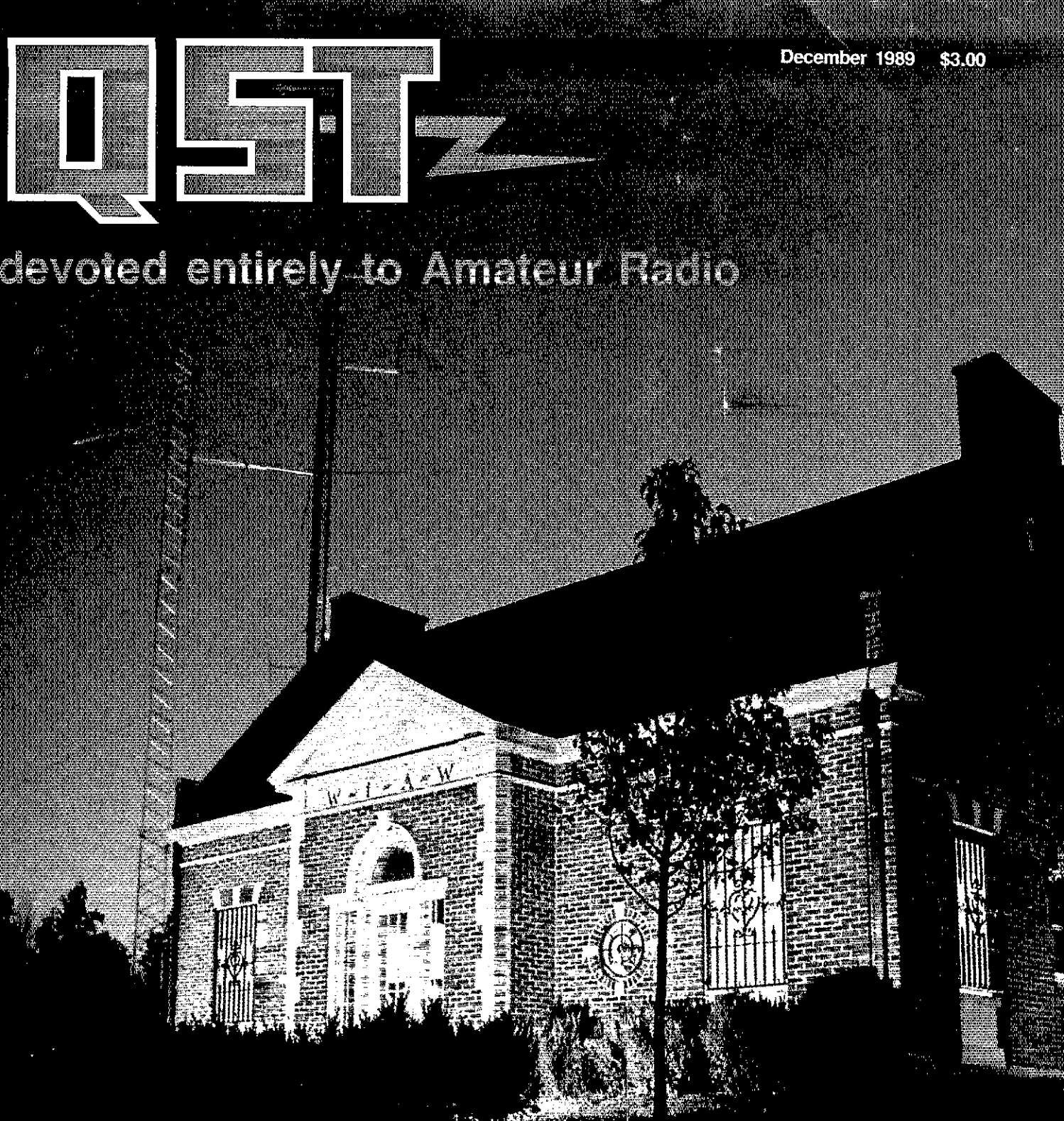
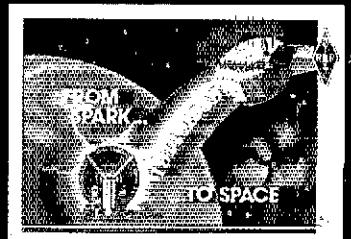
QST

devoted entirely to Amateur Radio

December 1989 $3.00



The New W1AW Really Shines!



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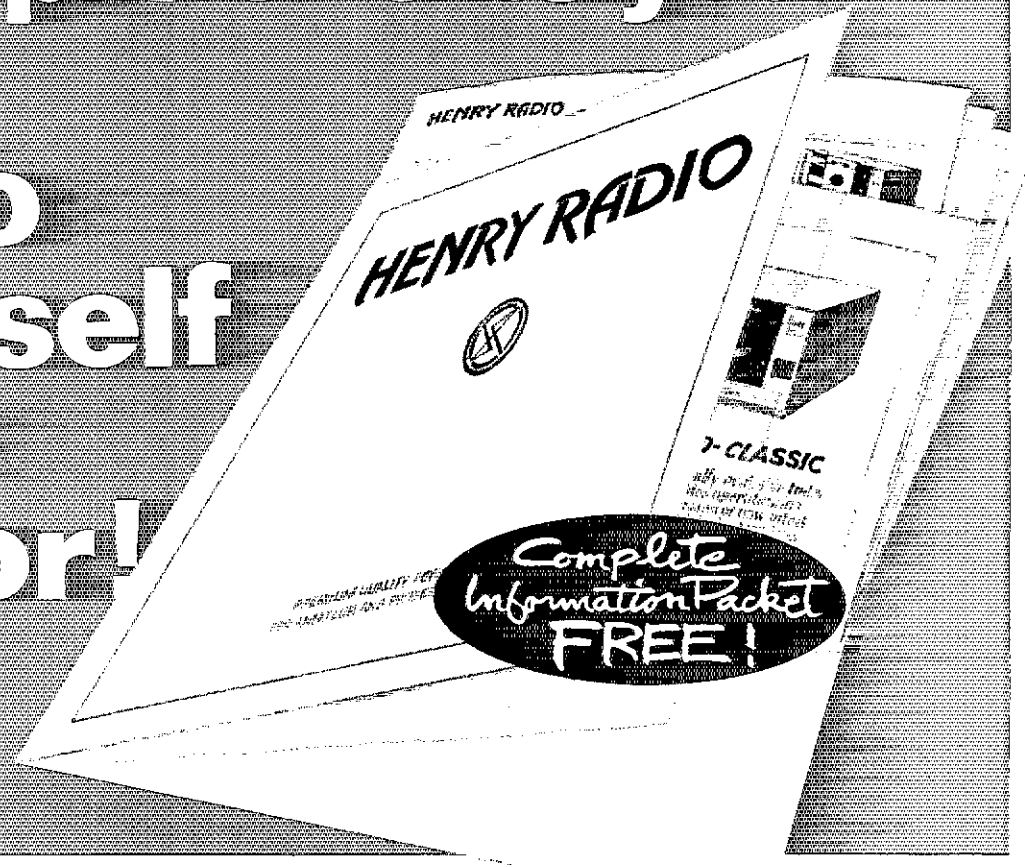
If you plan to buy an amplifier this year...

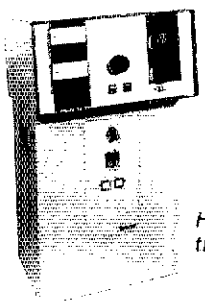
do yourself a favor!



You wouldn't buy a car from a dealer who offers only one model. . .so why buy an amplifier that way?

Henry Radio offers the widest choice of amplifiers in the world. We design and produce amplifiers to fit different needs and different budgets. We feel we offer the best equipment and there are a lot of amateurs who obviously agree. That's why we've sold over 40,000 amplifiers during the last 25 years. If you plan to buy an amplifier, do yourself a big favor. . .call, write, FAX, or come in. But make sure you have our new information packet in your hands before you make a decision. You owe it to yourself. Read it through, compare the specs, compare prices, compare VALUE.

And, of course, when you buy from Henry Radio you're buying factory direct.



Our present HF amplifier line includes the following models:

2KD STANDARD	Single 3-500Z Desk SSB Amp	**3K CLASSIC MKII**	Domestic Console
2KD CLASSIC	Desk Model Linear Amplifier	**3K CLASSIC MKII**	Export Console
2K CLASSIC	Console Amplifier	**3K CLASSIC RF**	RF Deck only
2K CLASSIC X	Domestic Console	**5K CLASSIC**	Export Console
2K CLASSIC X	Export Console	**5K CLASSIC RF**	RF Deck only
2K CLASSIC X RF	RF Deck only	**3K PREMIER**	Console Amp. with 160 meters
3KD CLASSIC	Single 3CX1200A7 Desk Amp	**3KD PREMIER**	Desk Amp. with 160 meters

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TS-950SD

"DX-clusive" HF Transceiver

The new TS-950SD is the first Amateur Radio transceiver to utilize Digital Signal Processing (DSP), a high voltage final amplifier, dual fluorescent tube digital display and digital meter with a peak-hold function.

The Ultimate Signal.

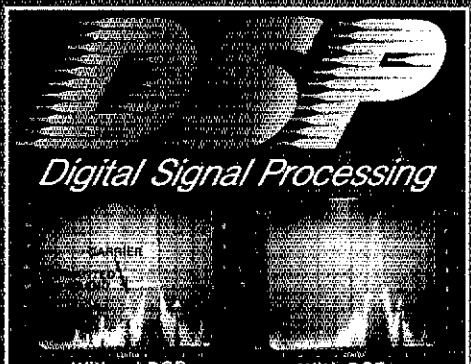
• **Dual Frequency Receive Function.** The TS-950SD can receive two frequencies simultaneously. The sub-receiver has independent controls for frequency step size, noise blanker, and AF gain and its own digital display!

• **New! Digital AF filter.** Synchronized with SSB IF slope tuning, the digital AF filter provides sharp characteristics for optimum filter response.

• **New high voltage final amplifier.** 50 V power transistors in the 150-watt final section, results in minimum distortion and higher efficiency. Full-power key-down time exceeds one hour.

• **New! Built-in microprocessor controlled automatic antenna tuner.** The new antenna tuner is faster and you can store the settings in memory! (Manual override is also possible.)

• **Outstanding general coverage receiver performance and sensitivity.** Kenwood's Dyna-Mix™ high sensitivity direct mixing system provides from 100 kHz to 30 MHz. The intermodulation dynamic range is 105 dB.



• **Digital Signal Processor.** DSP is a state-of-the-art technique that maximizes your transmitted RF energy. Your signal stands out because it is much more pure than your competition! You can even tailor your transmitted CW or voice signal waveshape!

• **High performance IF filters built-in.** Select various filter combinations from the front panel. For CW: 250 and 500 Hz, 2.4 kHz for SSB, and 6 kHz for AM. Filter selections can be stored in memory!

• ***Multi-Drive Band Pass Filter* (BPF) circuitry.** Fifteen band pass filters are available in the front end to enhance performance.

• **Famous Kenwood interference reduction circuits.** SSB Slope Tuning, CW VBT (Variable Bandwidth Tuning), CW AF tune, IF notch filter, dual-mode noise blanker with level control, 4-step RF attenuator (10, 20, or 30 dB), switchable AGC circuit, and all-mode squelch.

• **Built-in TCXO for highest stability.**

• **Built-in electronic keyer circuit.**

• **100 memory channels.** Store independent transmit and receive frequencies, mode, filter data, auto-tuner data and CTCSS frequency.

• **Digital bar meter.**

Additional Features: • Built-in interface for computer control • Programmable tone encoder • Optional VS-2 voice synthesizer • Built-in heavy duty AC power supply and speaker • Adjustable VFO tuning torque • Multiple scanning functions • MC-43S hand microphone supplied

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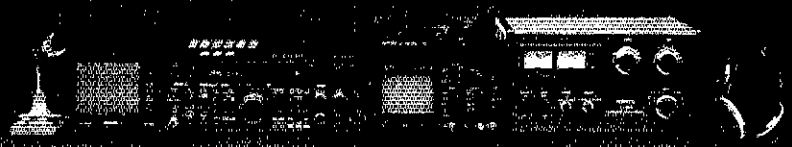
Optional Accessories
• VS-2 Voice synthesizer • SP-950 External speaker w/AF filter • SM-230 Station monitor w/pan display • SW-2100 SWR/power meter • TL-922A Linear amplifier (not for QSK)



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

HOME IS WHERE YOUR IC-725 IS

Fixed, mobile or portable, ICOM's new IC-725 delivers band-commanding performance. The easy-to-operate IC-725 reflects ICOM's world-renown excellence in circuit designs, versatility and dependability. Your enjoyment is also guaranteed with ICOM's one full year warranty!

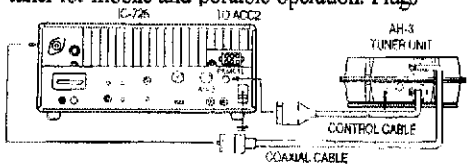
SMALL SIZE, BIG PERFORMANCE!

Extraordinary Performance! Includes: 160 through 10 meter operation • 100 watts output • Shortwave reception from 100kHz to 33MHz • SSB, CW and AM modes (FM optional) • Sensitive 105db dynamic range receiver • Low noise DDS switching • Panel-selectable RF preamp and attenuator • Dual VFO's • Selectable AGC • Rugged full duty cycle finals.

GLOBE-SPANNING OPERATION!

Full Featured Operation! 26 tunable memories with Band Stacking Registers which enable you to store a frequency, switch bands, and return to the stored frequency • 10Hz digital frequency display • Three tuning rates • Three scan modes • Highly effective Noise Blanker • RIT • Semi-QSK CW • Optional narrow CW filter • Built-in AH-3 controller • IC-725 measures only 9.0 x 3.7 x 9.4 inches (H, W, D).

Optional AH-3 automatic and remote antenna tuner for mobile and portable operation. Plugs directly into the IC-725. Wide impedance matching range. Mating whip unit (AH2-B) bolts to auto's frame, works 80-10 meters.



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OUR COVER

Come along with *QST* Contributing Editor Jim Cain, K1TN, as he describes the new W1AW to a family visiting the Newington landmark. The story begins on page 14. *(cover photo by Kirk Kleinschmidt, NTØZ)*

CONTENTS

December 1989
Volume LXXIII Number 12

TECHNICAL

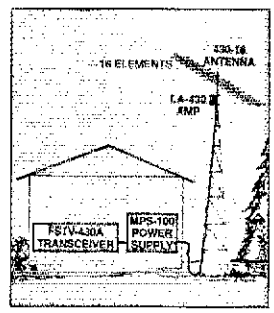
NEWS AND FEATURES

OPERATING

DEPARTMENTS

INTRODUCING AEA'S NEW ATV SYSTEM

Add a new dimension to your amateur radio communications with AEA's Amateur Television (ATV) system. If you hold at least a technician-class license, you can transmit and receive live or taped audio and video Fast-Scan TV (FSTV) information that rivals broadcast quality. Now you can share more than conversation over the air with this new mode of "personal communications."



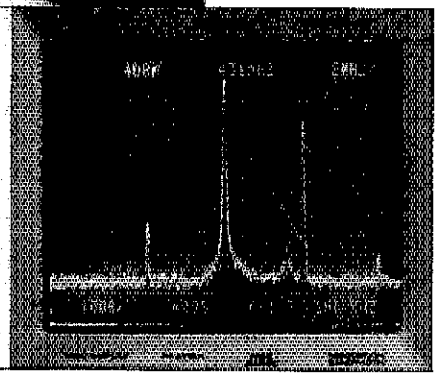
It's Easy and Inexpensive. If you have a video camera or camcorder and a standard TV set, you may already own the most expensive components of an ATV system. AEA's ATV system includes a transceiver and antenna. Simply connect the camera, TV and the antenna to the transceiver, and you're on the air LIVE with one watt P.E.P.! Your TV set will monitor your transmitted and received pictures. If you want to broadcast with more power, AEA also offers a 50 watt mast-mounted linear amplifier with power supply.

The FSTV-430A Transceiver features a low-noise UHF GaAsFET preamp with a typical noise figure of less than 1.5dB and a crystal-controlled or variable tuning down converter. Output is available on channel 3 or 4 for signal reception AND monitoring transmissions. Two frequencies can be selected from the front panel for transmission (one crystal is included). The AEA design is also optimized for superior video and audio quality without sync buzz even with weak signals. The FSTV-430A is the only transceiver you need to work ATV and it also allows you to use the same TV set to monitor your transmitted and received pictures.

The LA-430/50 Amplifier with Power Supply gives a boost to your ATV signal. It includes a 50W P.E.P. mast-mounted Linear Amplifier (**patent pending**) covering 420 to 450 MHz and a GaAsFET preamp which utilize the antenna feedline for DC power. The mast- mount eliminates the line loss between the amplifier/preamplifier and the antenna to improve both transmission and reception, and is the equivalent of a 100W amplifier in the shack with a 3dB line loss. The amplifier is housed in a weather-resistant alodized aluminum case. The MPS-100 power supply also provides a 13.6 volt output for the FSTV-430A.

What is the advantage of Vestigial Sideband (VSB)?

AEA's FSTV-430A Vestigial Sideband operation drastically reduces adjacent-channel interference. VSB requires much less bandwidth than existing double-sideband designs; it's the standard method of modulation required by the FCC for all U.S. broadcast TV stations. Similar in principle to SSB, VSB puts all of the audio energy and most of the video in ONE sideband instead of two. Using about half the spectrum space of competitive units, the FSTV-430A is the ONLY ATV unit that conserves spectrum space by using VSB. Even with AEA's LA-430/50 amplifier, one sideband is reduced more than 30dB. VSB presents an obvious advantage to the bandwidth-conscious ATV operator.



The 430-16 Antenna is a high-performance, computer-optimized yagi specifically designed for ATV operation. It features broadband frequency coverage from 420 to 440 MHz. O-ring sealed connectors, 28 degree E plane and 32 degree H plane beam widths and 16 elements on a 10-foot boom.

See AEA's FSTV System at your local authorized AEA dealer. Put yourself in the ATV picture and join the fun!

Advanced Electronic Applications, Inc.
2006-196th St. SW/P.O. Box 2160 Lynnwood, WA 98036 206-775-7373

AEA Brings You A Better Experience.

R5 10, 12, 15, 17, 20 METERS

Communicate From the Tight Spots

R5 is the antenna designed for space age living, on small city lots, apartments, condominiums or for travel in motor homes. If you have limited space, or galaxies of space, R5 will give the most performance from your transceiver.

R5 electrical halfwave, only 16′ 4″ tall design allows the antenna to be mounted virtually anywhere, without compromising performance. It easily handles 1800 watts of power with a solid state matching network giving full band coverage of 10-12-15-17-20 meters.

Easy set-up makes this antenna ideal for portable or fixed installations. It performs without a rotator, or tower. A simple support mast and 50 ohm cable is your connection to ham friends around the world.

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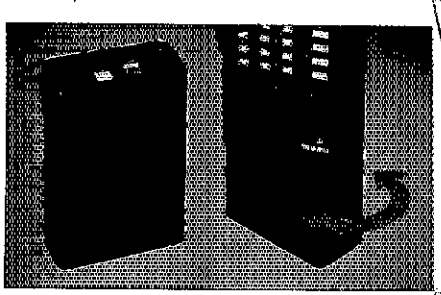
Ultimate Affordable HT!

