, linear polarization, either horizontal or vertical, can be used, but the results obtained may be less satisfactory because of spin modulation.[6]

For your Mode B receive system, the frequency and polarization requirements are self-explanatory. Although the minimum receive antenna gain recommendation is 10 dBic, several commercially available antennas surpass this value by 2 to 3 dB and should be considered. Selecting a higher-gain receive antenna is nearly always worth the cost since it relaxes requirements elsewhere in your system. The exception comes in when you have to elevate the antenna as well as rotate it in azimuth.[7]

The recommendations in Table 1 suggest a preamp is a good idea for Mode B. If you use a short run of good, low-loss transmission line such as Belden 9913, you can leave the preamp in the shack and needn't weatherproof it. Using an expensive preamp with a noise figure of anything less than 2 dB or so is a waste because the sky noise at 145 MHz far exceeds 2 dB. An inexpensive preamp with a gain of 18 to 20 dB should work just fine.[8] I'll talk about effective noise temperature and figure of merit in detail in a future column.

For the experienced satellite user, Mode JL should be the closest thing to perfection yet offered. Mode JL combines 24-cm (1269-MHz) and 2-meter uplinks to produce a 70-cm downlink. Mode JL's combination of low uplink power requirements, small antennas, low sky noise, low spin modulation, wide passband and so forth, should delight the heart of anyone who has ever wished for a broad-coverage DX satellite. Moreover, the combination of 2-meter and 24-cm uplinks means those living where 24-cm equipment is difficult to obtain can enjoy using 2-meter uplinks on this fine mode, just as many enjoyed using Mode J (2 meters up, 70 cm down) on AMSAT OSCAR 8 in the late 1970s. Table 2 presents the minimum recommended station capabilities for Mode JL use. As mentioned earlier, the exact operating frequencies will be published after launch.

Table 1
Minimum Mode B Station Requirements

Uplink

Frequency: 435.425 to 435.575 MHz.

EIRP: 21.5 dBW for 20 dB peak and 10 dB average SNR on downlink.

Polarization: RHC.

Suitable uplink components: 10 W to a 12-dBic gain antenna.

Downlink

Frequency: 145.975 to 145.825 MHz.

Polarization: RHC.

Minimum recommended antenna gain: 10 dBic.

Maximum receive system effective noise temperature: 625 K (NF = 5 dB).

Minimum figure of merit: −18 dB/K.

Table 2
Minimum Mode JL Station Requirements

Uplink

Frequency: Mode L, 1269.575 to 1269.325 MHz; Mode J: 145.840 MHz ±20 kHz or 144.450 MHz ±20 kHz.

EIRP: Mode L, 25 dBW for 20 dB peak and 10 dB average SNR on downlink; Mode J, 25 dBW for 20 dB peak and 10 dB average SNR on downlink.

Polarization: RHC.

Suitable uplink components: Mode L, 10 W to a 15-dBic gain antenna; Mode J, 20 W to 12-dBic gain antenna.

Downlink

Frequency: 435.725 to 435.975 MHz.

Polarization: RHC.

Minimum recommended antenna gain: 13 dBic.

Maximum receive system effective noise temperature: 290 K (NF = 3.0 dB).

Minimum figure of merit: −12 dB/K.

Again, the frequency requirements are self-explanatory. The RF power requirements for the uplinks at 24 cm and 2 meters are identical: 25 dBW, which corresponds to 316 watts EIRP. As shown in Table 2, you can get 25 dBW at 24 cm from a 10-W transmitter driving a 15-dBic gain antenna. A small, crossed Yagi or helix can yield the required 15 dBic quite easily. Many loop Yagis that yield 18 dBi and more are available, but they are linearly polarized. They may be used, although results on Phase 3C remain to be seen. For the 2-meter uplink on Mode JL, a typical setup might include 20 W fed to a 12-dBic gain antenna. If you have more antenna gain, you can roll back the power, and vice versa.

For your Mode JL receive system (see Table 2), good UHF practice is in order. That means a well-designed 70-cm crossed Yagi or helix antenna with RHC polarization. Stay away from those older-design crossed Yagis with the gamma-match feed! Most newer antenna designs use T-matches or folded dipoles with baluns to illuminate the array. Antenna designs have improved greatly in the last few years. You'll get much better results if you use an antenna of recent design. The recommended minimum gain of 13 dBic for your 70-cm receive antenna should be taken as a real minimum. You really don't want to compromise with your receive antenna. If you do, you'll always be wondering why others seem to hear more than you. Besides, some modern designs provide up to 15 dBic of gain in an antenna having a reasonable boom length, and if you invest in a good 70-cm antenna for Mode JL, it will pay off when using it on the Mode B uplink as well.

With Mode JL, you get the chance to field that nice, new GaAsFET preamp, too. On 70 cm, where the sky noise is much lower than on 2 meters, and RFI from terrestrial sources also mitigates, you can use a good, low-noise preamp. One with a noise figure of less than 1 dB is fine. It's a good idea to place the preamp right at the antenna. If, for example, you put 50 feet of transmission line ahead of your preamp and that transmission line has, say, 2 dB loss at 70 cm, you could just as well add that 2 dB to the noise figure of your preamp; the results are practically the same. In other words, you will have worsened the noise figure of your system by 2 dB and wasted much of the benefit you bought the preamp for in the first place.

If you use your 70-cm antenna for receive only (ie, you don't operate Mode

Table 3
Minimum Mode S Station Requirements

Uplink

Frequency: 435.625 MHz, ±15 kHz.

EIRP: Approx 27 dBW under average Mode B AGC conditions

Polarization: RHC

Suitable uplink components: 25 W to a 13-dBic gain antenna.

Downlink

Frequency: 2400.710 MHz, ±15 kHz.

Polarization: RHC.

Minimum recommended antenna gain: 28 dBic.

Typical antenna: 1.4-m dish, assuming 50% efficiency.

Maximum receive system effective noise temperature: 290 K (NF = 3 dB).

Minimum figure of merit: +3 dB/K.

B), you can simply patch your preamp into the transmission line at the antenna in a weatherproof container. If you want to use your 70-cm antenna for both receive and transmit (as most operators do), you'll need to isolate the preamp with transfer relays. In-line preamps with built-in relays are readily available, but cost more. As an alternative, you may opt to find and install your own relays. But placing the preamp at the antenna is most essential if you want to ensure that you'll hear the satellite well.

For the expert satellite user, Mode S offers the newest challenges. For the first time, an Amateur Radio transponder in space will use the S-Band at 2.4 GHz (13 cm).[9] Fortunately, getting on 13 cm these days can be as simple as patching together some basic building blocks. So, even a beginner can succeed if a modicum of care is employed in selecting the system components.

Mode S is designed primarily for a single, narrowband FM signal, but up to four well-spaced SSB stations can also be accommodated. Table 3 provides recommended minimum ground station capabilities for working Mode S.

Because of the high frequencies involved, the Mode S operating frequencies must be viewed as tentative only, and are subject to significant changes when the satellite is finally placed into operation in space. The frequencies shown, however, may be used for general planning purposes. For the 70-cm uplink, one estimate of the required FM uplink power is 27 dBW EIRP, assuming the FM threshold on the downlink is 10 dB. An uplink power of 27 dBW (501 W) EIRP can be generated using 25 W to a 13-dBic gain antenna, for example. If you go up to a 15-dBic antenna similar to one commercial model now available, you can drop the power back 2 dB to 16 W and still get the desired 27 dBW EIRP.

On the downlink side, you'll get to try out your UHF skills. First, a good, low-noise preamp is *absolutely essential.* You simply can't proceed without one *mounted right at your 13-cm receive antenna.* A reasonably priced 13-cm preamp has a noise figure of 1 dB or less. Get the best one you can afford.

This band is just about the lowest frequency where a dish antenna is clearly preferable to a Yagi.[10] A 1.4-m (4.6-ft) dish with a well-designed feed system should provide the minimum recommended gain of 28 dBic. This is about the smallest dish that can be used with obtainable preamp noise figures and this combination will consistently yield the minimum required figure of merit of +3 dB/K. A 1.9-m (6-ft) dish should provide about 30 dBic, and offer a little better FM margin, reduce the preamp requirements, or a little of both.

This column will return in July with initial reports of operating conditions on the new Phase 3C satellite. Next month, I'll have a QST *feature article that will highlight Phase 3C.*[11]

Notes

[1]I'll cover RUDAK in a later column.

[2]The new Russian satellite RS-10/11 offers an even more modest entry point, requiring only an HF transmitter and receiver to operate one of its modes. See prior installments of this column for details.

[3]The exact frequencies will be published after launch, but approximate values were given in the March column.

[4]Converting from watts to dBW was explained in the March column, and is also addressed in the *ARRL Handbook.*

[5]dBic means decibels referred to an isotropic, circularly polarized source.

[6]Spin modulation results when an elliptically polarized signal is received on a linearly polarized antenna or when a linearly polarized signal is received on an elliptically polarized antenna.

[7]Highly directional antennas are specified for all satellite work. Consequently, the satellite user must accurately point the antennas both in azimuth (compass directions) and elevation. This applies to all modes addressed. Extremely long booms stress the rotators and often complicate installation.

[8]Although your Mode B station will see no benefit from the low-noise performance of a 2-m GaAsFET preamp, the strong-signal overload characteristics of GaAsFETs may warrant their installation for those who operate in dense RF environments, ie, an urban area with numerous repeaters.

[9]Several prior OSCARs have had beacons at 2.4 GHz and above, but Phase 3C is the first to have a *transponder* on this frequency.

[10]Convincing arguments can be made that 13 cm and above is the domain of dish antennas, while the realm of the Yagi and helix is 70 cm and below; for the 24-cm band, it's a toss-up.

[11]Additional information on Phase 3C may be obtained by sending an SASE to AMSAT, PO Box 27, Washington, DC 20044.

Exam Info

WHAT DO I BRING?

Whether you're going for an upgrade or for your initial ticket, here are some pointers to follow for what to bring to an ARRL/VEC-coordinated test session.

All applicants: Regardless of your current license status, bring the following items: (1) a check or money order for the $4.55 test fee (payable to ARRL/VEC); (2) all currently valid Certificate(s) of Successful Completion of Examination (CSCE)—regardless of the VEC that coordinated the session where the CSCE was issued—to document any element credit that you claim; and, (3) a photo ID (such as a driver's license).

When a photo ID is not available, the applicant must present to the administering VE Team any *two* of the following items: birth certificate (with the appropriate seal); school ID; school report card from the current (or at least very recent) grading period; utility bill; bank statement or other business correspondence that specifically names the person; or a postmarked envelope addressed to the applicant at his/her current mailing address as it appears on the Form 610.

Note: While minors frequently have difficulty *officially* documenting who they are, identification by another person at the session is *not* acceptable even when the applicant is the son or daughter of the person making the identification!

Licensed applicants: A licensed individual must also bring the actual license that, as of exam day, is currently valid (or recently expired; see FCC Rules 97.13 and 97.47[b]), plus a photocopy of the license.

Without the actual license, the applicant may still test, but will be issued a CSCE for elements passed at the session only—even if an upgrade would otherwise be earned. In such cases, the upgrade credit will be delayed. The VE Team will complete a second CSCE that indicates both element *and* upgrade credit as well and will forward it to the ARRL/VEC for holding until the applicant provides us with the missing license copy.

Licensed Applicants with Tickets Pending Action: An individual who is licensed, has passed the additional elements necessary to upgrade, and is waiting for the pending license, may test for an even higher class of license. However, to be immediately issued a CSCE for the newly earned license class immediately, the applicant must provide the administering VE Team with the currently valid license plus the actual CSCE(s) that documents the pending upgrade.

The VE Team will check these items for authenticity and will return them to the applicant. The license copy will be attached to the 610 for forwarding to the FCC.

Remember that your Form 610 for this next upgrade level will not be forwarded to the FCC until your pending license is issued and you have sent the ARRL/VEC a photocopy of the ticket. When the license you're waiting for arrives, mail a photocopy of the *signed* ticket to: ARRL/VEC, ATTN Gerrie Wood, 225 Main St, Newington, CT 06111. We will attach the license copy to the Form 610 and immediately forward them to the FCC for processing.

Remember, too, that credit for elements passed is good for only one year following the test date; don't QRX too long on forwarding needed license copies.—*Jim Clary, WB9IHH, Manager, ARRL/VEC*

Coming Conventions

ALABAMA STATE CONVENTION

May 14-15, 1988, Birmingham

The Birmingham Amateur Radio Club is sponsoring the Alabama State Convention, which will be held at the Jefferson Civic Center. Doors will open at 9 AM both days. Admission is $5, children under 12 free. Features include exams, forums, banquet, flea market, nonham activities. Hotel/motel services offered: Ramada 1-800-272-6232. Belton 328-6320, Radisson 1-800-228-9822. Talk-in on 146.28/88. Exhibitor info: Roy Johnson, NQ4D, tel 205-681-0855, Flea market: Mike Spanos, KA4VCA, tel 205-663-4457. Hamfest: Frances Pilman, N4LYN, tel 205-879-0720 or Mildred Cullen, AA4XF, tel 205-822-6130.

ATLANTIC DIVISION/NEW YORK STATE CONVENTION

May 20-22, 1988, Rochester

The 1988 edition of the Rochester Hamfest/Atlantic Division/New York State Convention will be held at the Monroe County Fairgrounds, East Henrietta Rd (Rte 15A) and Calkins Rd. Hotel headquarters is the Rochester Marriott Thruway. Both locations are near NY Thruway exit 46. Features will be an outdoor flea market at noon on Friday, May 20. Indoor and outdoor spaces are available. Indoor spaces are for noncommercial sellers and are available by advance reservation only. Indoor flea market setup starts Friday at 1 PM. Open for business Saturday and Sunday at 7 AM. Volunteer license exams will be held on Saturday; advance registration is required before May 14. Contact RaRa VE Team, PO Box 15381, Rochester, NY 14615. Groups presenting programs are SAYLARC, NTS, WDN, NYPON, NYS, NYSPTEN, Navy MARS. Registration is $6 in advance, $7 at gate, banquet $14. Outdoor flea-market permits $5 per parking space. Indoor flea-market space $16 per table. To order tickets write: Rochester Hamfest Tickets, 174 Croydon Rd, Rochester, NY 14610. For all other information call 716-424-7184 or 716-424-1100 during business hours.

May 14-15
Alabama State, Birmingham

May 20-22
Atlantic Division/New York State, Rochester

May 20-22
Midwest Division, South Sioux City, NE

June 3-5
West Gulf Division, Arlington, TX

ARRL NATIONAL CONVENTIONS

Sept 9-11, 1988—Portland, Oregon

June 2-4, 1989—Dallas/Forth Worth, Texas

MIDWEST DIVISION CONVENTION

May 20-22, 1988, South Sioux City, NE

The 3900 Club and Seeland Amateur Radio Association is sponsoring the Midwest Division Convention from the afternoon of May 20 until the morning of the 22nd. Features are seminars, packet, DX, antennas, ARRL forums, flea market, VE exams (walk-ins permitted). Talk-in will be on 146.37/97. Admission will be $6 convention, $11 banquet, at door $12. For more information contact R. W. Pitner, WØFZO, 2931 Pierce St, Sioux City, IA 51104, tel 712-258-1520.

WEST GULF DIVISION CONVENTION

June 3-5, 1988, Arlington, Texas

Ham-Com, Inc is sponsoring the Ham-Com 1988 ARRL West Gulf Division Convention at the Arlington Convention Center, intersection of Interstate 30 and Texas Highway 360, between Six Flags and Texas Rangers Baseball Stadium. Single $7, family $10, at door $8 and $11. Friday Hospitality 6 PM, Saturday Flea Market 7 AM-5 PM, Exhibits 9 AM-5 PM, Sunday Flea Market 7 AM-2 PM, Exhibits 9 AM-2 PM. Talk-in on 147.745/145. Sponsored by the Arlington ARC. Contact Ham-Com, Box 25028, Dallas, TX 75225. For registration and exhibitor information, call John Fleet, tel 214-521-9430.

Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ
Convention Program Manager

Attention: The deadline for receipt of items for this column is the 5th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes of any kind and games of chance such as bingo.

†**Arizona (Sierra Vista)—April 30-May 1.** *Sponsor:* Cochise ARA. *Time*: 8 AM-5 PM. *Place*: CARA Facility, S Moson Rd, Rte 90 five miles east of 90/92 jct. *Features*: VE exams, free tailgating. *Talk-in*: 146.16/76 or 146.52. *Contact*: Steve Wagner, W7CI, 602-458-6946, or CARA, PO Box 1855, Sierra Vista, AZ 85636.

Arkansas (Springdale)—May 21. *Sponsor*: Northwest Arkansas ARC. *Time*: Setup at 6 AM, public 8 AM-4 PM. *Place*: Rodeo Center on East Emma Ave (Highway 68B). *Features*: snack bar, ARRL/VEC testing, forums, swap tables, commercial exhibits. *Talk-in*: 146.16/76. *Tables*: $3. *Contact*: Chuck Webb, KA5BML, or Mary Webb, KA5HEV, PO Box 338, Prairie Grove, AR 72753, tel 501-846-2847.

†**California (Fresno)—May 6-8.** *Sponsor*: Fresno ARC. *Time*: Fri 7 PM, Sat 9 AM-4 PM. *Place*: Airport Holiday Inn. *Features*: Wine party, luncheon & banquet, exams, swap tables, vendors exhibits. *Talk-in*: 146.34/94. *Admission*: $5 partial, $23 full advance, $25 at door, banquet $14 advance, $16 door. *Contact*: Ed Plummer, 12460 E Heather, Clovis, CA 93612.

Colorado (Colorado Springs)—May 21. *Sponsor*: Pikes Peak RAA. *Time*: 8:30 AM. *Place*: Rustic Hills Mall at Palmer Park and Academy Blvd. *Features*: ARRL/VE testing. *Talk-in*: 146.37/97. *Admission*: free. *Tables*: $8 in advance, $10 at door. *Contact*: Al, NØCMW, 303-473-1660, or write PPRAA Swapfest 88, PO Box 16521, Colorado Springs, CO 80935.

†**Connecticut (Newington)—June 5.** *Sponsor*: Newington Amateur Radio League. *Time*: 9 AM-2 PM (dealers 8 AM). *Place*: Newington High School, Rte 173 (Willard Ave), just north of Rte 175 (Cedar St). *Features*: refreshments, VEC exams, guided tours of ARRL HQ and W1AW (more info tel Tom Namnoum, KM1O, 203-666-1615 eves). *Talk-in*: 144.85/145.45, 223.24/224.84, 146.52 simplex. *Admission*: no advance, door $2. *Tables*: $8.50 ($10 after May 21). *Contact*: Les Andrew, KA1KRP, 23 Grove St, West Hartford, CT 06110 (SASE please).

Florida (St Petersburg)—May 8. *Sponsor*: St Petersburg ARC (SPARC). *Time*: 8 AM-3 PM. *Place*: Lake Maggorie Park, shelter 1 & 2; Ninth St S and Lake Maggorie, St Petersburg. *Features*: free swap tables. *Talk-in*: 147.66/06. *Admission*: free. *Contact*: Hank Briese, WA4RLV, 10804 84th Ave N, Seminole, FL 34642.

†**Idaho (Coeur d'Alene)—June 4.** *Sponsor*: Kootenai ARS. *Time*: 7 AM-3 PM. *Place*: Coeur d'Alene Airport. *Features*: free RV parking (no hookups), airplane parking, contest, refreshments, Novice exams & Gabfest. *Talk-in*: 146.38/98, simplex 146.52. *Admission*: free. *Contact*: tel 208-722-5405.

Illinois (Chicago)—May 15. *Sponsor*: Chicago ARC. *Time*: 9 AM-3 PM. *Place*: North Park Village, 5801 N Pulaski. *Features*: refreshments. *Admission*: $2. *Contact*: tel 312-545-3622.

†**Illinois (Godfrey)—May 21.** *Sponsor*: Lewis & Clark Radio Club. *Time*: gates open for vendors 7 AM, public 8 AM-3 PM. *Place*: Lewis & Clark Community College Campus, Hwy 67-111. *Features*: refreshments, free parking, testing (all classes) starting 10 AM, flea market. *Talk-in*: 144.63/5.23. *Admission*: free. *Contact*: Harold Elmore, KC9GL, or write Lewis & Clark Radio Club, PO Box 553, Godfrey, IL 62035, tel 618-466-1909.

†**Illinois (Kankakee)—May 15.** *Sponsor*: Kankakee ARS. *Time*: 8 AM-3 PM. *Place*: Exit 308 off I-57 to Rte 45 South 1 mile. *Features*: free parking, flea market, commercial vendors, refreshments. *Talk-in*: 146.34/94. *Admission*: advance $2.50, door $3. *Contact*: Frank DalCanton, KA9PWW, RR #1, Box 361, Chebanse, IL 60922, tel (D) 815-937-2452, (N) 815-932-6703.

†**Illinois (Knoxville)—May 15.** *Sponsor*: Knox County ARC. *Time*: 7 AM-3 PM. *Place*: Knox County Fairgrounds, exit 51 on I-74. *Features*: flea market, food, VE testing for all classes. *Talk-in*: 147.00/146.40. *Admission*: advance $3, door $4. *Contact*: Keith Watson, WB9KHL, 119 South Cherry St, #3, Galesburg, IL 61401-4527, tel (D) 309-289-6446, (N) 309-342-3885.

Illinois (Sandwich)—May 1. *Sponsor*: Kishwaukee ARC. *Time*: 8 AM-1 PM. *Place*: Sandwich Fairgrounds. *Features*: overnight camping, but without hook-ups. *Talk-in*: 146.13/73. *Admission*: advance $2, door $3. *Tables*: reserved tables $5. *Contact*: Howard Newquist, PO Box 264, Sycamore, IL 60178.

Indiana (Evansville)—May 15. *Sponsor*: Tri-State ARS. *Time*: 6 AM-3 PM. *Place*: US 41 N, approximately 4 miles north of Evansville at the Vanderburgh-Scott County 4H Center. *Features*: flea market, dealers, camping, nonham activities, packet, VEC testing (30 day advance reservations). *Talk-in*: 147.75/15. *Admission*: $3. *Contact*: Charlie Sartore, 709 E Virginia St, Evansville, IN 47711, tel 812-477-0708 or George Utley, 6017 Oakhill Rd, Evansville, IN 47711, tel 812-428-0275. For VE testing Blanche Elpers, 840 Herndon Dr, Evansville, IN 47711, tel 812-424-9182.

†**Indiana (Muncie)—June 5.** *Sponsor*: Muncie Area ARC. *Time*: 8 AM-3 PM Sun, setup after 5 PM Sat. *Place*: Delaware County Fairgrounds. *Features*: refreshments, VE testing from 9 AM-11 AM, free

†ARRL Hamfest

parking, overnight camping with full hookup $5 per space. *Talk-in*: 146.13/73. *Admission*: advance $3, door $4. *Tables*: $5 with power. *Contact*: Rick Garrett, 2401 W Oliver Dr, Muncie, IN 47302, tel 317-286-5486.

†**Indiana (Wabash)—May 22.** *Sponsor*: Wabash County ARC. *Time*: 6 AM-4 PM. *Place*: 4-H Fairgrounds, State Rd 13 N. *Features*: exams, flea market. *Talk-in*: 147.63/03, 146.52 and 146.34/94. *Admission*: advance $3.50, door $4. *Tables*: $10 in advance only. *Contact*: Don Spangler, W9HNO, 235 Southwood Dr, Wabash, IN 46992, tel 219-563-5564.

Kansas (Pittsburg)—June 4. *Sponsor*: Pittsburg Rpt Organization. *Time*: 7:45 AM-5 PM. *Place*: Lincoln Park Pavillion, 709 West 9th. *Features*: VE exams from 7:45 AM-10 AM, flea market, doors open to public at 10 AM, basket dinner at 1 PM, free parking. *Talk-in*: 146.34/94 or 147.84/24. *Admission*: $5 for hams and $1 for each additional family member over 15 yrs old. *Tables*: free. *Contact*: Ken Johnston, KCØVZ, PO Box 1303, Pittsburg, KS 66762.

†**Kansas (Salina)—June 5.** *Sponsor*: Central Kansas ARC. *Time*: 9 AM-3 PM. *Place*: 4H Bldg, Kenwood Park. *Features*: License exams, flea market, refreshments, ARRL meeting, DX meeting, packet meeting, YL and XYL meetings. *Talk-in*: 147.63/03. *Admission*: no advance, at door $2.50. *Contact*: tel (D) 913-825-4727, (N) 913-263-1602.

†**Louisiana (Baton Rouge)—May 21-22.** *Sponsor*: Baton Rouge ARC. *Time*: Saturday 8 AM-9 PM, Sunday 8 AM-2 PM. *Place*: I12 and Airline Hwy. *Features*: VE testing, LA Council Meeting, tours, QCWA President coming, Saturday PM banquet, dealers, swap tables, nonham activities. *Talk-in*: 146.19/79, 146.28/88. *Admission*: no advance, door $1. *Contact*: Holiday Inn South 1-800-465-4329 or Chris Springer—Special Rates "with Amateur Radio groups," tel 504-928-0632 til 7 PM, or 504-928-3128 after 8 PM.

Michigan (Cadillac)—May 21. *Sponsor*: Wexaukee ARC. *Time*: 8:30 AM-3 PM. *Place*: Cadillac Middle School, 500 Chestnut St. *Features*: Guest Speaker—Doug DeMaw, W1FB, refreshments, swap tables. *Talk-in*: 146.37/97. *Admission*: $3. *Tables*: $6. *Contact*: John Craddock, KX8Z, 616-797-5491 or Wexaukee ARC, PO Box 163, Cadillac, MI 49601.

†**Michigan (Chelsea)—June 5.** *Sponsor*: Chelsea Communications Club. *Time*: 8 AM-1 PM. *Place*: Exit 159, I-94 N ½ mile turn left one block. *Features*: breakfast and lunch served. *Talk-in*: 146.38/98. *Admission*: advance $2.50, door $3. *Contact*: tel 313-475-1795.

New Hampshire (Nashua)—May 20-22. *Sponsor*: Northeast VHF Assn. *Place*: Rivier College, located near Route 3 a short distance north of the Massachusetts border. *Features*: Friday night hospitality room including a informal "swap-fest," technical talk on Saturday, "rap sessions" for various VHF/UHF bands, noise-figure and antenna-gain measurements on Sunday. *Admission*: To preregister or reserve a room, contact David Knight, KA1DT, 15 Oakdale Ave, Nashua, NH 03062 before May 14, registration at door $20. *Contact*: Lewis D. Collins, W1GXT, 10 Marshall Terr, Wayland, MA 01778, tel 617-358-2854 (6-10 PM local time).

†**New York (Old Westbury)—May 15.** *Sponsor*: Long Island Mobile ARC, Inc. *Time*: Dealers 7:30 AM. Public 9 AM-4 PM. *Place*: NY Institute of Technology—Long Island Expwy, Rte 495, north at exit 39N on Glen Cove Rd, to Rte 25A, Northern Blvd—1 mile east to site. *Features*: refreshments, VHF tune-up clinic, free parking. *Talk-in*: 146.25/85. *Admission*: no advance, door $3. *Contact*: Mark Nadel, NK2T, 516-796-2366, or Hank Wener, WB2ALW, day & night 516-484-4322.

New York (Rome)—June 5. *Sponsor*: Rome Radio Club. *Time*: 9 AM-5 PM. *Place*: Becks Grove. *Features*: flea market, refreshments, demonstrations, children's programs, dinner at 5 PM. *Talk-in*: 146.28/88. *Admission*: $3. *Contact*: Rome Radio Club, PO Box 721, Rome, NY 13440.

New York (Skaneateles)—May 27-28. *Sponsor*: ARC of Skaneateles. *Time*: Friday 12 noon-6 PM, Saturday 9 AM-5 PM. *Place*: Skaneateles is 7 miles east of Auburn, 20 miles WSW of Syracuse, on Rte 20. Take Rte 20 to center of Village to Jordan Rd, north three blocks to Allyn Arena. *Features*: commercial vendors, flea market, technical talks, food, local motel & restaurants available. *Talk-in*: 147.00/146.40 and 447.30/2.30. *Admission*: advance $2.50, door $3. *Contact*: Hank Bryant 315-685-7658, or mail remittance for advance tickets to SKANFEST, PO Box 302, Skaneateles, NY 13152 (by May 13).

Nova Scotia (Halifax)—May 27-28. *Sponsor*: The Halifax and Dartmouth ARCs. *Time*: Sellers set-up at 6:30 AM, public 9 AM-1:30 PM. *Place*: St Mary's University. *Features*: Pub night Friday 7 PM, free admission, NSARA annual meeting 2 PM, transmitter hunt 4 PM, dinner and dance 7:30 PM, refreshments. *Talk-in*: 146.04/64, 146.25/85 and 147.75/15. *Admission*: $2. *Tables*: $3 each plus admission, commercial sellers rates available on request. *Contact*: Arnie Brown, VE1AOG, 53 Stewart Harris Dr, Dartmouth, NS B2W 3Z4, tel 902-435-3344 (reservations required for banquet at $17 per person).

†**Ohio (Athens)—May 15.** *Sponsor*: Athens County ARA. *Time*: 8 AM-3 PM. *Place*: City Recreation Center on East State St. *Features*: license exams (mail a completed 610 form and a $4.55 check payable to ARRL/VEC to John Cornwell, NC8V, 101 Coventry Ln, Athens, OH 45701; walk-ins accepted). *Talk-in*: 146.34/94. *Admission*: $4. *Contact*: Rod Holley, KA8NDC, 15267 S Canaan Rd, Athens, OH 45701, tel 614-593-8177. For general information, write to Carl J. Denbow, KA8JXG, 63 Morris Ave, Athens, OH 45701.

Ohio (Medina)—May 8. *Sponsor*: Medina M2M Group, Inc. *Time*: 8 AM-2 PM. *Features*: special nonham activities, specials for mother. *Talk-in*: 147.63/03. *Admission*: advance $3, door $4. *Contact*: Clarence Miller, 620 Oak St, Medina, OH 44256, tel 216-725-4492.

†**Oklahoma (Tulsa)—May 14-15.** *Sponsor*: Broken Arrow and Tulsa ARCs. *Time*: Sat 9 AM-5 PM, Sun 8 AM-4 PM. *Place*: Tulsa State Fairgrounds Pavilion. *Features*: flea market, dealer exhibits, exams, family BBQ dinner. *Admission*: advance $6, door $8, children under 12 free, dinner tickets are $7. *Tables*: advance $7.50, door $10. *Contact*: Ron Gamel, N5WX, 918-663-0385, or write Green Country Hamfest, PO Box 4283, Tulsa, OK 74159.

Ontario (Kitchener)—June 4. *Sponsor*: Guelph ARC, and Kitchener-Waterloo ARC. *Time*: Vendors 6 AM, public 8 AM-2 PM. *Place*: Bingeman Park, 1380 Victoria St N. *Talk-in*: KSR—146.37/97, ZMG—144.61/5.21, simplex 146.52. *Admission*: $3, children 12 and under free. *Tables*: For vendors $5 per 8-ft space. *Contact*: Ray Jennings, VE3CZE, 61 Ottawa Cres, Guelph, ON N1E 2A8, tel 519-822-8342.

†**Pennsylvania (Drexel Hill)—May 1.** *Sponsor*: Delaware County ARA/Drexel Hill Middle School ARC. *Time*: 8 AM-1 PM. *Place*: Suburban Philadelphia Delaware County. *Features*: VE testing. *Talk-in*: 147.96/36. *Admission*: advance $3, door $3. *Contact*: David Tatum, WB3KTQ, Drexel Hill Middle School, State Rd, Drexel Hill, PA 19026, tel 215-644-1549.

†**Pennsylvania (Pittsburgh)—June 5.** *Sponsor*: Breeze Shooters. *Time*: 9 AM-4 PM. *Place*: White Swan Amusement Park, Rte 60 (Parkway W), near Greater Pittsburgh International Airport. *Features*: free parking, free tailgate vending, family amusement park. *Talk-in*: 146.28/88, 2-meter check-in on 146.52, 10-meter check-in on 29 MHz and 28.495 MHz. *Admission*: free. *Tables*: under-roof vendors by advance reservation, limited space, registration $2 each, 3 for $5, 7 for $10. *Contact*: Jim Inverarity, K3TOQ, 2639 Sunnyfield Dr, Pittsburgh, PA 15241, tel 412-833-2681.

†**Pennsylvania (Tamaqua)—May 15.** *Sponsor*: Tamaqua Transmitting Society and Anthracite Repeater Assn. *Time*: Grounds 7 AM, exams 9 AM. *Place*: from the center of Tamaqua follow the large hamfest signs pointing toward the New England Valley Fire Company, 1 mile west of Tamaqua. *Features*: exams, auction, food. *Talk-in*: 146.52, 146.07/67, 145.705/105. *Admission*: $3, tailgaters $1. *Tables*: $3 w/power. *Contact*: K3NYX, 127 Market St, Tamaqua, PA 18252, tel (D) 717-668-0300, (N) 717-668-5198.

Pennsylvania (Whitneyville)—May 15. *Sponsor*: Tioga Co ARC. *Time*: 8 AM-4 PM. *Place*: Tioga County Fairgrounds, located just off US Rte 6, midway between Mansfield and Wellsboro. *Features*: flea market, free parking, VE testing, refreshments. *Talk-in*: 146.19/79, 146.52 simplex. *Admission*: advance $2.50, door $3 (for advance tickets send check or money order and #10 SASE to: Bill Reilly, RD 4, Box 103, Wellsboro, PA 16901 (deadline May 1). *Tables*: $3. *Contact*: John Winkler, WB3GPY, RD 2, Box 267, Wellsboro, PA 16901.

†**Pennsylvania (Wrightstown)—May 15.** *Sponsor*: Warminster ARC. *Time*: 7 AM (6 AM for vendors). *Place*: Middletown Grange Fairgrounds located on Penns Park Road in Wrightstown. *Features*: New equipment vendors, large flea market. *Talk-in*: 146.52 simplex, 147.69/09. *Admission*: $3 (nonham spouses and children free). *Tables*: 8-ft tables $5/space, some power available, unlimited outdoor spaces at $5/space. *Contact*: Frank Charlton, KA3FBP, 1479 Kingsley Dr, Warminster, PA 18974, tel 215-675-2549, or Alan L. Folsom, Jr (B) 215-647-7154, (H) 215-443-7063.

Quebec (Sorel)—May 22. *Sponsor*: Sorel-Tracy ARC. *Time*: 7 AM for exhibitors and 9 AM for public. *Place*: Tracy Curling Club. *Admission*: $4. *Tables*: outdoor $6, indoor $8, limited quantity, please reserve before May 15. *Contact*: Sorel-Tracy ARC, PO Box 533, Sorel, QC J3P 5N6, Canada.

Texas (Abilene)—May 21. *Sponsor*: Key City ARC. *Time*: 6 PM-11 PM, May 20, dealer setup 8 AM-5 PM, May 21, Swapfest. *Place*: Abilene Civic Center (Downtown Abilene—Pine Street). *Features*: exams, swap tables, B1 Bomber Dyess AFB tour. *Talk-in*: 146.20/80. *Admission*: advance $5, door $6, spouses and children under 12 free. *Tables*: $2. *Contact*: Bill Jones, N5DOX, Box 2722, Abilene, TX 79604, tel 915-698-4606, or 14.090 RTTY noon to midnight local time.

†**Virginia (Manassas)—June 5.** *Sponsor*: Ole Virginia Hams ARC Inc. *Time*: 8 AM-4 PM. *Place*: Prince Williams County Fairgrounds, ½ mile south of Manassas on Rte 234. *Features*: nonham programs, children's entertainment, CW proficiency, QSL bureaus, ARRL booth. *Talk-in*: 146.37/146.97 (WA4FPM repeater, Manassas), 146.52 simplex. *Admission*: no advances, at door $5, children under 12 free. *Contact*: Joe Schlatter, K4FPT, 7511 Todd Pl, Manassas, VA 22110, tel 703-368-8599 after 7 PM.

Virginia (Roanoke)—May 29. *Sponsor*: Roanoke Valley ARC. *Time*: 9 AM-5 PM. *Place*: Intersection of Rte 460-Rte 11 and I-581. *Features*: ARES/SKYWARN meetings, forums. *Talk-in*: 146.385/985 and 146.52 simplex. *Admission*: advance $4, door $5. *Contact*: Charles H. Nichols, KB4WSB (days) 703-345-1404, (nights) 703-342-8562, or Dick Wilmuth, WD4OGL (nights) 703-362-3933.

†**Washington (Yakima)—May 21-22.** *Sponsor*: W7AQ-Yakima ARC. *Time*: Sat 9 AM-5 PM, Sun 9 AM-1 PM. *Place*: Central Washington State Fairgrounds, 10th St and E Nob Hill Blvd. *Features*: forums, speakers, no-host banquet, breakfast each morning at 7 AM. *Talk-in*: 146.24/84 and 146.21/61. *Admission*: advance $5, door $5. *Contact*: W7AQ, Yakima ARC, PO Box 9211, Yakima, WA 98909.

†**West Virginia (Bluefield)—May 8.** *Sponsor*: East River ARC. *Time*: 9 AM-3 PM. *Talk-in*: 144.89/5.49. *Admission*: no advance, at door $4. *Contact*: Jim Perdue, KC8NG, Rte 5, Box 457, Bluefield, WV 24701, tel 304-325-3058 after 3 PM.

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 203-666-1541 ext 283.

Silent Keys

Administered by Nancy A. Slipski

It is with deep regret that we record the passing of these amateurs:

W1BDF, Edgar V. Seeler, Jr, Cambridge, MA
W1BFK, Joseph Holderness, New Bedford, MA
WB1BWP, Otto E. Pawloski, Forestville, CT
W1CHY, Ferdinand D. Schaller, Sherborn, MA
KA1DK, John H. Fuller, South Burlington, VT
K1EME, Lillian M. Sencabaugh, North Reading, MA
W1ITH, Robert M. French, Solon, ME
KA1JA, William C. Hall, Bristol, NH
K1LOW, Robert E. Darsney, Lynn, MA
W1MCX, Warren H. Andrews, Salem, MA
W1MXO, Ernest A. Tetu, Manchester, NH
W1TAV, Donald W. Belcher, East Bridgewater, MA
W1TI, Harold W. Beach, South Yarmouth, MA
W1ZW, Philip K. Baldwin, Northfield, VT
*W2AIM, Nathaniel Pfeffer, New York, NY
W2CD, Jack H. Trapkin, Riverdale, NY
N2ER, Edgar F. Sutherland, Sun City, AZ
KA2FQO, John C. Regner, Ashville, NY
W2PMV, Lewis West, Haworth, NJ
N2RT, Raymond E. Teeter, Locke, NY
W2SJX, Lewis Benson, Orange Springs, FL
WA2YKQ, Reginald A. Lamson, Elizabeth, NJ
W3BT, Vernon D. Penner, Sr, Easton, MD
N3EXP, Wilbur W. Kukich, Midland, PA
KQ3L, John W. Casner, Altoona, PA
WA3PPM, Russell L. Graves, Jr, Maryville, TN
W4AHQ, Alexander F. Popelarski, Alexandria, VA
WA4AIY, Edward S. Lazowska, Cocoa Beach, FL
W4AJX, Robert G. Ragsdale, Sr, Oviedo, FL
KA4BGZ, William T. Murray, Salem, VA
W4BMV, Bernard J. Patterson, Massillon, OH
KB4DLY, John W. Wintzinger, Satellite Beach, FL
K4GRM, Robert L. Weill, Naples, FL
KD4HQ, William L. Sykes, Buchanan, TN
K4ICP, Wilson E. James, Anniston, AL
N4KEU, Dudley D. Watts, Arlington, VA
KI4KH, Harry Lehman, Oklawaha, FL
W4LWP, Elton B. Chick, Quincy, IL
*WB4MAE, John H. Manning, Fairfax, VA
K4QVZ, Roy L. Baker, Lake City, FL
WB4VRI, George D. Parlett, Richmond, VA
W4VYM, James C. Smith, Toccoa, GA
WB4YKA, Raymond E. Morel, Clearwater, FL
W4YKD, Henry B. Stenson, Lake Park, FL
W4YXW, William D. Owens, Huntsville, AL
WD5ADU, Emery A. Newman, Albuquerque, NM
K5AJW, Maurice V. Holding, Oklahoma City, OK
K5BTC, J. P. Fuqua, Livingston, TX
WD5CEV, Ralph H. Floyd, North Zulch, TX
K5DMP, Dean H. Wooldridge, McAllen, TX
WV5F, Elva Louise Garens, Brady, TX
W5JO, John A. Scott, Fort Worth, TX
WB5LET, R. W. Sanford, Longview, TX
WA5SNX, Esker C. Brower, Coffeeville, MS
W5VOP, Paul Griffey, Santa Rosa, CA
W5ZO, James G. Flynn, Crawford, TX
K6BCV, Carl L. Wolf, Littlerock, CA
K6CO, Alfred L. Leininger, San Bernardino, CA
KA6DEM, George W. Covey, Rosamond, CA
WA6GUA, Jean B. Clark, Los Angeles, CA
N6HO, William Sokolovich, San Diego, CA
N6IZQ, Ernest F. Clifton, Bishop, CA
W6JDG, Charles H. Smith, San Francisco, CA
KB6LWQ, Homer G. Holzgrafe, Santa Barbara, CA
N6NIJ, Louis J. Seltzinger, Redlands, CA
WB6NMJ, William L. Blandford, Petaluma, CA
KA6POS, Kenneth Vaillancourt, San Francisco, CA
W6QCS, Frank A. Mudie, El Monte, CA
WB6SCC, Lawrence Q. Bowen, Fullerton, CA
K6SMG, Kenneth E. Sorensen, Fowler, CA
*K6TG, Benjamin F. Saylor, Modesto, CA
W6WNN, Frank R. Grey, Woodburn, OR
K7CIX, George H. Carl, Jr, Portland, OR
W7FLD, Matt Karamatic, Aberdeen, WA
NN7J, Lonny D. Hanson, Columbia Falls, MT
KA7JQV, Jesse Brace, Portland, OR
W7MEV, Keith L. Beck, Grants Pass, OR
KD7NJ, William D. LeKey, Phoenix, OR
KA7OLE, Richard A. Foster, Dallas, OR
K7QBD, Jeanne H. Smith, Winchester Bay, OR
K7QEG, Haskell Sharrard, Pendleton, OR
WB7QEH, Donald J. Looker, Phoenix, AZ
W7WMP, Frank Young, Rockport, WA
W8AHS, Vincent R. Briscar, Cleveland, OH
W8BYT, Leonard F. Grazier, Sr, Canfield, OH
WA8BZV, E. W. Schmidt, Delphos, OH
W8HQ, John M. Nolan, Harlingen, TX
W8HS, Robert L. Karl, Southfield, MI
W8MPW, Carl A. Drake, Coshocton, OH
W8MXW, Maurice J. Lamb, Elida, OH
NR8Q, Glen R. Raudebaugh, Findlay, OH
K8RQK, Donald P. Knaepple, Sr, San Antonio, TX
W9AMV, Robert B. Ricketts, Indianapolis, IN
W9AYL, Helmer O. Ahlborg, Park Ridge, IL
WA9CWD, Charles T. Shartzer, Calumet City, IL
W9FBU, John F. Vesel, Greenwood, WI
WD9GHH, John J. Kidd, Indianapolis, IN
W9HGK, Ralph K. Reichenbach, Deerfield, IL
WA9PBS, Donald Van Sant, Rock Falls, IL
KC9PP, Earl E. Borchert, Terre Haute, IN
WB9TLJ, Willis F. Harps, Cicero, IL
W9WXV, Lloyd J. Nalley, Rockford, IL
W9ZPG, Charles L. Dwyer, Deerfield, IL
WØAIT, A. Karl Slagle, Columbia, MO
NØAYQ, Bruce Winberg, Shoreview, MN
KØCHB, John R. Reese, Newton, KS
WØEKL, Roy H. Sanderson, Goodland, KS
WØEQS, Arnold L. Pung, Bloomington, MN
WØFGO, Carl F. Anderson, Newton, KS
KØGYS, Arnold S. Swenson, Minneapolis, MN
WØMHB, Erwin C. Darge, Omaha, NE
VE3AKQ, Carl N. Vollick, Dunnville, ON Canada
VE3CHH, Jim A. Baskey, Millgrove, ON Canada
VE3LWI, Frank A. Covey, Hamilton, ON Canada
VE3ORQ, Sandy McPhedran, Islington, ON Canada
VE7BY, Ron Hodgson, Nile Creek, BC Canada
HK1QQ, Herman Olarte, Barranquilla, Colombia

*Life Member, ARRL

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.

Note: 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*.

50 Years Ago

May, 1938

☐ Hq. has been including a questionnaire form with each membership certificate for some time now, and the tallied results show an increasing average age of amateurs—from 22 years in 1926 to just 30 years today. The editorial page suggests that "the growing complexity and cost of amateur radio is slowly restricting its pursuit to those of broader experience and training and greater financial responsibility."

☐ The spacing of half-wave elements in a directional antenna can be varied to achieve desired gain patterns; W2DFN shows us measurements for both in and out of phase structures.

☐ XE1A (XE2N, op) took top honors in the DX contest. Domestically, W2UK, W3EMM and W3EVT were 1-2-3 on c.w., while W3EMM, W4CYU and W9ARA led on voice.

☐ And in last autumn's sweepstakes, where checking of more than 1,000 logs is just now completed, W6MVK, W3BES and W1EZ were national highs on telegraphy, with W6ITH, W9PWU and VE9AL the 'phone winners.

☐ W1CBD's continuous-coverage transmitter with 100 watts output on four bands uses band-pass couplers/doublers and separate final tanks. No tuning of intermediate stages is required within a given band.

☐ With the same objective, W1JPE's approach, while still employing plug-in coils for changing bands, uses a combination of band-pass filters and relay-connected padding condensers to set the operating frequency from the operating table.

☐ Another Hq. staffer, W1SZ, tackles the problem with a broadcast-type push-button switch to select crystals or an electron-coupled oscillator at the operating table.

☐ The final documents at the world radio conference in Cairo have not yet been signed, but it looks as though we in the western hemisphere will retain our frequency privileges, while the demands of high-frequency broadcasting will remove 7200-7300 kc. from amateur use in the rest of the world.

☐ W1EER gets continuous rotation of his beam by using circular troughs of mercury for feeder contacts.

☐ After ruining a number of crystals by way of "high output" oscillators, W9EHC surveyed a number of circuits and chose a simple one where the crystal acts as a frequency control device only.

☐ Hallicrafters introduces the "Sky Buddy" receiver at a price of $29.50.

25 Years Ago

May, 1963

☐ The Building Fund has reached $100,000 of its $250k goal. To speed achieving that figure, a number of prominent amateurs—most following successful careers in electronics because of their early amateur interest—have joined to put up $75,000 in dollar-for-dollar matching funds.

☐ Knowing the potent signal that WØAIW emits, we'll be sure to read Lee's description of his four-element quad antenna and envy the directional pattern he achieves.

☐ To prove that it is the "modern" (superhet) broadcast receiver usually at fault in cases of amateur interference, rather than his rig, WA2ANU sets an old t.r.f. set alongside. Free of the image problem, it brings in stations beautifully while the ham transmitter is in operation.

☐ Transistor technology has improved to the point that components workable up through v.h.f. are available at low cost; W1CUT builds a grid-dip meter capable of measuring up through 230 Mc.

☐ Seventy-six entrants in last autumn's sweepstakes worked all 73 section multipliers. *QST* recognition downplays national high scores in favor of section winners. (But just between us, W5WZQ (c.w.) and K6EVR (voice) achieved the largest totals.) PVRC again nosed out Frankford.

☐ Though great as a v.h.f. preamp, the 6CW4 Nuvistor is often a tricky device to neutralize. W1REZ shows us the tube in a grounded-grid configuration which pretty much solves the problem.

☐ A "crystal v.f.o."? Yep, W3QLV has painstakingly reground surplus FT-243 crystals (20 of 'em) to precise frequencies so that selected pairs, heterodyned, produce outputs every kilocycle between 3500 and 3599!

☐ The Midwest Eyeball Network, initiated by WØGET and WØNTI, is performing a terrific public service by handling traffic for doctors and hospitals seeking emergency corneal transplants.

☐ A photo feature, "Hams in the Telstar Project," proudly recognizes a number of amateurs prominent in the design and construction of Ma Bell's communication satellite.

☐ Gus, W4BPD, is embarking on another leg of his supercolossal DXpedition that has activated a batch of exquisitely rare DXCC countries.

☐ A wide variety of viewpoints is expressed in two pages of "correspondence" concerning the matter of upgrading our examination standards—incentive licensing. This year's Board meeting will be filled with debates.—*W1RW*

Public Service

Conducted By Luck Hurder, KY1T
Deputy Manager, Field Services Department, ARRL

The Painless QNI: Being an NCS

By Charles A. "Tony" Willoughby, WD4OWB

In the February *QST* Public Service column, Section Manager Wells discussed traffic handling on slow-speed nets. If you are now handling traffic on your local or Section CW net, you may have noticed improvements in your CW and general operating abilities as well. In this article we will put your ability to good use in learning how to become a Net Control Station.

To begin, let's examine exactly what an NCS does during a net session. The primary function of an NCS is to make sure the traffic is routed as smoothly and quickly as possible. The NCS accomplishes this by controlling the flow of traffic on the net. In your mind, picture a street intersection. Each lane of traffic moves in its turn as the light turns green. Without the light, everyone would try to move at the same time; the result would not be a pretty sight! The NCS performs the same function. Without one, a traffic net would soon be a shambles. The NCS decides who will transmit, when they will transmit and the frequency to pass traffic on. In short, all the functions of the net are under the control of the NCS. An NCS must also have some organizational abilities. On any net, there are nights when there are many messages to be passed and the net control must be able to keep track of all of them. It sounds difficult, but this too is a skill that can be learned by practice. To demonstrate, let's assume that this is your first night as NCS.

Your first order of business will be to prepare yourself a few minutes before the net. You should have the following items handy:

1) Pen and paper
2) Message blanks
3) Traffic sheet
4) List of QN signals

The traffic sheet is a listing of the stations on the net, and who is holding traffic, where the traffic goes, etc. In my shack I use a legal pad with a column for each entry in the following format;

STA QTC FOR WHERE CLR QNX

where

STA = call of station checking in.
QTC = number of messages held.
FOR = station for whom the traffic is listed.
WHERE = number of kHz up or down where traffic is being passed.
CLR = traffic cleared entry.
QNX = station excused entry.

After preparing your traffic sheet, preparing your rig by tuning to the net frequency and taking numerous deep breaths to settle your nerves, you are now ready to call the Cooperville Slow-Speed Net.

Each net begins its session with the net preamble. The preamble differs from net to net but usually follows the general format of the one given here. You should know the preamble of your local net by this time. Tonight you will use the call KD4YOU. To keep things simple, we'll handle only two pieces of traffic tonight. It's now net time so reach for the key and send the preamble: CQ CQ CSSN THE COOPERVILLE SLOW SPEED NET QND QNN KD4YOU TONY IN COOPERVILLE, KY PSE QNZ (Zero beat with the NCS) ANY REPS PSE QNI DE KD4YOU K. You immediately hear someone send: U. At this time take your traffic sheet, acknowledge the station, and place the information in the proper columns as it is sent. This station says: KD4YOU DE KD4RWU/9RN GE TONY QRU K

This station is representing the ninth region net and his name is Tom. You would reply: KD4RWU GE TOM TU $\overline{\text{AS}}$ NEXT K. You just told Tom to stand by and asked for any other reps to check in. Hearing no one, you now ask for any stations holding traffic to check in: CSSN QTC QNI DE KD4YOU K. A station replies with the letter Q. You recognize the station and you copy the following, entering it as before on your traffic sheet. KD4YOU DE KD4QH GE TONY QTC THRU 1 K. This is your friend Dave, who has one message for out-of-state. Looking at your traffic sheet, you see that KD4RWU is ninth region rep, and would handle this traffic; passing it involves moving the stations off frequency. Remember, the receiving station calls the transmitting station first, so NCS addresses the station holding the traffic first. After recognizing Dave and asking him to stand by, quickly double-check your traffic sheet to make sure you send the right station off frequency and then send Dave's suffix: QH. Dave responds with: C. Then send Tom's suffix: RWU. He also responds: C. You then send: UP 5 GET 1 THRU K. You have just asked both Tom and Dave to move up five kHz and pass the traffic. Both will reply GG to indicate they are going and then they immediately move off frequency. Enter a +5 by both calls in the WHERE column, and call for any other stations with traffic: CSSN QTC QNI DE KD4YOU K.

The next station to respond is Frank, KD4UJA, with traffic for Rosie, KD4SAA. After you recognize Frank, he sends the following: KD4YOU DE KD4UJA GE TONY QTC SAA 1 K. Enter the information as you did for Tom and Dave, then ask Frank to stand by. Now you should once again call for stations with traffic. No one responds, so you are now free to call for regular check-ins: CSSN DE KD4YOU QNI K.

If you've been listening to the net for a while, you may have noticed that every station has a specific letter that they like to use to check in with. Hearing the letter E in response to your call, you know that Russ, KD4EBN, is checking in. You recognize the station and see that it is Russ: DE KD4EBN GE TONY QRU K. Enter his call on the traffic sheet and draw a dash through the QTC column to show that he holds no traffic. Thank him for checking in, then call for any other check-ins by sending: NEXT K. Rosie, KD4SAA, enters the net now. Your traffic sheet shows that KD4JUA is holding traffic for Rosie so after she says that he holds no traffic, inform her of this by sending: KD4SAA GE ROSIE QNU $\overline{\text{AS}}$.

Now, just do as you did with Tom and Dave before, only send these stations down 5 kHz. Tom and Dave have not yet reentered the net so you know that they are still up five. Rosie and Frank move down and you are free to call for checkins again. Hearing no response, you may excuse Russ at this time since no traffic is waiting for him. Send his suffix and when he responds tell him: TNX RUSS QRU QNX DE KD4YOU K. Russ will now say good evening, give his call, and leave the net. After Russ signs, you hear someone send: QH. This is Dave wishing to recheck into the net. You respond with: QH and Dave says CLR. The response you should make is: R AS. Now enter on your traffic sheet an X in the CLR column by Dave's call so you know the traffic has been passed. The other stations off frequency are back wishing to recheck as well at this point, so you take them one at a time and make the appropriate entries to the traffic sheet. Proceed now by asking for more check-ins. If you hear no response after a couple of calls, you are free to excuse everyone from the net. You may do this one station at a time or excuse everyone at once. Tonight you decide to do the latter by sending: CSSN TNX ALL FOR QNI ES TFC QRU QNF (Net is free) 73 DE KD4YOU $\overline{\text{AR}}$.

When the frequency falls silent the net is closed and your job is done, right? Wrong! You have one final job, which is filling out an NCS report for the Net Manager. To do this, you use the totals from your traffic sheet. The text for tonight's report would look like this: CSSN JAN EIGHT QNI 6 QTC 2 QNS (Stations in net) YOU/NCS (Identifying yourself as NCS) RWU/9RN (Indicating he was ninth region rep) QH UJA EBN SAA 73. Sign it, put

it into proper ARRL NTS format, and send it to the Net Manager as a piece of traffic on the next session of the net. Now the job is done. Believe me, it will get easier after you have done it a while!

You may be wondering how to become an NCS. The Net Manager may ask you when he believes you are proficient enough to handle the job properly. Of course, you can most certainly volunteer! Often, as in my case, there is a pressing need for another NCS to relieve some of the burden from the other stations. However it is done, along with the job comes responsibility. In accepting, you agree to be on time for the night or nights you have been asked to be NCS and to be prepared. If for some reason you will be unable to make the net on some particular night, let the Net Manager know ahead of time if at all possible so a substitute can be arranged. Above all, be kind, helpful and patient with any newcomers (and some of the old-timers!) to the net. After all, it wasn't so long ago that you were new at this yourself, and where would you be now if it wasn't for the help you received from the more experienced net members?

I sincerely hope that this article has been of assistance to you in beginning your "career" as a traffic handler. I'd like to express my appreciation to Thomas, N4LSJ, Steve, KJ4XU, and all the members of the Kentucky Novice Traffic Net and the Morning Kentucky Phone Net for enduring my many mistakes as I learned the ropes of traffic handling. Finally, a very special thanks to Bob Cooper, KB4OZ, who Elmered me into traffic nets and patiently turned a young squirt into an avid public service traffic handler.

SPOTLIGHT ON SERVICE

OIL SPILL!

By Bob Hicks, KC8CR, Emergency Coordinator, Ohio County, West Virginia

On January 2, 1988, a 3-million-gallon Ashland Oil Company storage tank burst and spilled over one million gallons of diesel oil into the Monongahela River at Floreffe, Pennsylvania. As a result, the city of Wheeling, West Virginia and many surrounding communities faced an impending serious water shortage, because Wheeling is one of the cities that processes its water from the Ohio River and then supplies many of the neighboring communities.

Due to many factors, primarily weather conditions, it was difficult for the city to forecast when the slick would reach the city intake ports in Warwood. The situation had been discussed on several 2 meter nets, and local amateurs were anticipating helping with the distribution of drinking water as this was one of the ways amateurs up the river had been utilized in the past.

On Friday, January 8, Art, WB8IIL, stopped in at the city building at approximately 4 PM to see if there was any activity in the Office of Emergency Servies. Art had been liaison to this office for many years as his place of employment was only a short distance up the street and he was readily available in case of emergency. Our director of Emergency Services, Joe Alberts, notified Art that the intake pumps would be shut down at 5:30 PM and asked that we inform the ARES group to man the station in the OES. Art immediately activated the station and put out a call on 2 meters alerting amateurs of the current situation and of our potential involvement.

Art, joined by Terry, WB8JGY, left the air to telephone the Emergency Coordinator for Ohio County. Art informed KC8CR that the Director wanted us to man the station, as they were unsure as to the efficiency of their contingency plans and could not predict what problems might materialize. On Saturday, Conrad, WB3DQD, Assistant EC for Ohio county, made several trips to the filtration plant to keep us abreast of activities at that site. Conrad lives several blocks from the plant. The city was pumping water from Big Wheeling Creek into barges supplied by Ashland, transporting these barges upstream and pumping the water from the barges into the filtration plant. The creek water had been tested and showed no signs of pollution from the slick.

Conrad's information was relayed to city officials in the city building and helped to clarify several situations. Several people, including out-of-town reporters, followed Conrad around after they copied the transmissions on his hand-held radio. They were having a great deal of difficulty copying on Fire Department frequencies because of intermod.

The OES station used the call W8ZQ, the club call for the Northern Panhandle ARC. At 9:18 AM, Pete, KA8VAQ put out a call from W8ZQ to officially activate the Ohio County ARES Net, as Director Alberts had requested four amateurs for duty in the field. These amateurs were to be familiar with the Wheeling area and report to the city building at 10 AM.

Bob, KC8CR, was on frequency and put out the call for assistance on all the local repeaters. When this call failed to produce the needed help, Bob utilized the preplanned telephone call-up tree, secured the required number of amateurs and reported to the city building. After the briefing, K8EPR presented the plan of action. The city was going to send all available tankers to five locations. At each of these locations a draught basin would be set up. These basins were located in outlying areas where the city would be least able to supply water as the emergency continued. The Volunteer Fire Department would supply the manpower and the pumps to put this water back into the system through fire hydrants. Amateurs were to keep the city building informed of the arrival, departure and gallonage of each tanker. The tankers would eventually go to Moundsville, Glendale and Martins Ferry.

By noon, it was apparent that city officials were going to have trouble communicating with their people at the Wheeling Civic Center. All of the tankers were going to the civic center to have their water tested and treated. In fact, a triangle was set up among the three pickup sites, the Civic Center and the five dump sites. However, the outside temperature during this emergency ranged from 0 to 23 degrees Fahrenheit; frozen valves and lines were a constant problem. Tankers from the Strohs Brewery of Pittsburgh, the US Army National Guard, WV Department of Highways and the City of Wheeling were used to move approximately 300,000 gallons of water between noon on Sunday, January 10 and 10 AM on Monday, January 11.

Amateurs from seven counties in three states provided Amateur Radio public service communications support during this emergency, with participants ranging in age from 18 to 80. Four members of the Wallace family from Bellaire, Ohio helped out; three are licensed amateurs—WD8JIK, KA8WYF and KB8BSF. David Wallace is not yet a ham, but as a good citizen, he did in fact contribute 15 hours of bone-chilling public service work in near-zero temperatures.

As is often the case in emergencies such as this, trained Amateur Radio operators once again came to the assistance of their communities, providing vital communications support in time of need.

Checking Your Message

Traffic handlers don't have to dine out to fight over the check! Even good ops find much confusion when counting up the text of a message. You can eliminate some of this confusion by remembering these basic rules:

1) Punctuation ("X-rays," "Querys") count separately as a word.

2) Mixed letter-number groups (1700Z, for instance) count as one word.

3) Initial or number groups count as one word if sent together, two if sent separately.

4) The signature does not count as part of the text, but any closing lines, such as "Love" or "Best wishes," do.

Here are some examples:

- Charles J McClain—3 words
- W B Stewart—3 words
- St Louis—2 words
- 3 PM—2 words
- SASE—1 word
- ARL FORTY SIX—3 words
- 2N1601—1 word
- Seventy three—2 words
- 73—1 word

Telephone numbers count as 3 words (area code, prefix, number), and ZIP codes count as one. ZIP + 4 codes count as two words. Canadian postal codes count as two words (first three characters, last three characters.)

Although it is improper to change the text of a message, you may change the check. Always do this by following the original check with a slash bar, then the corrected check. On phone, use the words "corrected to."

Field Organization Reports February 1988

ARRL Section Emergency Coordinator Reports

Thirty-two SEC reports were received, denoting a total ARES membership of 17,138. Sections reporting were: AB, AR, EPA, GA, IA, LAX, MDC, MI, MN, MO, MS, MT, NE, NFL, NH, NNJ, NV, OH, OK, ORG, SD, SDG, UT, VT, WA, WI, WMA, WNY, WPA, WTX, WV, WY.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	99	85.00	699	1424
TCC Central				
TCC Pacific	112	96.55	565	1106
Summary	211	90.77	1264	2530
Cycle Three				
TCC Eastern	54	93.10	41	82
Cycle Four				
TCC Eastern	114	98.28	620	1241
TCC Central	83	95.40	549	1123
TCC Pacific	103	88.79	658	1284
Summary	300	94.15	1827	3648

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	29	1222	42.13	.957	95.4	
CAN	29	805	27.75	.612	100.0	
PAN*	58	589	10.15	.611	98.2	
Region Nets						
1RN	58	636	10.97	.508	93.0	100.0
2RN	58	454	7.83	.525	97.6	100.0
3RN	29	284	9.79	.600	97.0	100.0
4RN	58	614	10.59	.410	78.0	96.6
RN5	58	978	16.86	.675	93.0	100.0
RN6	48	204	4.25	.312		98.2
RN7	58	366	6.31	.497	93.9	100.0
8RN	58	545	9.39	.404	97.7	93.1
9RN	58	296	5.10	.349	78.5	100.0
TEN	66	954	14.45	.442	85.0	100.0
TWN	56	281	5.02	.380	88.6	96.5
ECN						82.8
TCC						
TCC Eastern	99	1241				
TCC Central						
TCC Pacific	122	1106				
Cycle Three						
Area Net						
EAN	28	294	10.50	.571	87.2	
Region Nets						
1RN	29	157	5.41	.387	90.0	89.3
2RN	28	170	6.10	.411	92.9	89.6
3RN	22	53	2.41	.240	80.0	85.7
4RN						92.8
8RN						92.8
ECN						89.3
TCC						
TCC Eastern	54	82				
Cycle Four						
Area Nets						
EAN	29	1409	48.58	1.510	98.5	
CAN	29	1275	43.97	1.442	100.0	
PAN	29	782	26.97	.952	96.0	
Region Nets						
1RN						100.0
2RN	32	157	4.90	.520	56.9	100.0
3RN	58	308	5.31	.389	98.3	96.5
4RN	58	737	12.71	.496	97.2	100.0
RN5	58	587	10.12	.670	100.0	100.0
RN6	58	517	8.91	.980	96.0	94.8
RN7	58	308	5.31	.612	95.4	100.0
8RN	56	395	7.05	.449	94.0	100.0
9RN	56	464	8.29	.535	92.7	100.0
TEN	58	528	9.10	.653	83.0	100.0
TWN	51	245	4.80	.381	91.5	96.5
ECN						100.0
ARN	29	79	2.72	.083	100.0	93.1
TCC						
TCC Eastern	114	1241				
TCC Central	83	1123				
TCC Pacific	103	1284				

*PAN operates both cycles one and two.
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AL, AR, CT, DE, EMA, ENY, EPA, GA, IA, ID, IL, IN, KS, MDC, ME, MI, MN, MO, NC, NFL, NH, NLI, NTX, OH, OK, ONT, OR, ORG, RI, SB, SC, SD, SDG, SFL, STX, SV, TN, UT, VA, VT, WA, WMA, WTX, WNY, WPA, 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 NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public-service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, upon sending notification of qualifying months to ARRL Public Service Branch, will be awarded a special PSHR certificate from HQ

397
KC9CJ
209
KA1BBU
177
N4EXQ
160
N4GHI
154
WB5SRX
140
KB4WT
138
WB4DVZ
135
W2QNL
134
N2EIA
131
KW1U
129
KA9FFO
KA3DLY
128
WX4H
124
KA1EXJ
123
WA2SPL
VE4JA
N3EGF
W2MTA
122
WA9VLC
W3FA
WB4ZTR
118
WA2VJL
117
W7LRB
116
NM1K
VE4LB
WB1HIH
N1CPX
VE3ORN
NG1A
115
KD0CL
K2YQK
114
KT1Q
WA4QXT
113
KD7ME
112
W9YCV
111
W1PEX
WR5O
WD8KQC
110
WB6DOB
W9CBE
108
WA9VND
107
K4ZK
W7VSE
WB2OWO
N0FOO
K4NLK
106
WB1GXZ
WF8O
KA9RNY
WE2G
105
WA4JDH
WA2FJJ
AA4MP
W4ANK
104
WA4PFK
W9JUJ
WD4COL
N0DPF
WA1FCD
103
WB2VUK
WA0HTN
WB4WII
102
W6INH
W9EHS
K9CNP
KA2UBD
W4JLS
101
KA2F
WD5GKH
NC9T
WA2ERT
AG9G
K8TVG
WB8JGW
KA4TLC
N4JRE
99
KA1GWE
K4JST
98
WA4EIC
KK5Z
W4PIM
WB2RBA
AA4AT
WB1HBB
WD8QXT
KB4BZA
N5AMK
97
WA2EPI
WB4WQL
KA9RII
KD8HB
KB1AF
96
W1RWG
95
N2HIF
WJ7E
94
VE4IX
ND2S
K4MTX
VE3BDM
93
NQ2H
NJ3V
W5YQZ
91
KA1FVY
W0OYH
K4BGZ
KI4YV
90
W7GHT
KA0KPY
N8HHH
WB1CBP
VE3DPO
N6EQZ
89
WA4RLV
K0BXF
N7ELF
KA2ZKM/T
88
KA1IFC
W3YVQ
KI4QH
87
K2VX
W4CKS
KA1ODT
WB4HRR
86
KA7AID
N4MEJ
85
N2XJ
N1EDD
W5CTZ
N3COY
VE3CYR
84
WA3WIY
KT9I
WB7WOW
W5VMP
83
KB2AYD
KA4TWI
KE0NI
82
WA4RUE
WB0ZNY
KA4HHE
K2ZVI
KA2QOO
WD0GUF
WA8DHB
WB8SYA
81
NB1A
N2HSP
80
N7GGJ
N8GPU/T
NK1Q
79
WB5J
AA4HT
NJ9S
W1KX
K0INI
78
KA2INE
AC5Z
N8CEI
77
K6UYK
WA1JVV
WA3UNX
WA3YLO
N7BGW
K3JL
NO0A
WA1TBY
KA4MTX
76
W4RWB
N2HDL
W6VOM
NN2H
KA8CPS
N2HPT
KA2ZYX
75
N3EMD
WB6QBX
K0SI
WB4PNY
KA9VII
KF5BL
74
N6NLW
KC4VK
KJ9J
WA4LLE
K2YAI
WB8R
N8EFB
KD8KU
N8FWA
73
KV3X
WB5YDD
72
WD4KBW
KA4FZI
KA7EEE
K0ERM
W2FR
KK4FV
K5UPN
NB2D
N8FWA
KD8KU
71
KA2ZNZ/T
KD0NH
WA4LTO
AJ5F
KB5ADE
70
W2RRX
K9ZBM
KF4FG
KI4BR
KA1LIH
N4GNL
69
WB2QMP
NK1N
WA6QCA
N4PL
KJ4VT
N8IBS
KN1K
KB0Z
68
KQ3T
W4HON
N2ABA
N2HXS
NW4O
N2GPA
KB2BKE
67
KF5RD
NV5L
KC3Y
ND0N
N4KRA
KB4TRI
W4TZC
KA9WWT
W7LG
K4IWW
WZ5N
66
N4MWR
N0HWD
KA0SBY
KB4OPR
KF8J
K5MXQ
KA7MUL
65
NZ5J
K8JDI
64
KB4LB
WB9PFZ
K3NNI
KD0YL
KC2JW
W0KK
63
KA7MUL
WA4RNP
KB4JPN
WB0WNJ
WB8KWC
WD8KBW
N1CVE
KP4DJ
62
KA1KP
W9DZV
WA3UZI
W0OUD
AI0O
N4KSO
VE3GT
61
N1DHT
W1YOL
K4BAI
W3ZID
N0AGO
KA0ARP
W0UCE
KA0BCB
VE3POJ
60
WB4TZR
K0PCK
K4VWK
K2TWZ
59
KA9CTW/T
58
WB1BTJ/T
55
VE2EDO
54
KB5DOE
51
N0HMR/T
50
KB2BNW/N
KA1QFV/T
49
N8HRW/T
47
KA1HPO/T
KA2UJU/T
46
N2FOP
N8FWG/T
KA2JMA/T
45
N2ETO/T
44
KA1NOI/T
42
N2EVG/T
41
KA8TND/T
40
KA6HJK/T

The following stations qualified during the month of January, but were not listed in the April column: N1CPX, WB1HBB, KA1HPO/T, N4KRA, W7LRB, N8FXH, KE8PO, K8UOY, KA8WNO, KD8WX, N0HMR/T, K0INI, KE0NI, KB0Z, VE7BNI, VE7EJU, VE7EJW.

Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

The Brass Pounders League Medallion is available to individual operators who achieve BPL and are listed in the BPL column for the third time. This medallion is a one-time-only award, ie, 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 callsign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	610	1689	1984	93	4356
W4DUG	2127	45	2137	14	4323
W3VR	301	1081	1143	53	2578
N1BBT	837	732	846	701	3116
K4KDJ	989	0	989	0	1978
WB9YPY	---	1052	114	608	1774
WD4IIO	580	84	572	53	1289
N3AZW	---	---	---	---	1265
WA4JDH	1	471	525	4	1001
K4DOR	50	430	460	20	960
KA2UBD	0	453	447	1	901
W1PEX	0	240	615	27	882
W9JUJ	3	450	398	3	854
N0DPF	290	108	374	50	822
KC9CJ	16	452	36	310	814
WB0WNJ	209	100	500	4	813
KA1IFC	1	396	387	19	803
WX4H	0	396	340	11	747
N6LHE	11	360	366	6	743
WD4KBW	0	418	323	0	741
KT1Q	0	374	354	7	735
KA9FEZ	---	---	---	---	731
N4GHI	56	314	289	54	713
WB5YDD	4	353	296	14	667
KA8CPS	6	340	302	17	665
N4EXQ	17	342	180	113	652
AA4AT	27	302	312	8	649
WF6O	1	327	305	10	643
WA9VND	10	299	297	24	630
W9ZRX	0	317	313	0	630
KV8Q	0	305	312	4	621
WA0YJX	139	157	225	76	597
WB4PNY	0	307	281	2	590
N3EGF	173	129	248	33	583
NJ3V	63	220	272	6	561
KA9RII	3	279	262	9	553
WA2SPL	4	209	292	29	534
N1CPX	28	197	285	15	525
WA4QXT	71	208	229	15	523
W3ATQ	0	258	246	12	516
WB5J	30	221	249	10	510
N4PL	78	165	246	16	505

BPL for 100 or more originations plus deliveries:
KA9VII 146

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Telegraph Society	26	175	198
Central Gulf Coast Hurricane Net	29	135	4149
Clearing House Net	29	796	403
Empire Slow Speed Net	29	54	394
Great Lakes Net		29	837
IMRA	25	1138	1854
Kentucky Post Office Net	5	5	59
Mission Trail Net	29	50	812
NYSPTEN	29	64	574
Southwest Traffic Net	29	237	1777
West Coast Slow Speed Net	28	481	97
20ISSBN	27	334	1322
75 Meter Interstate SB Net	29	536	1432
7290 Traffic Net	46	614	3193

Amateur Radio Operators And Emergency Managers—A Partnership In Emergency Response

By Joseph H. Massa, Office of Civil Defense, Federal Emergency Management Agency, Washington, DC

The Amateur Radio community in the United States stands at more than one half million members. For many, it is a way of life, a family affair which includes grandparents and children. For most, it is a strong family and community bond.

What is the significance of Amateur Radio to emergency response? Take a few pages from recent history and we can see that Amateur Radio has played a critically necessary role in emergency response.

Amateur Radio operation is not merely a recreational activity. In smaller communities where many miles separate households from emergency services such as transportation, hospitals and weather warning posts, radio operators become the primary communications link.

Did you know?

• During the Mount St Helens volcanic eruption, May 18, 1980, it was the *Amateur Radio operators* who provided critically needed resources for communication between the disaster site and command posts surrounding the mountain. These radio operators volunteered numerous hours, passing emergency traffic into and out of the disaster area.

• The Three Mile Island nuclear facility emergency that occurred March 28, 1979, caused a communications gridlock. Public telecommunications systems were overtaxed when surrounding communities sought information on how families might be affected by the incident. Additional stress was placed on the system when local, state and federal officials had to consult with one another. Converging media and their electronic needs all but paralyzed the communications network. It was a network of *Amateur Radio operators* that bridged the gap.

• The Air Florida crash of January 14, 1982, near downtown Washington, DC, brought with it communications chaos. It also exposed a glaring communications problem in the Greater Washington Metropolitan Area. Emergency responders from Washington DC, Maryland and Virginia could not communicate because of radio-frequency incompatibility. *Amateur Radio operators* and their equipment provided the necessary communications capability for transmitting and receiving emergency information.

These examples do not begin to underscore the essential communications support services that Amateur Radio operators have provided in critical situations. Cooperative efforts between Amateur Radio operators and emergency response organizations are numerous and the list grows daily.

The American Radio Relay League includes members throughout the country, and represents radio relay capabilities that span much of the continent. For this reason, the Federal Emergency Management Agency (FEMA) considers the Amateur Radio operator an indispensable and integral resource in emergency response.

FEMA encourages emergency management officials at state and local levels of government to work closely with the Amateur Radio community to develop emergency communications plans, participate in disaster exercises, and offer its unique capabilities to government emergency management officials.

To bring greater continuity to this unique relationship, a Memorandum of Understanding (MOU) was signed August 3, 1984 by ARRL's President and the Director of the Federal Emergency Management Agency. The MOU states in part:

> FEMA, through its Regional Offices, will encourage State and local emergency management officials to interact with ARRL Section Managers and other appropriate ARRL Field Organization officials, in an effort to establish cooperative relationships with ARRL Field Organization volunteers.

The Military Affiliate Radio System

Most modern-day traffic handlers don't realize that our standard message preamble is largely fashioned after the form used in the Army Amateur Radio System, which had its heyday in the '30s. The ARRL standard preamble prior to that time was quite different, but the AARS form was adopted because it had advantages and was so widely used. AARS nets were numerous in the '30s, using WL calls on two frequencies (3497.5 and 6990 kHz) outside the amateur bands and many frequencies, using amateur calls and amateur participants, inside the bands.

MARS, the post-World War II successor to AARS, encompasses all four of the US armed services. Although it operates numerous nets, all of which are outside the amateur bands on military frequencies, thousands of amateurs participate in MARS. This service performs some traffic coverage that we amateurs are not permitted to perform. MARS, which stands for "Military Affiliate Radio System," is conducted in three different organizations under the direction of the Army, Navy/Marine Corps and Air Force. Therefore, MARS is not in the strictest sense Amateur Radio.

Nevertheless, many amateur messages find their way into MARS circuits, and MARS messages find their way into amateur nets. In fact, NTS has a semiformal liaison with MARS to handle the many messages from families in the States to their sons and daughters serving overseas.

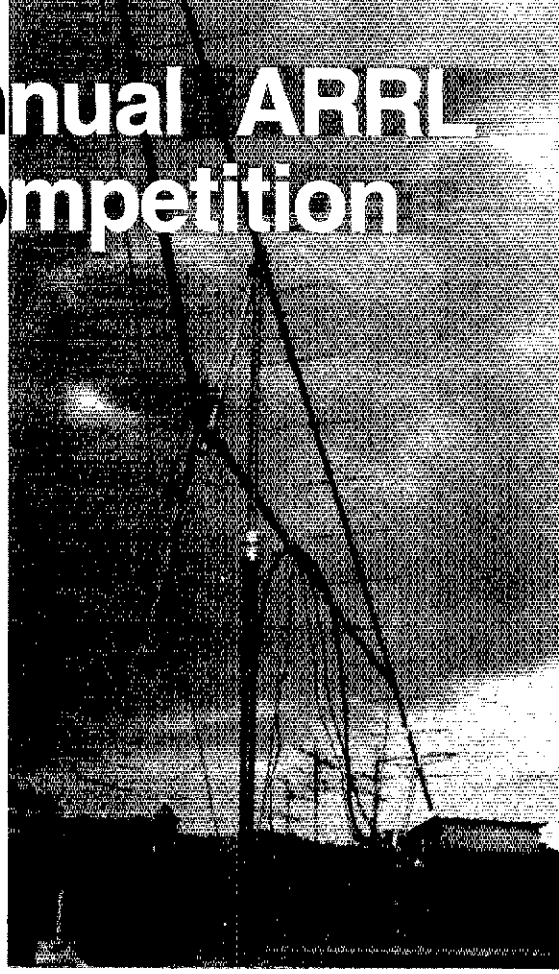
Traffic for some points overseas at which US military personnel are stationed can be handled via MARS, provided a complete military address is given, even though some of these points cannot be covered by Amateur Radio or the NTS. The traffic is originated in standard ARRL form and refiled into MARS form (now quite a bit different from ours) when it is introduced into a MARS circuit for transmission overseas. In this manner, traffic may be exchanged with military personnel in West Germany, Japan and a few other countries that do not otherwise permit the handling of international third-party traffic.

Traffic coming from MARS circuits into amateur nets for delivery by Amateur Radio are converted from MARS to amateur form and handled as any other amateur message. The exception occurs when traffic originates overseas. In this case, the name of the country in which it originates, followed by "via MARS," should appear as the place of origin, so it does not appear that such messages were handled illegally by Amateur Radio. There are places where US military personnel are stationed that even MARS cannot handle traffic with, presumably because of objections by the host country. This information is in the hands of MARS "gateway" stations and changes from time to time.

The amount of MARS traffic appearing on amateur nets is not great, since MARS already has a fine system of handling it on MARS frequencies, but it is important that we maintain liaison as closely as possible since all civilian MARS members are US licensed amateurs.

Results, Eleventh Annual ARRL International EME Competition

By Billy Lunt, KR1R Contest Manager and Mark Gamble Contest Assistant



The EME contest doesn't require huge antennas to participate. DL6WU scores very well on 432 using a 24-el 6-meter-boom single Yagi with an "armstrong" rotator.

The Moon was a harsh mistress indeed this year to the heralded EMEers. Her elusive embrace was not easily captured. A few good examples of these poor conditions are summed up in the following statements. Enrico, HB9SV, stated, "The weather conditions in Switzerland made for noisy conditions on 144 MHz and 432 MHz." Dale, AF1T, remarked, "Conditions during the second weekend, especially Sunday, Nov 15, were absolutely dismal! You know something is wrong when even W5UN and DL8DAT are weak!" Shep, W7HAH, on the other hand, found that the Moon was being very kind to him on all days except the 15th of November when he encountered "Faraday rotation lockout." Perhaps the Moon didn't appreciate his Yagi approach.

Most entrants in this year's EME contest seem to agree that it was one of the most difficult in a while, yet still rewarding. Dave, W5UN, declared, "I found the conditions to be very poor this year due to the unfortunate occurrence of a major solar flare the Thursday preceding the first contest weekend. Residual effects occurred during the second weekend. Even so, the contest was enjoyable."

This year's EME contest seized the attention of 127 amateur stations, who competed in nine different categories. In the single-operator multiband category it was Enrico, HB9SV, who captured the esteemed "top spot" with a score of 742k points. Following in second place with a commanding score of 624k was Hannes, OE5JFL. Shep, W7HAH, followed Hannes with a strong third-place effort, scoring 455k points. In total, the single-operator multiband category had a total of 17 entrants.

In the single-operator 50-MHz category, the winner was Ray, WA4NJP, with a score of 200 points. Perhaps next year someone may challenge Ray for the Moon's attention on 6 meters, as he was the only entry received for 1987.

Single operator, 144 MHz, was again the largest category, attracting a total of 58 entries. And yes, once again the "King of 144 MHz" is the omnipresent W5UN, with 1,284,400 points. Dave not only had the highest score in the contest but was also the only single op to break the 1-meg mark! Following in second place with a score of 945k was KB8RQ. Gary attributed his high score to the new K6MYC-designed antenna. Manfred, DL8DAT, racked up 823k points for the third-place spot.

Thirty-three single operators were burning up the atmosphere on the 432-MHz band. The leader of the pack was DL9KR with a score of 381k points. It seems that there is no obstacle too great for Jan as he had to face extremely gusty winds for his win. In second, and nipping at his heels with a score of 315k, was Frank, NC1I. Finishing in third place with a score of 285k was FD1FHI.

In the single-operator 1296-MHz category, OE9XXI worked 24 QSOs and 19 mults to take the leading spot. His 45k points were just too much for Tom, WD5AGO, to overcome, finishing second with 4k points.

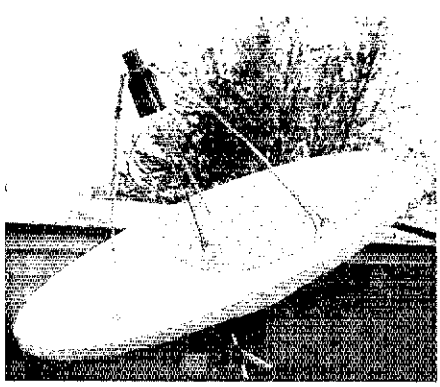
The multioperator, multiband category was led by K2UYH. The SNJ-based multiop crew turned in a whopping score of 1,065,000 points for their first-place victory and also claimed the second highest score of the contest. In second place with a score of 558k was the West Virginia team of W3IWI/8. YU1AW and YU7EF placed third with a score of 231k points. In total, there were four entries in this category, up one over last year.

The multioperator 144-MHz category boasted a total of seven entrants this year. OZ1EME walked away with a secure 300k margin. Denmark's winning multiop crew amassed 436k points for their final score. In second place with 96k points was the Hungary team of HG1W. Radio Club Prague, OK1KRA, finished third with a score of 40k points.

There were five entries in the multioperator 432-MHz category, an increase of one over last year. The three-man Seven Hills, Ohio crew out-multiplied second-place finishers KP4I with 29 multipliers, for a score of 217k points, to take first place. The French team of F1ELL finished in third place with 165k.

Of the two entrants in the multioperator 1296-MHz category, it was WBØDRL who led the way with 27k points. In second with 11k was the HB9MZO crew.

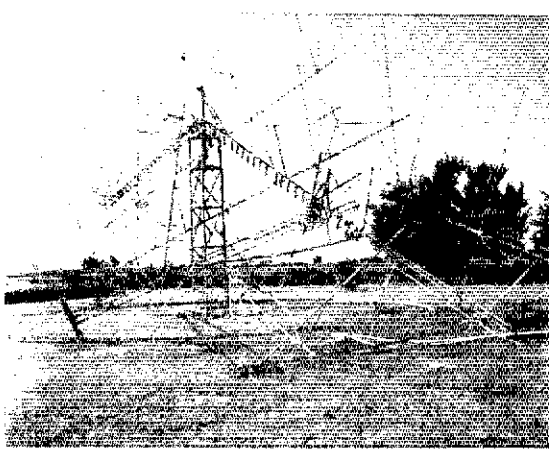
Thanks to all the participants in this year's contest for their soapbox comments, photos and enthusiasm. Next year is sure to provide fun and excitement. Watch for the dates and rules of the Twelfth Annual ARRL International EME Competition to be announced in a future issue of *QST*. CU there! 73.



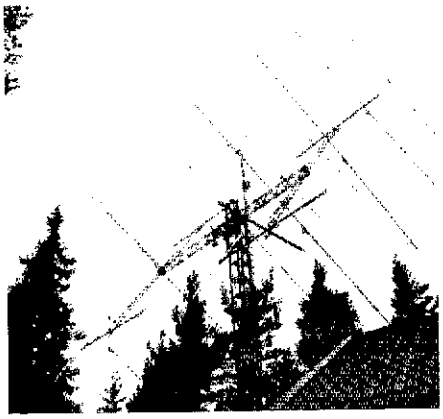
Hand cranking through a bore sight, Tom, WD5AGO, managed to place second in the 1296, single-operator category.

SOAPBOX

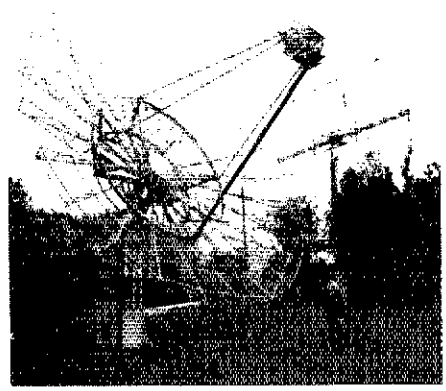
The new array was not completed until just a few hours before the weekend. In spite of that and poor conditions, it was a fun test! (W7IUV). It was my first contest with a real EME antenna and I had a ball (KI3W). The contest was certainly a lot of fun, my first via the moon (WD9ACA). Conditions poor. Alcohol consumption high. Lots of fun (GM4IPK). Bad snowstorm the last day so we



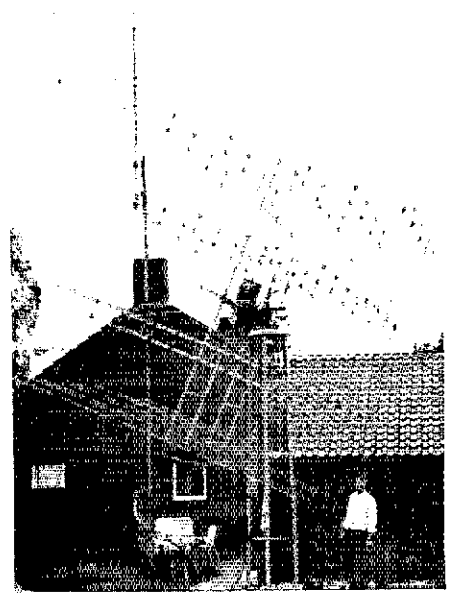
What's left of Gary KB8RQ's 32 32-19 Boomers after a wind storm? Not much!



Using this stacked array, SM5DGX worked 76 QSOs and 33 mults for his ninth-place finish.



Enrico, HB9SV, displays his single-operator, multiband winning antennas.



PA3CSG's antenna used for their 47 QSOs on 432 MHz.

couldn't operate (WA7KYM). My first 1296 contest; really enjoyed it. More power and bigger dish next year (WD5AGO). Typical signals received on 70 cm from the Arecibo 1000-ft-diameter dish ran about 109-dBm. Assuming these were from 1-kW rigs, our 60-watt signal should have been received at −121 dBm, or 31 dB above the noise in 500-Hz, 100-degree system (KP4I). Faraday lockup after moon reached azimuth 160 degrees on all four mornings (DL9KR). Made my first 4 EME contacts in the contest. I will be back for more in the future (W5NZS). Thanks for running the contest; it's always fun (K5WXN). This year as well, the weather was not very good during the two parts of the EME contest. There was a strong wind and it rained on Oct 18 and Nov 14. For this reason, there was much noise on 144 MHz and 432 MHz and an instability of my antennas. In spite of these inconveniences, I am satisfied with my results. I was able to contact 21 new stations (HB9SV). Very enjoyable contest this year with no weather problems for a change (W7HAH). Made 9 QSOs for approximately 20 hours work on 432 and worked 6 stations in 36 minutes on 2-meters! (W7ID). Contest was great this year. I was running my new antenna array, 16 2M-5WL that K6MYC designed. The 32 32-19 boomer that I ran the last two years went down in a wind storm during the summer. I felt that K6MYC's new 2M-5WL are as good as my old 32 array. See everyone on 144.016 next contest. I was only a few contacts from last year's score (KB8RQ). What a great time—16 new stations and 1 new country. See you on 144.011 (N5BLZ). I worked the whole summer to get the new antenna up for the test but I still had many problems the first weekend (SM5DGX).

FEEDBACK

☐ Please refer back to March 1987 *QST*, pp 85-86, for the following correction. HB9CRQ, a single-operator, multiband entrant, scored 217,800 and not 117,800 as listed in that issue of *QST*.

Scores

Scores list: call, score, stations heard, stations worked, multipliers, band (A—50 MHz, B—144 MHz, C—220 MHz, D—432 MHZ, E—1296 MHz, F—2304 MHz).

Single Operator, Multiband

HB9SV	742,000-	55-	55-	28-	B
		40-	40-	20-	D
		21-	21-	16-	E
OE5JFL	624,000-	103-	97-	34-	D
		24-	23-	18-	E
W7HAH	455,000-	72-	72-	35-	B
		19-	19-	15-	E
K4QIF	413,600-	4-	4-	3-	B
		76-	76-	31-	D
		14-	14-	10-	E
N4GJV	400,400-	18-	18-	13-	B
		73-	73-	31-	D
HB9CRQ	266,400-	69-	69-	32-	B
		5-	5-	4-	D
WB9QMN	151,900-	28-	28-	18-	B
		21-	21-	15-	D
F2TU	123,200-	26-	26-	16-	D
		18-	18-	12-	E
Y22ME	121,800-	12-	12-	12-	B
		30-	30-	17-	D
W7FN	110,400-	69-	47-	22-	B
		2-	1-	1-	D
G3LTF	71,300-	2-	2-	2-	B
		18-	18-	13-	D
		11-	11-	8-	E
VE4MA	69,000-	18-	18-	13-	D
		11-	11-	9-	E
		1-	1-	1-	F
AF1T	51,700-	27-	27-	19-	B
		2-	2-	2-	D
W7ID	19,500-	6-	6-	5-	B
		9-	9-	8-	D
SM3AKW	16,400-	5-	5-	4-	B
		14-	14-	10-	D
		2-	2-	2-	E
UA3TCF	2,500-	1-	1-	1-	B
		4-	4-	4-	D
SM0PYP	2,000-	3-	2-	2-	B
		3-	3-	3-	D
		3-	3-	2-	E
		1-	1-	1-	F

Single Operator, 50 MHz

WA4NJP	300-	2-	2-	1-	A

Single Operator, 144 MHz

W5UN	1,284,400-	247-	247-	52-	B
KB8RQ	945,000-	189-	189-	50-	B
DL8DAT	823,200-	168-	168-	49-	B
N5BLZ	609,600-	127-	127-	48-	B
WA1JXN/7	502,000-	140-	140-	43-	B
SM5FRH	520,300-	121-	121-	43-	B
EA2LU	298,800-	83-	83-	36-	B
WD9ACA	291,600-	84-	81-	36-	B
SM5DGX	250,800-	76-	76-	33-	B
K8ZK/1	244,400-	74-	74-	33-	B
K2OS	224,400-	68-	68-	33-	B
LZ2US	224,400-	68-	68-	33-	B
OK1MS	217,000-	62-	62-	35-	B
OZ4MM	211,700-	73-	73-	29-	B
SM2CEW	207,400-	61-	61-	34-	B
SM3LBN	180,000-	60-	60-	30-	B
K1WHS	159,600-	57-	57-	28-	B
W7IUV	153,900-	57-	57-	27-	B
SM4GVF	145,600-	56-	56-	26-	B
DJ7UD	135,000-	54-	54-	25-	B
PA0NIE	132,300-	49-	49-	27-	B
WA8TKJ	124,800-	48-	48-	26-	B
ON7RB	83,600-	38-	38-	22-	B
KF8M	71,400-	57-	34-	21-	B
GM4IPK	61,200-	34-	34-	18-	B
K8HXW	51,000-	30-	30-	17-	B
F6DRO	47,800-	28-	27-	17-	B
I1KTC	44,200-	26-	26-	17-	B
UA1ZCL	43,200-	24-	24-	18-	B
SM5IOT	42,200-	72-	27-	16-	B
KI3W	41,400-	23-	23-	18-	B
N6CW	40,000-	25-	25-	16-	B
W8RWH	28,500-	19-	19-	15-	B
WA7TDU	28,000-	38-	20-	14-	B
Y23RD	26,600-	19-	19-	14-	B
EA3DXU	20,400-	17-	17-	12-	B
W5UWB	16,000-	16-	16-	10-	B
W8RT	14,300-	13-	13-	11-	B
W8VB	14,300-	13-	13-	11-	B
F8EYM	12,600-	14-	14-	9-	B
WB8PAT	11,000-	11-	11-	10-	B
KC3LZ	10,000-	10-	10-	10-	B
GM4JJJ	8,000-	16-	10-	8-	B
K5WE	7,200-	9-	9-	8-	B
NI1W	4,200-	7-	7-	6-	B
W8WVM	3,600-	10-	6-	6-	B
WA4MVI	2,500-	5-	5-	5-	B
N8GTI	1,200-	4-	4-	3-	B
W1AIM	900-	7-	3-	3-	B
K2GAL	900-	7-	3-	3-	B
JA9EYI	900-	11-	3-	3-	B
PA3EON	800-	22-	4-	2-	B
WA7VHW	600-	3-	3-	2-	B
W2RS	400-	10-	2-	2-	B
LA3EQ	100-	1-	1-	1-	B
VK3AUU	100-	1-	1-	1-	B
KN5S	100-	1-	1-	1-	B
VE5LY	100-	1-	1-	1-	B

Single Operator, 432 MHz

DL9KR	381,100-	103-	103-	37-	D
NC1I	315,000-	94-	90-	35-	D
FD1FHI	265,600-	98-	84-	34-	D
K1FO	270,600-	82-	82-	33-	D
DJ8MB	151,200-	54-	54-	28-	D
DJ8BV	135,000-	50-	50-	27-	D
WA3FFC	105,100-	47-	47-	23-	D
JA6CZD	90,300-	43-	43-	21-	D
W9IP	78,000-	39-	39-	20-	D
JR4AEP	62,000-	31-	31-	20-	D
KL7WE	59,500-	35-	35-	17-	D
JA4BLC	52,800-	33-	33-	16-	D
DL6WU	45,000-	39-	25-	18-	D
W8RAP	40,800-	38-	27-	15-	D
OE9HHV	28,000-	20-	20-	14-	D
KDØGT	25,200-	18-	18-	14-	D
K5WXN	24,000-	24-	20-	12-	D
W7CI	21,600-	9-	9-	6-	D
YU1IQ	21,600-	29-	18-	12-	D
W1JR	19,500-	15-	15-	13-	D
OH2DQ	19,200-	16-	16-	12-	D
JHØYSI	17,600-	16-	16-	11-	D
XE1XA	16,500-	15-	15-	11-	D
UA6LGH	16,000-	23-	23-	8-	D
JA9BOH	14,000-	14-	14-	10-	D
WA4OFS	14,000-	14-	14-	10-	D
W5NZS	1,600-	4-	4-	4-	D
LZ2AR	900-	3-	3-	3-	D
I5TDJ	400-	2-	2-	2-	D

Single Operator, 1296 MHz

OE9XXI	45,600-	24-	24-	19-	E
WD5AGO	4,200-	11-	7-	6-	E

Multioperator, Multiband

K2UYH (+K2s SMN,TXB,KA2VAD,N2AHN, WB2KMY)	1,065,000-	53-	53-	28-	B
		80-	80-	31-	D
		17-	17-	14-	E
W3WI/8 (+K2s AOE,TKN,KA2OEG, WB3DZC,AA4TJ,N4FMA,WB4ZJO,K8JL, WA7CJO)	556,600-	85-	86	32-	D
		18-	18-	12-	E
		11-	11-	7-	F
YU1AW (+YU7EF)	231,000-	6-	6-	6-	B
		64-	64-	27-	D
OK1KIR (OK1s DAI,DAK,DCI,CZ,ops)	72,600-	22-	22-	14-	D
		10-	10-	7-	E
		1-	1-	1-	F

Multioperator, 144 MHz

OZ1EME (OZ1FTU,OZ2GZ,OZ5IQ,ops)	436,000-	109-	109-	40-	B
HG1W (+HG1s YA,YI,YU,ops)	96,600-	42-	42-	23-	B
OK1KRA (OK1s AUT,BRA,DIX,ops)	45,900-	30-	27-	17-	B
I2FAK (+IW2CSM)	40,800-	24-	24-	17-	B
KL7X (+AL7FS)	31,500-	21-	21-	15-	B
WA7KYM (+W8KJY)	30,600-	22-	22-	14-	B
EI3DP (+EI2CNB,EI4BZ,EI5FT,EI6BT, EI8EI)	400-	2-	2-	2-	B

Multioperator, 432 MHz

K8WW (+NI8O,WD8BHC)	217,500-	75-	75-	29-	D
KP4I (+NU2Y)	180,400-	82-	82-	22-	D
F1ELL (+F1DDA,FD1s FLN,HTB,F6BBO)	165,200-	59-	59-	28-	D
PA3CSG (+PA3s CYN,DSB,PA4BD)	112,800-	47-	47-	24-	D
WA9FWD (+N9KC)	22,100-	17-	17-	13-	D

Multioperator, 1296 MHz

WB8DRL (+WA8TKJ)	27,000-	20-	18-	15-	E
HB9MZO (+HB9s CXR,VI)	11,200-	14-	14-	8-	E

Check Log

K5AZU

Field Day Rules

1) **Eligibility:** Field Day is open competitively to all amateurs in the ARRL and CRRL Field Organizations (plus Yukon and NWT). Foreign stations may be contacted for credit, but are not eligible to compete.

2) **Object:** To work as many stations as possible and, in doing so, to learn to operate in abnormal situations under less-than-optimum conditions. A premium is placed on skills and equipment developed to meet the challenge of emergency preparedness and to acquaint the public with the capabilities of Amateur Radio.

3) **Dates:** June 25-26, 1988.

4) **Field Day Period:** From 1800 UTC Saturday until 2100 UTC Sunday. Class A and Class B (see below) stations who do not begin setting up until 1800 UTC Saturday may operate the entire Field Day period of 27 hours. Others must begin their setup no earlier than 1800 UTC Friday, and may operate no more than 24 consecutive hours; ie, once on-the-air Field Day operation has started, it must end 24 hours from that point.

5) **Entry Categories:** Field Day entries are classified according to the maximum number of simultaneous transmitted signals, followed by the designation of the nature of the individual or group participation. Below 30 MHz, once a transmitter is used for a contact on a band, it must remain on that band for at least 15 minutes. During this 15-minute period, the transmitter is considered to be transmitting a signal, whether it is or not, for purpose of determining transmitter class. Switching devices prohibited.

(Class A) Club/nonclub portable: Club groups (or nonclub groups with three or more licensed amateurs) set up specifically for Field Day. Such stations must be located in places that are not regular station locations, and must use no facilities installed for permanent station use, nor any structures installed permanently for Field Day use. Stations must be operated under one call sign (except when the Novice/Technician position is used) and under the control of a single licensee or trustee for each entry. All equipment (including antennas) must lie within a circle whose diameter does not exceed 300 meters (1000 feet). All contacts must be made with transmitter(s) and receiver(s) operating independent of commercial mains. Entrants who, for one reason or another, operate a transmitter or receiver from commercial mains for one or more contacts will be listed separately at the end of their class.

Any Class A group whose entry classification is two or more transmitters (non-Novice) may also use one Novice/Technician operating position (Novice bands only) without changing its basic entry classification. For Field Day purposes only, any Canadian "Amateur" licensee, who has been licensed for less than six months prior to Field Day, shall be considered a "Novice" to provide a means for Canadian Field Day Class A stations with two or more transmitters to participate with a "Novice/Technician" operating position. This "Canadian Novice station" is restricted to the US Novice subbands and power/mode restrictions. The Novice/Technician station (including antennas) should be set up and operated by Novice and Technician licensees and should use the call sign of one of the Novice/Technician operators.

(Class A—Battery) Club/nonclub portable: Club groups (or nonclub groups with three or more licensed amateurs) set up specifically for Field Day and all contacts are made using an output power of 5 W or less and the power source is other than commercial mains or motor-driven generator (eg, batteries, solar cells, water-driven generators). Other provisions are the same as for class A.

(Class B) One- or two-person portable: Nonclub stations set up and operated by not more than two licensed amateurs will be placed in Class B. Other provisions are the same as for Class A. One- and two-person Class B entries will be listed separately in the results.

(Class B—Battery) One- or two-person portable: Nonclub stations set up and operated by not more than two licensed amateurs and all contacts are made using an output power of 5 W or less and the power source is other than commercial mains or motor-driven generator (eg, batteries, solar cells, water-driven generators). Other provisions are the same as for Class A. One- and two-person Class B—Battery entries will be listed separately in the results.

(Class C) Mobile: Stations in vehicles capable of operating while in motion and normally operated in this manner, including antenna. This includes maritime and aeronautical mobiles.

(Class D) Home stations: Stations operating from permanent or licensed station locations using commercial power. Class D stations may count contacts only with Class A, B, C and E Field Day groups for points.

(Class E) Home stations—emergency power: Same as Class D, but using emergency power for transmitters and receivers. Work stations in Class A, B, C, D and E.

6) **Exchange:** Stations in any ARRL Section will exchange their Field Day operating class and ARRL Section (see page 8 in any *QST*). For example, if your club group was planning to operate in the three-transmitter, Class A category from Missouri, you would send "3 A Missouri." Foreign stations send RS(T) and QTH.

7) **Miscellaneous Rules**

A) Operators participating in Field Day may not, from any other station, contact for point credit the Field Day portable station of a group with which they participated.

B) A station used to contact one or more Field Day stations may not subsequently be used under any other call during the Field Day period. Family stations are exempted.

C) Each phone and each CW segment is considered as a separate band. All voice communication contacts are equivalent, and packet/RTTY/ASCII is counted as CW. A station may be worked once on each band. Crossband contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited, except that a Novice/Technician position may operate on any Novice band segment at any time. No repeater contacts.

8) **Scoring:** Scores are based on the number of valid contact points times the multiplier corresponding to the highest power used at any time during the Field Day period, plus bonus points. Phone contacts count one point each, and CW contacts count two points each. Power multipliers: If *all* contacts are made using an output power of 5 W or **less and if a power source other than commercial mains or motor-driven generator is used (eg, batteries, solar cells, water-driven generators), multiply by 5.** If any or all contacts are made using an output power of 150 W or less, multiply by 2. Multiply by 1 if any or all contacts are made using an output power over 150 watts. Batteries may be charged while in use for Class C entries only. For other classes, batteries charged during the Field Day period must be charged from a power source independent of the commercial mains.

A) **Bonus points:** The following bonus points will be added to the score (after the multiplier is applied) to determine the final score. Only Class A and B stations are eligible for bonuses. Just check the box on the Field

Send for Your Field Day Package

Send to HQ a 9- × 12-inch self-addressed envelope with 4 units of First Class US postage or 4 IRCs for the official Field Day Entry Package. This package includes 1 Publicity Kit, 1 Field Day Summary Sheet, 1 large dupe sheet with instructions and a check list to ensure that your entry is complete. If you require more dupe sheets, indicate so in your request and affix 1 unit of additional First Class postage to your SASE for each two additional dupe sheets requested.

Special Bonus Points

The Canadian Radio Relay League (CRRL) has had a longstanding association with the ARRL. To commemorate their new autonomy, bonus points will be awarded for contacting each of the eleven CRRL official bulletin stations ending with a "QST" suffix (ie VE1QST, VE2QST, etc). "QST" stations will identify their call signs and send signal reports for the exchange.

Field Day stations will earn a bonus of 100 points for the *first* contact with a "QST" station. Additional contacts with each of the other 10 "QST" stations will earn 10 bonus points per station worked thereafter, regardless of band. Therefore, there is a possible total of 200 extra bonus points to be earned. Further contacts with the same "QST" stations on additional bands count for QSO points only.

Day summary sheet to indicate that you qualify for the bonus, and attach the necessary proof.

(1) *100% emergency power:* 100 points per transmitter for 100% emergency power. All equipment and facilities at the Field Day site must be operated from a source independent of the commercial mains. Example: A club operating 3A using 100% emergency power may claim 300 bonus points.

(2) *Public relations:* 100 points for public relations. Publicity must be obtained or a bona fide attempt to obtain publicity must be made, or operation conducted from a public place (eg, a shopping center). Evidence must be submitted in the form of a clipping, a memo from a BC/TV station stating that publicity was given or a copy of material that was sent to news media for publicity purposes.

(3) *Message origination:* 100 points for origination of a message by the club president or other Field Day leader, addressed to the SM or SEC, stating the club name (or nonclub group), number of operators, field location and number of ARES members participating. The message must be transmitted during the Field Day period, and a fully serviced copy of it must be in standard ARRL message form or no credit will be given.

(4) *Message relay:* 10 points for each message received and relayed during the Field Day period, up to a maximum of 100 points. Copies of each message, properly serviced, must be included with the Field Day report.

(5) *Satellite QSO:* 100 points can be earned by completing at least one QSO via satellite during the Field Day period. The repeater provision of Rule 7C is waived for satellite QSOs. A satellite station does not count as an additional transmitter. On the summary sheet, show satellite QSOs as a separate "band."

W1AW Field Day Bulletin Schedule

In addition to the regular schedule detailed on page 87 of April *QST*, extra CW bulletins will be run at 1400 UTC (10 AM EDT), and extra phone bulletins at 1500 UTC (11 AM EDT) both Saturday and Sunday mornings.

(6) *Natural Power:* Field Day groups making a minimum of five QSOs without using power from commercial mains or petroleum derivatives can earn 100 points. Intuitively, this means an "alternate" energy source of power such as solar, wind, methane or grain alcohol. This includes batteries charged by natural means (not dry cells). The natural-power station counts as an additional transmitter. If you do not wish to change your entry class, take one of your other transmitters off the air while making the natural-power QSOs. A separate list of natural-power QSOs should be enclosed with your entry.

(7) *W1AW message:* A bonus of 100 points will be earned by copying a special ARRL Field Day bulletin sent over W1AW on its regularly announced frequencies just before and during Field Day. This message can be received directly from W1AW or by any relay method. An accurate copy of the received message should be included in your Field Day report.

(8) *Packet Radio:* 100 points can be earned by completing at least one QSO on packet radio during the Field Day period. The repeater provision of Rule 7C is waived for packet-radio QSOs. A packet station does not count as an additional transmitter. On the summary sheet, show packet-radio QSOs as a separate "band."

9) **Reporting:** Entries must be postmarked by July 26, 1988. No late entries can be accepted. A complete entry consists of a summary sheet and a list of stations worked on each band/mode during Field Day, plus bonus proof. The list of stations worked on each band or mode may take the form of official ARRL dupe sheets or an alphanumeric listing of call signs worked per band and mode. This list may be computer-generated. Incomplete or illegible entries will be classified as checklogs. A copy of Field Day logs should be kept by your Field Day group, but should not be sent in unless specifically requested later by ARRL.

10) **Condition of Entry:** Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

11) **Disqualifications:** See January 1988 *QST*, page 86.

ARRL June VHF QSO Party Plaque Program

The greatest VHF contest of all, the June VHF QSO Party, is once again upon us. There are, however, a few new additions to the awards program... Plaques! For the first time since the inception of this contest, the League will offer 25 handsome 9- × 12-inch engraved plaques. They will be awarded to the winners of the categories listed below. Also listed below are the sponsors who generously donated $40 to fund each plaque. A big "thank you" to each of the sponsors. The most popular VHF contest of the season is now even better. Good luck! 73.

Single Operator

Position	*Donor*
1st	John Kanode, N4MM
2nd	Bald Knob VHF Contest Group
3rd	MO-KAN Council of ARCs
4th	Terry Netzley, W8NJR
5th	Delaware Valley VHF Society
6th	Ken Kreis, WD9ACA
7th	2-Meter EME Bulletin
8th	"Q" Products
9th	Central States VHF Society
10th	Telex Communications Inc (Hy-Gain)

Multioperator

Position	*Donor*
1st	Randy Stegemeyer, W7HR
2nd	PHD ARA
3rd	In Memory of Dudley Watts, N4KEU—WB4FDT
4th	Frank Potts, NC1I
5th	Mt Airy VHF Radio Club
6th	"Q" Products
7th	Mark Wilson, AA2Z
8th	Cushcraft
9th	Central States VHF Society
10th	W1XX (+K1GX,KB9NM) Contest Team

QRP Portable—Single Operator

Position	*Donor*
1st	K2OVS and K2RIW
2nd	Peter Putman, KT2B
3rd	Contest Committee—LIMARC
4th	West Coast VHFer
5th	Sunrise Radio Club—W2SV

Rules, June VHF QSO Party

1) **Object:** To work as many amateur stations in as many different 2° × 1° grid squares as possible using authorized amateur frequencies above 50 MHz.

2) **Contest Period:** Begins 1800 UTC Saturday, June 11, and ends at 0300 UTC Monday, June 13.

3) **Categories**

(A) Single operator: One person performs all operating and logging functions.

(1) *Multiband.*

(2) *Single band:* Single-band entries on 50, 144, 220, 432, 902, 1296 and 2304-and-up MHz categories will be recognized both in *QST* score listings and in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 9, Awards.

(3) *QRP Portable:* Run 10-W output or less using a portable power source from a portable location. The intent of this rule is to encourage operation from "remote" locations, not to have home or fixed stations run low power.

(B) Multioperator: Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1000 feet).

4) **Exchange:** Grid locator (see Jan 1983 *QST*, page 49). Example: W1AW in Newington, CT would send FN31. Exchange of signal report is optional.

5) **Scoring**

(A) *QSO points:* Count one point for each complete 50- or 144-MHz QSO. Count two points for each 220- or 432-MHz QSO. Count three points for each QSO on 902 or 1296 MHz. Count four points for each 2.3-GHz-or-higher QSO.

(B) *Multiplier:* The total number of different grid squares worked per band. Each 2° × 1° grid square counts as one multiplier on each band it is worked.

(C) *Final score:* Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score (see scoring example).

6) **Use of FM**

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted. This prohibits use of all repeater frequencies. Contest entrants may not transmit on repeaters or repeater frequencies on 2 meters for the purpose of soliciting contacts.

(B) Use of the national simplex frequency, 146.52 MHz, or immediate adjacent guard frequencies is prohibited. Contest entrants may not transmit on 146.52 MHz for the purpose of making or soliciting QSOs. The intent of this rule is to protect the national simplex frequency from contest monopolization. There are no restrictions on the use of 223.50 MHz.

(C) Only recognized simplex frequencies may be used, such as 144.90 to 145.00; 146.49, .55 and .58; and 147.42, .45, .48, .51, .54 and .57 MHz on the 2-meter band. Local-option simplex channels and frequencies adjacent to the above that do not violate the intent of (A) or (B) above or the spirit and intent of the band plans as recommended in the *ARRL Repeater Directory, may* be used for contest purposes.

7) **Miscellaneous**

(A) *Stations may be worked for credit only once per band from any given grid square, regardless of mode.* This does not prohibit working a station from more than one grid square with the same call sign. Such a roving station, however, must submit a separate entry for each grid square from which operation takes place. In this situation, the entrant may opt to waive rule 7 (C) and use a single different grid square. Crossband QSOs do not count. Aeronautical mobile contacts do not count.

(B) Partial QSOs do not count. Both calls, the full exchange and acknowledgment must be sent and received.

(C) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(D) Only one signal per band (6, 2, 1¼, etc) at any given time is permitted, regardless of mode.

(E) While no minimum distance is specified for contacts, equipment should be capable of real communications (ie, able to communicate over at least 1 km).

(F) Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station must exist for each QSO made under these conditions.

(G) A station located *precisely* on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(H) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs using coherent radiation on transmission (eg, laser) and employing at least one stage of electronic detection on receive.

8) **Reporting:** Entries must be received no later than 30 days after the end of the contest (July 13, 1988). No late entries can be accepted.

9) **Awards**

(A) Plaques will be awarded in the following categories:

(1) Top ten single-operator scorers

(2) Top ten multioperator scorers

(3) Top five QRP portable single-operator scorers

(B) Certificates will be awarded in the following categories:

(1) Single operator

(a) Top single-operator score in each ARRL Section.

(b) Top single operator on each band (50, 144, 220, 432, 902, 1296 and 2304-and-up categories) in each ARRL Section where significant effort or competition is evidenced. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if WBØTEM has the highest single-operator all-band score in the Iowa Section and his 50- and 220-MHz scores are higher than any other IA single-op's, he will earn a certificate for being the single-operator Section leader *and* endorsement stickers for 50 and 220 MHz.

(c) Top single-operator QRP portable multiband and single-band score in each ARRL Section where significant effort or competition is evidenced.

(2) Top multioperator score in each ARRL Section where significant effort or competition is evidenced. Multioperator entries are *not eligible* for single-band awards.

10) **Condition of Entry:** Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

11) Disqualifications: See January 1988 *QST*, page 86.

Scoring Example

Band (MHz)	QSOs	QSO Points	Grid Squares
50	25 (×1)	25	10
144	40 (×1)	40	20
220	10 (×2)	20	5
432	15 (×2)	30	10
1296	6 (×3)	18	3
Totals	96	133	48

Final score = (QSO points) × (total no. grid squares):
(6384 = 133 × 48).

50.110 Moratorium?

In the past year especially, much has been said about contesters QRMing the DX window at 50.110 MHz. Thus far, although much discussed, a consensus solution has not emerged. Most proposals have centered on some kind of rigid ban, but without wide acceptance would be doomed to failure. Why not ease into a band plan that recognizes the rights of both contesters and DXers, both of whom have similar objectives?

Thus, without hard-and-fast rules and threats of disqualification etc, domestic stations are encouraged in the June contest to refrain from monopolizing the frequency range 50.100-50.120 MHz for domestic contest QSOs. This is based on the simple requisite of being considerate of other operators. Try it and perhaps a more clearly defined consensus will develop in the future.

Good luck, good contesting and good DX!

Results, 54th ARRL November Sweepstakes

By Billy Lunt, KR1R and Mark Gamble, N1FOZ
Contest Manager Contest Assistant ARRL

Year: 1930. Month: May. Event: First Annual ARRL Sweepstakes results published. By the Great Xerxes, how things have changed! Nowadays, to see a score of 13,158 points on the SS summary sheet induces a reaction from the entrant of "I only had a few hours of operation as my XYL planned a crystal party on both days!" But in 1930 this score, turned in by Joe Feeley, W1ADW, dominated all other scores for his first-place victory. There can be many contrasts drawn between the Sweepstakes of old and new, but none can be as striking as the number of entrants, multipliers or categories.

Back in 1930, there was only one entry category for Sweepstakes. Now, however, you can compete in any of three major entry categories—high power, low power and, the latest addition, QRP (5 watts or less output). The QRP category was heralded by the amateur community through their Contest Advisory Committee representatives and the ARRL Awards Committee. Participation within this most recent category exceeded expectations.

In 1930, the League consisted of only 68 sections. This past year the League introduced the 75th SS multiplier, West Texas. Another ARRL section has now been added. By the Board of Directors action, the West Indies Section has been split into two sections, Puerto Rico and the Virgin Islands. These two sections will be operative in the 1988 SS.

QSO rates in the contests of old must have been extremely slow by today's standards, as W1ADW worked a total of 153 stations in the first Sweepstakes, which lasted two weeks. How many of you "old-timers" remember that? The factor that probably had the greatest effect therefore was not the unreliability of one's rig, but the number of participants in the contest. In 1930 there were 116 entrants; in 1987 there were 1909. Almost all the 1987 participants scored over 13,158 points.

CW op Hester, N4MPQ, finished with 15k points from the NC section.

15-year-old twins N1EBG and N1EBF operating at multiop station N1ADE.

In the CW portion of this year's contest, 894 amateurs sent in entries. Each was vying for the top position in one of the following categories: high-power single-op, low-power single-op, QRP single-op and multioperator.

When the last echo of brass pounding had subsided, it was W5WMU decisively winning the honor of "SS CW Ace." Bill, K5GA, guest-operated at W5WMU during the contest. His dynamic ability to "run 'em" racked-up over 188k points. Winning low-power requires the ability to break through that pileup on the first or second try as you dial up and down the bands. Larry, NF7P, displayed his ability on the "Low Power Front" beyond doubt. He garnered an impressive score of 152k. Finesse is the only way to describe what is necessary to be a great QRP operator. To be heard through the QRM isn't easy, but it is rewarding. Steve, N2IC, triumphed in this new category. In fact he maneuvered his station to the top with a score of nearly 108k. The AA5B twosome was awesome. Bruce, AA5B, and Scott, K5TA, ravaged the bands like "a pack of wolves." Their score of over 174k earns them the position of CW multiop SS record holders (the old record was set by K5CM in 1986 with 172k points).

On November 21, at 2100 UTC, in the phone portion, the words "CQ Contest" rang out like buckshot on all bands. Contest stations from around the USA and Canada contended for the prestigious position of number-one phone operator in the aforementioned category.

The uncontested champion of the high-power category, or "SS Phone Ace" if you will, was the venerable Dan, W7WA. His first-rate effort secured 304k points. Nice going Dan! In the low-power category, Dick, K4XU, was tops with a score of over 201k. Fred, KE7X, surpassed all other QRPers for the win in this category. His score of 113k secured this position. It wasn't even close in the multioperator category. The Colorado

Division Leaders

CW

Division	High Power	Low Power	QRP	Multioperator
Canada	VE7CC	VE7ARQ	VE3OOL	VE3ART
Atlantic	K3LR	K2ZJ	K3WW	WB2PSI
Central	W9RE	K9ZO	WB9HRO	KJ9D
Dakota	KØDD (KØKX,op)	WØUC	WØYHE	ABØP
Delta	W5WMU (K5GA,op)	K4LTA	K5MK	K5MC
Great Lakes	WD8IXE	K8ND	W8IDM	K8AQM
Hudson	W2RQ	W2GD	AA2U	—
Midwest	K4VX (NU9R,op)	KØVBU	KVØI	ABØS
New England	K1ZZ	K1CC	KH6CP/1	KA1KPH
Northwestern	W7NI (N6TR,op)	W7YAQ	N7DM	K7LED
Pacific	WA7NIN (W6OAT,op)	NF7P	KD6PY	W6BIP
Rocky Mountain	WØUA	K4XU	N2IC	AA5B
Roanoke	K4PQL	KØEJ	KD8G	K4IX
Southeastern	N4WW (KØLUZ,op)	K4XS	KB4GID	N8LM
Southwestern	K6LL	N6ND	K6ZH	W6UE
West Gulf	N5AU	KM5H	AC5K	K5CM

Division Leaders

Phone

Division	High Power	Low Power	QRP	Multioperator
Canada	VE7CC	VE6ATT	VE3OOL	VE3GAS
Atlantic	W3LPL (K3ZZ,op)	N2MM	K3WUW	K2ZJ
Central	AC9C	WA1UJU	NJ9C	K9RS
Dakota	KØDD	K1LL	WØYHE	NØHUN
Delta	W5WMU	K5FUV	—	N4TG
Great Lakes	WB8JBM (N8DCJ,op)	K8BL	NQ8Y	WD9INF
Hudson	KC7KU	KS2G	AA2U	K5NA
Midwest	K4VX (NU9R,op)	KVØI	WAØVBW	NOØY
New England	W1WEF	K1TO	KH6CP/1	K1NG
Northwestern	W7WA	K7KJM	KE7X	W7EJ
Pacific	N6BV	ND7M	KD6PY	WA7NIN
Rocky Mountain	KØRF (WØUA,op)	K4XU	WØLSO	KØUK
Roanoke	W4MYA	KØEJ	NK4Q	KC4DY
Southeastern	N4EEB	K4XS	KB4GID	W4AQL
Southwestern	K6LL	N6RJ	WB6JJE	KF6OG
West Gulf	N5AU	NT5V	W5VGX	K5CM

Single Operator High Power Top Ten

CW		Phone	
Call	Score	Call	Score
W5WMU (K5GA,op)	188,700	W7WA	304,050
N5AU	183,600	KØDD	302,550
K3LR	179,250	K6LL	297,184
WA7NIN (W6OAT,op)	179,228	K6NA (N6TR,op)	286,050
K5GN	179,080	N6BV	279,600
W7NI (N6TR,op)	177,008	WBØO	279,000
K6LL	175,350	W6GO	274,350
N4WW (KØLUZ,op)	174,150	KØRF (WØUA,op)	268,950
N6BT (WA6VEF,op)	174,000	N5AU	259,650
W7WA	172,350	K5YNZ (KE5CV,op)	259,350

Single Operator Low Power Top Ten

CW		Phone	
Call	Score	Call	Score
NF7P	152,400	K4XU	201,750
K1CC	145,928	K4XS	198,468
K4XU	144,152	WØCP	195,600
W2GD	143,850	N6RJ	189,750
N6ND	140,700	WØIJR (KØEU,op)	188,700
KZ6E	138,750	KVØI	171,828
K7UP	132,150	KØSCM	170,528
KY2P	128,760	K7KJM	162,504
K4XS	127,604	K1LL	160,650
NE6I	126,150	K7LXC	160,432

Single Operator QRP Top Ten

CW		Phone	
Call	Score	Call	Score
N2IC	107,856	KE7X	113,120
KVØI	97,532	WØLSO	112,500
KØSCM	92,448	K7SS	103,200
KØFRP	80,640	WØKEA	81,000
AA2U	77,818	KD6PY	72,854
KT5X	73,584	W5VGX	70,000
WB9HRO	69,264	K3WUW	61,200
KD6PY	68,112	KH6CP/1	46,096
KH6CP/1	67,104	WAØVBW	44,208
KB1W	66,640	WØYHE	43,680

Multioperator Top Ten

CW		Phone	
Call	Score	Call	Score
AA5B	174,450	KØUK	281,550
K5CM	171,750	W7EJ	276,150
KØRF	170,940	AA5B	272,550
K8AQM	162,504	K5CM	264,300
W6UE	150,750	WA7NIN	249,232
VE3ART	141,408	WD9INF	245,100
ABØS	139,824	K9RS	229,800
ABØP	135,900	NØHUN	221,850
K5RR	133,350	K8CC	214,500
N8LM	121,104	NK7U	212,250

duo of Bill, KØUK and Larry, KØCL, won top spot with 281k.

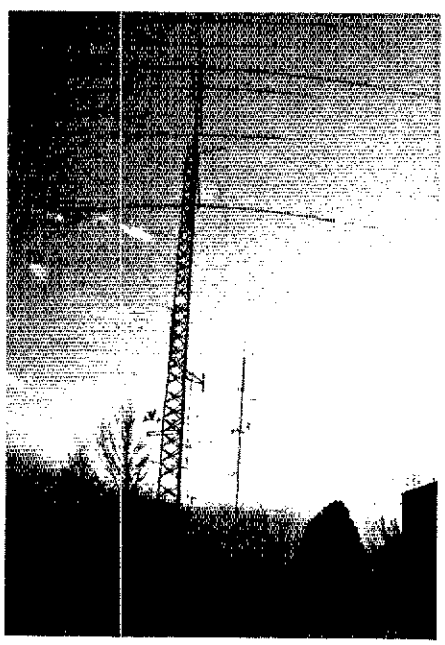
Affiliated Club Competition was rugged in most categories. The unlimited category was an exception, as the only club to make the minimum requirement of 51 entries was Connecticut's Murphy's Marauders. They compiled a total of 4,285,148 points. The North Texas Contest Club was hot. Their combined efforts launched them to the top of the Medium Category with the highest of all club scores, 5,161,494 points. The gavel for Local Club Competition went to the River City Contesters of California. They rallied for a combined score of 1,643,670 points.

Thanks to everyone who participated in the contest and contributed to the success of the 1987 ARRL November Sweepstakes. Next year will surely prove to be another exciting contest. 73.

SOAPBOX

CW

Checking old logs I find my first SS operation was in 1933. The *QST* report showed it to be a 9 (Nine!) day contest. The top score was a W9 with 495 contacts. Other calls listed then that were still at it this year included W6BIP, W9GIL and W9YB! (W1BIH). Great fun! Missed NWT for a clean sweep. I broke my personal QSO record; it was my highest score since I started entering in 1978! (WB1CNM). It was a great contest and I enjoyed every sleepless minute of it! Looking forward to next year's Sweepstakes already (W1KEE). There is no other contest to compare to SS. I finally got my operating system down—four hours before the final gun. All the better for next year. (KM1G). I had hoped to Work All States for "We the People" award but was unable to. This is a great QRP contest with lots of good listeners (KZ1L). If I knew how to really operate CW, I would be a holy terror in this contest (WB1GQR). 21 MHz sure cooperated this year. Barely had time to get on 14 MHz. Same time spent as last year but made more contacts with one-fifth the power (W2DW). Nice to see some top-notch competitors in the NLI section. It makes SS a true sport! (KD2RD). Really enjoyed the contest; I guess CW is not dead. Sure wish I could copy some of the high-speed guys. But when you're 83, you can't write that fast (W2NPT). I got all the hard sections, and missed "easy" SJV! (AA4GA). Lost all 40/80-meter QSOs in the deep dark reaches of a computer! (WA4SSB). The SS is the best of all contests! My 35th SS and it is still a thrill to get the clean sweep! (W4YE). I worked my first Sweepstakes in 1937. 102 QSOs in 39 sections in 26 hours, over two weekends. 50 years later I get my first "clean sweep." It was a real thrill to get number 75 (W4XD). Had a ball even without a keyer. Especially when AL7CQ called me! Can't wait for next year (WB8VFA). Incredible QRM! Sent QRL and 3 stations on the same frequency sent yes! A true contester's contest. Hope I have more time next year (WM5K). Is there really a West Texas section? (WV5K). The 1987 CW Sweepstakes was a blast—great 40-meter-band conditions and my best CW score in 7 years of participation! (WA6GFR). 368 of 721 QSOs east of the Mississippi River—W1WEF and K1AR, 20 over S9 on both 20 and 40 meters (AH6AZ). Thanks for the new QRP class. I usually run a QRO station. It is nice to try a new low power mode. Good thing 15 and 10 were open. See you next year for "QRP" SS (NL7DU). Don't ask. . . ! (W7GFT). Lots of active stations and good conditions = best SS ever. (NF7P). Boy, I just can't seem to get a sweep on CW, 4 of the 5 I missed were Canadian Sections. Try, try again!! (KW8G). My thanks to all those Q-classers who made made pulling their signals through the static and QRM more challenging (WD8IXE). Where, oh where, is VE4? First non-sweep in four years. . . my first QSO the day after the test? You guessed it—VE4!! (K9UIY). First contest ever, doubled my goal—not bad for a 19-year-old (been a ham eight weeks) (N9GVT/AA). I was very excited to see that a QRP mode was added. Have operated at 5 watts or less for the last 5 years and my results looked kind of poor when compared to all the "150 watt" and below stations. Really enjoyed SS—many comments like, "super signal for 5 watts" (WØYHE). Who else will admit they worked SS CW with a computer? I did and had a ball! (WBØYUC). My first serious QRP contest—I was amazed (KVØI). Checked the station 15 minutes before the contest only to find that an arctic fox had chewed through the coax (VE8KD).



A view of the antenna farm at WMA club station W1NY.

Phone

First Sweepstakes contest for me, will do it bigger and better next year (WA1PLK). We ran multiop from my QTH with my tower and beam, and Jim's (KS1A) rig. Our object was to score high and get a clean sweep. What a great feeling to have a VE8 call us 22 QSOs into the contest!! We did get the clean sweep. First time ever! (WB1GEX). Sweepstakes this year felt more like Field Day! The commercial power went out 2 minutes before the contest, so I had to get the generator running. I ended up using emergency power for the first hour and a half of the contest (AK1K). Our second multi-op effort and we improved our score over last year! (K1NG). Next year, I may give QRP a try, particularly if 10 and 15 continue to improve (WB2ROV). The Sweepstakes helped me get Alaska for WAS after 13 years of "CQ Alaska"! (WA2YEI). Worked a few states I never knew existed. Will be back next year more prepared (WD2AHD). Heard several VE2 and ME stations, but running QRP phone it was tough to snag them. It's like pulling chicken's teeth! This was a real challenge, fun and totally exhausting (K3WUW). Had a lot of fun! First time ever working a phone contest! I was amazed what one can do with a "hunk of wire thrown out a window"! I'm not the contest type because I always end up "listening"! (KA3GXP). Was nice to be home in SC for the Sweepstakes (KJ4KB). K8MJZ must have a super receiver to hear me on 80 meters (K4VFY). Can you believe it? I heard N4BP in SFL, but where was Mississippi? After working KH6, KL7, VY1, ND and SC (my personal bugaboo), to miss a sweep due to SFL and MS is a heart-breaker (AA4UJ). Forgot it was Sweepstakes time—happened to turn rig on and voilà! . . . there was pandemonium on the air. Already had plans for the afternoon, but managed to put in a couple of 5-hour stints at the mike. (KA5NLY). Lots of fun for the OM/XYL team! (AA4UC). Was on low power for phone weekend. Never heard WTX until very late in the contest, when I heard WF5E on 21-MHz backscatter calling CQ. Called him for over 20 minutes every time he stood by, but couldn't hear me (W5ONL). My first phone SS contest. Great fun! Nice having a rare section and not having to compete with NTX and STX (WF5E). It was great to hear the 10-meter band sound like "old times." The "spots" do make a difference! (WB6NFO). Mahalo to my many VHF friends for working me on 10 meters. Aloha (KH6RS).

Affiliated Club Competition

	Score	Entries	CW Winner	Phone Winner
Unlimited Category				
Murphy's Marauders	4,285,148	51	K1ZZ	W1WEF
Medium Category				
North Texas Contest Club	5,161,494	47	N5AU	N5AU
Society of Midwest Contesters	4,251,020	50	K4VX (NU9R,op)	K4VX (NU9R,op)
Northern California Contest Club	4,094,378	43	WA7NIN (W6OAT,op)	N6BV
Mad River Radio Club	2,864,622	28	K3LR	N8ATR
Minnesota Wireless Assn	2,732,938	28	KØDD (KØKX,op)	KØDD
Potomac Valley RC	2,665,412	39	W3LPL	W3LPL (K3ZZ,op)
Yankee Clipper Contest Club	1,679,810	30	K1TR	KA2AEV
Texas DX Society	1,669,596	12	W5WMU (K5GA,op)	NR5M
Southern California Contest Club	1,498,682	16	K6NA	K6NA (N6TR,op)
Utah Contest Club	1,105,278	12	W7CFL	KS1G
South Jersey Radio Assn	782,930	29	K2YY	W2PAU
Hoosier Contest Club	748,354	12	W9RE	W9RE
Western Washington DX Club	675,522	12	N7TT	N7TT
Motor City RC	604,408	38	K8SB	K8SB
Nashua (NH) Area RC	448,740	11	K8LT	K1HI
Central MI ARC	443,378	14	W8TJQ	K8GVK
Zygo ARC	348,036	13	W1ECH	WA1NLD
Highland ARA	271,216	14	NF8G	KJ8I
Local Category				
River City Contesters	1,643,670	10	N6IG	W6GO
Salt City DX Assn	1,183,148	10	K2KIR	AJ3K
Rubber Circle Contest Club	1,171,030	10	W7WA	W7WA
Overlook Mountain ARC	1,143,878	9	K5NA	K2UR
Kansas City DX Club	915,762	8	KBØG	NØCDH
Albuquerque DX Assn	912,942	10	NC5O	WS5O
Central Arizona DX Assn	753,458	7	KY7M	K7NO
Frankford Radio Club	722,096	9	W2GD	N2MM
Grand Mesa Contesters	683,060	8	KJØG	KØGAS
Willamette Valley DX Club	558,908	5	K7KJM	K7KJM
Radio Club of Tocoma	524,908	7	W7BUN	W7BUN
Rochester (NY) DX Assn	522,172	9	W2HPF	AF2K
Dixie DXers	516,540	8	K4BAI	K4BAI
Suncoast ARC	472,364	4	K4XS	K4XS
Central Virginia Contest Club	418,970	5	W4MYA	W4MYA
Long Island Mobile ARC	414,718	10	K2AU	WB2DIN
Binghamton ARA	410,902	9	NE2W	NE2W
Colorado Contest Conspiracy	409,600	3	WØIJR	WØIJR (KØEU,op)
CDXA	377,772	3	N4ZC (WA8MAZ,op)	—
Reading RC	364,958	5	KS3F	KS3F
Arkansas DX Assn	319,676	4	W9OBF	K5FUV
Northop RC	313,016	9	K6HRT	K6HRT
Eastern Iowa DX Assn	307,216	4	WØEJ	WØEJ
North Hills RC	303,594	4	K6SG	N6IG
Western ARA	294,332	4	W6TCO	N6RJ
Schaumberg ARC	277,976	4	K9LW	WAØAVL
Wichita ARC	263,840	3	WØAWP	NIØS
Fox River Radio League	262,080	6	K9LUW	K9LUW
Long Island Contest Club	251,484	3	KD2RD	KD2TT
Rockford ARA	249,270	5	K9LJN	K9GH
Providence RA	243,792	3	—	K1DS
Four Lakes ARC	226,842	5	WB9HRO	WB9HRO
Northern Ohio ARS	222,302	3	W8SJU (WB8PHI,op)	N8LL
Pennsylvania Wireless Assn	218,616	4	K3TX	K3TX
Livinston AR Klub	199,510	9	KW8G	KW8G
Northern New Mexico ARC	192,982	5	N5EPA	N5EPA
Bolingbrook ARS	187,470	8	NA9I	N9FIV
Unisys ARC Santa Clara	180,852	4	KJ6V	KJ6V
Redwood Empire DX Assn	178,522	5	K6LRN	K6LRN
Hazel Park ARC	178,450	9	WB8ITB	WB8MDG
Albany ARA	168,762	7	NW2J	NW2J
Western New York DX Assn	166,478	6	WB2ABD	WB2YQH
Gloucester County ARC	159,606	6	K2HPV	N2ETJ
Rowan ARS	152,332	6	W8UT	KJ4TI
Sturdy Memorial Hospital ARC	151,478	5	KD2SX/1	N1EHX
Rip Van Winkle ARS	147,960	5	W2DW	—
West Park Radio Ops	141,192	7	W8IDM	WD8AJF
Order of the Boiled Owls	134,592	3	K2SX	—
San Gabriel Valley RC	129,958	8	N6IBP	N6IBP
Valley RC of Eugene	124,608	5	K7DBV	AI7W
Warminster ARC	123,858	9	KY3T	KA3QND
Northern Arizona DX Assn	122,200	3	W7YS	—
Murgas ARC	121,282	5	KB3JK	WA1MKE
Utica ARC	121,114	6	KK2B	KK2B
OH-KY-IN ARS	116,940	4	KF4AV	KI4QJ
Dauberville DX Assn	114,414	6	KA3NJA	KA3NJA
Burlington County RC	113,418	8	WB2UVB	WB2YOF
Delta DX Assn	111,908	4	NT5G	N5FYJ
Rappahannock Valley RC	111,336	6	WB4LNT	WB4LNT
Mitre Bedford ARC	106,066	3	W1FM	W1FM
Clark County ARC	91,582	8	—	N9AOJ
Athens County ARC	91,318	5	—	NC8V
Western Illinois ARC	84,770	4	N9JF	—
Wheaton Community Radio Amateur	69,640	3	—	KR9K
West Allis RAC	25,550	3	K9KR	KA9JCP
Fresno ARC	25,494	4	WB6ITM	WA6YAB
RAC of Greater Millwaukee	24,616	3	W9FPA	W9FPA

"!-&!!-" QRP, I'm gonna buy a kW (AA4Q). The Argonaut 515 worked flawlessly. Missed VE8 on both modes. Most common response to my exchange: "all again" (KD6PY). Really great to clean sweep on both modes with low power (W6UQF). Novice enhancement has really changed SS. 945 QSOs in 8½ hours on 28.4 (K6LL). Many thanks to all those who DID NOT dupe me! (KS1G). Excellent 10-meter conditions. Thank you Novices and Technicians! (W7WA). Thanks to all the Novices for the 10-meter contacts and to all the CK 87s for their first SS participation (K7LXC). "ARRGGHH!!!" (N4SL). What a difference running Q class this year, versus B class last year. A humbling experience! But, will I do it again next year? You bet! (N8EIH). Somehow managed to work KE7X in MT, 2-way QRP on phone...for a new one. I asked for a signal report and had to explain why—he said he was glad to do so, TNX (K9EIJ). Only my second clean sweep in 22 years of SS (W9JOO). All in all my best effort in years (WØIJR). This was my first time in the SS. If contests had mottoes, this one's would be "try it; you'll like it!" (VE5RC).

Scores

CW scores are listed first, followed by phone. Within each call area, scores are listed by ARRL sections. Within each section, single-operator scores are listed first in decending numerical order, followed by multioperator scores. Each line score lists call sign, final score, number of QSOs, number of sections worked, hours operated and output power used (A = 150 watts or less, B = more than 150 watts, Q = 5 watts or less). Example: In Connecticut, K1ZZ worked 1064 stations in 75 sections for a final score of 159,600 points. He operated for 24 hours and used more than 150 watts.

CW

1

Connecticut

K1ZZ	159,600-	1064-	75-	24-	B	W1WEF	153,000-	1020-	75-	24-	B	W1GNR	105,228-	711-	74-	23-	B	WA1FCN	54,386-	383-	71-	16-	A	W1TKG	17,584-	157-	56-
K1TO	154,200-	1028-	75-	24-	B	K1CC	146,928-	986-	74-	24-	A	N1CC	99,804-	673-	74-	20-	A	KA1CV	54,166-	371-	73-	20-	Q	KA1MM	14,864-	158-	47-
K1XA	153,624-	1038-	74-	24-	B	K1RM	126,600-	844-	75-	17-	B	W1BIH	98,450-	643-	75-	15-	B	K1KI	48,680-	350-	69-	12-	B	KB1WR	10,388-	98-	53-
						NJ2L	119,140-	805-	74-	24-	B	KG1D	78,100-	550-	71-	18-	A	N8RA	46,900-	350-	67-	16-	B	WA1LVW	10,094-	103-	49-
						W1AW (K8HVT,op)						K1YRP	69,552-	483-	72-	13-	A	WA1LJP	45,780-	327-	70-	21-	A	WA1STO	8,800-	100-	44-
							118,548-	801-	74-	16-	B	K1IN	67,968-	472-	72-	12-	B	K1TN	43,746-	317-	69-	11-	A	NF1U	9,668-	111-	39-
						W1OD	117,364-	793-	74-	22-	A	KH6CP/1	67,104-	466-	72-	24-	Q	WB9IHH	42,420-	303-	70-	8-	A	NJ1V	5,402-	73-	37-
						W1ECH	111,106-	761-	73-	22-	A	WA1NLD	64,094-	439-	73-	22-	A	KA1MWX	38,592-	288-	67-	18-	A	W1KKF	5,148-	78-	33-
						AA2Z	105,856-	722-	74-	22-	A	W1ACR	62,338-	439-	71-	20-	B	K1BV	32,940-	270-	61-	8-	B	WB1DQT	4,292-	74-	29-
						K1DW	106,128-	737-	72-	21-	B	N4XR	60,088-	406-	74-	11-	B	K8HVT	20,000-	200-	50-	4-	B	WB4FDT	416-	16-	13-

Eastern Massachusetts

WB1CNM	97,384	858	74	24 B
NB1Y	88,892	626	71	23 B
W1KEE	66,872	463	72	23 A
W1FM	50,250	375	67	11 A
NK1O	47,328	348	66	10 A
K1NTR	39,168	288	68	10 A
KM1G	37,210	305	61	18 A
W1AX	36,210	255	71	6 B
KA1IOR	35,508	269	66	19 A
WA1IPP	34,404	282	61	18 Q
K1SEC	33,984	288	59	7 A
NB1B	32,706	237	69	11 B
K1UCA	31,968	216	74	23 B
N1DC	31,488	246	64	17 A
KQ1F	30,192	222	68	10 A
N1AU	25,254	207	61	12 A
N1AJJ	22,072	178	62	12 A
KA1CLV	21,080	170	62	15 A
KB1VL	20,976	184	57	12 A
KC1EL	19,764	162	61	12 A
KZ1L	19,536	148	66	12 Q
WA8SWM	18,972	153	62	8 B
KO1O	13,716	127	54	5 A
K1XM	11,092	118	47	2 B
W1SR	9,400	100	47	6 A
KA1GEP	8,800	100	44	6 A
W1PLJ	5,238	77	34	9 B
K2PNK	2,800	50	28	5 A

Maine

KX1E	70,886	529	67	22 A
KA1OR	46,718	329	71	24 B
WA2ERT/1	38,760	285	68	13 A
KA1ZX	10,094	103	49	7 A

New Hampshire

K1TR	134,384	908	74	22 B
W1PH	115,778	793	73	24 A
N1ELN	85,984	589	73	24 A
K8LT	70,280	495	71	19 A
KK1E	44,446	313	71	12 A
KC1F	41,990	323	65	11 A
WA1MZV	38,356	298	61	19 B
NJ1H	33,020	254	65	17 A
KA1NXT	15,974	163	49	14 B
K2TE	9,328	108	44	3 A
W1UN	7,614	81	47	2 B
KA1LMR	4,032	56	36	8 Q
AC1J	2,184	39	28	2 A
KI1M (+K1OSM)	34,688	271	64	14 A

Rhode Island

KD2SX/1	124,468	841	74	23 B
KM1X	115,588	781	74	23 B
K1IU	46,242	367	63	7 B
K1VSJ	37,118	277	67	11 A
K9SB/1	29,008	259	56	9 B
K8IM/1	19,840	180	62	9 B
WA1HYN	9,450	135	35	4 A
W1RFQ	7,938	63	63	8 A
K2MN	3,584	56	32	24 A
W1JP/M	480	20	12	4 A

Vermont

WB1GQR	126,980	907	70	24 B
W3SOH	57,400	410	70	17 A
NB1A	56,840	406	70	19 A
K1IK	6,868	101	34	3 A

Western Massachusetts

KZ1M	100,196	677	74	24 A
KB1W	66,640	476	70	22 Q
K1FIR	24,898	211	59	8 B
W1XH	3,564	54	33	6 Q
W1JP	650	25	13	2 A
KA1KPH (+NC1B,NM1K)	69,904	514	68	18 B

2

Eastern New York

K5NA	150,526	1031	73	24 B
W2XL	133,052	889	74	24 B
K2UR	114,256	772	74	22 B
KU2Q	109,816	742	74	24 B
WA2STM	106,848	742	72	22 A
N2AZS	87,188	614	71	22 A
W2DW	61,904	424	73	12 A
N2HIF	57,800	425	68	16 A
K2HA	49,270	379	65	19 A
NW2J	34,348	277	62	10 A
KW2D	32,612	254	64	18 A
AA2Y	32,128	251	64	13 A
KN2Q	29,768	244	61	9 A
N2FZJ	28,844	217	66	18 A
WB2FOB	23,072	206	56	13 A
KA2MYJ	18,816	147	64	11 A
W2NRD	16,974	123	69	14 A
WA2CJY	3,348	62	27	3 A
KA2MZZ	2,600	50	26	24 A

NYC-Long Island

KD2RD	122,396	827	74	24 B
K2AU	117,822	807	73	23 B
KA2AEV	117,150	781	75	23 B
K2SX	117,068	791	74	22 B
KA2CIW	40,320	315	64	15 A
K2YGM	37,788	282	67	9 A
W2GKZ	29,250	225	65	12 B
W2KTF	20,740	170	61	5 A
W2XS	18,924	166	57	6 A
WB2QEU	14,012	113	62	5 A
W2AYJ	13,144	124	53	7 B
W2GGE	4,380	73	30	2 B
W2DX	3,000	50	30	2 A

Northern New Jersey

W2RQ	162,600	1084	75	24 B
KZ2S	153,150	1021	75	24 B
W2GD	143,850	959	75	24 A
KY2P	128,760	870	74	24 A
K6DI	104,400	725	72	24 B
AA2U	77,818	533	73	24 Q
KY2H	68,448	496	69	21 A
K2TWK	45,540	330	69	20 A
KG2N	38,400	320	60	16 A
W2HCA	34,036	254	67	15 A
KT2D	29,920	220	68	11 A
K2JT	26,640	222	60	8 Q
W2TI	26,334	209	63	10 A
N2HDY	11,500	115	50	10 A
W2HN	10,656	74	72	12 A
WA2UDT	8,800	100	44	4 A
W2JEK	2,378	41	29	3 Q
W2NPT	2,300	50	23	15 A
WA8QOA	360	15	12	4 A

Southern New Jersey

N2MM	122,700	818	75	22 A
K2YY	118,570	835	71	24 B
AB2E	98,718	683	73	24 B
WA2LBT	63,648	468	68	22 A
W2PAU	55,522	391	71	15 B
WB2SJA	49,818	361	69	22 A
K2HPV	47,704	358	67	14 Q
W2EA	38,144	298	64	16 A
ND2P	33,728	272	62	15 B
WB2UVB	27,612	234	59	12 A
WB2UEY	20,618	189	61	13 A
NX2C	18,444	159	58	11 A
W3ELJ	14,300	130	55	11 A
N2EZ	13,668	134	51	10 A
N2GUW	10,904	116	47	16 A
WB2DIN	6,806	83	41	24 B
K2TD	6,660	90	37	3 A
N2GDW	4,278	69	31	8 A
WA2RCB	3,894	59	33	5 Q
NT2V	80	8	5	5 Q
KA2CQX	12	3	2	1 A

Western New York

K2KIR	141,636	957	74	23 B
K2ZJ	123,580	835	74	24 A
KQ2K	118,368	822	72	24 B
W2HPF	97,090	665	73	18 B
NM2L	86,400	610	70	15 B
KW2J	78,548	538	73	21 B
W2FR	72,416	496	73	17 A
NE2W	67,864	499	68	19 A
N2MF	61,770	435	71	11 A
WB2ABD	54,020	365	74	13 A
WA2EYA	43,160	332	65	17 A
N2GU	41,616	308	68	14 A
K2UC	39,168	288	68	15 A
WB2YQH	28,600	200	72	11 A
KE2CF	25,960	220	59	24 A
NM2J	23,868	194	61	13 B
W2TZ	21,692	187	58	4 A
WA2SON	19,440	162	60	17 A
AI2S	17,138	128	68	14 Q
KK2B	9,200	100	46	7 A
W2OMV	4,620	70	33	5 A
WA2ICY	4,536	63	36	4 A
K2XU	1,664	32	26	2 A
NA2Q	952	28	17	1 A
WB2PSI (K2MP,KD2OM,KE2CP,NB2M, W2AV,WA2s DHS,ZKD,ZQN,WB2KAO, W2VU,ops)	110,400	736	75	24 B
W2OW (N2HR,N8IN,ops)	94,200	628	75	20 B

3

Delaware

K3WUW	118,990	815	73	23 B
KQ3G	48,416	356	68	16 B

Eastern Pennsylvania

KS3F	109,480	782	70	23 B
KC3M	86,112	598	72	21 A
WA3JLD	81,648	567	72	21 A
N2EY	77,816	548	71	22 A
K3TX	73,220	523	70	24 B
K3WW	63,072	432	73	21 Q
W9NXF	57,312	398	72	13 B
N8CQ/3	56,942	401	71	12 B
W3FW	43,920	360	61	11 A
K3KW	40,736	304	67	12 A
KY3T	37,310	287	65	18 B
WB3ESR	34,160	280	61	15 A
WA3RTY	33,978	274	62	21 A
KB3JK	29,648	243	61	13 B
KY3M	26,904	228	59	12 B
KU3A	23,180	190	61	9 A
KR3I	23,084	199	58	9 A
NJ3N	18,032	184	49	24 A
NI3J	17,324	142	61	18 A
W3ADE	14,280	140	51	8 A
KB3GL	9,400	100	47	9 A
K3IPK	8,736	104	42	2 A
WB3KXM	7,400	100	37	12 A
N3CZB	5,418	69	43	6 A
AI3Q	4,998	51	49	9 B
WB8KPE	2,350	47	25	4 A
KA3QND	750	25	15	4 A
AG3G	112	8	7	1 A
KA3NJA	24	4	3	3 A

Maryland-DC

W3LPL	164,668	1128	73	24 B
K3NA	153,180	1035	74	24 B
K3ZZ	134,828	911	74	24 B
K3SA	60,000	400	75	10 B
W3AZ	58,220	410	71	18 B
W3UJ	55,510	427	65	15 B
WB2EKK	44,472	327	68	10 A
W3GG	34,800	300	58	4 B
W3DYA	34,160	280	61	20 A
W3GN	33,138	283	63	10 B
K3HPG	30,848	241	64	7 A
WB3JRU	28,426	233	61	9 A
KG3Z	23,520	196	60	17 A
W3EE	19,980	185	54	10 A
K3ZO	15,000	150	50	2 B
WA8MCQ	11,374	121	47	7 Q
K3TKS	10,584	108	49	14 Q
N3GB	6,630	85	39	4 B
W3FQE	2,700	45	30	4 B

Western Pennsylvania

K3LR	179,250	1195	75	24 B
K5ZD/3	160,728	1086	74	24 B
W3WC	51,840	360	72	21 A
W3HDH	45,156	318	71	8 B
N3ZZ	44,808	328	68	13 A
KA3GXP	22,144	173	64	8 A
W3SIJ	1,224	36	17	7 A
K3UA (+W3FSB)	23,880	199	60	3 B

4

Alabama

WZ4F	154,800	1032	75	24 B
W4NTI	45,260	310	73	19 A

Georgia

N4RJ	170,700	1138	75	24 B
K4BAI	135,300	902	75	24 B
AA4GA	84,656	572	74	24 A
KB4GID	41,208	303	68	21 Q
W4AQL (N4CXF,op)	29,618	251	59	16 A
KI4AS	27,392	214	64	20 Q
AA4LR	25,296	204	62	19 A
ND1J	24,180	186	65	24 Q
N4UZ	16,074	141	57	24 B
N8LM (+K8HLB,W8MHS,WB4SPS)	121,104	841	72	24 B

Kentucky

WM4T (KU8E,op)	149,824	1013	74	24 B
N4TY	148,148	1001	73	24 B
N4XM	109,792	752	73	24 B
WB4PRU	98,550	657	75	17 B
WB4FOT	88,184	604	73	24 A
N1WR	72,988	514	71	22 A
N4OGW	35,400	295	60	13 A
KF4AV	13,208	127	52	4 A
AA4RX	6,080	80	38	3 Q

North Carolina

K4POL	154,200	1028	75	24 B
N4ZC (WA8MAZ,op)	145,188	981	74	24 B
AA4NC	113,184	786	72	18 B
N4AA	87,454	599	73	20 A
WB5M	53,300	410	65	18 A
W8UT	46,728	354	66	16 B
NK4Q	38,502	279	69	20 Q
N4MPQ	15,840	144	55	12 A
KB4RJZ	50	5	5	3 A