TH-205AT

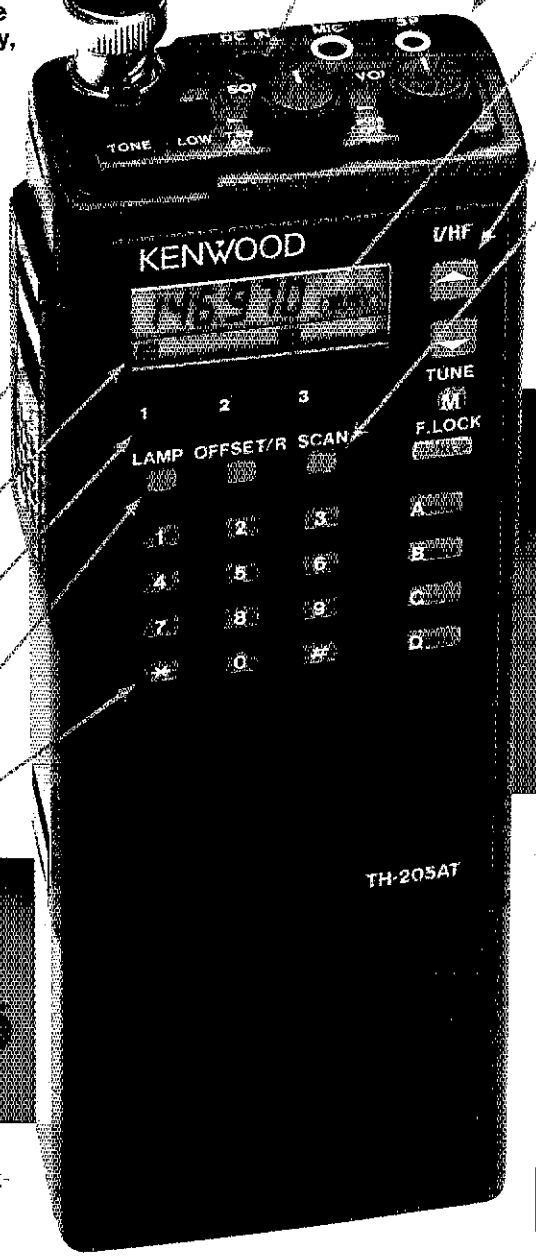
Affordable 5-watt hand-held transceiver. Ultimate Affordability!

It's here now! The affordable, "Kenwood Quality" hand-held transceiver. Standard features include a large, easy-to-read LCD display, wide-range power requirements (operates on 7.2 VDC—16 VDC), 3-channel memory, built-in battery saver circuit, and, when operated on 12 VDC, a robust five watts of power! The die-cast metal rear panel/heat sink assures cool, reliable operation. Receiver frequency coverage from 141—163 MHz is also standard—you can even listen to the "weather channels" at 162.40 or 162.55 MHz!

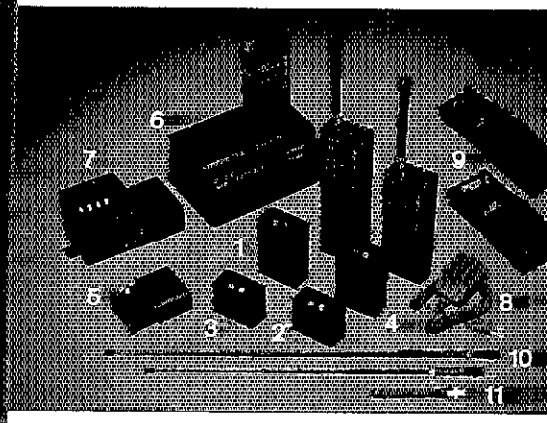
- Monitor switch—to check frequency when PL encode/decode switch is on.
- Extended frequency coverage for certain MARS and CAP operations.
- 3 memory channels store frequency and offset. And so easy to use! Simply press the memory channel number to recall your favorite channels!
- Night light, offset/reverse.
- 16-key DTMF pad for repeater autopatch is standard.



- NEW! Twist-Lok Positive-Connect™ battery case. A wide range of quick-change commercial duty battery packs are available.



- 12 VDC input terminal—allows direct mobile or external power supply operation. When 12 VDC is applied, power output increases to **5 watts!**
- Heavy-duty final amplifier and heat sink. The die-cast rear panel assures reliable operation. With the optional 12-volt PB-1 battery pack, the TH-205AT provides 5 W output. The standard 8.4 volt PB-2 provides 2.5 W output. (500 mW low power).
- Large, easy-to-read LCD display. Frequency, offset, memory channel, TX, RX, and battery indicator.
- Frequency UP/DOWN keys. Used to select frequency or scanning direction.
- Scan function
- Automatic battery saver circuit extends battery life. No buttons to push!
- Supplied accessories include: Rubber flex antenna, belt hook, 8.4 V, 500 mAH NiCd battery pack, wall charger.



Optional Accessories:

1) PB-1 12 V 800 mAH NiCd batt. pack (5 W output). **2)** PB-2 8.4 V 500 mAH NiCd batt. pack (2.5 W output). **3)** PB-3 7.2 V 800 mAH NiCd batt. pack (1.5 W output). **4)** PB-4 7.2 V 1600 mAH NiCd batt. pack (1.5 W output). **5)** BT-5 AA manganese/alkaline battery case. **6)** BC-7 Rapid charger for PB-1, 2, 3, or 4. **7)** BC-8 Compact battery charger **8)** SMC-30 Speaker microphone. **9)** SC-12, SC-13 Soft cases. **10)** RA-3, RA-5 Telescoping antennas. **11)** RA-88 StubbyDuk antenna • TSU-3 CTCSS encode/decode unit • VB-2530 2 m, 25 W RF power booster • LH-4, LH-5 Leather cases • MB-4 Mobile bracket • BH-5 Swivel mount • PG-2V DC cable • PG-3C Filtered cigar lighter cord.

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

KENWOOD

TM-731A/631A

144/450 and 144/220 MHz FM Dual Banders

- **Extended receiver range** (136.000 – 173.995 MHz) on 2 m; 70 cm coverage is 438.000 – 449.995 MHz; 1-1/4 m coverage is 215 – 229.995 MHz. (Specifications guaranteed on Amateur bands only. Two meter transmit range is 144 – 148 MHz. Modifiable for MARS/CAP. Permits required.)
- **Separate frequency display for "main" and "sub-band."**
- **Versatile scanning functions.** Dual scan, and carrier and time operated scan stop.
- **30 memory channels.** Stores everything you need to make operating easier. Two channels for "odd splits."
- **50 Watts on 2 m, 35 watts on 70 cm, 25 watts on 1-1/4 m.** Approx. 5 watts low power.
- **Automatic offset selection.**
- **Dual antenna ports.**
- **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.**
- **Full duplex operation.**
- **Dimmer switch.**
- **16 key DTMF/control mic. included.**
- **Frequency (dial) lock.**

Optional Accessories:
• **PG-4H** Extra interface cable for IF-20 (for three to four radios) • **PG-4J** Extension cable kit for IF-20 DC and audio • **PS-430** Power supply • **TSU-6** CTCSS decode unit • **SWT-1** 2 m antenna tuner • **SWT-2** 70 cm antenna tuner • **SP-41** 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-700** Dual band 2 m/70 cm mobile antenna (mount not supplied) • **MB-11** Mobile bracket • **MC-43S** UP/DWN hand mic. • **MC-48B** 16-key DTMF hand mic.

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South Dakota — Roland Cory, W0YMB, 1010 7th St, W, Mobridge 57601 (605-845-2400)

Delta Division
Arkansas — Bob Harmon, W5SEP, Rt 1, Box 219, Winslow 72959
Louisiana — John M. Wondergem, K5KR, 600 Smith Dr, Metairie 70005 (504-837-1485)
Mississippi — Vessen "Butch" Magee, KF5DE, 2120 Belvedere Dr, Jackson 39205 (601-373-4325)
Tennessee — Harry Simpson, W4MI, 1830 Macaulay Ave, Memphis 38127 (901-357-8148)

Great Lakes Division
Kentucky — John A. Thernes, WM4T, 60 Locust Ave, Covington 41017 (606-331-0331)
Michigan — George E. Race, WB8BGY, 3865 Gibbs Rd, Albion 49224 (517-531-4758)
Ohio — John P. Haungs, WA8STX, 10615 Thornview Dr, Evendale 45241 (513-563-7373)

Hudson Division
Eastern New York — Paul S. Vydareny, WB2VUK, 259 N Washington, North Tarrytown 10591 (914-631-7424)
NYC-Long Island — Walter M. Wenzel, KA2RGI, 373 Fifteenth St, West Babylon 11704 (516-957-5726)
Northern New Jersey — Richard S. Moseson, NW2L, 19 Linden Ave, Bloomfield, 07003 (201-680-1585)

Midwest Division
Iowa — Robert W. Walstrom, W0EJ, 7431 Macon Dr NE, Cedar Rapids 52402 (319-393-8982)
Kansas — Robert M. Summers, K0BXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Bill McGrannahan, K0ORB, 4826 Jarboe, Kansas City 64112-1335 (816-561-0730)
Nebraska — Vern J. Wirka, WB0GQM, 3106 Vinton, Omaha 68105 (402-341-4572)

New England Division
Connecticut — Caesar Rondina, N1DCS, 5 Bailey Dr, West Haven 06516 (203-934-2477)
Eastern Massachusetts — Barry Porter, KB1PA, 47 Erin Rd, Stoughton 02072 (617-341-2639)
Maine — Clyde E. Bonesteel, Jr, WA2ERT, PO Box 14, Birch Harbor 04613 (207-963-7192)
New Hampshire — William Burden, WB1BRE, 11 Briand, Nashua 03063 (603-889-9322)
Rhode Island — William Foss, KA1JXH, 70 Mayfair Rd, Cumberland 02864 (401-334-3058)
Vermont — Frank Suitor, W1CTM, 33 Lakeview Terr, Burlington 05401
Western Massachusetts — William C. Voedisch, W1UD, 240 Main St, Leominster 01453 (508-534-6256)

Northwestern Division
Alaska — Dianne Lee Marshall, AL7FG, One Dog Path, Ester 99725 (907-479-5819)
Idaho — Don Clower, KA7T, 5103 W. Cherry Ln, Meridian 83642 (208-888-7020)
Montana — A. F. "Pete" Peters, KF7R, Rte 38, Box 2017, Livingston 59047 (406-222-2601)
Oregon — Randy Stimson, KZ7T, 9890 SW Inglewood St, Portland 97225 (503-297-1175)
Western Washington — Mary Lewis, W7QGP, 10352 Sand Point Way NE, Seattle 98125 (206-523-9117)
Eastern Washington — Tom Plaisance, KC7PH, 101 N 37th Ave, Yakima 98902 (509-966-4612)

Pacific Division
East Bay — Bob Vallio, W6RGG, 18655 Sheffield Rd, Castro Valley, CA 94546 (415-537-6704)
Nevada — Joseph D. Lambert, W8IXD, PO Box 1201, Boulder City 89005 (702-294-0505)
Pacific — Wayne Jones, NH6GJ, PO Box 794, Wahiawa, HI 96786 (808-621-5916)
Sacramento Valley — Jettie Hill, W6RFF, 306 St Charles Ct, Roseville, CA 95661 (916-783-0383)
San Francisco — Richard Wilson, K6LRN, PO Box 4212, San Rafael, CA 94913
San Joaquin Valley — Byron Smith, WA6YLB, 269 S Silva St, Tulare, CA 93274 (209-685-0305)
Santa Clara Valley — Glenn Thomas, WB6W, 554 Simas Dr, Milpitas, CA 95035 (408-263-9450)

Roanoke Division
North Carolina — W. Reed Whitten, AB4W, 1208 Oxford Place, Cary 27511 (919-467-7464)
South Carolina — Charles E. Moeller, N4FVU, 116 Willow Winds Dr, Columbia 29210-4454 (803-772-1186)
Virginia — Claude Feigley, W3ATQ, 135 The Maine, Williamsburg 23185 (804-253-0658)
West Virginia — Karl S. Thompson, K8KT, Star Rte Box 11A, Seth, 25181 (304-837-3681)

Rocky Mountain Division
Colorado — Edith Sheffield, KA0MQA, 1444 Roslyn St, Denver 80220 (303-355-2488)
New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd, NE, Albuquerque 87112 (505-299-4581)
Utah — Richard Fisher, NS7K, 1510 Celia Way, Layton 84041 (801-544-1928)
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, 12380 NW 30 St, Sunrise 33323 (305-572-3172)
Puerto Rico — Alberto L. Valldejuli, WP4CSG, V-11 19th St, Berwind Estates, Rio Piedras 00924
Virgin Islands — Ronald Hall, Sr, KP2N, PO Box 3987, St Thomas 00803 (809-774-4740)

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 — W. W. "Dan" Dansby, W5URI, 5805 Walla Ave, Fort Worth 76133 (817-292-5019)
Oklahoma — Joseph Lynch, N6CL, PO Box 73, Oklahoma City 73101 (405-528-6625)
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 . . ."

Our Anniversary Year

The League's 75th anniversary year has been eventful for Amateur Radio and its national organization. We've dealt with a host of immediate challenges. We've looked toward the future. But we've also taken the time to stop and remember; to pay proper tribute to those whose vision created and nurtured the League, and who made it possible for us to enjoy Amateur Radio through a tumultuous Twentieth Century and beyond.

We endured our share of setbacks during 1989.

On the 220-MHz front, we found new friends on Capitol Hill and enjoyed continued support from within the Department of Defense. But this wasn't enough to change any minds at the FCC, and in the waning days of Dennis Patrick's chairmanship the Commissioners declared they had been right, a year earlier, in deciding to withdraw the 220-222 MHz allocation from the Amateur Service for the benefit of land mobile. So, our petition for reconsideration (along with a few thousand others) was denied. We went on to the next stop, the Federal Court of Appeals, somewhat comforted by the fact that if the Court remands the matter to the FCC there will be at *most* one Commissioner remaining who had a hand in the original decision.

On Capitol Hill, a schedule of Amateur Radio license fees found its way into budget reconciliation legislation in both houses of Congress. While we seldom use this page to comment on the broader workings of government, monitoring the budget reconciliation process has shown us nothing that might refute the criticism of the deficit-reduction process so often heard elsewhere. No elected official has said publicly, or has been reported to have said privately, that a schedule of fees to tax radio amateurs is good public policy; but, orphan or not, one has been adopted by each of our legislative bodies despite the efforts of Senator Carl Levin and others, and at this writing we remain at the mercy of the House-Senate conference process. The League has been very active on this issue, lining up support among the conferees with the help of key League members in their districts. If as a result of some technicality the fee schedule survives the conference, relief may yet come in the form of separate legislation.

The League had its own deficit to contend with during the year, as reported on this page in June. We operated at a substantial loss during 1988, prompting a number of cost-reduction steps that have made it a bit more difficult, at least temporarily, to provide the quality of service to members that we always strive for. With two months of financial results still to come as this is written, it looks as if the gap between income and expenses will be much narrower in 1989 than in the previous year. This is good, but not good enough if we are to have reserves adequate to meet, for example, the fiscal demands of preparing for a 1992 World Administrative Radio Conference. This is bound to be a matter for serious consideration at next January's meeting of the ARRL Board.

A 1992 WARC moved from possibility to virtual certainty as the Plenipotentiary Conference of the International Telecommunication Union scheduled one for the first quarter of that year. The agenda, while not yet developed in detail, is expected to encompass a number of HF, UHF, and microwave amateur bands. Domestic and international preparations shifted to a much higher gear as administrations responded to what is, by ITU standards, an unusually short time to develop positions on complex technical matters. ARRL and its sister IARU societies continued their own preparations and positioned themselves to be in the thick of things as national policies are developed.

Also with an eye to the future, the Board "bit the bullet" on a codeless class of Amateur Radio license. In the six years since the concept was last seriously proposed, the environment and membership opinion had both changed so dramatically that what had been unthinkable in 1983 now represented the thinking of a significant portion of the membership. Correspondence received was split right down the middle between proponents and opponents, leaving directors with the unenviable task of finding a middle ground acceptable to as many members as possible while reflecting their own informed view of what is in the long-term best interests of Amateur Radio. It was a difficult issue, and it opened some wounds—most of which, we're happy to say, seem to be healing without leaving scars. A proposal is expected from the FCC soon, which will serve as the focal point for further discussion early next year.

At the direction of the Board, the League's officers have done some long-range planning: What must we do now, so we'll be where we want to be a few years from now? This work will continue next year, but some ideas have emerged that are already shaping what we do as we enter the '90s.

In the midst of all this there was still time to pause and reflect on the past, to which we owe the strong traditions and high standards that are responsible for the enviable reputation of Amateur Radio and the League. The spirit of "The Old Man" could be felt at the National Convention in June, at the W1AW rededication in July, at the IARU Region 2 Conference in September, and at countless other gatherings of radio amateurs under the ARRL banner throughout the year. Perhaps it was even felt on the air, where operating standards during Hurricane Hugo and the northern California earthquake emergency were, with few exceptions, something to be proud of.

I closed my 1988 annual report to the Board, at the beginning of the year, with the following thought. Having had a year to think about it, I can't say it any better. "From Spark to Space" is not just a slogan. It is a capsule history of a remarkable technical and social phenomenon.—*David Sumner, K1ZZ*

Performance. Yours and your radio's. They go hand in hand. To be a truly world-class competitor, you've got to have a truly world-class rig. And it's here, now. The versatile new FT-1000 from Yaesu.

Designed for the elite global contest and DX operators. With state-of-the-art design including **direct digital synthesis (DDS)** for low noise and fast lock-up time. The FT-1000 will blow away your competition with a spectacular combination of power and operating flexibility. This HF transceiver boasts a list of

Performance.

features and options that other manufacturers still have on their drawing boards: Like **200 watts RF power output; Built-in TCXO,** for superior frequency stability; **Independent filter selection; Dual receive with balance control** and **two tuning knobs** for simultaneous reception in tough pile-up situations. Using **BPF-1** allows cross-band dual receive.

And the FT-1000 options such as **digital voice-recording system (DVS-2)** for storing and playback "CQ Contest" messages. On RX the DVS-2 has a 16-second running memory for playing back garbled calls. There's also a **CW spot control,** so you can align your frequency to that of an incoming signal without having to transmit; Plus **direct keyboard frequency entry; Front panel RX antenna selector; Built-in cascaded filters;**

Dual-mode noise blanker. And the receiver front-end uses a **four JFET up-conversion mixer,** for high dynamic range.

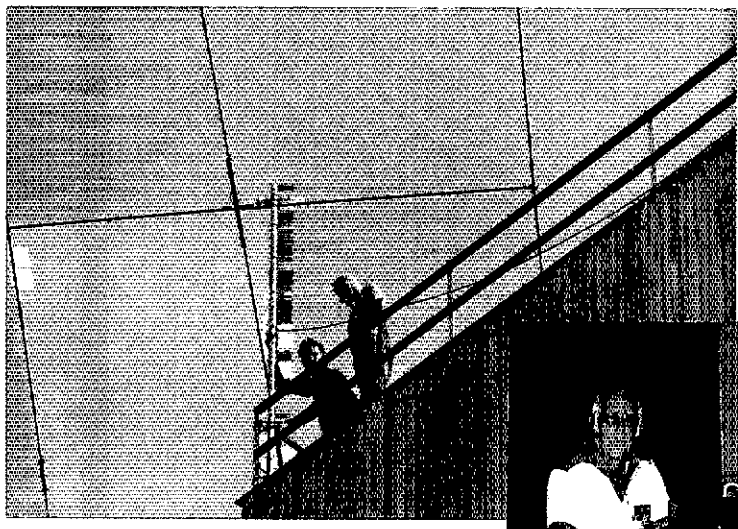
This HF rig is the product of three years of intensive research and design. These efforts show in Yaesu's scrupulous attention to detail with features and options ergonomically designed to allow you to achieve a position of competitive dominance. To hear and be heard... Like never before.

See the exciting new FT-1000 at your Yaesu dealer today. It's the best of the best.

YAESU

Performance without compromise.

UP FRONT in QST



Here she is: Each year, the Southern Counties Amateur Radio Association operates K2BR at the Miss America Pageant in Atlantic City to pass messages for the contestants and guests. The SCARA crew also provides communications for the pageant parade. Installing the tri-bander atop the 150-foot convention hall are George Bull, N2HWK, and Min Bouchard, K2MB. At the controls of the special-event station are (l-r) Jesse Pagen, WA2PRY, and Toni Bull, N2CYL. *(photos courtesy of W2OB)*

Elusive Propagation

Auroral-E contacts are rare on 50 MHz, and practically unheard of on 2-meters. Beginning on page 28, noted VHF authority Emil Pocock, W3EP, tells us about this unusual mode and what happened during the Great Aurora of March 1989 in his in-depth article, "Auroral-E Propagation at 144 MHz."