Northern Florida

N4WW (K8LUZ,op)	174,150	1161	75	24 B
N4EEB	153,920	1040	74	24 B
NX4N	138,846	951	73	19 B
K4XS	127,904	874	73	24 A
K4VFY (N4EVS,op)	70,956	486	73	17 A
W4RVU	53,958	391	69	18 A
KD1U	39,600	300	66	19 A
WB4ZAY	39,440	290	68	17 A
W4WKQ	39,204	297	66	15 B
W4VQ	29,770	229	65	11 Q
WA4SSB	2,640	44	30	4 A
N4MNU	8	2	2	23 A
WC4E (+KA4TCW)	100,500	670	75	18 B

South Carolina

K8EJ	109,964	743	74	23 A
W4BTZ	101,550	677	75	22 B
K4ADI	30,998	246	63	11 A

Southern Florida

N4BP	154,088	1041	74	24 B
WD4AHZ	78,384	552	71	24 A
AA4RO	42,746	319	67	19 A
N4GVT	35,328	256	69	18 A
KO4D	27,594	219	63	11 B
W4YN	10,200	100	51	9 A
WB9OEP/4	7,120	89	40	5 A
N4RP	1,278	29	22	3 A
WV5Z (+N5KRX)	11,368	116	49	8 A

Tennessee

N4ZZ	156,880	1060	74	24 B
K4LTA	115,440	780	74	24 A
AA4DO	111,444	753	74	24 A
N4IR	85,248	576	74	20 A
K3CQ	73,008	507	72	18 B
K4OAQ	59,432	437	68	15 A
N4TG	34,560	270	64	8 A
AA4DL	26,520	204	65	12 A
WB4FNN	9,130	83	55	28 A
K4XO	5,618	53	53	3 A
KK4QE	286	13	11	8 Q

Virginia

W4MYA	116,070	795	73	23 B
W9LTI/4	92,272	632	73	24 A
W4YE	85,950	573	75	16 A
W9YY	85,396	577	74	14 B
N3OS	75,482	517	73	20 A
KE9A	74,160	515	72	24 A
NK5I	73,296	509	72	19 A
K4BAM	71,484	518	69	21 A
N3JT	70,700	505	70	15 B
W4XD	70,650	471	75	17 A
WD4JHY	70,420	503	70	22 A
K4FPF	54,720	380	72	20 A
K4OD	50,370	365	69	16 B
AA4UJ	42,024	309	68	11 B
N4ZR	40,664	299	68	10 A
WD4ELJ	34,000	250	68	13 A
WB4LNT	33,460	239	70	20 A
K4JM	27,966	237	59	10 Q
KX4V	26,880	210	64	10 Q
N3MA	21,840	182	60	10 B
KA4RLJ	19,800	180	55	24 A
W4SNH	18,352	124	74	17 A
N3AVA	4,608	64	36	2 B
K4UK	1,102	29	19	3 Q
K4DHB	312	13	12	2 A
AA4IC	98	7	7	4 A
K4IX (+KB4VUG,KC4CEW,N4s BRA, IXM,QYK,W4HIR,WA4YSE)	89,058	473	73	24 A

West Indies

KV4FZ (N8OP,op)	170,550	1137	75	24 B
WP4FMH	3,348	54	31	12 A

5

Arkansas

K5QO	171,600	1144	75	24 B
KM5G	104,488	708	74	24 A
W9OBF	64,320	480	67	18 A
NV5T	14,740	134	55	11 Q
W5KL	14,200	142	50	4 B
K5JH	5,120	80	32	8 A
WA5VBE	2,112	44	24	4 A
K5FUV	828	23	18	1 A

Louisiana

W5WMU (K5GA,op)	188,700	1258	75	24 B
KZ5D	96,900	646	75	19 A
WC5D	92,564	634	73	24 A
NT5G	75,776	512	74	24 A
K5KLA	37,536	276	68	15 Q
NO5W	19,372	167	58	12 Q
WB8VFA	10,300	103	50	8 A
K5HAA	4,148	61	34	8 A
NU5F	2,494	43	29	9 Q
KA5PBA	2	1	1	1 A
K5MC (+W5EW,WC5N,WW5H)	116,216	796	73	24 B

Mississippi

WQ5L	55,522	391	71	12 A
K5MK	50,976	354	72	20 Q

New Mexico

K7UP	132,150	881	75	24 A
KT5X	73,584	504	73	21 Q
NC5O	57,960	414	70	15 A
WS5O	48,144	354	68	15 A
N5EPA	43,550	325	67	21 A
K5QQ	33,864	249	68	8 A
KD5VV	30,228	229	68	15 A
WD5CAW	24,282	213	57	19 A
AI9X	23,400	195	60	24 B
KA5NNG	14,820	130	57	10 Q
AA5CC	12,240	120	51	11 Q
KN5S	3,366	51	33	24 B
AA5B (+K5TA)	174,450	1163	75	24 B

North Texas

N5AU	183,600	1224	75	24 B
KM5R	156,600	1044	75	24 B
KC5DX	155,250	1035	75	24 B
K5MR	149,212	1022	73	24 B
K5NW	147,450	983	75	24 B
K5RX	136,456	922	74	19 B
N4QS	116,100	774	76	24 A
W5FO	105,150	701	75	18 B
KW5P	93,300	622	75	21 A
N5TP	89,936	616	73	16 B
W5ONL	82,436	557	74	18 B
W5MYA	73,576	541	68	15 A
N5JB	62,906	443	71	11 A
KD5PJ	57,120	408	70	19 A
N5RM	54,944	404	68	8 B
K5WXZ	50,920	380	67	21 A
N5CR	47,484	349	68	5 B
NN5T	46,200	330	70	24 A
WM5K	44,380	317	70	9 A
W5MW	37,922	283	67	18 B
NT5V	25,520	220	58	12 A
NN5E	20,904	156	67	12 A
W5AH	11,128	107	52	7 Q
N5UA	10,200	100	51	9 B
WA6FEB	512	16	16	3 A
K5RR (K5KJ,K5MW,WD5K,ops)	133,350	889	75	24 B
KM5K (+KY5N)	89,498	613	73	22 A

Oklahoma

KM5H	122,840	830	74	24 A
WM4Z	90,288	627	72	20 A
NI8W	26,474	217	61	12 A
WK5P	23,718	201	59	13 Q
KA5DAV	14,448	129	56	13 A
K5CM (+N5s CG,KW)	171,750	1145	75	24 B

South Texas

K5GN	179,080	1210	74	24 B
WN4KKN/5	161,468	1091	74	21 B
KG5U	152,700	1018	75	24 B
W5RRR (KN5H,op)	128,056	872	74	20 B
W5ASP	108,770	745	73	18 B
W5WQN	93,744	651	72	24 B
KE5AL	92,960	664	70	24 A
WV5K	75,544	532	71	18 B
W5XD	67,620	463	70	22 A
W6LXG	55,626	381	73	12 A
AC5K	49,420	353	70	17 Q
W5NR	32,294	241	67	12 B
K5DX	27,960	233	60	24 B
WW5O	22,400	200	56	13 A
WX5I	11,186	119	47	12 A
N5JEE	2,706	41	33	5 A
W5EHM (KB1CM,AA5BT,KA5s QAA,ZVB, WB5VZL,WR5J,ops)	117,530	805	73	24 B
KC5CP (+N5EY)	52,560	365	72	20 B

West Texas

N4DW	114,700	775	74	24 A
WF5E	113,880	780	73	24 B
N5DO	74,692	526	71	20 A
W5VGX	44,460	342	65	13 Q
N5TR	30,240	240	63	7 A
KU5S	24,924	186	67	20 A

6

East Bay

N6BV	163,050	1087	75	24 B
W6RGG	103,008	696	74	18 B
N6EK	102,054	699	73	24 B
K6PJY	100,944	701	72	24 A
K6HIH	81,030	555	73	18 B
KA8TV	76,072	514	74	24 A
KS6H	72,720	505	72	23 A
W6MFZ	37,088	304	61	10 B
K6CSL	26,082	207	63	20 A
WA6YQM	5,100	75	34	11 A
WX6M	1,904	34	28	2 B
WZ6Z	1,872	36	26	2 B

Los Angeles

NE6I	126,150	841	75	24 A
N6PN	118,772	789	74	23 A
N6HC	89,856	624	72	17 A
WA6GDS	58,220	410	71	17 A
WB6JJE	47,232	328	72	21 Q
WB6VVS	43,296	328	66	20 A
WB6JHC (4X1IF,op)	31,496	254	62	18 Q
WA6UYB	26,718	219	61	15 A
N6GL	26,260	202	65	15 A
N6HE	24,720	208	60	7 A
WA6BIL	23,814	189	63	11 A
WS6T	20,520	180	57	19 A
N6IBP	15,892	137	58	13 A
N6GEN	11,564	118	49	10 A
AE6D	9,702	99	49	14 A
W6CN	8,910	99	45	13 A
W6QFP	7,676	101	38	11 A
W6UE (AA6RX,WA8OTU,ops)	150,750	1005	75	24 B
W6SD (KB6STD,KI8DJ,N6s LGO,LIE, WB6s LPJ,MHS,WA6KYR,WQ6F,ops)	29,140	235	62	20 B

Orange

KZ6E	138,750	925	75	23 A
WB6YPX (AA6BE,op)	71,000	500	71	18 A
W6TCO	65,320	460	71	23 A
K6HRT	41,344	323	64	16 A
NX6M	19,440	180	54	22 Q
W6SX	13,818	141	49	2 B
WA6GFR	12,614	119	53	19 A
K6RUB	12,544	128	49	7 A
KA6SAR (N)	6,536	86	38	19 A
WA6RND	3,720	60	31	4 A
N6PE (+NET)	108,142	727	73	20 B

Pacific

AH6AZ	105,266	721	73	19 B

Santa Barbara

W2KVA/6	73,440	510	72	21 B
WA6FGV	61,680	455	68	18 A
W6TKF	57,680	412	70	16 A
K6MP	19,250	175	55	8 A
W6OUL	10,404	102	51	5 A
W7CB/6	10,000	100	50	3 B
VE3AWE/W6	9,568	104	46	3 B
AA4Q/6	3,120	60	26	4 Q

Santa Clara Valley

N6BT (WA8VEF,op)	174,000	1160	75	24 B
K6XO	114,700	775	74	24 B
N6KV	94,900	650	73	24 A
N6ZB	88,848	617	72	21 B
AD6E	76,176	529	72	18 A
NS6V	74,760	534	70	16 A
KD6PY	68,112	473	72	24 Q
K6YA (KA7EXM,op)	46,800	360	65	20 A
K8XG	45,500	325	70	12 A
N6RK	42,024	309	68	18 Q
W6IO	41,616	308	68	18 Q
KJ6V	39,864	302	66	13 B
N6NF	28,000	200	70	10 A
KI6KS	*26,964*	*214*	*63*	*19 A*
W8KZJ	13,300	133	50	8 A

W6IGU 5,818- 53-53-10-A
W6DBZ 510- 17-15-2-A

San Diego

K6NA 170,100-1134-75-24-B
NC6U 148,800- 992-75-24-B
N6ND 140,700- 938-75-24-A
W6UQF 125,100- 834-75-24-A
NI6W 122,932- 842-73-24-A
N6AYW 53,064- 398-67-23-A
K6ZH 50,256- 349-72-16-Q
W6MVW 45,126- 327-69-20-A
W6JXA 28,480- 210-63-10-A
W6QX 25,986- 213-61-19-Q
AA6EE 24,704- 193-64-7-A

San Francisco

W6JTI 110,550- 737-75-24-A
K6LRN 43,746- 317-69-12-B
K6BWX 28,910- 245-59-14-B
WA6LLY 11,550- 105-55-6-A
WB2CHO/6 380- 15-12-2-A
W6BIP (+KK1A) 103,650- 691-75-21-B

San Joaquin Valley

KD6WW 104,098- 713-73-19-A
WB6ITM 14,364- 133-54-12-Q
WA6YAB 2,940- 49-30-5-A

Sacramento Valley

N6IG 164,250-1095-75-24-B
W6GO (K3EST,op) 157,050-1047-75-24-B
NB6G 143,850- 959-75-24-B
KV6H 121,392- 843-72-24-B
N6JV 111,150- 741-75-23-B
K6SG 107,152- 724-74-22-B
N6GG 99,752- 674-74-20-A
W6NKR 46,644- 338-69-12-B
K6BPB 40,896- 288-71-20-A
W6EGX 35,640- 280-69-11-A

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Alaska

AL7CQ 117,216- 814-72-24-B
NL7GP 74,314- 509-73-9-B
AL7BK 18,040- 164-55-18-A
NL7DU 9,840- 120-41-18-Q

Arizona

K6LL 175,350-1169-75-24-B
KY7M 152,884-1033-74-23-B
K7NO 132,900- 888-75-23-B
N7CIX 108,500- 775-70-21-A
W7YS 61,488- 427-72-20-A
N7CPL 61,486- 433-71-21-A
W7GFT 52,360- 365-69-18-B
NG7S 39,712- 292-68-24-A
W7ZMD 37,620- 285-66-12-A
NN7A 21,000- 175-60-8-A

Idaho

K7QD 146,146-1001-73-22-B
N7HJM 107,004- 723-74-24-A
WE7X 57,400- 410-70-18-A
KK7A 20,862- 183-57-7-Q
W7QDM 6,640- 83-40-2-A

Montana

KS7T 125,856- 874-72-24-B
KE7X 120,304- 824-73-24-A
K6PPI/7 105,998- 726-73-24-A
KS7V 89,096- 602-74-20-A
W7WWS (SM6ORD,op) 86,544- 601-72-20-B
N7ICC 3,108- 42-37-11-A
W7LR 2,914- 47-31-2-A

Nevada

WA7NIN (W6OAT,op) 179,228-1211-74-24-B
NF7P 152,400-1016-75-24-A
NC7K 97,500- 650-75-23-A
KU7Y 58,032- 412-68-23-Q
ND7M 40,108- 271-74-17-Q
NW7S 29,618- 251-59-19-A

Oregon

W7NI (N6TR,op) 177,006-1196-74-24-B
AI7B 171,384-1158-74-24-B
AG7M 167,560-1117-75-24-B
W7YAQ 121,950- 815-75-24-A
K7KJM 101,470- 695-73-23-A
K7WPC 38,272- 299-64-16-A
W7WHY 32,280- 266-60-15-B
K7DBV 26,928- 228-64-12-Q
N7DG 20,160- 140-72-14-B
AI7W 3,360- 56-30-7-A
NS7W 1,840- 40-23-4-A
KA7OLK 782- 23-17-16-Q

Utah

W7CPL 128,700- 858-75-24-B
W7HS 26,240- 205-64-18-A
K7CU 13,932- 129-54-8-A
KK7C 2,968- 53-28-3-Q
W7MR (+KE7ST,N7JIH,WE7s B,D) 108,116- 717-74-24-B

Washington

W7WA 172,350-1149-75-24-B
N7TT 147,300- 982-75-24-B
KR7G 143,550- 957-75-24-B
K7WA 95,338- 653-73-24-A
WA7RKJ 94,754- 649-73-15-A
W7BUN 66,632- 637-68-17-B
N4SL 66,256- 474-72-18-A
W7LKG 60,492- 426-71-17-B
N7ETC 50,292- 381-66-19-A
N7DM 34,440- 246-70-15-Q
K7SS 30,552- 228-67-8-Q
W7IEU 28,698- 211-68-18-A
WA7BPI 25,216- 197-64-7-A
W7GB 24,400- 200-61-8-B
W7KJ 22,448- 184-61-14-Q
N8CHU/7 21,594- 177-61-13-A
W7BYK 17,284- 149-58-9-A
N7EPD 10,904- 116-47-5-A
KT7G 9,698- 101-48-2-A
W7QN 7,740- 88-45-7-A
WA7QCC 6,474- 83-39-6-A
KD7GB 672- 21-16-5-A
N7JB 264- 12-11-1-A
KE7UD 12- 3-2-2-A
K7LED (K6PQJ,KA7CSE,N7NW, WA7UVJ, ops) 82,224- 571-72-24-A

Wyoming

K7MM 102,300- 682-75-20-A
WC7M 95,568- 724-66-18-B
N7GVV 48,960- 340-72-19-A
K7QYG 35,108- 262-67-14-A
KZ7V 10,848- 113-48-11-A
NC7O 10,300- 103-50-9-A
WC7S 4,940- 65-38-14-B

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Michigan

NE8O 82,140- 555-74-24-A
W8TJQ 81,468- 558-73-21-B
W8VPC 79,804- 562-71-22-A
NJ8X 79,520- 560-71-23-A
K8SB 75,900- 550-69-22-A
K8RDJ 67,734- 477-71-24-A
KW8G 56,140- 401-70-23-A
K8SIA 55,096- 388-71-11-A
WB8ITB 54,180- 430-63-16-A
WA8VEB 48,990- 355-69-18-A
N8EA 47,302- 353-67-24-A
K8CC 43,420- 334-65-5-B
K8SAK 41,942- 313-67-20-A
KN8S 35,200- 275-64-9-B
W8EGI 31,380- 245-64-12-A
N8CQA 30,736- 226-68-17-Q
K8CV 28,880- 239-60-19-A
WA8OJR 25,530- 185-69-20-A
WB8AAX 22,788- 211-54-13-Q
WA8YPY 20,130- 183-55-11-A
KA8VDX 18,644- 158-59-15-A
W8MSK 18,012- 158-57-10-A
K8DD 16,740- 155-54-6-Q
WB8MDG 15,778- 161-49-14-A
KA8GOM 13,668- 134-51-13-A
N8HSN 12,400- 155-40-23-A
W8URM 10,000- 100-50-4-A
W8VWY 9,120- 120-38-6-Q
KA8IZE 5,396- 71-38-18-A
N8GWV 3,328- 52-32-12-A
W8SS 2,538- 47-27-5-A
WA8FRD 2,500- 50-25-12-A
W8PVI 2,436- 42-29-8-A
K8GVK 1,680- 40-21-2-A
W8WVU 528- 22-12-24-A
KE8X 176- 11-8-1-A
W8GIY 96- 8-6-3-A
WB8IFD 70- 7-5-3-A
NS8F 50- 5-5-8-A
NY8H 18- 3-3-3-A
KBAQM (+K8JM,KA8POW,N8INX,NB8L, NI8L,W8IQ,WD9INF) 162,504-1098-74-24-B

Ohio

WD8IXE 156,288-1056-74-24-B
K8AZ (K8NZ,op) 155,400-1050-74-24-B
W8FN 147,752-1012-73-24-B
K8ND 117,822- 807-73-24-A
KO8M 117,434- 827-71-24-A
W8SJU (WB8PHI,op) 94,998- 669-71-24-B
K3JT 90,082- 617-73-20-B
W8UPH 85,484- 603-71-24-A
KA8ETK 70,856- 512-69-21-A
W8PN 60,112- 442-68-20-A
K1FR 54,400- 400-68-10-A
NC8V 48,852- 354-69-10-B
W8IDM 48,560- 335-68-19-Q
WA8TMK 41,400- 300-69-18-A
NF8G 32,568- 236-69-23-A
NW4G 30,810- 237-65-12-A
N8CSL (K8MR,op) 26,032- 219-64-8-B
W8EAR 27,000- 225-60-12-A
W8GOC 25,740- 195-68-5-A
K8BL 22,000- 200-55-5-A
NO8Q 10,980- 122-45-9-Q
WD8AJF 9,800- 100-49-10-A
W8PMJ 7,392- 84-44-3-A
KA8ZRH 6,536- 89-38-7-A
N8FU 5,160- 86-30-5-A
K8MR 1,764- 42-21-2-A
W8VZE 374- 17-11-2-A
W8EDU (AF8A,N8ARD,WB8WTS,ops) 108,992- 743-72-24-B
WB8SMC (KA8WIG,N8HBI,NC8O,NR8C, WB8s MRU, QVC,WD8PWG,ops) 82,040- 586-70-24-B

West Virginia

W4NW/8 87,698- 619-71-15-A
KB8FJ 48,990- 345-71-8-B
KD8G 43,014- 321-67-8-Q
W8DL 36,408- 246-74-16-Q
W8JWX 27,648- 216-64-24-Q
KC8JH 200- 10-10-1-A

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Illinois

AG9A 146,668- 991-74-24-B
K9KM 146,372- 989-74-24-B
AC9C 140,452- 949-74-24-B
WB8JKI 123,078- 843-73-24-B
KS9O 122,700- 818-75-24-B
N8AEJ 114,996- 777-74-24-B
K9ZO 113,400- 756-75-24-A
K9UIY 109,076- 737-74-24-A
K9LJN 107,894- 739-73-24-B
K9WA 103,076- 706-73-24-A
KC9T 100,048- 676-74-24-A
NA1R 81,648- 567-72-23-A
NA9J 79,920- 555-72-24-B
K9BG 74,736- 519-72-13-B
K9HDE 73,872- 513-72-17-B
N9NA 71,820- 513-70-18-A
W9LNQ 67,680- 470-72-18-A
K9LUW 67,568- 463-73-21-A
N9JF 64,944- 451-72-20-A
K9JU 61,320- 438-70-21-Q
NJ9C 57,816- 396-73-21-Q
W9VA 56,090- 385-71-11-A
K9BB 52,640- 376-70-16-A
KN9B 50,370- 365-69-17-Q
W9ZTK 43,684- 328-67-13-A
WA9AXL 39,864- 302-66-12-A
K9LW 39,848- 293-68-10-A
WB9TBU 37,940- 271-70-19-Q
K9RR 35,750- 275-65-19-A
W9HBI 33,012- 262-63-11-A
K9IFO 32,368- 238-68-24-Q
K9PPW 32,016- 232-69-11-A
K9CW 29,512- 217-68-11-A
KM9L 28,258- 199-71-10-A
W9EBY 27,580- 197-70-19-A
KA9IMX 25,200- 200-63-24-A
W9ZEN 22,686- 199-57-12-A
W9KV 21,594- 177-61-10-A
W9REC 18,090- 135-67-14-A
KG9Z 17,160- 156-55-9-Q
K9CC 16,940- 154-55-5-A
K9EIJ 16,638- 141-59-12-Q
W9IL 14,040- 135-52-6-A
NA9I 11,040- 120-46-24-A
ND9X 10,176- 96-53-9-Q
AK9Y 7,380- 90-41-5-A
W9TM 5,504- 88-32-3-A
NM9C 4,218- 57-37-9-A
W9AQM 2,600- 50-28-3-A
W9RW 874- 23-19-1-B
WA8AVL (+N9CXC) 93,878- 643-73-23-B
AF9M (+KA9s GIZ,VPH,KB9LI,NA9I, NC9F,W9JI,WB9RGZ) 55,338- 401-69-24-A
NO9D (+KA8s VAB,ZKO,KD9KU,KE9DE, N9GQJ,NA9I,NM9J,W9OY) 31,034- 263-59-18-B

Indiana

W9RE 161,400-1076-75-24-B
K9RS 145,562- 997-73-24-B
N9NO 124,848- 867-72-23-B
KM9D 114,464- 784-73-23-B
W9JOO 66,400- 475-72-24-A
AJ9C 63,616- 448-71-12-A
N9ACD 59,616- 432-69-17-A
K9HCX 16,588- 143-58-6-A
AD7U 8,342- 97-43-5-Q
N9NB 2,700- 50-27-1-B
N9NC 1,000- 25-20-1-B
KJ9D (+WA8YVR,KK9V) 106,500- 710-75-14-B
W9YB (KM9R,WA9PIE,ops) 69,276- 502-69-24-B

Wisconsin

W9XT (WA9D,op) 142,800- 952-75-24-B
W8AIH/9 (K9FVF,op) 137,850- 919-75-24-B
W2WOE/9 113,550- 757-75-24-B
NI9U 98,842- 677-73-22-A
KB9S 95,424- 672-71-18-B
WA1UJU 85,260- 609-70-24-A
W8NA 82,928- 588-73-15-A
K9OSH 70,290- 495-71-20-B
WB9HRO 69,264- 481-72-21-Q
W9HE 66,598- 469-71-15-A
NB8C 57,218- 427-67-12-B
KO9Q 49,420- 353-70-13-A
K1TMM 42,344- 316-67-15-A
NG9L 42,228- 306-69-12-A
NI9C 39,072- 296-66-14-A
K9KR 25,440- 212-60-15-B
N9EZ 24,396- 214-57-8-A
N9KS 23,664- 174-68-10-A
NA9M 23,600- 200-59-15-Q
W9OYG 15,312- 132-58-13-A
W9FPA 14,580- 140-52-9-A
N9CIQ 12,168- 117-52-3-A
N9GVT 5,772- 78-37-15-A
N9EAX 3,366- 51-33-7-A
KE9FT 2,286- 41-28-7-A
WB9ZIO 2,240- 40-28-7-B
KB9W 1,190- 35-17-1-A

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Colorado

W0UA 163,374-1119-73-24-B
KO0D 149,066-1021-73-24-B
K4XU 144,152- 974-74-24-A
W0IJR 125,800- 850-74-24-A
AC0S 109,584- 761-72-20-B
N2IC 107,856- 749-72-24-Q
KJ0G 104,340- 705-74-22-B
W0CP 104,192- 704-74-18-A
K0MIC 104,160- 744-70-22-B
W1XE 103,500- 690-75-24-A
KD0ZR 68,432- 592-73-23-B
K0FRP 60,640- 576-70-24-Q
K0DTK 55,888- 464-71-18-A
KR0U 39,864- 302-66-16-Q
N0FFZ 33,670- 259-65-19-A
W0KEA 23,200- 200-58-13-Q
KI0G 19,800- 180-55-15-Q
K0LMD 12,348- 147-42-11-A
NY0Q 750- 25-15-8-Q
K9MWM/0 380- 15-12-4-A
K0RF (+K2NA) 170,940-1155-74-24-B

Iowa

W0EJ 118,844- 803-74-20-B
NC0Z 65,536- 512-64-17-A
NU0Q 47,748- 346-69-17-A
NU0L 35,416- 274-67-15-A
W0JTC 34,848- 264-66-16-A
WB0B 380- 19-10-3-Q
KE0BX (+KA0YZH,KB0s ASM,AQD, N0IJP) 75,900- 550-69-24-B
N0ICI (+KD0RT) 61,372- 458-67-19-A

Kansas

KB0G 160,728-1086-74-24-B
K0VBU 105,900- 706-75-24-A
WA4TWB 58,788- 425-69-12-B
W0AWP 32,234- 227-71-17-A
N0FMR 29,512- 236-62-16-A
NW0F 26,536- 214-62-12-Q
W0YRN 3,180- 53-30-8-A
AB0S (+K0WA,W0CEM) 139,824- 971-72-24-B

Minnesota

N0AT 140,850- 939-75-24-B
K0NJL 128,168- 868-74-23-B
W0AA (N0C1B,op) 127,896- 878-73-22-B
KM0O 126,144- 864-73-23-B
W0UC 114,450- 763-75-24-A
K3WT 102,346- 701-73-24-A
WA0RBW 90,312- 636-71-16-B
K0FZG 87,552- 608-72-24-A
K0TO 80,929- 562-72-18-A
K0HB 71,284- 502-71-22-B
KN0V 60,480- 432-70-17-A
WA0MHJ 47,302- 353-67-10-B
K0TK 43,550- 335-65-6-B
W0YHE 29,524- 242-61-14-Q
W0TIV 23,640- 197-60-9-A
W0NGB 20,788- 176-59-13-A
WA0WWW 15,900- 150-53-7-A
WB0YUC 14,592- 128-57-9-A
K0WW 12,288- 128-48-4-A
KB0VP 10,780- 110-49-11-A
K9GJX 10,752- 112-48-14-Q
AB82P (+WB0HCH) 135,900- 906-75-24-B
K0TLC (KA6s TML,WQA,ZSU,KK6C, KZ9I,WB0s FBN,SNP,WD8s BQR, HRX, ops) 64,998- 471-69-20-B

Missouri

K4VX (NU9R,op) 170,100-1134-75-24-B
KM0L 123,600- 824-75-20-B
W0HBH 104,390- 715-73-23-A
K0DEQ 78,440- 530-74-16-B
NS0S 22,368- 193-58-8-A
WD8ARX 11,730- 115-51-17-A
KA0KKV 3,712- 58-32-14-Q

North Dakota

WB0O 166,204-1123-74-24-B

Nebraska

KV0I 97,532- 659-74-24-Q
K8SCM 92,448- 642-72-24-Q
K8MZV 48,508- 362-67-17-A
WB0SYV 46,976- 367-64-17-A

South Dakota

K0DD (K0KX,op) 71,150-1141-75-24-B
K1LL 110,880- 770-72-24-A
WA0NSY 32,508- 258-63-17-A
K5LZT 2,856- 51-28-3-A

VE

Maritime-NFLD

VO1AW 25,870- 199-65-12-A

Quebec

VE2AQP 61,880- 442-70-21-B
VE2FFE 25,320- 211-60-11-A
VE2BLX 3,240- 54-30-5-A
VE2CBS (VE2s AHD,EDL,LFL,UL,WA,ops) 32,736- 264-62-14-B

Ontario

VE3OOL 33,792- 258-66-15-Q
VE3NBE 22,932- 182-63-10-A
VE3TEE 3,120- 52-30-13-A
VE3ART (VE3s ABG,GAS,ops) 141,408- 982-72-20-B

Manitoba

VE4AEX 30,810- 237-65-20-A

Saskatchewan

VE5VP 29,148- 247-59-18-
VE5AAD 19,890- 195-51-7-
VE5AGM 18,848- 158-54-21-
VE5KZ 11,978- 113-53-12-

Alberta

VE6DZ 46,020- 354-65-14-

British Columbia

VE7CC 161,700-1078-75-24-
VE7ARQ 94,424- 638-74-17-
VE7YU 39,996- 303-66-20-
VE7EKS 1,440- 35-20-7-

Northwest Territories

VE8KD 19,376- 173-56-13-

Phone

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Connecticut

W1WEF 218,550-1457-75-24-
K8HVT 168,484-1154-73-24-
NJ2L 158,400-1056-75-24-
K1TO 148,868-1006-74-24-
N8RA 135,000- 900-75-24-
W1ODY 134,028- 918-73-23-
K1NYK 118,944- 828-72-20-
K1CC 113,400- 756-75-14-
K1RM 110,400- 736-75-15-
AA2Z 103,392- 718-72-17-
WA1LVW 97,382- 667-73-21-
NK1P 95,922- 657-73-15-
NJ1V 92,016- 648-71-17-
KB1HY 84,064- 588-74-15-
K1WA 79,600- 524-75-17-
WA1LJP 70,892- 479-74-23-
KG1D 67,536- 469-72-17-
KA1CI 66,240- 480-69-16-
WA1NLD 62,906- 443-71-23-
K1IN 47,888- 347-69-15-
KH6CP/1 46,096- 344-67-23-
K1BV 45,288- 333-68-
W1GNR 41,880- 299-70-23-
KA1JTH 39,000- 300-65-15-
K1DII 38,224- 283-84-15-
W1BIH 28,416- 192-74-
KB1WR 25,352- 216-61-15-
NF1U 23,064- 199-58-15-
W1ECH 23,072- 206-56-
KB1I 20,448- 213-48-
W1QI 17,564- 157-58-
AB1U 15,092- 154-49-
KA1VC 14,760- 164-45-
K1KI 13,426- 137-49-
W1TKG 11,904- 124-48-
KA1CV 9,436- 114-37-15
WB1DQT 9,200- 100-41-
K1SSO 7,800- 100-39-15
WA1STO 7,600- 100-38-
WA3VIL 6,960- 87-40-
KA1MIS 6,184- 96-27-15
KA1RDX 3,948- 94-21-15
KA1MWX 1,140- 30-19-
KA1MWT 910- 35-13-
N1DXL 288- 18-8-
KA1JTI 18- 3-3-
N1ADE (+N1s EBF,EBG) 106,336- 732-74-24-
K1DW (+K1NCD) 85,058- 599-71-24-

Eastern Massachusetts

N1AU (K5MR,op) 111,580- 797-70-24-
WB2UMF 54,284- 399-68-15-
W1FM 50,784- 368-69-15-
WB1FAW 36,582- 273-67-15-
W1TUM 31,200- 240-65-15-
WA8SWM 27,216- 216-63-15-
NK1O 25,668- 207-62-
W1KRS 24,600- 205-60-15-
KC1EL 24,444- 194-63-15-
K1UCA 22,960- 184-70-23-
WA1AYS 16,988- 137-62-15-
N1DPK 16,912- 151-56-15-
W1AX 13,824- 98-72-
N1DAM 11,250- 125-45-
K1ZZJ 8,208- 108-38-
N1CKO 5,032- 74-34-
NB1B 4,968- 69-36-
W1PLJ 4,964- 73-34-
W1LUG 4,602- 59-39-15-
N1DS 4,216- 68-31-15-
WA1PLK 1,344- 42-16-
KA1CQD 638- 29-11-
WB1GEX (+KS1A) 136,200- 908-75-
KQ1V (+KA1PCM) 31,224- 572-71-
W1TKZ (KA1s FCR,PQY,QWE,N1s EYZ,ND1Z,ops) 18,380- 180-51-
KD2SX/1 (+KA1CQD) 2,544- 53-24-

Maine

KA1ZX 44,208- 307-72-12-A
WB1EDL 5,418- 63-43-6-A

New Hampshire

K1HI 149,550- 997-75-21-B
AK1K 87,408- 607-72-22-A
AF1T 83,638- 589-71-13-B
K1TR 47,436- 354-67-7-B
WA1MZV 29,078- 217-67-19-A
K2TE 25,252- 214-59-9-A
KT1H 17,248- 154-56-8-A
AC1J 15,052- 142-53-5-A
K1GW 12,642- 129-49-3-B
KA1NXT 11,938- 127-47-14-B
KA1AUA 6,958- 71-49-10-A
KA1LMR 5,704- 62-46-16-Q
N1FCC 5,328- 74-36-6-B
NJ1H 2,300- 46-25-3-A
KA1LDS 506- 23-11-4-A
WB1BRE 216- 12-9-2-A

Rhode Island

K1VSJ 79,624- 538-74-17-B
WA2FTC 27,560- 213-65-23-A
K6IM 27,392- 214-64-12-A
K1DS 26,880- 210-64-7-A
K2MN 23,954- 203-58-11-A
N1EHX 15,620- 142-55-12-B
KA9HAO 9,000- 100-45-8-Q
KA1DNB 3,776- 59-32-3-A
W1LQA 3,200- 50-32-7-A
K1NG (+KI1G,KD2SX) 201,188- 1378-73-22-B
WA1TAQ (+KA1KWE) 127,200- 848-75-21-A
W1OP (K1s HGC,PLV,KZ1K,N1s AKO, BBM,ops) 89,712- 623-72-24-B
W1AQ (K1AGA,KA1MO,WA1s VEK,VPC, KM1X,WA2KPE,ops) 44,330- 341-65-21-A

Vermont

WB1GQR 217,050- 1447-75-24-B
NK1A 206,850- 1379-75-24-B
W3SOH 30,000- 250-60-10-A
W1AIM 14,000- 100-70-10-A
KA1OVA 2,750- 55-25-7-A

Western Massachusetts

KZ1M 69,984- 486-72-22-A
KB1W 65,604- 462-71-9-B
WA1HFF 50,616- 342-74-21-A
K1KNQ 31,392- 218-72-9-B
K1BR 392- 14-14-11-B
NJ1F (+N1EMG) 129,944- 878-74-18-B
KA1KPH (+N1DPM,NC1s BJ,NM1K) 123,624- 872-71-16-B

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Eastern New York

K2UR 125,550- 837-75-23-B
KC2AG 124,179- 839-74-24-B
KD2NE 54,180- 367-70-14-B
WA3AFS 53,392- 376-71-13-B
WB2ROV 46,464- 352-66-24-B
NW2J 35,490- 273-65-10-A
N2AZS 26,962- 221-61-11-A
WB2KHE 25,080- 209-60-17-A
NW2F 17,564- 157-56-11-B
KN2Q 14,580- 152-45-8-A
KC2QF 10,700- 107-50-3-B
W2NRD 9,548- 77-62-12-A
KC2YJ 8,800- 100-44-4-B
KB2EKN 1,292- 34-19-3-A
WB2HIH 720- 24-15-3-A
K5NA (+KU2Q,WB2CQ) 182,700- 1218-75-24-B
KY2J (+KA2TIP) 166,950- 1113-75-24-B

NYC-Long Island

KA2AEV 123,580- 835-74-22-B
KK2E 110,334- 777-71-19-B
KD2TT 88,768- 608-73-16-B
K2AU 63,510- 435-73-15-B
KS2G 62,928- 456-69-17-A
K2YGM 50,126- 353-71-12-B
N2EGO 22,196- 179-62-16-A
WB2QEU 18,648- 148-63-6-A
K2RYI 14,840- 140-53-10-A
N2HOF 14,016- 146-48-7-A
KA2NWO 10,706- 101-53-4-A
K2HVN 10,658- 73-73-10-A
WA2YEI 8,484- 101-42-8-B
N2RQ 4,830- 69-35-4-A
W2DX 4,416- 69-32-3-B
W2TNI 560- 20-14-4-A
N2FIG 24- 4-3-2-A

Northern New Jersey

KC7KU 146,850- 979-75-24-B
KZ2S 109,340- 781-70-13-B
K8DI 107,892- 729-74-24-B
KT2D 26,840- 220-81-15-A
W2GD 22,272- 192-58-3-B
WB2HJW 18,000- 150-60-7-B
K4BNC 15,000- 100-75-24-B
KE2CG 14,910- 105-71-18-B
WA2CWX 12,600- 126-50-8-A
AA2U 9,680- 110-44-8-Q
N2EW 9,374- 109-43-9-A
N2GZJ 9,282- 119-39-15-A
W2HN 8,978- 67-67-11-A
WD2AHD 4,704- 58-42-5-A
N2GMZ 3,720- 60-31-10-A
K2GQ (KA2s EYH,HJH,N2s AVF,HFG, WA2NXW,ops) 72,450- 525-69-24-A
K2MFF (N2s FXZ,GIO,HSJ,KA2s PFM, RRR,ops) 61,962- 449-69-21-B

Southern New Jersey

AB2E 145,950- 973-75-24-B
N2MM 124,350- 829-75-24-A
K8XR 113,850- 759-75-24-A
WB2DIN 87,264- 606-72-17-B
W2PAU 71,540- 490-73-17-B
WB2SJA 63,802- 437-73-22-A
N2ETJ 63,048- 444-71-24-A
WA2LBT 58,646- 413-71-24-A
ND2P 57,120- 420-68-15-A
NX2C 54,400- 400-68-15-A
KZ2I 45,500- 325-70-20-A
WA2WJL 35,532- 282-63-12-A
WB2YOF 29,264- 236-62-24-A
WB2UEY 25,056- 216-58-16-A
WA2RCB 23,760- 198-60-9-Q
WB2R 23,668- 194-61-17-A
N2RF 21,420- 210-51-9-A
W2FGY 17,264- 166-52-12-B
W2EA 17,172- 159-54-8-A
N2EZ 14,382- 153-47-11-A
W2ORA 11,468- 124-46-6-A
WB2UVB 11,224- 122-46-10-A
N2VW 10,700- 107-50-4-B
NF2C 10,336- 136-38-8-A
N2GUW 10,296- 99-52-7-A
KA2KFO 9,494- 101-47-12-A
K2LOO 7,110- 79-45-6-B
KD2AE 3,808- 58-34-4-B
N2FJQ 3,800- 50-38-6-B
N2HQL 3,072- 64-24-8-A
N2FJM 2,700- 54-25-11-A
N2AWC 2,132- 41-26-6-A
WB2YEH 1,800- 50-18-5-Q
AB2Y 1,026- 27-19-2-B
WB2LNR 480- 20-12-5-B

Western New York

AJ3K 157,500- 1050-75-24-B
AF2K 108,576- 754-72-24-B
W2HPF 105,524- 713-74-16-B
KQ2K 55,878- 417-67-12-B
KB2SE 55,772- 382-73-16-A
KB2NU 54,244- 382-71-16-B
W2HG 50,468- 341-74-10-B
NM2J 49,980- 357-70-24-B
K2UC 41,540- 310-67-14-A
NZ2E 37,520- 280-67-15-B
K2OL 34,304- 288-64-24-A
KK2B 33,500- 250-67-10-B
NE2W 31,580- 263-60-12-A
WA2WPI 30,744- 244-63-18-A
W2MTA 29,394- 213-69-15-A
WB2YQH 29,200- 200-73-13-A
WB2EKP 28,160- 220-64-16-A
KE2CU 21,648- 164-66-11-A
K1JUL 21,122- 179-59-12-A
W2FXA 20,606- 161-64-6-B
KD2PC 20,406- 179-57-18-A
N2ARG 19,140- 165-58-12-A
NA2A 17,278- 163-53-8-A
WB2ABD 14,410- 131-55-3-B
K1MEO 11,424- 112-51-8-B
AI2S 9,424- 76-62-8-Q
W2OMV 8,034- 103-39-12-A
W2TZ 7,684- 113-34-2-A
K2KIR 3,360- 60-28-1-B
KA2KDA 3,294- 61-27-11-B
KB2CSM 2,400- 60-20-7-A
N2GSS 6- 3-1-1-A
K2ZJ (+K2ZL,N2MF) 197,550- 1317-75-24-B
NM2L (+KA2AJT,KB2DM,WB2WBU, WD2AFI) 169,050- 1127-75-24-B
W2OW (KD2PC,N2HR,N6IN) 134,400- 896-75-23-B
WB2PSI (K2s MP,OS,UD,KD2OM,N2EZY, W2AV,WA2s BYP,DHS,ZKD,ZQN, WB2QCJ) 81,000- 540-75-24-B
K2IQ (WA1LLC,KA2s CFH,MTB,OZV, WA2AZA,WB2PYU,ops) 58,520- 418-70-24-A
WA2ZXS (+KA2s ML,RQR,N3OOU, WD6CQV,WB7DLP) 21,472- 176-61-16-A

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Delaware

AC3T (KA3B,op) 92,272- 632-73-22-B
N3DLM 71,424- 496-72-21-B
K3WUW 61,200- 425-72-23-Q
K3HBP 26,496- 207-64-10-A
N3FQB 26,332- 227-58-20-A
KC3AM (+KA3BOP) 30,888- 234-66-13-B

Eastern Pennsylvania

KS3F 183,150- 1221-75-24-B
N3CHL 63,072- 438-72-15-B
K3TX 61,180- 437-70-24-B
WA1MKE 44,472- 327-68-21-A
KA3NJA 42,240- 320-66-19-A
WA3LFY 41,454- 329-63-11-B
KB3JK 32,898- 257-64-13-B
K3WW 30,150- 225-67-15-Q
KA3QND 28,424- 209-68-13-A
K3ZLK 23,660- 182-65-12-A
KC3AD 7,326- 99-37-6-A
WB3KXM 6,868- 101-34-12-A
KQ3V 5,776- 76-38-2-B
W2UP 5,244- 89-38-2-Q
W3GBG 4,410- 63-35-7-Q
WB3EPW 4,218- 62-34-4-Q
KW3T 3,480- 60-29-7-A
K3EBZ 3,120- 60-26-3-A
KA3PKN 2,820- 47-30-4-A
KY3T 2,000- 40-25-3-B
KA3LCF 1,200- 30-20-2-A
AG3G 714- 21-17-3-A

Maryland-DC

W3LPL (K3ZZ,op) 215,900- 1446-75-24-B
K3NA 191,250- 1275-75-24-B
N3AOE 86,578- 593-73-23-A
W3UJ 82,140- 555-74-19-A
W3ZZ 53,544- 388-69-8-B
W3GNQ 38,896- 286-66-8-B
K3SA 38,080- 280-68-6-B
K3GEK 32,922- 279-59-6-A
W3EE 24,400- 200-61-12-A
WB2EKK 16,576- 148-56-3-A
N3GB 11,280- 120-47-24-B
W3FQE 9,360- 130-36-8-B
KD7JZ/3 7,872- 96-41-8-A
WB3IMM 7,068- 91-39-7-A
WA3VPL 6,388- 82-39-4-A
N3FDG 3,132- 54-29-4-A
KC3D (+KA3ONG) 80,316- 582-69-13-B
WB3JRU (+KC3AJ) 1,564- 37-21-1-A

Western Pennsylvania

K5ZD/3 95,016- 642-74-12-A
N3TP 93,152- 656-71-18-B
K3MD 26,544- 237-56-4-B
KA3ROX 15,912- 156-51-16-A
KA3GXP 9,360- 90-52-7-A
K3RYA 8,214- 111-37-6-A
K3UA 7,740- 86-45-1-A
N3AEP 480- 20-12-1-B
KD3E (KA3SFO,NJ3N,ops) 47,740- 341-70-22-A
N3FAS (+KA3NJJ) 35,400- 295-60-21-B

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Alabama

WZ4F 213,000- 1420-75-24-B
N4RNA 2,090- 55-19-6-A

Georgia

N4FD 152,250- 1015-75-20-A
AA4LR 57,312- 398-72-21-A
K4EZ 38,760- 285-68-11-A
K4BAI 32,630- 251-65-7-A
KE4XT 31,892- 238-67-13-A
KB4GID 25,058- 187-67-17-Q
AA4GA 9,200- 100-46-2-A
ND1J 7,480- 85-44-5-Q
W4UYC 4,392- 61-36-4-A
KI4Y 308- 14-11-1-A
W4AQL (+KA1KXT,KB4POZ,N4CXF, N4MLG,WA4ABY,WA4IXY,W8ZI) 104,544- 726-72-21-B

Kentucky

KI4QJ 76,396- 536-71-24-A
KB4AMA 47,748- 346-69-20-A
WB4FDK 40,880- 280-73-11-B
N4OHW 37,922- 283-67-19-B
KB4SRE 33,552- 233-72-13-A
KI4DC 28,910- 207-65-7-B
WB4LKP 23,530- 181-65-24-B
AA4RX 16,830- 165-51-3-A
KB4YTD (T) 8,150- 163-25-6-A

North Carolina

N4AA 155,400- 1036-75-19-B
KJ4TI 42,420- 303-70-20-A
W4UH 20,298- 172-59-4-A
WB4Y 18,470- 135-61-10-A
N4IQA 13,674- 129-53-13-A
NK4Q 13,668- 134-51-11-Q
AF4D 13,266- 99-67-10-A
KB4OEN 13,152- 137-48-14-A
N4QEN 12,500- 125-50-10-A
KB4C 10,500- 150-35-2-B

Northern Florida

N4EEB 225,996- 1527-74-24-B
K4XS 198,468- 1341-74-24-A
W4ZTW 49,764- 377-68-14-A
KK4RV 19,760- 152-65-21-A
WC4E (+KA4TCW) 45,792- 318-72-6-A

South Carolina

K6EJ 133,200- 900-74-20-A
K4ADI 78,292- 529-74-20-B
AB4CL 20,178- 171-59-12-A
KJ4KB 13,500- 135-50-9-A
WD4PLF 9,108- 99-46-6-B

Southern Florida

K1ZX/4 146,100- 974-75-24-B
N4BP 99,792- 693-72-9-B
N4TL 25,920- 216-60-8-B
WA2MZE 24,192- 189-64-12-A
K4VFY (N4EVS,op) 22,420- 190-59-14-Q
WA4VQD 22,204- 162-61-18-A
WK4F 9,380- 70-67-12-B

Tennessee

N4ZZ 230,700- 1538-75-24-B
K3CQ 127,500- 850-75-24-B
AA4DO 41,580- 297-70-15-A
KK4FB 18,762- 159-59-11-A
WA4MCZ 10,272- 107-48-7-A
K4XO 2,900- 50-29-3-A
N4TG (+KI4UZ,N4IR) 196,024- 1338-74-24-B

Virginia

W4MYA 179,142- 1227-73-24-B
AA4UJ 79,278- 543-73-18-B
W3YY 65,136- 472-69-24-B
W4YE 50,400- 350-72-11-A
KB4RME 43,746- 317-69-22-A
W4TMN 41,674- 311-67-20-A
WA3RGH 38,296- 307-64-9-A
K4OD 30,096- 228-66-10-B
K3ZJ 29,040- 242-60-6-A
WB4LNT 28,520- 230-62-16-A
K4BAM 24,306- 206-59-7-A
WD4KQJ 18,144- 182-56-8-A
KB4MRH 13,524- 147-46-13-A
N4NNZ 12,272- 118-52-9-A
KA4RLJ 7,380- 90-41-24-A
KA5NLY 7,272- 101-36-10-Q
N4JGQ 6,720- 96-35-7-A
KB4EUZ 4,536- 63-36-7-A
KA4ERK 4,032- 56-36-4-A
W4JLS 3,840- 64-30-3-A
K4UK 736- 23-16-1-A
KC4DY (+AB4U,KB4s NNE,PW,N4s GNN,VG) 144,000- 960-75-23-B
AA4UC (+KB4OMD) 39,780- 306-65-24-A

West Indies

WA2UDT/KP2 9,202- 107-43-6-A
N2HLZ/KP2 3,712- 64-29-7-A

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Arkansas

K5FUV 137,344- 928-74-24-A
W9OBF 117,384- 804-73-24-A
AA5BE 54,720- 380-72-20-B
WD5COT 29,854- 253-59-9-A
KA5FZL 24,800- 200-62-21-B
WA5VBE 19,372- 167-58-11-A
K5JH 17,360- 155-56-10-A
N5KKD 17,160- 156-55-7-A

Louisiana

W5WMU 248,000- 1640-75-24-B
N5EPU 68,376- 462-74-24-A
WC5D 32,028- 239-67-8-A
N5FYJ 28,140- 210-67-13-A
N5JM 3,844- 62-31-4-A
KA5PBA 1,680- 35-24-6-A
W5EW (+K5MC,WC5N) 140,304- 948-74-21-B

Mississippi

WQ5L 40,180- 287-70-9-B
K5SVC 32,760- 260-63-8-A
KV5F (+WD5JNC) 18,480- 168-55-18-A

New Mexico

KN5S 153,750- 1025-75-20-B
N5EPA 127,090- 895-71-24-A
WS5O 67,480- 482-70-16-A
W5OLN 25,254- 189-69-17-B
WB5CYK 22,790- 215-53-7-B
KA5VTQ 19,266- 169-57-25-A
N5HXT 17,172- 159-54-11-A
N5JXU 1,870- 55-17-5-Q
AA5B (+K5TA) 272,550- 1817-75-24-B
KE5BL (+K5QQ,KD5VV,AI9X) 187,050- 1247-75-23-B

North Texas

N5AU 259,650- 1731-75-24-B
K5YNZ (KE5CV,op) 259,350- 1729-75-24-B
KM5R 225,000- 1500-75-24-B
N5UA 163,350- 1089-75-23-B
K5RX 157,200- 1048-75-18-B
K5NW 156,584- 1058-74-20-B
NT5V 154,350- 1029-75-22-A
KC5DX 151,650- 1011-75-13-B
W5MYA 125,504- 848-74-19-A
N5JB 124,800- 832-75-14-B
WG5J 102,816- 756-68-15-B
K5RR (KR9Y,op) 96,508- 681-73-8-B
N5RM 67,190- 480-73-13-B
KF5VU 64,998- 471-69-18-A
W5ONL 58,898- 409-72-20-A
W5LMG 58,100- 415-70-22-B
K5WXZ 54,954- 387-71-23-A
W5LKP 51,504- 348-74-16-B
N5IET 44,460- 342-65-23-A
N5DTO 41,080- 316-65-18-A
W5MW 40,800- 300-68-23-B
W5FO 40,084- 313-64-5-B
N5UD 31,220- 223-70-10-A
KD5XH 28,098- 223-63-17-A
NN5T 24,400- 200-61-11-A
K5EQ 10,152- 108-47-7-A
K5MR (+NR5K) 202,500- 1350-75-24-B
KN6M/5 (+N5RZ) 180,900- 1206-75-20-B
KW5P (+KB5EIH,N5LAU) 83,850- 559-75-24-A

Oklahoma

WM4Z 139,564- 943-74-24-A
KM5H 137,400- 916-75-22-A
N5JKN 41,860- 322-65-20-A
AA5CO 28,670- 235-61-8-A
WD5COS 26,880- 210-64-17-B
K5CM (+N5s OG,KW) 284,300- 1762-75-24-B

South Texas

WS4Q 256,200- 1708-75-24-B
NR5M 254,550- 1697-75-24-B
KG5U 180,450- 1203-75-22-B
K5DX 151,108- 1021-74-20-B
KC5CP 133,050- 887-75-22-B
W5ASP 126,918- 883-73-16-B
WA7YEJ 122,494- 839-73-22-B
K5WA 111,750- 745-75-14-B
WN4KKN/5 69,790- 615-73-9-B
WV5K 60,080- 429-70-15-B
WU5Z 54,648- 396-69-23-A
WA5IYX 51,336- 372-69-24-A
W5LXG 44,354- 331-67-9-A
W5NR 27,060- 205-66-12-B
W5UFA 10,908- 101-54-9-A
N5ZR 3,410- 55-31-5-A

W5EHM (CE3LAR,WN4KKN,KA5OVB, KA5QAA,KA5WSS,KA5ZVB,N5JGX, WR5J,WD8EOP) 152,400- 1016-75-24-B
W5XD (+KB5BYH) 21,836- 206-53-8-B

West Texas

WF5E 170,550- 1137-75-24-B
W5VGX 70,000- 500-70-15-Q
N5DO 60,590- 415-73-12-A
N4DW 31,270- 295-53-6-B
K5RF 10,000- 100-50-4-A
KD5SP (+N5KTW,WD5EGS) 103,748- 701-74-24-B

6

East Bay

N6BV 279,900- 1884-75-24-B
K6ZM (KI6EZ,op) 145,780- 985-74-24-B
W6BSY 138,150- 921-75-23-B
VE2AQS/W6 97,488- 677-72-15-B
WR6R 89,936- 616-73-22-A
KS6H 88,350- 589-75-21-A
N6EK 64,584- 468-69-16-B
N6CCL 56,576- 416-68-17-B
KH6HI 44,840- 360-59-8-B
WZ6Z 29,358- 233-63-6-B
WA6YQM 15,272- 166-46-13-A
WX6M 13,188- 157-42-1-B
K6CSL 6,408- 89-36-7-A
KS6Q 2,162- 47-23-3-B

Los Angeles

N6HC 155,400- 1050-74-19-A
W8AKS/6 80,850- 539-75-20-A
KE6B 58,380- 417-70-21-A
WB6NFO 44,020- 310-71-24-A
WA6GDS 36,820- 263-70-9-A
WB6JJE 34,580- 247-70-13-Q
N6IBP 28,248- 214-66-15-A
W6OFP 27,342- 217-63-20-A
KD6JP 20,086- 162-62-16-A
N6GEN 17,400- 150-58-8-A
K6ICS 15,680- 140-56-10-A
WB6BXP 12,800- 128-50-11-A
W8UGU 8,400- 84-50-11-A
W6UE (AA6RX,op) 5,600- 70-40-2-Q
KE6FY 4,422- 67-33-6-A
WB6VVS 3,840- 60-32-3-A
W6CN 3,100- 50-31-3-Q
W6PFE 2,450- 49-25-6-A
KB6STF 1,900- 50-19-6-A
WB6FFW 1,748- 38-23-5-A
NG6L 714- 21-17-3-A
W6VPZ (AA6CS,K6KH,KB6s PMQ,PMR, N6HCS,N6JI,N6OQU,W8CN,W6GC, WX6N,ops) 121,410- 855-71-24-B
WD6DJY (KH6WZ,WB6LMN,ops) 111,836- 766-73-14-B
W6GAA (WA6BIL,WB6JCD,ops) 51,800- 370-70-23-A
N6PN (+KR6X) 43,112- 317-68-11-A
W6KAT (+N6BAX,WA6SNG,WB6JBL) 42,344- 316-67-24-A

Orange

N6RJ 189,750- 1265-75-24-A
KI6DU 53,340- 381-70-13-A
NC6U 44,640- 310-72-11-B
K6HRT 37,696- 304-62-12-A
WA6GFR 20,184- 174-58-21-A
W6CPB 9,200- 92-50-9-B
N6NKN 9,030- 105-43-8-A
N6IGI 3,432- 52-33-3-A
KF6OG (+WA6s CWM,T) 169,500- 1130-75-23-B
N6DBF (+KB6SI,N6PSU,WA6PMX, WD6GSH) 41,844- 317-66-22-B
WA6YNT (K6HRT,KB6s TBY,IJC,KI6WD N6s OUG,MUL,QHR,WB6CWD,ops) 21,798- 173-63-20-B

Pacific

KH6RS (K6GSS,op) 162,060- 1095-74-21-B
AH6FL 42,024- 309-68-8-B
N7IBB/KH6 (T) 1,760- 44-20-5-A
NH6GJ 234- 13-9-3-A
WH6BKQ 24- 4-3-4-A

Santa Barbara

W6TKF 106,872- 732-73-15-B
W2KVA/6 86,876- 587-74-18-B
K6VMN 74,592- 518-72-18-B
WA6FGV 73,872- 513-72-19-A
KD6LD 28,080- 216-65-16-B
W6HYK 7,128- 81-44-9-A
KG6QX 2,444- 47-26-5-A
AA4Q/6 18- 3-3-1-Q
KA6L (+KD6QX,WA6VNC) 85,120- 608-70-24-B

Santa Clara Valley

N6BT (WA6VEF,op) 239,400- 1596-75-24-B
KI6CG 172,500- 1150-75-24-B
KJ6V 80,352- 558-72-23-B
KD6PY 72,854- 499-73-24-Q
KG6AO 56,442- 409-69-17-B
KI6KG 33,672- 244-69-15-A
N6NF 29,200- 200-73-20-B
N6ZB 17,490- 165-53-7-A
WA6HRK 12,128- 129-47-21-A
W6IGU 4,050- 45-45-7-A
KA6NG 1,216- 38-16-2-B
N6TU (K6XO,KA6LAF,SM0DRD,ops) 160,200- 1068-75-24-B

San Diego

K6NA (N6TR,op)
286,050- 1907- 75- 24- B
N6ND 126,450- 843- 75- 10- B
W8UQF 105,150- 701- 75- 22- A
KI6ZH 47,570- 335- 71- 23- A
KB6PJU 31,464- 414- 38- 11- Q
W6JXA 25,048- 202- 62- 9- A
WA6UFY 24,898- 211- 59- 10- B
KJ6AU 6,318- 81- 39- 11- A

San Francisco

W6BIP 116,250- 775- 75- 19- B
K6LRN 58,608- 407- 72- 24- B
WA8LLY 48,280- 340- 71- 14- A
WB2CHO 27,528- 222- 62- 11- A
KA6JLT 15,500- 155- 50- 10- A

San Joaquin Valley

WC6H 241,200- 1808- 75- 24- B
N6PR 44,220- 335- 68- 9- A
KG6OB 25,134- 213- 59- 15- A
WA6YAB 6,534- 99- 33- 6- A
KI6PG 6,156- 81- 38- 11- A
WB6ITM 1,856- 38- 29- 2- Q
N6ODO 1,258- 37- 17- 4- A
WW6O (+KB6NIZ,N6KEP)
95,904- 666- 72- 21- B
N6PKG (+N6PKI)
48,714- 353- 69- 24- A
KI6PR (+K6RAU,KA6GSK,KB6SBH, WA6PIC,WB7UGZ)
45,156- 318- 71- 24- A

Sacramento Valley

W6GO 274,350- 1829- 75- 24- B
KV6H 187,200- 1248- 75- 24- B
AI6V 175,200- 1168- 75- 18- B
NB6G 169,350- 1129- 75- 24- B
KF6A 162,800- 1100- 74- 21- B
K6SG 152,278- 1043- 73- 24- B
N6IG 93,732- 642- 73- 14- A
N6IV 62,604- 423- 74- 18- A
KI6PL 61,750- 475- 65- 15- B
KI6PO 40,960- 320- 64- 20- A
N6JM 10,400- 100- 52- 9- A

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Alaska

AL7CQ 166,352- 1124- 74- 24- B
NL7HT 21,924- 189- 58- 15- A
NL7DU 2,592- 44- 29- 8- Q

Arizona

K6LL 297,184- 2008- 74- 24- B
K7NO 202,650- 1351- 75- 23- B
KC7V 184,950- 1233- 75- 21- B
W7ZMD 35,230- 271- 65- 11- A
WB7CFL 30,016- 224- 67- 7- B
K7ZKU 11,466- 117- 49- 16- A
KY7M 7,224- 84- 43- 2- A
N7CPL 672- 21- 16- 2- A
N7JMA (+N7s ERG,JRZ,KD9H,N8ADI)
74,752- 512- 73- 23- A

Idaho

KK7A 149,212- 1022- 73- 24- A
N7HJM 120,842- 851- 71- 19- A
W7UQ (KF7CN,N7JPZ,WE7X,KA7ZWO, ops)
93,832- 634- 74- 22- A

Montana

KS7T 177,600- 1200- 74- 24- B
KE7X 113,120- 808- 70- 23- Q
NV7Y 80,448- 551- 73- 22- B
KW7I 30,954- 231- 67- 18- A
N7ICC 22,632- 184- 69- 20- A
KA7MMY 20,768- 178- 59- 11- A
W7LR 10,384- 118- 44- 3- A

Nevada

ND7M 102,900- 686- 75- 17- A
WB8WNH 32,480- 230- 56- 24- A
WB7VVH 14,560- 140- 52- 13- B
WA7NIN (+W8OAT)
249,232- 1684- 74- 23- B

Oregon

K7KJM 162,504- 1098- 74- 24- A
W7YAQ 149,400- 998- 75- 24- A
K7SS 103,200- 688- 75- 24- Q
AI7W 61,880- 442- 70- 22- A
N7GPO 28,710- 261- 55- 9- A
K7GDN 27,470- 205- 67- 13- B
N7DG 24,420- 165- 74- 18- B
KA7OAI 19,836- 178- 56- 11- A
W7GUR 11,424- 112- 51- 6- A
K6KM 9,212- 98- 47- 24- B
KA7FEF 7,360- 92- 40- 11- A
WB7EMO 3,904- 61- 32- 4- A
W7PXL (K7DBV,op)
2,970- 55- 27- 2- A
WB9HZT/7 1,472- 32- 23- 4- A
W7EJ (+AI7B,N7AKQ,W7ZR)
276,150- 1841- 75- 24- B
NK7U (+NI7T)
212,250- 1415- 75- 24- B

Utah

KS1G 237,450- 1583- 75- 24- B
W7CFL 211,900- 1412- 75- 24- B
KE7KF 110,902- 781- 71- 16- B
KE7QA 51,240- 366- 70- 23- A
W7GXC 27,548- 194- 71- 12- A
WB7ONP 17,930- 163- 55- 19- A
KF7CD 14,640- 140- 53- 22- A
WA7TUX 14,580- 130- 56- 18- Q
W7HS 8,448- 96- 44- 7- B
W7MR (+KE7s RU,ST,N7s JIH,JSZ, WE7s B,D)
181,050- 1207- 75- 24- B

Washington

W7WA 304,050- 2027- 75- 24- B
N7TT 229,350- 1529- 75- 24- B
K7IDX 199,050- 1327- 75- 24- B
K7LXC 160,432- 1084- 74- 24- A
W7BUN 153,772- 1039- 74- 15- B
K7LXC 124,912- 844- 74- 24- A
N7IFA 124,392- 852- 73- 17- B
W7HX 81,760- 584- 70- 10- B
N7GGJ 37,448- 302- 62- 20- A
WB7CLU 30,552- 228- 67- 19- B
KY7K 27,060- 205- 66- 18- A
KR7G 24,428- 197- 62- 7- B
KE7ZG 20,848- 178- 58- 20- A
NS7O 20,640- 172- 60- 10- A
KI7G 20,212- 163- 62- 3- A
K7HBN 19,942- 169- 59- 6- Q
W7QN 17,980- 155- 58- 14- A
K7XX 16,704- 174- 48- 5- B
WA7QCC 16,500- 150- 55- 6- A
W7BQG 15,120- 140- 54- 16- A
N7JB 14,910- 105- 71- 15- A
W7QCV 11,610- 129- 45- 8- A
N4SL 9,800- 70- 70- 16- A
W7LKG 9,292- 101- 46- 4- B
KD7LJ 8,568- 102- 42- 8- A
NB7N (+NN7L)
129,056- 872- 74- 23- B

Wyoming

K7MM 154,808- 1046- 74- 24- A
WD7L 62,790- 455- 69- 23- B
KA7GKI 27,938- 229- 61- 24- Q
KB7M 19,320- 161- 60- 21- Q
WE7S 19,030- 173- 55- 11- B
WB7I 2,752- 43- 32- 7- A

8

Michigan

NE8O 75,312- 523- 72- 21- A
KW8G 66,450- 443- 75- 19- A
K8SB 59,084- 428- 69- 16- A
K8GVK 55,890- 405- 69- 17- A
KE8KG 50,592- 372- 68- 18- A
K8GSR 49,818- 361- 69- 21- B
N8HIB 48,764- 334- 73- 19- A
KA8GOM 47,328- 348- 69- 24- A
K8SAK 46,364- 346- 67- 19- A
NS8F 42,024- 309- 68- 23- A
WB8MDG 41,952- 304- 69- 18- A
N8GRY 39,334- 277- 71- 24- A
K8CV 38,352- 282- 68- 20- A
WD8KZX 38,324- 288- 67- 22- A
K8KUH 32,400- 270- 60- 18- B
W8JRK 29,312- 229- 64- 9- A
WA8YPY 28,320- 240- 59- 22- A
NU8F 27,580- 197- 70- 24- B
NZ8G 25,480- 196- 65- 15- A
W8VWY 24,704- 193- 64- 10- A
KA8WBQ 22,712- 167- 68- 24- A
W8EGI 22,568- 182- 62- 9- A
KA8ZUO 21,340- 194- 55- 20- A
WB8GUS 20,880- 180- 58- 22- A
KA8IZE 20,740- 170- 61- 15- A
NS8V 20,608- 184- 56- 13- A
WA8FRD 18,040- 184- 55- 13- A
N8HSN 17,388- 161- 54- 23- A
K8SIA 17,280- 144- 60- 5- A
N8FPN 17,270- 157- 55- 15- A
KE8X 17,160- 156- 55- 5- A
NO8T 16,536- 156- 52- 11- A
WB8TOT 16,120- 155- 52- 12- A
WA8MJY 15,196- 131- 58- 9- A
W8SS 14,250- 125- 57- 12- A
W8FEM 14,200- 100- 71- 12- A
W8PPG 14,098- 133- 53- 12- A
KE8LE 11,988- 111- 54- 10- A
K8DD 11,960- 130- 46- 24- Q
K3UWO 11,760- 120- 49- 13- A
KA8GIA 11,544- 111- 52- 12- A
WB8AFO 11,430- 127- 45- 10- A
WA8OJR 10,528- 112- 47- 9- A
KA8WAX 8,686- 101- 43- 7- A
WB8ITB 8,514- 99- 43- 3- A
KE8GC 8,372- 91- 46- 12- A
W8VPC 7,000- 100- 35- 4- A
WB8IFD 5,320- 95- 28- 8- A
WB8JYX 4,560- 76- 30- 2- A
N8EA 4,536- 63- 36- 24- B
N8ECL 1,980- 49- 20- 5- A
KA8KGW 1,536- 48- 16- 6- A
KA8SQL 1,386- 33- 21- 5- A
KA8SQS 1,254- 33- 19- 5- A
WD8KZO 810- 27- 15- 2- A
W8TJQ 504- 18- 14- 1- A
W8ROS 288- 12- 12- 1- A
KA8KGV 252- 14- 9- 1- A
KA8ZUQ 160- 10- 8- 1- A
KA8ZUT 50- 5- 5- 1- A
NY8H 50- 5- 5- 1- A
KB8BOU 24- 6- 2- 9- A
K8CC (+KE8OC,KN8S,W8WD,WD8RHO)
214,500- 1430- 75- 24- B
N8CXX (+K8JM,N8BTU,NE8T)
205,050- 1367- 75- 24- B
K8MJZ (+AI8D)
204,150- 1361- 75- 23- B
KY8I (+NY7F,K8CQF,NA8G)
57,600- 400- 72- 19- B
KB8CHA (+KB8APA)
1,496- 44- 17- 7- A
KA8ZUP (+KE8GC)
900- 30- 15- 5- A

Ohio

WB8JBM (N8DCJ,op)
180,300- 1202- 75- 24- B
WB8JKR 125,100- 834- 75- 19- B
N8LL 120,768- 816- 74- 21- B
N8ATR 112,950- 753- 75- 23- B
K8BL 104,390- 715- 73- 21- A
KJ8T 91,612- 619- 74- 18- B
KA8D 90,082- 617- 73- 17- B
W8UPH 75,402- 531- 71- 24- A
K8ND 73,438- 503- 73- 11- A
NC8V 49,096- 361- 68- 9- B
WD8AJF 48,860- 349- 70- 14- A
KJ8I 46,340- 331- 70- 13- B
NY8L 45,804- 347- 66- 7- B
WA8KIW 42,432- 312- 68- 18- A
W8FN 40,500- 378- 54- 7- B
W8SJU 40,040- 308- 65- 24- A
KA8ETK 34,452- 261- 66- 10- A
NF8G 32,780- 234- 70- 19- A
K8NZ 31,580- 263- 60- 5- A
NW4G 29,948- 217- 69- 11- B
NQ8Y 27,302- 187- 73- 22- Q
N8EIH 26,962- 221- 61- 14- Q
W8RHY 24,822- 197- 63- 24- A
NR8Z 24,700- 190- 65- 8- B
KA8NDC 23,760- 198- 60- 12- A
N8FSP 22,628- 176- 64- 13- A
N8GWJ 22,176- 168- 66- 20- Q
W8NHO 20,416- 176- 58- 17- B
AI8O 19,500- 150- 65- 13- A
WD8DVX 19,008- 144- 66- 13- A
W8IDM 17,360- 155- 56- 9- Q
N8DDL 17,112- 124- 69- 13- A
NS8G 15,576- 132- 59- 7- A
WA8KFB 15,222- 129- 59- 6- A
KE8E 14,976- 144- 52- 17- A
KK8S 14,820- 114- 65- 14- B
WD8AIL 14,258- 132- 54- 10- A
KD8UC 13,428- 137- 49- 17- A
WA8RCN 11,960- 115- 52- 6- A
K8MR 11,340- 135- 42- 3- B
W8IMF 10,908- 101- 54- 9- B
WA8IMF 10,184- 134- 38- 10- A
KD8UN 7,820- 85- 46- 17- B
N2FRW 4,968- 69- 36- 24- A
K8CKY 3,410- 55- 31- 5- A
W8VZE 2,668- 46- 29- 3- A
N8INT 2,622- 69- 19- 17- A
WB8YEW 2,200- 50- 22- 4- A
KA8VPL 1,440- 48- 15- 5- A
KA8TKO 1,080- 36- 15- 3- A
KA8ZEP 884- 34- 13- 3- A
WD8KTM 420- 21- 10- 1- B
N8INS 280- 20- 7- 12- A
KB8AYZ 270- 15- 9- 2- A
WD9INF (+K8AQM,KN8R,N8INX,NI8L, NU8Z,W8IQ)
245,100- 1634- 75- 24- B
KB8IZ (+KC8PQ,N8DPD)
181,200- 1208- 75- 24- B
WB8SMC (N8HBI,WB8s MRU,QVC,ops)
148,668- 991- 74- 40- B
WB8MIP (+K8AHJ,N8HOB,WB8s PIY, ZYD)
55,572- 421- 66- 13- B
W8EDU (KL7JCQ,N8GAW,ops)
11,628- 153- 38- 8- B

West Virginia

KC8JH 102,666- 723- 71- 17- A
KB8FJ 37,812- 274- 69- 7- A
W8VEN 36,856- 271- 68- 20- B
WD8QNO 11,880- 110- 54- 6- B
NJ8J 11,808- 123- 48- 10- A
KC9S (+K3LDE,W3s DCI,PYZ,WA3QGA)
112,184- 758- 74- 24- B

9

Illinois

AC9C 212,084- 1433- 74- 24- B
K9ZO 205,050- 1387- 75- 24- B
K9HDE 138,450- 923- 75- 20- B
WA8AVL 132,750- 885- 75- 24- B
KS9O 129,500- 875- 74- 19- B
AG9E 91,152- 633- 72- 22- A
N9AEJ 63,948- 438- 73- 10- B
KR9K 61,632- 428- 72- 21- B
K9LUW 59,422- 407- 73- 20- A
WA9DRE 54,316- 367- 74- 17- B
W9LNQ 48,720- 348- 70- 10- A
K9RR 41,400- 300- 69- 18- A
N9FIV 39,468- 286- 69- 16- A
NU9C 39,260- 302- 65- 14- Q
W9VA 36,960- 280- 66- 5- B
K9GH 33,604- 271- 62- 17- B
WB9GKA 28,418- 222- 64- 19- A
W9RW 25,870- 199- 65- 10- B
WD9GIG 21,924- 174- 63- 11- B
K9UIY 18,090- 201- 45- 5- A
KC9UM 16,060- 146- 55- 6- B
KE9CE 15,840- 165- 48- 9- A
KD9Q 14,664- 141- 52- 5- B
N9IJF 13,640- 124- 55- 5- A
N9ALC 12,980- 110- 59- 7- A
W9HEG 12,390- 105- 59- 18- A
KA9FUG 11,500- 115- 50- 8- A
KM9L 10,400- 100- 52- 7- A
NA9I 9,844- 107- 46- 24- A
KE9BL 8,554- 91- 47- 8- A
W9TM 7,676- 101- 38- 3- A
N8HWK 7,056- 98- 36- 16- A
K9EIJ 5,494- 67- 41- 7- Q
K9FFC 4,368- 56- 39- 7- A
N9GMM 2,698- 71- 19- 7- A
KA9RTV 1,988- 41- 24- 3- A
KA9VPH (N)
1,176- 42- 14- 2- A
KE9DT 952- 28- 17- 4- A
W9KVF 928- 29- 16- 2- Q
KE9DE 480- 20- 12- 1- A
KG9Z (+KA9TNZ,NJ9Q)
148,500- 990- 75- 24- B
KA9VAB (+KA9s VPH,ZKO,KD9KU, KE9DE,N9DE,N9FRT,NM9J,NO9D, W9OY,WA9DIP)
78,588- 531- 74- 24- B
W9VVI (W1HTA,KA9JPT,N9s CRG,GBU, NT9C,ops)
19,080- 180- 53- 16- B

Indiana

N9QX 126,700- 858- 75- 24- B
W9RE 125,080- 845- 74- 11- B
KB9C 109,964- 743- 74- 22- B
AJ9C 104,390- 715- 73- 15- B
W9JOO 81,000- 540- 75- 24- A
N9ACD 23,668- 194- 61- 8- A
N9AOJ 22,780- 170- 67- 16- A
KA9VKX 21,948- 188- 59- 17- A
WB9NQQ 20,280- 169- 60- 10- A
KB9LQ 9,592- 109- 44- 7- B
N4DBJ 5,830- 55- 53- 8- A
N9EVR 5,664- 59- 48- 4- A
K9FN 3,528- 49- 36- 9- B
KM9D 2,856- 51- 28- 2- B
WB9WDW 2,820- 47- 30- 5- A
N9NC 2,000- 40- 25- 2- B
K9RS (+NA9D)
229,800- 1532- 75- 24- B
W9REG (WD4CJS,K9s LYA,YBM,KA9s HGN,IHB,NOH,RLZ,KC9U,N9s DIG,GKE, GWM,ops)
63,888- 484- 66- 24- B
N9FVS (+WD4ARN)
6,004- 79- 38- 6- A

Wisconsin

W9XT 185,400- 1236- 75- 24- B
K9OSH 157,350- 1049- 75- 24- B
WA1UJU 110,334- 777- 71- 24- A
K9KR 88,080- 595- 74- 19- B
K1TMM 74,880- 520- 72- 17- A
NG9L 64,528- 436- 74- 15- A
NI9C 55,480- 380- 73- 17- A
WB9HRO 53,560- 412- 65- 11- B
W9NA 52,882- 371- 71- 10- A
WB9SBD 52,392- 354- 74- 15- A
KB9S 38,544- 292- 66- 13- Q
NA9M 23,200- 200- 58- 9- A
KB9DZ 22,272- 192- 58- 14- A
KE9FT 15,288- 147- 52- 12- A
WB9BWP 14,586- 143- 51- 10- A
WB9ZIO 12,154- 103- 59- 12- B
KE5PX 10,296- 117- 44- 13- Q
W9FPA 9,984- 104- 48- 7- A
KD9YY 9,318- 81- 39- 12- B
W9VTL 2,952- 51- 26- 11- A
KA9JCP 108- 9- 6- 3- A
WA9TZE 72- 6- 6- 1- A
KA9KFU 2- 1- 1- 1- A
WB9AIH/9 (K9FVF,N9BSH,ops)
197,850- 1319- 75- 24- B
W9YT (KA9s VOK,WZV,NA9W,WF9V, N9FLZ,ops)
140,100- 934- 75- 23- B

0

Colorado

K9RF (W9UA,op)
266,950- 1793- 75- 24- B
K4XU 201,750- 1345- 75- 24- A
W9CP 195,600- 1304- 75- 24- A
W9IJR (K9EU,op)
188,700- 1258- 75- 24- A
W9PSY 150,368- 1016- 74- 24- B
K9GAS 148,148- 1001- 74- 21- B
K9FRP 122,494- 839- 73- 19- A
W9LSO 112,500- 750- 75- 24- Q
KB3EI 98,640- 685- 72- 24- A
AD9O 95,100- 634- 75- 19- A
W1XE 85,628- 603- 71- 12- B
W9KEA 81,000- 540- 75- 24- Q
AC9S 72,896- 544- 67- 8- B
KD9DI 63,364- 434- 73- 23- A
KE9PX 27,776- 224- 62- 20- A
K9MWM 24,882- 209- 59- 5- B
N9AJM 20,298- 172- 59- 17- B
NY9R 17,280- 160- 54- 8- A
KA1MPF/9 14,700- 150- 49- 13- A
K9DTK 11,160- 124- 45- 5- A
N9FFZ 10,300- 103- 50- 16- A
WB9Z 4,526- 73- 31- 6- B
KD9ZN 3,300- 55- 30- 4- A
NY9Q 2,744- 49- 28- 5- A
K9UK (+K9CL)
281,550- 1877- 75- 24- B
K9LMD (+KA9QFF)
31,620- 255- 62- 12- A

Iowa

N9GA 175,200- 1168- 75- 22- B
WB9J 124,200- 828- 75- 24- A
KC9GM 63,344- 428- 74- 16- A
KD9RT 55,296- 384- 72- 16- A
WA9VBW 44,208- 307- 72- 18- Q
W9PPF 39,744- 288- 69- 21- B
KF9Z 24,428- 197- 62- 11- A
AD9H 22,932- 182- 63- 8- B
K9EVC 16,620- 118- 45- 14- A
KA9QQP 10,028- 109- 46- 15- A
KB9ATA 1,440- 45- 16- 4- A
K9JGH (+K9JGI,N9ILJ)
93,148- 638- 73- 24- A
KE9BX (+KA9YZH,KB9s ASM,AQD,N9UP)
75,900- 550- 69- 24- B
N2BTJ (+KA3AWL,KA9QYK,N9HKH, WA9JYF)
69,224- 509- 68- 22- B

Kansas

NZ9T 85,994- 589- 73- 22- A
WB9YJT 50,260- 359- 70- 20- A
K9VBU 50,024- 338- 74- 11- A
NE9C 48,248- 326- 74- 22- A
NI9S 29,108- 231- 63- 8- B
NO9Y (+WA9TKJ)
202,500- 1350- 75- 24- B
W9CEM (+AB9S,K9WA,NW9W)
196,840- 1330- 74- 24- B

Minnesota

K9IJL 147,168- 1022- 72- 19- B
NV9P 113,032- 796- 71- 2
AC9W 111,982- 767- 73- 2
K9FZG 103,600- 700- 74- 2
W9YC (N9ECB,op)
93,456- 649- 72- 2
WA9RBW 78,110- 535- 73- 1
KB9ZQ 71,832- 484- 74- 1
WA9MHJ 66,722- 457- 73- 1
W9IUC 62,100- 414- 75- 1
N9CIB 59,616- 432- 69-
WB9YUC 51,976- 358- 73-
KM9O 51,136- 376- 68-
WB9ZUR 45,552- 312- 73- 1
W9YHE 43,680- 312- 70- 2
KA9VVF 42,340- 290- 73- 1
KD9CQJ 28,416- 222- 64-
W9TIV 9,800- 70- 70-
K3WT 9,360- 104- 45-
K9MPH 7,998- 93- 43-
K9VW 3,388- 51- 33-
W9NGB 2,940- 49- 30-
K9TK 2,500- 50- 25-
KA9ZPP 868- 31- 14-
N9AT (+AB9P)
193,436- 1307- 74- 2
WB9HCH (+ops)
181,448- 1226- 74-
K9LTC (KA9s QAP,TML,ZSU,KK9C, N9GKO,NA9U,WB9s FBN,SNP, WD9BQR,ops)
70,432- 496- 71-

Missouri

K4VX (NU9R,op)
248,850- 1659- 75-
K9LIR 151,500- 1010- 75-
N9CDH 125,850- 839- 75-
K9DEQ 82,656- 574- 72-
N9BGL 39,690- 315- 63-
NS9B 34,720- 248- 70-
K9OCU 18,762- 159- 59-
W9NKO 11,232- 108- 52-
WD9BBN 10,718- 103- 52-
KA9GRO 6,200- 100- 41-
KA9P 1,040- 26- 20-
KB9ANL 576- 24- 12-
W9RR (KM5L,N5JJI,KM9s E,L,NT NW9F,ops)
183,300- 1222- 75-
W9OEV (KA2MAP,KA9HML,KA9H KA9WCH,N9IAT,ops)
18,728- 204- 41-

North Dakota

WB9O 279,000- 1860- 75-

Nebraska

KV9I 171,828- 1161- 74-
K9SCM 170,528- 1168- 73-
K9MZV 30,976- 242- 64-

South Dakota

K9DD 302,550- 2017- 75-
K1LL 160,650- 1071- 75-
WB9MWJ 117,450- 783- 75-
K5LZT 4,148- 61- 34-
N9HUN (+KB9QA)
221,850- 1479- 75-

VE

Maritime-NFLD

VO1AW 19,494- 171- 57-
VE1AGE 4,480- 70- 32-

Quebec

VE2MS 51,612- 374- 69-
VE2MAB (VE2s AMV,BRT,DWT,
ESP,GOP,HAX,MPD,TD,ops)
41,160- 294- 70-

Ontario

VE3QVI 29,984- 227- 66-
VE3TJL 13,000- 130- 50-
VE3OMU 10,700- 107- 50-
VE3FVW 6,696- 93- 36-
VE3DOL 6,160- 66- 55-
VE3GSA 5,840- 73- 40-
VE3GAS (+VE3QB)
188,776- 1252- 74-

Manitoba

VE4AKN 10,500- 105- 50-
NJ8C/VE4 (+VE4JK,W8SA)
176,700- 1178- 75-
VE4GV (+VE4s AIM,AMC)
106,200- 708- 75-

Saskatchewan

VE5GHC 39,996- 303- 66-
VE5AAD 8,364- 102- 41-
VE5TO 8,272- 88- 47-
VE5AG (+VE5BCT)
158,850- 1059- 75-
VE5RC (+ops)
27,520- 215- 64-

Alberta

VE6ATT 90,948- 688- 66-
VE6DZ 21,000- 175- 60-
VE6RI 17,360- 158- 56-

British Columbia

VE7CC 230,550- 1537- 75-
VE7ARQ 26,884- 286- 47-
VE7EKS 42- 7-

Checklogs

W1HTA, KA2CIW, KK2E, N2HIP, W2KTF, NF3X, K5LZO, W5BU, W NR8J, KO8N, W4LBO/8, VE1AC

Contest Corral

Conducted By Mark R. Burke, KA1MIS
Contest Assistant, ARRL

MAY

4

West Coast Qualifying Run, 10-40 WPM, at 0400Z May 5 (10 PM PDT May 4). 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.