Anglo-Soviet Station Visit: Here's Stan Sychov, RB5JZ, operating at G3FXB last June. According to How's DX Editor Ellen White, W1YL/4, Stan was one of the first Russian hams to operate in the United Kingdom. Contesters will remember RB5JZ as a founder of UK5MAF and as holder of his former call, UY5LK. *(G3FXB photo)*

***NCJ* has a new editor!** Tom Taormina, K5RC, is the new *National Contest Journal* editor, replacing Randy Thompson, K5ZD, who handled that job for several years. Tom brings years of contest and DX experience to the *NCJ* helm. He's won many single-operator and multioperator contest titles and has been involved in the construction of a number of superstations in the Houston, Texas, area. *NCJ* carries articles on contests, operating and DXing, and is published six times a year by the ARRL.

League Lines

Both the House and Senate have passed bills creating ***fees for Amateur Radio licenses*** (and other FCC licenses). The House has proposed a $30 fee, and the Senate has proposed a $35 fee for each amateur form 610 processed by the FCC. By the time you read this, we should know the results of the joint House-Senate Conference Committee meeting planned for November 1, just after press time for *QST*. We are hopeful that the fees for amateurs will be dropped during the meeting. Watch W1AW bulletins for late-breaking news.

Amateurs provided communications to the earthquake-stricken San Francisco area in the aftermath of the October disaster that caused widespread damage in northern California. ARRL officials in the affected areas report that local amateur emergency nets on the 2-meter and 220-MHz bands were in full swing, providing on-site emergency communication assistance. The extensive packet network in the San Francisco area was dedicated to handling the heavy volume of health and welfare traffic.

The FCC has clarified the ***new rules concerning station identification*** when operating at a station other than your own [part 97.119 (a)]. The wording in the new rules is to thwart bootlegging. It is not intended to prevent visiting operators from using their call signs at other stations—a practice that was okay under the old rules, and is still okay under the new rules.

There are a couple of acceptable procedures: (1) A visiting operator can be designated control operator of your station. In this case, the visitor signs your station call sign and operates within the privileges of your license to the extent his license permits; if he has greater privileges than you, he can use them by signing your call sign followed by his. (2) You may simply "lend" your equipment to your visitor, and the equipment in your shack then becomes your visitor's temporary station. Your visitor signs his own call and operates within the privileges of his license.

Another first for the ARRL/VEC! Two Soviet amateurs were examined at the ***first ARRL/VEC coordinated session held in the USSR***. The session, held on September 28 in Khabarovsk, was sponsored by the Portland (Oregon) Amateur Radio Club VE Team. The two amateurs were Gene G. Shulgin, UZ3AU, who passed the Novice written and 20-WPM code elements, and Mike A. Zavarukhin, UAØCN, who passed all elements for the Amateur Extra exam. The VE team consisted of K7RUN, WAØDIM, and KX7Z.

Changes at the FCC: Commissioner Patricia Diaz Dennis left the Commission in September. Diane Killory has stepped down as FCC General Counsel; the new FCC Councel is Robert Pettit.

Did an Elmer help you get into Amateur Radio? Return the favor with an ***Elmer certificate*** from the Educational Activities Branch at ARRL HQ. Send a 9 × 12-inch SASE with 45-cents postage for your certificate. You may also nominate your volunteer instructor for ARRL Instructor of the Year, or nominate a professional teacher for ARRL Professional Teacher of the Year. Make your nomination before January 31, 1990, by contacting your Section Manager.

HQ often gets calls from amateurs asking what ***the most recently issued call signs*** are. We frequently publish this information in the *QST* Happenings column. For example, in the fourth district, Group C (1 × 3) calls like N4WZL have nearly all been assigned. After N4ZZZ is issued, the FCC will begin issuing calls for Technician- and General-class operators from the Group D (2 × 3) call sign block.

W1AW has started ***experimental bulletin transmissions on 18.100 MHz (CW and RTTY) and 18.160 MHz (SSB)***. Further experimental transmissions are expected to begin on 10.140 MHz (CW/RTTY). Stay tuned to W1AW bulletins, *The ARRL Letter* and *QST* for additional information.

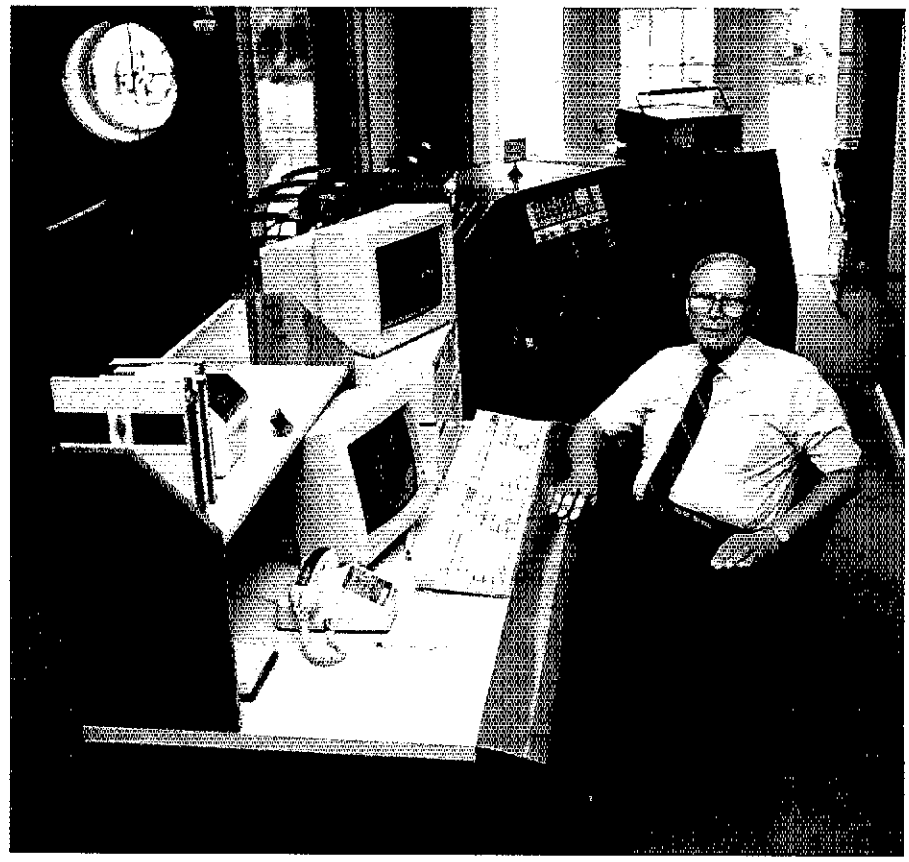
We recently conducted an informal poll of W1AW listeners in response to ***suggestions that the AMTOR transmission be sent first*** on teleprinter bulletin transmissions. The results were dead even—indicating no mandate in either direction. Because a large number of those who copy AMTOR stated that they did so by automatic means, and that it makes no difference to them which transmission is first, it seems to us that W1AW can best serve teleprinter listeners by retaining the Baudot-ASCII-AMTOR order of transmission. Further input is welcome.

Hurricane Hugo wiped out all the QSL cards at the US Virgin Islands QSL Bureau! Shipments to KP2 and KV4 will resume as soon as the bureau is functional.

A Visit to W1AW

Take a tour of Amateur Radio's flagship station.

By James D. Cain, K1TN
ARRL Contributing Editor
PO Box 42
Andover, CT 06232



The main station console features computer-controlled bulletins and code practice and audio-mixing and -splitting equipment. To the left is one of the glass sound-proof visitor studios. Chief Operator Chuck Bender, W1WPR, who will retire this year after 38 years of dedicated service to the amateur community, is at the controls. *(KC1MP photos)*

"Visitors," I thought to myself, dragging a comb across my head. "You can tell it's their first time here—they've taken a parade lap around the parking lot to figure out what's what."

The blue minivan heads toward W1AW. The van is packed, so they've come a long way. The driver's talking into a mike, so they probably got directions to 225 Main Street from one of the locals.

A couple and young boy disembark, stretching their legs. I can hear it now:

"We are on vacation and found ourselves just a couple hundred miles from Newington. Since we were in the neighborhood we decided to see the new station. Is it open?"

"Of course. Come on in while we switch from code practice to an official bulletin."

The new W1AW warps time for most visitors. Outside, the architecture of the small brick building gives away its age of more than 50 years—especially the round, funky Georgian windows. Yet, fresh brick and masonry, new paint and trim hint of city gentrification. "The old was good, don't throw it away."

I press keys on the '286 computer driving the transmitters, then we do the introductions. My visitors are from the Midwest. Both husband and wife are hams. Their son, who looks to be about 10, makes a beeline for the computers.

Heads swivel as my guests try to take everything in at once. The impression is one of "high tech functional."

"Just wander around and let me know if you have any questions," I say. "We are transmitting official bulletins on CW, on six bands. That will be followed by the same bulletins on AMTOR, Baudot, and ASCII. Then SSB."

Our Aluminum Curtain

I notice the couple peering at the drawing of the antenna system and suggest we go out to exercise our necks on the real things, before darkness closes in. "It's pretty cloudy and might rain, too. If you don't like our New England weather, just wait a minute."

Outside, I explain that the bigger, newer building across the parking lot is the office building. "There are a few staff members inside, judging from the cars in the lot right now. Even on weekends, there're usually a few people working on special projects. It's a lot quieter."

Husband Kevin obviously is waiting for me to continue my spiel.

"We put that 120 feet of Rohn tower up 12 years ago," I tell him. "You can see it on the cover of the *1978 ARRL Handbook*. We had Telrex Yagis for 40 and 20 on it. The three 60-foot towers already were in place at that time. This summer the 60-footers were replaced with identical ones; after some 30 years, we figured they were ready to retire."

"The new beams for 20 through 10 meters, including the WARC bands, were specially designed by Bill Myers, K1GQ, and manufactured by Cushcraft. We've also got standard Cushcraft Yagis for 30 and 40 meters.

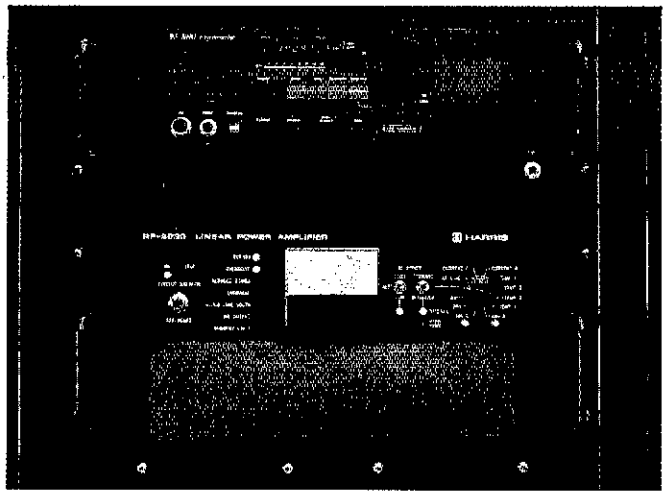
"The system was designed for broadcasting, which is what W1AW does.

"At my home station I used to have stacked 20 meter beams," I tell them. "The top one turned and the bottom one was fixed at 45 degrees for working Europeans during contests.

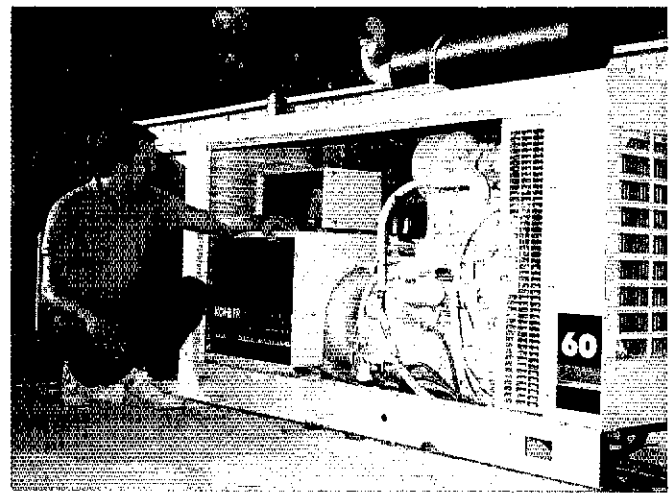
"I fed the two in phase, often turning the top antenna to 15 or 20 degrees, to increase coverage of Europe, from Norway to southern Italy. The idea is much the same here. We have listeners from British Columbia to Miami. So the system was designed to cut a wide swath.

"Another consideration was bandwidth, since we transmit both on CW and high up in the phone bands."

"What about interaction?" Kevin wants to know.



The 20-meter Harris transceiver/amplifier setup—one of seven identical Harris radios that provide RF for bulletin and code-practice transmissions.



League Building Manager Greg Kwasowski inspects the new 60-kW emergency generator that is fed by a 550-gallon underground diesel fuel tank. The generator automatically kicks in during a power outage.

"Good question. The antennas are stacked to avoid that as much as possible. When the first set went up they were put in position temporarily, and as a result we had SWR problems on a couple of bands.

"Murphy visited in other ways, too. We had to cut back power on 15 meters at first because the signal on that band set off the new fire alarms. Knowing Murphy intimately as we do, the cable connecting the two alarm sensors on the second floor probably was a perfect half-wave on 21 MHz!"

Kevin nods sympathetically, recalling "It took me a week to stop my new garage door opener from falsing every time I transmitted above 14 MHz."

"So are we loud on all bands now, or what?"

"Uh huh," Kevin says, as he counts the runs of Heliax, ascending the tower like so many snakes.

"Regular coax deteriorates with age," I say, reading his mind. "We are here for the long haul, if you will pardon the pun."

Where is *QST* Made?

Linda had turned her attention to the beams and wires gracing the office building.

"Those are for the laboratory station, which is a testing ground for both new commercial gear and equipment under design.

"By the way, it's possible for staffers to eat lunch there, and check the bands for some DX, too." We are, after all, talking about a buildingful of hams!

Kevin surveys the neighborhood that has grown up around the League's site since the land was purchased and the original station built there in the 1930s. "What about TVI?"

"There has been surprisingly little over the years," I tell him. "The station managers have been able to take particular care about proper grounding and the like. We had our share in the old days but managed to get it cured one way or another. Now, of course, this area is on cable TV."

It was getting dark, starting to sprinkle rain, and I had to get back inside to start up the transmitters again.

The racks of Harris Corporation equipment lurked in their glass-paneled room as we re-entered the station, the computers winking at me for another command, while the visitors' "booths" behind massive glass doors beckoned with rigs ready to fire up on every conceivable band and mode. I had noticed Kevin in particular eyeballing the 12-meter beam.

"Can I operate while the bulletins are being transmitted?" Kevin wants to know.

"You bet. That was one of the goals of the new station. But with all those kilowatts in the next room, you may have to dodge a birdie or two.

"Just let me get this 'phone bulletin going and we'll sit you down."

Kevin and Linda watch as the business-like Harris rigs spring to life again, while their son Brian stays glued to the '286.

Kevin: "I've never seen rigs like the Harris' before but they look pretty straightforward. Sort of a ham's dream station."

"In some ways they are," I answer. "We are on the air about 10 hours a day, 362 days a year, at a thousand watts out. The transmitters had to be rated for punishing duty no ham rig ever will encounter.

"There were three options: the first was to use regular amateur transceivers and amplifiers. Although that possibility was explored with several manufacturers, it was soon abandoned. Foremost was what engineers call Mean Time Between Failure. If ham rigs had what is needed for W1AW service, you and I wouldn't be able to afford them.

"Take a peek inside any 1980s ham transceiver and you'll encounter another problem for us: serviceability. These rigs are not easily worked on. You and I can afford down time; W1AW cannot.

"And, finally, our engineers were concerned about the constant changing of commercial ham gear. We were looking for many years of service from these radios. We could have been stuck with radios no longer in production, and eventually with radios for which repair parts could be difficult to obtain. These things just did not add up."

Why Not Homebrew?

"Well, that all makes a lot of sense," admits Kevin. "But since W1AW has special requirements, why didn't your lab engineers just build custom rigs, like you did in the past?"

"You'll be glad to know that not only was that option thoroughly explored, the original recommendation was to go that route. Unfortunately, what looked promising at first blush turned out to have a number of drawbacks.

"There was no question that our lab engineers could design a custom system; indeed, they already had a tentative plan on their drawing boards. But even this was taking them away from their regular duties, including testing equipment for *QST* product reviews, building and testing projects for the *Handbook*, and so forth.

"As the manpower requirements for a custom design began to emerge, it was obvious that outside help would be needed. And it also seemed inefficient to add both staff and lab and construction facilities for a one-time project. The bottom line was that when all the intangibles of homebrewing were figured in, commercial gear was cost competitive.

"The crucial blow to this option was the element of time: W1AW was ready for its facelift *now*. Thus it was decided to buy commercial transmitters, which still left League staff to integrate everything, a considerable undertaking in itself.

"So by getting matching Harris transceivers and amplifiers we not only achieved complete compatibility, we have totally in-

Visitor Louis Parascondola, WA1GSO, checks out one of three new visitor operating studios. Be sure to bring a copy of your ham license when you visit the station.

The attic has been transformed from a storage loft into a classroom/conference area. It also will be used as a media and emergency planning area.

terchangeable rigs in case of a failure and more flexibility in other ways.

"We got transceivers instead of just transmitters mostly because they are off-the-shelf items. That's the way Harris makes them. And of course we have them if the bulletin rigs need to be pressed into two-way service for any reason.

"We were very fortunate; Harris introduced a new rig just in time to meet our very stringent transmitting requirements. We didn't get the first ones off the production line, but a year earlier our choices would have been much more limited.

"Still, the Harris receivers are not up to ham state of the art; we hams spend a lot of time just listening, and demand top performance from our receivers. A DXer working through a pileup would find himself lunging for knobs that just aren't there on the Harris'—like IF shift and passband tuning.

"In case you were wondering, the possibility of buying just transmitters was entertained, but it turned out that they are more expensive than buying transceivers!"

Linda was looking at the cassette deck and audio tailoring panel.

"What you see is a big part of our design for the future. Not only do we want to have super-clean audio right now, but we have the facilities here to make our own audio tapes for such things as learning the code and for providing news releases to the media."

Try This Call on for Size

"Seventeen or 12 meters sure would be fun," Kevin hints. "All I have up for the WARC bands is a vertical."

I motion to one of the visitors' booths. "You can work either band. We have three operating positions set up: one for serious HF work; the one over there, as you can see, is a very basic set up for beginners; and the third for satellite work. Step right in."

"Now this looks familiar," Kevin said, smiling. "A transceiver, amplifier, keyer, mike and rotator control box."

"We arranged the inside of W1AW so visitors could make themselves at home and just operate, so why don't you do that? If you have any questions, ask me. I'm going to go watch the bulletin run and learn something from Brian about computers.

"By the way, you did bring copies of your FCC licenses, yes?"

Kevin and Linda laughed and nodded. "And what about you?" Linda asked, a twinkle in her eye. "You are a ham, aren't you?"

"Yep. An Extra, matter of fact, although technically we don't have to be, since W1AW now transmits exclusively in the General class portions of the bands. I guess the Extra just goes with the territory. If you're going to be a little crazy about something, you may as well have the documentation for it."

Brian, precocious kid that he was, remained glued to the computers. "How's come you got two computers?"

"Redundancy," I say, biting my tongue to keep from correcting his English. "One breaks, hook up the other."

"What about if it breaks in the middle of a transmission?" he coos.

Concocting a story about instant switchover with complete data transfer enters my mind, but I reconsider. "Guess we'd be off the air for a minute or so."

The interrogation continues. "So you've got the main program format on the hard disk and you use floppies for changing the text. The computer is hooked up to the transmitter, right?"

Here's an opening to throw this kid, who sort of reminds me of me 30 years ago, a curve ball. "We use a program to convert digital data to RF energy in the transmitters," I entone, feeling my face flush.

"My mom and dad do that all the time on packet," Brian counters. What's the big deal?

"Actually, nothing. We are doing just what your folks do at home; W1AW is Amateur Radio on a much larger scale. The program was specially designed by our guys in the lab, as was the switching required to simultaneously drive six or more transmitters.

"Jon Bloom, KE3Z, our lab supervisor, wrote original software using computer "C" language. We use DRSI's PC Packet System for crystal-controlled timing instead of using software. This set-up allows the computer to do such things as monitor transmitter parameters at the same time that code or data are being sent.

"And of course, the hardware is ready for W1AW to transmit packet when that day inevitably comes."

"Inevitably?"

"'Inevitably' means something is bound to happen, sooner or later," I announce, pretty satisfied finally knowing something this kid doesn't.