6

ARRL Spring Sprints, 902 MHz, see Apr *QST*, page 97.

7-8

Nevada QSO Party, sponsored by the Frontier ARS, from 0000Z May 7 until 0600Z May 8. 160-6 meters, CW/SSB/FM/RTTY/SSTV. No cross-mode or repeater contacts. Suggested frequencies: CW—15 kHz up from the bottom of the General bands; SSB—25 kHz up from the bottom of the General bands; Novice and Tech CW and SSB portions of the bands. Exchange RS(T) and QTH (county for NV stations; state/province/DXCC country for others). Count 1 point for each station worked per band per mode. Non-NV stations count an additional 20 point bonus for working FARS members. Multipliers: total number of NV counties worked (NV stations add total number of states/provinces/countries worked). Multiply total QSO points by multipliers for final score. Certificates awarded. Mail logs by Jun 1 to Jim Frye, NW7O, 4120 Oakhill Ave, Las Vegas, NV 89121.

Ten-Ten International Net Spring CW QSO Party, see Apr *QST*, p 97.

12

ARRL Spring Sprints, 1296 MHz, see Apr *QST*, p 97.

W1AW Qualifying Run, 10-40 WPM at 0200Z May 13 (10 PM EDT May 12). Transmitted simultaneously on 1.818 3.580 7.080 14.070 21.080 28.080 50.080 147.555 MHz. See May 4 listing for more details.

14

Ten-Meter Dash, sponsored by the Western Washington DX Club, 1700Z-1900Z May 14. Single operator, SSB (no cross mode), low-power (100 W or less) category only. QSOs must be made between 28.300 and 28.500. Exchange signal report and state. Novice and Tech stations also indicate their license class. Count 1 point for US contacts, 2 points for DX contacts, and 3 points for US Novice and Tech contacts. Multiply total QSO points by total number of states/provinces/DXCC countries worked for final score. Awards. Send logs and SASE (if results wanted) by Jun 18 to Andrew Isar, NN7L, PO Box 554, Gig Harbor, WA 98335.

14-15

County Hunters SSB Contest, see Apr *QST*, p 98.

CQ-M Contest (Peace to the World) sponsored by the Krenkel Central Radio Club of the USSR, from 2100Z May 14 until 2100Z May 15. CW and phone, 1.8 through 28 MHz and amateur satellites. QSOs made via satellite count as a separate band. Work stations once per band, regardless of mode. No crossmode QSOs. Categories: single op, single band (phone, CW and mixed); single op, all band (phone and CW); multioperator, single transmitter (all bands); SWL. Multiop stations must stay on a band for minimum of 10 minutes. Exchange signal report and serial number. Count one point per QSO with your own country, 2 points per QSO with a different country within your continent, 3 points per QSO with other continents. Multiply total QSO points by the sum of different countries (R-150-S country list) worked per band. The R-150 list is basically the same as the ARRL countries list except for USSR countries. Serious competitors should review the R-150 list. Awards. Mail logs by Jul 1 to CQ-M Contest Committee, PO Box 88, Moscow, USSR.

Michigan QSO Party, sponsored by the Oak Park ARC, from 1800Z May 14 until 0300Z May 15 and 1100Z May 15 until 0200Z May 16. Phone and CW. Work stations once per band and mode. MI-to-MI QSOs allowed. Work portables/mobiles again as they change county. No repeater QSOs. Exchange signal report, QSO number and QTH (county for MI stations, state or country for others). Suggested frequencies: CW—1.810 3.540 3.725 7.035 7.125 14.035 21.035 21.125 28.035 28.125; phone—1.855 3.905 7.280 14.280 21.380 28.580; VHF—50.125 145.025 146.520. Count 1 point per phone QSO and 2 points per CW QSO. QSOs with club station W8MB count five points. MI stations multiply by sum of states, countries and MI counties worked (max 83) for final score. Others multiply by number of MI counties worked (max 83) VHF-only entrants may add multipliers from each band for total multiplier. Awards. Mail logs by Jul 1 to Mark Shaw, K8ED, 27600 Franklin Rd, Apt 516, Southfield, MI 48034.

Utah QSO Party, see Apr *QST*, p 98.

A. Volta RTTY DX Contest, sponsored by the Associazione Radio-amatori Italiani, from 1200Z May 14 until 1200Z May 15. 80-10 meters. Entry classes: single-op all band; single-op single band; multi op, single transmitter; SWL. Work stations once per band. Exchange signal report, serial number and CQ Zone. Multipliers are DXCC countries and call areas in W/K, VE and VK. QSOs within the same country do not count (W2 cannot work W2, but can work W1, W3, W4, etc). Two-way RTTY contacts with stations outside your own country count for points in accordance with the exchange points table available from sponsor. QSOs with different continents on 3.5 and 28 MHz are worth double the points. Multiply QSO points by sum of DXCC countries and W/VE/VK call areas worked per band for final score. Count one additional multiplier for working the same "country" on at least four bands. Awards. Logs must be received by Jul 16. Send complete log to Francesco Di Michele, PO Box 55, 22063 Cantu', Italy.

21-22

Armed Forces Day—This year marks the 39th anniversary of communications tests between the Amateur Radio community and the Military Communications System. Special commemorative QSL cards will be issued to amateurs achieving a verified two-way radio contact with any of the participating military radio stations. Those who receive and accurately copy the Armed Forces Day CW and/or RTTY message from the Secretary of Defense will receive a special commemorative certificate.

Crossband Radio Contacts—The military-to-amateur cross-band operations will be conducted from 1300Z May 21 until 0245Z May 22. Military stations will transmit on military frequencies and will announce the specific amateur band frequencies being monitored. Limit contacts to three minutes. The following stations will transmit on the designated frequencies (in kHz): AAE, Fort Sam Houston, TX: LSB—4028.5 7358.5; USB—13994.5 27992.5; RTTY/CW—14665; Packet—20992.5. AAG, Presidio of San Francisco, CA: LSB—4033.5; USB—14488.5; RTTY/CW—6988. AIR, Washington, DC: LSB—4025 7315; USB—14408; RTTY—13986.5; CW—6995.5 13997.5. NAM, Norfolk, VA: USB/RTTY/CW—14400. NAV, Cheltenham, MD: USB—14389.5; RTTY—7372.5. NPG, Stockton, CA: LSB—4001.5 7301.5; USB—14375 21460; RTTY—13927.5; CW—4010 6970 7365 10259.5 13975.5 20998.5. NPL, San Diego, CA: USB—14385; RTTY—7382.5. NMH, Alexandria, VA: LSB—7346.5; USB—20937.5; RTTY—14440; CW—4015. NMN, Portsmouth, VA: USB/RTTY/CW—7393. NZJ, El Toro, CA: USB—14480; RTTY—7375. WAR, Fort Meade, MD: LSB—4018.5; USB—14403.5 20994.5; RTTY/CW—13992.5; CW—6997.5.

Receiving Test—The CW and the RTTY broadcast will be special Armed Forces Day messages from the Secretary of Defense to any Amateur Radio operator or SWL desiring to participate. A 10-minute tuning call will precede each transmission. The CW broadcast will be transmitted at 25 WPM beginning at 0300Z May 22. The RTTY broadcast will begin at 0345Z May 22 and will be transmitted at 60 WPM using 170-Hz shift. Both the CW and RTTY broadcast will be transmitted from the following stations at the listed frequencies (in kHz): AAE, Fort Sam Houston, TX—4018.5 6988 9990; AAG, Presidio of San Francisco, CA—4021.5 7309.5 13994.5; AIR, Washington, DC—6995.5 13997.5; NAM, Norfolk, VA—4005 7393 14400; NAV, Cheltenham, MD—7372.5 14389.5; NPG, Stockton, CA—4010 7365 13975.5; WAR, Fort Meade, MD—4028.5 6997.5 14403.5.

Submission of Test Entries—Transcriptions of the CW and/or RTTY Receiving Tests should be submitted "as received." No attempt should be made to correct possible transmission errors. The time, frequency and call sign of the military station copied as well as the name, call sign and address of the individual submitting the entry must be indicated on the page containing the test message. Entries must be postmarked no later than May 28 and submitted to the respective military command as follows: AIR to Armed Forces Day Test, 2045CG/DOJM, Andrews AFB, Washington, DC 20331-6345; AAE, AAG or WAR to Armed Forces Day Test, Commander, USAISC, ATTN: AS-OPS-OA, Fort Huachuca, AZ 85613-5000; NAM, NAV or NPG to Armed Forces Day Test, Naval Communication Unit, Washington, DC 20397-5161.

ARRL Spring Sprints, 50 MHz, see Apr *QST*, p 97.

World Telecommunications Day Contest, sponsored by the Liga de Amadores Brasileiros de Radio Emissao, beginning 0000Z May 21 until 2400Z May 22. Phone and CW. Bands: Only 160/80/40/20/15/10. Categories: Single-op/single-transmitter/all-band operation (No spotting nets in this category); multi-op/single-transmitter/all-band operation (After band change the station must remain there for at least 10 minutes). Exchange: RS(T) and ITU Zone. Contacts between stations on different continents are worth 2 points on the 20/15/10-meter bands and 4 points on the 160/80/40-meter bands. Stations on same continent but different country count 1 point on the 20/15/10-meter bands and 2 points on the 160/80/40-meter bands. Contacts between stations in the same country are permitted for zone multiplier but have no point value. Same station may be worked once on each band. Multipliers: 75 geographical broadcast zones established by the ITU. Multiply total QSO points by the sum of all multipliers worked on each band for final score. Certificates and plaques. Logs required with a separate sheet for each band. Send logs by Jul 31 to LABRE, WTD Contest Committee, PO Box 07-0004, 70000, Brasilia (DF), Brazil.

23

W1AW Qualifying Run, 10-40 WPM at 2000Z May 23 (4 PM EDT May 23). See May 12 listing for more details.

26

ARRL Spring Sprints, 2304 MHz, see Apr *QST*, p 97.

28-29

CQ WW WPX Coutest, CW, see Mar *QST*, p 83.

31

West Coast Qualifying Run, 10-40 WPM at 0400Z Jun 1 (9 PM PDT May 31). See May 4 listing for more details.

JUNE

10

W1AW Qualifying Run, 10-40 WPM at 0200Z Jun 11 (10 PM EDT Jun 10). See May 12 listing for more details.

(continued on page 98)

Special Events

Conducted By Mark R. Burke, KA1MIS
Contest Assistant, ARRL

Conway, Arkansas: The Faulkner County ARC will operate W5AUU 1500Z-2100Z **Apr 30** in celebration of Toad Suck Daze. Suggested frequency: 14.250. Send QSL with large SASE to Kelly Boswell, KA5MGL, 599 4th Ave, Conway, AR 72032-5805.

Portsmouth Island, North Carolina: The Portsmouth Island DX Assn will operate from 0001Z **Apr 30** until 1500Z **May 1** to commemorate the 235th year of Portsmouth Island's founding and inclusion on the National Register of Historic Places. Suggested frequencies: phone—3.800 14.260 21.360 28.360 144.200; CW—14.060 21.060 28.060. For special QSL, send SASE to WA4DAN, 403 E 14th St, Greenville, NC 27858.

Sacramento, California: The California State Railroad Museum will operate WB6RVR/6 1600Z-2400Z **Apr 30** and **May 1** to commemorate the fifth consecutive year of steam train operations at the site. Suggested frequencies: phone—7.260 14.260 21.360 28.360. For commemorative QSL, send QSL and SASE to California State Railroad Museum, Attn: Steam Trains, 111 I St, Sacramento, CA 95814.

Bristol, Virginia: The Bristol ARC will operate WB4DKI 2000Z **May 6**-0100Z **May 7** and 1300Z-2200Z **May 7** to commemorate National Hospital Week. Suggested frequencies: phone—50 kHz up from the lower end of the General SSB bands; CW—7.110. For QSL and certificate, send QSL to Steve Ferguson, 2220 High St, Bristol, VA 24201.

Barton, Vermont: The BSA of the Green Mountain Council will operate from their annual Scout Show and Camporee **May 6-7**. Suggested frequencies: phone—3.950 7.250 21.400 28.400; CW—3.725 7.125 21.150 28.225; FM—146.475 146.760 146.880 146.940. Ask operators for QSL information.

Springfield, Illinois: The Sangamon Valley RC will operate W9DUA May 6-8, 1400Z-2000Z each day, to honor the dedication of the Vietnam War Memorial in Springfield. Suggested frequencies: 35 kHz up from the lower General-class portion of 80-10 meters including 10-meter Novice portion. For certificate, send QSL and large SASE to Sangamon Valley RC, Red Cross Building, 1025 S 6th St, Springfield, IL 62703.

Wheaton, Illinois: The BSA of the DuPage Area Council will operate the Wheaton Community RAC's station W9CCU 0400Z-0900Z **May 7** to encourage radio as a hobby of local youth. Suggested frequencies: 14.290 28.390 146.490. For certificate, send SASE to WCRA, Attn: Scoutarama, PO Box QSL, Wheaton, IL 60189.

Meadville, Pennsylvania: The Crawford ARS will operate W3M1E from 1600Z **May 12** until 0400Z **Jul 5** to celebrate the Meadville Area Bicentennial. Operation will be on the 80- through 10-meter phone bands. For commemorative QSL, send QSL and no. 10 SASE to Bill Warren, N3EWP, RD #1, Box 575, Conneaut Lake, PA 16316.

Batavia, New York: The Genesee Radio Amateurs will operate W2RCX 1300Z-2200Z **May 14** to celebrate their 25th anniversary. Suggested frequencies: 3.913 7.213 14.303 21.313 28.313 147.225/825. For QSL, send QSL and SASE to GRAM, PO Box 572, Batavia, NY 14020.

Fairfield, Connecticut: The Greater Fairfield ARA will operate WB1CQO 1300Z-2200Z **May 14** during the 53rd Annual Dogwood Festival. Suggested frequencies: 3.975 7.235 14.330 21.420 28.310. For certificate, send QSL and large SASE to FARA, PO Box 486, Southport, CT 06490-0486.

Schenectady, New York: SARA will operate K2AE 1300Z-2000Z **May 14** during the BSA's "North-O-Ree III." Suggested frequencies: 14.330 28.360. For commemorative QSL, send QSL and SASE to WB2STS, 2 Union St, Schenectady, NY 12305.

Oklahoma City, Oklahoma: The Salvation Army Oklahoma/Arkansas Divisional Headquarters ARES will operate N5FM from 0100Z **May 14** until 0100Z **May 15** to commemorate National Salvation Army week. Suggested frequencies: 3.875 7.245 14.250 28.495. For special certificate, send QSL and 9- × 12-in SASE (2 units First Class postage) to N5FM, The Salvation Army, PO Box 12600, Oklahoma City, OK 73157.

Owensboro, Kentucky: The Owensboro ARC will operate K4HY from 0200Z **May 14** until 0600Z **May 15** during their annual B-B-Q Festival. Suggested frequencies: 7.235 28.350. For certificate, send SASE to Ray Tate, N4EKG, 1615 E 23rd St, Owensboro, KY 42303.

Uniontown, Pennsylvania: The Uniontown ARC will operate W3PIE **May 14-15**, 1700Z-0300Z each day, to commemorate the 50th anniversary of their club. Suggested frequencies: lower portions of the 80, 40 and 20-meter General phone bands; 28.333 146.550; 6- and 2-meter and 220- and 432-MHz sideband. For certificate, send QSL and large SASE to Uniontown ARC, c/o John Cermak, Box 433, Republic, PA 15475.

Charlotte, North Carolina: The Mecklenburg RS will operate W4BFB **May 20-22** to commemorate the signing of the Mecklenburg Declaration of Independence. Suggested frequencies: 3.905 7.205 14.305 21.305 28.305. For certificate and copy of the Mecklenburg Declaration, send SASE to Mecklenburg ARS, PO Box 221136, Charlotte, NC 28222.

Dubuque, Iowa: The Great River ARC will operate NSØU 1500Z-2200Z **May 21** at the annual Dubuquefest special events and message center. Operation will be in the lower 20 kHz of the 75- through 15-meter General bands. N9FVN will operate simultaneously on the 10-meter Novice band. For QSL, send SASE to NSØU, 2735 Hickory Hill, Dubuque, IA 52001.

Baltimore, Maryland: The Maryland Mobileers ARC will operate WA3PJQ 1330Z-2000Z **May 21** to honor the Submarine Service. Suggested frequencies: phone—3.880 7.240 14.240; FM—146.805. Ask operators for QSL information.

Buffalo, New York: The WNY Navy-Marine Corps MARS Group will operate W2TU from 1600Z **May 21** at the Naval and Serviceman's Park to commemorate Armed Forces Day. Operation will be in the lower portions of the 75- and 40-meter General phone bands and 20 through 10 as conditions and operators allow. For QSL, send QSL and SASE to W2TU via *Callbook* address.

Pentagon, Washington DC: The Pentagon ARC will operate K4AF **May 21** in celebration of Armed Forces Day. Suggested frequencies: phone—7.235 14.235; CW—7.035 14.035. For QSL, send QSL to PARC, 1100 ABG/SS-P, Room 5E367, Pentagon, Washington DC 20330.

Angels Camp, California: The Calaveras ARS will operate WA6YGA **May 21-22**, 1700-0100Z each day, to celebrate the annual Calaveras County Fair and the Jumping Frog Jubilee. Suggested frequencies: phone—lower 25 kHz of the 40- through 15-meter General bands and 28.405; CW—14.050. For special QSL, send QSL and SASE to CARS, PO Box 806, Altaville, CA 95221.

York, Pennsylvania: The York ARC will operate W3EDU 1300Z-2300Z **May 21** and 1300Z-1700Z **May 22** to commemorate York as the home of the Continental Congress in 1777-1778. Suggested frequencies: 3.875 7.275 14.250 21.350 28.350. For certificate, send QSL to Millard J. Martin, 2070 Thelon Dr, York, PA 17404.

Grandview, Missouri: The Southside ARC will operate NBØE **May 21-22**, 1600Z-2300Z each day, to commemorate President Harry S Truman's 104th birthday. Suggested frequencies: 7.245 14.245. For certificate, send SASE to Southside ARC, PO Box 1142, Grandview, MO 64030.

Chicago, Illinois: The DuPage ARC will operate W9DUP **May 21-22**, 1600Z-2300Z each day, at the Chicago Museum of Science and Industry. Suggested frequencies: phone—7.250 14.300 28.400 145.65/25. For special QSL, send no. 10 SASE to DARC, PO Box 71, Clarendon Hills, IL 60514.

Fairchild Air Force Base, Washington: SSgt Wayne Beasley will operate N7ICS 1800Z **May 22** -0100Z **May 23** in observance of Aerospace Day. Operation will be 25 kHz up from the lower edge of the General phone bands and the Novice 10-meter band. For QSL, send SASE to SSgt Wayne Beasley, N7ICS, 9046 Georgia Ave, Fairchild AFB, WA 99011-2014.

North Freedom, Wisconsin: The Morse Telegraph Club will operate AD9E **May 28-29**, 1400Z-2300Z each day, to commemorate the 144th anniversary of the "What Hath God Wrought" message of Samuel F. B. Morse and Alfred Vail. Suggested frequencies: 3.544 7.044 7.144 14.044 21.044. For QSL, send QSL and SASE to R. L. King, KA9GNY, 411 Lynn Ave, Baraboo, WI 53913.

Alma, Michigan: The Gratiot Co ARA will operate NO8V **May 28-29** in conjunction with the Alma Highland Festival and Games. Suggested frequencies: phone—lower 25 kHz of the 40, 20 and 15-meter General bands and 28.400; CW—14.035 21.035. For certificate, send QSL and SASE to NO8V, 917 Mill, Alma, MI 48801.

Chillicothe, Ohio: The Scioto Valley ARC will operate W8BAP **May 28-29**, 1400Z-2200Z each day, to celebrate its annual "Feast of the Flowering Moon" festival. Suggested frequencies: phone—lower 25 kHz of the 40- and 15-meter General bands and 10-meter Novice band. For commemorative certificate, send QSL and SASE to W8BAP, PO Box 73, Chillicothe, OH 45601.

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 **Jun 1** to make the **Aug** issue. Please include the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign of the special-event station. 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- × 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.

Contest Corral

(continued from page 97)

11-12

ARRL June VHF QSO Party, this issue, p 89.
World Wide South America Contest, CW.

18-19

All Asian DX Contest, phone.

22

W1AW Qualifying Run, 10-40 WPM at 1300Z Jun 22 (9 AM EDT Jun 22). See May 12 listing for more details.

25-26

Field Day, this issue, p 87.

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 **Jun 1** to make the **Aug** issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

CANADA

ALBERTA: SM, Bill Gillespie, VE6ABC—A/SM: VE6AMM. SEC/TC: VE6AFO. OO: VE6TY. SM/DEC/STM: VE6ABC. Northern Alberta Radio Club amateurs provided communications for Bantam A Hockey, Minor Hockey Week, and Birkebeiner Ski Event. During ski event, one case of hypothermia was reported and removed to hospital by helicopter. Amateur Radio again proves its value. Next NARC event is the Old Timers Hockey tournament in March. Thanks to all volunteers assisting. Saskatchewan SM retires. Gord Kosmenko steps down due to business pressures and former SM Bill Munday, VE5WM, steps in to complete Gord's term. Traffic: APSN Dec. & Jan. QNI 2479, QTC 18, Informal 116. AARES Net QNI 185. ATN QNI 220, QTC 81. Personal totals: VE6CHK 61, VE6GUS 22, VE6QN 16, VE6BAT, AMM, BNI 6, VE6WN 3, VE6YL, ZV, ABC 2.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB—British Columbia Public Service Net, Phone, meets every night at 3729 kHz, time 0130 UTC Net Manger, Jim, VE7BLO. Check-ins High 208, Low 117. Total 4880. British Columbia Emergency Net CW meets nightly at 3650 kHz time 0630 UTC. Net Manager Ferdi, VE7EJU, reports QTC 234, QNI 832. We wish at this time to say thanks to all the NCSs for their time in conducting net duties on our BC nets. VE7AKG, Doc, has moved and one of our many years NCS for BC phone net is absent. Good news: North and West ARC has been reactivated. They are looking for members and volunteers for Field Day. Thanks to Burnaby, Surrey and Victoria Clubs newsletters. The Shriners' banquet was really enjoyed by us and the formal installing of their officers of their communications group for 1988/89. President: Ken Lighe, VE7DHI; Vice President: Allen Clingman, VE7FRK, Sec: George Campbell, VE7FRE and Coordinator Major, Tony Craig, VE7XQ. Traffic: VE7BNI 334, VE7EJU 185, VE7EJW 111, VE7XA 49, VE7FB 29, VE7FME 19, VE3EGM 16, VE7BCF 8, VE7BZI 6, VE7EIR 6.

MANITOBA: SM, Jack Adams, VE4JA—ASM-NM: VE4IX. SEC: VE4VR. STM: VE4OO. ATC: VE4ADP. OO: VE4FK. NM: VE4LB. NM: VE4TE. Thought spring was here February 21. It rained, but minus 15C dropping to minus 25C February 22. Winnipeg repeater society crew working on upgrading of repeaters throughout Manitoba. Hopefully in the near future the repeater linking between Alberta West and Ontario East will be histroy when Saskatchewan and Manitoba fill that gap. It is annoying that many, many of the repeater users fail to help out financially to upgrade and maintain repeater systems, but are the first to complain if system fails. CRRL Evening Phone Net to stay as is: nightly at 7:00 PM local time on 3.759 MHz. After a lengthy illness, Joe Matthews, VE4BI, became a Silent Key. Joe passed away during his sleep February 26, 1988. Joe will be missed on Day Ten and Tenth Region traffic nets. Net reports: MTN CW net 28 sessions, 269 QNI, 55 QTC; MBWX net 29 sessions, 508 QNI, 17 QTC; CRRL Evening Phone Net 1070 QNI, 11 QTC, 29 sessions. Individual traffic: VE4JA 69, VE4RO 26. Total individual 301.

ONTARIO: SM, Larry Thivierge, VE3GT—SM: VE3GSA. SEC: VE3GV. STM: VE3CYR. TC: VE3EGO. Due to an ARRL Headquarters misunderstanding of the last sentence of my December column, traffic totals for that month were omitted from the Section News in March QST. This is the first time this has ever happened, and I sincerely apologize for the omission. As he has done for the past several years, Jim, VE3DCX, has the Tweed Girl Guides and Brownies as well as the Deputy District Commissioner of the Hastings District of the Guides over to his shack to participate in the Guide Jamboree on the Air. Contacts were made with VE3CLT, VE3RSE and VE5AFQ. After overcoming their shyness, the girls had a great time chatting and swapping notes and addresses with the other Guides. Jim is a Queens Scout and feels very strongly about the value of the Girl Guide and Scout groups in our communities. After starting in 1981, VE3WV and VE3MLA have reached contact number 1,000 on straight CW on the low end of the 2-metre band. VE3KCZ and VE3ORN are active on packet NTS activities. Gateway, the ARRL Packet radio newsletter, contains a lot of interesting items for packeteers. The new executive of the North Shore ARC is VE3CRK, VE3OUB, VE3DKW, VE3IHS and VE3ASH. Welland Co. ARC is hosting their first Amateur Radio and computer flea market on June 18. Niagara Peninsula ARC has changed their bulletin format and are also mailing it in a business envelope. The change will save money and also ensure first-class mail service as the Post Office sorting machines could not process the bulletins in its present format. VE3OTI and VE3PHU in Thunder Bay have upgraded to Advanced. I would be most grateful to receive a copy of the following Club Bulletins on a regular basis: North Bay, Skywide, Nortown, Westside, Peel, Metro, York Region, Kitchener/Waterloo, Guelph, Hamilton, Lake of the Woods and also items of interest from Northern Ontario. Amateur Radio depends on many volunteers in different appointments and various categories to promote our hobby and to keep our organizations, associations and clubs healthy and strong. Too often, many are overlooked and go unrecognized. To all of our volunteers, my sincere thanks for all of your devoted help and support. Traffic: (December 1987) VE3KK 838, VE3GSQ 706, VE3ORN 672, VE3FAS 525, VE3GNW 490, VE3CYR 254, VE3DCX 175, VE3GT 144, VE3DPO 140, VE3BCZ 117, VE3WV 113, VE3EAM 103, VE3KXB 80, VE3BB 70, VE3BUO 66, VE3WG 56, VE3KCZ 50, VE3NVJ 45, VE3BDM 39, VE3AJN 26, VE3POJ 25, VE3BAJ 17, VE3FGV 6. (February 1988) VE3ORN 286, VE3CYR 206, VE3DCX 180, VE3GNW 131, VE3WG 121, VE3GT 85, VE3GSQ 82, VE3BCZ 74, VE3DPO 61, VE3BDM 53, VE3BUO 46, VE3EAM 37, VE3FGU 25, VE3POJ 24, VE3KCZ 23, VE3AJN 19, VE3NVJ 18, VE3BAJ 11, VE3WV 8.

QUEBEC: SM, Harold Moreau, VE2BP—STM: VE2EDO. BM: VE2ALE. Congrats to VE2DWN for the WPX 500. New calls are heard since last DOC exams, Welcome to all. With regret, I have to report the following Silent Keys: VE2HU, VE2TJ and VE2AAR. Felicitations a Clermont, VE2ABE, qui est actif en SSB. Le Hamfest de Sorel-Tracy aura lieu au Curling de Tracy, comme par le passe.Prompt retablissement a Jean, VE2BBZ, qui est a l'hopital. TRAFFIC: VE2BP 58, VE2WH 39, VE2EDO 29 VE2JN 17, VE2EC 14.

SASKATCHEWAN: SM, B. Rattray, VE5RC—SEC: VE5WM. TC: VE5GF. ECs: VE5AFQ, ACI, AQ, MP. NMs: VE5AGM, AE, EE, MML, EX, WM. VE5RC will complete the present SM term ending Dec /88. Regina amateurs provided communications for 230 Scouts, Guides & many skiers during the Klondike Derby & Kinsmen Triathalon-VE5WM, AAA, IQ, WWW, AHW, UU, CS, EE, BE, ELJ, GHC, RC. The voice of SKI'60, an annual Duck Lake Participation event was provided by VE5s YK, NR, HG, VF, KQ, EB, VJ, NT, CK, BCS, FF, BDQ, WC & VE4ALW with VE5EH at the helm for 350 skiers. No SK hamfest this year, but a 1-day flea market social by the RARA in its place; details to be announced. Saskatoon amateurs are testing new site for the 04/64 repeater near Hanley aiming for better coverage. VE5DA runs packet BBS on 14.107-24 hours. Traffic: VE5AGM 18, VE5WM 6, VE5RC 1.

ATLANTIC DIVISION

DELAWARE: SM, Robert J. Pegritz, KC3TI. Congrats go to Mike Witkowski, N3FDL, for becoming APCO Communicator of the Year for Delaware. AWARE now linking with several western states via 2 meter teleconference link on regular basis. Listen to net Mondays at 8 PM for details on 147.225. Gore-Tex Triathlon in Wilmington on May 7th. A big thanks to all who helped with Walk-America last month. It's not too early to think about scholarships for deserving students in 1989. Call me for info. Del. Tfc. Net needs check-in's from New Castle Co. every night on 3905 kHz at 6:30 PM local. Support your local hamfests . . . how else are we ever going to get rich? Listen to nets for local ARRL bulletins from our manager KD3GB, Bill Martin. DTN stns 368 tfc 43 in 21 sessns. DEPN stns 56 tfc 13 in 4 sessns. Traffic: WB3DUG 42, KA3GRQ 36, K3JL 26, KC3TI 26, K3YBW 24, W3QQ 23, WA3WIY 18, W3PVO 9. Have A Good Summer!!

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO. STM, BM: KB3UD. PIO: W3ZXV. TC: W3FAF. Let's take a moment to thank the hamfest committees who make our fun possible and keep our clubs solvent. This month, Delaware County ARA hamfest is May 1, followed by both Warminster and Tamaqua Xmitting on May 15, the Rochester Hamfest with ARRL Atlantic Div. Convention May 20-22, and Ephrata ARS on May 28. Wearing another hat, ASM WA3PZO will speak at Rochester, and KC3LM will represent Section leadership. ARES and local NTS net managers are invited to request ARRL local net certificates from the SM, STM, or SEC, to say "thanks" to volunteers. Section net schedule:

EPA	3610 kHz	Daily 7 & 10 PM	AA3B, Mgr.
EPAEPTN	3917 kHz	Daily 6 PM	WA3EHD, Mgr.
PTTN	3610 kHz	Daily 6:30 PM	WB3EPU, Mgr.
KB3UD	144.97 MHz	EPA Section Node PBBS	

On the club circuit, Suburban's '88 officers are N3FSC, WA3WAK, WB3GBN, and WB2YEH. Warminster's are KY3T, NI3J, N3ESI, and KA3JEF. Pack Rats are holding their annual ARRL night this month. W3ABC and KC3LM plan to be there. Special Service Club Reading RC now has WA3WSJ serving as an ARRL HF Awards Manager who can validate WAS and 5BWAS. Susquehanna Co. ARC got a super newspaper article about their K200BK callsign activity. We'd appreciate copies of publicity from other Eastern PA 200 stations for our files. Assistant TC KT3W's KT3W-4 packet BBS is a technical Q&A service, with plans for testing TCP/IP. New Official Bulletin Stations: W3SMF and KU3V. New Public Info Assistants: N3IK and K2RS. The countdown to Gettysburg continues! Watch the Eastern PA News on packet (mailed to OBS's not on packet) for the latest updates. The cooperation from Amateurs throughout EPA and from our neighbor Sections has been simply outstanding. District 1 ARES plus Berks and Lehigh Counties had an NDMS drill on the sked last month. ASM WA3PZO has been acting as our ARES liaison to NDMS. Amateur Radio also served a Limerick nuclear plant drill. New ARES appointments: KB3JK as DEC6, KA3OGL as EC Adams, and KA4JZF as EC Susquehanna. Better late than never, congrats to SEC KB3YS and AEC N3FVO on their marriage Feb. 19. Traffic (February): N3AZW 1265, N3COY 240, N3DRM 198, W3JKX 157, KD3AO 135, W3IPX 118, KA3DLY 103, KB3UD 84, N3CD 74, K3WPI 62, KY3M 54, W3KAG 52, WA3CKA 51, AA3B 48, W4UQ 45, WB8KPE 39, KU3R 39, N3EFW 34, K3TX 32, W3ZID 31, W3FAF 28, W3TWV 27, W3AQN 25, KA3RGF 24, W3VA 19, W3ADE 18, W3CL 15, W3GJC 14, W3DP 7, K3YD 4. February nets (QNI/QTC/SESSIONS): EPA 464/178/58; EPAEPTN 587/193/29; MARCTN 163/84/13; MARCARES 55/21/4; D3ARES 91/18/5; D8ARES 75/5/4; SEPATN 69/15/8. February PBBS: AG3F 408, KB3UD 335, K3RLI 331, WA7SSP 152, WA3TSW 34.

MARYLAND-D.C.: SM, Philip Battey, W3FZV—Thanks to Walt, KX3U, Assistant Section Manager, for writing last month's column in my absence. Our OO stations are actively trying to correct bad operating procedures on the bands. Let's all help in any way that we can: remember, anyone's operating behavior directly influences the way that others think of all of us. Our new Public Information Officer (PIO) in MD-D.C. is Holly Bevan, N3BMB, of Crownsville, and the editor of the Anne Arundel Club bulletin. Best of luck to her as she spreads the good word about ham radio. The Frederick ARC will operate Bicentennial station K200SKE during April 23-29. The League has issued new guidelines for all appointments, a big change in which the eligibility for most positions is Novice class. K3GHH, active in WPA, 3RN and EAN thirty years ago, is again an active traffic man from Towson, running a DX-20, NC-303 and vertical antenna. Your SM recently met with the Rock Creek ARA, talked with some fine gents there, and heard a talk by WA3YLO, our ACC. Member N3FSH, Joel of Washington, has good luck with some rare DX. The George Wash. University Club, WA3SQU, works in collaboration with the Department of State Club, W3DOS, in giving VE exams. WA2IMB is president and OT W3WOX is advisor at GWU. The Maryland Mobileers is an active club in Severna Park. N3CDR, Herb in Rockville, recently published a nice article about the responsibilities of an Assistant Technical Coordinator (ATC) in the March issue of Auto Call. Several clubs submit articles to that fine newsletter. All clubs please remember your 1988 Annual Report to be sent to ARRL. KN3U, Al, could use some help with his time-consuming job of Section Emergency Coordinator. NC3V has become very active in traffic work. NF3X has taken over the EC duties of W4FBA. W3FZV worked a few OT in the QCWA party. K2EB is the new mgr. of MEPN. KX3U has a new rig, and it sounds FB. WITH THE NETS: NET/MGR QND/QTC/QNI: MSN/KC3Y 29/46/336; WRPON/WB3BFK 25/19/243; MDD/W3FA/58/282/609 (TOP BRASS W3FA/125, NC3V/92, KC3Y/77, N3EGF/77, WA3YLO/58), MEPN/N3EGF 31/223/944, HOCARES/WA1QAA 2/7/23, BCN/N3EGF 4/2/37, MAVEN/W3YVQ 1/0/6. PSHR: N3EGF 123, W3FA 122, W3YVQ 88, WA3YLO 77, KC3Y 67, K3NNI 64, WA3UZI 62. Traffic: N3EGF 583, W3IWI(PBBS) 457, W3FA 195, NC3V 124, KC3Y 112, W3LDD 102, K3ORW 87, WA3YLO 81, N3DE 77, W3YVQ 69, WA3UZI 68, NC3Z 58, W3DQI 47, WB3BJM 46, K3NNI 46, WB3BFK 41, KC3ZJ 39, KK3F 27, W3FZV 24, WA2WDT 20, K2EB 20, KJ3E 20, NF3X 18, N3RO 15, KT3T 15, WA1QAA 14, KX3U 13, W3ZNW 10, WA3GYW 8, NB3P 6, K3OMN 5, KC3DW 4

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—ASM: N2CER. SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: N2BQT. PIO: VACANT. SGL: VACANT. BM: WB2UVB. OOC: WA2HEB. ATCs K2JF, KA2RJA and WB2MNF. VE testing May 19, 7 PM sharp in the Basement Training Room of the Bellmawr Community Bldg. on Browning Rd. For further info contact Bill Helmetag, WA2VQG at (609) 546-7710 or (609) 939-3032. Also on May 19 by DVRA at Hopewell Branch of the Mercer County Library, W. Delaware Ave, Pennington, NJ. Start time is 12:30 PM. For reservations, or info contact Don Wright, AA2F at (609) 737-1723. On March 5, the first SNJ/ARRL Forum was held in Mays Landing. In addition to the Section Staff, many representatives of our section's affiliated clubs were present. The highlight of the day was the talk from Rick, K1CE, of League Hq. Out of the meeting came the following: On Sunday mornings at 8 AM, SNJ will have an ARES Net, which all section amateurs are invited to participate in and: a quarterly section newsletter will be published and distributed to all Field Organization appointees and affiliated clubs. This newsletter will contain information about all our clubs in the section, VE information and other section-type events. Next forum to be held in the fall. Until next month, 73. Traffic: WA2HEB 6.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—AFFILIATED CLUBS: It's again annual report time and some 22 affiliated clubs (including 3 Special Service Clubs!!!) are either about to, or maybe in some cases, already have been dropped from affiliation! If your club is one of 14 that have not filed since 1986, you are on the margin . . . come on ACHTUNG! ARATS, BARA, Carlton Webster, Champlain Valley, Drumlins, Ft. Herkimer, Fulton, Explorer 204, Liverpool, Otsego, RDXA, RIT, Rome, SUARC, and if you filed before 1986, you are not affiliated, come on back . . . request filing material from AH2W, Lee Hayford, at ARRL HQ. Clarkson, Elmira, Gleason, Kodak, N. Franklin, Rookies, Tioga, U of R. So there you have it, your club and the League need each other. Ask your club officers about any of the above. Hope the use of abbreviations don't confuse any of you. Let me know if that happens!

NET NAME		QNI-QSP-QND	NET NAME		QNI-QSP-QND
NY RACES	SSB	090-007-04	NYSR	CW	016-005-04
NYS/M*	CW	368-292-29	NYS/E*	CW	334-222-29
WDN/M*	FM	368-222-29	WDN/E*	FM	521-262-29
NYPON*	SSB	633-568-29	VHF THIN	FM	050-000-04
NYSPTEN	SSB	574-064-29	BRVSN	FM	304-005-29
Empire SS	CW	394-054-29	JCRACN	FM	
Q Net	FM	376-003-29	BLUELINE	FM	120-010-29
OCTEN/E*	FM	662-102-29	OCTEN/L*	FM	306-052-29
STAR*	FM	396-065-29	LCARES	FM	047-000-04
TIGARDS	FM	062-006-04	WDN/L*	FM	460-118-29
CNYTN*	FM	261-141-29	NYS/L*	CW	297-219-29

*NTS Net. Other nets are invited to send monthly info to the SM and to join the National Traffic System. Feb. BPL: KA2UBD and NJ3V. PSHR: N2ABA N2EIA N2EVG WA2FJJ N2FOP W2FR N2HXS KC2JW W2MTA WB2OWO KA2QOO WB2RBA ND2S KA2UBD NJ3V K2YAI KA2ZKM KA2ZNZ. NY HAMS: FCC sez 26K, 3rd place behind CA 60K, FL 26K, with TX 25K and WY at 938 hams for the rare DX position! WESTERN NEW YORK has 20 affiliated clubs with the potential to become Special Service Clubs, contact Lee Hayford, AH2W, at ARRL HQ to receive more info—N2EH WNY ACC. CONGRATS: RAWNY with W200PE and WNYDXA with W200RR succeeded in the "race" for Constitution Bicentennial Callsigns, look for them July 23-29 in honor of New York's eleventh signing of the US Constitution. My condolences to BARA, Ft. Herkimer, UARC and others who applied and could not fit into the FCC limits established.

(continued on page 104)

HAMFESTS: Owego 5/7, Rochester 5/20-22, Skaneateles 5/28, Rome 6/5, Cortland 6/18, FD 6/25-26, Batavia 7/10, Traffic handlers at Verona 8/13, Elmira 9/24, Also: Empire State Games at Syracuse, August 3 to 7, will need lots of operators with 2M FM HTs with extra batteries; sign up with WNY PIO and NYSEG Coordinator WA2PUU. Traffic (Feb.): KA2UBD 901, NJ3V 561, N2EIA 489, W2MTA 419, WA2FJJ 375, WB2OWO 297, N2ABA 245, ND2S 231, KA2ZKM 223, KA2QOO 222, WB2QIX 179, NN2H 156, W2FR 151, N2HXS 132, KU2N 125, KA2ZNZ 124, K2YAI 83, KC2JW 68, N2FOP 50, WB3CUF 42, NY2V 33, N2EVG 29, K2QR 22, KA2SJG 16, AF2K 5, WA2OEP 4.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—SEC: WA3UFN. STM: N3EMD. BM: KC3ET. TC: N3EFN. OOC: KX3V. ACC: AK3J. SGL: W3DTW. PIO: N3DOK.

NET	QNI	QTC	SESS	kHz	T/D
WPACW	279	173	29	3585	7:00 P/D
WPAPTN	387	245	29	3983	6:00 P/D
KFN	203	117	29	3983	1:00 P/D
PFN	162	313	29	3958	5:00 P/D
WPA2MTN	304	135	29	146.28/88	8:00 P/D
NWPA2MTN	539	56	28	144.53/145.13	9:00 P/D
WPARTTY	12	4	4	3640	9:00 P/SU

I would like to report that Western Pennsylvania had its share of problems the last several months. Five train derailments, a couple of them could have been very disastrous due to the chemicals in some of the cars. Some areas were evacuated until the cars were put on the tracks. The Ashland Oil Company tank which collapsed and spewed nearly a million gallons of fuel oil into the Monongahela River created major problems for the communities' water supplies from Pittsburgh clear down to the Mississippi River. In Beaver County, the Nuclear Plant in Shippingport had a possible problem with a fire which damaged some of the control in the control room. In all of these events, ARES and RACES operators were alert to stand by if needed and surrounding counties stood by. I want to thank all who volunteered their aid, especially Kay Craigie, KC3LM, for her offer of assistance and others out of the section for their offers of assistance. It is very good to know that so many amateurs are ready to help. I want to thank them all. The EME Director for Allegheny County is amazed at the way we respond when needed. We have use for OOs, ORS, OES, ATC & PIAs. February traffic: KO3T 614, N3EMD 502, N3AES 281, W3OKN 244, WA3UNX 223, N3FM 189, N3CZW 163, WA3DBW 149, K3SMB 65, KV3X 49, W3KUN 48, W3NGO 45, KD3AC 42, W3RUL 38, KA3OEM 33, K3LTV 21, W3SN 20, KA3EGE 19, WA7WIB 16, WA3QNT 16, KC3YE 16, WA3TSD 14, N3COR 11, W3AHH 6, K3HWL 4, N3FQP 4. (Jan.) W3NGO 81.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ—SEC: W9QBH. STM: K9CNP. OOC: W9TT. BM: K9EUI. SGL: K9IDQ. PIO: N9EWA. ACC: WB9SFT. TC: N9RF. ASM: AA9D.

ILLINOIS SECTION NETS

NET	FREQ	TIMES(LOCAL ILLINIOS)
ISN	3905	1800 DAILY
ILN	3890	1830 + 2200 DAILY
ITN	3705	1900 DAILY
CTN	147.69/09	2100 DAILY
ILARES	3905	1630 1ST + 3RD SUNDAYS

ILLINOIS INDEPENDENT NETS

IEN	3940	0900 SUNDAY
ILPN	3855	1645 M-F, 0830 SUNDAY
NCPN	3915	0700 MONDAY - SATURDAY
NCPN	7270	1215 MONDAY - SATURDAY

It is with mixed emotions that I report the retirement of Otto (Dusty) Rhoades, W9KPT, as State Government Liaison (SGL) for Illinois. It has been both an honor and a privilege to serve the amateur operators of Illinois along with Dusty Rhoades. Dusty is probably the single most knowledgeable individual in Illinois regarding radio telecommunication. During his career as Supervisor of Operation for the Illinois State Police, he was responsible for the development of the Illinois State Police Emergency Radio Network (ISPERN) which was a forerunner of similar networks throughout the United States. He also pioneered the Law Enforcement Teleprinter System (LETS) which grew up to become the Law Enforcement Agency Data System (LEADS), the computerized data and communication system in use today. He was instrumental in the production of the Illinois Associated Police Communications Officers (APCO—now the Associated Public-Safety Communications Officers) radio procedure manual and served as Director of National APCO Project Three Phases 1 and 2. In the pursuit of technical excellence in the telecommunications systems that serve our police agencies, it was necessary for Dusty to educate the legislature as to the importance of these projects so that they would be funded. In so doing, he developed many contacts which have served us, the amateurs of Illinois, very well during his tenure as SGL. Dusty, our hats are off to you, and we all wish you VY 73 in your latest retirement! Welcome aboard (again) to newly appointed SGL Ben Kinningham, K9IDQ. Ben has previously served the Illinois section as Public Information Officer. While he has something of a tough act to follow, Ben's employment in broadcast news specializing in State Government coverage makes him a natural for the SGL hat. Congratulations are again in order for Terry, KA9FEZ, who has racked up yet another BPL traffic month with a total of 731. Traffic: KA9FEZ 731, W9HLX 332, NC9T 233, WA9VLC 194, W9HOT 188, W9EHS 127, W9NXG 107, K9CNP 105, K9QEW 84, WD9CIR 65, WB9TVD 47, NN9M 42, KA9CTW/T 39, W9KR 17, W9LNQ 12, K9WMP 11, W9TRD 11, W9DZV 10, W9VEY/M 10, WA9RUM 8, W9HBI 7, WD9HQW 7, WB9JTK 3.

INDIANA: SM, Ron Koczor, K9TJS—ASM: W9UMH, KD9ER. SEC: WD9AVQ. STM: W9JUJ. ACC: K9ZBM. TC: K9PS. PIO: KA9LQM. SGL: WA9VQO. BM: N9CJT. NM: ITN KD9DU, QIN KJ9J, ICN KD9ER, VHF W9PMT, IWN KA9ERC.

NET	FREQ	TIME DAILY UTC	QNI	QTC	QTR	SES
ITN	3910	1330/2130/2300	3253	430	2278	85
QIN	3656	1430/0000/0300	491	336	1263	56
ICN	3705	2315	138	34	633	28
IWN	3910		1738		359	29
IWN	VHF		1642		358	29
VHF NETS			4081	200	5451	141

Appt: KI9R, OO/AA: N9GHT. OO/AA; KA9ZOR. EC Jefferson County; OO reports rcvd from KA9BYN, KA9PCT, WA9VLK, K9FW, WA9VQO, KA9FFO, KA9DZM, N9CJT. Silent Key: WA9UAW, Ft. Wayne; KD9IZ, Ft. Wayne; W9REW, Ft. Wayne; WA9DYC, Evansville. BPL: W9JUJ, O/3, R/450, S/398, D/3.

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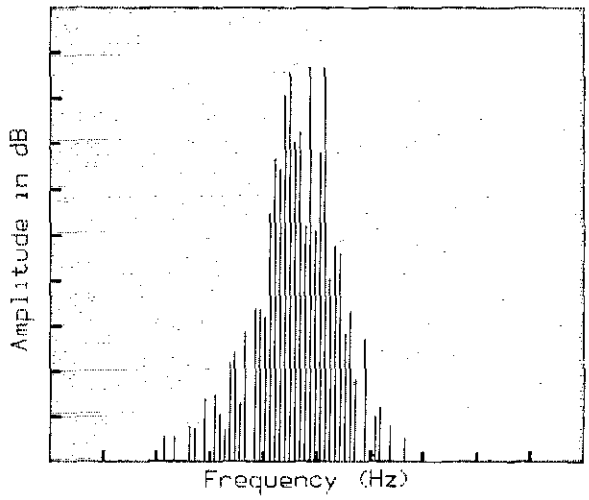
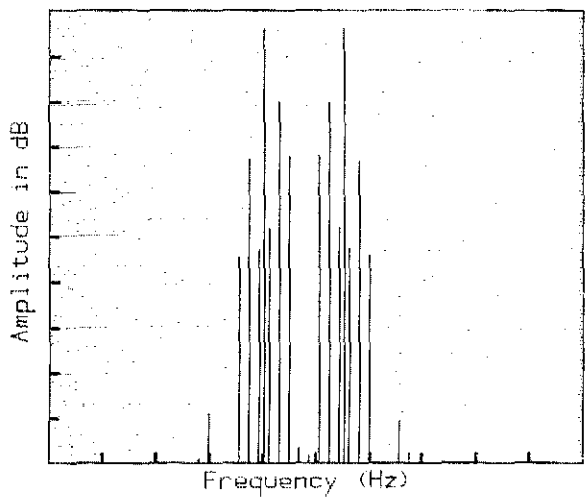
This may be part of the
Problem.
(Here's a Hint: Pick the frequencies for Mark and Space Filters.)



This is part of the
Solution.
(Can you now find Mark and Space Signals?)



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W9ZRX. O/0, R/317, S/313, D/0. Congratulations to WA4VWV, Fishers, IN, on his appointmen to the ARRL ANERCOM committee. *Steve's experience should make him an outstanding* contributor to this important function. ARRL members should respond to the call for election of a new Indiana SM. There are at least two people who have said they are interested in the position so we'll have a real election. Please vote! May 15 is the Evansville Hamfest and the Wabash Hamfest is scheduled for May 22. May is a nice time of the year for hamfests in Indiana, so make sure you schedule one of these for your May outing! Please remember that you must maintain your ARRL membership to maintain your ARRL appointments. That includes EC, ORS, OBS, OO/AA and all ARRL appointments. I usually allow a few months after headquarters notifies me of your expired membership before acting to cancel your appointment. Don't let your membership expire and I won't have to send you a letter! *It's hard to find good people,* so I'd like to keep you in the family! Note, too, that the ARES is an ARRL function and that county ECs must be appointed and approved by the SEC. If your county has a volunteer to perform the EC function, please have him contact WD9AVQ for the application paperwork. N9CJT has been contacting clubs and others on our 2 meter BBS network to see how well our bulletins are being distributed. Please respond to his question. Station reports for February: W9JUJ 854, W9ZRX 530, KJ9J 210, NJ9S 194, NR9K 168, KA9FFO 105, K9TKE 90, K9WWJ 86, KA9RNY 82, WA9QCF 51, KA9LQM 44, WD9DWD 38, KB9HH 38, WB9IHR 35, K9ZBM 32, KD9ER 32, W9ZGC 31, WB9PFZ 18, W9XD 10, W9PMT 10.

WISCONSIN: SM, Richard R. Regent, K9GDF—Ozaukee Radio Club will hold its ARRL sanctioned Swapfest May 7th *starting at 8 AM at the Circle B Recreation Center, Highway* 60 and County I, north of Cedarburg, with walk-in exams beginning at 9 AM given by Badger Examiners. May 14th, Tri-County Hamfest sponsored by MANCORAD, Sheboygan 220 Repeater Club and Calumet County RC, starting at 8 AM at the Manitowoc County Expo, Highways 42, 151 and I-43 on County Highway R. Exams by ARRL VE Team will be available. Bicentennial Special event week is May 14th through 20th in Wisconsin with several clubs authorized to use special 200 call signs. *Sheboygan County ARC officers: Pres. NI9Z (also* voted as Ham of the Year); V. Pres. WB9QCY. Sec. KC9EZ; Treas. WA9SNU; Board Member W9RF; and Novice Rep. KA9YQU. West Allis RAC is offering some excellent scholarships, write to WA9POV for information. KJ9I has 128 countries on 160 meters. Two-meter grid square activity now shows K9VGE at 138 grids with W9YCV at 127. KA9VII is new Net Manager for the North Woods Traffic Net. Traffic: WB9YPY 1774, KC9CJ 814, KA9RII 553, KA9VII 289, W9CBE 289, W9YCV 275, K9GDF 256, WA9WYS 212, W9CXY 170, N9GJI 151, KA9BHL 145, N9BDL 116, W9UCL 98, WB9ICH 96, W9DND 77, WD9IID 67, K9EP 61, AG9G 60, K9AKG 59, N9BCX 50, K9FHI 44, K9UTQ 42, W9KLN 40, KA9KLZ 39, KA9WWT 36, K9JPS 33, KG9B 33, W9ODV 30, KA9JJY 29, *WD9JID 27, KA9USV 14, WD9DNQ 10, W9PVD 9, K9BED* 9, K9LGU 6, W9UW 5. (Jan.) KC9CJ 860.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KCØT—Well gang, "Mid-Winter Madness" is behind us now and has in turn kicked off the Hamfest season. Hamfests will come in rapid succession now and will average more than one per month around the state. As KØBUD says, "the thrill of the great event where 'used equipment trades basements,' the Hamfest. He also wonders where it will all end with the trend towards earlier opening times—4 AM? Traffic activity has held up at a steady *pace, thanks to all. One thing I have noticed (being active* mostly during cycle 4 nets) is that we are moving more traffic through Region 10, C-4, on a consistent basis. That's good and thanks to all nets for their fine operations and dedication—just great! With pleasure we announce that Clarence (Geb) Gebhardt, WØGRW, Shoreview, as the February Amateur of the Month. Congratulations Geb, you deserve it, and keep up the great work! And speaking of Field Day, I read someplace, "be sure to spray the operating area for poison ivy two weeks ahead." . . . So, until next time, 73. Jim Swisher, KAØEPY, STM.

NET	TIME	FREQ	QNI/QTC/SESS	MGR
MN EMERGENCY FREQ		3860 kHz	BULLETINS 3860 kHz	
MSN/1	6:30P	3685 kHz	289/135/29	WØUCE
MSN/2	*10:00P*	*3685 kHz*	*193/45/29*	*KDØNH*
MSSN	6:00P	3710 kHz	329/42/29	KAØSBY
MSPN/N	12:05	3660 kHz	390/207/29	WBØWNJ
MSPN/E	5:30	3660 kHz	885/215/29	KCØT/KDØCI
MNAMWXNT	6:00P	3860 kHz	380/234/27	KØOGI
PAW	9:00A	3925 kHz	3984/389/148	WDØBAC

Traffic: WBØWNJ 813, WAØTFC 363, KAØEPY 311, NØFOO 218, WØGRW 199, KDØCL 195, KAØSBY 171, KAØARP 159, WØUCE 148, KT9I 141, WAØONE 83, KDØNH 70, KCØT 67, KØOGI 58, NØHWD 58, WDØGUF 51, KAØFDM 45, KDØCI 40, NØJP 36, KØCSE 32, WØTIV 30, KØQBE 22, NØHSR 20, W9DM 16, NØBGP 2. Total 3,349.

NORTH DAKOTA: SM, Bill Kurtti, WCØM—Mayville Picnic, May 8. Peace Garden Hamfest July 8-10. Test sessions Apr 23 Jamestown/May 14 Bismarck. Regret to report the passing away of WBØITE and the moving away of KØRJL. Many tnxs to Dave for his work as net control on the data net and many other activities in the Minot area. NK8F's car hit an icy spot one morning at 4:00 AM and turned over in the ditch. Rich dug his antenna out of the snow under the car and contacted KBØAOU who called State Radio for help. Congratulations upgrades! Tech: KA7AYN, KAØZUF, KAØZEF. General: KAØWWP, NØHIC, KAØZIJ. Advanced: KAØWWQ. Extra: NØIJR. 2 Meter packet has now reached across the state, tnx to WØTUP for installing digis at Parshall and Keene. Traffic: WDCDO 239, KAØFSM 57.

NET	FREQ	TIME	SESS/QNI/QTC	MGR
GOOSE RIVER	1.9 MHz	9 AM Sun	4/128/2	WØCDO
Data	3885 kHz	6:30 Da	27/677/20	KAØFSM
Wx Nets	3885 kHz	9 AM	57/953/60	WØGFE
		12:30, 5:00 PM Mon-Fri		
Storm Net	3885 kHz	as needed	1/ 30/2	WCØM
North 40	146.64	0300 Z Sun		NSØH

SOUTH DAKOTA: SM: R. L. Cory, WØYMB—Asst SM: NØABE, WAØFPR. Sec: KAØKPY. STM: KDØYL. Make plans now to attend the Black Hills Hamfest that will be held at Surbeck Center in Rapid City on July, 1,2,3. A fantastic program is planned, and also there will be a Dakota Chapter 102 meeting of QCWA. The Air Force backscatter radar system to be installed in the North East part of the State has been delayed until 1990 due to cut back in funds. This will give one year reprieve to North East S. Dakota Hams from

any ill effects that might come from the 4.8 Megawatts of power in their area. The S. Dakota Legislature again this year rejected the license plate bill that would have reduced the cost to be a fair amount. The Mobridge repeater is operational on 147.21 input and rec. it on 147.81. Total Traffic reported for Feb. was 1335. Traffic: NØDPF 822, KØERM 170, KØAIE 107, WØMZI 66, WØHOJ 66, KAØKPY 43, KDØYL 42, WBØOMF 10, WØYMB 9.

DELTA DIVISION

ARKANSAS: SM, Dale Temple, W5RXU—Ozark Hamboree 88, May 21, 1988, at the Rodeo Community Building in Springdale, AR. For information, contact Bob Harmon, W5SEP, Rt. 1, Box 219, Winslow, AR 72959. (501) 634-3642. Rick Roderick, K5UR, Chairman of ARRL DX Advisory Committee won for North America the 1987 WPX SSB DX Contest on 160 meters. Congrats, Rick. The All Arkansas Hamfest & ARRL Convention May 14-15, 1988, at the North Little Rock Community Center. For information, contact Dale Temple, W5RXU, 1620 Tarrytown, Little Rock, AR, 72207 (501) 225-5868. Don't forget Ark. ARRL Info on EC Net, Sundays, 5:30 PM.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR— ASM: KB5CX. SEC: N5ADF. ACC: K5DPG. SGL: KD5SL. TC: W5RWF. OOC: KE5QK. Packet: NE5S. Jefferson ARC election of officers: John, N5IWB, V. Pres: Jay, N5HZV, Sec: Fannie, WB4ICU, Tres: Bob, KB5GQ. Their 1988 VEC testing schedule: May, 21 UNO, June 19 Hamfest, July 31 and September 11, Mercy Hospital. October 29, UNO and December 11, Mercy Hospital. Contact Doug WF5O 271-2266 for further information. Nearly 1200 hams attended the super Hamfest at Lafayette March 12 & 13. As usual it was well organized, a good location with plenty of forums, swap tables, dealers, eye-ball QSOs and good food. I do believe everyone passed a good time in that Cajun Hospitality. Joel Harrison WB5IGF our Delta Division Director and Rick Roderick K5UR Delta Div. DXAC, participated in the greetings, meetings and forums. We sure have top notch representatives in both of our Arkansas Razor Backs. Regretfully the Alexandria Hamfest scheduled for April 9 has been cancelled due to problems beyond their control. The Lafayette ARC election of officers: Pres: Danny, K5ARH, V. Pres: Nick, K5QXJ, Sec: Betty, KA5DKF and Tres: James, N5KNX. Iberville Repeater Assoc. election of officers: Pres: Cecil, WD5CQG, V. Pres: Joe, KB5DNN, Sec: Kermit, N5JIZ and Tres: Linda, KB5EHI. Hope to see you all at the Baton Rouge Hamfest May 21, 22, at their new location at the Holiday Inn, South. 73 de "Wondy," K5KR.

MISSISSIPPI: SM, Jim Davis, KK5Z—ASM: W5TRD. SEC: KA4PKA. SGL: KA5WRX. PIO: WN5M. STM: KB5W. BM: W5EPW. TC: KF5DE. OOC: KK5K. VHF/UHF Coord: N5DWU. Packet Mgr: WA5DVV. Congrats to: New officers of Tupelo ARC: Pres: WN5M; 1st VP: K5LFS; 2nd VP: WX5P; Prop Officer: WJ5K; Sect: KC5IX, Program Chmn: K5JG and Directors WB5OBH and KC5TX; New officers of Rankin County ARC: Pres: K5DZE, VP: KA5SVV, Sect: N5III and Treas: N5BRL. Congrats to N5EZQ new director of Mississippi Bureau of Narcotics, GL, Jim. Following ARES participated in NWS practice tornado: Lauderdale ARES, Meridian (WD5HLD), Coast ARES, Biloxi (KA5QNO) and Covington County, Collins (W5LSG). Mni trx for DEC/EC reports from WB5UNA, WD5HLD, N5LKT, N5LJC, K5DZE, W4KGJ, AJØX, N5BBA and W5LSG (Gud Job by KA4PKA, SEC). 12 regular ARRL bulletins, 4 propo f'cast bulletins and 2 CRRL bulletins (Tnx to W5EPW, BM). Packet Radio growing by leaps and bounds as STAs being established statewide. Need more in North. DRN5: 978 msgs in 58 sess. Miss rep 98% by N5AMK, KT5Z, W5HKW, KB5W, KE5EC. Gulf Coast SB Net (WD5JXT) Sess 29, QNI 1339, QTC 18. ARRL Info Net (KK5Z) Sess 4, QNI 75. Pine Belt Emerg Net (KA5OBT) Sess 3, QNI 24. Mag Sec Net (W5YRX) Sess 29, QNI 505, QTC 10. Miss Slow Net (W5YRX) Sess 11, QNI 58, QTC 4. MISS/LOU/EMERG Net (N5EZX) Sess 4, QNI 101. Miss SB Net (KF5DE) Sess 29, QNI 2035 (new record), QTC 85. NE Miss Wx Net (WN5M) Sess 5, QNI 101. MTN (KB5W) Sess 29, QNI 185, QTC 90. Coast ARES Net (N5LKT) Sess 4, QNI 84. Traffic: KK5Z, R-2, D-2, Total 4. W5JDF, R-40, S-39, D-2, 0-1, Total 82. W5WZ, R-32, S-42, D-4, O- 3, Total 81. KT5Z R-46, S-51, D-3, Total 100. KB5W, R-171, S-183, D-4, 0-2. Total 360. NØBGP/Railroad mobile, O-1, D-1, Total 2.

TENNESSEE: SM, Harry Simpson, W4MI—ASM: WA4GLS. ASM/ACC: K4CXY. ASM/PIO: W4TYU. SEC: K4UVH. OOC: K4LSP. SGL: N4POY. TC: W4HHK. I am happy to make the following announcements: NG4J, Anita Tefteteller, has generously agreed to continue as STM until "a proper replacement" is found. That might take a long time, Anita. NO4Q was offered, and accepted, appointment as Bulletin Manager. His untimely death left that appointment open. Then, my old friend (and yours) W4SGI, Gene Banta, agreed to become Bulletin Manager. He will do his usual excellent job, of course, but he can't make all the nets. How about some volunteer OBS to help him spread the word? We need many appointees in several fields. Please do your part to help the work of our order. Which reminds me, K4WOP and W4MI have started a campaign to reactivate the TN CW Net on 3635 kHz at 8 PM Eastern. At this time, there are two of us, but I promised Jim I would shame some of our friends into joining us. The reports have been coming in well, except for a few isolated areas. One thing that surprises me, there are over 300 members of our 3980 SSB nets, and activity reports can be counted without using our toes! N4NBC has written an excellent story for *QST* on the West Memphis tornado. Look for it. N4NPV did a similar job on the January 19th tornado in Humboldt. Thanks to EC KA4MNH for his report. Thanks to NG4J, W4PFP, KA4UVR, KA4LS, WA4HKU AND KA4MNH for their Net reports. WB5YDD thanks K4WWQ, NG4J and NO4Q for their 95% participation on DRN5. My thanks to all of you for your cooperation in this formative period. Traffic: W9FZW 292 (BPL), WA4FMR 121, W4DDK 95, W4TYV 53, KA5KDB 42, K4WOP 38, W4MI 34, WA4GZZ 18, W4PFP 13, W4PSN 8.

GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, WM4T—SEC: WB4NHO. STM: KA4MTX. PIO: WA4SWF. If there is enough interest, I will try to get a meeting room reserved at the Louisville Hamfest for us to discuss repeaters and coordination. If you or your club owns a repeater, let me know if your group would be interested in attending the meeting. This is the time of year when many clubs hold membership drives. Elect officers, and begin the new year. If your club is ARRL affiliated, be sure to check the renewal date of the affiliation. Forms are available

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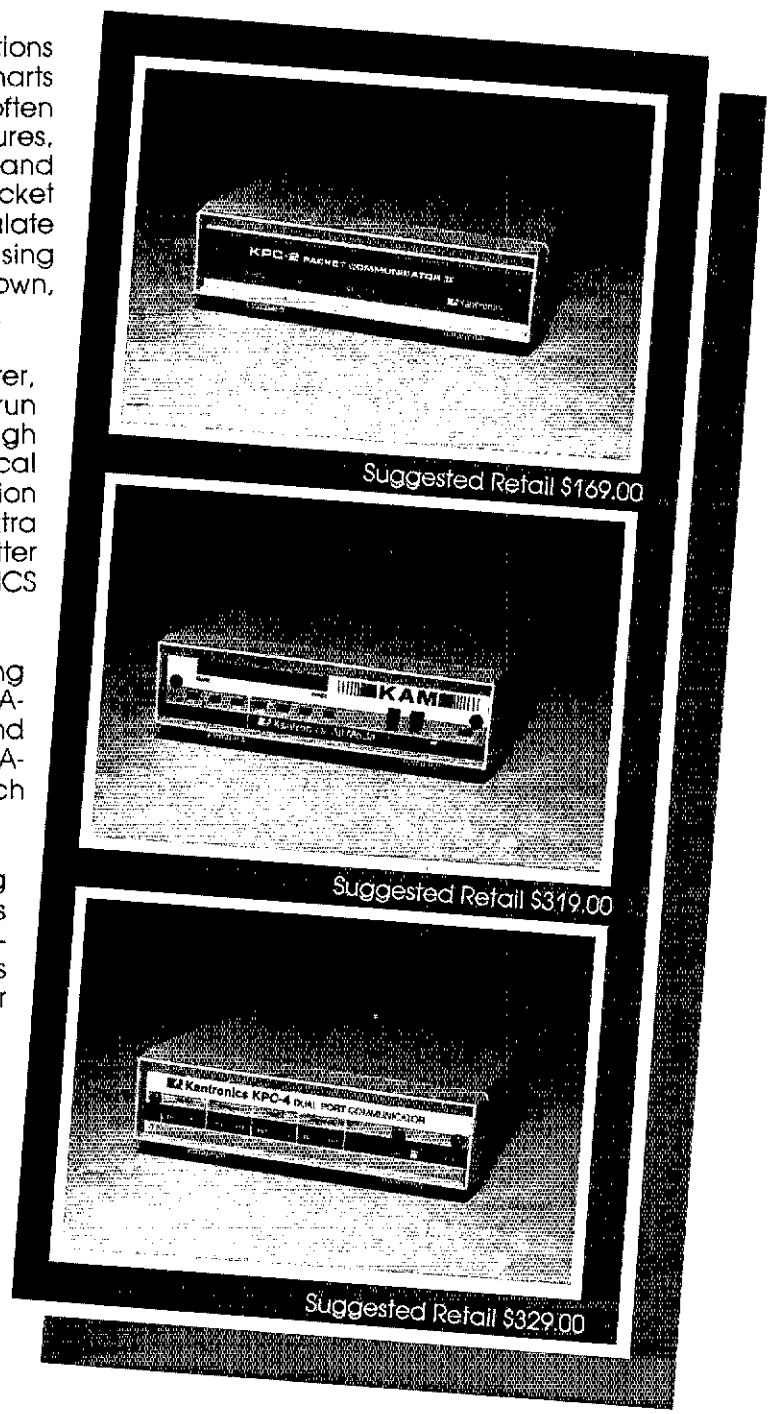

UNIT	WEFAX	KA-NODE	GATEWAY	32K-RAM	PBBS	PSK-MSK
KAM	yes	yes	yes	yes	yes	yes
KPC-4	yes	yes	yes	yes	yes	yes
KPC-2	yes	yes	no	yes	yes	no
KPC-2400	yes	yes	no	yes	yes	no
KPC-1	yes	yes	no	yes	yes	no

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from me or ARRL HQ. May begins the month when authorized clubs will begin the use of special 200 call signs as permitted by the FCC.