"That's pretty neat," he concludes. "Do you have any games on the spare computer?"

I play my trump card, addressing Morse Tutor on the hard disk.

"Have fun."

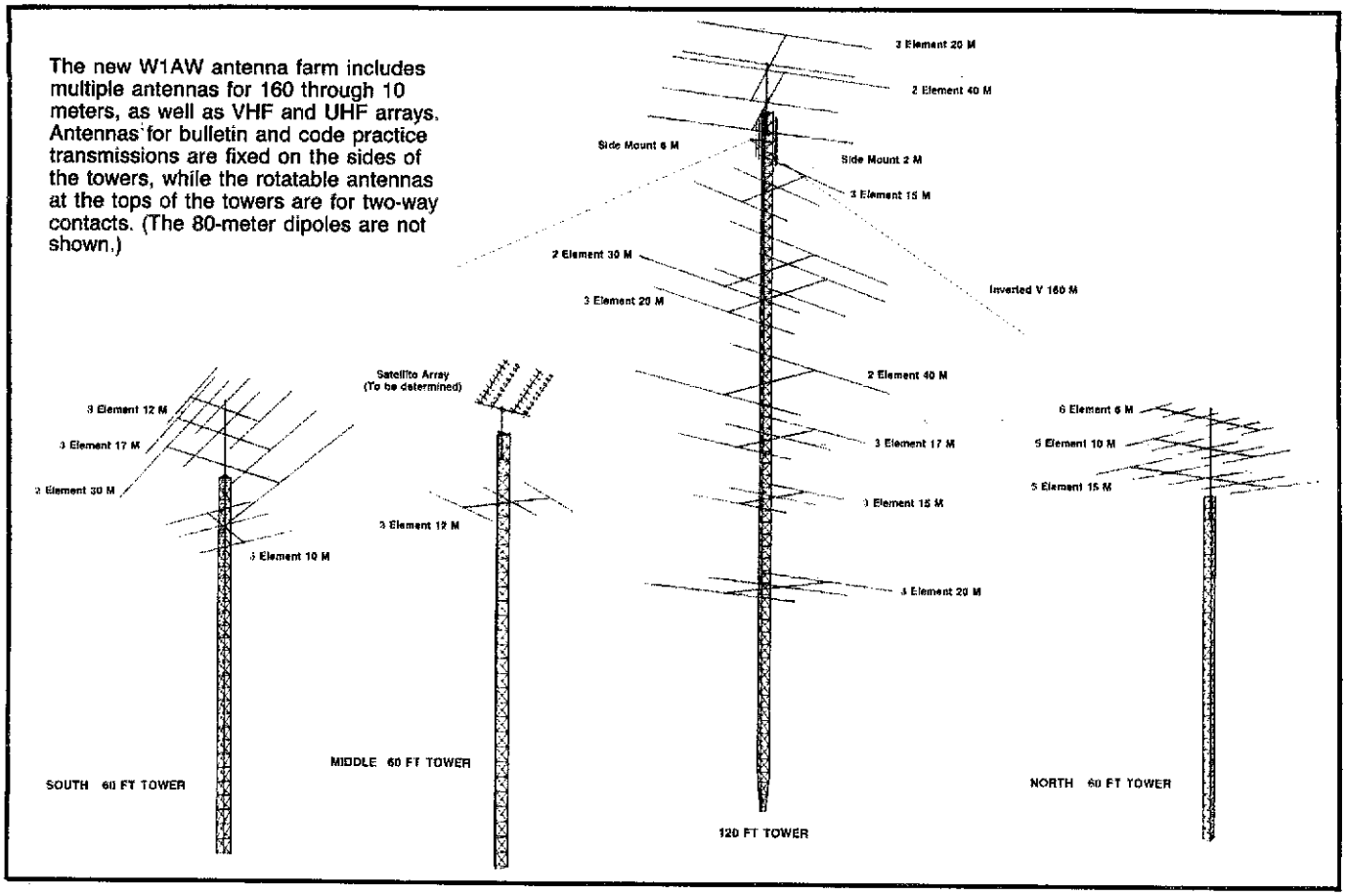
Kevin emerges from the HF visitors' station, leaving Linda at the mike. "24 Megs is pretty good. I worked a JA and got a pile-up going. That W1AW call sign sure is magic! You must have fun here."

I admit that we do not make random contacts during regular hours. That would violate FCC rules, since station operators are paid. "But occasionally I'll stay after hours and work the pileups."

The Joy of Moving

I tell Kevin I am just a fill-in operator, helping out during the renovation. "I came down last summer and ran the station from a construction trailer. The building you are standing in of course had to be emptied while repairs were made. The brick structure was sound, but 50 years of daily use had taken its toll."

"So that's why you weren't always on



The new W1AW antenna farm includes multiple antennas for 160 through 10 meters, as well as VHF and UHF arrays. Antennas for bulletin and code practice transmissions are fixed on the sides of the towers, while the rotatable antennas at the tops of the towers are for two-way contacts. (The 80-meter dipoles are not shown.)

all the bands, and not always transmitting 'phone bulletins?"

"That's right. The trailer was temporary, with commercial ham rigs feeding the old antennas. Then the antennas started coming down, the trailer had to be removed for final construction work, we moved the station into the main building for a while, and now we are back. Whew."

"Sounds like real ham spirit to me," says Kevin. "When I was getting divorced from my first wife I moved out of the house and operated from an apartment with wires on the ceiling. Anything to stay on the air."

I nod.

"I overheard you explaining the control system to Brian," Kevin says. "I'm curious about your choice of a 286-based computer."

"I was too, Kevin, since you and I probably will make do with our 8088-based machines for a long time to come. But our engineers felt the '286 would have a much longer life span in terms of being current." And they can be upgraded in the future, instead of requiring replacement.

"This same reasoning went into the various lab-built control units you see here. Everything from the control interface to the keying matrix was over-engineered for future possibilities. Someday, for example, we may need to transmit different messages on different bands, or maybe data and voice at the same time. We have that capability.

"And take a look inside this switching box. Plenty of room to work, all the parts are readily available, and you can change boards quickly and easily. Not to mention that minor modifications will be a snap, should they become necessary.

"All this was to enable W1AW to remain state-of-the-art for years to come, yet to stay on the air more than 4000 hours a year. No easy task.

"Incidentally, these units were designed by Ed Hare, KA1CV, one of the lab guys. Someone just the other day summed up Ed's part in this project pretty well: 'Ed converted dreams into working units.'"

A Grand Tradition

"I sure do see your point," Kevin said, "But let me ask you this." His face took on an uncharacteristically serious demeanor.

"I listened to W1AW code practice and copied the bulletins, more than 10 years ago. Couldn't have lived without them.

"But today, you can get computer code practice programs. And there are newsletters, including ARRL's own *ARRL Letter*, for news of what's happening. Any chance W1AW is anachronistic?"

"Maybe."

It seemed this would not suffice, without some explanation, judging from the repositioning of Kevin's jaw.

"Take your son Brian there, for example. He is fascinated by computers, and full of questions. Good for him. But as much as we all depend on computers these days, you can't love them, any more than you can love a ratchet wrench.

"Computers are inanimate objects, while radio is organic. There's DNA in radio. The voice coming out of your speaker or the message on your packet screen has a human being breathing in and out at the other end.

"If you are interested in radio and you have a receiver, W1AW is there. Free of charge. Sending new code practice every day, and bulletins as soon as the news is available. Until Cable News Network starts covering the FCC, or packet protocols, or DXpeditions, W1AW will do its best to report.

"There are beacons, and there are Beacons. We aim to be The Beacon. And when you visit your ARRL headquarters, a station should be there. A station that demonstrates not only the best Amateur Radio has to offer today, but maybe even points the way to what is in our future.

"Yet a lot of tradition remains in this, the Maxim Memorial Station building. ARRL's founder, Hiram Percy Maxim—the original W1AW—didn't live to see the station built in his honor more than half a century ago, but I think he would approve of the forward thinking evident here."

It was past time to eat and I was starting to get a little light headed. "You want to order out for a pizza? I ask Kevin. "I bet you didn't know pizza pie was invented in New Haven, Connecticut."

"Then you must be an expert. Waddya want on it?"

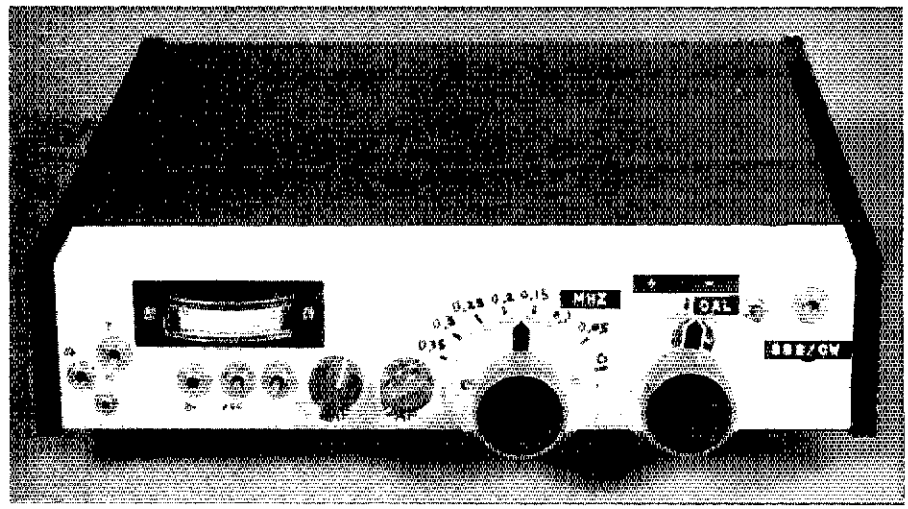
"I'm sure that's one thing we all can agree on."

"Ham."

A QRP SSB/CW Transceiver for 14 MHz

Part 1: Exotic circuitry and hard-to-find components aren't necessary if you want to build excellent performance into a home-brew SSB/CW transceiver: Careful design is the key.

By Wes Hayward, W7ZOI
7700 SW Danielle Ave
Beaverton, OR 97005



It's hard to justify the construction of a complete SSB/CW transceiver in this "modern" era of readily available commercial equipment. The popular, multiband MF/HF transceivers offer excellent performance, often at a reasonable cost. Still, I feel a twinge of guilt when I use them. They offer nothing of the feeling of exploration that I've grown to expect from Amateur Radio.

The rig described here is not a copy of the usual "appliance." I've used the project as a vehicle to investigate alternative circuits and a block diagram that departs from the traditional. The circuit is simple and modular, with flexibility that allows for later changes.

I present this rig in order to encourage other home-brew enthusiasts to give QRP SSB a try. I'll not dwell on the standard circuits that are already covered in *Solid-State Design* or in *The ARRL Handbook*.[1,2] Rather, I'll emphasize only those circuits that depart from the traditional. This is intended to be an idea article rather than a construction piece. There are no circuit boards or patterns available for this rig. All construction was done using "ugly" methods.[3]

System Architecture

The filter method was chosen for this transceiver. While that is generally considered to be "the only choice," phasing methods should not be overlooked for an experimental transceiver.[4] The block diagram is shown in Fig 1.

The traditional filter transceiver shares one or more crystal filters between the receive and transmit modes. I wanted to avoid the compromises and complexities of filter switching, so I decided to use separate filters for each function. The transmit and receive modules can then be used for completely independent operation. This might be especially interesting for use with, for example, a VHF/UHF station for OSCAR communications.

Commercial crystal filters from my junk box were used in this project. They are all 9-MHz circuits that are, fortunately, well matched to each other. A 5-MHz local oscillator drives both the receiver and transmitter mixers. Budget-minded builders may elect to built their own filters.[5,6]

The Receiver

The receiver is very much like the Progressive Receiver that's been in *The ARRL Handbook* for several years.[7] The front end and VFO are presented in Fig 2. I initially used a VFO variable capacitor with a vernier drive mechanism. Problems occurred with the mounting, however. The VFO was rebuilt without a vernier. Instead, two capacitors were used. One (C1, **BANDSET**) tunes the entire band, while the other (C2) is a bandspread control with a total range of only 25 kHz. This scheme seems to be practical for a simple transceiver.

The receiver begins with a doubly tuned preselector and a diode-ring mixer (U1, a Mini-Circuits SBL-1). This is followed by a bipolar transistor (Q3, an NEC99532) in a negative-feedback IF amplifier. A ferrite transformer (T4) matches the IF amplifier to the receiver crystal filter (FL1) as shown in Fig 3. The filter I used is similar to the KVG XF-9B. The less-expensive KVG XF-9A was tried in this application and was found wanting for stop-band attenuation.

The crystal filter drives an MC1350P IF amplifier (U2) and a diode-ring product detector (U3, an SBL-1). I would discourage a builder from departing from a diode-ring detector. An NE602 detector was tried, but suffered from severe in-band intermodulation distortion.

The BFO signal is low-pass filtered before driving the detector. A reduced-voltage sample of the BFO energy is routed to the transmit balanced modulator (to be described in Part 2 of this article). Care was taken to extract the sample from a point away from the detector. (The diode-ring detector clips the BFO waveform; clipped carrier-oscillator drive for the balanced modulator is undesirable.)

The audio amplifier (Q6-Q8 and U4) is standard. However, the audio-derived AGC system departs from the usual. U5A (one section of an LM324) amplifies the audio to a level suitable for

[1]Notes appear on page 20.

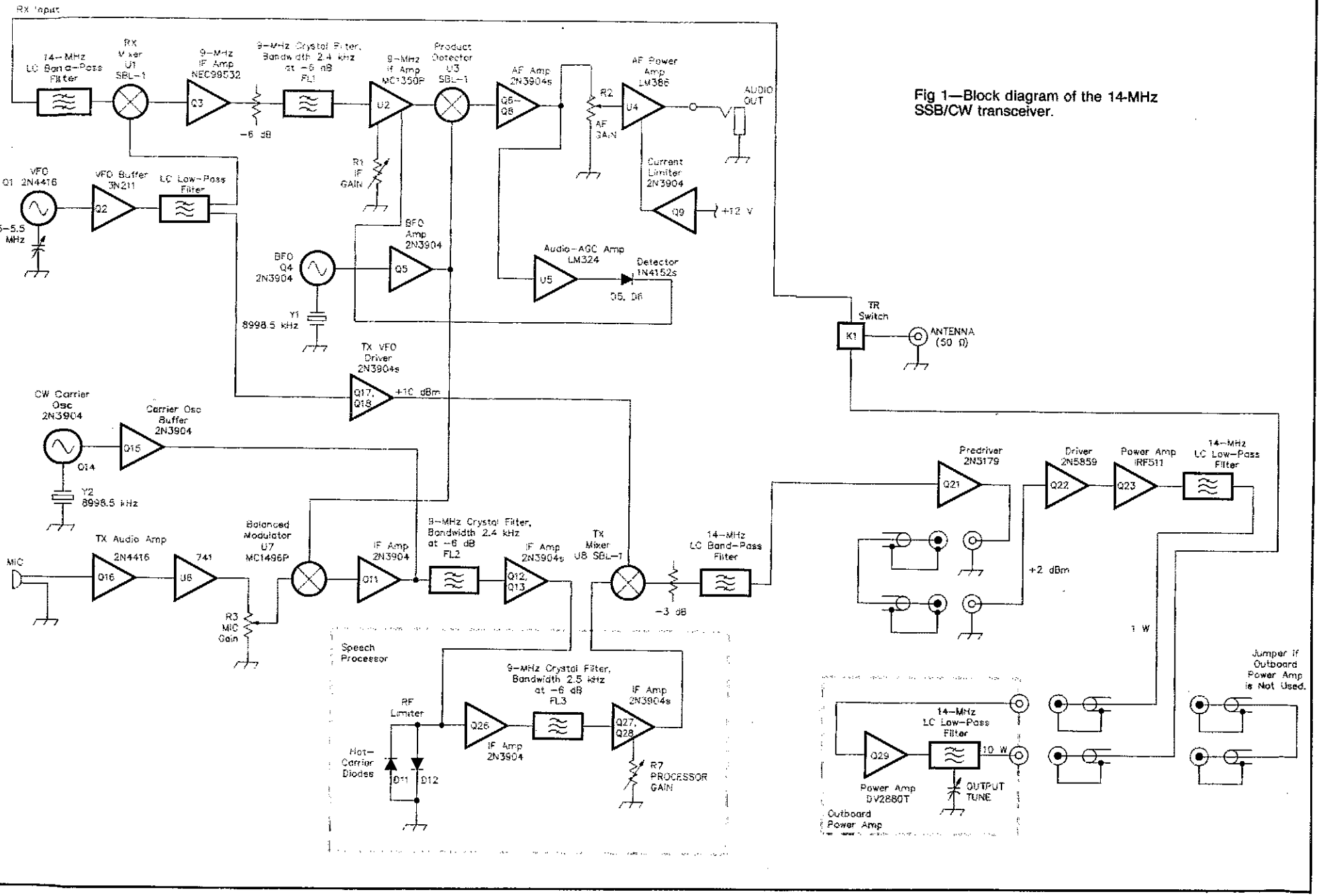


Fig 1—Block diagram of the 14-MHz SSB/CW transceiver.

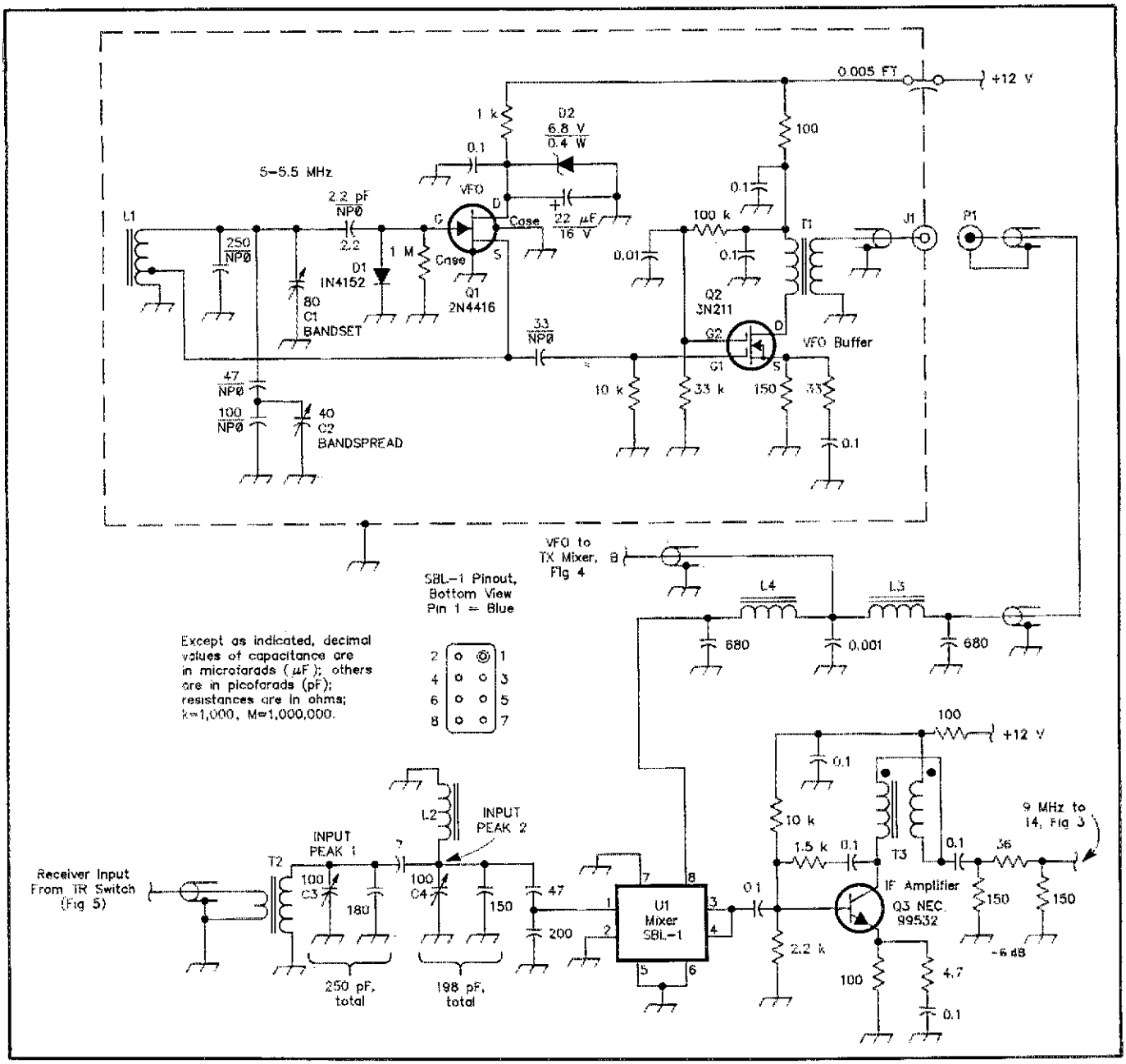


Fig 2—Schematic of the transceiver front end and VFO. Resistors are ¼ W, carbon film; unless otherwise indicated, capacitors are monolithic or disc ceramic. The VFO circuitry is built into a die-cast aluminum box.

C1, C2—Panel-mountable, air-dielectric variable with ¼-inch-diam shaft.
C3, C4—100-pF ceramic- or mica-dielectric trimmer.
J1—Coaxial jack. (The prototype transceiver uses a panel-mount SMB jack here, but a BNC or phono jack is suitable.)
L1—23 turns of no. 22 enam wire on a T-68-6 toroidal, powdered-iron core, with a feedback tap 5 turns from the grounded end of the winding.
L2—11 turns of no. 24 enam wire on a T-44-6 toroidal, powdered-iron core.
L3, L4—25 turns of no. 24 enam wire on a T-37-6 toroidal, powdered-iron core.
T1—Broadband transformer: Primary, 16 turns of no. 26 enam wire on an FT-37-43 toroidal, ferrite core; secondary, 4 turns of no. 26 enam wire wound over the primary.
T2—Narrow-band transformer: Tuned winding, 11 turns of no. 24 enam wire on a T-44-6 toroidal, powdered-iron core; input link, 2 turns of no. 24 enam wire over the tuned winding's grounded end.
T3—Broadband transformer: 10 bifilar turns of no. 28 enam wire on an FT-37-43 toroidal, ferrite core. Observe phasing.

detection by D5. U5D functions as a unity gain inverter to drive a second diode (D6), providing full-wave detection. Each diode operates as a peak detector, providing one sample of the audio level per cycle. Full-wave operation doubles the sampling rate to better approach the Nyquist criterion. The practical result is a simple circuit with better dynamic performance than other audio-derived ones I've tried.

Notes

[1]W. Hayward and D. DeMaw, *Solid-State Design for the Radio Amateur* (Newington: ARRL, 1986).
[2]K. Kleinschmidt, ed, *The 1990 ARRL Handbook*, (Newington: ARRL, 1989).
[3]R. and W. Hayward, "The Ugly Weekender," *QST*, Aug 1981, pp 18-21.
[4]G. Breed, "A New Breed of Receiver," *QST*, Jan 1988, pp 16-23.
[5]W. Hayward, "Designing and Building Simple Crystal Filters," *QST*, Jul 1987, pp 24-29.
[6]W. Hayward, "A Unified Approach to the Design of Crystal Ladder Filters," *QST*, May 1982, pp 21-27; also see Feedback, *QST*, Jul 1987, p 41.
[7]W. Hayward and J. Lawson, "A Progressive Communications Receiver," *QST*, Nov 1981. Also see Feedback, *QST*, Jan 1982, p 47; Apr 1982, p 54; and Oct 1982, p 41. This receiver also appears in the 1982 through 1990 editions of *The ARRL Handbook*.

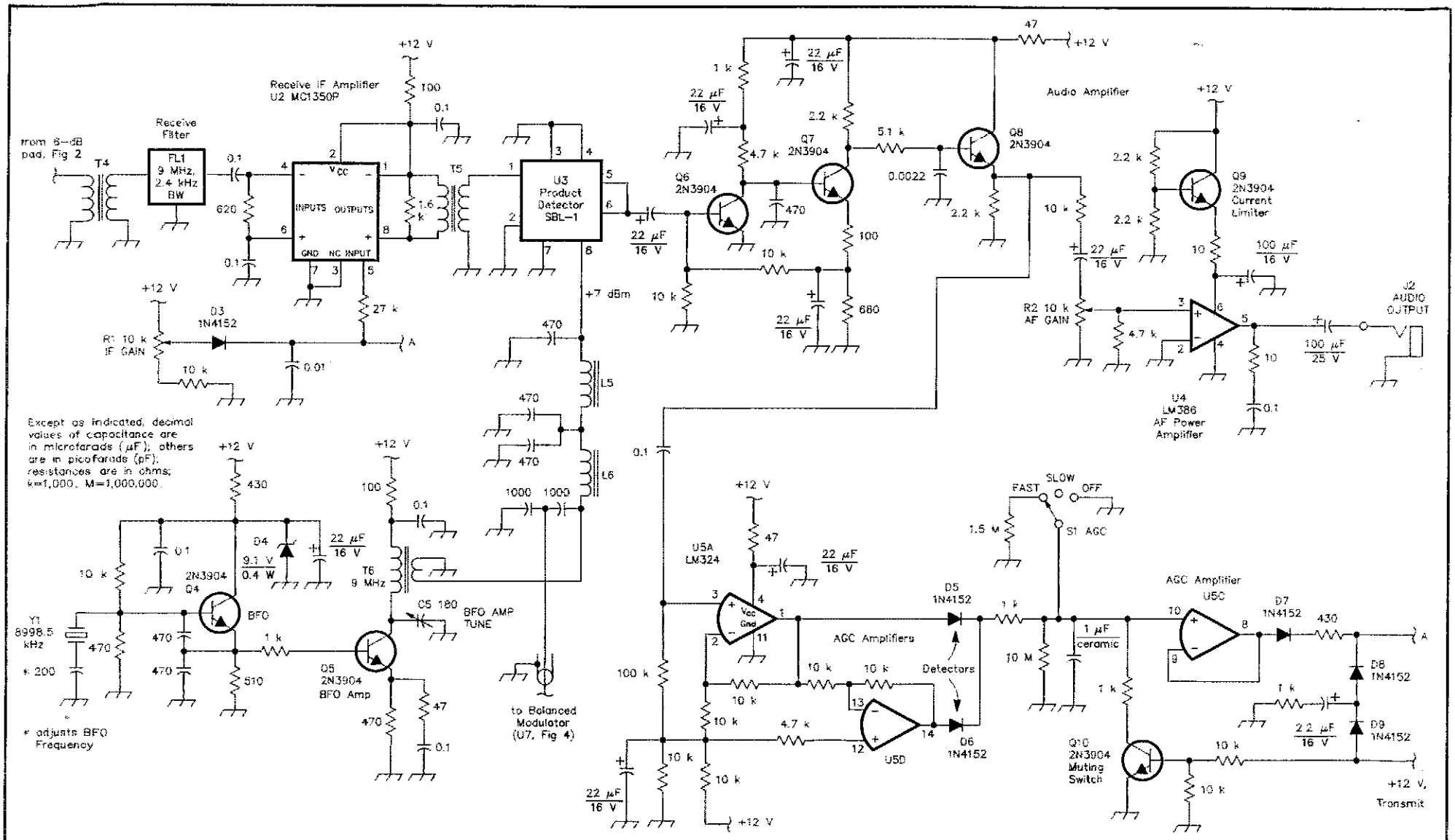


Fig 3—The transceiver receive filter, IF amplifier and detector circuitry. Resistors are ¼ W, carbon film; unless otherwise indicated, capacitors are monolithic or disc ceramic.

FL1—9-MHz crystal filter, 2.4 kHz wide at −6 dB (KVG XF-9B).

L5, L6—22 turns of no. 26 enam wire on a T-37-6 toroidal, powdered-iron core.

T4—Broadband transformer: Primary, 5 turns of no. 26 enam wire wound over the secondary winding; secondary, 16 turns of no. 26 enam wire on an FT-37-43 toroidal, ferrite core.

T5—Broadband transformer: Primary, 20 turns of no. 26 enam wire on an FT-37-43 toroidal, ferrite core; secondary, 3 turns over the primary.

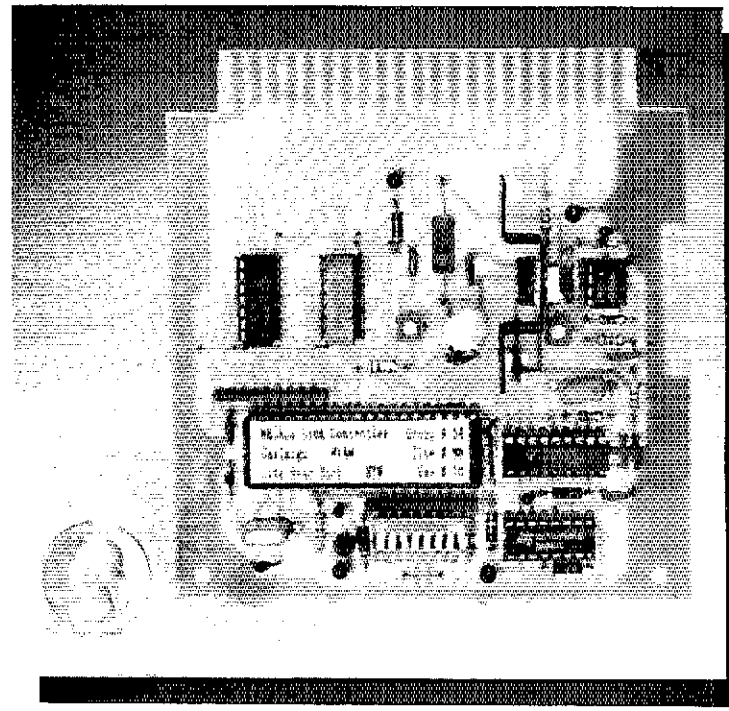
T6—Narrow-band transformer: Primary, 26 turns of no. 24 enam wire on a T-50-2 toroidal, powdered-iron core.

Y1—8998.5-kHz crystal (KVG XF-901 suitable).

A Repeater-Linking Controller

Want to add a link to your repeater, or install a remote base? Build this microprocessor-based controller!

By John Bednar, WB3ESS
548 Cherryville Rd
Northampton, PA 18067



Recently, local repeater groups decided to link their repeaters so that, among other things, Novice licensees could communicate with the crowd on 2 meters by way of a 220-MHz repeater. I designed the controller described in this article to perform this linking function. In cooperation with a link transceiver, the controller provides all the functions necessary to operate this link, and has the flexibility to be used in much more complex systems. The controller can also be used to control a single-frequency remote base that can be accessed from the auxiliary frequency.

To build a multiple-repeater, on-call or full-time link system, several participating repeater clubs must install similar link systems on each repeater. Where the coverage area is relatively small, or where terrain allows for broad-coverage simplex operation, the link transceivers could operate on a single frequency, as shown in Fig 1A. Alternatively, a dedicated hub repeater (Fig 1B) with no hang time can be used for better coverage than simplex linking can provide.

When the controller is attached to a link transceiver and a repeater, the controller monitors a control line and a DTMF output and connects the link transceiver to the host repeater on command. As the design of this controller progressed, I added many features that have made the link an important and popular part of our club's repeater system. This controller:

- Can be used as a remote-base or link controller.
- Is easily interfaced to a host repeater because it requires only one controllable TTL output from the repeater.
- Can be turned on and off from both the host repeater and the link frequency.
- Has two readable inputs and three controllable outputs that can be controlled from the link frequency.
- Has DIP-switch-programmable CW speed and time-out timer.
- Has a group-call-up feature, allowing users to access multiple link-controlled repeaters with a single command.
- Generates CW messages for all functions.
- Indicates to users when the host repeater is busy with autopatch and other linking tasks.
- Indicates to users which site link is active.
- Has buffered inputs and outputs.
- Uses a watchdog timer to restart the microprocessor if the program stops running.
- Uses a commercially available circuit board and commonly available parts.[1,2]

Because repeater linking is classified by the FCC as auxiliary operation, the link transceivers must operate above 220.5 MHz.

Circuit Description

The complete schematic of the controller is shown in Fig 2. The heart of the controller is the Intel® 8749H microcontroller. The 8749H is a single-chip device housing a microprocessor, internal EPROM, RAM, I/O and a counter/timer. This IC has been in production for over ten years, and its low cost makes it attractive for use in controller projects. The microcontroller handles many linking tasks, including timing, identification, evaluating access codes, and tone generation for the controller's CW messages.

I wrote the software for the microprocessor in assembly language on a personal computer, and then assembled it with a cross-assembler program.[3] The assembled output is burned into the 8749H's internal EPROM with a programmer designed for this microcontroller. Programmed microcontrollers are available from me.[4]

The watchdog circuit is based on a CMOS 4098. The 4098 monitors the microprocessor to be sure that the CPU is running the program. If the CPU stops executing the program for any reason, the 4098 will automatically restart the CPU. The link controller functions without this IC; however, the added protection it provides far exceeds the extra cost and time to include it.

The DTMF decoder (U3) is an SSI202, which is available from Radio Shack® and other sources.[5] The '202 decodes received tones and makes the output available to the microprocessor for evaluation. The LM358 operational amplifier (U4) provides a separate audio-gain adjustment for the DTMF-decoder input. This op amp is well suited to single-supply operation, and other types should not be used in its place. An RC filter between the op-amp output and the decoder input provides the proper audio response for the SSI202 decoder when discriminator audio is used from the link transceiver. LED DS2 gives a visual indication when the SSI202 is decoding tones.

The pair of 7407s provide buffering of all of the controller's inputs and outputs. These buffer ICs are used to protect the microcontroller from unwanted external

[1]Notes appear on p 27.

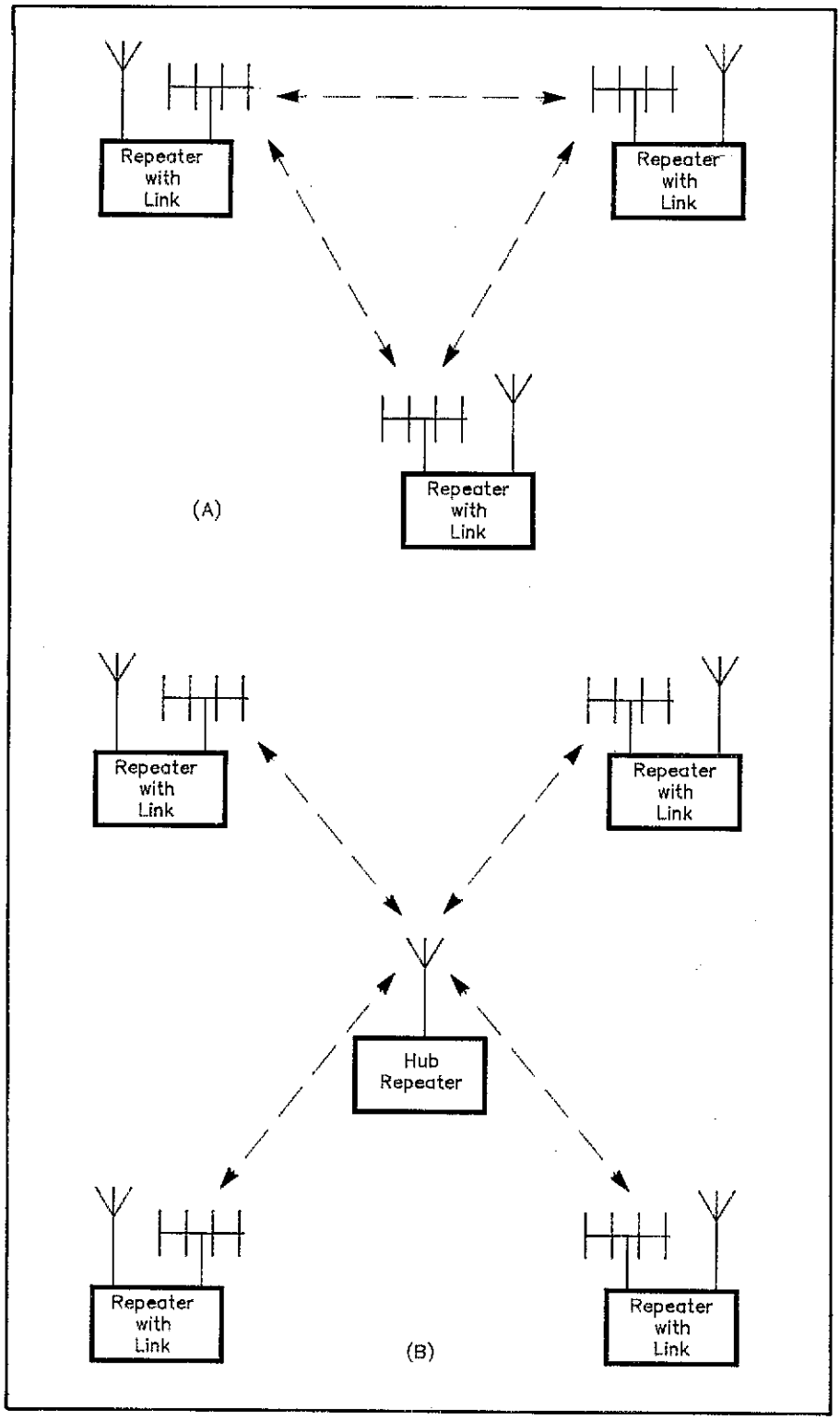


Fig 1—Repeater linking is a good way to improve repeater-system coverage—in terms of distance *and* frequency. At A, a basic three-repeater link system is shown. The links share a common simplex frequency above 220.5 MHz. At B, a four-repeater system with a dedicated hub repeater is shown. In this system, the hub repeater must operate such that at the end of each transmission, the hub repeater returns immediately to receive mode. This is necessary for proper operation of the site-readback feature included in the link controller described in the text.

signals (line transients, etc). Settings of the DIP switches and potentiometers are discussed in the section called Interfacing.

Construction

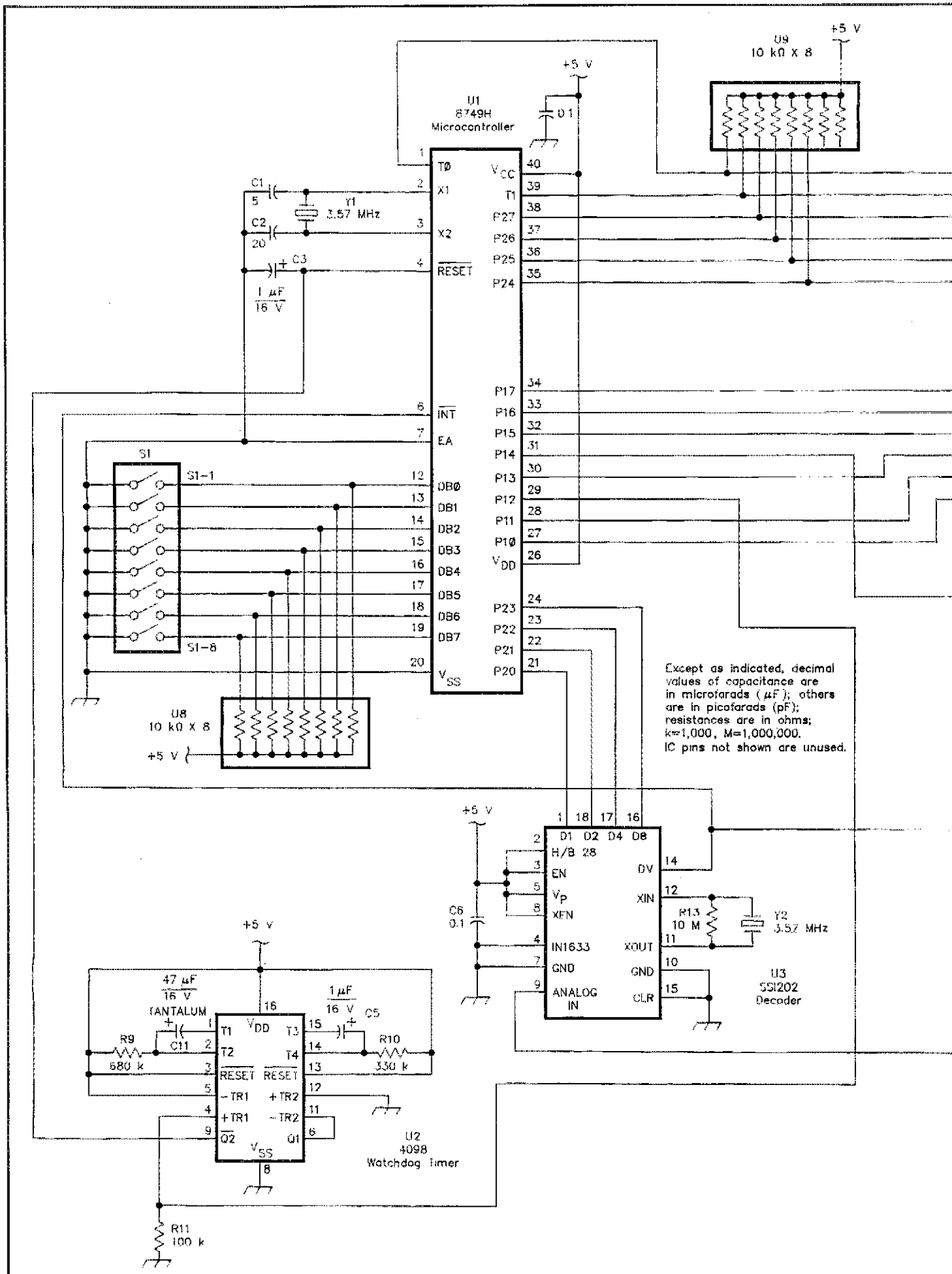
If you have a moderately stocked junk box, constructing this controller will cost you approximately $60. The DTMF decoder, crystals, card-edge connector, DIP switch and other parts are available from Radio Shack. When assembling the controller, be sure to place the microcontroller in an IC socket. The microcontroller can be erased and reprogrammed if a change of codes or call sign is necessary. By using sockets for all of the ICs, repairs will be faster and easier.