NET	QNI	QTC	SESS	MGR
MKPN	1464	197	29	WD4RWU
KTN	840	42	29	WB4LBG
KYN	326	136	58	K4AVX/KZ8Q
TSTMN	448	44	29	KZ8Q
KNTN	232	63	37	KA4SAA (Temp)

Traffic: K4VHF 214, WD4RWU 109, KI4QH 60, KA4SAA 59, N4GNL 50, K4MTX 37, K4AVX 36, KB4UJA 28, K4HOE 22, WA4EBN 17, N4PEK 11, WB4AUN 8, KU4A 7, WA4SWF 6, KK4ET 6, WA4NOG 6, WD4CQF 4. PSHR: KI4QH 88, KA4MTX 77, N4GNL 70.

MICHIGAN: SM, George E. Race, WB8BGY—ASM: WA1LRL. STM: WD8KQC. SGL: N8CNY. TC: W8YZ. OOC: WA2AJQ. I am pleased to announce the appointment of Larry Macionski, WA2AJQ as an OOC. Larry has been working closely with the Detroit FCC Office, and brings much expertise to this position. This important program needs your support. If you would like to be an OO, please contact Larry. My records show we have only six OOs in MI. You must pass a certifications exam from HQ to fill an OO position. The DEC/RACES Manager program is now in place. District #1-N8CNY, #2-N8FTY, #3-K8CQF, #4-WB8BGY, #5-NK8X, #6-WA8GVK, #7-N8AYQ, #8-WB8Q. This program puts in place a combined ARES/RACES effort. The goals of the DECs are to have an EC/RACES position filled in each MI County by years end, State RACES Director, N8HFV, reports great enthusiasm by all attending the State District meetings. Each EC is responsible for the total ARPSC program in their County. Each has to be the local expert on ARES, RACES, NTS and the local League representative to all. The Ausable Valley ARC is having a contest to name their Newsletter mascot, a smiling pig. Lots of names have been submitted. I will report the outcome here. Welcome to a new Club, The Montcalm Area ARC. I had the pleasure of addressing their group and witnessing their first election of officers. Pres. WA8QCW, VP N8HFV, SEC. N8HDH, Tres. N8HOK. Their goals, to be an affiliated ARRL Club and be active in public service. The ARRL Affiliated Club Program offers many advantages to your club. MI needs an ACC: If you are interested in this position, please let me know. The ACC position is one that requires you to make club presentations around the State, promoting ARRL affiliation and its benefits. An excellent position for someone who has a few extra evenings a month to visit various clubs. Please support the following MI area Nets:

NET	FREQ	TIME/DAY	QNI	QTC	SESS	MGR
MNN	3710	5:30PM Dy				KE8JG
UPN*	3921	5:00PM Dy	1193	96	33	WA8DHB
MACS*	3953	11:00AM M-Sa	475	182	29	K8OCP
MITN	3953	7:00PM Dy	708	302	29	WD8EIB
QMN*	3663	6:00PM Dy	813	153	86	WD8RHU
SEMTN	145.33	10:15PM Dy	374	90	29	N8HSC
GLEN	3932	9:00PM Dy	837	29	29	KA9EIZ
WSSBN	3935	7:00PM Dy	764	54	29	W8NDI
VHF Net Reports Total			654	30	46	NO8Q

*QMN Fast-6:30PM Dy; QMN Late-10PM Dy; MACS-1PM Sun; UPN-12PM Sun; Traffic (Feb): KA8CPS 665, N8HHH 253, WD8KQC 230, WA8DHB 149, K8GXV 84, WB8R 74, WB8SYA 62, WB8YDZ 61, N8DSW 59, N8FPN 56, K8UPE 56, K8ZJU 43, W8IHX 40, W8EOI 36, K8HAP 36, KD8LZ 31, WB8BGY 31, KI8Q 30, WA8YMH 30, W8YIQ 29, W8RNQ 28, K8OCP 25, K8EQO 24, WA8MVH 23, W8VIZ 23, W8CDU 21, NY8W 21, W8BEZ 18, WD8EIB 17, KC8TU 14, WD8MJB 13, W8LRM 12, N8EXS 12, K8RDN 11, KA8PWM 11, K8MJK 9, W8IDT 8, WB8WJV 7, KA8LAR 6, W8CUP 5, KA8VDX 3, W8URM 1.

OHIO: SM, Jeffrey A. Maass, K8ND (@ W8CQK)—Asst SM: David Kersten, N8AUH (@ KB8CI), Phone: (216) 221-6740. SEC: WD8MPV (@ KB8CI). STM: KF8J. BM: W8ZM. ACC: KJ3O (@KB8CI). TC: KB8MU. OOC: WB8ZCE. SGL: N8CVK.

NET	QNI	QTC	SESS	TIME(LOCAL)	FREQ	MGR
BN(E)	265	140	29	1845	3.577	N8EVC
BN(L)	178	106	29	2200	3.577	K8TVG
BNR	328	90	29	1800	3.605	W8EK
BSSN	282	88	28	0945,1900	3.873	KD8FW
ONN	145	36	29	1825	3.708	WD8KBW
OSN	270	61	29	1810	3.577	N8AEH
OSSBN	2303	1267	97	1030,1615,1830	3.9725	WB8JGW
OSSN	230	101	29	0645 M-F,0800S-SN	3.577	KA8GJV
Ohio Section ARES Net				1700 Sun	3.875	WD8MPV

Hamfests in May and June: Medina Hamfest 5/8; Portage ARC Hamfair 5/22; DeForest ARC Fleamarket 6/4; Goodyear ARC Hamfest 6/12. Contact Affilited Club Coordinator KJ3O to list your hamfest on our schedule. Amateur Radio Examinations: Columbus 5/7; Maumee 5/14; Cincinnati 5/21; Canton 5/28; Wickliffe 6/4; North Olmsted 6/11; Ravenna 6/11; Maumee 6/11; Dayton 6/18; Zanesville 6/25. Contact me for details on any session listed above. I can provide names and phone numbers for session contact persons. Congratulations to the Fayette ARA on their renewal as an ARRL Special Service Club (SSC)! This organization is not one of our largest, but they are able to do an amazing job with the small population that they have: Congratulations! Don't forget: if you are a member of an ARRL Affiliated Club or SSC, you can renew your ARRL membership through the club, and the club gets to keep $2 of your annual dues! If you are joining the League for the first time, or if you haven't been a member for five years or more, the club gets $5 of you dues! It doesn't cost you any more to be a member, but you help your club's treasury! Contact your club treasurer for details. The Toledo/Northwest Ohio SKYWARN Net primary frequency has been changed from 146.94 to 147.375 MHz, with increased range and decreased interference the main reason. We are in the middle of the tornado season in Ohio: keep alert! The OH-KT-IN ARS has named it's 1988 "Ham of the Year": Bruce Vanselow, N8FWA. Bruce received the award for his many activities with the club, including serving as publicity chairman, coordinator for club public service activities, and net control for many club nets. He also serves as Net manager for the Tristate Amateur Traffic Net (TATN), a local traffic net of the National Traffic System. Congratulations! If you examine the list of my Section Cabinet at the top of this column, you will note that I have added the home packet-radio Bulletin Board System (BBS) call sign for those who are active on packet. You can communicate with them by entering packet messages on your local BBS, which will them be automatically forwarded to the addressee's home BBS: contact local packeteers for information. Congratulations to new ARRL Field Organization appointees KD8HB (Official Relay Station); K8PFD (Official Relay Station); WB8KWC (Official Bulletin Station); and W8PH

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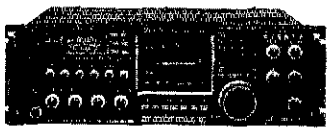

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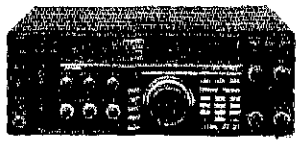

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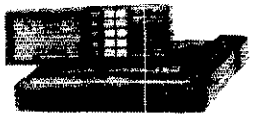

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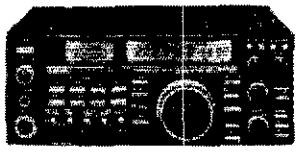

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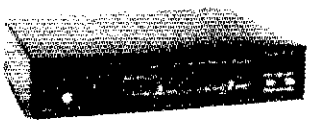

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(Official Bulletin Station). We need more stations who want to play a part in promoting and participating in the ARRL programs of the Ohio Section. If you would like to learn about the opportunities, contact me for a brochure and an application. The 113 stations listed below have practiced their traffic handling skills in preparation for disaster, handling a total of 8654 messages during the month of February 1988: KV8Q 621, WB8JGW 380, K8TVG 380, KD8KU 378, W8PMJ 350, K8JDI 290, W8ZOL 256, N8IBS 230, N8GEC 218, W8QZK 211, W8BO 208, WD8KFN 196, K8IOW 183, N8AUH 170, KF8J 158, WA8HED 154, WD8QXT 147, W8EK 144, KD8HB 141, N8IIP 140, N8ISI 139, K8CMR 138, W8SKP 123, KA8GJV 122, K8PFD 118, WD8IKC 93, KC8YV 83, N9AUG 83, NE8X 82, WA8SSI 81, K8OZ 79, N8FWA 77, N8EFB 75, W8CXM 74, KE8CV 70, W8FPA 68, N8GPU 65, W8LDU 55, KA8CGF 55, WB8BWY 53, K8ALV 50, K8DHD 50, WD8RIB 48, K8DXZ 44, N8AEH 43, WA8GMT 42, WB8KWC 40, W8JLW 39, KC8JF 38, KD8XL 35, KD8FW 34, NY8O 33, WD8KBW 32, KA8BNQ 31, WD8MIO 31, WB8DPZ 30, K8NQN 29, K8LQM 28, NW8E 28, KA8YIT 25, N8HSE 25, K8CKY 23, KC8UZ 22, KC8JV 21, K8ES 21, NF8B 20, N8HRW 20, WD8CTX 17, WB3LHI 16, NC8Q 16, KA8SOM 15, N8CW 13, KD8WI 13, KA8OQF 13, KG8H 12, KE8DQ 12, N8AJU 12, KA8RIX 12, KA8DRR 12, N8FPH 12, W9SWM 11, WA8RLB 11, K8VOY 11, N8ISF 11, WD8CSP 11, N8CJS 10, W8XT 10, KB8DIL 9, N2NS 9, WD8JAW 8, WB8AWM 8, KE8JV 8, N8CDN 8, WB8MRL 8, WA3EZN 8, W8BHL 7, KB8CMW 7, KD8IC 6, WB8KWD 6, KA8UVU 6, WB8GDM 6, N8HBF 5, WD8JYE 5, W8GDQ 5, WA8NZE 4, K8EF 4, N8EFB 4, WD8DKQ 3, KA8SON 3, N8HOT 3, KA8VYT 1. W8CQK (PBBS) 651. (Jan.) W8PMJ 381, KD8KR 170, K8ND 114, WA8HGH 23, KC8UZ 22, N8GOB 6, N8HIL 2.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM & STM: K2ZM. SEC: WA2ZYM. BM: WB2IXR. PIO: KB2TM. TC & OO/RFI: KC2ZO. ATC: WA2VGM. SGL: KB2HQ. NWSLTR ED: WB2NHC. NET REPORTS FOR FEBRUARY(QNI/QSP): AESN 66/0 ESS 394/54 HVN 359/133 NYPON 633/568 NYS/E 334/222 NYS/L 297/219 NYS/M 368/292 SDN 281/141. CLUB NEWS: Albany ARA in February saw a demonstration of a computer contest program developed by NQ2H and heard KA2MBA describe his expertences as a visitor and ham in the Phillipines. They welcome new member WB2TBG and upgrades WA2EOV and N2HXN. Catskill ARA is preparing for elections in April. Communications Club of NR is having regular code practice at meetings for those who wish to upgrade. Overlook Mtn ARC is planning their auction for April and report KE2BN now WB2I. Putnam Emerg. ARL now has a new controller on their repeater. Herb and Barbara Sweet talked about Partners of the Americas program at the February Schenectady ARA meeting. They report upgrade KC8SR and new member KB2DLP. West. ARA heard about the care and feeding of NiCads. West. ECA discussed their new bylaws. As mentioned in the latest Albany ARA newsletter, there is pending legislation in New York State to limit antenna and tower structures to tree height or 25 feet. Let us all be aware of this and be ready to write to our representatives if anything further on this occurs. Our SGL will try to keep the information flowing. A very special thanks to all those who made the Hudson Division Convention of 1988 the success it was. To those who attended and those who helped, a very big thank you. Feb. PSHR: WE2G WB2VUK N2HIF NQ2H KB2AYD K2ZVI N2HDL WB1BTJ. FEB. Traffic: N2HIF 348, WB2VUK 253, N2HDL 212, KB2AYD 130, K2ZM 110, K2ZVI 108, NQ2H 99, WA2JBO 50. K2HNW 40, WA3RKB 38, KA2NGJ 31, WE2G 29, WB1BTJ 13, W2CJO 9.

NEW YORK CITY-LONG ISLAND: SM/SEC: Walter M. Wenzel, KA2RGI—ASM: K2IZ. ASM: VE: W2NL. ACC: KA2WIJ. STM:K2MT. OOC: NB2T. TC: WA2YNH. BM: W2JUP. PIO: N2GQR. The following are traffic nets in and around the section that handle NLI messages.

NET	FREQ	TIME	DAY	MGR
BAVHF	145.350/R	2000	DLY	K2YOK
NCVHF	146.745/R	1930	M-F	K2HPG
SCVHF	145.370/R	2000	S-F	KA2JMA
NYPON	3.913	1700	DLY	KA2UBD
NYS/M	3.677	1000	DLY	N2EIA
NYS/E	3.677	1900	DLY	KU2N
NYS/L	3.677	2200	DLY	KU2N
NLT	28.450	2100	WED	KB2BKE
ESS*	3.590	1800	DLY	W2WSS
PNS	145.01	24hr	DLY	AI2Q-4
PNS(alt)	145.03	24hr	DLY	WB2IBO-4

*Independent Net, recognized by NTS, all times are local. Access AI2Q-4 (Packet Node Station) via WB2QBP-2 Net Rom Node. If for any reason AI2Q- 4 is down, WB2IBO-4 on 145.03 is the official PNS alternate. Access WB2IBO-4 via K2LSX-7 (NRN) or KA2RGI-1 (digi). Check into the NYC-LI Ten Meter Net (NLT) for additional traffic handling training. Novices please take note that this net is designed for your participation. We are still in need of good operators for ARES and NTS, so join in and become part of the doers and not just a taker. Give something back to the hobby. EXAM SESSIONS: LIMARC-second Saturday of each month at NY Inst. of Technology, Old Westbury - contact Joe, W2NL 516-541-2450; SUFFOLK COUNTY VE TEAM - second Saturday of each month at Suffolk County Community College, Selden - contact George, WA2VNV 516-751-0894; GRUMMAN ARC - second Weds. of each month at Bethpage High School, Bethpage - contact Howard, W2QUV 516-354-6861; GREAT SOUTH BAY ARC - normally fourth Sunday of each month (date shifted for holidays) at the Babylon Town Hall Annex - contact Jim, W2DUK 516-957-5287. If your group holds regularly scheduled license exam sessions and/or classes, let me know at least three months in advance so they can be added to the column before the printing deadline. Do you have any interesting information or history about your radio club? If you do please make it known by sending a copy of the information to Alan Taylor, KA2WIJ, and myself so the information can be passed along via the Section Affiliated Club Newsletter. If your club has not been receiving the newsletter, please let me know, and we will find out what the problem is. The Section and the Division is establishing a Speakers Bureau, and we need your assistance. Please let us know if you would like to be a guest speaker at local clubs or if you have had a recent guest speaker that was interesting and you think the person would like to speak at other clubs. Please pass on the name, address, and subject to me or Rick, N2GQR, so we can contact you or them and possibly add you to the listing that will be passed out to the affiliated clubs very soon. I want to thank everyone that has assisted my wife Carol (KA2VYH) and family during the time that my father-in-law was in the hospital with a massive stroke and all of the thoughts and care that were expressed when he passed away. I also want to pass along my condolences to John, K2IZ, and his family on the passing on of his wife Carol's father during the same weekend. My thoughts and feelings are also extended to the family of Aram, WA2CUQ. This winter has indeed been rough on loved ones and now as we look forward to the joys of summer which are just around the corner may we all share a little bit more of the special feeling we have for a hobby and a way of life that has enriched us all by never forsaking our families at the expense of the hobby. Reminder: Next month is Field Day so if you have not informed me of your Field Day location please do so now so we schedule photos of your Field Day. We will have photographers going around to all the Field Day sites taking pictures for a display and a possible newspaper article. More to come in the ACC newsletter. Traffic (Feb.): N2AKZ 304, N2YQK 248, NB2D 110, KB2BKE 76, N2HPT 64, N2HSP 55, K2TWZ 52, N2GPA 51, N2GKZ 50, KA2ZYX 41, K2MT 30, KA2UIU 17, KA2JMA 15, N2GNQ 14, NF2N 13.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASM (VE Liaison): N2XJ. ASM (FO Info): NW2L. SEC: N2BMN. STM: KA2F. OO/AAC: KA2BZS. AAC: KY2S. SGL: W2KB. TC: K2BLA. BM: N2CXX and PIO: WB2NQV (PH 735-8550). Appointment endorsements for the next two-year term starting 5/88 are: WA2UZT DEC Somerset County. EC's KA2CHK (Scotch Plains), N2EXX (W Milford), N3CBM (Wanaque), NN2T (Waldwick), W2CC (Englewood), WA2YUR (Paterson), and WB2IXS (Pompton Lks). OESs: KAWPFU, KB2ZB, KC2IE, KT2D, N2AUR, N2DZZ, N2EXX, N2FDM, N3CBM, NN2T, WA2YUR, WB2AQW, WB2GAI, and WB2IXS. NE2P, DEC Hunterdon County, has resigned. A replacement is needed. Please contact SEC N2BMN at 641-9494. George Diehl, W2IHA, former Director, Hudson Divison ARRL, at this writing (3/1/87) is recovering from open heart surgery. Congratulations to the following who were newly licensed or upgraded during February sessions conducted by: Raritan Bay ARC (7/5) Major Armstrong Memorial ARC (12/6), NNJ VE Board (28/15), and Bergen ARA (27/17). Novice (5): T Bain, R Wagner, S Barrett, P Budlewski, and S Slotnick. Technician (20): KB2BWM, KB2ERC, KB2ERD, KB2EXA, KB2EXJ, KB2QBI, KA2UYB, K Kupper Schmid, KB2BOX, KB2CWU, KB2EQQ, KB2EWZ, KB2FBJ, KA2RLN, KA2UIH, J Norton, KB2CYY, G McDonald Sr, G McDonald Jr, and J Wagoner. General (10): KB2ENE, KB2DHJ, KB2EEP, KA2FNZ, KB2EUB, N2HPZ, N2HWY, KA2NOF, KA2UEL, and L Brigando. Advanced (4): W Martin, N2HUU, WA2DWB, and KA2UIH. Extra (4): KB2CZI, N2FKA, KE2AH, and WA1KWJ. Total applicants (74). Total new or upgrade (43). 58.1%. Thanks to the hard work of Net Managers WB2FTX and N2FGC, NTS operations are expanding on NJVHF. N2FGC has run two training sessions on basic traffic handling operations. Traffic Nets and Statistics for January 1988.

NET	MGR	FREQ	TIME	SESS	SES	QSP	QNI
NJM	WB2ZJF	3695	1000	DY	31	124	252
NJPN	W2CC	3950	1800	DY	36	94	356
NJN/E	NZ2R	3695	1900	DY/P	29	97	189
NJN/L	WA2EPI	3695	2200	DY/P	Not Received		
NJVN/E	WB2FTX	146.895	1930	DY/P	31	57	419
NJVN/L	N2FGC	146.49	2230	DY/P	31	28	375
NJTTN	WA2EPI	223.88	2100	DY	31	46	218
NJSN	KA2INE	3735	1830	DY	31	46	156
OBTTN	KA2F	147.12	2000	DY	31	92	238
NNJ.PL	W2QNL	145.01	24HR	VIA WA2SNA-1			

Packet NTS liaison station activity for February, 1988: 57 NTS messages were auto forwarded by the WA2SNA-1 PBBS, 50 were taken off for delivery or transfer to other nets by KC2YG (1), NZ2T (11), W2QNL (19), WA2EXX (1), and WB2FTX (18). Total 107. SAR/PSHR: KA2F 78/68, WA2EPI 91/102, N2DXP 131/61, WB2QMP 132/68, W2QNL 182/217, N2XJ 314/100, W2RRX 147/99, KA2INE 73/67, WB2FTX 77/61, KB2BNW 19/46, NZ2R 89/97, KB2WI 9/-, NR2O 48/-, K2VX 25/-, W2CC 29/-. W2XD 16/-. (Jan.) W2CC 15/-, W2XD 21/-.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WØEJ—ASM: WBØAVW. SEC: KDØBG. STM: KCØXL. ACC: NUØP. OOC: WAØQMU; BM: KØIIR. TC: KØDAS. New calls heard in the section are WEØM, WEØU, and NØKW. Congratulations! NUØP has published the first of what will be a quarterly section newsletter. Initial distribution will be affiliated clubs and section appointees. Many of the converted terminals received from the State have been heard on packet. A big "Thank You!" goes out to KDØBG, KAØDNB, and WØRPK for their superb efforts in making this project a success. The Davenport Hamfest has kicked off the 'fest season. I enjoyed meeting and talking with many of you there. The Davenport Radio Amateur Club has a new club station and reports a fine club score for the January CQ 160 Meter CW contest. The Northeast Iowa Radio Association has put up a new antenna farm. The Cedar Valley Amateur Radio Club is planning to replace their aging HF tribander. Congratulations to NBØH who recently retired from Rockwell International and will no doubt be heard even more frequently on the HF bands. Many have been working the Constitutional Bicentennial 200 stations. Thank you to those of our number who responded to an item in QST asking for volunteers for the amateur auxillary. Traffic: KØIPT 216, WØSS 161, KAØADF 104, WØYLS 81, KØGP 66, KCØXL 47, WBØMCX 42, KBØBKZ 42, KØBRE 41, W4JL 30, WBØAVW 22, KCØKZ 7, WØBW 6, K4KUU 4, KAØVBA 3. (Jan.) WØOMV 6.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: NØBLD. STM: WØOYH. ACC: KØBXF. TC: WBØNQM. BM: KØJDD. SGL: NØBLD. Net Mgrs: CW-open, Voice-WØFRC, RTTY-open; Slow Speed CW-WØMYM, WX Net-WBØYWZ, PIO: WBØWSG. DECs: WØOAG, WØEB and WBØYJT. Still looking for the right volunteer to accept the Packet Coordination duties for Kansas. We need to have ourselves capable of handling third-party traffic via a reliable system such as PACKET ASAP. With deep regret, I inform you of a couple of recent Silent Keys: WØFGO, Carl Anderson, and KØCHB, John Reese. ARES info now in your hands, let us all get real active in supporting the ARES program. Catch up on net activity for Nov. Dec. and Jan. QNI/QTC follows: KSBN 1559/292 1723/305 1789/141. KPN 490/31 371/19 513/14. KMWN 691/556 820/623 756/646. KWN 973/675 1061/747 1103/677. CSTN 2080/40 2519/127 2335/51. QKS 242/90 229/73 225/82. QKS-SS 27/10 31/10 32/7. Now some more good news. At last report, Doc, WØCR,

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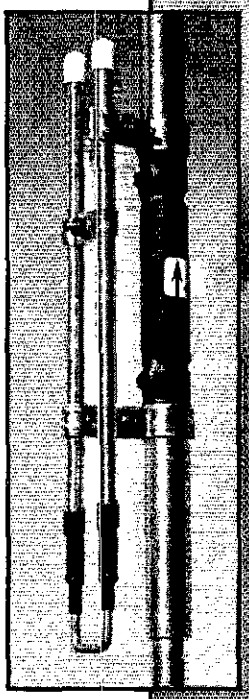

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is doing well after his stroke and hopefully will be back on the air soon. Again many thanks to those who have been providing liaison to the various NTS functions. If you would happen to be interested in joining this elite group, contact either WØOYH or KØBXF for details. Traffic: WØFIR 180, WØFRC 145, WØOYH 134, KSØU 127, NBØZ 93, KØBXF 79, WØQMT 77, WBØZNY 75, WØFDJ 69, WØMYM 10, WØCHJ 8, WØRBO 4, NØDJT 1. (Dec.) WØFIR 194.

MISSOURI: SM, Ben Smith, KØPCK—STM: KØSI. SEC: K9OCU. BM: WBØTEG. TC/RFI Coordinator: K4CHS. SGL: KDØUD. ACC/PIO: KT5Y and OO Coordinator: WBØRHK. 1988 club officers for the Kansas City DX are: Pres: KBØU. VP: KØVXU. Sec. KØVBU. and Treas. KBØG. When your club takes part in events in your community this summer, send me the information and details so we can use it in the Missouri Section News. I have two VHS copies of "The New World of Amateur Radio." If your club would like to use this for a program, let me know and I will send a copy. Newly elected club officers for the Eastern Ozarks ARC are: Pres: AFØJ. VP: KAØOLK. Sec: WØFWY. Treas: KDØIK. Activities Manager: KAØWGQ and elected to the Board of Directors were: NØFLO, KAØCUU and NØILE. Silent Keys reported: WØNYV and WØCMQ.

NET	SES	QNI	QTC	DAY	TIME	FREQ	MGR
MON	58	352	172	DLY	7:00/9:45	3.583	KØSI
MOSSB	29	1080	204	DLY	6:00	3.963	KØORB
MEOW	29	898	125	DLY	5:30	3.963	KØDSQ
HBN	21	361	30	MON-FRI	12:05	7.260	KØDSQ
RRABN	29	971	7	Dly	8:00	146.19/79	KAØLLN
PHD	5	161	3	MON	9:00	146.43	WAØKUH
KCBAR	5	102	7	MON	8:00	145.41	KAØSSE
MORAT	4	23	7	SAT	8:00AM	3.630	NOØE
SLAN	5	375	3	MON	8:00	146.31/91	KØWEX
ZAEN	4	54	3	TUE	8:00	147.84/24	NOØE
CMEN	4	46	2	WED	9:00	146.16.76	KØPCK
JCCCN	30	34	2	WED	8:00	146.40/7.00	WBØOZX
ARESN	4	57	0	THU	9:00	147.855/.255	KAØTGL
KARES	4	53	0	SAT	9:00AM	146.37/97	NZØF
TCN	4	40	0	THU	9:00	147.69/09	NZØF
ZAEN	4	54	3	TUE	8:00	147.84/.24	NOØE
MOFON	4	19	1	WED	6:15	222.42/4.02	AIØO
SARN	3	29	0	TUE	9:00	146.43/7.03	WØENW
CARL	4	20	0	Wed	8:30	146.46	WBØWLU

Traffic: WAØYJX 597, KØSI 208, NDØN 200, KØORB 160, AIØO 143, WØBMA 106, WAØHTN 100, K2ONP 75, KØPCK 68, K9OCU 61, KM5L 53, NIØR 40, WØOUD 40, KGØL 20, KDØAJ 14, WAØKUH 9.

NEBRASKA: SM, Vern Wirka, WBØGQM. STM: Jerry Kohn, WDØEGK. SEC: Michael Ruhrdanze, NØFER. Amateur exams are scheduled for Lincoln, Nebraska, May 7, 1988, contact WAØYPY in Lincoln. The greater Omaha Amateur Television group has started a program of excellence awards. During the weekly Sunday 8 PM (local) net ATV enthusiasts are invited to vote for excellence in various categories. For example, best black and white picture, best color picture, best looking studio and best sound quality. The ARRL Midwest Division is May 20-22 in South Sioux City, Nebraska at the Marina Inn. A flea market, commercial exhibits, exams, ARRL forum and many programs are just a few of the attractions set for the convention in South Sioux City. Clubs throughout the section are encouraged to send your newsletters and publications to your Section Manager so your events can be publicized. Also, if you have any suggestions about improvements in the section Field Organization, please forward your comments to the Section Manager. Make your plans now to attend the Victoria Springs Hamfest at the Victoria Springs State Recreation Area near Anselmo, NE, July 29-31. These are the days of scheduled activity but many amateurs arrive at the park as much as a week early and stay in the park campground for a relaxing time with ample chances for plenty of eyeball QSOs. For clarification of information which appeared in the March issue of this column . . . The Nebraska Cornhusker Net had a total net QNI for 1987 of 12,926. The largest QNI for an individual session of the cornhusker net was for Saturday, which had a total QNI of 2137. The Saturday Net Control is Tom Bracket, KØJFN. Traffic: KØDKM 314, WØKK 123, KAØBCB 20, WAØBOK 10, NOØA 7, WBØGQM 5, WCØO 1.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Pete Kemp, KZ1Z—ASM: KB1H. STM: K1EIC. SEC: N1DCS. OOC: NA1I. ACC: NK1J. PIO: WA1CMF. TC: W1HAD. SGL: K1AH.

NET	NM	SESS	QTC	QNI
CN	WB1GXZ	58	178	331
CPN	NK1J	29	128	296
WCN	N1EDD	29	168	373
CSN	WB1GXZ	21	42	112
NVTN	K1CE	28	112	238
CSTN	K1CE		142	
RTN	KY1F	29	92	264
TMRCN	NM1K	4	5	80

Greetings all. Spring has finally arrived, and with thoughts of change in the air, I announce that, effective 1 March, Dick, KB1H, will become the new Section Manager. I would like to thank my team for their cooperativeness and support. I leave the section in good hands and wish KB1H all the best as he assumes the reins. All stations and station appointees are reminded to send reports and correspondence DIRECTLY to the coordinators responsible for their respective areas. Coordinators are listed in the masthead of every section activities column. Sending requests to the Section Manager only complicates matters, and in some instances delays a timely response. 220 activities are developing nicely in the SE portion of CT. Repeaters: K1IKE-223.72 KW1A-223.80 W1BGT-224.34 and W1LW-224.54 are now linked to provide communications from Worcester, MA to Long Island, New Haven to Hartford and part of RI. Prepare for Field Day NOW. The ARRL Bd of Directors has announced that Life Memberships are now transferable to the surviving spouse. Congratulations to K3ZJJ having received the FARA Award of Merit, and to the CT Slow Net (CSN) on their first anniversary. SARA was very busy handling communications for Stamford's First Night festivities. KA1FOT has received SARA's Ham of the Year Award. A BIG TNX to KB1BE for all of his work in providing W1AW with DX Bulletin information and his volunteer efforts with the DXCC Desk. 73 Pete, KZ1Z. Traffic: WB1GXZ 414, N1EDD 310, W1EFW 173, N1API-4 163, KA1GWE 150, NM1K 133, KY1F 100, NK1J 78, NK1N 74, WB1CRH 69, W1YOL 68, KA1JAN 58, KA1FVY 56, KB1ZC 54, KA1KP 52, N1BOW 51, W1BDN 44, WA1NLD 42, N1FJW 34, KY1T 31, WB2SGI 26, W1CUH 25, WB1ESJ 17, W1QV 4. (Jan.) WB1ESJ 16.

EASTERN MASSACHUSETTS: SM, Barry Porter, KB1PA—ASM: K9HI. STM: KW1U. ACC: KA1KCU. PIO: K1HLZ. BM: KB1AF. OO/AA: AG1F. SGL: K3HI. TC: KA1IU. EMass Hotline 437-0111. Westlink 449-2226. With the band conditions changing, on-the-air activity is increasing and the winter doldrums seem to be over. Spring signals the start of the Hamfest season and brings an increase in club activities and public service activities. Hope to see you at Deerfield, this year being held at the Kingston, NH fairgrounds. By the time this is printed, all the planning that Steve, WB1DNZ, has done (again) to coordinate the Ham support for the Boston Marathon will be finished and the Race over. There is more work than many people realize to properly putting the support of the marathon together. Thanks Steve! There are still openings in the field organization for anyone interested in any aspect of ham radio. KB1AF reports that there were 372 Bulletins transmitted in January. Now that the Patriot State is back state side, KA1BBU can get away from his telephone. N1BBT qualified for Brass Pounders League with 2,369 points for January while keeping the cadets happy. There were 7,440 pieces of traffic handled in EMASS in January. WOW!! Don't forget that the New England Spectrum Management Council will be holding a general meeting on May 14, from 1 PM to 5 PM at the Curtis Middle School in Sudbury, MA. For further info and directions contact Chan Eaton, W1IFL. The Falmouth Club sponsored a demo for the local troop of Boy Scouts conducted by Jim, WA1GPO and Harry, W2HKB. It has been reported in Falmouth that the Ham Emergency Nets conducted during the recent power failures and telephone outages were handled impressively. One person listening on a scanner reported that the Ham nets were the only ones with accurate, up to date information. My hat is off to those who helped in these events. The PART station, WB1GOF, reports the following were reported on 146.52 for the time period of January 14 to February 12: DMV's-18, Accidents-13, Car Fires-1. AG1F will be giving a presentation to the Cape Ann Club on radio direction findings. The Algonquin club station renovation is nearing completion. From the description in the club newsletter it sounds like it will be a super setup. The Middlesex club has changed their meeting night so it will not conflict with NEPRA. They now meet the 4th Thursday of the month at the Newton Police Station. As mentioned last month, I would like to see more publicity generated about amateur radio activities in this section. We have a long way to go if we are to educate the general public and our elected officials on the benefits of our service. If you want to help in this effort, please contact myself or K1HLZ. The State recently formed an emergency planning group mandated by the Federal Government Title III Superfund Amendment. I am not sure why hams were excluded from this group but I bet it is because of ignorance of our hobby and the role we could play. Our hobby continues to grow, but is the growth rate fast enough?? There has been talk of reviving some form of a no code license if we cannot keep growing and attract the number of new hams we need to continue to justify our spectrum allocations. Does anyone have any suggestions?? I hope everyone remembers to set their clocks forward on April 2. Have you expressed YOUR opinions or thoughts on Ham radio to your Section Staff, Section Manager or Division Director lately?? Traffic: N1BBT 3116, KW1U 1531, KA1BBU 875, WA1TBY 774, KB1AF 528, WA1FCD 465, KA1MDM 443, KN1K 410, NG1A 359, NK1Q 159, NK1O 143, KA1NOI 133, KA1LIH 112, K1GGS 110, K1ABO 108, N1AJJ 108, NN1Y 100, WA1FNM 89, W1CE 77, KA1EID 59, N1CVE 48, WA1CRE 32, K1LCQ 32, K1BZD 21, W1DMH 15, KA1EDY 49.

MAINE: SM: Cliff Laverty, W1RWG—ASM: Bill Mann, W1KX. SEC: KA8UVQ. STM: WA2ERT. BM: W1JTH. OOC: W1KX. PIO: KY1E. SGL: K1NIT. TC: KQ1L. ASM/Packet: N1AHH. Phil Young , W1JTH, Bulletin Manager, reports 62 transmissions by 5 bulletin stations comprising 9 ARRL, 3 Maine, 1 propagation, and 2 packet on CMEN SGN MPSN RACES MENET (packet). As follows: OBS bulletins transmissions:

N1BUG	8	15	SSB	3.940	SGN
W1KX	10	20	SSB	3.940	RCS/MPS
W1VEH	ME	5-63	placed on MENET PBBS		
W1JTH	1	1	SSB	3.940	SGN
N1EUK	2	3	FM	10/70	CMEN
N1BCF	13	21	FM	31/91	Hancock

Traffic: KA1JOJ 253, ND1A 68, W1RWG 68, N1BCF 60, WA2ERT 52, AK1W 35, W1VEH 33, KA1ODT 30, W1BMX 29, W1KX 25, W1JTH 11, WB1CBP 19, NI1Y 12, N1EZR 12, WA1YNZ 10, N1BJW 5, AJ6C 3, NC4Y 1, N1FFN 1. PSHR: WA2ERT,W1RWG,WB1CBP,KA1ODT,W1KX.

NET	SESS	CHECKINS	TRFC	MGR
SEA GULL	25	1003	160	K1GUP
PINE TREE	29	289	70	ND1A
AROOSTOOK EMERG	4	62	3	WA1YNZ
MEPUBSVC	4	38	3	KA8UVQ
CENMEEMERGENCY	8	183	2	N1EUK
RACES OXFORD CTY	4	59	18	W1RWG
RACES HANCOCK CTY	4	43	1	WA2ERT
RACESKENNEBEC CTY	4	61	1	KA1LPW
ARES CUMBERLAND	5	66	1	KA1ODT

In traditional amateur response, Ralph, N1FJL, came across a car on fire in Augusta and Called the fire dept. thru 146.82 repeater in time to minimize the damage. The Pine Tree Chapter of QCWA elected officers for 1988. President Bernie Langley, W1EZR; Vice President Charlie Stenger, W1HTG; Sec/Tres Phil Young, W1JTH. Make a note of 4 important Hamfests: June 4, Bangor, July 16, Union, August 13,14, St. Albans, September 10, Windsor. VE exams at most places-check first. "The New World of Amateur Radio" cassettes are available from WB1DKS, WA2ERT, AK1W, and W1RWG.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—ASM/contest and DX: W1NH. ASM/youth activities: KX1L. The winter snow and cold may discourage outside activities, but also seems to encourage increased support for NTS and traffic handling. Our individual traffic count for Feb is over 2800 and has been high all winter! A growing portion of that traffic is via packet, and it's encouraging to see more new call signs added to the ranks of traffic handlers. Springtime provides many clubs the opportunity to do public-service activities in support of WalkAThons, BikeAThons, etc. Take this opportunity to activate your local ARES operations in support of these activities and to train new Hams in emergency comm disciplines. You also have an opportunity to help ham radio make a visible contribution to the community! On the international scene, Ron, KA1ERN, helped provide comm for a rescue of 20 NH residents stranded in Haiti. The Missionary group was stranded when a storm hit the island and the only

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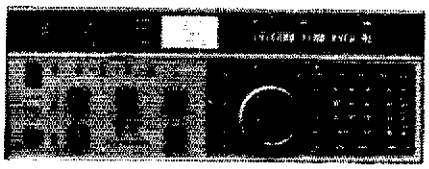

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288 1.8 KHz 8-pole SSB filter	69.00	
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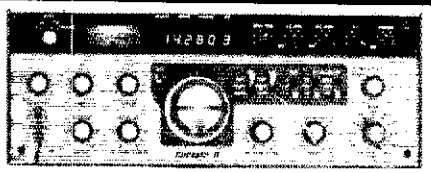

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603 KR-1B Dual keyer paddle	69.00	
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705 Electret desk microphone	69.00	
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link to the island was via Ham radio. Ron passed traffic via several hams in Haiti. Thanks, Ron, for your role in this emergency. Tom, W1EJ, has been appointed by ARRL President Price as Chairman of the VHF-UHF Advisory Committee for 1988. And thanks to Doug, K1DG, as retiring Chairman of the ARRL Contest Advisory Comm for his years of dedicated work. Congrats to new section appointees—WA1YKL/ATC, N1ELO/OES and N1BVI/Lakes region EC! GBARA has been renewed as a Special Service Club. On the social side, both GBRA and NARC are planning bus trips to ARRL HQ on June 5 for the annual open house. Contact these clubs if you are interested in this visit. The NH QSO party was very well attended this year with the expected increase in 10 M activity. New Ham activity seemed to be up, and many clubs have stations on the air. I am seeing much early planning in process for Field Day as the clubs gear up for this event. It's not too early for your group to get ready for FD! My own activities for Feb included a demo of Ham radio for a group of local Cub Scouts with some real interest shown. I attended the IRS dinner along with Div Dir K1KI and enjoyed visiting with club members and spouses. The NHARA state org meeting was well attended as WB1HBB took over as President. Plans for promoting Amateur Radio Week and operating a Bicentennial "200" station were discussed. Dot and I attended the annual PCARC awards banquet, and I spoke to the group on Special Service clubs. A nice visit and fun night on the seacoast! Thanks to IRS pres W1HMT and PCARC pres W1GGA for the chance to attend these events. Finally, an encouraging contact from UNH. Jay, KA1PQK, a student, contacted me and is working to activate a campus club. He is talking with licensed faculty and students and is working on promoting the planned club and also Novice classes! GBRA is planning to work with Jay, and if you are interested in helping, contact Jay or Fred, K1ACL. Traffic: MFM 179, GSPN 166, NHN 54. W1PEX 882, N1CPX 525 (BPL), K1TQY 272, WA1FHB 242, WB1HBB 170, W1FYR 148, NE1J 108, KK1E 101, W1ALE 81, N1NH 53, N1ALM 52, WA1YZN 46, KI1M 32, KA1OLK 25, KA1OU 23, KA1QWT 20, KG1T 18, KA1PFS 18, W1TN 15, KA1HPO 10, KA1LBW 9, N1DQA 8, KA1LMR 6, KA1JOU 2, KA1KFX 1, KB4N 0. DEC—W1FYR 144, KK1E 132, WB1GXM 98, W1ALE 93, N1ALM 88, WA1YZN 74, KA1OU 57.

VERMONT: SM, Frank I. Suitor, W1CTM—ASM: AE1T. STM: KT1Q. SEC: W1KRV. PIO: WA1YOY. Congratulations are extended to Peter Drexel (AE1T) who will assume the post of Section Manger on July 1, 1988. Pete comes to this office with an outstanding record of service as both STM and Assistant Section Manager. We are indeed very fortunate to have a person of Pete's capability as our new SM. Milton Hamfest attendance set a record (325) and the very successful flea market covered the entire cafeteria. Forums on ARES and Packet Radio were very well attended and the Imported Brooklyn auctioneer provided some good comic relief while moving some of those boat anchors. VE exams were as follows: Gen'l KA1PYK, KB2DUB. Tech KA1RLM, plus 2 new Novices and 1 new Tech. As more VT towns consider zoning, it is up to all of us to make sure that ham radio antennas are not restricted any more than the FCC regulations allow. For additional info on FCC regulations, contact our section Volunteer Legal Counsel, W1SOV, or the SM. BARC treasurer (N1DLE) is recovering at home from surgery. Best wishes for a speedy recovery, Barb. CVARC VT QSO party coordinator (WA1PDN-Dan) reports the following section top 3 section winners: NK1A (1st), N1EBT (2nd), KC1BT (3rd). Annual (1988) club reports have been submitted to ARRL by Burr and Burton ARC and the Burlington ARC. All ARRL clubs are reminded to submit their reports. GMWS (NN200D) CVARC (W200BD) and BARC (W200KOO) were very active during 3/12-18 celebrating VT's ratification of the US Constitution by becoming the 14th state to join the USA in 1791. The following BARC operators helped make over 1000 QSOs from the club station at the Burlington Red Cross: KA1MTO, KJ1E, NB1A, N1EOZ, W1BRG/CTM/KVK/RPR, WA1UVW and WB1FWR. GMWS had a busy time with 850+ QSOs by operating crew of KA1NWB/NZA, KC1CO, N1AGY/ENK/FHY, WA1ONT, WB1HHG, WB2MIC, and W3SOH. The CVARC contingent had 600+ QSOs by operators K1HKZ, KA1KAQ/MNH, N1EBT/EHT and NK1A. All in all, our section did a super job of supporting our US Constitutional celebration. Thanks to all operators for keeping the Green Mt. State on the map! BARC March meeting featured a FB coax/connector presentation by W1AIM. Chip is the section Technical Coordinator and will be glad to make a similar presentation to ur club meeting upon request. Contact him at 1-800-422-8606. KA1QZR (Jim) reports having wkd all states (twice) as a Novice plus 37 countries toward DXCC—all in 3 months. He also has the RCC award and wishes to thank his Elmer, W1DJW (Ray). Our SEC (Joe) reports ARES membship now at 205 with new ECs N1ENH (Shelburn) and N1EQO (Williamstown). K1LOO is trying to set up an RTTY net on both 80 & 160 and is looking for stations with RTTY capability. Contact W1KRV if u wish to join ARES and receive his free outstanding monthly bulletin. GMWS reports W3SOH is now a regular check-in to the breakfast club! The first statewide emergency management conference called by the VT Dept. of Public Safety is scheduled for May 5/6 at Fairlee. Contact W1KRV if u or ur club EC would like to attend. Next VE exams are scheduled by CVARC (Montpelier) on May 21, contact WB1ABG. A new DX net is being held on Mondays at 1930 L on the W1BD repeater (146.625). Also new emergency autodial numbers are available from NK1A for the W1BD autopatch. STM (KT1Q-Ed) indicates our section had 100% participation in 1RN/3 & 86% in 1RN/2 on the NTS. If you wish to learn more about NTS and how u can participate, contact KT1Q. BPL awards went to KT1Q & WA2SPL. Feb. Traffic report: KT1Q 735, WA2SPL 534, WB2MIC 126, WA1JVV 111, N1DHT 84, AE1T 51, W1KRV 43, WA1VXW 34. Net reports: VTN 29/175/147, VPHN 4/82/7, GMN 25/49934, CAR 25/699/48, BFN 13/120/0, TSFMN4/66/8, CVFMN 4/83/3, CVDXN /485/0, BSEN 4/91/1, VSSN 12/45/6, TSEN 4/54/0, VPEN 4/20/3, VSBN 29/8/0, BCAN 5/27/3.

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD—OO/RFI: N1CM. PIO/ACC: K1BE. SEC/SGL: WB1HIH. TC: KA1JJM. STM: KA1EXJ. The Mohawk ARA handled the communications for the New England Dog Sled Race. The trek was 13 miles between Gardner and Winchendon. KA1OSO, a teacher at Hubbardston Central School, has 38 students in his Novice class. North Worcester County is in the process of having a new growth in ham radio. KA1OTS, KA1QOI, W1SPG, N3FSM and N1FBD spent all day Saturday with the local Cub Scouts offering communication on their Tundra Campout. Burrrr, it's cold out there. Roses to N1FIY. He travelled from the Worcester area to Hubbardston to instruct KA1OSO's novice students on operating and setting up an Amateur Radio station. The 97/07 (W1BIM) repeater has new hardline, connectors and antenna. Intermod problems are being cleared up but because the problem only comes at an irregular time the progress is slow. The 45/85 (W1GZ) repeater has been serviced and is back to normal operation. MARA is contemplating purchasing a new controller for the repeater. The K9ES-3 PBBS has proved to be a great help clearing traffic in southern Worcester County. It's great to have an outlet for traffic in that area of the county. Traffic: KA1IFC 803, KA1EXJ 323, W1UD 566, WB1HIH 149, WA1YYK 98, KA1EKQ 80, K1JHC 64, KA1QFV/T 55, NM1U 38, KB1TR 32, NI1V 25, W1SJV 24, WA1OPN 6, KA1CRX 122, W1KK 111. Traffic totals are up 62 percent and participation in scheduled nets are better than 90 percent. I want to congratulate all traffic handlers in this section. We may be a small section, but we've been doing a big job!

NORTHWESTERN DIVISION

ALASKA: SM, Dianne Marshall, AL7FG—Tony Smaker, KL7AF, has been appointed SEC and Jim Dixon, NL7HI, DEC for Interior Alaska. Volunteers needed for ARRL appointments in Alaska especially for STM, call SM at 479-5819. The Alaska Tsunami net was called together by SEC KL7AF as a result of the March 6 magnitude 7.3 earthquake which occurred in the Gulf of Alaska. No damage or injuries reported. NETS—Snipers 3920 1800 local, Ak Fish 3725 1930 MWF local, Motley Group 3933 2100 local, AP net 14.292 0800 local, Tanana Valley Emergency preparedness net Sundays 8 PM 28.4 MHz and 8:15 on 146.37.97 repeater. Everyone plan to attend the Motley Group Picnic July 22, 23, 24, 1988 at Byers Lake campground, mile 147 Parks Highway.

IDAHO: SM, Don Clower, KA7T—SEC: K7REX. STM: W7GHT. OOC: WB7CYO. ACC: N7BI. PIO: WB7PFQ. The ARRL has a group of amateurs throughout the United States that report on non-amateur signals in our bands that cause interference. If you are being interferred with or have heard non-amateur signals in our bands, please notify me, and I will get the message to one of our two monitoring stations here in Idaho. Again, I would like to challenge a ham club here in Idaho to take on the job of hosting our Northwest Region convention in 1989 or 1990. It would be a great club project and would be a money maker for the community that was the host city. It is time we Idaho hams showed our stuff. My staff and myself will give you all the help and support we can. Think about it. 73, Don.

MONTANA: SM: Ken Kopp, KØPP—First annual ham radio ski week-end at Bozeman's Bridger Bowl Feb. 20,21. YRC's (Billings) Novice/Tech net on 28.4 MHz Tuesdays at 8:00 PM. MSN has moved to 0800 Sundays on 3920 kHz. Miles City will host Father's Day picnic June 19. Information from K7HWK. FVARC will host Glacier-Waterton Hamfest July 15,16,17. Contact W7BKM for information. WIMU moved to Mac's Inn, Idaho due to problems with Jackson Hole Motel. Will be August 13,14. SK NN7J honored at FVARC's annual banquet. WB7THN, N7HPB, N7AIK, W7JMX, N7AFS, KØPP used BARC's (Butte) 146.94 MHz repeater to assist Red Cross during Whitehall area wildfire. Time to plan for Field Day, June 25,26. Make the AARC's (Anaconda) traveling FD trophy your goal. Six of state's 13 clubs have "W200" calls assigned for use November 5-11. Traffic: W7TGU 951 (PSHR)

NET	SESS	QNI	QTC	MGR
IMN	29	299	113	KA7EEE
MSN	4	66	0	KØPP
MTN	29	2104	129	KF7R

OREGON: SM, Randy Stimson KZ7T—ASM: KM7R. STM: W7VSE. SEC: W7FBP. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. RFI: AK7T. OOC: KA7HJT. STC: N7ENI. The Salem Hamfest and flea market, which is the first of the year, was bigger and better than ever. There were some 1400 in attendance, which is a big increase over the year before. So this means that the migration of used equipment has started for 1988. The VE exams went well, they tested some 70 hams and I believe the passing rate was 72%. The hams had a close call in the city of Albany when the City Council decided to restrict how high the antennas can be. The hams organized and started a campaign against it and they were successful. They also succeeded in getting the dish ordinance changed. This is a good example of what we can do if we organize. The packet people have started a group to coordinate there packet frequencies and it is called Oregon Digital Network Coordination Counsel. What they need now is for all System Node/Digipeaters owners to contact: ODNCC,7560 SW 69th, Portland, OR 97223. Then they would be able to complete the coordination. Traffic (P) = Packet: W7VSE 366, N7BGW 207, KA7EEE 97, WB7VSN 97, N7ELF 74, W7ODG 53, WB7EMO 51, W7LRB 46, N7APC 36, N7CPA 33P, WJ7E 29, KF7BX 24, KZ7T 16P, KA7AID 8. (Jan.) W7LRB 34.

WASHINGTON: SM, Brad Wells, KR7L—STM: KD7ME. SEC: KA7INX. TC: W7BUN. OOC: N7DVR. SGL: KD7AC. BM: N7CAK. PIO: N7FKV. ACC/ASM: KC7PH. ASM: KD7G. ASM: KA7CSP. ASM: W7UOF. ASM: K7CLL. The Central Washington State Hamfest is May 21-22 at the Central Washington State Fairgrounds in Yakima. Take the Fairgrounds exit off I-82 and follow the signs. VE testing on Saturday, May 21, at 1:30 PM with walk-ins accepted. Special emphasis at this testing session will be exams for children and people with disabilities. (Contact Bill Carter, NC7C, at 509-575-0185). There will be an ARES luncheon Saturday at 11:30 AM. No-host dinner Saturday at 7:00 PM. QCWA breakfast Sunday at 7:00 AM, Sunday morning 2-meter "bunny hunt," packet forum, swap & shop, and lots of free parking. Contact Jo, KA7LJQ, at 509-678-4798 for more info. Members of the Kitsap ARES helped to provide communications for the first major bicycle event of this year—The Chilly-Hilly Bike Race on Bainbridge Island. This event, on February 27, drew 4000 participants, but the weather was mild in contrast to prior years. Yakima ARES was called on February 22 to assist in a "lost skier" search. Utilizing their comm van, they assisted Search and Rescue groups to successfully locate and transport two people. Washington Section traffic & emergency nets:

WARTS	3970 kHz	6:00 PM	Daily
NWSSB	3945 kHz	6:30 PM	Daily
CBN	3960 kHz	7:00 PM	Daily
NTN	3970 kHz	12:00 Noon	Daily
WSN	3590 kHz	6:45 PM/9:45 PM	Daily
WCN	3702 kHz	7:00 PM	Daily
PSTS	146.92 MHz	5:30 PM/10:30 PM	Daily
EWTN	146.64 MHz	5:30 PM/9:30 PM	Daily
WEN	3987 kHz	9:00 AM	Sat
WEN	3987 kHz	6:30 PM	Mon

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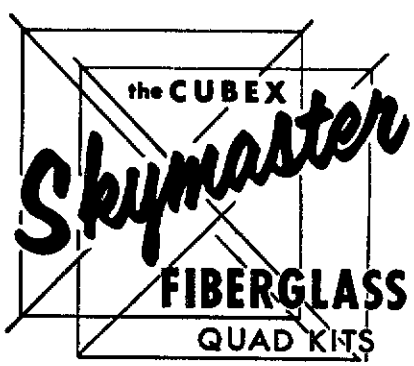

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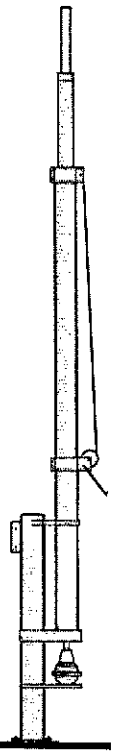
MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
MA-40	40'	21'6"	2	242	3" sq.	4½"	$ 809.00
MA-550	55'	22'1"	3	435	3" sq.	6"	$1369.00
MA-550MDP*	55'	22'1"	3	620	3" sq.	6"	$2909.00
MA-770	71'	22'10"	4	845	3" sq.	8"	$2509.00
MA-770MDP*	71'	22'10"	4	830	3" sq.	8"	$3969.00
MA-850MDP*	85'	23'6"	5	1128	3" sq.	10"	$5349.00

*MDP models complete with heavy-duty motor drive with positive pull down.

Shown w/optional MARB550 rotorbase and rotator.



FREE STANDING CRANK-UP TOWERS
Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TX-438	38'	21'6"	2	355	12½"	15"	$1019.00
TX-455	55'	22'	3	670	12½"	18"	$1539.00
TX-472	72'	22'8"	4	1040	12½"	21⅝"	$2529.00
TX-472MDP*	72'	22'8"	4	1210	12½"	21⅝"	$4069.00
TX-489	89'	23'4"	5	1590	12½"	25⅝"	$4399.00
TX-489MDPL*	89'	23'4"	5	1800	12½"	25⅝"	$6599.00

*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).

FREE STANDING HEAVY-DUTY CRANK-UP TOWERS.
Will handle 30 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
HDX-538	38'	21'6"	2	600	15"	18"	$1319.00
HDX-555	55'	22'	3	870	15"	21⅝"	$2309.00
HDX-572	72'	22'8"	4	1420	15"	25¾"	$3959.00
HDX-572MDPL*	72'	22'8"	4	1600	15"	25¾"	$6049.00
HDX-589MDPL*	89'	23'8"	5	2440	15"	30⅝"	$7919.00

*Includes heavy-duty motor drives with dual level wind and positive pull down. HDX-572MDPL includes limit switch brackets only. HDX-589MDPL includes limit switches and limit switch brackets.

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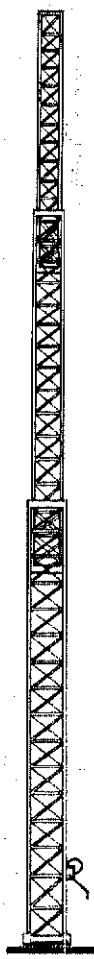
Will handle 18 sq. ft. antennas at 50 MPH winds. (TMM-433HD handles 24 sq. ft.)

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TMM-433SS*	33' w/o mast	11'4"	4	315	10"	18"	$1089.00
TMM-433HD*	33' w/o mast	11'4"	4	400	12½"	20⅞"	$1319.00
TMM-541SS*	41' w/o mast	12'	5	430	10"	20⅞"	$1429.00

*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.



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These nets support the many public service activities of Amateur Radio. Take some time each week to check-in and volunteer your services. The Apple City RAC has a Novice net on 28305.6 kHz from 7-9 PM every evening. On January 29th, the Washington State Department of Community Development presented an outstanding community service award to the amateurs of this state. The ceremony took place at the Washington Center for the Performing Arts in Olympia with a keynote speech by Governor Booth Gardner. Kate Heimbach, Acting Director for the Division of Emergency Management, made the presentation and noted that "hundreds of amateur radio operators throughout the state donate countless hours and personal equipment to support local and state government in a variety of public safety activities. Their efforts contribute to saving lives and property in Washington State." Those of you who have devoted some of your time to traffic handling and ARES activities made this award possible. ARES Public Service Hours: Wahkiakum 12, Benton 39, Franklin 38, Asotin 1, Kitsap 51, Thurston 120, Yakima 40, Skagit 250, King 172. Traffic: K7GXZ 261, N7GGJ 183, W7IGC 168, WA7CBN 143, WA7PIN 138, WB7WOW 115, N6EQZ 112, K7SUX 90, W7GB 77, K7UQH 65, KA7PMD 39, WA7YEN 28, K7AJT 18, N7DIP 17, KA7TTY 15, W7AZU 8, KA7IIJ 8, W7IEU 7, K7CLL 2, KD7ME, KR7L.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, N6DHN. SEC: W6LKE. STM: K6APW. OOC: NY6Z. TC: N6AMG. K6APW reports EB ARES members provided communications for the American Red Cross CPR Marathon training session on Feb 20. Included among participants were KJ6CS, WB6DOB, N6EEG, N6EJW, N6IIW, WB6HPA, KB6JEC, N6JNK, W6JRZ, N6LFW, WA2UNP, W6VTJ, WB6YBA & K6APW with a big assist from WB6HAM/R. Newly appointed ARRL affiliated Contra Costa Communications Club welcomed new members KL7QZ, WA6TNI, WD6GGC & N6HPX. MDARC welcomes new members KB6IXU, KB9M, KA6EEQ, N6QYA, W6LSO, WA5HOJ, WA6TEZ, KA6SPJ, KA6JJX & KA6ALL. EBARC's new members are KE6AM & K2KGE. LARK has warned its "past-dues" members that they will be ex-communicated by the mailing-label computer. SBARA president KA6ROI also reminds their members to get their dues in soon. I'm pleased to get back on the SBARA mailing list—Tnx! HARC members KG6MH, W6ZTG, KB6HLX & N6DOC participated in a communication drill at Hayward's Kaizer Hospital. BARC new officers are N6ERR/Pres. KA6NQJ/VP. N6KVI/Secy. N6PMP/Treas. Traffic: WB6DOB 149, W6VOM 123, K6APW 71, WB6UZX 37.

NEVADA: SM: Joe Lambert, W8IXD—ASM: K7HRW. Congratulations to SNARS on its 20th Anniversary. SIERA expects to have a repeater up soon and is planning a Field Day. All Las Vegas area hams are invited to a picnic on May 14, at Sunset Park, Area F sponsored by LVRAC. LVARC is also planning a Field Day this year. Great increase in packet operation is reported in Southern Nevada. For information, contact WB7Z or WI7D. There is now an open repeater in Las Vegas on 146.70 (no longer dedicated RTTY machine). LVRAC will install a 10-meter remote capability soon on their 146.94 and 449.70 repeaters. Southern Nevada hams supported the April 23-24 Baker to Las Vegas Challenge Cup relay race which included about 80 teams of 20 runners each. The 1988 Nevada QSO Party will be held on May 7, 1988 from 0000Z until 0600Z on May 8. Contact NW7O for details. Also contact NW7O regarding membership in FARS Special Service Club in the Las Vegas area. WADG has appointed KA7KOH to be technical director. Nevada Section meeting in Reno in June.Contact K7HRW for date. DON'T FORGET THE RENO HAMFEST ON AUGUST 20 AT IDYWILD PARK. WE HOPE TO SEE YOU THERE!

PACIFIC: SM, Jonathan Starr, AH6GJ—New Section Appointments: ASM: Helen Nielsen, AH6GQ. SEC: Wayne Jones, NH6GJ. PIO: Katashi Nose, KH6IJ. BM: Mel Fukunaga, KH6H; SGL: Gene Piety, KH6PP. TC: Army Curtis, AH6P. OOC: Randal Leval, AH6GR. ACC: Lee Wical, KH6BZF. STM: Jack Erwin, KH6HIJ. MAUI DEC: Mel Fukunaga, KH6H. KAUAI DEC Bill Baisley, KH6S. HAWAII DEC: Chris Stewart, AH6GG. Guam DEC Robert McFerron, WH2AEN; Pkt NM Hal Sprague, KH6GPI; Local ECs NH6M & KH6NP. New Hilo digipeater on 145.05, AH6GG-1; nw KAUAI digi on 145.01 & 223.58, WA6SLF; new OAHU node KH6GPI-12. Kauai ARC News first issue looks Great; tnx Kimo & Jeff. Aloha Run Feb. 15 on Oahu: KH6HJA, KH6OV, KØAYL, NH6DY, KJ9U, KH6FD, KH6BI, KH6JCA, N5HRN, KH6JV, N4ESX, NH6GJ, KH6BIO, KH6CIZ, KA2WXU, NH6ML, NH6LH, AH6BJ, KA4INK, NH6LQ, WX4J. Lantern Parade Feb. 27: KH6HJA, KH6JCA, KH6BIO, KH6BI, KA2WXU, KJ9U, KH6FD, NH6GJ, NH6LQ, NH6LH, NH6IE, NH6MH, WH6BWD. Traffic: KH6H 30, KH6S. Aloha, de AH6GJ.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—Congratulations to Jack, KF6KJ, and his bride of 50 years ago, Bernice, who celebrated their Golden Wedding Anniversary on Valentine's Day. In addition to your long and happy married life, we note your service to your fellow hams, most recently as District Emergency Coordinator for the Northern Counties. Sorry we could not be present to share your memorable day, but we wish you another wonderful fifty years. Heard from Brad, N6CVF, our Tehama County EC who was the program for the Tehama club this month (when you read this, remember it is the February report) and for Shasta Cascade last month. Brad's typed page ends with "since my typewriter eats only rolls of RTTY paper, no one gets a typed envelope." Good thing he can also write! Speaking of ECs, Sacramento County now has a new one. Bob Lyman, KI6FT, who has been an Asst. EC for Jim Pearce, N6ESV. Thanks, Bob, for taking on the important job, and many, many thanks to Jim for his past good work. CLUBS, on your annual report to the League, please be sure to include AT LEAST ONE PHONE NUMBER where someone can be reached NIGHTS OR WEEKENDS. Look on the Yuba-Sutter repeater, WD6AXM/R for the monthly Sacramento Valley Section Net the first Sunday of the month at 8:00 PM on 146.085, input up .600 MHz. All hams are welcome to check in. Traffic: WA6WJZ 274, N6LUY 262, K6SRF 176, WA6ZUD 116, N6CVF 44, W6RFF 36, WB6SRQ 5.

SAN FRANCISCO: SM, Bob Smith, NA6T— The SFRC computer Faire was a big success last month, 10 different types of computers, and lots of members with questions. Hope you all attend the SFRC-RED CROSS disaster training. Sign up early for the GSLPRC picnic at Coyote Pt. Park on Aug.

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D-68	10/15/20/40/80/160	8	146'	149.95

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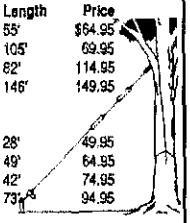
VS-53	10/15/20/40/80	3	42'	74.95
VS-64	10/15/20/40/80/160	4	73'	94.95



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Model	Band	Length	Price
D-10	10	16'	$17.95
D-15	15	22'	18.95
D-20	20	33'	19.95
D-40	40	66'	22.95
D-80	80/75	130'	25.95
D-160	160	260'	34.95

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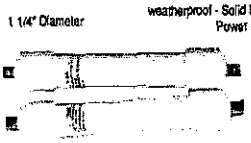

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Adapted from the article in Nov. 1985 QST by Al Helfrick, K2BLA.

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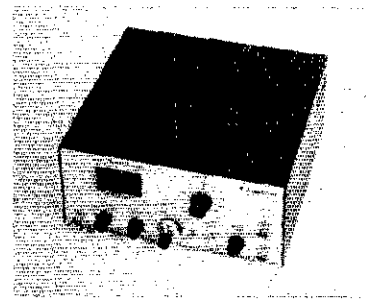

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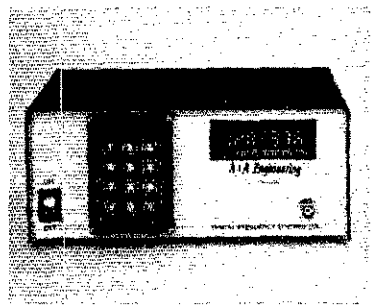

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AQ1-01

6, don't be left out this year. DON'T get left out w/o your SCRA QSL cards, the art work is great. If you aren't a club member, JOIN NOW. its the only way you can take advantage of a real good deal on QSL's! The newest club in the Section is the Redwood Amateur Radio Club covering from Fortuna to Weott, glad to have you aboard. HARC picnic will be Aug 28, put it on your calenders NOW! ARRL VE testing is planned for April 10 in EUREKA at the College of The Redwoods, call 822-4541 for further information. FD and JUNE is getting close, start your plans early, how is the REDXA-SCRA feud shaping up, anyone else want to join it? VOMARC will be participating in the Emergency Preparedness Drill in Sonoma on April 29 using the new VAN and the location at the police dept. UARC in Mendocino County has started NOVICE classes and RACES drills in the county, now they need everyone to participate. DNARC is meeting at K6HY's house the next few months for a little meeting and a lot of socializing. ABARC is meeting at the Sonoma County Park in Guatala, with Emergency Communications as the main topic of interest. They're a small but very active group. If you're in the area, attend the meetings for a real treat. REMEMBER, if you're not in your local radio club, you're missing the boat! Your local club needs YOUR support. Traffic: N6FWG 41.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WC6U. STM: N6AWH. TC: WA6EXV. ACC: W6DPD. Asst. SMs: W6TRP and K6YK. Emergency Coordinators are needed in Calaveras, Madera, Mariposa, and Mono Counties. KA6CUJ has resigned as EC for Calaveras County. Thanks, Max, for the years of service to Amateur Radio as EC. KA6VAF is the new EC for Tulare County. 1988 officers of the Stockton-Delta ARC are Pres N6RDX, VP N6ZU, S/T WA6WRP, Editor AA6CD. The club meets in Stockton. N6PXP is KJ6CK. KB6UNU is N6RED. KB6TXU is N6REB. KB6TPP is KJ6CH. KA6YSW is AA6GZ. KB6OBL is Tech. WG6P has a TS940. N6RED is on Packet. All appointees are reminded that a monthly activity report is a part of the appointment. I receive regular reports from a small number of the appointees. The number of you reporting needs to increase. Information printed in this column comes from the information I receive. If I don't get it, I can't print it. Now is the time to be finalizing those plans for Field Day 1988. Traffic: K6RAU 20, WA6YAB 6.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: WA6OCV. TC: WA6PWW. STM: N6JLJ. PIO: WB6OML. ASM: N6JQJ & NS6N. ACC: W6MKM. BM:(vacant) OOC:(vacant) Congratulations to the folks in city of Belmont, San Mateo county, who have been asked to write a new antenna ordinance for the city. I guess we'll get a favorable ordinance out of this one!....Who sez you need high power and big antennas to work DX? Congratulations to Patty N6BIS on her application for DXCC as worked using her awning as an antenna!....the Foothills ARS and EMARC had their very enjoyable annual joint banquet at the Blue Pheasant. Special tnx to the firms who donated prizes for the event....the Santa Cruz ARC board of directors who heard from our Affiliated Club Coordinator W6MKM and our Vice Director K6ITL on the advantages of becoming a Special Service Club....the Unisys ARC has been rumored to have their club station on CW, or maybe that's just a flock of "sperros"?....the EMARC club heard from Herman Baker N6ARP on Ham radio in "the olden daze", things like tubes, and BIG rigs and BIGGER electric bills!....the SLAC ARC is starting to get their own repeater together....the Northern California DX Club heard from Tom Schiller N6BT on "Optimizing Your ARRL CW and SSB DX Contest Scores"....WA6PWW, N6KL, and WB6W met to form comments on the FCC's proposed rewrite of part 15 of the rules and other items before the FCC. Official comments on several matters were submitted....W6NJR reports that Amateurs in the Saratoga ARES donated 1913 hours of service in 1987. Good work! PSHR: W6NJR 62. Traffic: W6NJR 1 (no other traffic reports received this month).

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W— ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: K4IWW. ACC: WC4T. TC: K4ITL. SGL: KE4ML New ASM is AB4S, Ed Stephenson. Ed has been SCM, CN Net Mgr., ORS & Asst. EC. He is currently NC Packet Mgr, & has played a major role in several emergency operations. I'm glad that Ed is a member of the NC section staff.[BT] The annual Roanoke Division League Planning Meeting will be held in Charlotte on May 14, 15 at the Registry Hotel. Division and Section staff from NC, SC, VA & WV will be discussing ARRL plans. All amateurs are invited to participate. This is YOUR chance to have direct input to the board of directors of YOUR ARRL — plan to attend. Contact person is W4MHF. [BT] FIELD DAY is June 27, 28. Consider a joint effort like the Rocky Mount & Wilson clubs; extend a special invitation to ALL local hams, especially inactive and Novice; Amateur Radio is a FRATERNITY! The extra points for publicity are most important. Write your press release well ahead and emphasize the national exercise — not your local efforts — local media will naturally bring out your group's role. Include information about the other groups & clubs in the area which are participating. When speaking to the public, stress Amateur Radio, not your club, group or self; your efforts are more significant (and more likely to be published or aired) when viewed within the context of an ARRL sponsored national emergency exercise. [BT] Why seek publicity for Amateur Radio? The best answer I've heard is that if the public doesn't know about our emergency communications capabilities, they won't know to ask for us when we are needed. [BT] Nat. Wx Serv. statewide tornado exercise on March 10 included EBS request that "Amateur radio operators activate their SKYWARN nets . . ." Good publicity for us! [BT] DFMA sponsored Durham Hamfest is on May 14. [BT] Traffic reported: K4NLK 296, K4IWW 201, WB4HRR 191, KA4EYF 149, N4JRE 125, WD4HTE 101, W4LWZ 100, KA4TLC 89, WB4WII 73, N9CGD 68, KB4FWL 67, KI4YV 61, K4SWN 59, N4MAR 56, WB4N 55, AJ5F 51, W4EHF 28, NE4J 27, WA4MNR 27, KB4ZZY 26, WD4MRD 25, AB4FY 21, WA2EDN 19, AB4EO 19, AA4SD 19, NT4K 17, N4CJJ 16, WB4DCP 7, N4UE 7, WD4EQK 6. (Jan.) NE4J 30.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ— As I mentioned in the last article, this month would be dedicated to discussing some of the unusual requests of amateurs during the January severe weather. First, I want to define the mission of ARES in South Carolina. There are five (5) phases to support during a COMMUNICATIONS EMERGENCY. (1) providing NWS with vital weather info; (2) supporting RESCUE OPERATIONS - EOC, hospitals, etc.; (3) communications for LOCAL GOVERNMENT and AGENCIES; (4) supporting SHELTER OPERATIONS; (5) HEALTH and WELFARE. The COMMUNICATION PHASES are listed by priority and the order in which available manpower is assigned. SC ARES has a commitment to provide COMMUNICATIONS, nothing more. If asked - the decision is yours. The question of liability has placed a severe constraint on the ability of Amateur Radio to provide communications. As a result of this question, we have agencies in SC which refuse to ask for assistance and others which completely ignores the question and demands assistance which places full liability on the amateur providing that assistance. If passed, pending Federal Legislation may relieve the volunteer from the question of liability. Until that time and if you or your club has an agreement with a local agency to provide assistance, contact that agency NOW, discuss the situation and come to a satisfactory agreement. Traffic: W4ANK 152, K4ZN 148, KB4BZA 98, N4MEJ 69, WA4LPV 68, KA4LRM 49, WD4PKZ 32, WB4UDK 22, W4DRF 18.

VIRGINIA: SM, Claude Feigley, W3ATQ—STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU. BM: AB4U. TC: WX4C. SGL: W4UMC. PIO: AA4VP.

VTN	1PM	3907	KB4NGO
VSBN	6PM	3947	KI4BR
VSN	6:30PM	3680	N4KSO
VN(EARLY)	7PM	3680	N4GHI
VN(LATE)	10PM	3680	WB4KSG
VLN	10:15PM	3947	KA4TWI
SVEN	7:15PM	146.82	NT4S
STARES	9PM	146.97	KJ4VT

New appointments, WX4C as TC, KB4PW as DEC, WB4QOJ and KB4BPF as PIA, and WD4CDT and WA2EIN as EC. N4JED has been named Awards Manager for the Roanoke Valley ARC, a Special Service Club. As such, he will be responsible for validating WAS, 5-Band WAS and VUCC certificate applications for that area. N4EXQ reports an expanding corp of ARES members with a total of 1079 ARES members in the section. With the increasing DX openings, I urge all DXers to submit envelopes to their DX QSL Bureau. If you need info on how and where to file envelopes, contact the SM. The following OOs, W4HU, W8IRT, K4KPT, KC4VR and AB4CG, submitted a total of 21 rule infractions for the past month. KA4VHR sez the Virginia Tech "Valentine's Day Massacre" was a success with over 900 msgs orginiated and sent (much of which was on HF and VHF packet). A lot was learned about passing ttc via packet. It is with deep regret that I report Robbie, W4QR, as a Silent Key. He was first licensed in 1919, and there is very little in Amateur Radio in which he did not participate. He received the Roanoke Division ARRL Service Award in 1986. Some upcoming VE exam skeds: Shenandoah Valley ARC, May 7, contact NC4B; May 14 Portsmouth ARC, contact AA4AT, Jun 4, Va. Beach ARC, contact KA4UNC. It was a good traffic month, mainly as a result of the Va. Tech message deluge. Total traffic count was 9733 with 48 stations reporting. K4KDJ, K4DOR, N4GHI, N4EXQ, AA4AT, WB4PNY AND W3ATQ made BPL. I believe most are aware that this is my last report as your SM since Mark, NN4I, assumed that post effective April 1. I want to take this opportunity to say I have enjoyed serving you as SM. If anything has been accomplished over the past 4 years, it is the result of the fine group of amateurs that make up the Virginia section. I cannot let the opportunity pass without thanking our STM: KB4WT, SEC: N4EXQ. ACC: NT4S, OOC W4HIU, BM: AB4U. PIO: AA4VP and SGL W4UMC for their FB support. Make plans to attend the Roanoke Division Planning Meeting in Charlotte, NC, May 14-15, the Roanoke Hamfest, May 29 and the Manassas Hamfest, June. Traffic: K4KDJ 1978, K4DOR 960, N4GHI 713, N4EXQ 652, AA4AT 649, WB4PNY 590, W3ATQ 516, K4JST 468, K4MTX 357, W4JLS 325, KA4TWI 292, WD4FTK 208, NW4O 196, KB4WT 183, WB4ZTR 164, WB4EDB 128, WD4MIS 127, WD4OCW 103, WB4ZNB 103, KK4FV 88, KB4NGO 84, KB4TRI 84, K4BGZ 83, W4TZC 79, WB4KIT 73, N4KSO 59, AA4GL 56, N6ANQ 52, KI4BR 52, KB4OPR 50, WA4LTO 48, NT4S 33, WB4KSG 25, KK8L 21, KJ4VT 20, KB4UED 16, KB4PW 14, KI4W 14, K4MLC 13, K4VWK 13, K4GR 11, KA8TNF 11, N4FNT 5, K4JUM 5, N4LYO 5, WA4TVS 2, WA1VRL 2, N3RC 2, W4YE 1.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: N8FXH. TC: K8LG. ACC: WA8CTO. SGL: K8BS. Rpt. Coord. WD8OZT. Enjoyed seeing everyone at Fayetteville on 2/28. KE8PO is now Extra Class, WB8ZFL is now Tech. Congrats to all who have upgraded. Next State Radio Council Mtg. will be on June 18 at Clarksburg. QNI WV nets for info. This year's Jax Mill H. F. will be on July 2 and 3. Plan now to attend; things are looking up.