Begin assembling the controller by soldering the six small jumpers (W1-W6) onto the PC board. The small jumper (W6) under the 40-pin IC may interfere with the socket, so it may be better to solder it in after that socket is installed. Next, solder the remaining IC sockets to the board, then install the 2.5-inch jumper (W7) that goes between U1 and U3. Follow this by installing the resistors, capacitors, and remaining parts.

It's important to use a tantalum capacitor at C11, and to use ceramic or tantalum capacitors at C3 and C5. Also, because resistor packs with eight resistors are not common, extra room was provided for the use of the more popular resistor packs containing nine resistors (U8 and U9). Bend the end pin from the unused resistor back onto the body of the device before inserting the resistor pack into the circuit board. Alternatively, discrete resistors can be used, in which case you'll need to connect one end of each resistor to the +5-V line.

Once the board is assembled, measure the output of the voltage regulator before installing any ICs. If the regulator voltage is less than 4.8 or greater than 5.2, check the PC board and regulator installation. When the regulator output is satisfactory, remove power from the board and install all the ICs. Apply power and recheck the regulator output. If the regulator voltage is normal, make initial tests to see if the controller is functioning, as follows: If an oscilloscope is available, monitor the CW-output pin (pin 17 on the circuit-board-edge connector) for the presence of the CW message immediately after power-up. Alternatively, the push-to-talk (PTT) output can be monitored with a voltmeter by placing a pull-up resistor (1- to 10-kΩ) between the PTT output (pin 15 on the PC-board edge connector) and +5 V. The voltmeter, connected to the PTT pin, should show a near-0-V output during the power-up message. When the message finishes, the PTT output should return to +5 V. If either of these tests give results other than those described, it is likely that Y1, C1, or C2 is faulty, or that the CAS (carrier-activated-squelch) input is being asserted low.

After the initial tests have been completed, the watchdog circuit should be checked for correct operation. Briefly place a 1-kΩ resistor across the terminals of crystal Y1 (pins 2 and 3 of U1) when the controller is sending CW. This will stop the oscillator (and thus the microprocessor). If the watchdog circuit is functioning correctly,


U9
10 kΩ X 8
+5 V
U1
8749H
Microcontroller
C1
5
Y1
3.57 MHz
C2
20
C3
1 µF
16 V
T0
X1
X2
RESET
INT
EA
VCC
T1
P27
P26
P25
P24
P17
P16
P15
P14
P13
P12
P11
P10
VDD
P23
P22
P21
P20
VSS
S1
S1-1
S1-8
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
U8
10 kΩ X 8
Except as indicated, decimal values of capacitance are in microfarads (µF); others are in picofarads (pF); resistances are in ohms; k=1,000, M=1,000,000.
IC pins not shown are unused.
C6
0.1
D1 D2 D4 D8
H/B 28
EN
VP
XFN
IN1633
GND
ANALOG IN
DV
XIN
XOUT
GND
CLR
R13
10 M
Y2
3.57 MHz
U3
SSI202
Decoder
47 µF
16 V
TANTALUM
C11
R9
680 k
1 µF
16 V
C5
R10
330 k
VDD
T1
T2
T3
T4
RESET
RESET
-TR1
+TR1
+TR2
-TR2
Q2
Q1
VSS
U2
4098
Watchdog Timer
R11
100 k

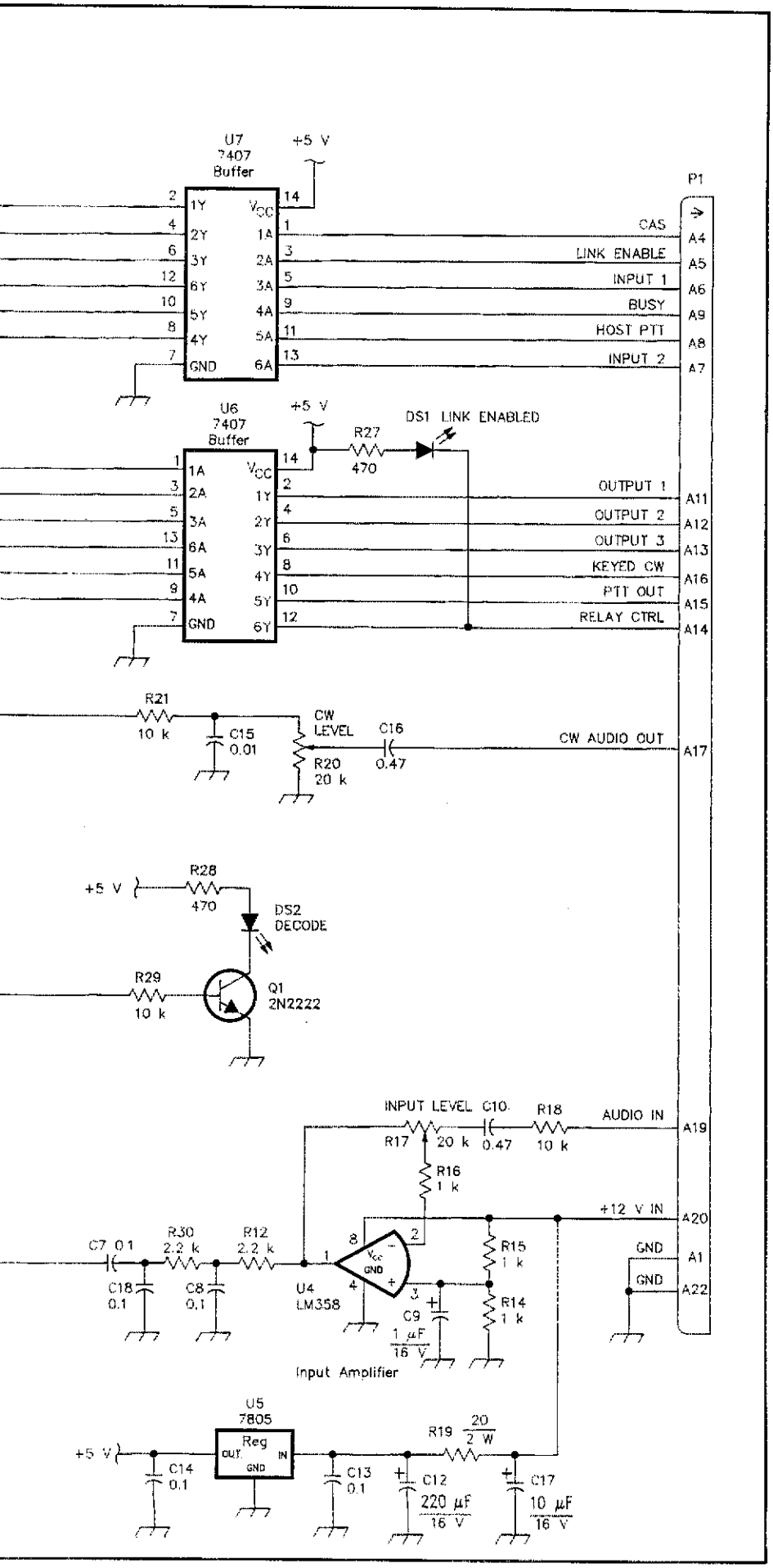


Fig 2—Schematic of the link controller. Unless otherwise noted, capacitors are 50-V monolithic or disc-ceramic units; and polarized capacitors are electrolytic. Fixed resistors are ¼-watt carbon-film units except as noted otherwise. IC pins not shown are unused. Construction is noncritical, except for the cautions mentioned in the text.
DS1, DS2—Red LED.
R17, R20—20-kΩ PC-mount single-turn potentiometer.
S1—SPST 8-position DIP switch.
U1—Intel 8749H single-chip microcontroller.
U2—4098.
U3—Silicon Systems, Inc, SSI202 tone decoder.
U4—LM358 dual operational amplifier.
U5—7805 5-V regulator (Radio Shack no. 276-1770).
U6, U7—7407 hex buffer.
U8, U9—10-kΩ × 8 resistor pack (see text).
Y1, Y2—3.579-MHz crystal (RS no. 272-1310)

U2 will reset the microprocessor after 6 to 12 seconds (the voltage on U1, pin 4 will briefly go low), and the power-up identification will be sent. If the reset operation occurs less than 6 seconds after you placed the resistor across the crystal, check the values of C11 and R9.

When installing the controller on a repeater, it is not necessary to isolate the controller in a separate metal enclosure. Because all address and data lines are internal to the microcontroller, RFI should not be a problem. In all current installations of the controller, the link transceiver and controller are mounted in common enclosures—only inches apart—with no interference.

Interfacing

Connections among the controller, host repeater and link transceiver are shown in Fig 3. The controller requires 11 to 15 V dc at less than 200 mA, and its inputs are TTL compatible; they must not be pulled above +5 V or below 0 V. If it's necessary to interface any of the inputs to signals that exceed 5 V, add a series resistor and a 4.7-V Zener diode to ground to protect the input.

The link-enable, host-repeater-PTT and busy inputs are active-low. The CAS line from the link transceiver signals the controller and the host repeater when the link receiver is active (receiving a signal). The controller expects this input to be pulled low when the link receiver is active. Most surplus commercial transceivers provide a CAS output. If your transceiver does not, check the schematic for a point in the squelch circuit from which a CAS signal can be derived.

The controller uses open-collector outputs (30 V, maximum) and can sink up to 40 mA. When interfacing an output to TTL, or during testing, a pull-up resistor will have to be added from that output pin to +5 V. (Without a pull-up resistor, the

output will be low all the time, giving the impression that that output is dead.)

The relay-control output is pulled low by the microcontroller whenever the link is turned on. Depending on the current requirements of the relay used it may be necessary to add a transistor buffer so that the controller output is not damaged. The PTT line from the repeater must be interfaced to the host-PTT input and wire-ORed with the PTT output from the controller before connecting it to the link transceiver. The wire-OR operation may be as simple as using two germanium diodes to provide isolation, as shown in Fig 3. The controller's PTT output goes low when the controller wants to key the link transceiver.

A keyed-CW output is provided for keying an external tone generator instead of using the 450-Hz tone produced by the controller. This output is active-low.

The CW audio from the controller must be mixed with the host-repeater audio before connecting it to the link-transceiver microphone input. This connection may be as simple as two resistors to provide isolation, or a simple op-amp audio mixer.[6] A potentiometer on the controller board (R20) is provided for adjusting the audio level, so a simple resistor-isolation scheme may be acceptable.

The receive audio from the link transceiver is connected to both the controller and the host repeater. This audio input on the controller is buffered by an op amp (U4) and has a potentiometer (R17) and an LED (DS2) for adjustment of the DTMF-decoder audio level. To adjust the decoder threshold, hold down a key on the DTMF keypad and adjust R17 just past the point at which DS2 lights. If speaker audio from the link transceiver is used for this test, it may be necessary to modify the decoder filter by removing C8 from the board and replacing R12 with a jumper to change the frequency response of the filter. The controller's input impedance is approximately 10 kΩ, and a dc-blocking capacitor is included. In most applications, the audio input (board-edge pin 19) can be connected directly to the receive-audio line from the link transceiver.

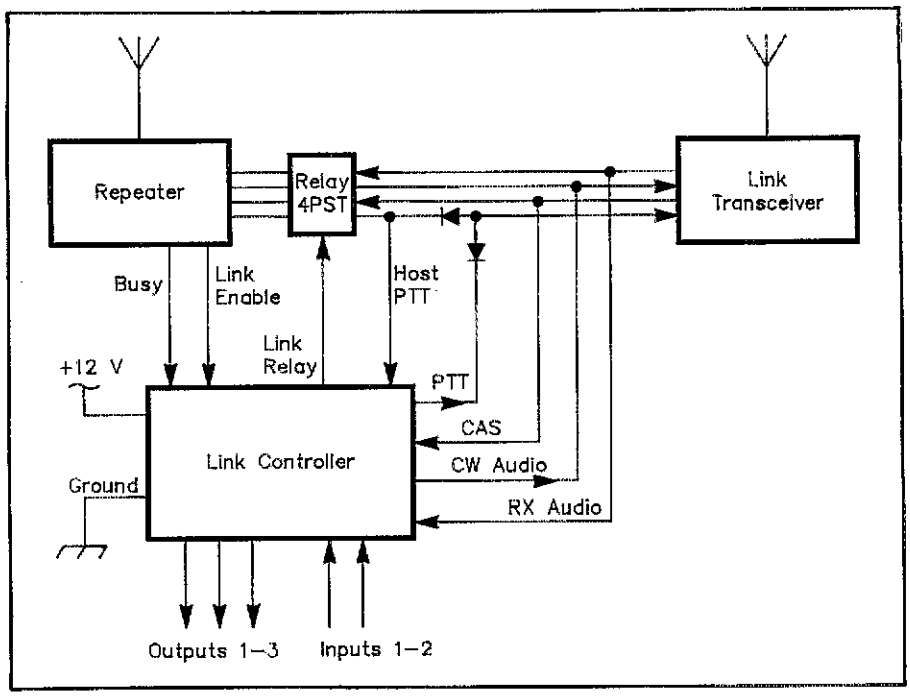


Fig 3—Interfacing diagram for the link controller. Connecting the link-controller PC board to a host repeater and link transceiver is discussed in detail in the text. The diodes in the PTT line provide isolation.

Access Codes

Now that you've built the link controller, you'll need to understand the access-code scheme to use it. Access codes are four elements long, consisting of a two-element site (or group) prefix plus a two-element command. The available controller commands are listed in Table 1. In this discussion, the term *site* refers to an individual controller, and *group* pertains to a number of link-equipped repeaters.

When a site prefix is used, properly configured controllers respond to all sixteen commands; if a group prefix is used, only the first five can be used. If the controller is used to link multiple repeaters, the group prefix and the first five commands should be identical in each controller so that the group features can be used effectively. For example, assume that the following codes were programmed into the microcontroller:

Site prefix: 25
Group prefix: 50
Link on, with timer: 32
Link off: 8*
Report link status: 5#

In this case, commands of 2532 or 5032 would turn the link on with the activity timer enabled, and the commands 258* or 508* would turn the link off. A command of 505# is ignored, because status reports are available only for individual site links. A code of 255# is valid, however, and will report the status of the controller (on/off/busy).

In addition to the commands used for basic linking operations, commands are provided to read the controller's readable inputs and program the outputs, and for security control. The read-input commands are used to monitor something at the repeater site (such as a fire or open-door alarm) and will send ON if the input is low and OFF if the input is high. The three outputs can be used to turn things on and off at the repeater site (such as enabling and disabling a transmitter or auxiliary receiver, etc). These outputs are programmable and are high when the controller is first powered up, and they may also be used to provide control functions for the host repeater. When an output is programmed low, the controller responds with ON; when an output is programmed high, the controller sends OFF.

The last two commands are provided to disable and enable the operation of the controller from the link frequency. If the DTMF decoder is disabled, the controller cannot be commanded from the link frequency; however, the host repeater can still be used to turn the link on and off. The CW responses to the last two commands were intentionally omitted to avoid drawing attention when these functions are used. If confirmation of the operation of either of these functions is needed, the commands can be followed by a status-check command. If link-frequency control is disabled, the controller won't respond.

After the controller receives the first valid DTMF site- or group-code element, it saves that and the next three elements. If a fifth element is received, the controller checks to see if that element is a #. If it is, the command is executed immediately, and the CW messages are sent when the input carrier stops. (This feature is included so that a control operator can turn off the link from the link frequency in the presence of other signals.) If a fifth received element is not a #, the entire command sequence is ignored. When a valid four-element command sequence is received, the code is evaluated and executed when the carrier drops.

The controller ignores all received commands that don't begin with a valid site or group prefix. I designed this command-validation scheme because many repeaters do not have provisions for completely muting DTMF-command tones. This could cause the link to mistake repeater-control commands for link-control commands.

Table 1
Link-Controller Command Functions

- Link on, time-out timer enabled
- Link on, time-out timer disabled
- Link off
- Enable site readback
- Disable site readback
- Read input 1
- Read input 2
- Report link status
- Output no. 1 low
- Output no. 1 high
- Output no. 2 low
- Output no. 2 high
- Output no. 3 low
- Output no. 3 high
- Disable DTMF decoder
- Enable DTMF decoder

With the systems used in this controller, all invalid leading elements are ignored.

Operation

Table 1 shows the link controller's functions. The uses of these functions are largely self-explanatory.

When power is applied to the controller, it sends a power-up message (simply the version number of the software). The link can be enabled from the host repeater, or from the link frequency. To enable the controller from the host repeater, a control line from the repeater must pull the link-enable pin (card-edge connector pin 5) low while the busy pin (card-edge pin 9) is high. Link identification is delayed for approximately 30-45 seconds, and is sent at 20 WPM during the first transmission after this timer expires. (The identification is delayed so that QSOs in progress aren't disturbed.) The controller then pulls the relay-control output low, closing the link relay and lighting LED DS1. When the link is enabled from the host repeater in this way, the time-out timer is not activated. Disabling the link from the host repeater is done by pulling the link-enable pin high, at which time the controller sends [call sign]/A OFF.[7]

I designed the controller to give the host repeater control priority. Therefore, if the host repeater has the controller's link-enable pin pulled low, the link cannot be turned off from the link frequency. If users try to turn off the link from the link frequency when the link-enable pin is low, the controller sends a CW message, ? ? NG, in reply.

To enable the link from the link frequency, send one of the valid access codes on the link frequency. The initial identification, which is sent immediately upon link activation, is sent in the format: DE [call sign]/A ON. After the initial identification (whether the link has been enabled from the repeater or from the link frequency), the controller identifies every 10 minutes, in keeping with FCC regulations for auxiliary operation.

When the link is turned off, the link relay is opened, DS1 goes off, and a [call sign]/A OFF message is sent on the link frequency. The link can be turned off from the link frequency by direct command, or from the host repeater, by pulling the link-enable input low and then high again.

When the controller is under link-frequency control, the CW messages for both link-on commands are the same, except that a T is transmitted on the end if the link was enabled with the time-out timer. When the timer mode is used, the link is turned off when the time-out timer expires. This time-out timer monitors the activity of the CAS input and is reset whenever the CAS input is low (active).

The use of the busy input (pin 9 on the card-edge connector) is optional, but adds several necessary features if the host repeater has other links or an autopatch. All sources that can busy the controller should be ORed together and connected to the busy input. If someone tries to turn the link on from the link frequency while the busy input is pulled low, a BUSY NOW DE [call sign]/A message will be returned. If at any point the busy line is pulled low while the link is on, the link will be turned off, DS1 will extinguish, and a busy message will be sent to the users on the link frequency. Resetting the busy input to a high will turn the link on again, at which time the link will identify.