NET	FREQ	TIME	QNI	QTC	Sess	NM
WVFN	3865	6:00	1321	150	29	W8YP
WVMD	7235	11:45	862	55	29	W8FZP
WVN	3567	7:00	307	110	29	KZ8Q
WVRN	3640	6:30	350	36	29	K8LG
WVNN	3730	5:15	139	35	29	
Hillbilly	14290	Noon Su	176	14	4	W8YP

Traffic: KA8WNO 473, W8YP 338, KE8PO 185, KD8WX 165, W8FZP 111, KE8FI 85, K8TPF 62, WD8LDY 61, K8UQY 54, N8FXH 53, K8QEW 49, K8KT 37, KA8QHC 32, NC8G 12, KA8OGF 12, W8JWX 9.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ0J—ASM: KA0MQA. SEC: WB0TUB. STM: KB0Z. ACC: WB0DUV. OOC: KC0UD. TC: W0LJF. PIO: N0DZA. SGL: WB0FQB. BM: K0WOP. The annual Channel 9 Health Fair was to be held the 2nd week of April, and had many, many, many amateurs throughout Colorado participating. The event was well coordinated again by KA0EFM. This communication effort is primarily handled by 2 meters but also includes HF and packet. Thanks to the many who donated their time to this public service event. NTS/PAS meeting scheduled for April 15-17th at the Stouffer Airport Hotel in Denver, organized by N0IA, NM of the Daytime 12th Region Net. The annual RMPRA Packetfest is planned for the first part of May. It is always well attended by packeteers from the Rocky Mountain area. Further info is available from W0GVT or WA6ERB. The annual PPRAA Swapfest will be held on May 21st in the Rustic Hills Shopping Center Mall in Colorado Springs from 9:00 AM to 4:00 PM. Further info contact N0CMW. This is always a good Swap. Will hope to see you there. 73, KQ0J. Nets: CWN: CWN QNI 69, QTC 70, QNF 386, 24 Sess. COL: QNI 1078, QTC 52-136, QNF 1045,

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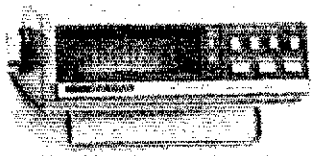

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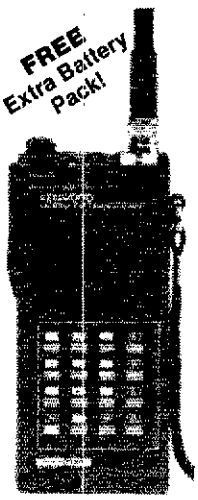

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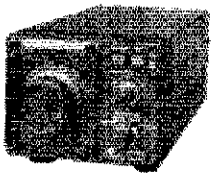

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29 Sess. HNN: QNI 252, QTC 148-794, QNF 1429, 29 Sess. NCTN: QNI 175, QTC 149, QNF 379, 28 sess. SCTN: QNI 256, QTC 30 QNF 379, 23 Sess. Traffic: KEØNI 237, KØHOA 152, WBØFFV 128, NØHMR 174, KBØZ 114, WDØBSZ 105, KØINI 94, NØHFZ 89, KAØWIE 44, WBØBLV 32, WØNFW 20.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMs: WA5UNO, KA5NNG, W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net meets daily, 3583 at 0230 UTC, handled 139 msgs with 200 checkins. NM Roadrunner Net meets daily, 3939 at 0100 UTC, handled 104 msgs with 1475 checkins. NM Breakfast Club meets daily, 3939 at 6:30 AM, handled 198 msgs with 1134 checkins. Yucca 2-mtr Net, 78/18, handled 17 msgs with 441 checkins. Caravan Club 2-mtr Net, 66/06 with 124 checkins. SCAT Net, 66/06 handled 4 msgs with 611 checkins. Info Net 12/72, with 93 checkins. Amateur Radio to the rescue when long distance telephone service to Deming, Silver City and Columbus failed for 3 hours. W5VFQ, N8BDE, WA5IND and many others maintained emergency communications with Albuquerque via the ZIA LINK while Mountain Bell repaired the problem. A special thanks to all who assisted during the emergency. Congrats also to W5UNK on his new "OO" position. Traffic: KB5UL 133, W5DAD 64.

UTAH: SM, Jim Brown, NA7G—SEC: Rich Fisher, NS7K. STM: John Sampson, W7OCX. New Davis Co. ARC Officers: Pres: NZ7X: VP: AC7H; Sec/Treas: K7DOU. One of our Ogden volunteers, Ron Chance, KF7BD, has consistently spent many hours monthly as an OO. His work, as well as our other OOs, help make ham radio better for all of us. Tnx, Ron. VHF Society Freq. Coord. for this year is John Lloyd, K7JL. The location for WIMU this year has been changed to Mack's Inn, near Island Park, ID, on the second full weekend of August. 73 de NA7G. Traffic: WA6KHE 91, N7JLC 68, WA7MEL 57, NS7K 45, N7IUN 31, N7ASY 20, NA7G 16, W7OCX 8.

WYOMING: SM, Jim Raisler, N7GVV—ASM: WA7H. SEC: W7TVK. NM: KC7AR, W7MZW, WB7K. ORS: NN7H. OO: WC7S. Dale, WC7S, has recently been appointed OO. Thanks for volunteering. Next month, I will list the recent EC appointments. Mac, WB7K, reports that at a January Boy Scout campout during some adverse weather, the University ARC (KB7M, WB7K, WA7NOI and WA7SVH) provided reliable radio communications back to Laramie. I'm sure the folks at home appreciated the reports. Traffic: NN7H 181, K7SLM 15. 3923 kHz nets: COWBOY: 21s/819 QNI/9 QTC, PONY EXPRESS: 4s/196 QNI/2 QTC. STATE ARES 4s/149 QNI. 2-Meter ARES Nets: 6 nets/ 5 sessions/252 checkins. Campbell and Crook Counties are now conducting area 2-meter nets which brings the state total to 6. Remember July 9-10 for WYOMING HAMFEST in Laramie.

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, WO4W—ASM: WX4I. SEC: KB4GDN. STM: N4RT. ACC: AA4BL. PIO: KB4KCH. TC: N4QII. SGL: N4FRQ. OOC: KF4VS. Pete Nelson, KF4VS, of Huntsville is our new section Official Observer Coordinator. He is looking for a few good OOs—call him if you are interested. I hope to see many of you at the ARRL forum at the Birminghamfest, which will be held May 14 and 15 this year. The Alabama Repeater Council is working with the Al. Public Service Commission to get reduced rates for repeater autopatches. Hams in Texas were successful with this, and I hope we wind up with the same results. The East Alabama ARC and the Auburn Univ. Radio Club have teamed up to put a new dual port digi on the air—the alias is "AOL" on 145.07/145.65 MHz. The new south Alabama SKYWARN net meets on the 147.18 "tall tower" repeater Mondays at 8:15. DEC KE8BP has done a good job with this. I regret to report Silent Keys NW4X of Mobile, WD4JGO, of Warrior, and WA4ZTR of Dothan. The Birmingham ARC will operate W2ØØCUE in December as part of the Constitution Bicentennial celebration.

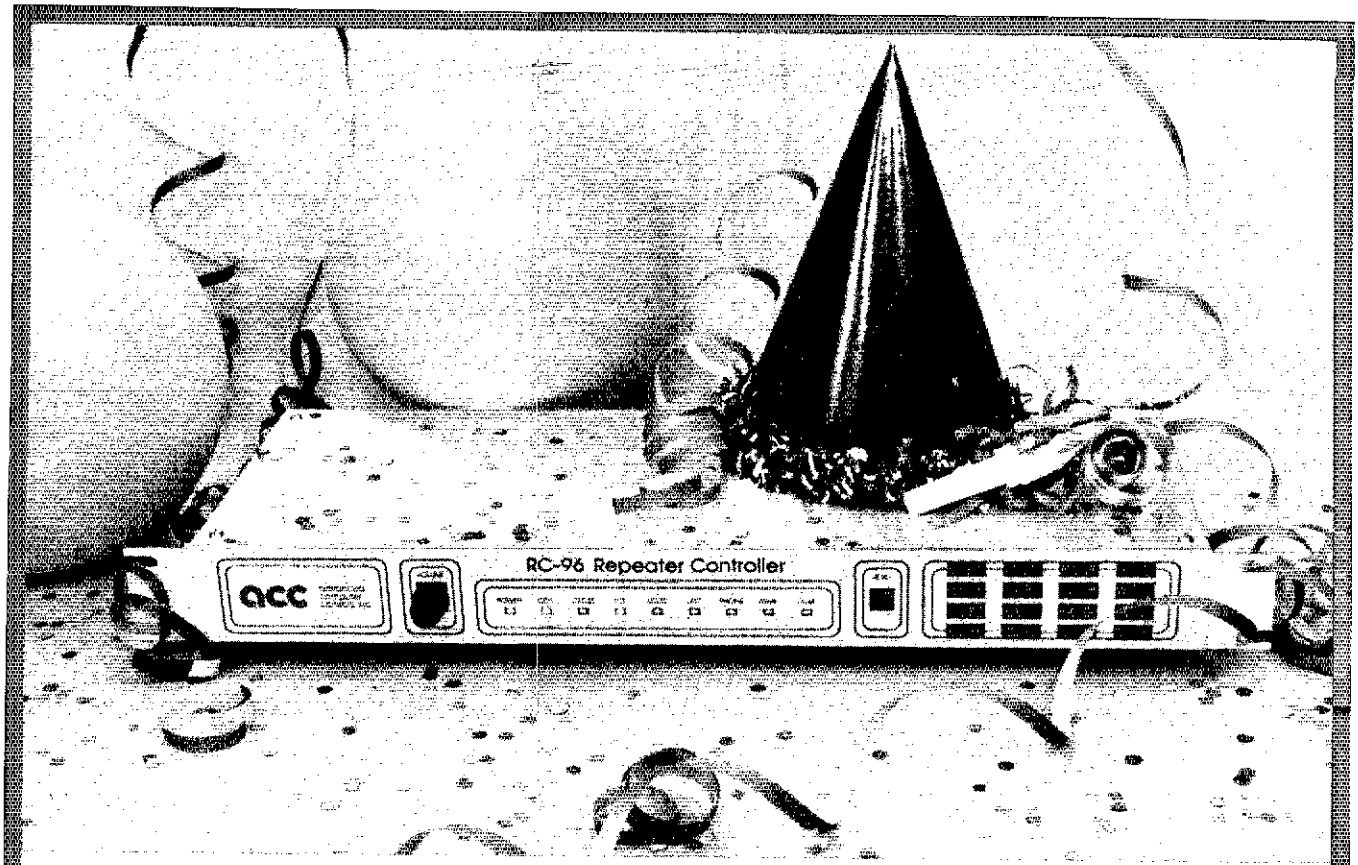
NET	FREQ	SES	QNI	QTC	MGR
AEND	3725	29	136	49	N4DCS
AENB	3575	58	421	119	W4QAT
ATNM	3965	32	3404	98	WO4E

PSHR: WA4JDH, W4PIM, W4CKS, WA4RNP. BPL: WA4JDH. Traffic: WA4JDH 1001, W4PIM 205, W4CKS 203, W4DGH 22, WA4ZPZ 10, WB4TVY 10, WO4W 9, WA4RNP 8.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM & ACC: WA4ABY. SEC: NC4E. STM: WB4WQL. ASTM: (Packet) W4QO. BM: WB4ZOJ. OOC: W4TG. PIO: WB4DEB. SGL: WB4UVW. TC: WD4PAH. Feb PSHR honorees are WB4DVZ, WD4COL KA4HHE, W4RWB, WA4LLE, KF4FG, WB4WQL, W4HON, N4MWR, KB4JPN & K4BAI. SGL: WB4UVW working hard with legislators on the GA STATE TAG issue. If he requests help, please come to his aid. Also, NC4E our SEC reports that we have over 900 ARES members registered. Pse when u attend a Hamfest or club meeting this year get a form & fill it out and send to Jack. Only Silent Key reported this month is Dick Teichman, K4LAR. Our deepest sympathy to his family. I cud not attend, but reports say that attendance at the Dalton Hamfest was really great. Tnx to all the VEs & instructors in the section fer the FB job ur doing to bring new blood into the hobby. I don't think that there's an area in the section that one can't find to take an exam. Agn TNX. Received only 1 petition for the "ARRL Herb S. Brier Instructor of the Year Award." Nominations are closed now, so remember next year. The ARRL Board of Directors made many changes in League appts. Many are now open to u Novices out there. If u desire one pse contact me fer info. Once agn I thank all at GARS fer the hospitality shown me during my recent visit. According to the net reports tfc & checkins have picked up. PSE check into one of the section nets if it's only once or twice a week. Message handling is important in case of emergency. Regardless what mode you use only practice makes perfect. CU in Albany in June or Atlanta in July. 73 & God Bless. Traffic: WB4DVZ 155, WB4WQL 135, WD4COL 123, W4ALLE 60, K4LDI 46, KA4HHE 45, KF4FG 35, N4MWR 31, K4BAI 26, W4HON 24, W4RWB 21, W4QO 19.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—ASM: KB4LB. BM: N4GMU. ACC: WD4RIQ. OOC: AB6I. STM: AA4HT. SEC: WA4PUP. PIO: WA4PUO. SGL: KC4N. OOC: AB6I. Noted recently that SSRC has appointed their Awards Manager, KK4PI, to approve WAS and VUCC applications for club members. If your club is a Special Service Club, you can do it too. The LMARS Club has WØRAO as VUCC Mgr and WB4HBH as WAS Mgr. If you wish to do so, write ARRL and give them the names, but only if your club is a SSC. If you are interested in becoming a SSC, get in touch with WD4RIQ, in Ocala and he can assist you. THIS YEAR THE OARC will have been affiliated with ARRL for 40 years. We congratulate the club and its officers of the past and present. Many more successful years!! New officers for 1988 reported by Palatka ARC are W4RCA, Pres. N4PZE, VP. K4YXO, Secy. W4NRT Treas. The Groundwave of DBARA says that K8SR is Pres, K4MAB is VP, KA8NUN Sec, KB4TUF is Treas. Congratulations to all these officers, as well as to all clubs, so that they may have a great '88!! If you have any questions or suggestions, please send them to me, N4ADI, via packet at KB4LB in Sanford, FL. 73, Roy. Traffic: WD4IIO 1289, WX4H 747, WA4QXT 523, N4PL 505, AA4HT 360, K4CY 349, KB9LT 256, KB4LB 214, KC4VK 168, AA4QC 168, N4SS 145, KC4FL 135, WD4IUI 116, N4GMU 114, W4KIX 82, KI4CQ 81, WC4D 80, WA4EYU 79, KB4FIY 69, N4JAQ 66, N4ADI 63, WA4SXW 62, W4UEA 54, WB4TZR 49, NF4O 49, N4DY 46, KA4KAH 45, WD4EQB 40, W7YWF 40, N4COB 34, WA4PUP 34, N2AOX 30, W4DTV 27, N4QYS 27, W4AT 18, WB4FJY 16, K3NON 16, W8IM 16, WB1EKV 15, KB4WPI 13, KJ4HS 12, KF4TM 8, WB4AWG 8, W4OZD 6, N4NKI 6.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: W4WYR. SGL: KC4N. OOC: W4TAH. ACC: K4EUK. Doc, WA4HDH, continues to make progress with his book on the history of QFN. He has been giving excerpts monthly to KA4FZI, who is the Florida Skip State CW Editor for Florida CW nets. A recent issue of Florida Skip included a quote by George Thurston, W4MLE, who was active on QFN beginning back in the early sixties. The quote really hit home with me. It brought back memories when as a Novice on QFNS and would listen to QFN, understanding virtually nothing, that a personal goal was set—to someday become a part of a net that could operate with the snap and efficiency that QFN does. The quote, "QFN's" role as interstate liaison for welfare and other large volume traffic remains, though even that is under attack by devoted packeteers. One of the aspects I hear most admired about QFN has been the sheer music of its QNI procedure and deft professionalism with which its operators dispatch traffic. To a non-traffic handling CW man—even an expert contester or DXer—QFN is utterly baffling. How can anyone make sense of a blur of one- two- or three-letter abbreviations, strange Q signals and QN signals, question marks, and even single dits, especially when three or four stations seem to be participating in an exchange with no call signs or even first names? But, because the member operators know each other so well and have honed their operating skills to a scalpel edge, QFN operators can communicate more information in a few seconds than an average voice net—at four times the data transmission rate—can convey in a minute or two. It takes not only superior operator skills to achieve this sort of performance; it takes superb net discipline among its members." W5TFB, CAN manager, once called the QFN NCS at the end of one of the sessions and remarked that someone should write a book about the net procedures. WV5Z has commented on how smoothly the stations check in and traffic listed on QFN. WV5Z has returned to Florida from Texas where he was very active on RN5—and still continues to be. KA4YHS, manager of the Southeast Florida Traffic Net, reported on February 21 that in 58 more days he will have checked into that net for four years without a miss. KD4GR, a net control for the SEFTN, offered a suggestion that perhaps code practice tapes might use a traffic format. This would not only help with the code practice, but would also give practice in cw traffic handling. Congrats to K8OCZ and KB4HEQ who have been appointed as VHF and HF Awards Manager respectively for the Tampa Bay Repeater Association. Club bulletins received this month include QRM, The Tampa ARC; The South Brevard Spark; Slant Bars, The Brandon ARS; The Martin County ARA, Common Emitter; Broward ARC; QSP, The Tampa Bay Repeater Assoc.; The Modulator, Ft. Myers ARC; The Everglades ARC Beam; Palmetto ARC Bug Juice. I understand that the Tampa Bay Repeater Assoc. is undergoing a name change to better reflect their varied activities in amateur radio. The Ft. Myers Modulator reprinted a nice letter from K4SCL, former SCM for Southern Florida, to KA4FZI. The letter commended her for her prompt response without question to his instructions as QFN NCS one evening when he was in a bind. It resulted in W4FRR, an out-of-state station, getting all his Florida traffic cleared promptly and him giving a nice compliment like: "you guys down there do a might fine job!" KC4N, John Hills, the SGL, sent an annual report of activities which included an update on amateur license tags, the determination that sales tax did not have to be collected by volunteer examiners, the inclusion of the FCC order preempting control of amateur antennas with a comprehensive land-use plan sent to all counties and municipalities, contacted the Dept. of Communications of the Dept. of Community Affairs regarding the safety management plan being developed for 800 MHz and also looked into the possibility of obtaining residential rates for repeater telephone use. Southern Florida shares KC4N in this appointment through the generosity of the Northen Florida Section where John lives in Tallahassee. KC4N can be found on the ARRL Information net most Saturday mornings on 3940 kHz at 8AM. Had a nice note from KC4XA, who has been a ham for sixty years and now lives in Broward County. His first license was W2DHF and he also held W2DRD as well as some others. He is operating on an indoor antenna now and as a result finds condo life a bit rough at times. DXing and traffic handling have been major activities for KC4XA-he now has a total of 129 countries and still check in occasionally to various nets. W4LLA reports 68 phone patches for the Research Vessel Knorr this past month. WB5YDD, assistant manager of CAND reported that RN5D was represented 100% during Feb. by NQ5W. 73 de WA4PFK. Traffic: W3CUL 4356, W4DUG 4323, W3VR 2578, WD4KBW 741, WA9VND 630, K4SCL 397, WA4PFK 388, N4NFK 348, WA4EIC 305, K4EUK 285, KA4FZI 248, WV5Z 244, K4ZK 215, W4TAH 213, K4IA 192, AA4BN 184, WA4RUE 169, N4ET 154, KK4WR 153, WA4RLV 140, N4MML 136, WB4WYG 116, W4DL 116, KB4KXV 114, KA4NXF 110, KY8Y 108, KA4YHS 99, KI4ZW 88, KB4LPL 87, WD4CHO 84, W1NJM 78, KJ4WJ 74, KA4SIH 60, WB4AID 57, AA4ZV 56, KY4U 55, KA4AJR 52, KF4RL 52, K4FQU 45, WT4F 36, KB4UIA 35, N1EGN 34, KB4MON 30, W3TLV 29, NK8O 28, KB4UHC 26, WD4NXK 25, W3QQ 23, N2COI 23, KAØGYF 20, KB4FO 20, WD4AEP 19, W4UIO 19, WA4VWJ 18, K4JI 17, W1KAM 17, WA4HDH 15, WA9AKY 15, N4QER 14, W3IJR 14, KB4EWO 12, KF4JA 11, K9EHP 10, VE3SI 9, AA4CH 9, N2FEL 8, W4LLA 8, W4MPV 7, AB4BC 7, W8OM 7, WA4PIL 6, W4IYT 6, KD4GR 6, KB4YJF 6, K4OVC 4, N4PSV 4, WA1BWV 4, KA4GDU 4, N4IXO 4, W4DWN 3, W4MFD 3, K4GVI 3, KA2KNZ 3, W4NSY 3, N4NZI 2, N4RHJ 2, AA4WJ 1, KY8T 1. (Jan.) N4IXO 2.



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WEST INDIES: SM, Jose A. Purcell, Jr. KP4IG—STM: WD4FMH. TC: KP4ARY. SGL: WP4CSG. SEC: KP4JV. PIO: NP4XM. PIA: KP4ABN. NM-WINS: KP4DJ. NM- WINE: VP2VI. NM-WINC: KP4LP. Congrats to USVI for their independence of the West Indies Section. Language barriers as well as distance were the sponsors for this change. Special thanks to KP4NQ and KP4JS from HRPR for their support to the ARRL activities in PR. Both Felipe and Jorge had demonstrated an outstanding assistance even in difficult times. NETS: WINC 145.350 MHz 6:30 PM daily; WINS 3710 kHz 7:00 PM daily; WINE 1895 kHz 8:00 PM daily. Both WINS and WINE in CW. Traffic: WINC QND: 170 QTC: 7. QNI: 160. WINS QND 750. QTC 7. QNI 750. KP4DJ traffic: sent 13 and delivered 4.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—NM's: K6LL, K7POF, WB7CAG. N7FVK coordinated Arizona's Special Olympics communications for Coconino ARES members at Flagstaff Snow Bowl. Very successful operation as usual. Navajo Co. ARC increased the coverage area of their 146.68 repeater by relocating antenna to water tower. Thanks to KA7VUX, KE7GP, and Neil Young, a volunteer from the fire dept. (Tnx Holbrook Radio Telegraph). W7YS reports very successful W200YS Bicentennial operation with over 2200 contacts. Sent in FB QSL card listing all the No. Az. DX Association ops who participated. New ARA officers recently elected are: N7JBZ, Pres.; WA7ZZT, V.P.; N7DFH, Treas.; and KA7VAB, Sec'y. ARA members supported the recent Phoenix Marathon event. (Tnx, Squelch Tail). Congrats to Bill, now ex-WA7BVN on his upgrade to Extra Class, and new call WK7B. W8ROD reports Green Valley ARC will sponsor a Special Event station at nearby Titan Missile Site museum using call sign KX7J on 16-17 April. Look for them on SSB on 7.230, 14.250, and 28.360. CW frequencies will be 7.050 and 14.050. Scottsdale ARC, an affiliated club, has applied for "Special Service Club" designation. FB. Marge, K1YCZ reports the Jan. meeting of Arizona Cactus Keys in Tucson was very well attended. The gals plan to have a booth at So. Mtn. Swapmeet as well as a Ft. Tuthill in July. (Tnx, Desert Aire Waves.) Cochise ARA plans their spring hamfest for 29 Apr.-1 May at Sierra Vista. They are also considering becoming an affilliated club. (Tnx, Cochise Smoke.) Don't forget: Int'l DX Convention at Visalia, CA Apr. 23-24; ARCA-sponsored Ft. Tuthill Hamfest, Flagstaff July 29-31, and ARCA Fall Swapmeet in Tucson on October 15. CUL, 73. Jim.

NET	ABBREV	QNI	TRAFFIC	SESS
SOUTHWEST NET	SWN	200	139	29
ARIZONA CACTUS NET(HF)	ACN	255	97	29
ARIZONA CACTUS NET(VHF)	ACN	672	81	29
ARIZONA TFC & EMERG NET	ATEN	1121	189	29

Traffic: KA7MUL 350, W7AMM 223, W7EP 186, WE7G 133, KE7EO 122, W7KCM 120, W7LVB 83, K7JKM 48, W7OIF 37, K7POF 27, K7RDH 26, W7GAQ 21.

LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF—I just received one of those letters that one always hopes to receive from a reader. H. Gordon Gaylord, N6NTW, wrote from San Diego, about helping a TOTALLY paralyzed (from the lower jaw down) 11-year-old boy. Gordon states that with today's input technology and processing capability much more than code can be accomplished. I am forwarding his letter to the Hilltop Amateur Masterlie System. N6NTWs address is 5412 Elgin Ave, San Diego, CA 92120. Power line noise in the Los Angeles area was the subject of a fine lecture at the Feb. DX Club Meeting by Bill Lonergan, WA6SEE. Bill's phone number is 213-481-6796 if Bill is not in, other office numbers for reporting line-noise are 481-4868 & 481-4211. Ron Boan, AK6Y, has been very popular at two important EMERGENCY COMMUNICATIONS MEETINGS in the past two weeks. Ron, our SEC & active Engineer, was one of the main speakers at our ARRL AIRES meeting at the Van Nuys Police Dept. in Feb. and on the 27th of Feb. Ron was one of the main speakers at the ARES/RACES gathering at Northrup. At Northrup our host was Kuby, N6JSX, our OOC for Los Angeles County. The Northrup meeting was very educational for the ARES as well as the RACES top-level administrators. As a result both ARES and RACES are recommending dual membership and a better understanding of one anothers charter during an emergency. The name of this real serious GAME is be prepared and paractice. KG6LF, Local Fuzz, our Police Chief Jerry Boyd from Coronado gave a real insight into the problem of responsibility during a serious emergency. Stan Harter, our California State Top RACES Administrator and Don Root, our Regional RACES Adminstrator, gave excellent speeches and answered questions until we all ran out of oxygen. Our ARRL Director, Fried, promised that we would have another get together soon for better understanding and mutual cooperation. General Dynamics ARS Swap Meet is the 2nd Sat of each month 7:30 AM to 11 AM. Call (714) 868-6180 or WB6KQY on the 146.91 MHz talk-in frequency for more information. You can write to GD ARS Box 1818 Pomona, CA 91769. AA6BB, Jerry, and KA6V Joanie, have taken over most if not all of the QSL manager job of our Silent Key W7PHO. Thanks Joanie and Jerry. You always do a good job and your many friends really appreiciate your work. Many of our local hams are active in racing. The most recent Old Timers Moto-cross Assoc. Winternationals was held near San Bernardino on the 27th and 28th of Feb.—you would be surprised how many hams were there from this area. N6AHV Tex (lifetime LA chapter Referee) was the announcer for all 36 races & Bobby, WB6UBD, was the Flag Master for all races. KE6IS, Opal was the official Tabulator for the two-day event. The Legal Advisor for the Moto-cross Assoc. is Joe, N6AHU. Another official position is assigned to KG6J, Art Macnmee. Art is the Parlimentarian for the Moto-cross Association. INDEXA, the DX group has just received a very generous gift from K7JXR, Jack. Jack has shipped a LIKE-NEW mint 701 ICOM with ICOM PS and desk microphone to INDEXA for trans-shipment to a rare or semi-rare DX station. STM News: Sorry to say we have lost W6MAB. He was handling Antarctica traffic from the south pole for many years. Now Silent Key, W6MAB. QCWA Chapter 130 had a great luncheon in Palm Springs. QCWA group nationwide had a large contest. The attendance seemed to be more than normal. Traffic: N6LHE 743, W6TH 428, K6UYK 410, W6INH 250, WB6VPY 47, K6YBV 42, W6NKE 30.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Riv. Co. W6LKN, Bob 714-686-3823, ASM: Org. Co. Ralph, WB6JBI 714-776-9272. ASM: San Ber. Co. Tony, WB6QHB 714-981-1836. Our SEC for the Orange Section, Ken, WA6ZEF, like many of us, has had his heart attack. Like many of us, he is doing well. Like many of us, he will slow down a bit. From all of us, "Good luck, Ken, and a fast recovery." Club News. ACC Sandy, WA6WZN. SIX METER CLUB Exec. Board: Pres Bob, K6PHE. VP Will, AA6DD. Treas, George, WT6U. Sec Grace N6FSL. SOARA Officers, Pres Muriel, KA6BJP. VP Lois, WD6CEO. Sec Vern AA6AR. Treas Emie, WA6QCA. SB CLUB ARA is looking into sending their newsletter by electronic methods. Will save the cost of printing and mailing the newsletter by uploading it to a local computer BBS. If some can receive newsletter electronically, it's worth a try. REHAB Radio Roundup (WD6BPT) is well under way now for 1988. It's fun to look back at 1987. 41 of 50 states were contacted during the year, and there were 10 DX contacts. The station celebrated its 10th birthday. A first for a hospital station? CORONA NORCO ARC Officers Pres Mark, N6MWH. VP Bob, KJ6B. Sec/Treas Fred, W6TKV. A K200TKV expedition to Sacramento is in the planning stages. The circle group is on the move. Fullerton RC, Inc. Pres Smitty, WA6GHE, comments on a new year. A time to make your new year resolution. A time to set new goals, and do at least one of the things you promised yourself you would accomplish. Let's all pull together, and make 1988 a banner year. The word is "BECOME INVOLVED." Victor Valley ARC Officers, Pres Jim W6OUU. 1st VP Henry, KA6ZPN. 2nd VP Polly, KA6KKN. Tre Walt KB6CKT. ORANGE CO.C.A.R.O. We've all heard of "adopting a Cabbage Patch Doll?" NOW every amateur operator SHOULD be involved with "Adopting a School!" We know that our children are the country's number one resource, and as such deserve our first concern in terms of protection. The idea is to have an amateur available to go to a pre-assigned site in case of any emergency, be it fire, flood, or "The Big One." Please call Mary Pagel, KA6IGG 714-772-5451. Please consider this need. ARES/RACES. The biggest event in the Orange Section was the visit to Southern Cal by Stan Harter,

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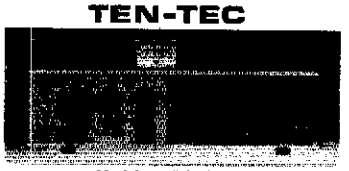

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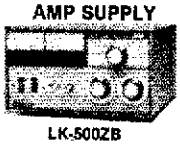

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KH6GBX, State of Calif Amateur Radio Coordinator. After meeting with Stan and Don Root OES Region Comm Coord at County, Section and Division level, I enforce my opinion that for the benefit of the public and the Amateur Radio Service, (1) Amateur Radio operators and public service officials must work together. (2) Calif RACES can be activated by OES Officials as needed, and the Calif National Guard can be activated by the Governor. (3) RACES Officials should be nominated by the Amateur community and appointed by the OES Office concerned. In this manner, the Amateur Organizations become part of the team and a close relationship will result. Packet Racket: Dan, WF6O NTS News, Prim NTS BBS for San Berdo Co is KB6GVT-1 on 03. Some SB Co high desert is going to N6ADV BBS on 05. N6ADV may be able to start taking Inyo Co. The packet outlets for NTS continue to grow! Traffic happenings: SCN1 29 sess, QNI 245, QTC 249. SCN2 20 sess, QNI 69, QTC 45. SCNV 29 ses, QNI 294. QTC 240. Congrats to WF6O for BPL/PSHR 643. KA6HJK/T 40. PSHR 117. WA6OCA PSHR 80. WB6QBZ PSHR 68. KA6TND PSHR 28. AD6A 102, N6GOT 86, K6ZCE 29, W6SX 27. W6CPB 26. N6QXR 6. KB6VP! 4. TC/LIC NEWS. Joe, K6OV, has been doing a fantastic job on his club presentations. D/F, Tee hunting a fun sport and useful in the area of turkey hunting. John, KD7XG, rpts STA KD7XG-5 is the VHF port to a system running two ports. The other port is KD7XG-0 on 20 meters (14.109) as part of the SKIPNET STA. We definitely needed to get SoCal back on 20-meter net work. Glad the Orange section and So Cal are part of the STA.

SAN DIEGO: SM, Arthur R. Smith, W6INI—STM: N6GW. SEC: W6INI. TC: N6JZE. Heard a fellow ham say recently, "I've enjoyed many years of ham radio and now I want to put something back into it. So I became a volunteer examiner." There's a lot of you out there who might consider adopting this commendable attitude. The charge to us in par 97.1 (a) - emergency communications - of our regulations is where we need to devote much effort. Join ARES thru one of the following nets:

0930 Sun	3.725 MHz	Section Net	CW
0900 Sun	3.905 MHz	Section/Cent Dist Net	SSB
0915 SUN	3.910 MHZ	So.Dist Net	SSB
0845 Sun	3.920 MHz	TriCity/NE/NO. Dist Net	SSB
0915 Sun	3.925 MHz	E. Dist Net	SSB

*Novice & Technician Classes welcome. Poway ARS 1988 officers: Pres. N6IMV, VP: WT5B, SEC: KB6VE, Trs. KI6SG. Escondido ARS runs T-hunt on the 3rd Sat. Call N6CLO (745-7850) for info. N6LYX has upgraded to Adv. KB6OXZ is now N6RHS. W1LE is active on USNA Alumni Net (0830 Wed. 7282.5). N. County Traffic Net met 26 times with 404 checkins, handled 118 messages. Traffic: KI6ZM 138, KI6ZH 114, N4KRA 91, N6GW 49, KU6D 28.

SANTA BARBARA: SM, Thomas I. Geiger, W2KVA—ASM/Ventura: N6MA. ASM/SBar: WB6BYU. ACC: KB5AH. BM: KI6XG. STM: N6WP. OOC: W8AKF. PIO: N6FOU. TC: W6KFV. SEC: WB6IIY. DEC/Ventura: WB6RVA. DEC/SBar: N6AJA. DEC/SLO: WB6IIY. I've received several letters and read a number of items in club publications recently that indicate there's some confusion about who's who in the ARRL Field Organization structure. This isn't too surprising —I was pretty confused about it myself before I became Section Manager. To clarify the structure, I will begin with a little bit of history. Back in the early years of ham radio, the American Radio Relay League was founded to facilitate the orderly movement of message traffic from point to point. In those days, the average amateur station could reliably communicate across town. For radio message traffic to reach from coast to coast, or even across the state, it required RELAYING. (Ever wonder where the name came from?) When ARRL became the national radio organization for the United States and Canada, an organization of Official Relay Stations (ORS), directed by a Route Manager (RM) eventually evolved. When phone operation became common, the Phone Activities Manager (PAM) recruited and coordinated the activities of Official Phone Station (OPS). Finally, the Section Emergency Coordinator supervised the activities of the local Emergency Coordinators. Since these activities all revolved around COMMUNICATIONS, the Section Field Organization was directed by a Section Communications Manager (SCM) who, in turn, reported to the Communications Department (CD) at ARRL Headquarters in Hartford (later Newington). By 1980 Official Bulletin Stations (OBS), Official VHF Stations (OVS) and Official Observers (OOs) had been added to the CD family. When restructuring of the League became a reality in 1980, many things changed. More next month about the New ARRL Field Organization.- Upcoming Events: April 16th Hamfest sponsored by Ventura ARC (K6MEP). May 14th West Coast VHF/UHF Conference sponsored by Santa Barbara ARC (K6TZ) - Holiday Inn, Buellton, CA.- contact Al Soenke, WA6VNN, 228 Hillview Dr., Goleta, CA 93117 (805) 968-0873. Traffic: N6NLW 155, W6NOR 109, KB6IEC 25.

WEST GULF DIVISION

NORTH TEXAS: SM, Phil Clements, K5PC—Asst. SM: K5MXQ. BTM: W5VMP. SEC: W5GPO. TC: W5LNL. BM: W5QXK. OOC: WB5JBP. PIO: K5HGL. SGL: N1CWP. ACC: W5URI. SKYWARN activity has started early this year; several nets have been activated with tornado sightings in the Northern part of our Section in February and early March. To quote officials at the NWS, we are overdue for a massive outbreak of severe weather in Texas, and this spring is already proving that ARES and RACES units should be geared up to meet all contingencies. Our Section ARES plan provides for rapid response of manpower and equipment to the disaster site. We do not wait to be "invited," but respond as soon as a possible communications emergency is known to exist. The first mobile unit approaching a disaster site will establish a command post in an appropriate area, and begin to assemble a pool of manpower and equipment; establishing contact with units already within the disaster area, and keeping responding units and Section ARES officials informed as to the existing conditions and requirements. The local EC, if available, is in charge of all operations. In his absence, the DEC will take charge. Time is our worst enemy in these situations; the first 24 hours are always the critical time. It is far better to over-respond than to arrive with too little, too late. Past experience has shown us that the initial size-up of a disaster area by public-safety officials is grossly underestimated in terms of needed requirements and mutual aid. There seems to be a period of several hours to recover from the initial shock of the disaster for the officials to start making rational decisions about requirements. This is why it is imperative for us to be in position, organized, and with the resources necessary to meet any and all contingencies. If you find yourself in the midst of a disaster, pick up your microphone and communicate your situation. Get word to the outside world as soon as possible so that we can get the ball rolling, and initiate a proper and prompt response. Charles Byars, W5GPO, our Section Emergency Coordinator, myself, and other Section officials will be monitoring 7290 kHz (day) 3873 kHz (night) and 2 mtrs (as appropriate) for the initial word that an emergency exists. Again, I stress, do not underestimate your situation! Tell it like it is! Many reports of record attendance in SKYWARN classes in all areas this year. We are trained, organized, and ready. I am proud of each and every one of you! We are blessed in our Section with an abundance of dedicated, public service-oriented amateurs who demonstrate on a daily basis that our credibility has been earned by hard work, and is appreciated by those agencies we serve. PSHR for Feb. KB5DOE KB5ADE W5YQZ W5VMP WZ5N K5UPN K5MXQ KF5BL. Traffic: W5YOZ 306, AJ5K 280, WZ5N 261, KD5RC 254, K5UPN 243, W5VMP 165, W5TNT 143, KA5AZK 107, K5MXQ 86, W9OYL 82, KF5BL 53, KB5ADE 51, KA5ZWY 49, KB5DOE 28, KC5NG 23, WA5EZT 22. (Jan.) AJ5K 118, WX5O 27.

OKLAHOMA: SM, Bill Goswick, K5WG—The Green Country Hamfest, hosted by the Tulsa and Broken Arrow ARCs, will be held 14-15 May at the Fairgrounds Pavilion in Tulsa. Talk-in on 146.31/91. This event has seen steady growth over the past several years and features an excellent flea market. Make plans to attend if you can. Congratulations to the newly-elected officers of the Broken Arrow ARC: President - Earl Stutzman, WB5UUW; VP-Steve Ray, N5FEM; Sec-Dave Wofford, KB5EMO; Treas-David Foster, N5KFU. The Sooner Traffic Net (STN; 3850 kHz, Mon-Sat, 2330Z) reported 462 check-ins/25 sessions/104 traffic in February; tnx, Steve N5FEM NM. The Oklahoma Traffic & Weather Net (OTWN; 3900 kHz, Mon- Sat, 2345Z) reported 453 check-ins/25 sessions/359 traffic/325 wx reports; tnx O.C. WA5OUV NM. Please check into these nets when you can. The Oklahoma Liaison Net (OLZ; 3682.5 kHz, 0100Z) still meets nightly and could use more participants. Dust off the old bug or keyer and join us there. February Traffic: WB5SRX 380, N5IKN 138, KF5RD 137, WA5OUV 90, N5FEM 90, W5RB 67, K5GBN 54, WA5OGC 27, W5VLW 26, KV5X 26, W5VOR 25, WA5ZOO 23, K5CAY 17, K5WG 11, W5JJ 3. January Traffic: WA5OGC 27. BPL: WB5SRX; PSHR: WB5SRX, KF5RD.

SOUTH TEXAS: SM: Arthur R. Ross, W5KR—ASM: N5TC. STM: WR5O. SEC: K5DG. ACC: WB5YDD. PIO: WA5UZB. BM: K5CVD. OOC: WA2VJL. TC: NZ5U. SGL: K5KJN. Please note that WR5O is the STM: he has a lot work ahead in trying to equal K5QEW. PIA N5KEP. Laredo, reports K5KYD, KF5RM, KB5BKY, K5SOJ and N5KEP provided communication for the George Washington's Birthday 30-mile bike race; NN5Q, KA5SWJ, K5KTX helped run the big parade. N5MAQ looking for anyone active on 160 meters. KA5CQN reports he upgraded to Technician. Clear Lake ARC has applied for ARRL affiliation; N5JQS and N5GIG upgraded to Advanced. OOC WA2VJL reports a need for more OO stations; drop him a line if you're interested. He is bragging about his all-Ham family since his youngest passed Novice. As a VE, WA2VJL reports KB5FFN and an unlicensed lady went to Technician and W9JLP upgraded to Advanced and passed 20 wpm. PIA KA5EEQ, Brenham, reports a Special Event station operated from Washington, TX in early March. San Benito ARC reports KA5UVY, KA5SJH and WA2VJL provided communication for Cameron County Stock Show and parade. University of Texas ARC (UTARC) news reports Novice license class going good; Temple ARC conducted SKYWARN course; WN4KRN has BBS operating on 145.01 MHz. BARN, Beaumont ARC, Newsletter reports WB5ZCK and others provided communication for soccer tournaments in which 50 teams played. PIA N5IKW, Sam Houston ARK, reports 14 in Novice class conducted by N5AF. PIO WA5UZB reports he and BM K5CVD plan to visit area clubs; speaking engagements scheduled for Sam Houston ARK, Northwest ARS, breakfast visits at Bryan ARC and Port Lavaca ARC; other visits skedd for LaPorte ARC, Brenham ARC, Houston ECHO Society, Golden Triangle ARC, Bay City ARC, JSC ARC, Clear Lake ARC; more will be on tap later; working to have all PIAs exchange ideas with each other. PIA WR5J, Austin, reports KB5ESH, KB5DSF, KB5ESI, KB5FIO and seven unlicensed applicants went to Technician; KB5BBV, KB5CHL, N5LXW and one unlicensed applicant went to General; blind KB5ELV went to General and passed 20 wpm, KA5ZVB, N4BXH, N5KOB and one unlicensed applicant went to Advanced; WB6RIG went to Extra; 5 Unlicensed applicants went to Novice, clubs getting early start on Field Day publicity. PIA NZ5J reports much excitement during 2-meter skip. DRN5 NM WB5YDD reports 978 messages in 58 February sessions; STX represented 100% by KD5KQ, K5QEW, W5SHN, W5KLV, N5DFO, K5GDX, WB5HZQ, KE5ZV, WA5ZJY, and WB5YDD. Bay Area ARC, LaPorte reports N5KEM upgraded to Extra; N5GIG and N5JQS went to Advanced; KB4JZR, KB5EPA, KB5OEZ and KA5VJG went to Technician. CAND ANM WB5YDD reports 805 messages in 29 February sessions; RN5 represented 100%, STX stations helping were KE5ZV, KD5KQ, W5KLV, NX5V, W5KLV, WA5ZJY, N5DFO and WB5TDD. PIA N5FIX, NARS in Houston, reports KF5ZL appointed Harris County RACES officer; 32 enrolled in a Novice class.

WEST TEXAS: SM, A. Milly Wise, W5OVH—ACC Jerome Dorrie, K5IS, is editor of a very informative bulletin called "The Shorted Circuit." ASM Glen is now the editor of the PARC Club Bulletin. Don Mosher, WB5BRY, was reelected to office of Pres. of Lubbock ARC and Fred, AA5DN, reelected SEC. A small plane crash in El Paso made national news. Cal, WA5LPB, was near, reported it on 2 meters. Then, Ed, K5DIT, called 911. The firemen and EMS units were there in minutes, but there was no mention of the hams in the news. ASM Glen reports ACC Jerome, K5IS, and Fred, WB5ZRC, received their SKYWARN certification. NW Texas ARC in Borger have a new meeting room and club station. N5AE, of Panhandle ARC has been doing a good job conducting Novice and upgrading classes. EPARC holds continuous code and theory classes. Jack, KB5QV, and Lou, K5CU, have added many new Novices to the Amateur ranks. Big Bend ARC alpine provided comm. for racing events, off road car race and bicycle race. The BBARC Emerg. van has been remodeled. Thanks to K5FD. Lubbock area has a new repeater on 147.20 up 600. Squelch tails of Snyder ARC new officers. Pres. Max KA5WMO, V/P Hamp, N5LEL, Sec/Treas KE5ZW. Many clubs in WTX Sect have bulletins where I get my news. Am very pleased to say I am getting reports from most of my appointees. Keep up the good work. 73, SM Milly Wise, W5OVH. Traffic: N5KUC R 5, S-1, D-5, T- 11; AE5I R-57, S-63, T-120. TEXAS CW NET: 58 Sess, QNI 668, QTC 350. TEXAS TRAFFIC: 29 Sess, QNI 913; QTC 139; DAY REGION 5: 58 Sess, WTX Rep 81% W5ERT 978 QTC. 7920 TRAFFIC NET: 46 Sess, QNI 3193, QTC 614, 2 NTS liaisons.

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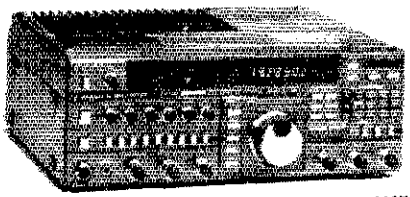

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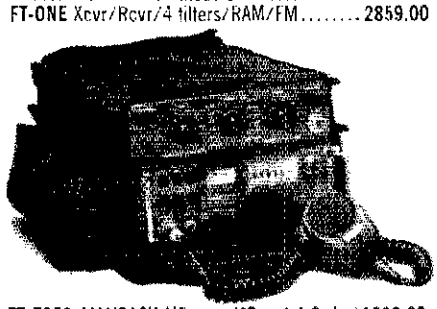

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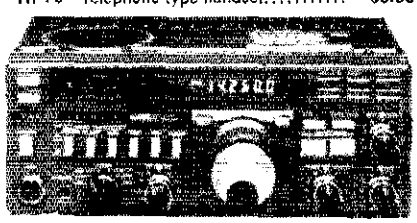

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FT-711RH 35w 440MHz FM w/autodialer mic	479.95
FT-2311R 10w 1.2GHz FM w/autodialer mic	559.95
FT-290R MKII 25w 2m FM/SSB xcvr	599.95
FT-690R MKII 10w 6m FM/SSB xcvr	589.95
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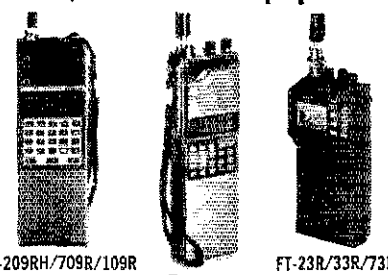

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Acc. for 09-series/03-series/FT-727R	LIST
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FBA-5A Alkaline batter holder for 727R	14.95
FNB-3 425ma 10.8v batt (comes w/03 series)	49.95
FNB-3A 425ma 10.8V battery for 727R	49.95
FNB-4 500ma 12v batt (comes w/09-series)	64.95
FNB-4A 500ma 12v batt for 727R	64.95
FTS-6 Encoder/decoder; 09-series	49.95
FTS-7 Encoder/decoder; 03-series	49.95
LCC-6 Leather case; 09-series	39.95
LCC-6A Leather case; 727R only	39.95
MH-12A2B Speaker/microphone	41.95
MH-18A2B Lapel speaker/microphone	41.95
NC-9B Wall charger for FNB-3	11.95
NC-15 Desk quick charger/AC ps	89.95
NC-18B Wall charger for FNB-4	11.95
MMB-21 Mobile bracket	11.95
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TA-2 2m 19" telescoping whip ant.	11.95
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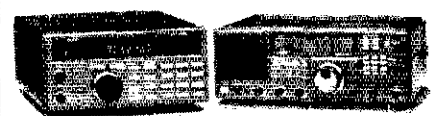
Other Handheld Accessories	CALL



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FRT-7700 Antenna tuner	64.95
FRV-8800 118-174 MHz VHF converter	129.95
FIF-232C Interface; VIC-20/TI/RS-232	79.95
FF-5 500 KHz low-pass filter for VLF	20.00
DC-8800 DC kit	4.50
FM-W/8800 FM-wide kit	20.00
FRG-9600 60 to 905 MHz receiver	699.95
VU-9600 NTSC video unit	25.00
Catpack software (specify computer)	79.95

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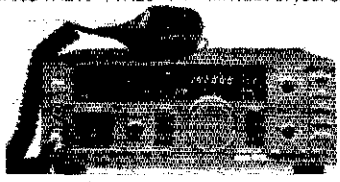

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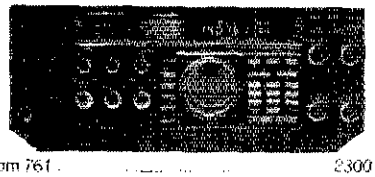

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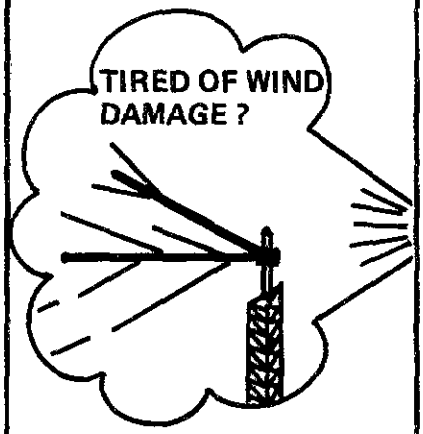

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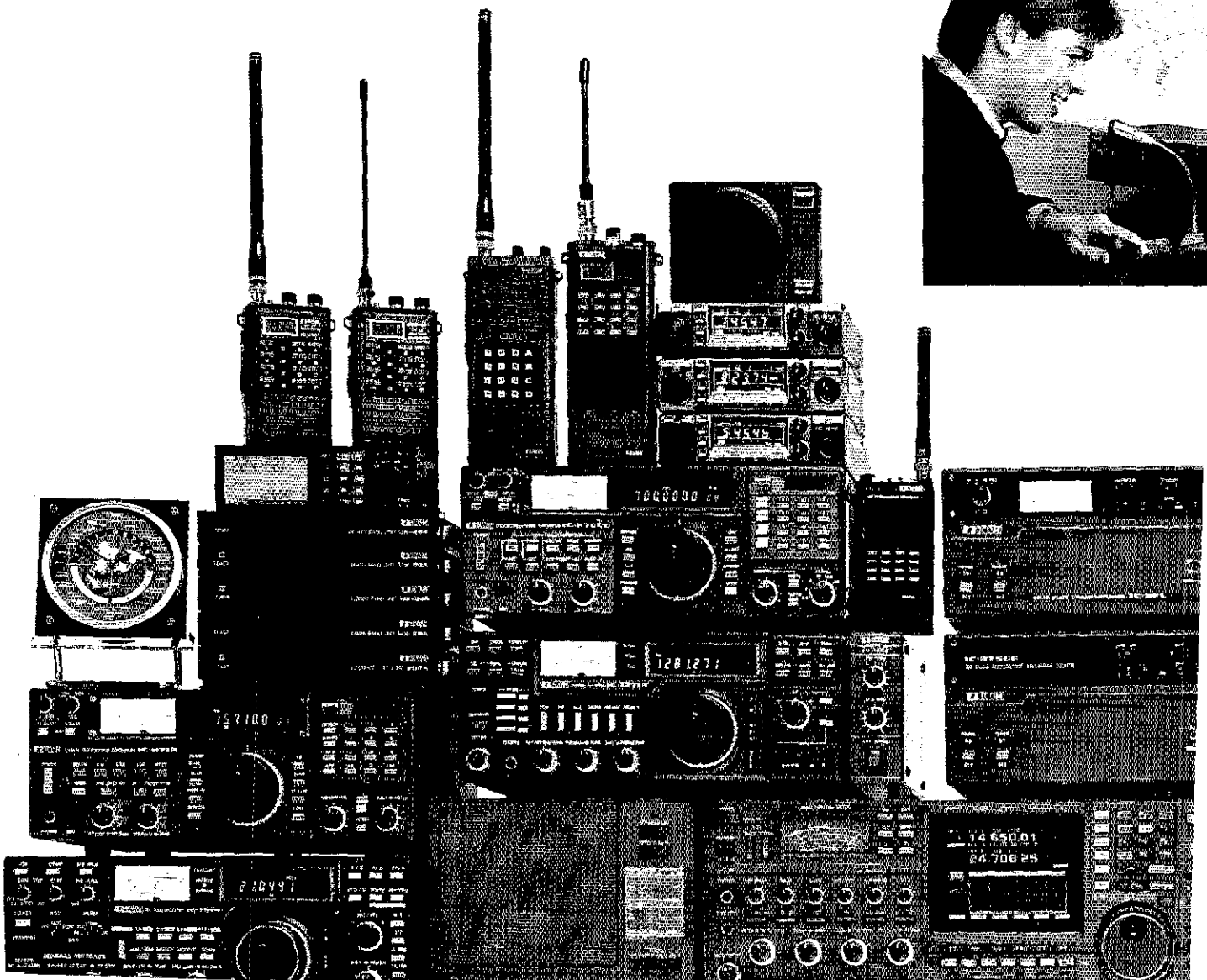

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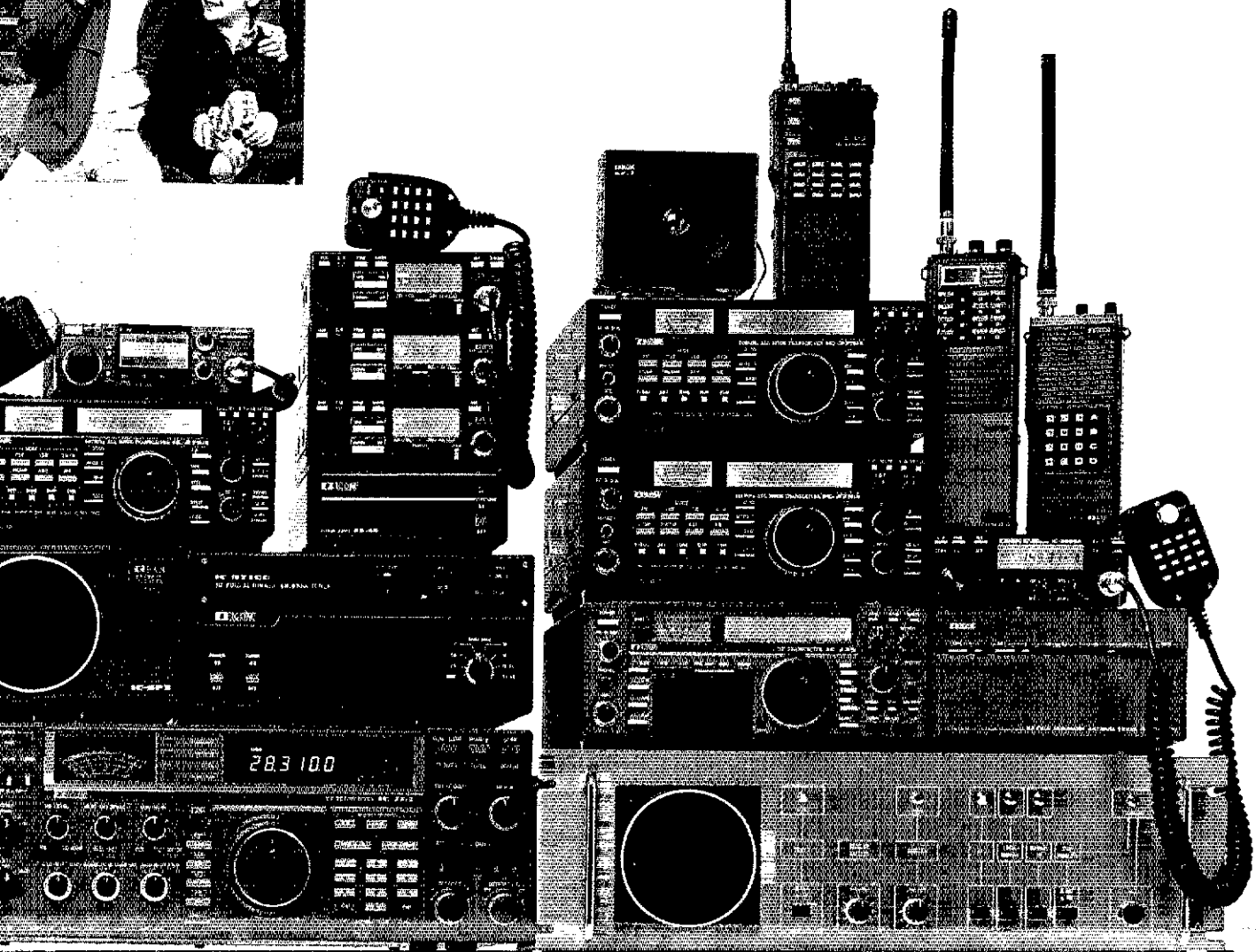

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ATV. . .Looking Good With ICOM

Investigating new areas and communicating via new modes are two of amateur radio's most exciting aspects, and the visual medium of ATV always rates highly popular in such pursuits. Recognizing those facts along with natural curiosities surrounding any new interest, this Tech Talk will overview the world of amateur television in a basic "what's involved" manner. The resultant insight will assure your getting started or continued operating success in a knowledgeable and confident manner.

Amateur video communications include the two different concepts or modes of Fast Scan TV and Slow Scan TV, each serving a particular purpose or filling a specific need. Both concepts add the dimension of sight to your amateur radio setup in an eye-opening window to the world manner.

FSTV pictures are similar to regular home TV pictures. They are comprised of several hundred lines, and scanned at an extremely fast rate to produce the effects of full motion. These video signals are several MegaHertz wide; consequently, VHF ranges like the 70cm and 1.2GHz amateur bands are necessary for FSTV operations. This mode is quite attractive for coordinated local area activities like weather watches, public event coverages and sharing friendly views of club projects.

A popularly recognized example of FSTV activity involves amaters' visual assistance during the annual Rose Parade. SSTV pictures are comprised of fewer lines; they are scanned at a very slow rate and transmitted over the air as a series of still views. These narrow-voice bandwidth signals are transmitted via HF bands like 80 or 20 meters using an SSB transceiver and an externally connected digital scan converter to accelerate/decelerate picture information for compatibility with regular (FSTV) cameras and monitors or TVs. Popular examples of SSTV activities include an almost constant flow of views highlighting Mexican pyramids, Australian sunsets, African plantations, etc., noted on 3.845 and 14.230MHz.

Setting up a modern 1.2GHz FSTV station is a cinch with ICOM's IC-1271A multi-mode transceiver and optional TV-1200 adapter. A home video camera and monitor are connected to the TV-1200, then the TV-1200's cable plugs into the IC-1271A's awaiting rear socket. A small 1.2GHz antenna completes the setup. During station planning, strive to locate your antenna and transceiver within 15 to 20 feet of each other and use low loss coax cable without sharp bends for maximum efficiency. Position your antenna so its maximum signal radiation will be directed away from your operating position, and enjoy the action.

SSTV station assembly is a similarly easy maneuver requiring only two cables. One routes from your transceiver's speaker output to a scan converter's input and the other routes from the converter's output to your transceiver's microphone input. A home video camera and monitor complete the system, and the addition of an ordinary voice tape recorder (with good speed regulation) provides storage of interesting pictures for later review.

Since SSTV is a full duty cycle mode, reducing your station's RF output power to between one-fourth and one-half its usual SSB level during actual picture transmission is heartily recommended. That reduction will not be noticeable to other stations (indeed, it will prove advantageous by making your audio and video signal levels equal on their receiver!), yet it will assure long and reliable operation of your station and linear amplifier plus its antenna system. All ICOM HF transceivers include a convenient front panel RF OUTPUT control that functions on all modes, allowing you to easily reduce power to any desired level and operate with full confidence.

Noteworthy considerations for superb SSTV reception include effective passband tuning and a sharp IF notch filter. SSTV signals use 1200Hz pulses for scan line synchronization and 1500 to 2300Hz tones for conveying video shades from black to white. Interference above 2300Hz or below 1200Hz can be minimized, and SSTV signals peaked using the continuously adjustable bandwidth effects of true passband tuning. A sharply tunable IF notch filter performs sheer magic in reducing interference situated between sync/1200Hz and black/1500Hz to below a picture-disrupting level. Additionally, sharp video-interfering heterodynes between black/1500Hz and white/2300Hz can be significantly attenuated for continued picture reception with minimum gray scale loss. If those pictures are printed IDs, typically using only 1200, 1500, and 2300Hz tones, that gray loss may not even be noticed. That's performance!

All of the previously outlined features are included in ICOM's incomparable HF transceivers. Some of those features also seem to be included in competitive brand transceivers, but check closely to assure you are getting the real thing. ICOM's full duty cycle ratings are legendary in field-proven performance, its true passband tuning narrows bandwidth while peaking desired signals, and only IF notch circuits assure proper AGC action.

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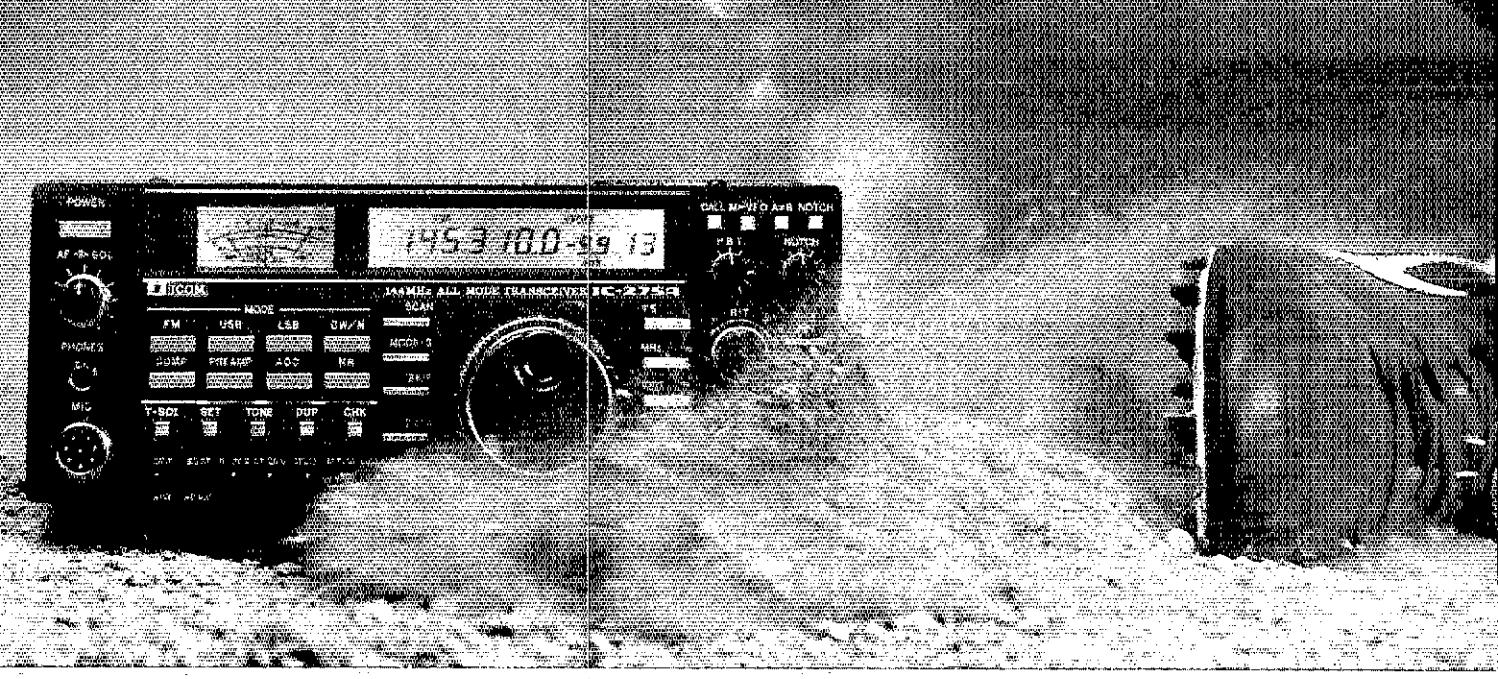

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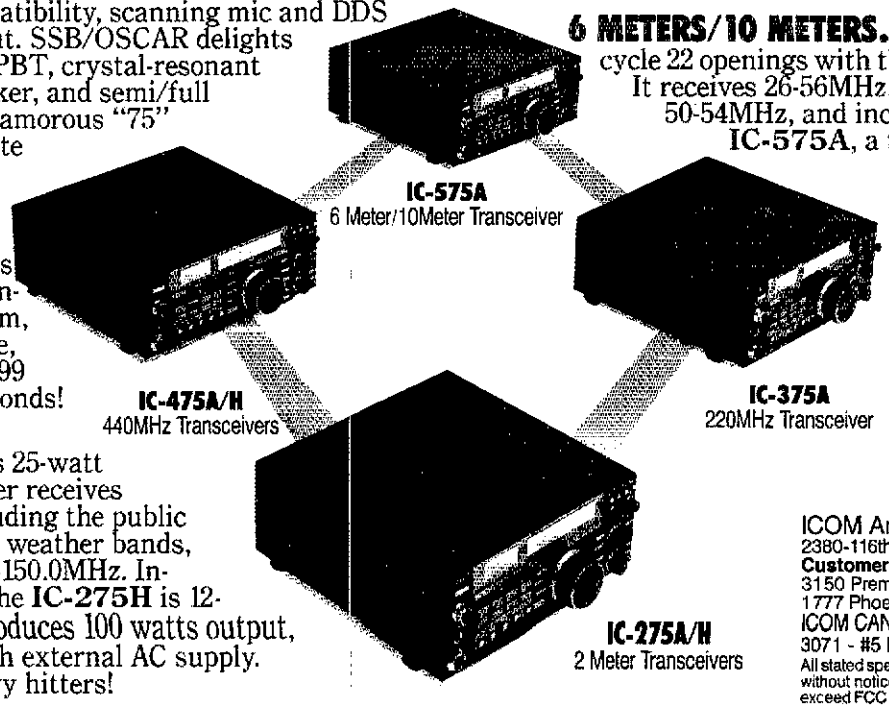

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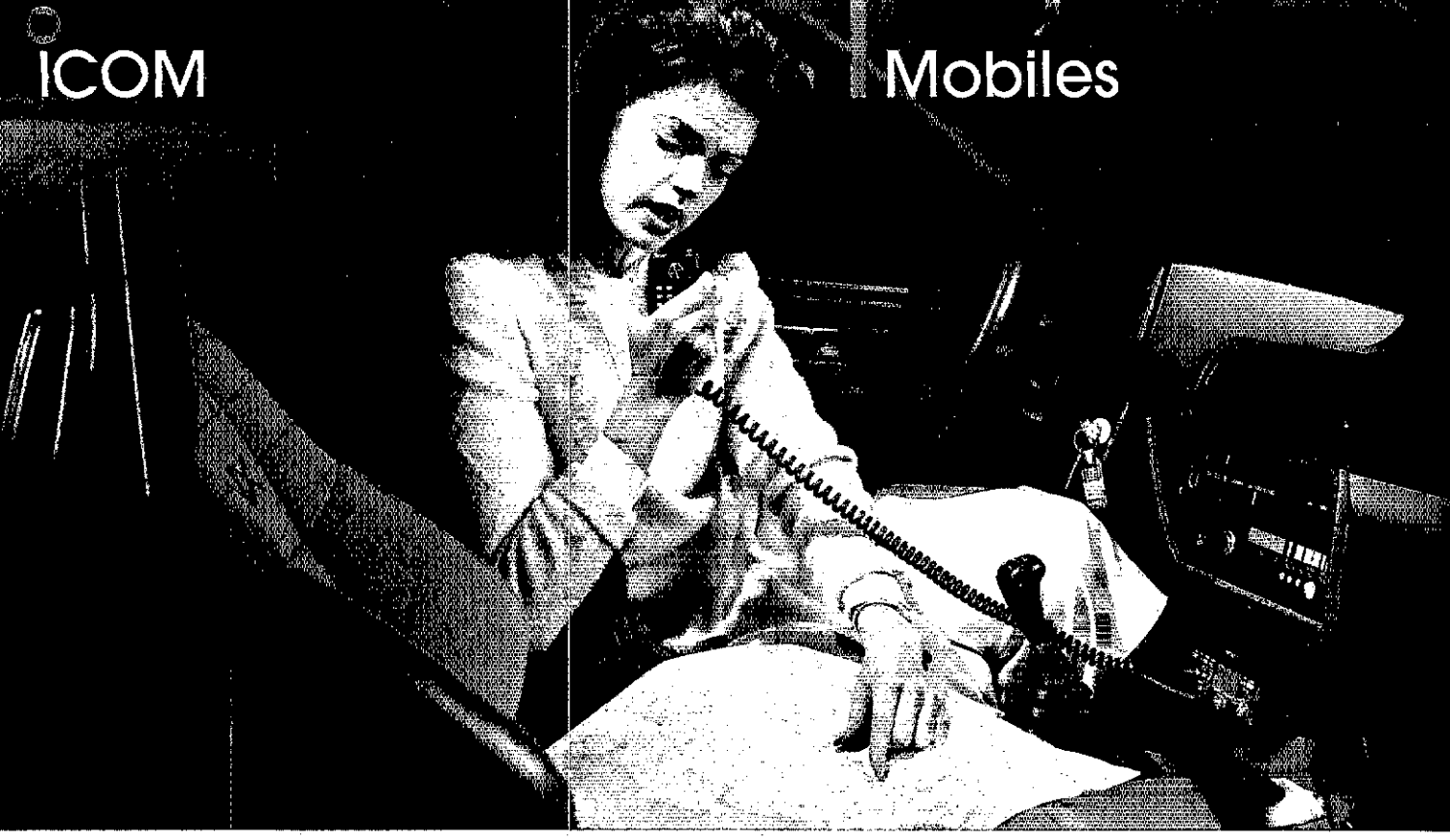

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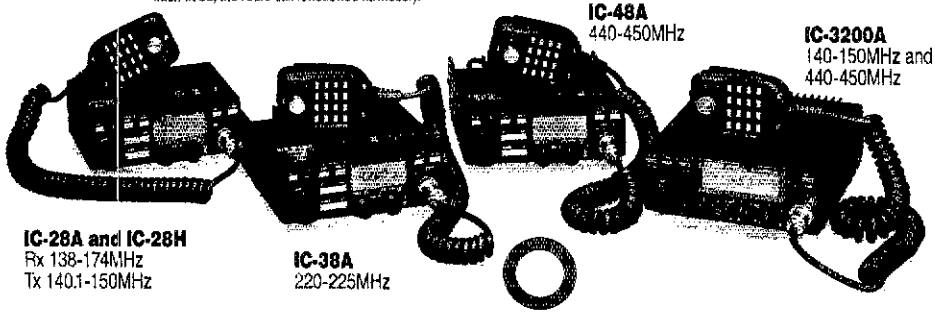

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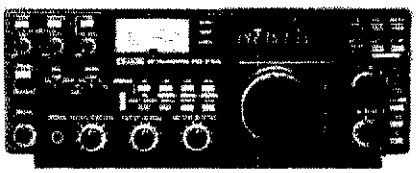
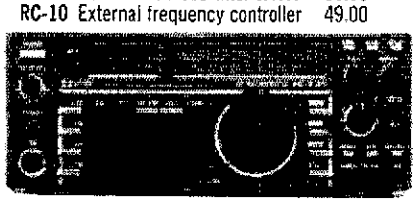
SP-20 Ext. speaker w/audio filter	149.00	139.95
FL-101 250 Hz 1st IF CW filter	73.50	
FL-53A 250 Hz 2nd IF CW filter	115.00	109.95
FL-102 6 kHz AM filter	59.00	
EX-310 Voice synthesizer	59.00	



IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	1449
PS-35 Internal power supply	219.00	199.95
FL-32A 500 Hz CW filter (1st IF)	69.00	
FL-63A 250 Hz CW filter (1st IF)	59.00	
FL-52A 500 Hz CW filter (2nd IF)	115.00	109.95
FL-53A 250 Hz CW filter (2nd IF)	115.00	109.95
FL-33 AM filter	49.00	
FL-70 2.8 kHz wide SSB filter	59.00	
RC-10 External frequency controller	49.00	



IC-735 HF transceiver/SW rcvr/mic	1099.00	959.95
PS-55 External power supply	219.00	199.95
AT-150 Automatic antenna tuner	445.00	389.95
FL-32A 500 Hz CW filter	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	1699
PS-15 20A external power supply	175.00	159.95
PS-30 Systems p/s w/cord, 6-pin plug	349.00	319.95
MB Mobile mount, 735/751A/761A	25.99	
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal for 751A	79.00	
PP-1 Speaker/patch	179.00	164.95
SM-6 Desk microphone	47.95	
SM-8 Desk mic - two cables, Scan	89.00	
SM-10 Compressor/graph EQ, 8 pin mic	149.00	139.95
AT-100 100W 8-band auto. antenna tuner	445.00	389.95
AT-500 500W 9-band auto. antenna tuner	589.00	519.95
AH-2 8-band tuner w/mount & whip	659.00	589.95
AH-2A Antenna tuner system, only	519.00	449.95
GC-5 World clock	91.95	89.95

VHF/UHF base multi-modes	Regular	SALE
IC-275A 25W 2m FM/SSB/CW w/ps	1299.00	1149
IC-275H 100W 2m FM/SSB/CW	1399.00	1229
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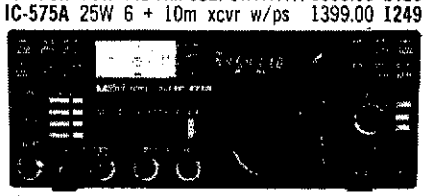
IC-475H 75W 440 FM/SSB/CW	1599.00	1429
IC-575A 25W 6 + 10m xcvr w/ps	1399.00	1249



IC-471A* 25W 430-450 CLOSEOUT	979.00	749.95
PS-25 Internal power supply	125.00	114.95
AG-1* Mast mounted preamplifier	99.50	
IC-471H* 75W 430-450 CLOSEOUT	1399.00	989.95
PS-35 Internal power supply	219.00	199.95
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Accessories common to 271A/H and 471A/H	
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UT-15 Encoder/decoder interface	34.00
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IC-490A 10W 430-440 Closeout	699.00	399.95

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BC-35 Drop in desk charger for all batteries	79.00
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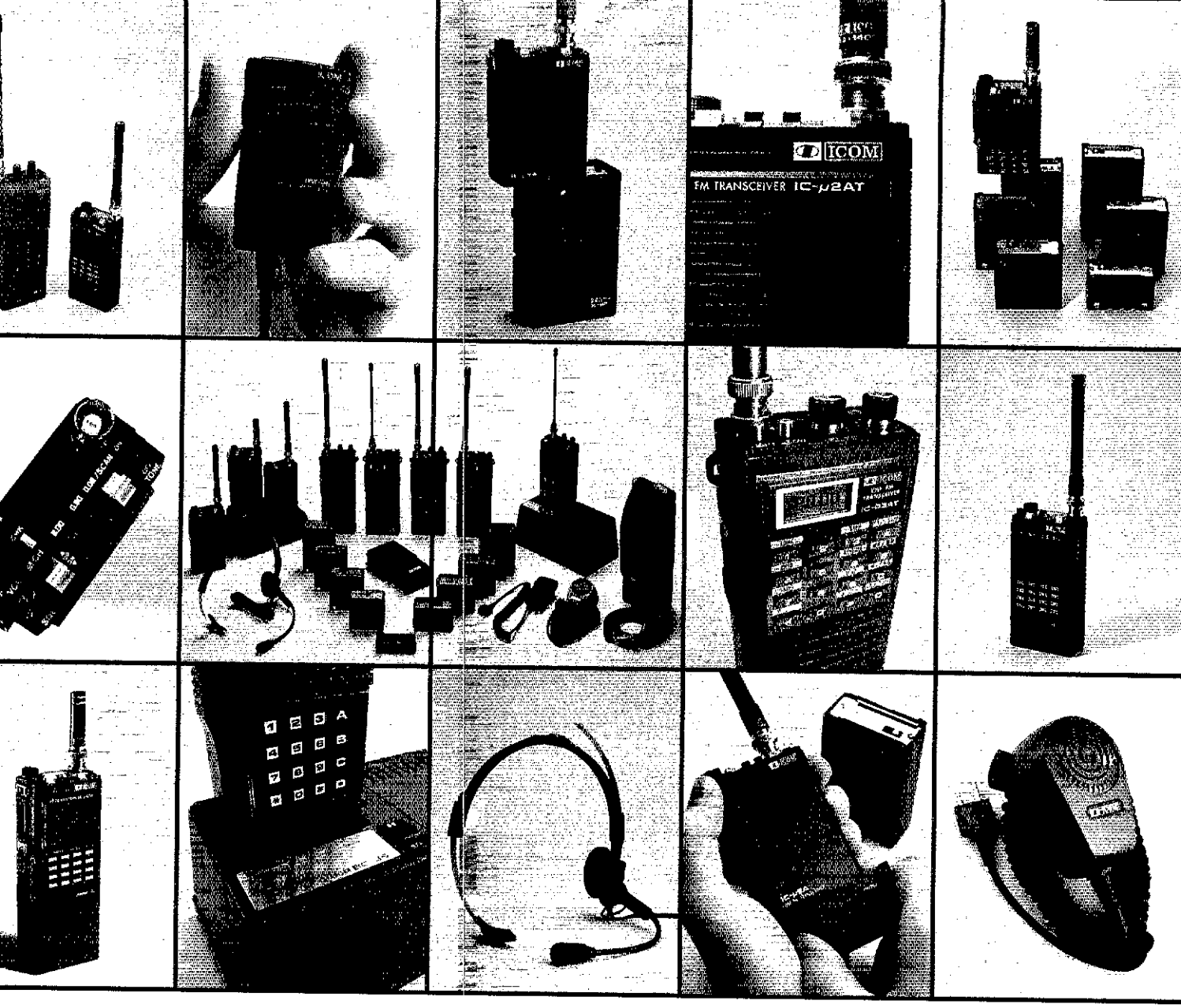

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Frequency selection is with the main tuning knob, direct keypad entry or up/down buttons that will shift in 100 kHz or one MHz increments or to the next ham band. DISPlay button selects 24 hour clock or date or tag. VOICE button causes a voice frequency announcement when optional synthesized voice board is installed.