Site readback is a feature that I added as a diagnostic tool. When site readback is enabled, each controller monitors the host PTT line and link CAS input to determine which controller in a system was the last to transmit. After six seconds of inactivity on the system, the last site that transmitted keys up and transmits a short character string that identifies that site. (The site-readback string may contain letters and/or numbers, and should be limited to less than five characters.) Because the controller only transmits the site identifier after a 6-second delay, it may only occur a couple of times during a normal QSO. During periods of interference or spurious kerchunks, this feature is valuable in locating the transmitting site. When the controller is initially powered up, the site-readback option is disabled; however, it can be enabled or disabled on the link frequency by DTMF control.

The CW speed is set by DIP switches 5-8. With these switches, the CW speed is adjustable from 7.5 to 20 WPM in sixteen steps. Likewise, the time-out timer is adjustable via DIP switches 1-4 from 32 seconds to 32.5 minutes in sixteen steps. The eight DIP switches are read only during the power-up sequence, so if any changes are made to the settings, the controller must be reset.

Summary

This link controller should fulfill the needs of most repeater clubs that want to add link capabilities to their repeaters. Don't forget that, when you add a link to your repeater system, the link frequency—as well as the repeater frequencies—must be coordinated.

From the start of this project, I paid special attention to low cost, useful features and ease of operation and interfacing. Although this design requires a programmed microcontroller for assembly, the controller's utility exceeds the inconvenience presented by this requirement.

Acknowledgments

Thanks to several people who kept me moving forward on this project over its year-long development. They include my wife, Suzie, N3DVF, Gary Weiss, N3ECW, and Mike Priebe, N3DZM.

John Bednar is employed by AT&T Microelectronics in Allentown, Pennsylvania, as a linear-digital test engineer. He has an associate's degree in electronics, and is currently attending Lafayette College in Easton, Pennsylvania, part time, working toward his BSEE. John was first licensed in 1976, and earned his Extra Class ticket in 1981. John's wife, Suzie, N3DVF, earned her General class license in 1984.

John has been active on moonbounce on 432 MHz, using eight Yagis and an 8938 amplifier, and in VHF/UHF contesting. He enjoys designing single-chip microcontroller projects.

Notes

[1]Single-sided PC boards are available from me for $16 (plus $3 shipping and handling in the US; if a board is ordered with a microcontroller, shipping and handling is $3 for both). Assembled and tested boards are also available from me; send an SASE for details. (With each order, I'll include a complete parts list with Mouser part numbers, detailed construction and installation hints and suitable interface circuits.) The ARRL and *QST* in no way warrant these offers.

[2]Most parts can be obtained from local Radio Shack® stores and from Mouser Electronics, tel 800-346-6873.

[3]Cross-32 (available from Universal Cross Assemblers, PO Box 384, Bedford, NS B4A 2X3, Canada).

[4]Programmed microcontrollers are available from me for $20 (plus $3 shipping and handling in the US—see note 1). Include call sign, site-readback character(s), 16 2-element command codes (see Table 1), 2-element site prefix, and 2-element group prefix desired. For more information, send me an SASE. The ARRL and *QST* in no way warrant this offer.

[5]An alternative source for the SSI202 decoder IC is Silicon Systems, Inc, 1014 Bethlehem Pike, Erdenheim, PA 19118, tel 215-233-4600. An equivalent part is made by Crystal Semiconductor (part no. CS202). For more information on this part, contact Merit Electronics, 20270 Ringwood Ave, San Jose, CA 95131, tel 408-434-0800.

[6]A suitable audio-mixer circuit diagram is available from me for an SASE. (This circuit diagram is part of the package of materials available with programmed microcontrollers; see note 1.)

[7]Although the FCC no longer requires it, the /A designator—denoting the link's auxiliary operation—is included for clarity in the identification messages.

Auroral-E Propagation at 144 MHz

In yet another VHF-propagation first, radio amateurs made dozens of 144-MHz auroral-E contacts during the great aurora of March 1989. Here's how it happened—and what auroral E is all about!

By Emil Pocock, W3EP
RR 3, Box 70 (Rte 207)
Lebanon, CT 06249

Until very recently, auroral-E propagation was known only to 50-MHz operators as a rare form of propagation that sometimes follows radio-aurora events. Signals propagated by auroral E have very little of the Doppler-shifted distortion characteristic of common auroral signals, and sometimes auroral-E signals are remarkably strong and clear. Because it is closely associated with auroral disturbances, auroral E is usually observed at latitudes higher than 40 degrees north rather than in more southerly regions. Contacts on 50 MHz are typically made across the northern part of the US and southern Canada over distances between 1000 and 3000 km. Auroral-E conditions appear most often after midnight (local time), when aurora-propagated signals have disappeared, but sometimes the two modes occur simultaneously.

During exceptional auroral-E conditions, 50-MHz paths may extend to 5000 km, such as between the Pacific Northwest and New England, or from Alaska and the Yukon to the Midwest and East Coast. Auroral-E contacts have also been made from California to Florida, the Midwest to the Canadian Maritime provinces, and over shorter distances within most of the US. Auroral E has also been widely reported in Europe. On a few rare occasions, there have been reports of 50- and 70-MHz signals being heard between Europe and North America,[1] but prior to 1989, no two-way contacts were reported.[2]

Auroral E shares many characteristics with the more familiar sporadic E, but much less is known about it.[3] As the two propagation modes share some important characteristics, it is useful to think of auroral E as aurora-induced sporadic E. Normal distances, typical signal strengths, and the selective nature of radio paths are similar for both modes. Just as the causes of sporadic E are not completely understood, the mechanisms responsible for auroral E are still under investigation. In both cases, the responsible reflecting medium appears to be the result of an unusually high level of ionization in the E layer.[4] The usual maximum distance for single-hop contacts via the E layer is about 2200 km, so it is likely that some sort of double-hop reflection plays a role in long-distance auroral-E contacts, just as with sporadic E. The maximum usable frequency (MUF) of auroral E is also uncertain, but until recently, it was widely assumed to be not much more than 70 MHz. Sporadic E has been observed as high as 220 MHz.

Auroral E and the Great Aurora of March 1989

Considering the limited experiences with this elusive propagation mode, VHF Amateur Radio operators were surprised to hear widespread auroral-E propagation on 50 MHz, and to discover auroral-E signals as high as 144 MHz, during the great aurora of March 13-14, 1989. It may be no coincidence that record-breaking auroral E was heard during one of the most intense radio auroras ever observed; this event surpassed several other great auroras in geographical extent and duration. A severe geomagnetic storm drove the K index to 9 during three reporting periods of three hours each, and the daily A index reached 248, the highest recorded since November 1960. The resulting aurora provided more than ten consecutive hours of VHF radio aurora conditions, and at its peak at about 0000 UTC March 14, aurora contacts were made as far south as the Mexican border, the Gulf Coast, and central Florida on all amateur bands from 50 through 432 MHz.[5]

Auroral-E conditions appeared for many hours on 50 MHz over much of the US and southern Canada. Hundreds of contacts were made over distances of up to 2200 km, in addition to a few longer transcontinental paths. To top off this most unusual opening, KA1MFA (Rhode Island) and G4GLT (Leicester, England) made the first reported US-to-Europe 50-MHz auroral-E contact.[6] The distance, about 5160 km, surely constitutes a new distance record for that mode and frequency. On 144 MHz, an even more astonishing transformation took place. In the midst of all the auroral hiss, rough-sounding CW notes, and raspy SSB signals was the sudden appearence of clear and exceedingly strong signals from distances well beyond tropo range, indicating that auroral-E propagation had reached a much higher frequency than ever before observed, at least in North America.[7]

My own experience was probably like that of many others who discovered auroral-E propagation that evening. I was tuning the 2-meter band late on March 13 (UTC) looking for distant stations, rare grids, and anything out of the ordinary. There seemed to be many more SSB stations on during this aurora than usual, and most could be copied, with some difficulty, through the Doppler-shifted raspiness. I stopped to listen to one very excited SSB station speaking much more rapidly than aurora-propagated signals normally allow. He appeared to be running stations one after another at a great rate. How could he do that through the auroral distortion? Just as I strained to catch his call and grid square, his signal began to clarify and strengthen remarkably. Suddenly he went from a raspy S5 to 40 dB over S9 and perfectly clear! "VE3KRP grid EN58," he boomed out! He was in western Ontario, nearly 1500 km distant. I dumped "W3EP" into the fray, and much to my surprise, he came back with my call and a quick acknowledgment. I knew immediately I had made an auroral-E contact on 144 MHz.

Many other stations knew what was happening during that evening as well.[8] Alert 2-meter operators made as many as 100 auroral-E contacts across the Great Lakes

[1]Notes appear on p 32.

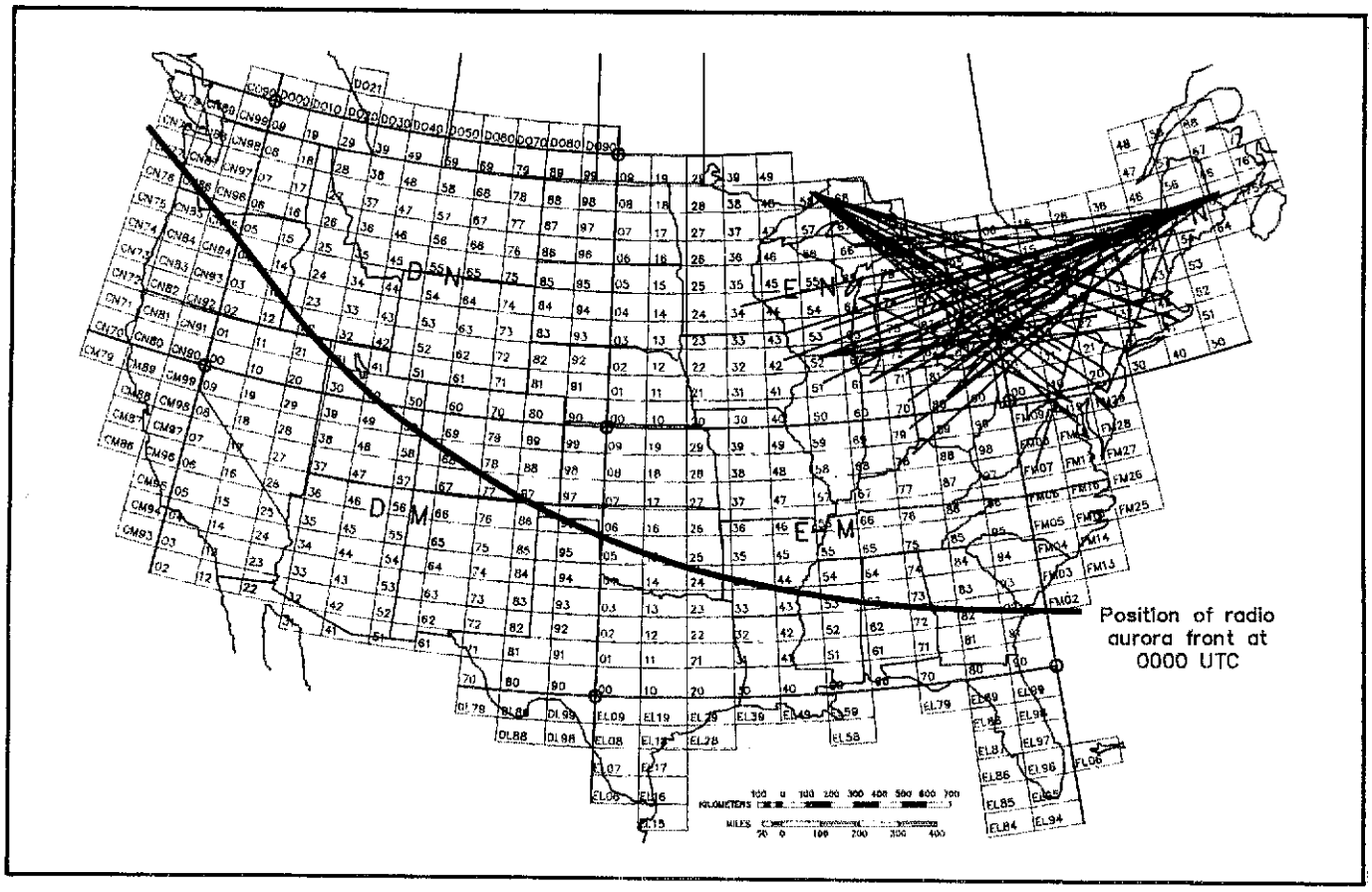


Fig 1—Nearly 100 auroral-E contacts were made on 144 MHz between 2330 and 0042 UTC, March 13-14, 1989. The radio aurora front (as plotted from several hundred 144-MHz aurora contacts) was well to the south of auroral-E activity. Aurora contacts were being made simultaneously on 50 through 432 MHz in virtually all parts of the country.

region between 2330 and 0042 UTC, as shown in Fig 1. The honor of the first 144-MHz auroral-E contact apparently goes to N1BUG (FN55) and WD9AHJ (EN62) made at 2330 UTC on March 13 over a distance of about 1475 km. All the contacts made during the 72-minute opening fell within the range of 1000 to 1900 km and signals were exceedingly strong and clear, very similar to sporadic-E propagation. Some stations ran large antennas and high power, such as N1BUG with his 1000 watts and array of four Yagis (see Fig 2), but such moonbounce-class stations were clearly not necessary. Others, like VE1ASJ, participated with just 10 watts and a groundplane antenna. Operating from the western side of the opening with 160 watts and an 18-element Yagi, VE3KRP strung together 26 quick contacts in 19 minutes, as shown in Fig 3. More than 75 stations in at least 42 grids, shown in Fig 4, are known to have participated in this historic event.

Analysis

Preliminary analysis was based on the assumption that a limited region of E-layer ionization resembling sporadic E was the responsible refracting medium. The 96 reported 144-MHz auroral-E contacts were analyzed by the same methods that have proved successful for sporadic E.[9] The paths and midpoints of known contacts were plotted in 15-minute intervals for the 2330-0030 UTC period and a series of maps were developed, similar to that for the first 15-minute segment shown in Fig 5. Nearly all the midpoints were contained in a broad area centered over grid FN04, but the locus of midpoints appeared to drift eastward 400 to 500 km over the 72-minute period during which 144-MHz contacts were reported. The locus was over the southern part of Lake Huron (EN94/EN95) early in the event and shifted eastward to an area over north-central New York (FN23) by 0030 UTC. See Fig 6.

If the responsible mechanism was truly refraction from an E-layer region of very high ion density, it might also exhibit MUF characteristics similar to sporadic E. Assuming that this reflecting region behaved like sporadic E at an altitude of 105 km, its MUF can be determined indirectly from signal frequency and path distance. A rough calculation shows that the

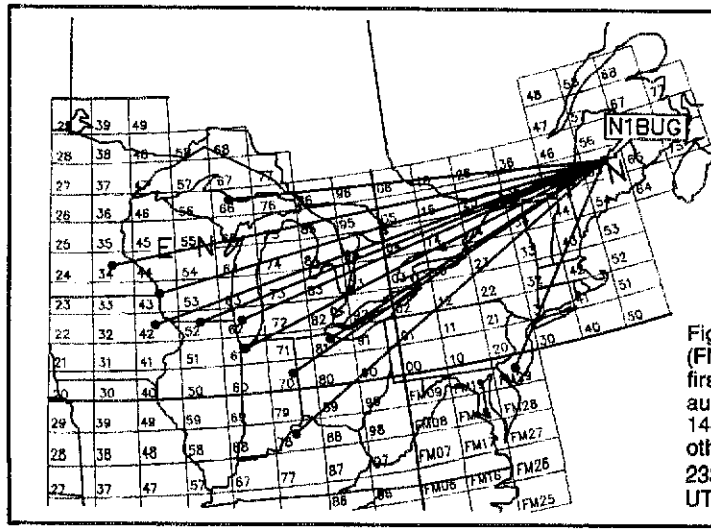


Fig 2—N1BUG (FN55) made the first reported auroral-E contact on 144 MHz, plus 13 others between 2330 and 0025 UTC.

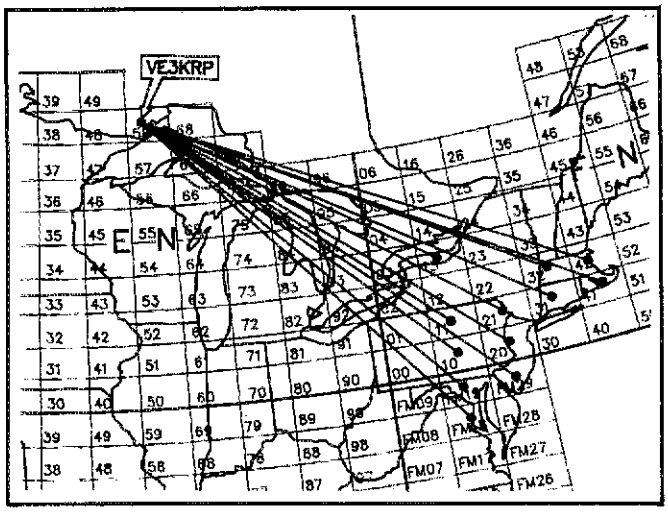


Fig 3—In a 19-minute span between 2336 and 2355 UTC, VE3KRP, in grid locator EN58, completed 26 auroral-E contacts on 144 MHz.

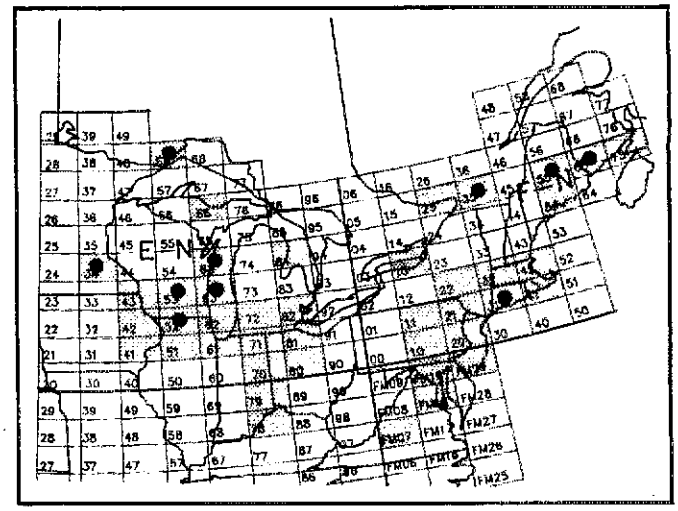


Fig 4—More than 75 stations in 42 grid locators made 144-MHz auroral-E contacts. The locations of those stations contributing logs for this study are shown with dots.

three longest 144 MHz contacts, which averaged about 1900 km, yield an MUF of about 166 MHz. This can be determined by substituting 1900 for d and 144 for f in Eq 5 of the sidebar, "Useful Definitions and Equations":

$$MUF = \frac{2239\ (f)}{\sqrt{420^2 + d^2}} = \frac{2239\ (144)}{\sqrt{420^2 + 1900^2}}$$

$$= 165.7\ MHz \qquad \text{(Eq 1)}$$

In contrast, the three shortest contacts averaged about 1000 km and indicate an astonishing MUF over 297 MHz! This suggests that 220-MHz auroral-E contacts could have been made if stations had been in the correct locations about 1600 km apart. Although these results may be surprising, they are consistent with other characteristics of this event.

Auroral-E contacts on 144 MHz ceased after 0045 when the reflecting region moved closer than 500 km to the East Coast. At that point, east-west 144-MHz radio paths longer than 1000 km no longer fit completely on the continent, because one end of the potential circuit had moved out over the Atlantic Ocean. The last 144-MHz auroral-E contact reported, between VE2DUB (FN35) and WE4N (FM07) at 0042 UTC, spanned about 1020 km along a predominantly north-south orientation. The active region had moved southeast over grid FN11, but the path distance indicated that the MUF was still in the 290-MHz range. The geometry of auroral-E contacts on 50 MHz made over this region after 0100 UTC indicated that the MUF was deteriorating quickly and may explain why no other 144-MHz contacts were reported. Fig 7 shows a series of five very short 50-MHz auroral-E contacts made by K3USC (in the extreme southeastern corner of grid EN92) between 0103 and 0129 UTC. The calculated MUF during the shortest two contacts (average length about 660 km) reached no higher than 144 MHz.[10] The timing of this series of contacts and their midpoints suggests that the same active E-layer region was responsible, although it was dissipating with its apparent eastward drift.