Rear panel controls adjust the VOX, CW monitor level and tone, and SSB sidetone monitor level. Switching is provided to control conventional linear amplifiers and high speed switching for QSK linears, such as the Titan. Other rear panel connections are included for a transverter, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc and provision for the optional RS-232 control interface.

An absolute delight for the all mode operator.

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The low drive requirement of the Titan (65 watts in for 1500 watts output typical) makes life much nicer for your exciter too. Operating temperatures are significantly lower and component life extended accordingly. This is especially comforting using "keydown" modes such as RTTY. Adjustable ALC is provided for controlling exciter RF output levels.

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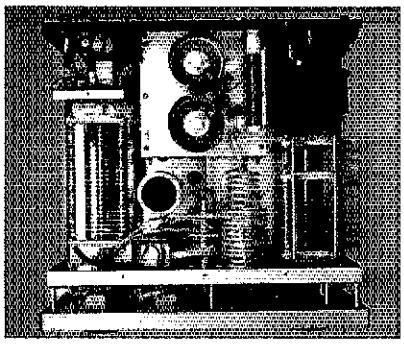

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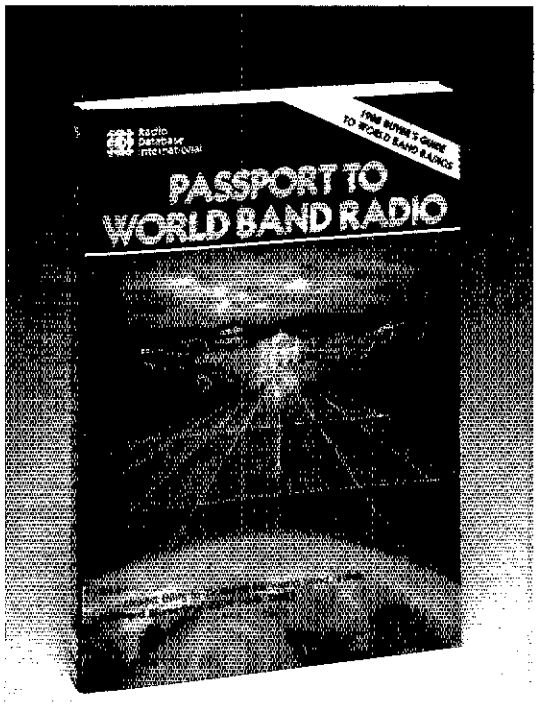

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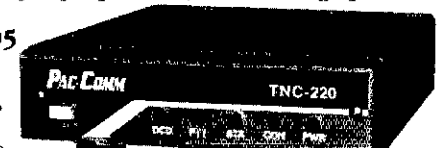

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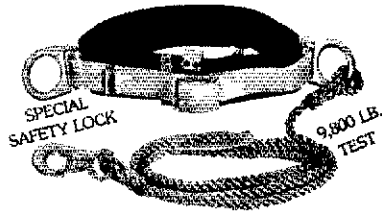

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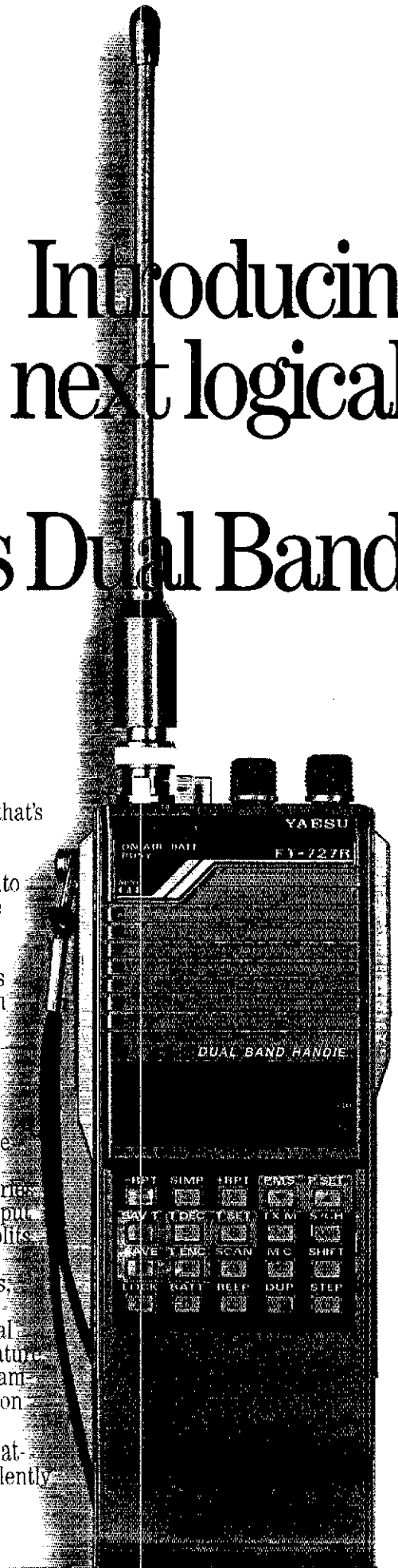

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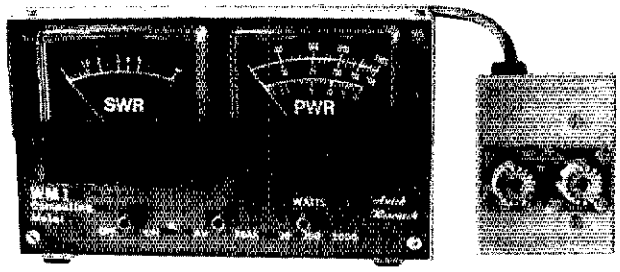

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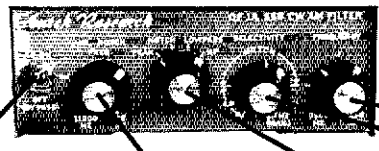

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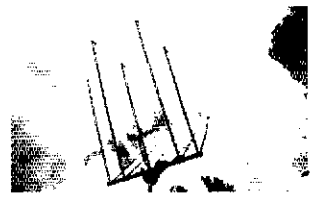

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- **Built-in automatic antenna tuner (optional)**
  Covers 80-10 meters.
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  Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 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)**
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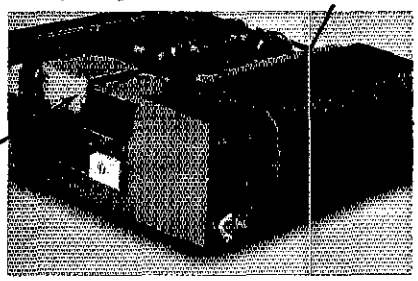

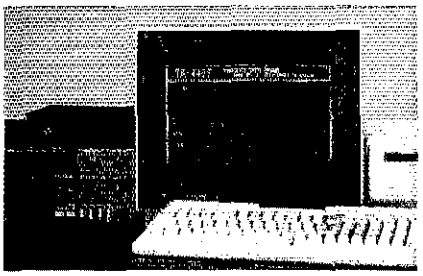

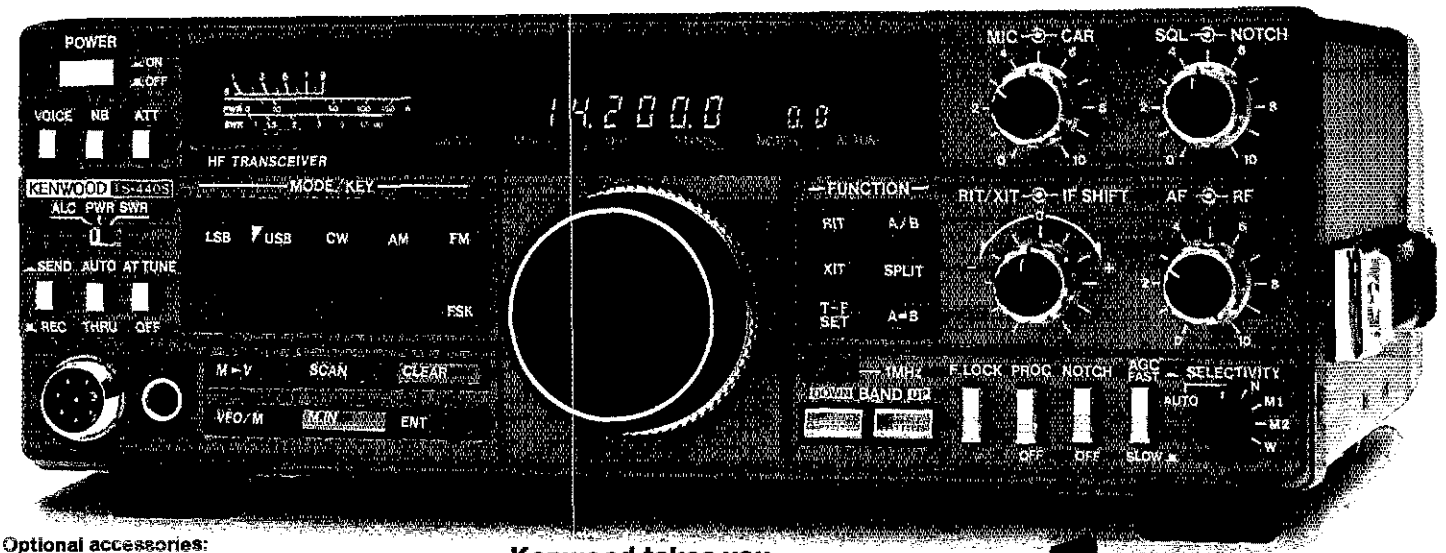

Optional accessories:
• AT-440 internal auto. antenna tuner (80 m—10 m) • AT-250 external auto. tuner (160 m—10 m) • AT-130 compact mobile antenna tuner (160 m—10 m) • IF-232C/IC-10 level translator and modem IC kit • PS-50 heavy duty power supply • PS-430/PS-30 DC power supply • SP-430 external speaker • MB-430 mobile mounting bracket • YK-88C/88CN 500 Hz/270 Hz CW filters • YK-88S/88SN 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 2 kw PEP linear amplifier • SM-220 station monitor • VS-1 voice synthesizer • SW-100A/200A/2000 SWR/power meters • TU-8 CTCSS tone unit • PG-2S extra DC cable.

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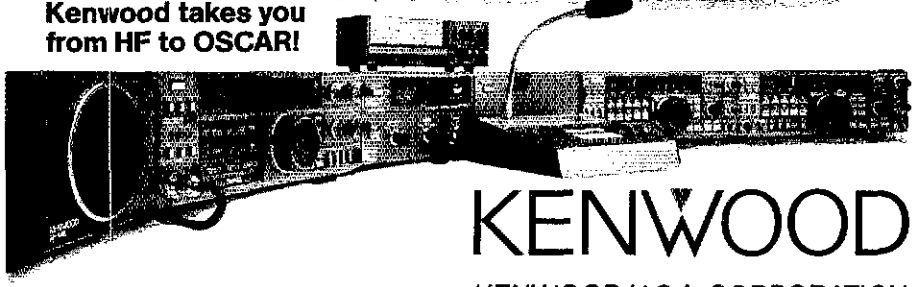

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(1) This list was prepared from an inventory taken on the date shown. The letters after the prices indicate in which store the equipment was located at that time. The quantities vary. In some cases there are several of an item; others, only one. Due to the lead and distribution time of this publication, some of the items may have already been sold by the time you see this ad. However, due to the number of trades we are involved in each day, some items are in stock that are not listed. **(2)** We reserve the right to sell certain power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. **(3)** Sometimes used gear is serviced after we receive your order. Please allow for a few days delay in shipping your order. **(4)** No trades on used gear. **(5)** Used gear policies do not apply to any New Equipment specials, Closeouts, etc.

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LA-1000 Amplifier $349 m
MC-8 Microphone 19 m
ASTRON
RS-12A 9A power supply $ 49 e
B & W
361 Keyer $ 29 m
6-position coax switch 19 m
CLEAR CHANNEL
AR-3300 30w 10m Xcvr $239 m
CLEGG
Thor 6 ps/modulator as-is $ 19 m
COLLINS
516A-1 AC ps; KWM-1 $ 75 m
516F-2 AC supply 149 m
KWM-2 Xcvr 429 m
DMI
PA-1300 1.3 GHz preamp $ 49 m
DAIWA
CNW-518 Ant tuner $199 w
DRAKE
1544 RV-75/R-7 adapter $ 19 m
7072 Microphone 19 m
AC-3 AC supply 49 m
AC-4 AC supply 69 mf
CPS-1 Converter ps 19 m
FL-1500 1.5 KHz filter 39 m
MN-4 Ant tuner 69 w
MS-4 Speaker 19 mc
P-75 Phone patch 49 f
PS-7 Power supply 149 fv
R-4A Ham Rcvr 149 m
R-4B Ham Rcvr 179 wf
T-4XB Transmitter 169 f
T-4XC Transmitter 219 m
Theta 9000 Terminal 269 m
TR-4C Xcvr 229 w
TR-7 Xcvr 499 f
HAL
CRI-100 Interface $ 99 m
CRI-200 Interface 139 m
CT-2100 Rcv terminal 199 v
DS-3000KSR V2 Terminal 249 m
ST-6000 Demodulator 399 m
HALLICRAFTERS
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ICOM
AT-150 Auto ant tuner $269 c
BP-2 Battery 34 w
HM-12 Hand mic 24 m
HS-15SB Switchbox 19 m
IC-2KL Amplifier 1099 w
IC-25H 2m FM Xcvr 239 w
IC-27A 2m FM Xcvr 289 m
IC-271A 2m Xcvr 599 c
IC-271A/PS-25 2m Xcvr/ps 689 c
IC-37A 220 FM Xcvr 369 c
IC-47A 440 FM Xcvr 399 w
IC-451A 430 Xcvr 469 m
IC-730 Xcvr 489 c
IC-740/ps/im/mkr/2 filts 599 c
PS-15 Power supply 99 f
UT-39 Encoder; u2A 15 m
KDK
FM-240 2m FM Xcvr $249 m
KENWOOD
AT-230 Antenna tuner $169 m
AT-250 Auto ant tuner 269 c
BC-5 Mobile charger 24 m
KPS-7 Power supply 39 f
MC-35S Hand mic 29 m
Mobile mt; TR-7600/7625 5 m
PS-30 Power supply 109 fc
R-600 SW receiver 229 m
SP-50 Mobile speaker 24 m
SP-520 Speaker 29 m
SP-820 Speaker 49 c
TH-31BT 220 FM HT 209 m
TM-401A 440 FM Xcvr 189 m
TR-7850 2m FM Xcvr 199 fc
TR-9130 2m SSB/FM Xcvr 379 e
TR-9500 430 Xcvr 399 f
TS-430S Xcvr 599 m
TS-520S Xcvr 399 fc
TS-530S/SSB filter 539 m
TS-600 6m Xcvr 369 f
TS-670 6-40m/GC/FM 569 e
TS-700S 2m Xcvr 349 wt
TS-711A 2m SSB/FM Xcvr 699 m
TS-820 Xcvr 399 m
TS-820S Xcvr 469 m
TS-830S Xcvr 699 mfc
TS-830S/CW filter 729 m
TS-940S/AT/VS-1 1649 m
TW-4000A/enc 2m/440 429 f
TW-4000A/enc/VS-1 469 m
VC-10 VHF conv 129 w
VFO-120 Remote VFO 79 w
VFO-240 Remote VFO 129 m
VFO-520 Remote VFO 99 mw
VFO-820 Remote VFO 99 m
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MFJ
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ROBOT
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225 Power supply 99 mw
252MO Power supply 89 f
255 Power supply 119 m
260 Power supply 129 m
262G Power supply 89 v
263 Remote VFO 119 c
276 Calibrator 19 w
280 Power supply 99 m
560 Corsair Xcvr 689 m
560 Corsair/CW filt 709 w
574 Century/21 Dig Xcvr 249 c
579 Century/22 Xcvr 279 m
579 Xcvr/calibrator 299 m
579 Xcvr/cal/kyr/1179 329 m
645 Keyer 49 c
700A Hand mic 19 m
700C Hand mic 19 m
979 Power supply 69 m
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TRANSCOM
SBA-3 AC ps (as-is) $ 14 m
USI
EV-9031 Monitor $ 69 v
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FBA-5 Batt holder $ 9 w
FC-757AT Auto tuner 269 m
FP-757HD Power supply 179 m
FRB-1 Relay box 9 m
FT-101 Xcvr 379 m
FT-101B Xcvr 389 mw
FT-101E Xcvr 429 fc
FT-101E/CW filter 449 m
FT-101ZD Xcvr 469 m
FT-102/CW filter 529 m
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FT-727R 2m/440 FM HT 299 m
FT-902DM Xcvr 699 m
FT-980 Xcvr 999 mf
FT-ONE Xcvr 1099 fc
FT-ONE/cw/am/fm/ram 1129 mw
FT-ONE/keyer/ram 1129 w
FV-101 Remote VFO 89 m
FV-107 Remote VFO 59 v
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MH-1B8 Hand mic 19 m
NC-24 Multi-charger 129 m
SP-102 Speaker 69 f
SP-980 Speaker 69 m
XF-8.9HC CW filter 19 w
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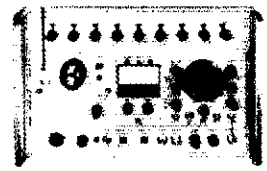

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3 Choices 70 W/45 W/25 W

Three Choices for 2m!

TM-2570A/2550A/2530A

Feature-packed 2m FM transceivers

The all-new "25-Series" gives you three RF power choices for 2m FM operation: 70 W, 45 W, and 25 W. Here's what you get:

- Telephone number memory and autodialer (up to 15 seven-digit phone numbers). **A Kenwood exclusive!**
- High performance GaAs FET front end receiver
- 23 channel memory stores offset, frequency, and subtone. Two pairs may be used for odd split operation
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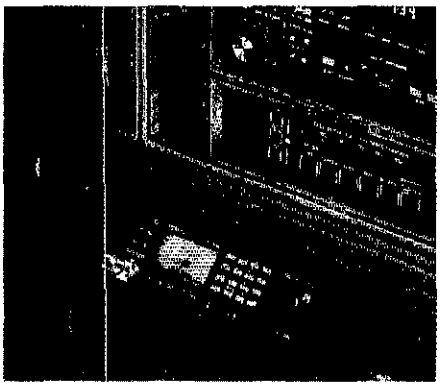
- Extended frequency coverage for MARS and CAP (142-149 MHz; 141-151 MHz modifiable)
- Center-stop tuning—**a Kenwood exclusive!**



- New 5-way adjustable mounting system
- Automatic repeater offset selection—**another Kenwood exclusive!**
- Direct keyboard frequency entry
- Front panel programmable 38-tone CTCSS encoder **includes** 97.4 Hz (optional)
- Big multi-color LCD and back-lit controls for excellent visibility
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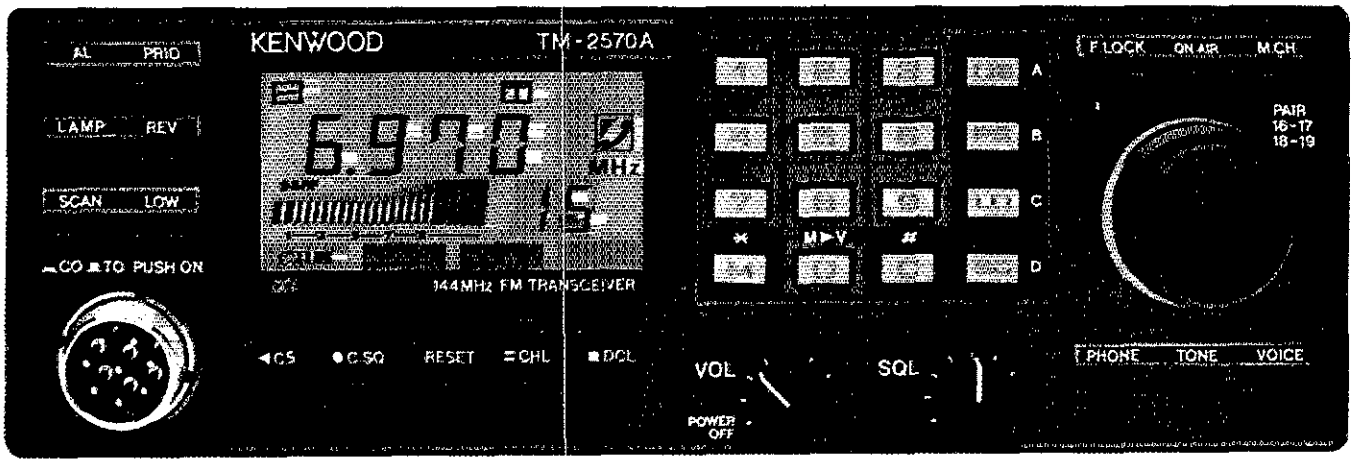
DCL Introducing... Digital Channel Link

Compatible with Kenwood's DCS (Digital Code Squelch), the DCL system enables your rig to **automatically** QSY to an open channel. Now you can automatically switch over to a simplex channel after repeater contact! Here's how it works:

The DCL system searches for an open channel, remembers it, returns to the original frequency and transmits control information to another DCL-equipped station that switches **both** radios to the open channel. Microprocessor control assures fast and reliable operation. The whole process happens in an instant!



Actual size front panel

Optional Accessories

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply for TM-2550A/2530A/3530A
- **PS-50** DC power supply for TM-2570A
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48B** extra DTMF mic. with UP/DWN switch
- **MC-43S** UP/DWN mic.
- **MC-55** (8-pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50B** mobile speaker
- **SW-200A/SW-200B** SWR/power meters
- **SW-100A/SW-100B** compact SWR/power meters
- **SWT-1** 2m antenna tuner

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

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New 220 MHz

220: FM for All!

Kenwood brings you a wide range of 220 MHz gear designed for every need. Choose from two types of mobile and two types of HT. The TH-315A is a full-featured HT covering 220—225 MHz. Ten memory channels and 2.5 watts of power. (5 W with PB-1 or 12 V DC.) Uses the same accessories as the TH-215A for 2 meters or TH-415A 440 MHz. For truly "pocket portability," choose the TH-31BT, a thumb-wheel programmable, 1 watt unit. For mobile use, select the TM-321A or TM-3530A.

The TM-321A is the 25 W, 220 MHz, 14-memory version of the super popular, super compact TM-221A. The 25-watt TM-3530A has 23 memories, a 15 telephone number memory and auto dialer. Direct keyboard frequency entry and front panel DTMF pad enhances operating convenience. Novice to Amateur Extra, these transceivers will put everyone on the air "Kenwood Style"!

TH-315A
Full-featured HT

TM-321A
Compact mobile transceiver

TH-31BT/31A
Pocket-held HT

New

New

TM-3530A
Full-featured mobile transceiver

The TM-321A comes with 16-key DTMF mic.
A complete line of accessories is available for all models.

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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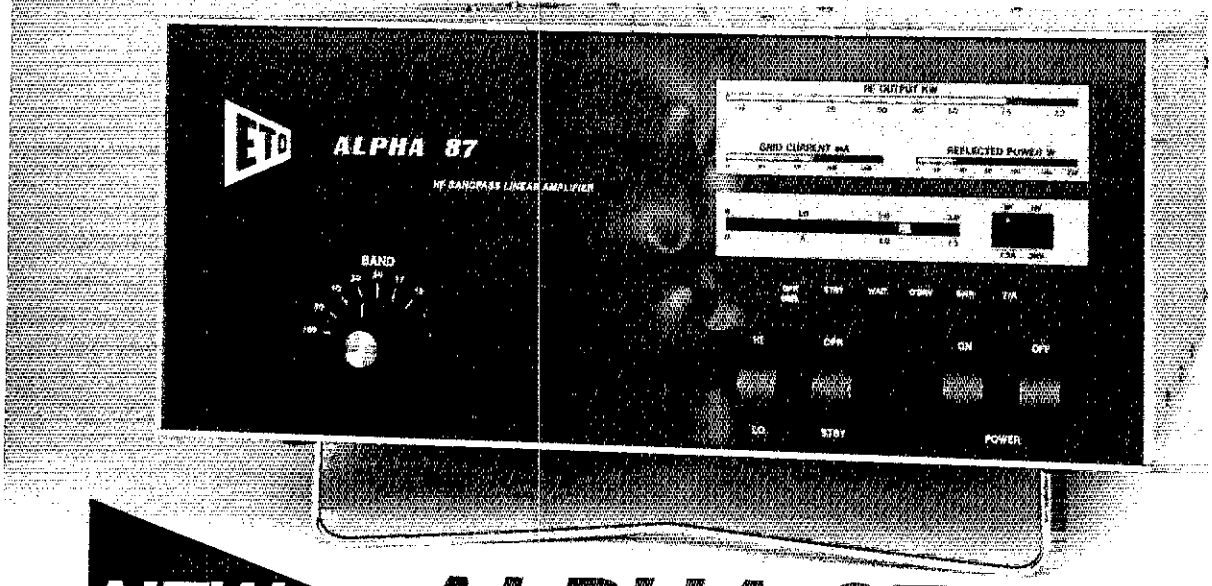
Hands Off!



NEW ALPHA 87

1.5 kW RF OUTPUT . . . ALL BANDS . . . NO TUNE UP

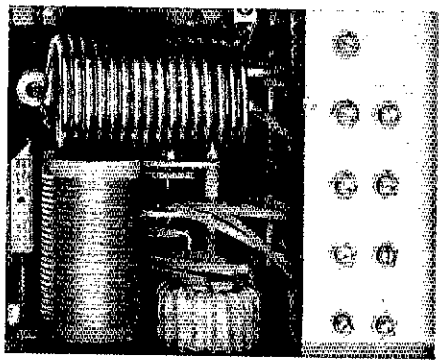
Just select the desired band and you're on the air with a full 1.5 kW of clean, crisp RF power surging up the coax. Manual tune-up is completely eliminated when you use ETO's new maximum legal power ***ALPHA 87*** bandpass linear amplifier.

ALPHA 87 is identical with the manually tuned ***ALPHA 86*** except for its output tuning networks. The ***'87*** employs an improved version of bandpass circuitry that's been thoroughly proven since 1974 in famous "no-tune-up" ***ALPHA 374's*** and ***ALPHA 78's***. Those amplifiers introduced thousands of serious amateurs to the synergistic blend of legendary ***ALPHA*** power and instant bandchange that made the ***'78*** our most popular ***ALPHA*** ever.

The new ***ALPHA 87*** can safely deliver far more long-term average RF output power than its famous predecessor . . . up to a full 1.5 kW . . . from the same size cabinet and AT THE SAME PRICE! Same exclusive 3 year ***ALPHA*** limited warranty and same famous ETO service, too.

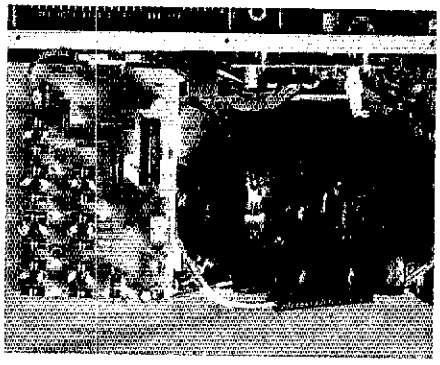
ALPHA 87 SPECIFICATIONS

- Full coverage of amateur 160, 80, 40, 30, 20, 17 and 15 meter bands (Qualified amateurs may easily modify the '87 for 12 and 10 meter coverage)
- 1.5 kW RF power output in any mode (aux. cooling fan required for Pavg. >1 kW)
- Full rated power into load VSWR <1.5:1; electronic VSWR and overload protection
- Instant, silent PIN diode T/R and QSK
- 60 to 80 watts drive for rated output
- Quiet, full cabinet forced air cooling
- ETO's exclusive 3 year limited warranty



Factory pre-tuned bandpass output networks provide full coverage of each amateur HF band. Maximum legal RF output is instantly available on any band.

Tuned input provides excellent match to transceiver and optimizes amplifier efficiency and linearity.



ALPHA 87 power supply uses 3.5 kVA tape-wound Hipersil® transformer and full wave bridge rectifier for maximum power and durability with mimimum size and weight. Matched and pre-aged computer grade capacitors used in 50 μF, 3+ kV filter yield excellent dynamic regulation and long life.

- **No-tune-up *ALPHA 87:* $3,495.00**
- **Manually tuned *ALPHA 86:* $2,995.00**

All ***ALPHA's*** are available FACTORY-DIRECT from ETO, freight pre-paid in North America. To order, or for a detailed brochure describing the ***ALPHA 86, 87*** and the forthcoming fully automatic ***ALPHA 88,*** call or write ETO.

ETO EHRHORN
TECHNOLOGICAL OPERATIONS, INC.
P.O. BOX 888
CANON CITY, CO 81212
(719) 275-1613

ALPHA 87 will be available for sale pending grant of FCC type acceptance which is expected before this ad appears.

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received May 14 through June 13 will appear in August *QST*. If the 13th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in your advertising before your ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

The League reserves the right to decline or discontinue advertising for any reason.

CLUBS/HAMFESTS/NETS

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers—W7GAQ/6, 146 Coleen Street, Livermore, CA 94550.

IMRA—International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

FCC EXAMS. Novice-Extra Class, Walk-in's only. Sunnyvale VEC ARC, POB 60142, Sunnyvale, CA 94088-0142, 408-255-9000, 24/hr. Gordon, W6NLG, President. Flea Market, March-Sept, Foothill College, Los Altos Hills, CA.

JOIN The Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C., 20933 Brant Avenue, Long Beach, CA 90810.

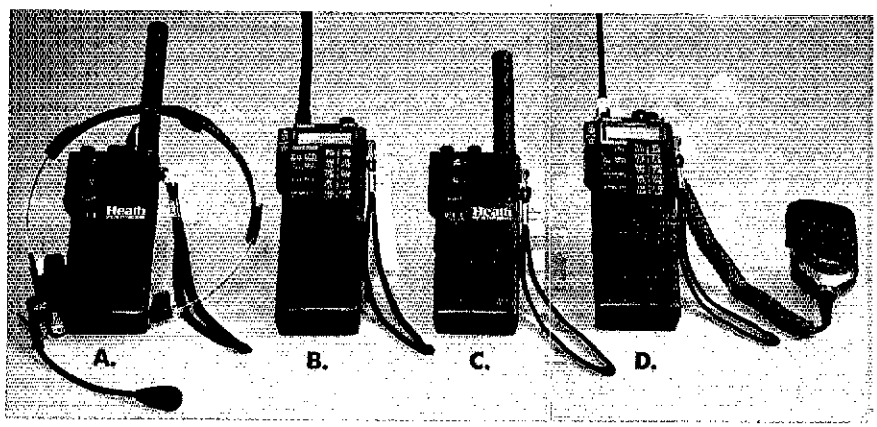
MARCO: Medical Amateur Radio Council, operates daily and Sunday nets. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. For information, write MARCO, Box 73's, Acme, PA 15610.

LITTLE Big Horn Net Sundays: 14.067 MHz, 2200 UTC, 21.176 MHz 2230 UTC. Historians and Native Americans welcome. SASE WA2OAC.

KANKAKEE Hamfest The annual Kankakee Hamfest will be held at the Kankakee County Fairgrounds on May 15, 1988; from 8 AM-3 PM. ARRL booth, large flea market and many exhibitors. $2.50 in advance, $3 at the gate. Take exit 308 off I-57 to Rt. 45 South 1 mile. For further info contact Frank DalCanton, KA9PWW, RR #1, Box 361, Chebanse, IL 60922, 815-932-6703 nights.

LOUISVILLE HF Society—New club. Novices, Ragchewers, DXers, Contesters Contact N4XM, KD4U, KK4Q for info 502-239-6123.

Heath tunes you in



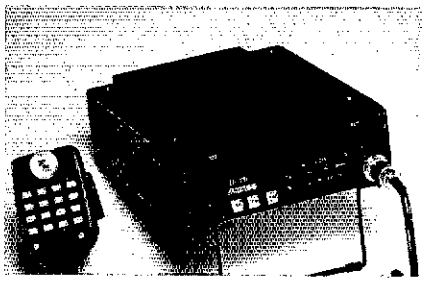
A. NEW! HW-4 450 MHz Handie Talkie. Basic features. One of the best priced 70cm hand-helds available.

B. NEW! HW-2-XL Deluxe 2 Meter Handie Talkie. 20 memories, DTMF, CTCSS.

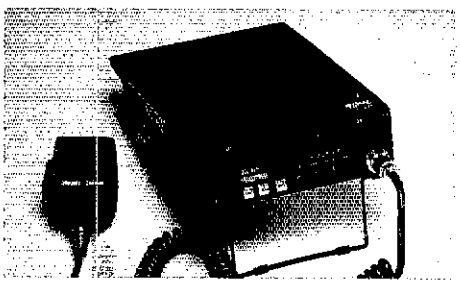
C. NEW! HW-2 2 Meter Handie Talkie. Basic features. One of the best priced 2M hand-helds available.

D. NEW! HW-4-XL Deluxe 450 MHz Handie Talkie. 20 memories, DTMF, CTCSS.

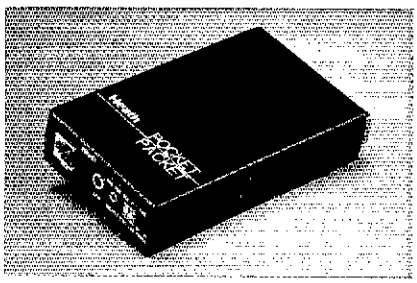
E. NEW! HW-24-HT Deluxe Twin Band Handie Talkie. (2 Meter & 450 MHz) 20 memories, DTMF, CTCSS, cross band full duplex.



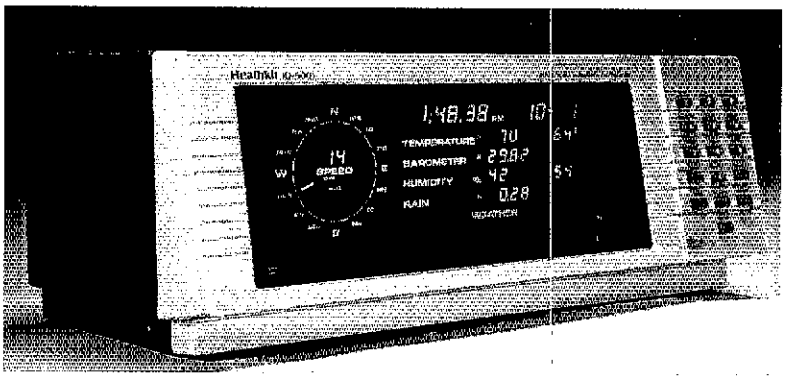
NEW! HW-24 10 Watt Twin Band Mobile Transceiver/Repeater. 20 memories, DTMF, CTCSS, cross band full duplex, unique cross band repeater function.



NEW! HW-24-H 50 Watt Twin Band Mobile Transceiver/Repeater. 20 memories, DTMF, CTCSS, cross band full duplex, unique cross band repeater function. Quiet fan for cool operation.



NEW! HK-21 Pocket Packet. A 20-second hookup to your handie talkie. TNC-2 compatible. Exclusive built-in mini bulletin board. Size only 2½"W x 1"H x 4¼"L.

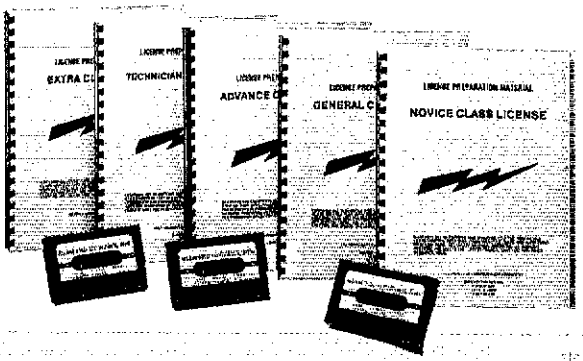


NEW! ID-5001 Advanced Weather Computer. Ideal for Skywarn enthusiasts.

To order, simply call Toll-Free: 1-800-253-0570 and ask for operator 15.

We also have 66 Heath/Zenith Computers & Electronics stores in North America. Call 616-982-3614 for the store location nearest you.

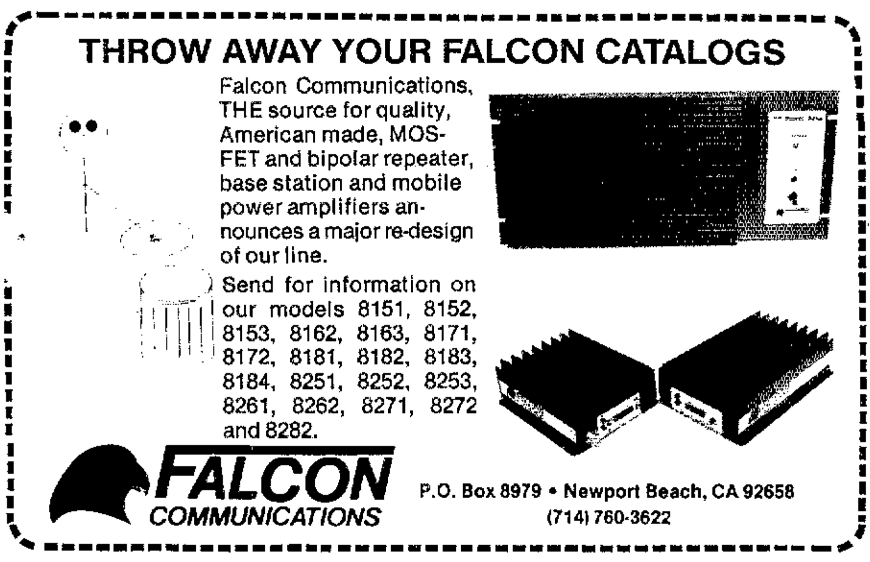
Come see us at the 1988 Dayton Hamvention and get 15% OFF any kit order, *plus FREE shipping!* We also have some sensational computer deals you won't want to miss. We're at booths 481, 482, 483 and 484.



NEW! Novice thru Extra Exam Study Booklets. Each includes over $100 in certificates from major manufacturers.

Heathkit®

Heath company



54th ANNUAL Hamfesters RC Hamfest. New Location—Will County Fairgrounds, Peotone, IL (was at Santa Fe Park). New Date—Sunday, July 31, 1988. Flea market, indoor dealer booths. Exams (pre-register by June 30. Call NF9N, 312-448-9432, for information.) Tickets: $3 advance, $4 at gate. SASE to Hamfesters, 13058 Finch Court, Lockport, IL 60441.

NORTHERN New Jersey—Sussex County ARC Hamfest, Sunday, July 17th. Sussex County Fairgrounds, Augusta, NJ. 8:00 AM. Indoor/Outdoor space. Acres of parking. Refreshments. Talk-In 147.90/30 and 146.52. For information call Donald Stickle, K2OX, 201-663-0677.

THANK You for attending Warren Ohio Hamfest. See you August 21, 1988.

QSL CARDS/RUBBER STAMPS/ENGRAVING

CANADIANS QSL samples $1 (refundable) M. Smith, VE7FI, Box 1376, Delta, BC V4M 3T3.

DON'T buy QSL cards until you see my free samples or draw your own design. I specialize in custom cards. Send black and white sketch: will give quote. I would also like to introduce you to our personalized QSL Business Cards. Same size as standard business cards (3-1/2 × 2). Write or call for free samples. Little Print Shop, Box 1160, Pflugerville, TX 78660, 512-990-1192.

FREE samples—stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs—1)FAMOUS KØAAB custom collection. 2)Railroad employees and railfan's specials. 3)Front report styles. 4)Multiple callsigns. 5)Ham business cards. State your sample wants. 39 cents self addressed business size envelope required. Marv Mahre, WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109-3621.

BE SURPRISED—get a variety of cards—100 for $8 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.

FREE, 100 QSLs with first order. Samples 50 cents. Gazebo Press, Rt. 4 Box 4148, LaPlata, MD 20646.

ENGRAVING: Callsign/Name Badges by WØLQV. 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.

PICTURE QSL CARDS of your shack, etc. from your photo or black ink art work. 500 $25.50; 1000 $39.50. Also non-picture cards. Customized cards, send specifications for estimate. Send two stamps for illustrated literature. Generous sample kit $2; half pound of samples $3. Raum's, R.D. 2, Orchard Road, Coopersburg, PA 18036. Phone 1-215-679-7238

QUALITY QSLs, Samples 50 cents. Olde Press, WB9MPP, Box 1252, Kankakee, IL 60901.

COLORFUL QSLs by WA7LNW—Improve your QSL returns! Revolutionary printing process combines brilliant rainbow colors with sparkling metallic inks. The ultimate QSLs! Samples $1 (refundable) COLORFUL QSLs, P.O. Box 5358, Glendale, AZ 85312-5358.

QSLs, QSLs, Rusprint QSLs quantities of 100, 200, 300 or more. Full color of Old Glory and cartoons. Also parchment, golden eagle and others. SASE appreciated. Rusprint, Rt. 1, Box 363-QST, Spring Hill, KS 66083.

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.

QSLs by "Sam" (samples $1). Sam's Print/Wheels, P.O. Box 55, Petersburg, NY 12138-9729.

MAGNETIC Callsign...2 inches × 6 inches...Instant transfer car to car! Your call in lettering Black, Blue, Green or Red (white background). Each sign only $8.50 ppd. Sign-On, Dept. T, 1923 Edward Lane, Merrick, NY 11566.

FULL Color—3,000 $300; 6,000 $400; 12,000 $600: WA8CZS, 1-614-452-6375.

QUALITY QSL Cards and Rubber Stamps. Send 39 cents postage or SASE for samples. New stock designs or custom cards from your black ink artwork. Sandollar Press, P.O. Box 30726, Santa Barbara, CA 93130.

CALL Sign Badges: Custom license plate holders. Personal, distinctive. Club discounts. SASE. WB3GND, Box 750, Clinton, MD 20735, 301-248-7302.

QSLs Quality and Fast Service for 28 years. Include call for decal. Samples 50 cents. Ray, K7HLR, Box 331, Clearfield, UT 84015.

QSL Samples—25 cents. Samcards, 48 Monte Carlo Drive, Pittsburgh, PA 15239.

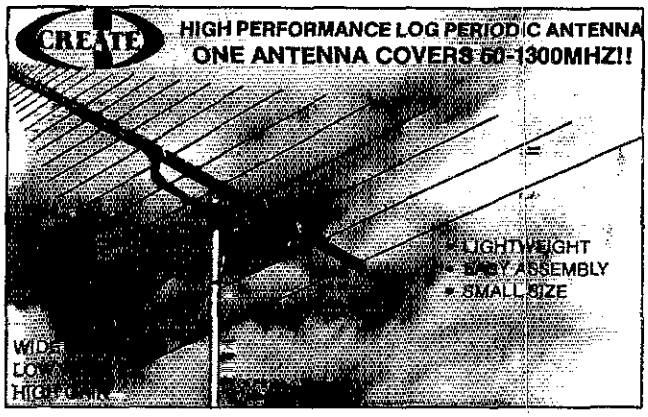
QSLs Samples $1 (refundable) (stamps okay) M. Dakin, Winz! Press, P.O. Box 265, Revere, MA 02151.

BROWNIES QSL Cards since 1939. Catalog & Samples $1 (refundable with order). 3035 Lehigh Street, Allentown, PA 18103.

QSLs & Rubber Stamps. Top quality QSL samples and stamp information $1. (Refundable with order.) Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

PHOTOS, Postcards—Become QSLs. Clear stick on labels. New! "Kall Kards". Stamp brings details. K-K-L, Box 412, Troy, NY 12181-0412.

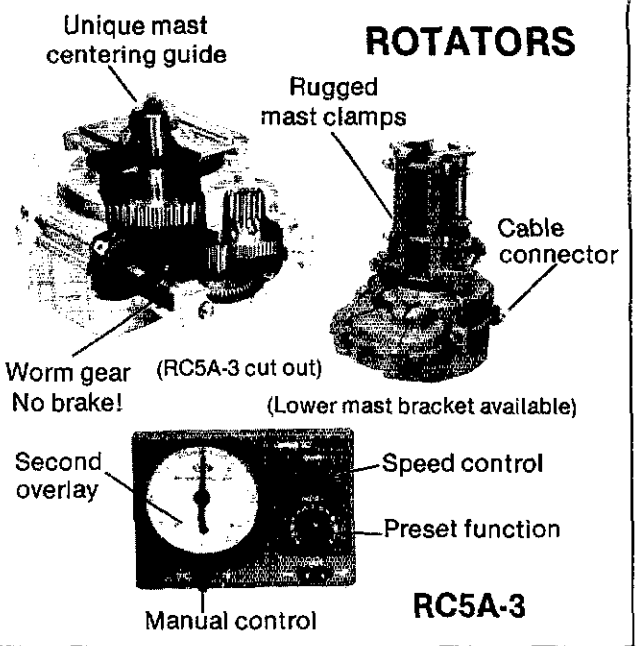
GAIL's QSL's, $6 first 100, $4 thereafter, stamp for sample. KAØYZT, 1150 Muenz, Wright City, MO 63390.



CLP5130-1 50-1300 MHz 25 el. 500W 6 ' Boom $239
CLP5130-2 105-1300 MHz 20 el. 500W 4 '6" Boom $139

Operate on 6m, 2m, 1¼m, 70cm, 900 MHz and 1.2 GHz using only one antenna and one feedline. No tuning is required and the VSWR is 2:1 or less across the entire frequency range with excellent forward gain. The boom is made of high quality aluminum and the elements are precut for easy assembly. Each model can be mounted for either vertical or horizontal polarization. Create VHF/UHF log periodics are great for the amateur bands, scanners and numerous other applications.

ROTATORS



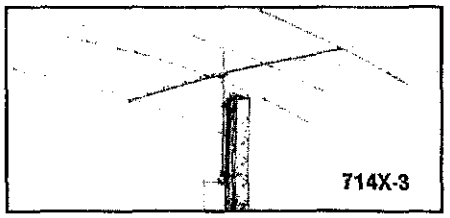
RC5-1	10 sq. ft.	$251
RC5-3	10 sq. ft. preset	$328
RC5A-2	25 sq. ft.	$399
RC5A-3	25 sq. ft. preset	$459
RC5B-3	35 sq. ft. preset	$736

(All rotators are UPS shippable)

See Lew McCoy's Review In August 1987 Issue Of CQ.

CREATE

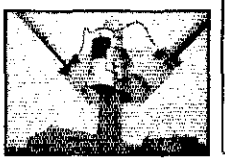
Creative Design Co., LTD.®

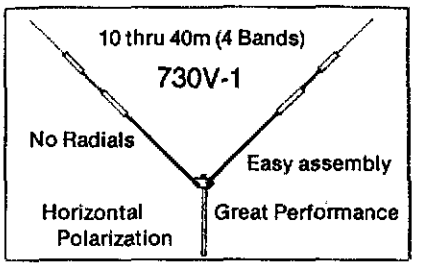


714 Series Tribanders
15-20-40 Meters

Model	Elements 40-20-15	Boom Length	Longest Element	Turning Radius	Wgt. Lbs.	Power PEP	Price
714T	2/4/4	28'6"	43'	25'3"	71	2 kw	$574.
714X	3/4/4	32'5"	44'	26'2"	75	2 kw	$762.
714T-3	2/4/4	28'6"	43'	25'3"	75	3 kw	$707.
714X-3	3/4/4	32'5"	44'	26'2"	80	3 kw	$928.

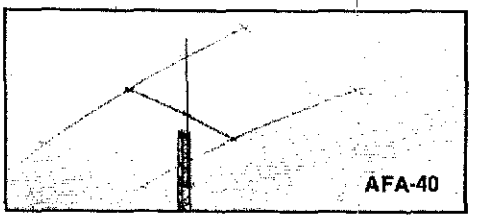
(Prices include balun)





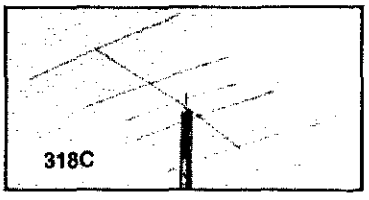
The 730V-1 is a V-dipole consisting of two 19 ft. heavy duty, self-supporting elements and bracket with an efficient balun that is ready for mounting on a standard TV mast. Rotation is not necessary. The V-dipole is superior to standard vertical antennas in gain, noise and efficiency. $159

2 Element Phased Arrays



Model	Freq Mhz	Boom Length	Longest Element	Turning Radius	Wgt. (Lbs)	Power PEP	Price
AFA-30	10	12'11"	32'1"	18'	29	1.5 kw	$258.
AFA-40	7	16' 8"	47'10"	25'7"	42	3 kw	$388.
AFA-75-1	3.8	29'6"	80'	42'7"	148	4 kw	$1,940.

(Prices include balun)



318 Series Tribanders
10-15-20 Meters
Available Soon
318B + 7 (10-40 Meters)!

Model	Elements 20-15-10	Boom Length	Longest Element	Turning Radius	Wgt. (Lbs.)	Power PEP	Price
318JR	3/3/3	13'1"	31'1"	15'9"	28	1.2 kw	$289.
318	3/3/3	16'4"	31'1"	17'4"	40	2 kw	$345.
318B	3/4/4	20'11"	31'1"	18'4"	49	2 kw	$434.
318C	5/5/5	29'10"	31'1"	21'	58	2 kw	$643.

(Prices include balun)

Prices do not include shipping.

ALSO AVAILABLE: ROOF TOWERS • MONOBANDERS • TRIBANDERS • TOWERS • DUALBANDERS • COMMERCIAL

All Create Antennas Are Manufactured With High Quality, Heavy Duty, Precision Aluminum Tubing For Easy Assembly And Long Life.

TO ORDER CALL M-F 9:00 AM to 6:00 PM PST

1-800-255-7020, or in CA 818-888-4927

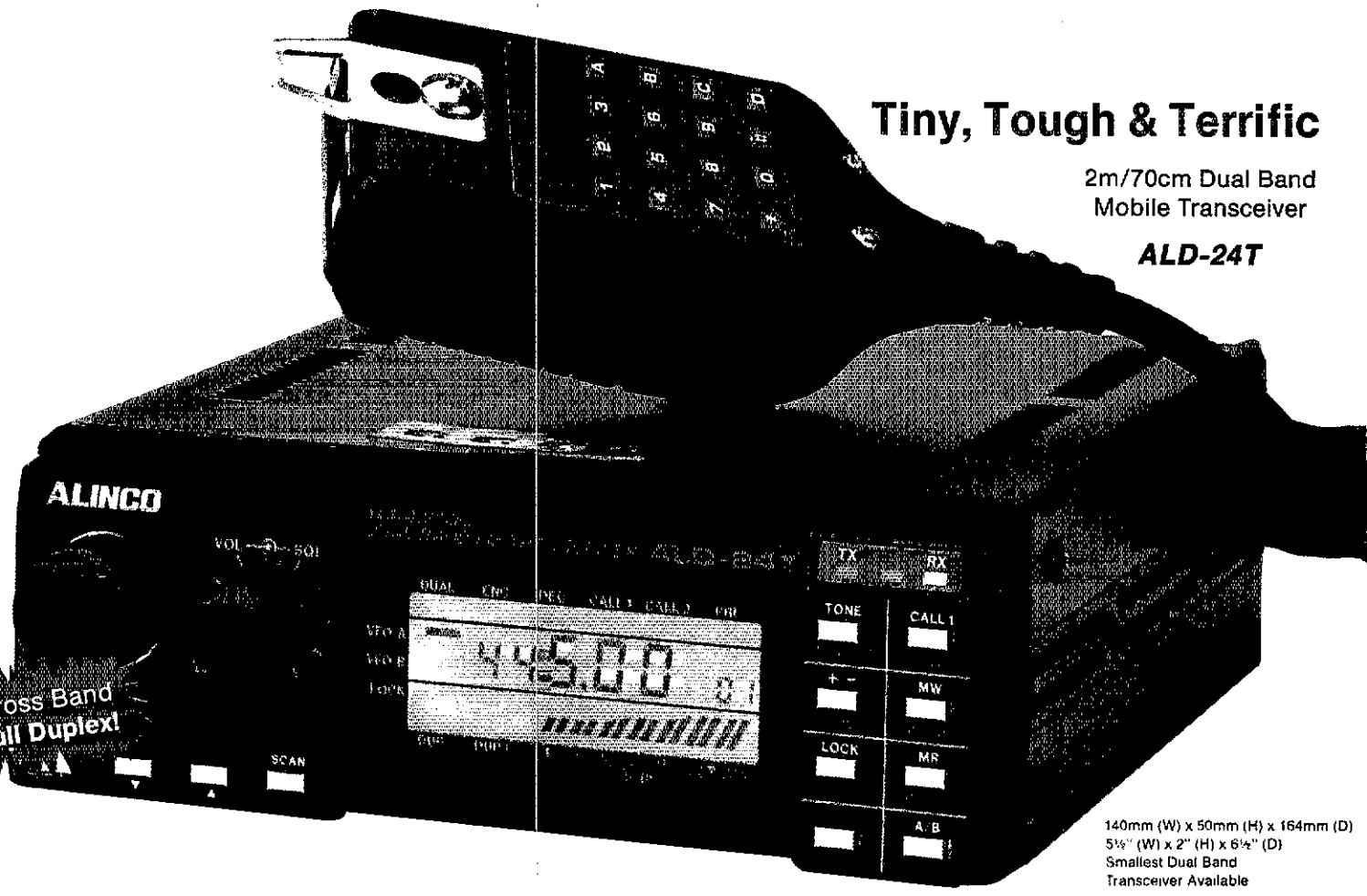
(Specifications and prices subject to change without notice or obligation) FAX 818-888-5112 TELEX 697-4899

ORION HI-TECH
P.O. Box 8771
Calabasas, CA 91302

See us at Dayton — Booths 222-224

ALINCO ELECTRONICS INC.
20705 South Western Ave., Suite 104 Torrance, CA 90501 • (213)618-8616

Dual Bander



Tiny, Tough & Terrific

2m/70cm Dual Band
Mobile Transceiver

ALD-24T

140mm (W) x 50mm (H) x 164mm (D)
5⅛" (W) x 2" (H) x 6½" (D)
Smallest Dual Band
Transceiver Available

With ALINCO's advanced engineering and technology, the ALD-24T 2m/70cm Dual Band Mobile Transceiver is designed to be the ultimate in compact size with an impressive array of features, allowing maximum flexibility in installation and ease of operation.

- 140-149.995 Mhz/440-450 Mhz
- CAP and MARS compatible
- 25 Watt High – 5 Watt Low Power both bands
- 21 Memory Channels
- Dual VFOs
- Large LCD
- **CTCSS Encoder/Decoder: Standard**
- 16-Key Autopatch Microphone with Up/Down Buttons
- Programmable Band Scan
- Memory Scan and Memory Lockout
- Ultra Compact & Light Weight
- Simple to Operate
- Programmable Standard and Non-Standard Repeater Offset

* Many more features, see your Dealer!
Also available:
25WATT 2m, 45 WATT 2m
and 25 WATT 450 MHZ.

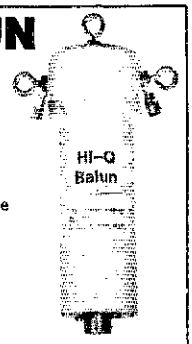
*ALL ALINCO Products carry a 2-year Factory Warranty.
See your favorite dealer, listed below, for full details.*

Alinco's products are carried by these fine dealers

A-Tech. - Burbank, CA
Amateur & Advance Comm. - Wilmington, DE
Amateur Comm. ETC., - San Antonio, TX
AES - Milwaukee, WI
AES - Wickliffe, OH
AES - Orlando, FL
AES - Clearwater, FL
AES - Las Vegas, NV
Austin Amateur Radio Supply - Austin, TX
Barry Electronics - New York, NY
Burghardt Amateur Center - Watertown, SD
Colorado Comm Center, Denver, CO
Delaware Amateur Supply - New Castle, DE
Doc's Communications - Rossville, GA
El Original Electronics - Brownsville, TX
EEB - Vienna, VA
EGE, INC. - Woodbridge, VA
EGE, INC. - Salem, NH
Erickson Communications - Chicago, IL
F & M Electronics - Greensboro, NC
Floyd Electronics - Collinsville, IL
The Ham Station - Evansville, IN
The Ham Hut - Amarillo, TX
Hatry Radio - Hartford, CT
Henry Radio - Los Angeles, CA
Hirsch Sales Co., Williamsville, NY
HR Electronics - Muskegan, MI
HRO - Anaheim, CA
HRO - Atlanta, GA
HRO - Burlingame, CA
HRO - Oakland, CA
HRO - Phoenix, AZ
HRO - San Diego, CA
HRO - Van Nuys, CA
HSC - Santa Clara, CA
HSC - Sacramento, CA
HSC - Sunnyvale, CA
International Radio Systems - Miami, FL
Jun's Electronics - Culver City, CA
Kennedy Associates - San Antonio, TX
KJI Electronics - Cedar Grove, NJ
Madison Electronics - Houston, TX
Maryland Radio Center - Laurel, MD
Memphis Amateur Electronics - Memphis, TN
Michigan Radio - Mt. Clemens, MI
Mission Consulting - Houston, TX
Missouri Radio Center - Kansas City, MO
N & G Electronics - Miami, FL
Omni Electronics - Laredo, TX
Quement Electronics - San Jose, CA
RF Enterprises, Merrifield, MN
R & L Electronics - Hamilton, OH
Reno Radio - Reno, NV
Rivendell Associates - Derry, NH
Rogus Electronics - Southington, CT
Rosen's Electronics - Williamson, WV
Ross Distributing Co. - Preston, ID
Satellite City, Minneapolis, MN
Sound North Electronics - International Falls, MN
Tel-Com Electronic Comm. - Littleton, MA
Texas Comm. Center - Houston, TX
Texas Towers - Plano, TX
VHF Communications - Jamestown, NY
Williams Radio Sales, Colfax, NC

CANADA:
Canadian Distributor
Texpro Sales Inc. - Burlington, Ontario

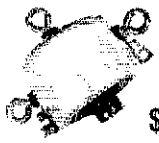
HI-Q BALUN



- For dipoles, yagis, inverted vees and doublets
- Replaces center insulator
- Puts power in antenna
- Broadbanded 3-40 MHz.
- Small, lightweight and weatherproof
- 1:1 impedance ratio
- For full legal power and more
- Helps eliminate TVI
- With SO 239 connector
- Built-in DC ground helps protect against lightning

Only $14.95

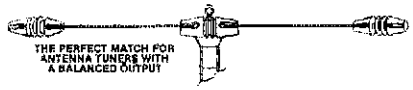
HI-Q ANTENNA CENTER INSULATOR



- Small, rugged, lightweight, weatherproof
- Replaces center insulator
- Handles full legal power and more
- With SO 239 connector

$6.95

THE ALL-BANDER DIPOLE



- Completely factory assembled ready to use
- Heavy 14 (7/22) gauge stranded copper antenna wire to survive those severe storms
- Center fed with 100 feet of low loss PVC covered 450 ohm balanced transmission line
- Includes center insulator with an eye hook for center support
- Includes custom molded insulators molded of top quality material with high dielectric qualities and excellent weatherability
- Complete installation instructions included
- Overall length 135 feet, less when erected as an inverted vee or sloper
- Handles 2 kw PEP & covers 160 through 10 meters
- May be trimmed to fit small city lots

Only $29.95

DIPOLES

MODEL	BANDS	LENGTH	PRICE
Dipoles			
D-80	80/75	130'	$31.95
D-40	40/15	66	28.95
D-20	20	33'	27.95
D-15	15	22'	26.95
D-10	10	16'	25.95
Shortened dipoles			
SD-80	80/75	90'	35.95
SD-40	40	45'	33.95
Parallel dipoles			
PD-8010	80,40,20,10/15	130'	43.95
PD-4010	40,20,10/15	66'	37.95
PD-8040	80,40/15	130'	39.95
PD-4020	40,20/15	66'	33.95
Dipole shorteners — only, same as included in SD models			
S-80	80/75		$13.95/pr
S-40	40		12.95/pr.

All antennas are complete with a HI-Q Balun, No. 14 antenna wire, insulators, 100' nylon antenna support rope (SD models only 50'), rated for full legal power. Antennas may be used as an inverted V, and may also be used by MARS or SWLs.

Antenna accessories — available with antenna orders	
Nylon guy rope, 450 lb. test, 100 feet	$4.49
Molded Dogbone Type antenna insulators	1.00/pr.
SO-239 coax connectors	.55
No. 14 7/22 Stranded hard drawn copper antenna wire	.09/ft.

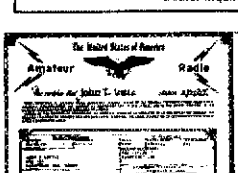
ALL PRICES ARE UPS PAID CONTINENTAL USA

Available at your favorite dealer or order direct from.

Van Gorden Engineering

P.O. Box 21305 • South Euclid, Ohio 44121

Dealer Inquiries Invited



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OLYMPIC VIEW GRAPHICS

Dept. Q — P.O. Box 1594

Poulsbo, WA 98370

WANTED: July 1926 *QST* and Nov. 1946 *QST*. Larry, W4TMN, POB 353, Toano, VA 23168, 804-566-1435.

ANTIQUE Telegraphy: 1919 Clockwork Omnigraph (CQ cover Feb. 1981); 25 + 1920's sounders and pony relays, may consider keys and bugs on trade, SASE list. Dennis Hoffman, N4610 Maxon, Ladysmith, WI 54848, 715-532-3971 evenings.

WANTED: National, Hallicrafter, 7 inch Television Receivers. Hallicrafter HT-20-HT30 Transmitters and Manuals. Central Electronics Transmitters and Basket Cases. K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37130, 615-893-5344.

RCA 74-B Antique Broadcast Microphone $99. Jon, WB4MMV, 139 Woodlake Drive, Charlottesville, VA 22901, 804-973-8697.

GENERAL Radio Model 650A impedance bridge, with self contained 650PI power supply, oscillator, and amplifier. Excellent condition, still works fine. $100 plus shipping. Dave Schoept, WØOZG, 418 Lake Forest Drive, Vicksburg, MS 39180.

WANTED: CQ Magazines for 1945, 1946, 1947 and *QST* May 1916. Bob Harmon, W5SEP, Rt. #1, Box 219, Winslow, AR 72959.

WANTED: Phono oscillators, wireless broadcasters circa 1940s, 1950s (kits included). Paying top dollar for any "broadcasters". Lansford Leigh Jr., 274 Delaware #610, Touraine Apts., Buffalo, NY 14202, 716-852-8660.

WANTED: Gadget category WWII surplus such as gyros, sights, mechanical computers. Also old catalogs of surplus dealers 1945 to 1965. Price, condition first letter to: Dave Leising, 211 North Grove Street, Lowell, MI 49331.

I PAY CASH For vintage audio equipment by Western Electric, Altec, McIntosh, Marantz, Westrex, etc. Randy Nachtrieb, WA6GJA, 6392 Park Avenue, Garden Grove, CA 92645, 714-897-9351.

SALE Pre-1930 *QSTs* or trade for Callbooks, ARRL Handbooks, or ham memorabilia. Richard Titus, NV2C, 231-9 Lucas Lane, Voorhees, NJ 08043.

WANTED: Military, Radio Equipment. Any vintage or type, portables preferred, all considered. Please send full particulars to Dennis, Box 95, Cross Timbers, MO 65634, 417-998-6517.

GENERAL

WANTED: Drake R7A Receiver. Tony Ficarra, 144 Gladstone Avenue, Wollongong, NSW AUSTRALIA 2500.

DO-IT-URSELF DXpedition, Stay at ZF8SB. 2BR cottage, beach, Quad. Fish or dive if band folds. Write airmail: ZF8SB, Little Cayman, CAYMAN ISLANDS.

TELETYPEWRITER parts, supplies, gears. Toroids, S.A.S.E. list. Typetronics, Box 8873, FL Lauderdale, FL 33310. Buy unused parts, cash or trade.

HAM TRADER YELLOW SHEETS. In our 26th year. Buy, Swap, Sell ham radio gear. Published twice a month. Ads quickly circulate—no long wait for results. Send #10 SASE for sample copy. $12 for one year (24 issues). P.O.B. 2057, Glen Ellyn, IL 60138-2057.

COLLINS Repair and Alignment, former Collins engineer. Research and Consulting, Glenn A. Baxter, P.E., Registered Professional Engineer. K1MAN 207-495-2215.

WE BUY Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astrai Electronics, P.O. Box 707, Linden, NJ 07036. Call toll-free 800-526-4052.

FAST, ACCURATE, readable, nonsensational—The ARRL Letter! Every two weeks, we fill you in on what's happening in Amateur Radio. But, you have to be an ARRL member to get it. For a one year subscription, send $19.50 (U.S. funds) and we'll send you the Letter first class mail anywhere in the U.S. and Canada. The ARRL Letter, 225 Main St., Newington, CT 06111.

CHASSIS & CABINET Kits. 5120 Harmony Grove Rd., Dover, PA 17315, SASE K3IWK.

INTERNATIONAL Amateur Radio Network 45 minute programs daily: 3.975/14.275/28.475 at 1300Z, 1700Z, 2100Z, 2400Z, 0400Z plus Sunday on 3.890 MHz AM at 2200Z and 7.290 MHz AM at 2300Z. Glenn Baxter, K1MAN, Network Manager.

WANTED: Drake R7A Receiver. Genuine buyer. Tony Ficarra, 144 Gladstone Avenue, Wollongong, NWS AUSTRALIA 2500.

COMPREHENSIVE Apple Software Transmit/receive CW/RTTY with/without TU. Variable speed code practice. Calculate/display beam headings on world map. More. $49.95 and callsign brings disk and electronic manual for II/II + /IIe. SASE for free brochure. W1EO, 39 Longridge Road, Carlisle, MA 01741.

SAVE $1.50 SHIPPING on any ARRL book. Send book price plus $1 to Marshall Hill Enterprises, Bradford NH 03221.

TRYLON FREE-STANDING Towers, up to 96 feet, for info write BJX Supply, Box 388, Corfu, NY 14036.

RTTY JOURNAL, published 10 times per year for those interested in digital communications. Read about RTTY, AMTOR, MSO, Packet Radio, RTTY DX and Contests, and Technical Articles concerning the digital modes. $10 per year (foreign higher). RTTY Journal, 9085 La Casita Avenue, Fountain Valley, CA 92708.

RADIO SHACK Color Computers: Hardware and Software for ham use. Dynamic Electronics, Box 896, Hartselle, Al. 35640, 205-773-2758.

SPY RADIOS WANTED! Buying all types of espionage radios and code machines! Especially wanted are military-type radios in civilian suitcases! Museum, Box 8146, Bossier City, LA 71113, 318-798-7319.

CRYPTOGRAPHY ITEMS wanted. Books, manuals, equipment. Anything related to secret codes or ciphers. WB2EZK, 17 Alfred Road, Merrick, NY 11566, 516-378-0263.

CX7 REPAIRS. Mandelkern, 505-526-0917.

WANTED: LAFAYETTE PrivaCom 3C, 525, 625, or GE5813B. Radio, 2053 Mohave Drive, Dayton, OH 45431, K9SQG.

"HAMLOG" COMPUTER Programs. 17 modules. Full Features. Auto-logs, 7-band WAS/DXCC. Apple $19.95. IBM, Kaypro, Tandy, C-128 $24.95. KA1AWH, PB 2015, Peabody, MA 01960.

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HAM RADIO REPAIR, all makes, all models. Robert Hall Electronics, PO Box 8363, San Francisco, CA 94128, 408-729-8200.

ELECTRONIC CENTER, INC. can save you money! Call for savings on Kenwood, ICOM, Yaesu, Encomm, Rohn Towers, SWL Receivers, and all accessories. Texas 1-800-441-0145; Nat'l 1-800-527-2156; Metro 263-7454; or 214-969-1936. Ham Department, home of the world-famous Sidewalk Sale, 2809 Ross Avenue, Dallas, TX 75201.

SUPER VR85 replaces the popular VR85 satellite tracking program for the Commodore 64. Features include high resolution color map and satellite sprite, tracking data display, footprint sprite, ground trace, mutual acquisition table, transponder mode display, room for twenty satellite Keplerian element sets, Autotrak compatibility, extensive instructions, and strong user support. Send SASE for details. SUPER VR85: $35 ppd (Calif. residents add 6% sales tax) RLD Research, McCloud, CA 96057. W6AMW owner.

SPECTRUM Communications SCR1000 2M Repeater. Wacom Duplexer WP-639. $1650. Milton Onaga, KH6US, P.O. Box 6122, Kahului, HI 96732-8922.

ATLAS RADIO Repair Service—Factory trained technicians. Fast service and reasonably priced. Parts available. RF Parts, 1320 Grand, San Marcos, CA 92069, 619-744-0720.

LIMITED SPACE Dipoles for 160/80, 160/40, 80/40, coax fed, no tuning, $59.50 postpaid. G5RV multi-bander $35. G5RV Junior $32. SASE. Tom Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06070.

BEAM Headings your QTH. $6. W8JBU, 253 River Road, Hinckley, OH 44233.

ALUMA Towers. Crank-up with hinged base, house bracket, mast. Mobile van, rooftop, trailer towers. Stack sections. Will take amateur gear or computers on trade. McClaran Sales, P.O. Box 2513, Vero Beach, FL 32961, 305-567-8224.

THE DX Bulletin is your best source of weekly DX information: DXpeditions, QSL information, propagation data, and much more. SASE or call for samples. Box 50, Fulton, CA 95439, 707-523-1001.

FOR SALE: 52 Ohm non-inductive resistors, Jennings vacuum variables, dummy loads, plate chokes, linear parts. SASE for list. Bill, KA7VJO, P.O. Box 2030, Upland, CA 91785, 714-986-3515.

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EIMAC 3-500Z's. New very limited quantity! $95 each, cash, COD, MO. Add $3.75 per tube for shipping and handling. I pay cash or trade for all types of transmitting or special purpose tubes. Mike Forman, 1472 MacArthur Blvd., Oakland, CA 94602, 415-530-8840.

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WANTED: Western Electric Tubes, Amps, Speakers, Caps, etc. Andy Bouwman, 616-454-3467 after 5 PM.

CLEAR Glass Coffee Mug: Custom engraved with your call sign and your first name. Only $10 per mug. CA residents add 6% sales tax. Write: Regency Glass Engraving, P.O. Box 802, Novato, CA 94948.

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THE ORIGINAL HAM SACK. Deluxe soft padded case for all popular handhelds. Three zippered compartments for radio, antenna and small accessories. Belt loops and detachable shoulder strap. Tough Dupont Cordura™ nylon. We are hams and we know you will like this case. Full refund guarantee. Made in New Hampshire. $12.50 includes shipping. Frank & Linda Reed, KC1DM & N1EUR, 15 Daniel Webster Drive, Hudson, NH 03051.

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DIPMETER

1.5 To 250 MHz

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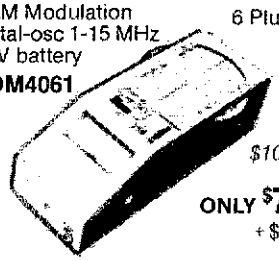


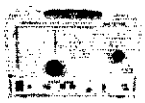
$109.95 Value

ONLY **$79.95** + $4 UPS

- Measure resonance of antennas and tank circuits.
- Check for Harmonic radiation.
- Use as OSC for Rec. alignment.
- More uses detailed in the RSGB Handbook, pages 18.15 to 18.21.

RF SIGNAL GENERATOR

SG4160



- 100 KHz - 150 MHz to 450 MHz on harmonics.
- RF Output 100 mVs.
- Modulation: Int. - 1 KHz Ext. - 50 Hz to 20 KHz.
- Crystal OSC 1 - 15 MHz.

$219.95 Value ONLY **$149.95** + $4 UPS

RF POWER METER/LOAD

PM330

- 1.8 to 500 MHz.
- 50 OHM-N-J Connector.
- 5W, 20W, 120 Watts.
- Accurate to +/- 10%.

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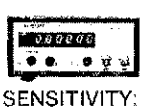
FREQUENCY COUNTER

FC5250



- 10 Hz to 150 MHz.
- 7 Digit readout.
- Gate 1s & 6 sec.
- Accurate to +/- 1 count.

SENSITIVITY: 25 - 100 mV to 30 MHz; 100 - 300 mV to 150 MHz

$169.95 Value ONLY **$129.95** + $4 UPS

AC Adapter is included with unit.

RF ATTENUATOR DC—500 MHz

RFA8000

- 0 - 81 dB in 1 dB steps.
- Accurate to +/- .3 dB
- Steps 1, 2, 3, 5, 10 and 20 dB
- 50 OHm - ½ Watt Insertion Loss .5 dB.

$299.00 Value ONLY **$149.95** + $4 UPS

SWR/RF ANTENNA METER

SWR3P

- Read SWR, RF power and field strength.
- 1.7 to 150 MHz.
- 10 or 100 watt range.
- SWR +/- 5%; POWER +/- 10% accuracy.

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Prices and Specs Subject to Change

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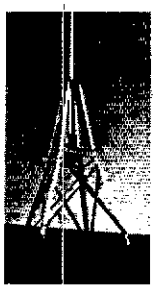
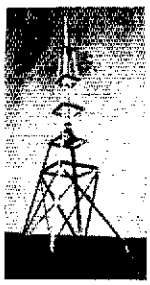
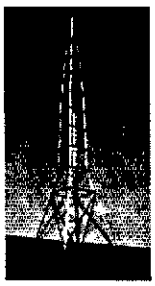
ROOF TOWERS



CR-18



CR-30



CR-45

CREATE ROOF TOWERS CONSTRUCTED OF HIGH GRADE ALUMINUM WITH GALVANIZED STEEL BRACING FOR ADDED STABILITY AND STRENGTH WILL EASILY ACCOMMODATE YOUR ANTENNA REQUIREMENTS. THREE SIZES OF ROOF TOWERS WILL SUPPORT VHF ANTENNAS, HF TRI-BANDERS, AND OSCAR SYSTEMS. ROTATORS EASILY MOUNT INSIDE THE TOWER. AN OPTIONAL THRUST BEARING (#303) IS RECOMMENDED. SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.

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	31-1/3"	440	18	129.00
CR-30	9'10"	27 @ 90 MPH	39"	1,322	33	224.00
CR-45	14'9"	23 @ 90 MPH	39"	881	57	328.00
#303TB	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2½"					39.00

***GUYING IS REQUIRED ON ALL ROOF TOWERS. UPS SHIPPABLE**

ROHN

20G	10' sect.	45.95
20AG	top sect. 9'	56.95
25G	10' sect.	57.95
25AG2	top sect. 9'	67.95
45G	10' sect.	137.95
45AG2	top sect. 9'	140.95
AS25G	access shelf	22.95
AS45G	access shelf	56.95
TB-3	thrust bearing	53.95
M200	10' mast	19.95
SB25G	short base	26.95
SB45G	short base	56.95
EF2545G	gin pole AND MORE!	324.95

HUSTLER

6BTV	6 band trap vert.	136.95
5BTV	5 band trap vert.	116.95
4BTV	4 band trap vert.	89.95
G7-144	Fix stat 2mt collinear	116.95
MO-1/MO-2	mobile masts	21.95
RM10/RM15	10m-15m resonator	11.95
RM10S/RM15S	super resonator	16.95
RM20/RM20S	std. & super resonator	15.95/21.95
RM30	30mt. std. resonator	16.95
RM40/RM40S	std. and super.	17.95/25.95
RM75/RM80	75 or 80 std	18.95
RM75S/RM80S	75 or 80 super	36.95
BM-1	bumper mt.	15.95
SSM-2	stainless ball mt.	17.95
SSM-3	spring	16.95
QD-1	quick disconnect	14.95
SGM-2	2mt. 5/8 mag. mt.	28.95
HOT	trunk mt. w/swivel ball AND MORE!	16.95

VAN GORDEN

PD8010	80-10 dipole kit	35.95
PD8040	80-40 dipole kit	33.95
PD4010	40-10 dipole kit	31.95
SD80	80 shortened dipole	29.95
SD40	40 shortened dipole	26.95
ALL BANDER	160-10mt.	28.95
GR5V	AND MORE!	49.95

CABLE & CONNECTORS — per/ft.

Belden 9913	Low Loss	
Columbia RG213	50 Ω (OHM)	35cts
RG8/U	Foam	30cts
RG 8X	Mini	22 cts
RG59/U	72 OHM	14 cts
PL259/Silver		.99/1.39
N-Male for 8/U		4.00
BNC(M)-UHF(F)		4.80
Columbia Low Loss	AND MORE!	39cts

KLM

KT34A	triband 4 el.	CALL FOR PRICES
KT34XA	triband 5 el.	
2M-14C	2mt. satellite	
2M-22C	2mt. satellite	
435-18C	70cm satellite	
435-40CX	70cm satellite	
432-30LBX	70cm satellite	
2M-13LBA	2 meter	
2M-16LBX	2 meter	

CUSHCRAFT

A4	4 el. triband	300.00
A3	3 el. triband	224.00
AV5	5 band trap vert.	105.00
32-19	19 el. 2mt. boomer	97.95
215WB	15 el. wide band 2 mt. boomer	83.95
424B	24 el. 70cm boomer	83.95
416TB	16 el. OSCAR 435 MHz	60.00
A144-10T	10 el. OSCAR 145.9 MHz	53.00
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AR-2	2mt. vert. ringo	24.50
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BUTTERNUT

HF6V	80-10 vertical	127.00
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2MCV5	2MT vertical	54.00
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TH7DXS	7 el. triband	CALL FOR PRICES
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EX-14	4 el. triband	
TH3JRS	3 el. 750W pep	
18AVTS	5 band trap vert.	
14AVQS	4 band trap vert.	
V2S	2mt. omni-direct	
V4	70cm omni-direct	
HB144MAG	2mt. mag. mt AND MORE!	

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T2X	20 sq. ft.	359.95
HAM IV	15 sq. ft.	299.95
CD45II	8.5 sq. ft.	213.95

DAIWA ROTORS

MR750E	16 sq. ft.	258.95
MR750PE	w/preset	419.95
MR7500	motor	99.95

LARSEN

LMMM	mag. mt.	15.95
LM150	2m coil & whip	25.95
NMOMM	mag. mt.	17.95
NMO150	2m coil & whip MUCH MORE!	27.95

AEA

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220 MHz	44.95
440 MHz	64.95

RTTY-AMTOR Packet

RTTY-AMTOR—PACKET

EEB is one of the few Amateur dealers that actually demonstrates the latest high tech equipment. We test every new item and only sell what we feel confident with. If you are considering Packet, call us and we'll sell you the best. (Ask for Scott, WR4S or Ted, AA4GM at 703-938-3350). If you are in the DC area, stop in and marvel at our dedicated RTTY room.

"NEW"!!!

PC-PakRat Terminal Program for IBM compatible and PK-232 Split Screen. Xmit & Recv Buffer All commands are Simple function keys. Complete help menus for all PK-232 commands & functions. Makes use of the PK-232 Host mode. List Price $29.95. Amt. Price $25.00

NEW PK-232 with weather fax!

- AMTOR, RTTY, PACKET, CW WEATHER FAX.
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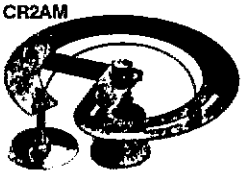

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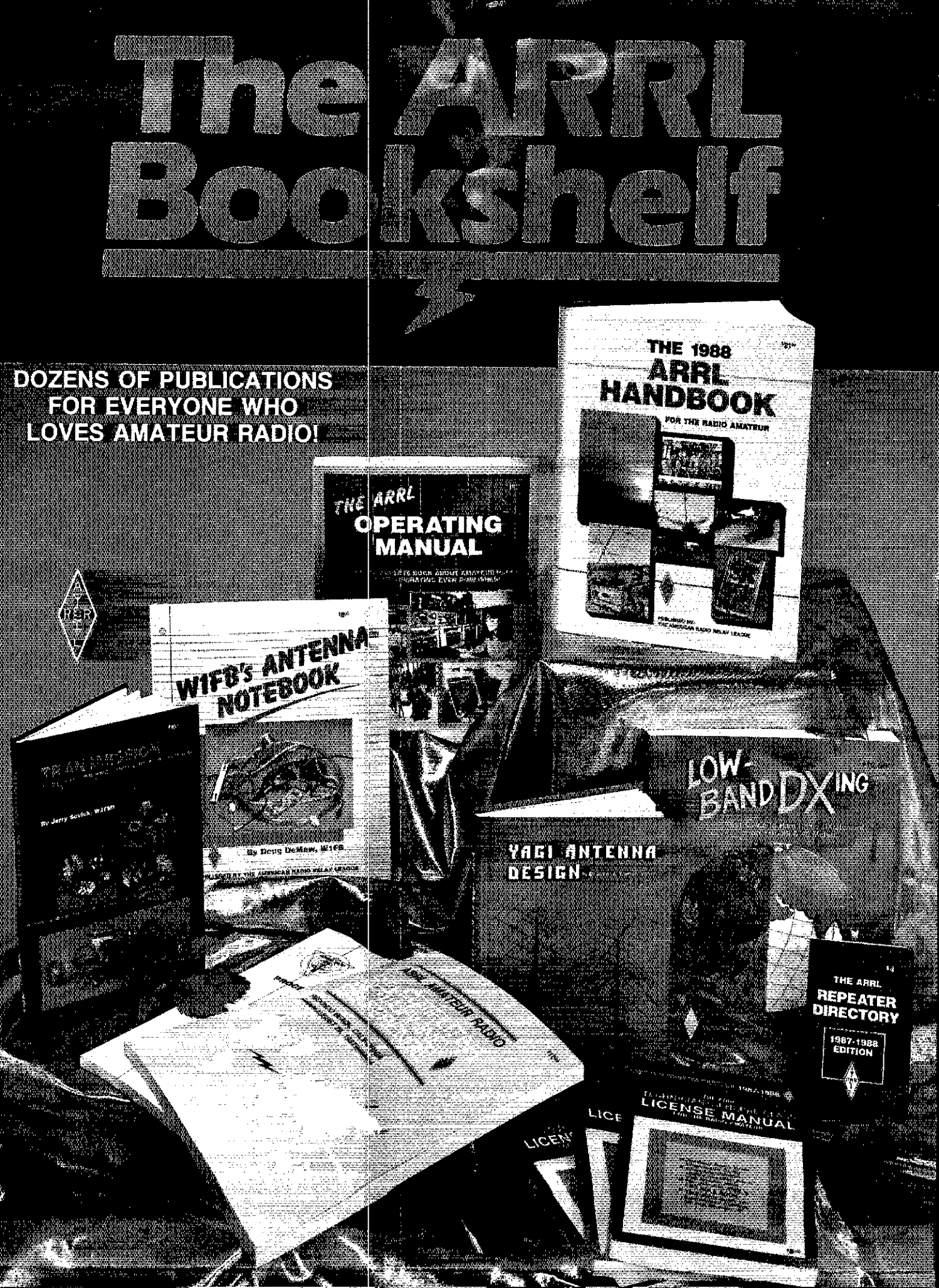

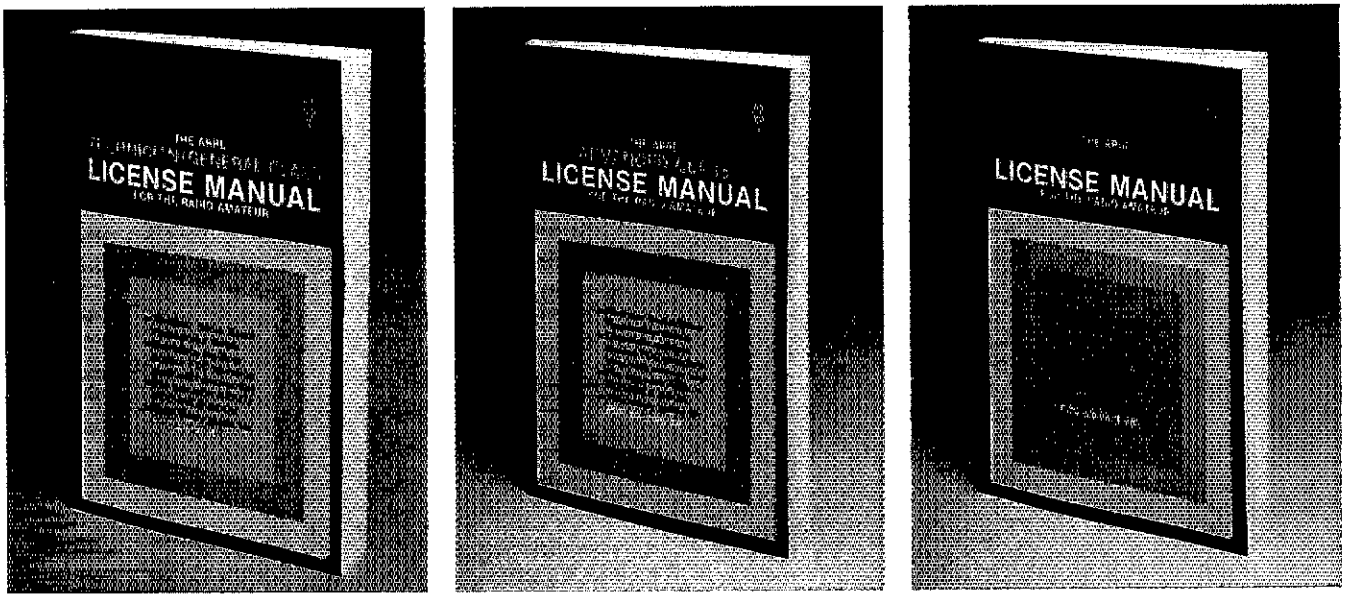

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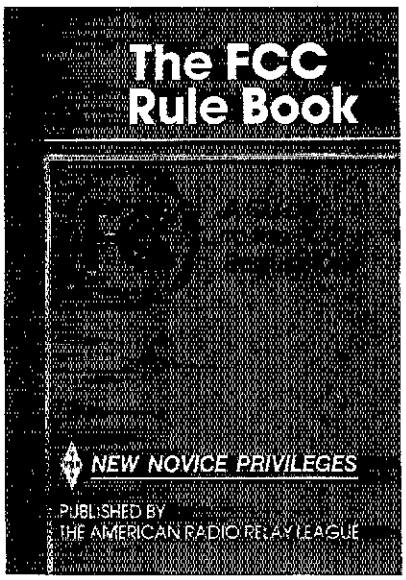

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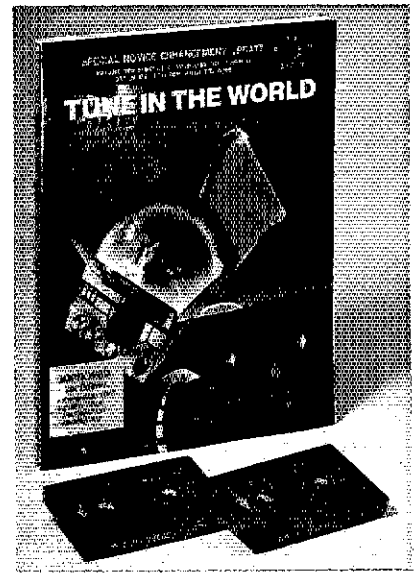
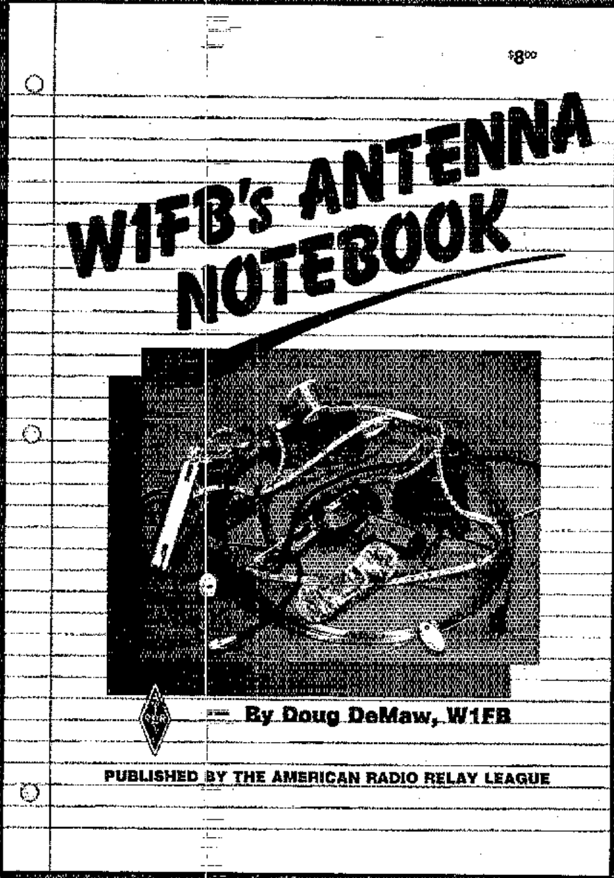


W1FB's Antenna Notebook

This is one of the most readable books about antennas ever published. It's not really a novel about antennas, but *W1FB's Antenna Notebook* is far from being a dry lecture on the properties of wire and vertical antennas. Instead, we can imagine ourselves being invited over to Doug DeMaw's hamshack to chew the rag about antennas. Have a seat in the easy chair in front of the fireplace while Doug grabs his *Antenna Notebook* off the shelf. Listen intently as we discuss what this new ARRL publication is about.



While the adage, "the bigger and higher the better" might be true for those with unlimited pocketbooks, lots of real estate, and plenty of technical and mechanical knowledge; most of us are constrained in some way, from putting up vast arrays of heavy metal! Wire antennas are inexpensive, can be unobtrusive, and give good performance if designed properly. Verticals don't have to be "equally weak in all directions," and we learn how to overcome this so-called "curse." That bargain coax that you picked up at the local flea market may look good, but is it? The first chapter describes a simple test to find out for sure, as well as telling us about the hidden traps of traps, what conditions cause baluns to do some very nasty things, and a brief discussion on SWR (or VSWR if you prefer.)

The second chapter is devoted to the dipole and its variations: the inverted-V, G5RV, trap dipoles, folded dipoles, multi-band dipoles, and dipole look-alikes. Chapter three covers the care and feeding of end-fed wires. Doug tells how to treat them properly so they won't bite! He will also make your day by telling you how to terminate true longwires—painlessly (so that most of the radiation will be in just one direction.)

During the time that W1FB was *QST* Technical Editor, he lived on a typical suburban lot in Newington, Connecticut. He had a tri-bander for 10, 15 and 20 meters on a 55-foot tower. Since Doug lacked the space to "go out" he decided to "go up" by optimizing his tower and beam for use on the lower amateur bands—especially 160-meters. You'll learn from his experience in one of the most informative chapters on vertical antennas ever written.

Since Doug used to live only 2 blocks from League HQ, he had to cope with over 1 volt of RF at the receiver antenna terminals when W1AW was on the air. With code practice and bulletins being sent on 7 bands, the result was the generation of all sorts of mixing products in many receivers. (This was before the time "bullet-proof" solid-state devices had been developed for receiver front ends.) All of this noise made reception difficult at best! The chapter on Special Receiving Antennas is the result of the author's experience using receiving loops and other types of antennas to overcome this problem. Of course, the antennas described offer a solution to other forms of man-made noise as well.

Wire antennas come in two models: the basic street model, like the dipole, and high performance "off road" configurations. The latter actually provide gain over a dipole in certain directions and are described at length: loops (in almost all geometric configurations,) collinear arrays, and cloud-warmers (for effective short-range communication.)

We know of a local amateur who worked 200 countries from his apartment using a 33-foot end-fed invisible antenna running from the window to a nearby tree. He used a black plastic comb as an insulator on the far end. Chapter 6 is devoted to limited-space and invisible antennas including flag poles, TV antennas (the guy lines are the antenna) and the half sloper.

Need a match? The chapter on matching techniques has circuits ranging from simple L-networks to complete Transmatches.

The final chapter is devoted to measurements. It tells how to build and use such useful devices as field strength meters, SWR bridges, noise bridges, dip meters and a current sampling meter for verticals.

That is *W1FB's Antenna Notebook* in a nutshell. This 122 page publication is available for $8.00 at your dealer or directly from ARRL. Please add $2.50 ($3.50 for UPS) for shipping and handling.

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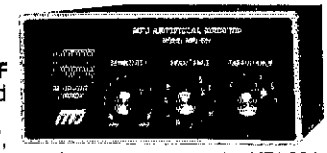

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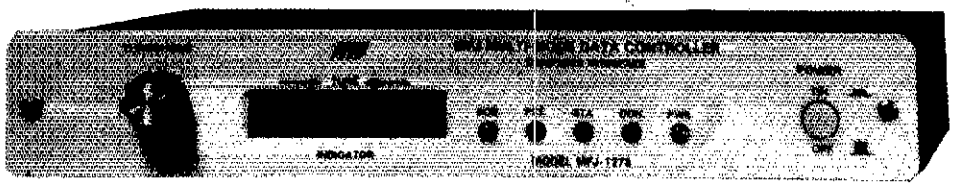

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Any Epson graphics compatible printer will print a wealth of interesting pictures and maps.

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Pictures and maps can be *printed to screen in real time or from disk* on IBM and compatibles with the MFJ-1284 Starter Pack.

You can transmit FAX pictures right off disk and have fun exchanging and collecting them.

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You get iambic operation with dot-dash memories, self-completing dots and dashes and jamproof spacing.

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Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

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WANTED: Kenwood TS130, Power Supply, Mic. Rick Wilson, 95-051 Kuahelani Avenue #143, Mililani, HI 96789.

KENWOOD TS-520SE w/500 Hz CW Filter, both manuals, MC-50 Mike $425. MFJ-949C $110. MFJ-422 Electronic Keyer w/Bencher Paddle $80. Ralph, KE7KP, 614-766-0251.

CASH Paid for Radio Broadcasting Equipment. Especially interested in newer studio and transmitting equipment and accessories. Jon, WB4MMV, 139 Woodlake Drive, Charlottesville, VA 22901, 804-973-8697.

ATARI CW, RTTY, ASCII, and Packet Programs for 8 bit models. Each program available on disk for $15 and on cartridge for $35. SASE for info. Electrosoft, 1656 South California Street, Loveland, CO 80537.

ALPHA 86 Linear. Never on the air. $2800. Bob Sullivan, WØYVA/4, POB 579, Great Falls, VA 22066, 703-450-6320 evenings.

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HAM RADIO license plate collector would like to hear from others who collect same. Jim Estrup, RR 3, Box 908, Kennebunk, ME 04043.

TELEX Three Element Beam, Mast and Rotator. Four months old, $300. K1OOL, 1188 Johnson Road, Woodbridge, CT 06525, 1-203-387-4335.

FOR SALE: Drake C-Line with 1st IF Filter, Bencher XZ-2 Audio Filter, MFJ LSP-520 Speech Processor, ECO 710 GD Meter. Best offer. Wanted: Rohn 6 Tower Sections. Call Russ, 215-678-7619.

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DEAD BATTERY ??? NiCds/Inserts/Packs. Pager (1.3V150) $3.75. Replacement battery inserts: ICOM BP2 $17.95, BP3 $16.95, BP5 $23.95, BP7 $30.95, BP8 $30.95; Kenwood PB24 $19.95, PB25/25H/26 $24.95; Azden 300 $19.95; Tempo S1/270mah $21.95, S1, 2, 4, 5, 15/450mah $22.95; Ten-Tec 2991 $24.95. Exact replacement packs: Yaesu FNB2 $23.95; Santec 142 $21.95; Motorola Rapid Charge: HT220 Slim (15V225) $31.95, HT220 Omni (15V450) $37.95. Many others, GE, RCA, Johnson, etc. SASE for quotes. In PA add 6%. Add $2 S&H/order. Cunard Associates, Dept. A, RD 6, Box 104, Bedford, PA 15522.

WANTED: Heath Keyer SA 5010. Pete Hughes, Rt. 1, Box 110A, Pampa, TX 79065.

SELL: HW-100 (HF Transceiver, RIT, CW Filter, Audio Filter, Speaker /$250), SB-200 (80M-10M Linear /$250), Commodore 64 Package (Disk Drive, Printer, Modem, CP/M, Monitor /$450), PK-1 (Packet TNC /$80), PC-XT Compatible (640K, two DS/DD drives, Multi I/O, Graphics, TTL Monitor /$750), AT-286 (1MB, 1.2MB floppy, 20MB hard drive, Multi I/O, Graphics, TTL Monitor, new / $1,450). All with manual. Many software free. You pay half ship. Free: Hallicrafter VHF Receiver (30Mc-60Mc), VIC-20, Heath Scope. You pay full ship. N2FNO, 201-351-0184, evenings.

DRAKE RV4-C, recent factory service, excellent condition, $65, I ship. W4JKC, 912-927-6643 after 6 PM EST.

WANTED: Left-handed Vibroplex Bug in good original condition. State model, condition and price. Ed, K2MFY, 2 Nutley Court, Plainview, NY 11803, 516-433-6820.

WANTED: Rohn 25G section (5 or more), guys, guy grips, turnbuckles, insulators, etc. LDF5-50 heliax plus connectors up to 250 ft. Will pick-up within 150 mi. of Huntsville, AL. Ham-M or Ham-IV will pay shipping. Robert Walls, 205-828-6738.

220 REPEATER. Micro Control Mark 3CR with preamp. Wacom duplexer, commercial antenna, two Midland 13509's. One with synthesizer. GLB 220 synthesizer. Gene, N6CFO, 503-482-8216.

FOR SALE: Kenwood TS830S, YL883 and YG455C, CW Filters. External VFO 230, mint, $850. Bill, NJ6T, 818-577-1212 days, 818-446-0732 eves PST.

McKAY-DYMEK DR33 Receiver, 50KHz-30MHz. Collins Filters (includes CW). DP40 Preselector, DA100 Active Antenna. All manuals included. All excellent condition. $650. J. Black, KB5AG, 919-556-2445.

QRP Heath HW-7 $50. Vibroplex original deluxe, left handed key w/plexi cover $50. Both mint. KE2DJ, 2108 Thomas View Road, Reston, VA 22091, 703-860-1305.

C-64 COMPATIBLE 1541 disk drive, $165 or trade for ham equipment, SW receiver or what have you. WA3IWW, 215-386-3343.

LINEAR Amp, mint condition, Heath SB221, 2KW, $695, plus shipping. Fred, W4KRT, 703-955-1101, P.O. Box 172, Berryville, VA 22611.

ICOM μ2AT, BP24, BC-50U. Like new, $125. Dr. Doug Metcalf, 919-760-5795 (day).

WANTED: 572-Bs; Roller Inductor; Turns Counter. Joel Thurtell, 382 N. Harvey, Plymouth, MI 48170, 313-453-8303.

DRAKE SPR-4 Rcvr. with N/B mint $150. K2LGO, 516-878-1419.

75A-4, NC303 Wanted. State model, condition, price and telephone. Bob Mattson, KC2LK, 10 Janewood, Highland, NY 12528.

ICOM 2KL HF Linear Amp, 500W, Solid State Automatic Band-Switching with ICOM Transceivers or manual with other HF gear, $1150. ICOM 27H, 2M, FM Mobile Transceiver with HM-12 up/down hand mike key pad $310. Both super condition. Clean original cartons and manuals. You ship. Bob Snyder, KB1QK, days 401-726-7000, evenings 617-784-8377.

ALPHA 78 For Sale $2300. Excellent condition. Paul Powell, 100 S. McGee, Borger, TX 79007, day phone 806-274-6373.

DRAKE TR-3, AC-4, Heath SWR meter, external spkr, Shure 444 mic. Mint condition with manuals. Will ship. $250. KE8JH, 616-327-2142 nights.

FOR SALE: KWM-2, PS-2 $500, Heath Shawnee $50, Pawnee $50, HW-2036 $150, SB303 $225, SX111 $50, DX60 $40. K3SR, 201-876-4939.

QTH FOR SALE. W3ZR is selling his EL-86 property in the beautiful SW Florida community of Cape Coral. Nice 3 br- 2½ ba. home on a ½ acre corner lot with 1700 sq. ft. living (Ham Shack & HDX-55 US Tower) appx. 2600 sq. ft. total. An attractive price of $72,900. For more details contact Dave Kosh or XYL at 1-813-574-3935.

WANTED: Corsair II 516 w/wo power supply. N1DPG, 203-584-1600.

R-390A Receiver Parts: Info SASE. CPRC-26 Military Manpack Radio, 6 meter FM, with antenna, crystal, handset: $22.50, $42.50 pair, $97.50 six. Military-Spec TS-352 Voltohm/Multimeter, leads, manual: $12.50. $4.50/piece shipping, $9 maximum. Baytronics, P.O. Box 591, Sandusky, OH 44870.

SELL New never used Argosy II w/audio CW filter in original carton. pwr. supply 225. Both $590. Lampkin 105-B micrometer signal generator 100 Kc to 450 Mc accuracy .001 w/calibration table. $90. All with books. P. Lelong, N6GO, 5408 Simpson Avenue, North Hollywood, CA 91607, 818-766-4010.

HEATH-KIT HW-5400 and HW-5400-1. Excellent condition and factory aligned. Moving to Alaska and have weight restrictions. $550 and will pay shipping. N8HLC, Dan Stephenson, 722 Choctaw Road, Eglin AFB, FL 32542.

HALLICRAFTERS Station—SX117, HT44, Power Supply, Cables, Manuals, Cartons, Excellent. Also, RCA AR88D Communications Receiver, .535 to 32 Mc, Manuals. Very good. Best offer. WB2JSE, 8909 Fargo Road, Stafford, NY 14143, 716-343-5894.

LINEAR. . . Collins 30L1, clean, works perfect $595. John, WA2V, 1117 DeWitt Terrace, Linden, NJ 07036, 201-468-0039.

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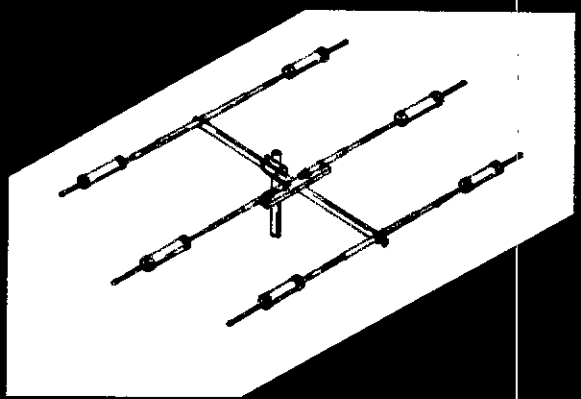

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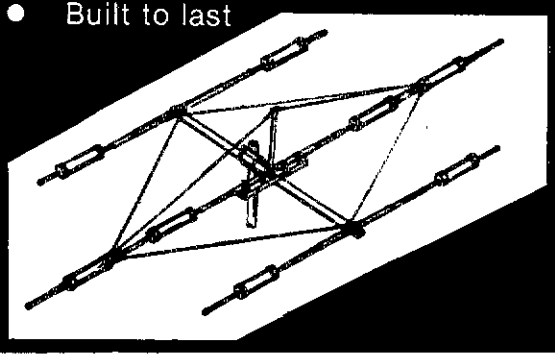

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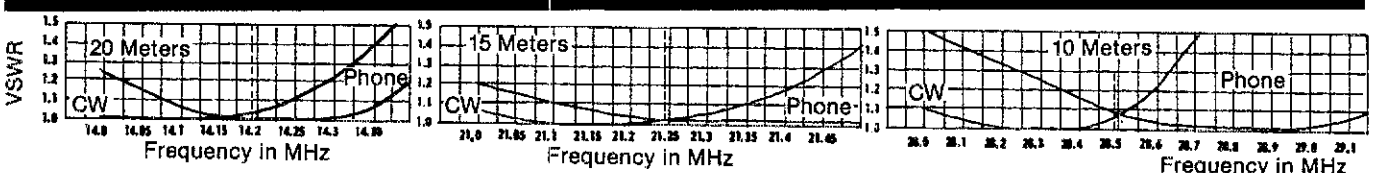

SPECIFICATIONS:

Forward gain	
Front-to-Back Ratio	
Power rating CW	1KW
SSB	2KW P.E.P.
Feedpoint Impedance	52 ohm
VSWR HT Resonance	1.5 to 1 or better
Matching System	Mosley
Number of Elements	3
Longest Element	28'
Boom Length	14'
Mast Size	1⅛" or 2"
Turning Radius	15'6"
Wind surface area (in. sq. ft.)	5.7
Wind load (EIA standard 80 mph)	114 lbs
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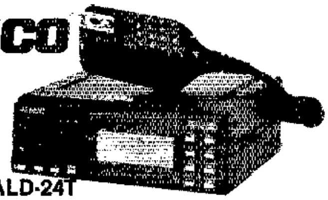

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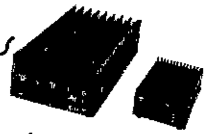

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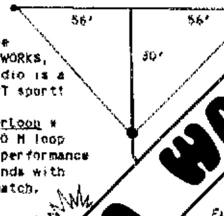

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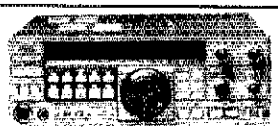

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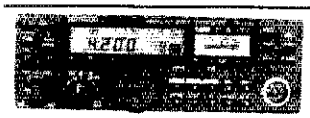

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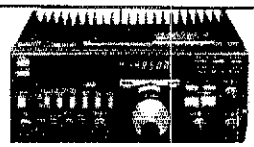

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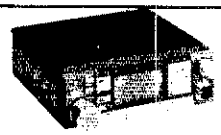

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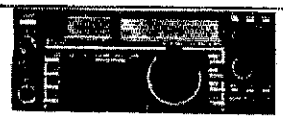

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B1016	2M	Yes	10W	160W	$259
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2-417	2M	45-170W	$299.00
3-22	220	2-20W	$112.00
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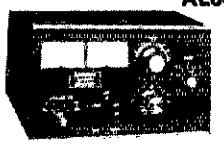

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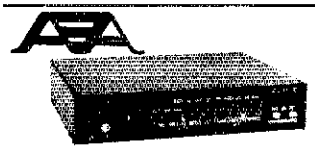

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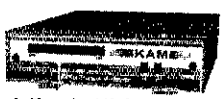

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YAESU FTV-650B G Meter Transverter for FT-101E Transceiver $125. Keith Y. Mortensen, 203-775-6738.

TEN-TEC Titan 425 Linear Amplifier, (2) 3CX800AT Tubes with 1500 Watts Output. 1-1/2 years old. Mint condition—$1750. You pay shipping. Call Bob, KA1DOS, 617-772-2629.

AM TRANSMITTER Wanted. State model, condition, price and telephone. Bob Mattson, KC2LK, 617-772-2629. JOHNSON Navigator, mint $150. Ranger Parts. Resistors Wanted, 50K and 4K both 100 Watt. KC2LGO, Box 158, Riverhead, NY 12528.

DRAKE TR-7A, PS-7, SP-75 Speech Processor, Service-Manual $950; Autek Filter QF-1A $50; 9" Black-White Monitor $60. N4JQH, 305-725-0011.

TOWER: 45 ft. Rohn 25, TA-33 Jr. tri-bander, CDE rotor, $350. You pick up. Shawn, N3AE, Blair Mill East, #223P, Horsham, PA 19044, 215-674-0224.

SELL: Hallicrafters FPM 300—80-10 pwr. supply built in. Very good condition. $200. Phone 717-564-0405, W3KBR.

IC-551D 6M Transceiver $400. Local only. WR4A, 205-721-0729, Madison, AL.

WANTED: Microphone for use in my shack. RCA Model 77D or 77DX. Write: Roger Holland, 4901 Hatton Point Road, Portsmouth, VA 23703.

FOR SALE: Ham Radio—Ten-Tec Solid State, Model 540, 200 Watt Transceiver, AC/DC Power Supply. John Spencer, Fairmont, MN 56031, 507-238-1621.

CDE HAM II $100; In Suitcase QRP-HW8, 10 W Linear ERC Filter, J43 Key $125; BC-312 $75; Cushcraft 214B 2M Yagi $50; Wilson SST-64 Crank-up Tower $150; Towtec Electric Winch $100. All items work and include manuals. You pay shipping. W8JCR, 2091 Marcia Drive, Bellbrook, OH 45305, 513-848-4467.

WANT: CATV Cable. Need 5000+ feet of 3/4" covered hard-line. Must be reasonable. KS9K, 414-554-9170.

WANTED: ICOM 735 and matching AH-2A automatic mobile antenna tuning system, both in good condition. Send detailed description and your best price to: Bill Jefferson, N4MXU, 67 Cedar Hills Circle, Chapel Hill, NC 27514.

ROSS' $$$$ New Opened Box Specials; Kenwood TS-8400 $389.90, TS-180S $879.90, RC-10 $169.90, TS-140 $764.90, TM-2530A $379.90, TR-851A $604.90; AEA PK-64 $109.90; ICOM IC-38A $349.90, IC-471A $709.90, IC-471H $909.90, IC-781A $5900, O4AT $349.90, IC-27A $339.90; Yaesu FT-2700RH $459.90; Hustler 6-BTV $119.90. All LTO. Send $2 for pricelist listing over 8777 ham-related items in stock for immediate shipment. (Free upon request with your order.) MENTION AD. Prices cash, FOB Preston. We close at 2:00 Saturdays & Mondays. Ross Distributing Company, 78 South State, (P.O. Box 234), Preston, ID 83263, 208-852-0830.

FOR SALE: Century 21, Omni D with Filter. NRØW, 913-738-2179.

SELL: Penta PL8295/PL172 Beam Pentode. Complete with socket and chimney mounting. I ship via UPS lower 48 only. With 4 spec sheets. W8MAW, P.O. Box 203, Constantine, MI 49042.

12 FT. DISH by Andrew Corp. on trailer. Folds to 8 ft. width. With 3.7-4.2 GHz buttonhook feed, modifiable to ham band. $1800. Richard Carey, W6GHD, 619-224-9300.

DIGITAL Automatic Displays. All Radios. Grand Systems, POB 3377, Blaine, WA 98230.

WANTED: ICOM IC-25A Transceiver. WB6ZWS, 1028 Fairview, Ojai, CA 93023.

ALPHA 78 Amplifier $2,195. Signal-One CX-11A Transceiver w/Hi-Pwr option $2,795. CX-7A $695. Drake TR-7 Transceiver w/PS7 P/S $595. L-7 Amplifier $725. L-4 Amplifier $595. MN-2000 $250. MN-2700 $350. T-4XB Transmitter $175. Eimac 3CX1200A7 new $350. 8877 new $550. 4CX5000A new $950. A. Emerald, 8956 Swallow, Ftn. Vly., CA 92708, 714-962-5940.

CRYSTALS-FIRE! The finishing, mailing and housing of C-W Crystals has been destroyed in February by fire. Thus we were out of business but hope to be back in production of FT-243's as this advertisement is published. FT-243's as in the March advertisement, made to order. 30M $2.95, five or more $2.50. 40M fundamentals and multipliers to 20M, 15M, 10M $2.50, five $1.95 each. 80M $2.95, five $2.50. 160M $3.95, five $2.95. 10M, 12M overtones $4.95. Airmail 35 cents per crystal. Stamps or long SASE for listings-circuits 1700 to 60,000 kilocycles. "Crystals Since 1933." WØLPS, C-W Crystals, Marshfield, MO 65706.

WANTED: Owner's manuals/copies for Eico 232 VTVM and Knight G-30 dip meter. WEØQ, Paul Juen, POB 29, Vergas, MN 56587.

WANTED: McElroy Professional hand key, Vibroplex Blue Racer (narrow base). J. White, 212 Marcin Lane, Burnsville, MN 55337.

GAASFET's—NE72084, $11. MMIC's—Avantek MSA 0104-0404, $3-$3.75. Johanson, ATC, other VHF-UHF-Microwave components. SASE for list. N2CEI, Box 341A, RD 1, Frenchtown, NJ 08825.

WANTED: Input amplifier plug-ins for Tektronix 561 or 564 Oscilloscopes. Mike Sanders, 209-477-6428.

MININEC Antenna Analysis for IBM-PC. Powerful new version with plotting, antenna files, and more. SASE for details. K6STI, 507-1/2 Taylor, Vista, CA 92084.

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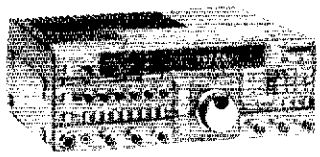
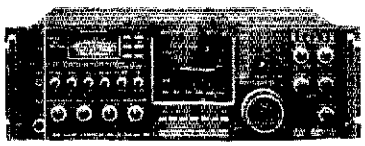


FT-767GX

HF Equipment	List	Juns
FT-747 GX New Economical Performer	$889.95	Call $
FT-757 GX II Gen. Cvg Xcvr	1129.95	Call $
FT-767 4 Band New	1929.00	Call $
FL-7000 15m-160m Solid State Amp	1995.00	Call $
Receivers		
FRG-8800 150 kHz - 30 MHz	759.95	Call $
FRG-9600 60-905 MHz	699.95	Call $
VHF		
FT-212RH NEW 2m, 45w mobile	459.95	Call $
FT-211RH FM Mobile 45w	389.95	Call $
FT-290R All Mode Portable	599.95	Call $
FT-23 R/TT Mini HT	344.95	Call $
FT-209RH FM Handheld 5w	389.95	Call $
UHF		
FT-712RH, 70cm, 35w mobile	499.95	Call $
FT-711RH FM Mobile 35w	449.95	Call $
FT-73 R/TT Mini HT	349.95	Call $
FT-709RH FM HT 4w	389.95	Call $
VHF/UHF Full Duplex		
FT-736R, New All Mode, 2m/70cm	1749.95	Call $
FEX-736-50 6m, 10w Module	259.95	Call $
FEX-736-220 220 MHz, 25w Module	279.95	Call $
FEX-736-1.2 1.2 GHz, 10w Module	539.95	Call $
FT-726R All Mode Xcvr	1095.95	Call $
FT-690R MKII, 6m, All Mode, port.	569.95	Call $
Dual Bander		
FT-727R 2m/70 cm HT	439.95	Call $
220 MHZ		
FT-109 RH New HT	399.95	Call $
Repeaters		
FTR-2410 2m Repeaters	1269.95	Call $
FTR-5410 70cm Repeaters	1289.95	Call $



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HF Equipment	List	Juns
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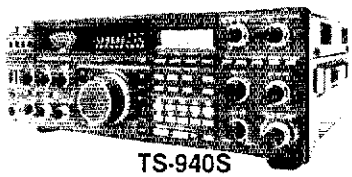
IC-761 Loaded With Extras	2699	Call $
IC-735 Gen. Cvg Xcvr	1099.00	Call $
IC-751A Gen. Cvg. Xcvr	1699.00	Call $
IC-575A 10m/6m Xcvr	1399.00	Call $
Receivers		
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call $
IC-R71A 100 kHz-30 MHz Rcvr	999.00	Call $
VHF		
IC-275A All Mode Base w/PS	1299.00	Call $
IC-275H All Mode Base 100w	1399.00	Call $
IC-28A FM Mobile 25w	469.00	Call $
IC-28H FM Mobile 45w	499.00	Call $
IC-2AT FM HT	319.00	Call $
IC-02AT FM HT, HP	409.00	Call $
IC-μ2AT Micro HT	329.00	Call $
IC-900 Six Band Mobile	639.00	Call $
UHF		
IC-475A All Mode 25w	1399.00	Call $
IC-48A FM Mobile 25w	509.00	Call $
IC-4AT FM HT	349.00	Call $
IC-04AT FM HT	449.00	Call $
IC-μ4AT 440 FM HT	369.00	Call $
IC-3200A FM 2m/70cm 25w	649.00	Call $
220 MHZ		
IC-375A All-Mode, 25w, Base Sta.	1399.00	Call $
IC-38A 25w FM Xcvr	489.00	Call $
IC-37A FM Mobile 25w	499.00	Call $
IC-3AT FM HT	349.00	Call $
IC-03AT Deluxe HT	449.00	Call $
1.2 GHz		
IC-1271A All Mode 10w	1269.00	Call $
IC-1200 FM, 10w Mobile	699.00	Call $
IC-12AT Deluxe 1w HT	473.00	Call $



TS-940S

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TS-940S/AT Gen. Cvg Xcvr	$2449.95	Call $
TS-830S Xcvr	1199.95	Call $
TS-440S/AT Gen. Cvg Xcvr	1379.95	Call $
TS-140S Compact, Gen. Cvg Xcvr	929.95	Call $
TS-680S HF Plus 6m Xcvr	1099.95	Call $
TL-922A HF Amp	1649.95	Call $
Receivers		
R-5000 100 kHz-30 MHz	999.95	Call $
R-2000 150 kHz-30 MHz	749.95	Call $
VHF		
TS-711A All Mode Base 25w	1029.95	Call $
TR-751A All Mode Mobile 25w	649.95	Call $
TM-221A Compact FM 45w	439.95	Call $
TM-2530A FM Mobile 25w	479.95	Call $
TM-2550A FM Mobile 45w	499.95	Call $
TM-2570A FM Mobile 70w	599.95	Call $
TH21-BT FM, HT	279.95	Call $
TH-215A, 2m HT Has It All	379.95	Call $
TH-25AT 5w Pocket HT NEW	349.95	Call $
TM-721A 2m/70cm, FM, mobile	649.95	Call $
UHF		
TS-811A All Mode Base 25w	1,229.95	Call $
TR-851A 25w SSB/FM	749.95	Call $
TM-421A Compact FM 35w	449.95	Call $
TH-415A 2.5w 440 HT	399.95	Call $
TH-41BT FM, HT	399.95	Call $
TH-45AT 5w Pocket HT NEW	369.95	Call $
TW-4100A, 2m/70cm FM	599.95	Call $
TM-721A dual band	649.95	Call $
TR-50 1w 1.2GHz FM	629.95	Call $
220 MHZ		
TM-3530A FM 220 MHz 25w	499.95	Call $
TH-31BT FM, 220 MHz HT	299.95	Call $
TM-321A Compact 25w Mobile	449.95	Call $
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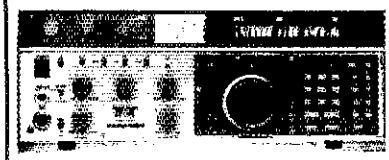

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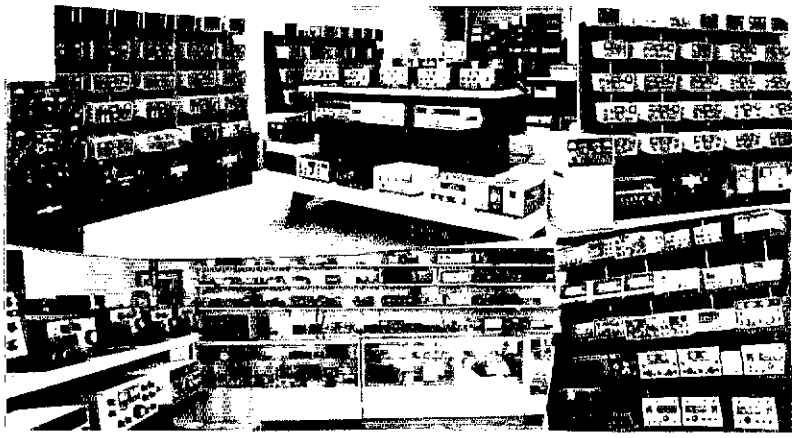

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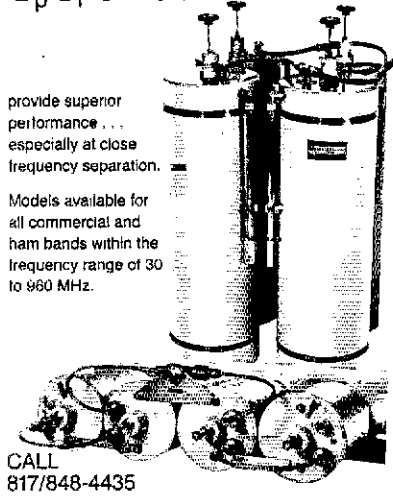

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18AVT/WBS	trap vertical 10 thru 80 meters	
	Multiband Doublets	
18TD	portable tape dipole 10-80 meters	
29DQS	trap doublet 40 and 80 meters	
58DQS	trap doublet 10 thru 80 meters	
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28BS	2 meter 8 element beam	
214BS	2 meter 14 element beam	
64BS	4 element 6 meter beam	
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4218XL	18 element 2 mtr, 28.8' boomer	$125.00
A4S	4 element triband beam	$344.00
AV4	40-10 mtr. vertical	$94.50
AV5	80-10 mtr. vertical	$111.00
ARX2B	2 mtr. 'Ringo Ranger'	$39.25
ARX450B	450 MHz. 'Ringo Ranger'	$39.25
A144-11	144 MHz, 11 ele. VHF	$50.50
A147-11	11 element 146-148 MHz. beam	$50.50
A147-22	22 element 'Power Packer'	$141.75
A144-10T	10 element 2 mtr. 'Oscar'	$54.00
A144-20T	20 element 2 mtr. 'Oscar'	$77.50
215WB	15 element 2 mtr. 'Boomer'	$81.00
220B	17 element FM 'Boomer'	$101.25
230WB	144-148MHz, 30 element	$216.00
32-19	19 element 2 mtr. 'Boomer'	$101.25
424B	24 element 'Boomer'	$81.00
10-4CD	4 element 10 mtr. 'Skywalker'	$124.75
15-4CD	4 element 15 mtr. 'Skywalker'	$145.00
20-4CD	4 element 14 MHz 'Skywalker'	$310.50

HUSTLER ANTENNAS

4BTV	40-10 mtr. vertical	$79.00
5BTV	80-10 mtr. vertical	$105.00
6BTV	6 band trap vertical	$124.00

ROTORS

Alliance	HD73 [10.7 sq.ft.]	$104.00
Alliance	U110	$47.00
TELEX	AR40 TV, 3 sq ft	CALL
TELEX	CD45-II [8.5 sq.ft.]	CALL
TELEX	HAM IV [15 sq. ft.]	CALL
TELEX	T2X [20 sq. ft.]	CALL

ROTOR CABLE

[2-18 & 6-22]	4080 - per foot	$0.18
[2-16 & 6-20]	4090 - per foot	$0.35
1108	RG8U Mini 8 low loss foam per foot	$0.17
	500' roll	$79.00
1198	RG8U Columbia superflex $31/100' or 500' for	$139.00

uniden sale

BC145XL . $92.90
16 Ch 10 band programmable, built-in delay, review, priority, memory backup, Ch lockout, direct Ch access, weather, track tuning AC/DC.

BC100XL
$149.90
16 Ch 9 bnad, aircraft, keyboard lock, track tuning, lighted LCD display, auto search, auto squelch, scan delay, battery low indicator, Ch lockout, direct Ch access, with AC adaptor/charger, earphone & case.

BC50XL	10 Ch 10 Band, Ch lockout, **PACKAGE PRICED,** with battery pack & charger	$124.90
BC70XLT	20 Ch 10 band hand held	$159.90
BC100XLT	100 Ch 11 band, hand held, aircraft	$199.90
BC200XLT	200Ch 12 band 800MHz Hand Held	$299.90
BC175XL	16 Ch 11 band, aircraft, AC/DC	$159.90
BC210XLT	40 Ch 11 band, weather, aircraft AC/DC	$179.90
BC560XL	16 Ch 10 band mobile	$99.90
BC580XLT	100 Ch 11 band mobile, weather, air	$219.90
BC760XLT	100 Ch 12 band w/800MHz mobile	$279.90
BC800XLT	40 Ch 12 band 800MHz, AC/DC	$239.90

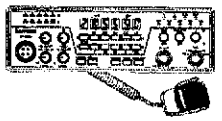
TS2 . . . $319.90
75 channel 12 band, 800 MHz, aircraft & weather, Turbo-Scan®, bank scanning, instant weather, programmable, accu-seek, permanent backup, direct access, with AC adapater, DC cord & mobile mt bracket.

INF1. . . . $219.90
WITH TURBO SCAN® pre-programmed by state to receive any type of police transmission, plus instant weather, programmed for all 50 states. Turbo Scan® scans at 40 Ch per second, DC power cord.

TS1 . . . . . **$229.95**
35 Ch 11 band, weather & aircraft, AC/DC.

INF2 . . . . . **$259.90**
Plus hear road & medical services, & amateur radio.

RANGER
10 meter transceiver, 25 watt, can be programmed to split transceive, SSB, CW, AM, FM, programamble scanning, fully automatic noise blanker, 2½H, 7¼W, 11D.



AR3500. . . . $334.90

REGENCY LAND MOBILE
Utili-Com, 1 watt/2 Ch 2-way, lightweight, battery operated portable, w/flexible antenna, plastic case & battery charger. Supplied with itinerary frequency 151.625.

UC102 . . . . . $139.90

MAXON. . . . $26.95
Model 49SA - 49 MHz, FM 2-WAY RADIO
hands free operation, voice activated transmit up to ½ mile. Batteries optional

model 49B **$34.95**
same features as 49SA except uses "AA" nicad batteries and comes with battery charger

TENNA PHASE III POWER SUPPLIES

PS3 . . . . . **$15.90**
Output:13.8V DC - 3 amp constant 5 amp surge, electronic overload protection w/instant auto reset, fuse protected.

PS4 . . . . . **$19.90**
Fully regulated, 13.8 VDC - 4 amps constant with surge protection, overload protection w/instant auto reset.

PS7 . . . . . **$24.90**
Fully regulated, 7 amp constant,10 amp surge capacity.

PS12 . . . . . **$34.90**
Fully regulated, 10 amp constant 13 amp surge, electronic overload protection w/instant auto reset.

PS20 . . . . . **$64.90**
Fully regulated, 25 amp surge capacity, 13.8 VDC, 20 amp constant, with meter.

PS25 . . . . . **$79.90**
Regulated 4.5-15VDC-25 Amp constant 27 amp surge, instant auto reset, dual meter for current & voltage.

PS35 . . . . . **$99.90**
Same as above except, 35 amp constant, 37 amp surge, adjustable from 10 to 15 volts.

ROSS' $$$$ Used May Specials: Kenwood TS-430S/W3, Fltrs. $749.90, SP-430 $42.50, TM-411A $299.90, TS-700A $309.90; Yaesu YO-901 $379.90, FC-901 $169.90, FR-101S/W, 6M, 2M, FM, CW $349.90, FT-ONE W/3, CW, FL, AM $1295.90; Swan 102BX $459.90. Phone or send SASE for used items list. Over 8777 new ham items in stock. MENTION AD. Prices cash, FOB Preston. We close at 2:00 Saturdays & Mondays. Ross Distributing Company, 78 South State, Preston, ID 83263, 208-852-0830, P.O. Box 234.

1988 CALLBOOKS: $22 any mix. $5/order shipping/handling. Postpaid USA. Century Print, 6059 Essex, Riverside, CA 92504-1500.

KENWOOD TS-820S or Yaesu FT-901DM. Complete factory alignment. You won't find better ones. Options included. $600 each. KD6N, 206-376-2719.

KEY-BUGS and Paddles. Buy, Sell or Trade. SASE for list. "CW Forever" Key Co., P.O.B 659, Manchester, MO 63011.

WANTED: Collins 75A-4; KWS-1. Thurtell, 382 N. Harvey, Plymouth, MI 48170, 313-453-8303.

SELL: Cushcraft A-3 Tribander $150, Azden PCS-300 2 meter HT and magnet mount mobile antenna $175, MFJ "Professor Morse", Code Computer/Keyer $60, Gonset 3-30 Mc Converter $20. Manuals, original cartons. Excellent. You ship. Carl Hines, 1309 Fikewood Drive, Wilson, NC 27893, 919-243-5388.

NEW-Universal Timer. Large digital display of time in 12 or 24 hours, 24 zones, switchable digital display of temperature in F° or C°, 1 year battery, alarm timer $20. Wristwatch world timer 12 or 24 hour, 12 zones alarm calculator $10. Solar charger for AAA $10. Solar panel 3V 100MA multi plug adapter $10. $2 S&H each. Larger panels available. NY state add tax. Send SASE for information. B.E.A.M. Solar & Electronics, N2ZY, 6205-11th Avenue, Brooklyn, NY 11219.

WANTED—Turns counter for rotary inductor. K2LGO.

CENTURY 21 like new, original owner. Crystal calibrator, $190. K3LQQ, 813-973-1238, 84 Chapel Drive, Zephyr Hills, FL 34249.

START Your day on the "Classroom Net". Join WB2JKJ and the crew at the core of the Big Apple daily on 7.238 MHz at 7 AM Eastern time. Or 21.395 later in the day. Regular check ins now earn an attendance award. If you can't make it to class send a card. We will tell you about the most exciting use of Ham Radio in Education today, plus you will become eligible for our world famous "QSL Of The Week Award". Don't delay get out your callbook and write WB2JKJ today.

WANTED: Crank-Up Tower. R. DeAngelis, P.O. Box 294, Malverne, NY 11565.

WIRE FOR Dipoles, Slopers, Loops, new #14, multistranded copper, non-stretch, flexible. Best available. Low Cost, $.105/ft. (delivered) to 3700 ft. continuous, 275 ft. increments. Minimum 275 ft.: $29, includes UPS shipping/USA. Davis, P.O. Box 230, Carlisle, MA 01741, 617-369-1738.

BARGAINS: She wants to park in the garage again. Tek 532 scope with dual trace plug-in $125. Tek 535 same. WE dataphone 103G1 $25. Motorola MoCom 70 $50. Scott FM tuner LT-10 with LM-35 stereo $25. Technical Material 455 KHz SSB product detector $25. TS 1379A/U spectrum analyzer 0-30 MHz $250. Tube type TTY TU with 2 inch scope 9 transformers $25. Panadaptor SSB-3 spectrum analyzer 2-40 MHz $250. Xerox 400 I telecopier, drum type fax $25. Ballentine ACVTVM 1mV-100V $25. HP525C counter plug-in 100-500 MHz cavity parts $25. K6GNX, 702-831-8088, Box 7974, Incline Village, NV 89450.

E.F. JOHNSON Transmitters Literature and Accessories wanted for my station. Will pickup. Len Crispino, Box 702, Hudson Falls, NY 12839, 518-638-8199.

WANTED: Various models of Lighting, Zephyr and Blue Racer Bugs. Smiley White, WB4EDB, POB 5150, Fredericksburg, VA 22403 or call collect between 0330Z and 0400Z.

UPGRADE With Mastermorse. 26 sample VEC code tests plus write and print your own, plus random groups, random words, variable tone, 1-35 WPM, C64 disk, $9.95. Wm. Fisher, 2 Barnard Road, Armonk, NY 10504.

HOSS-TRADER ED says, "Shop around for the best price then telephone the HOSS last for the best deal." New Amp Supply Linear 2500 Watts /Tubes, Hypersill Transformer regular $1199; cash $1079. New 45 Watt Azden PCS-5000 $349. New ICOM 2AT Handy Talkie $269, ICOM 02AT 5 Watt Handy Talkie $329, ICOM 735 Transceiver regular $1099; cash $899. New Wm. Nye 3 KW Antennas Tuner MBV-A regular $675; cash $549. ICOM 2 Meter 28-A regular $469; cash $399. Visa/Mastercard Accepted!!!!! Moory Electronics, P.O. Box 506, DeWitt, AR 72042, tel. 501-946-2820.

AEA Pakratt PK-232 with IBM software, $265. I will ship. KV5F, callbook address, 601-497-1567.

RARE Vacuum Tubes For Sale to best offer. Original DeForest Audion, original E.E.I. Audiotron, W.E. Co. 215A, 1010 & 101F, Hytron VT-121 (2). Denison, 81 Navesink Avenue, Rumson, NJ 07760, 201-842-2067.

SALE: Drake R4C, T4XC, Power Supply, Noise Blanker, .25, .4, 1.5 KHz Filters. $350 plus shipping. Excellent condition. Kurt Bittmann, WB2YVY, 147 McGaw Avenue, Centereach, NY 11720, 516-585-9775.

WANTED: External VFO for Hallicrafters Xmtr Model HT-40. NZ2U, 86 Main Street W, Apalachin, NY 13732, 607-625-2451.

WANTED-Used 4CX1000A Tube. Good condition. Also used FT-101. W4OZH, Box 1143, Lehigh, FL 33970.

FOR SALE: Heath HW-6502 5 watt 2 meter handheld, spkr-mike, HW-6502-2 mobile console with 25 watt amp. These are factory built! $250 you ship. Also IBM PC Jr. Does not include keyboard or monitor. Includes cluster & power expansion attachments. All in good working condition. Best offer. Contact KB4JCI via callbook.

FOR SALE: Alpha 78, 1 KW amplifier, with 10 meters, automatic or manual tune. $2500. Bob, N2HKM, 201-945-0534.

WANTED: Hallicrafters HQ-180A mint condition. Want BC-348Q with 28VDC dynamotor. N2EG, Jarvis, 31 Forest, Flemington, NJ 08822, 201-782-2762.

WANTED: Motorola Expo, 450-470 MHz, PL, Charger. WAØNRF, 218-724-1007.

TEN-TEC Century 21 with 27G Calibrator. Excellent, $200. KF3C, 412-537-7693.

BARGAINS: XYL, children reclaim house. Three beautiful wood instruments: Leeds Northrup Wheatsome bridge $100, LN telephone test set $75, Honeywell lightbeam galvanometer $50. Gertsch FM-3 $75, BC221T by Zenith $25, Lampkin 205A deviation monitor $25. Battery type field strength/noisemeter-EDLABS model 42 $25. Viking ranger "glows in the dark" $150. Mite Navy portable TTY-532-UG $100, Model 26 $25. Hallicrafters 2m AM rig SR-42 with HA-26 VFO $25. Instructograph code tapes (9) $10. HP320BR distortion analyzer $25. GE 2m base station 4ES32A $50. Hammarlund SP-600 with Technical Material SSB converter $125. K6GNX, 702-831-8088, Box 7074, Incline Village, NV 89450.

WANTED: Used SSR Amplifier. Defects not of great concern. If price is right write or call W1MG, 617-987-5075.

"Q" PRODUCTS: 8877 QRO VHF Amplifiers, HV Power Supplies, Coaxial Power Relays, Amplifier and Power Supply Parts. Order now before June 1 price increase. SASE for catalog. "Q" Products, Larry Price, N7BNJ, 10412 36th Street E, Puyallup, WA 98372, 206-841-7465 evenings.

MACKET: Macintosh packet program, $39.95. For details write to S. Fine Software, P.O.B. 6037, State College, PA 16801.

STAINLESS Steel Turnbuckles, U-Bolts, Eye Bolts, Screw Eyes, Bolts, Screws. Elwick, Dept. 677-S, 230 Woods Lane, Somerdale, NJ 08083.

ATLAS 350-XL Wanted. N5NM, Box 2169, Santa Fe, NM 87504-2169, 505-988-2305.

NATIONAL Radio Manual and NCL-2000 factory parts list. SASE. Max Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

JOBS FOR HAMS

WANTED For Summer of 1988: Instructors in Electronics, Ham Radio, and Computers. Small boys' science camp in Pennsylvania. Apply: Donald Wacker, P.O. Box 356, Paupack, PA 18451.

CAMP Counselor/Radio Instructor, nine summer weeks in New Hampshire. Top facility for DX, Ham, Novice instr and also local AM, with long established activity. New rigs, triple-beam tower, in superb area on Ossipee Lake. Write/Call, Alan Stolz, WA1LGI, Five Lockwood Circle, Westport, CT 06880, 203-226-4389.

ADVERTISING DEPARTMENT STAFF

Bruce O. Williams, WA6IVC,
Advertising Manager
Angela Beebe, Advertising Assistant

203-667-2494 is a direct line, and will be answered only by Advertising Department personnel

Index of Advertisers

ANTENNA/TOWER SALE!

hy-gain

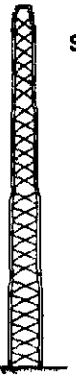
CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
HG52SS	52 ft	9 sq ft	$CALL
HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



ROHN

Self Supporting Towers On SALE!

FREIGHT PREPAID

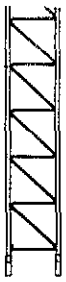
- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	$379
HBX48	48 ft	10 sq ft	303	$489
HBX56	56 ft	10 sq ft	385	$569
HDBX40	40 ft	18 sq ft	251	$459
HDBX48	48 ft	18 sq ft	363	$559

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

ROHN

Guyed Tower Packages



- World Famous Rohn Quality and Dependability
- Rugged high wind survival provides safe installation
- Multi purpose towers satisfy a wide range of needs
- Complete packages include: guy hardware, turnbuckles, guy assemblies, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.

Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

	Model 25G	Model 45G	Model 55G
50'	$ 699	$1239	$1529
60'	769	1399	1719
70'	829	1539	1879
80'	989	1719	2079
90'	1069	1999	2249
100'	1149	2179	2439
110'	1359	2329	2839
120'	1429	2499	3039

US TOWER CORPORATION

These rugged crankup towers and masts now available from Texas Towers!

Check these features:
- All steel construction
- Hot dipped galvanized
- Totally self-supporting-
- No guys needed

Coax arms, Thrustbearings Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock-

CALL FOR SALE PRICES!

Model	Min.Ht.	Max.Ht.	Ant.load*	Sale price
MA40 mast	21'	40'	10 sq ft	$629
MA550 mast	22'	50'	10 sq ft	999
TX438	22'	38'	18 sq ft	919
TX455	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

Note-US Towers Shipped Freight Collect From Visalia, CA Factory

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

RG-213U

$.29/ft $279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

9086

$.39/ft $379/1000 ft

- Same specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HARDLINE/HELIAX®

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket ..... $.79/ft.
½" LDF4-50 Andrew Heliax® $1.79/ft
⅞" LDF5-50 Andrew Heliax® $3.99/ft
select connectors below
Heliax® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE & HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$25	$25	$33	$33
½" Heliax®	$29	$29	$29	$29
⅞" Heliax®	$55	$55	$55	$55

COAX CONNECTORS

Amphenol Silver PL259 ..... $1.25
UG21B N Male $2.95
9086/9913 N Male Connector $4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga ..... $.10/ft.
¼ mile 18ga copper-clad steel wire $30
Dog bone end insulator ..... $.79 ea.

Van Gorden

1:1 Balun ..... $15 Center Insulator $8
Dipole Kits D80 $31.95/D40 $28.95
Short Dipole Kits SD80 $35.95/SD40 $33.95
All-band Dipole w/ladder line $29.95
G5RV all band antenna $49.95

ALPHA DELTA

DX-A 160-80-40 Sloper $49

CUSHCRAFT

A3 3-el Tribander $259
A4S 4-el Tribander Beam w/S.S. Hdwre $349
A743 & A744, 30/40 mtr KIT for the A3 & A4 $ 89
AP8 80-10 mtr Vertical $139
AV5 80-10mtr Vertical $119
D40 40mtr Dipole $159
40-2CD 2-el 40 mtr Beam $339
A50-5 5-el 6 mtr Beam ..... $ 98
215 WB NEW 15-el 2 mtr Beam ..... $ 89
230 WB NEW 30-el 2 mtr Beam $229
4218 XL 18-el 2 mtr Beam $129
3219 19-el 2 mtr Beam $109
220B 17-el 220MHz Beam $109
424B 24-el 432MHz 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
155BAS 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
2B0Q 80/40 mtr Trap Dipole
5B0Q 80-10 mtr Trap Dipole
BN86 80-10 mtr KW Balun W/Coax Seal

CALL FOR SPECIAL PRICES!

HUSTLER

6BTV 80-10 mtr Vert $149 5BTV 80-10 mtr Vert $129
4BTV 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!

BUTTERNUT ELECTRONICS CO

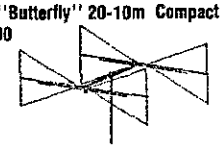
HF6V 80-10m Vertical $129 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $129 Delivered
- Full Legal Power
- Automatic Band Switching

Accessories:
RMK II Roof Mtg. Kit $49
STR II Stub-Tuned Radials $29
TBR160 160m Coil Kit $49
30m Add-on Kit $29
20m Add-on Kit $39
17/12m Add-on Kit $27

FREE UPS on ACCESSORIES when purchased w/antenna

HF5B "Butterfly" 20-10m Compact Beam $199.00



- Unique Design Reduces Size
- No Lossy Traps
- Turns w/TV Rotor
- Boom Length 6 Feet
- Element Length 12.5 Feet

FREE UPS Shipping in Continental USA

MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam $399.95
KT34XA 6-el Broad Band Triband Beam $589.95

ROTORS

Alliance HD73 (10.7 sq ft rating) $119.95
Alliance U110 (3 sq ft rating) $49
Telex CD 45II (8.5 sq ft rating) ..... $Call
Telex HAM 4 (15 sq ft rating) ..... $Call
Telex Tailtwister (20 sq ft rating) ..... $Call
Telex HDR300 Heavy Duty (25 sq ft rating) ... $Call

ROTOR CABLE

Standard 8 cord cables $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G ..... $48.00 45G $133.00
25G ..... $56.00 55G $165.00

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	$1049.
FK2558	58 ft.	13.3 sq. ft.	1099.
FK2568	68 ft.	11.7 sq. ft.	1149.
FK4544	44 ft.	34.8 sq. ft.	1389.
FK4554	54 ft.	29.1 sq. ft.	1469.
FK4564	64 ft.	28.4 sq. ft.	1579.

25G Double Guy Kit ..... $279.
45G Double Guy Kit ..... $299.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	$ 15/ft
1/4 EHS Guywire (6650 lb rating)	$.18/ft
5/16 EHS Guywire (11,200 lb rating)	$ 29/ft
5/32 7 x 7 Aircraft Cable (2700 lb rating)	$ 15/ft
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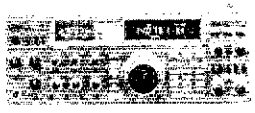

IC-761 NEWEST HF SUPER RIG
- 160-10M/General Coverage Receiver
- Built-in Power Supply and Automatic Antenna Tuner
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- QSK to 60 WPM

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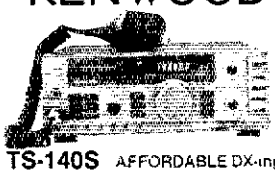

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2-211	2 in/110 out	
3-312	30 in/120 out	
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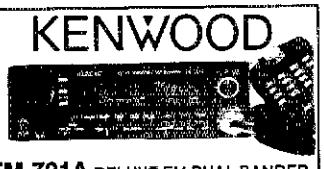

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- 45 Watts on 2 Meters 35 Watts on 70 cm
- 30 Memory Channels

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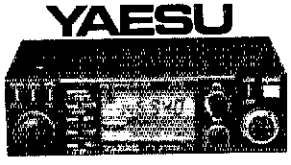

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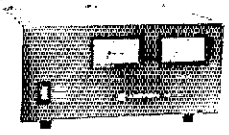

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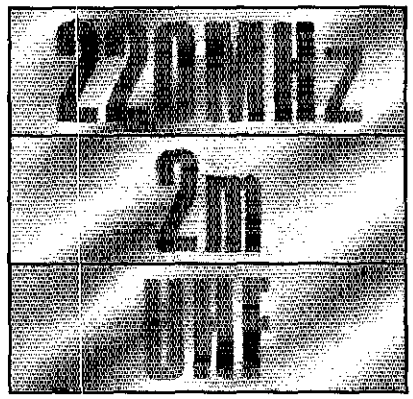


Whether you're a Novice or Extra class operator, you're sure to appreciate the high power, durability and size of Yaesu's FT-23R Series mini-HTs.

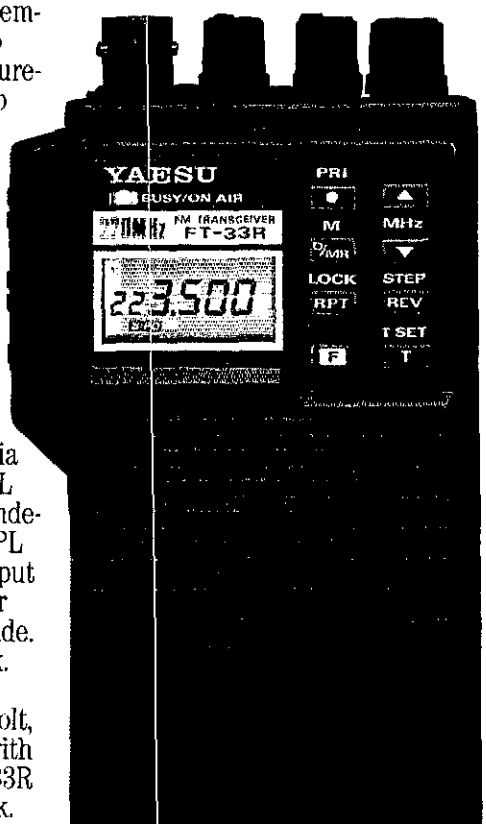
To begin with, you'll find a model that's right on your wavelength. The 2-meter FT-23R. The 220-MHz FT-33R. Or the 440-MHz FT-73R.

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, microprocessor-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.

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Prices and specifications subject to change without notice. PTT is a registered trademark of Motorola, Inc. FT-33R shown with optional FNB-9 battery pack.

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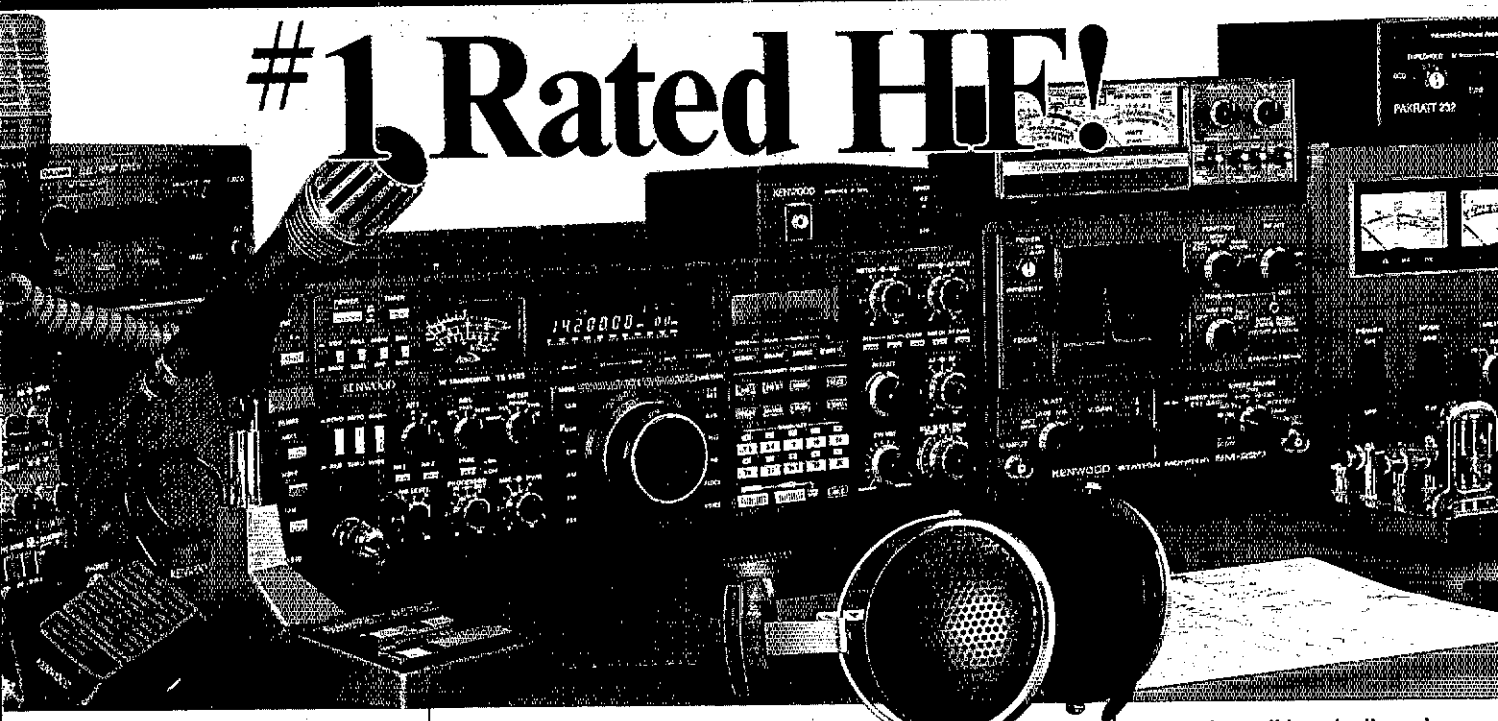
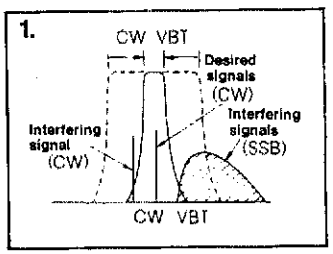


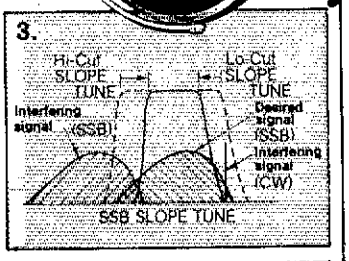
TS-940S

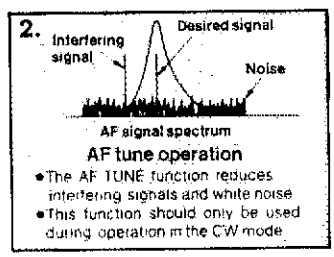
Competition class HF transceiver

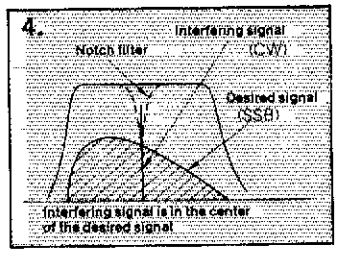
TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle ***time.*** The TS-940S is guaranteed to operate at full power output for periods ***exceeding one hour.*** (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in ***parts per million!***









1) CW Variable Bandwidth Tuning. Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) AF Tune. Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.

3) SSB Slope Tuning. Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) IF Notch Filter. The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

Optional accessories:
• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters • IF-232C/IF-10B computer interface.

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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