These analyses are all consistent with the known behavior of intense E-layer ionization, such as sporadic E. During most sporadic-E events, intense ionization appears in limited regions in the E layer, typically 100 to 120 km altitude, in thin sheets 2 to 5 km thick. These layers have been confirmed by rocket probes and by ionosonde soundings.[11] The observed behavior of 50- and 144-MHz auroral-E signal paths provides strong support for the

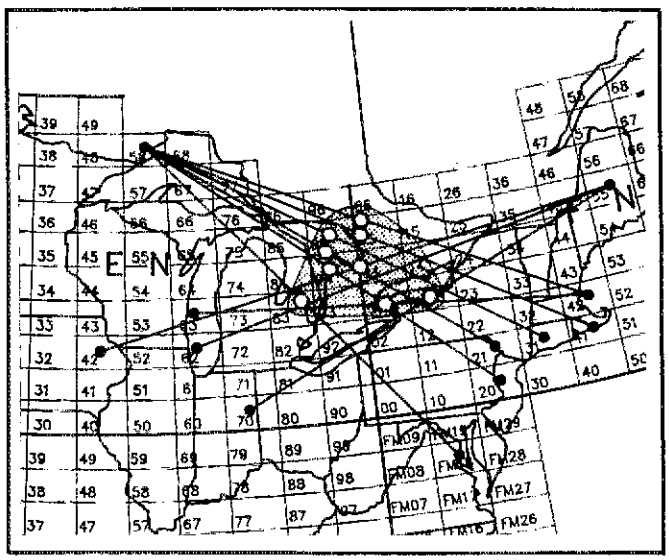


Fig 5—144-MHz auroral-E contacts made between 2330 and 2344 UTC, March 13. Open circles within the shaded area indicate path midpoints.

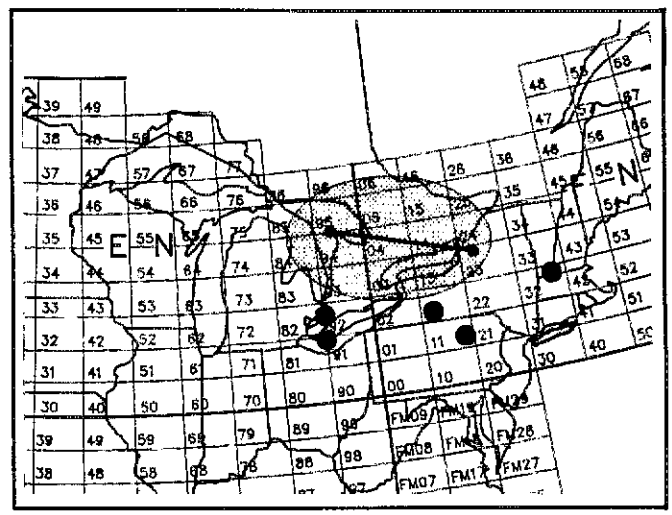


Fig 6—All but five of the path midpoints for 96 known 144-MHz auroral-E contacts fell within the shaded region. The five outliers are shown with large dots. The locus of the midpoints shifted eastward 400 to 500 km between 2330 and 0038 UTC, as indicated by the line in the shaded region.

existence of a similar E-layer configuration during this auroral-E episode, but there is no direct evidence in this case.

Radar Investigations

Some most interesting studies of intense E-layer ionization during strong auroras have been made recently by the Haystack Observatory of the Massachusetts Institute of Technology. The observatory operates a fully steerable 150-foot dish antenna at Millstone Hill, near Westford, Massachusetts. Using this antenna, scientists conduct radar investigations of the ionosphere at 440 MHz. Unfortunately, the 2.5-megawatt Millstone Hill radar was not operating during the March 1989 aurora, so direct comparisons of radar data and amateurs' experiences cannot be made. The radar did collect extensive data from its probes of the ionosphere during the great aurora of February 8-9, 1986, an event that was nearly as widespread and energetic as the March 1989 aurora.

Data collected by the Millstone Hill radar during the February 1986 aurora appear relevant to understanding the unusual ionospheric features of auroral-E propagation. The strength of signals returned from directly overhead of the radar site indicated the existence of intense ionization very similar to sporadic E. The electron density (the most significant measure of atmospheric ionization for propagation studies) approached 10^{12} electrons per cubic meter (e/m^3) several kilometers thick in the E layer, at about 110 km altitude.[12] This extraordinary ionization could account for auroral-E propagation nearly as high as 50 MHz, as indicated from the sidebar's Eq 7:

$$f_m = 48\sqrt{N} = 48\sqrt{10^{12}} = 48 \text{ MHz (Eq 2)}$$

Nevertheless, ionization at this level cannot account for 144-MHz auroral-E propagation using the sporadic-E model.

A further radar observation may have greater implications for 144-MHz auroral-E propagation. The Millstone Hill radar also probed the ionosphere at very low angles to a range of 3000 km during the February 1986 aurora and received exceedingly strong echoes from a wide arc to the north and west of the radar site.[13] See Fig 8. The strength of the returned signals was from 10 to 100 times stronger than echoes from overhead, suggesting an equivalent electron density of between 10^{13} and 10^{14} e/m^3. If these were measurements of actual electron densities, a strong case might be made that these observations could easily account for auroral-E reflections at 144 MHz and higher. Unfortunately, the situation is more complicated than that.

These echoes were returned only at angles nearly perpendicular to the magnetic field (that is, nearly parallel to the earth) from turbulent wave disturbances in the E layer. Perpendicular reflections from these wave disturbances made the required ion density appear much higher than actually existed. Thus it is not clear whether these unusual E-layer turbulences during auroral storms are connected with observations of 144-MHz auroral-E propagation, but the possibility remains.[14] An actual electron density as high as 10^{13} e/m^3 would support conventional 144-MHz reflections of the auroral-E type (which can be shown by the sidebar's Eq 5), but it must be emphasized that there is no evidence that densities actually reached this level. Amateurs might have been taking advantage of some as yet unexplained feature of the wave turbulence itself, much as the Millstone Hill radar did, in order to complete 144-MHz auroral-E paths. This possibility remains to be investigated.

Prospects

Recent observations from the Millstone Hill radar have shown that, during intense auroral storms, the E layer undergoes some very unusual transformations that may have direct implications for amateur communications and studies. Amateurs have discovered that auroral-E contacts can be made at least as high as 144 MHz, and MUF calculations indicated that 220-MHz contacts may have been possible. Observations made by the Millstone Hill radar suggest that anomalous wave disturbances in the E layer can support unusually strong echoes as high as 440 MHz and probably higher. It is uncertain if these observations are connected. Certainly more careful observations and comparison with professional investigations may help unravel these unusual phenomena.

The next few years bear especially close watching for VHF auroral-E activity. Mid-latitude auroral E seems to be associated with severe geomagnetic storms and resulting radio aurora. Auroras during the past have increased in number, intensity, and southerly extent around the peaks of the solar cycles, and cycle 22 has already proven itself to be one of the highest on record. It is likely that other great auroras during the next two or three years will offer further chances to observe auroral-E propagation on 144 MHz and even higher. See you there!

Acknowledgments

Many thanks to those who contributed logs for this study. They are listed in Note 8. Thanks also to Dr John C. Foster of Haystack Observatory, Dr Jean-Pierre St-

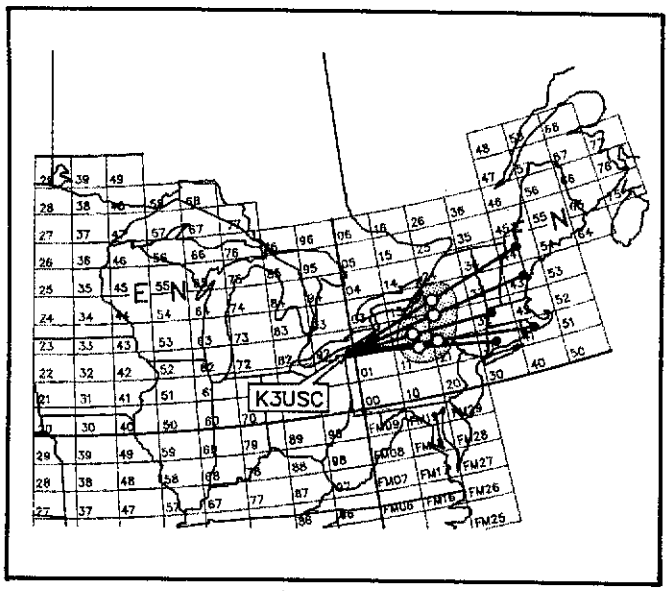


Fig 7—Five 50-MHz auroral-E contacts made by K3USC between 0103 and 0129 UTC March 14. The path midpoints are shown with open circles within the shaded area. Note that this area is just east of the midpoint distribution in Fig 6.

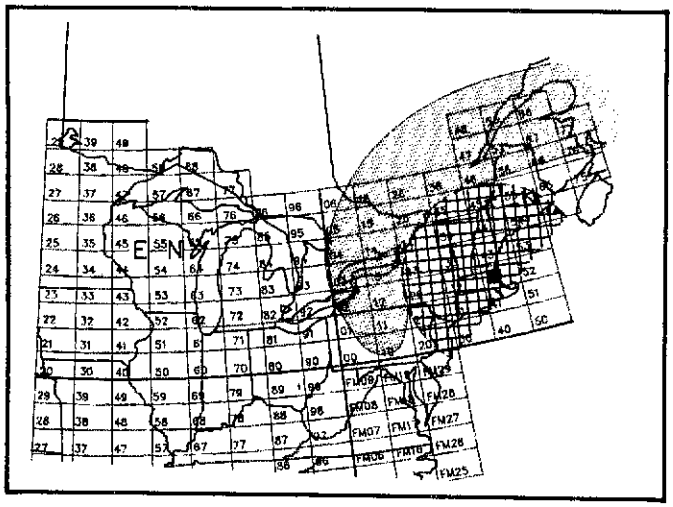


Fig 8—The shaded zone indicates the location of E-layer wave disturbances with an equivalent ionization between 10^{13} and 10^{14} e/m^3 at 2158 UTC on February 8, 1986, during another great aurora. These disturbances returned strong echoes at 440 MHz from the Millstone Hill radar site in eastern Massachusetts (indicated by the large dot). No data were recorded in the area below the radar's minimum elevation angle, indicated by the cross-hatching. Source: See Note 13.

Useful Definitions and Equations

The critical frequency (f_c) of an ionospheric layer is the highest frequency that will be reflected when a radio signal is beamed straight up. Critical frequency increases with electron density. The approximate relationship between the two variables is given by:

$$f_c = 9\sqrt{N} \qquad \text{(Eq 3)}$$

where
f_c = critical frequency in MHz
N = electron density in electrons per cubic meter (e/m^3)

The maximum usable frequency (MUF or f_m) is the highest frequency that will be reflected by an ionospheric layer between two points on earth. Discussions in this article assume the MUF is determined at the maximum possible single-reflection distance between stations, or about 2200 km for reflections from an E layer 105 km in altitude. The path distance for any given frequency can be calculated when the MUF is known. The relationship is given by:

$$d = 420\sqrt{\left(\frac{5.33\,f}{f_m}\right)^2 - 1} \qquad \text{(Eq 4)}$$

where
d = total path distance in kilometers
f = signal frequency in MHz
f_m = maximum usable frequency in MHz

This equation can be rewritten to solve for MUF, a convenience when signal frequency and path distance are known:

$$f_m = \frac{2239\,f}{\sqrt{420^2 + d^2}} \qquad \text{(Eq 5)}$$

The relationship between MUF and critical frequency can be derived from Eq 4 by setting distance (d) to zero:

$$f_m = 5.33\,f_c \qquad \text{(Eq 6)}$$

Eqs 3 and 6 can be combined to yield an easy way to approximate MUF when electron density is known:

$$f_m = 48\sqrt{N} \qquad \text{(Eq 7)}$$

Sources: H. Rishbeth and O. W. Garriott, *Introduction to Ionospheric Physics* (New York: Academic, 1969), pp 51-54; and K. Davies, *Ionospheric Radio Propagation* (Washington: Government Printing Office, 1965), p 165.—*W3EP*

Maurice of the University of Western Ontario, and Dr Ted Rappaport, N9NB, of Virginia Polytechnic Institute and State University, for their help in expanding my understanding of ionospheric phenomena.

Notes

[1]In the United Kingdom, Amateur Radio operators have access to the 4-meter band, 70.025 to 70.5 MHz. The SSB calling frequency is 70.2 MHz. Crossband activity (using 28.885 MHz as a second frequency) is common between the UK and other countries.

[2]Some of the earliest descriptions of auroral E can be found in E. Tilton, "Birth of an Aurora," The World Above 50 Mc., *QST*, Apr 1958, p 81 and B. Smith, "Europe Heard on Aurora," The World Above 50 Mc., *QST*, Nov 1969, p 91. Also, B. Smith, "Auroral E," The World Above 50 Mc., *QST*, Nov 1970, pp 96-97, summarized what was known about auroral-E propagation at that time.

[3]A brief overview can be found in E. Pocock, "Sporadic-E Propagation at VHF: A Review of Progress and Prospects," *QST*, Apr 1988, pp 33-39. (The equation in Note 17 of that article contained an error; it is corrected in Eq 4 of this article's sidebar.)

[4]Despite common usage in this article and elsewhere, reflection is not quite an accurate description of what happens to radio signals when they are returned to earth by an ionospheric layer. Radio waves are in fact gradually bent, or refracted, as they pass through an ionospheric layer. When they are refracted enough to return to earth, a long communications path is created. Sporadic-E refractions are something of an exception, as they occur over such a short distance in the E layer that they can be treated nearly as true specular reflections. It is not at all certain whether this same mechanism is responsible for auroral-E refractions.

[5]Other auroras of nearly equal intensity occurred in September 1957, February 1958, March 1970, July 1974, and February 1986. An extensive description of the March 1989 event is E. Pocock, "The Great Aurora of March 13-14, 1989: Some Preliminary Observations and Analyses," *Proceedings of the 23rd Conference of the Central States VHF Society* (Newington: ARRL, 1989).

[6]Reported in the Radio Society of Great Britain's *Six Meter and Up DXer*, April 1989.

[7]Swedish, Norwegian and Soviet stations in the auroral zone north of 55° north latitude reported several 144-MHz auroral-E contacts during July 25-27, 1986. Signals were generally very weak. (*Dubus*, Apr 1986.) Similar contacts may have been made earlier. Thanks to David Dibley, G4RGK, for bringing this to my attention.

[8]The descriptions and analyses of this auroral-E event are based on the 144-MHz logs of VE1ASA, VE2DUB, VE3KRP, N1BUG, W3EP/1, KB8JI, KD9JQ, K9VGE, KBØZQ, and WA9O/9; corroborating information came from the logs of VE2FN, WA2TEO, K9MRI, and NI9E. The 50-MHz log of K3USC made a valuable contribution. The logs of more than 50 other stations active on 144 MHz during March 13-14 did not indicate any auroral-E contacts.

[9]See the fine analyses by M. R. Owen, "The Great Sporadic-E Opening of June 14, 1987," *QST*, May 1988, pp 21-29. In the auroral-E study, all stations were treated as if they were located in the center of their reported grid locators (a 1°-latitude by 2°-longitude rectangle). This can introduce distance errors of as much as 200 km in cases where both stations are located in opposite corners of their respective grids, but errors are moderated by taking average distances of several contacts in cases requiring calculations.

[10]The actual distance between K3USC and W3EP/1, one of the two short contacts, was 660 km.

[11]L. C. Smith, "Rocket Observations of Sporadic E and Related Features in the E Region," *Radio Science*, Vol 1, Feb 1966, pp 178-86; and L. C. Smith and E. A. Mechtly, "Rocket Observations of Sporadic-E Layers," *Radio Science*, Vol 7, Mar 1972, pp 367-76.

[12]Letter from John C. Foster, Assistant Director, Haystack Observatory, Sep 12, 1989.

[13]J.-P. St.-Maurice, et al, "First Results on the Observations of 440-MHz High-Latitude Coherent Echoes from the E Region with the Millstone Hill Radar," *Journal of Geophysical Research*, Vol 94, Jun 1, 1989, pp 6771-99 and 7040-41. See especially plate 3 on page 7040.

[14]Letter from Jean-Pierre St.-Maurice, University of Western Ontario, Sep 1, 1989.

Feedback

YAESU FT-747GX OPERATING MANUAL ERRORS

☐ *QST*'s review of the Yaesu FT-747GX transceiver[1] is very well done, but a bit of incorrect information in the '747's *Operating Manual* was carried over into the review.

Pin 6 of the **BAND-DATA** jack *does not* provide access to a transistor capable of switching 150 V at 1.5 A. Pin 6 is connected to an IC (Q339), which will be destroyed if such switching is attempted.[2]

The manual also states that an FRB-757 relay box (used to control an external power amplifier) can be operated via the '747's PTT jack. This is not so—without a modification of the '747 circuit.[3] I tried the modification, but couldn't get it to work because my '747GX circuit was different from the schematic in the operating manual. When I called the Yaesu service department and told them about my problem, they offered to make the modification for me. I decided on a different solution. I use a double-pole switch (Radio Shack 275-709) as a foot-operated PTT switch. One pole turns on the '747 by shorting the PTT line, and the other switch pole operates the PTT relay in my Heath® SB-220 amplifier.—*Gene Warnock, KC4DP, Ft Myers Beach, FL 33931*

[1]D. Newkirk, "Yaesu FT-747GX MF/HF Transceiver," Product Review, *QST*, Aug 1989, pp 33-36, 52.

[2]Yaesu confirms the misprint in the manual. The pin should be identified as pin 2, not pin 6.—*Ed.*

[3]The relay-box modification is outlined in Yaesu's TB-8805. Contact Yaesu at 17210 Edwards Road, Cerritos, CA 90701, tel 213-404-4884.—*Ed.*

Product Review

Conducted By James W. Healy, NJ2L
Assistant Technical Editor

Bird 43P Peak-Reading Directional Wattmeter

Reviewed by Rus Healy, NJ2L

Bird Electronic Corporation's Model 43 Thruline® wattmeter has long been a commercial and Amateur Radio standard for RF-power measurement. The 43's ruggedness, accuracy and versatility, in addition to its other qualities, have given it this reputation. Bird, apparently having seen a demand for a peak-reading wattmeter with the same qualities that they build into the 43, modified the 43's meter-driving circuit to provide switchable peak- or average-power metering. The result is the 43P. (Model 43 owners can also install the new meter-driving circuit in average-only-reading 43s, as discussed later.)

The external differences between the 43 and the 43P are very subtle. In fact, the only externally visible difference is on the right side of the case, where the 43P has a switch (for selecting PEP or average-power metering) and an LED mounted in a round panel in the space occupied by a spare-element-storage recess in the standard 43.

The 43P's peak-reading-metering circuit operates from two 9-V batteries. The 43's *Instruction Book* supplement for the 43P states that the peak-reading operating time for a pair of alkaline batteries is 48 hours, so an ac-to-dc adapter would be a welcome accessory! As supplied, though, the 43P has no provision for connection of such an external supply. Fortunately, the batteries aren't drained during non-peak-reading measurements.

The 43P uses the same power-flow-sensing elements—commonly known as *slugs*—as the 43 (and many of Bird's other RF wattmeters). Bird's elements are self-contained, basically cylindrical, encapsulated sensors that are slightly smaller than a golf ball. Available in families of power-measurement class and frequency coverage, Bird's standard elements cover frequencies from 2 to 1000 MHz, and full-scale power-measurement ranges from 5 W to 5000 W between 2 and 25 MHz, and from 5 W to 1000 W above 25 MHz.

The 43P is not inexpensive. Availability wasn't great when we bought the review unit, either: It took more than six weeks from our order date to receive the 43P, and Bird had announced the 43P's availability several months before that. The 43P has been available for some time now, and many Amateur Radio dealers have them in stock. Pricing seems to be about the same from most Amateur Radio dealers and Bird.

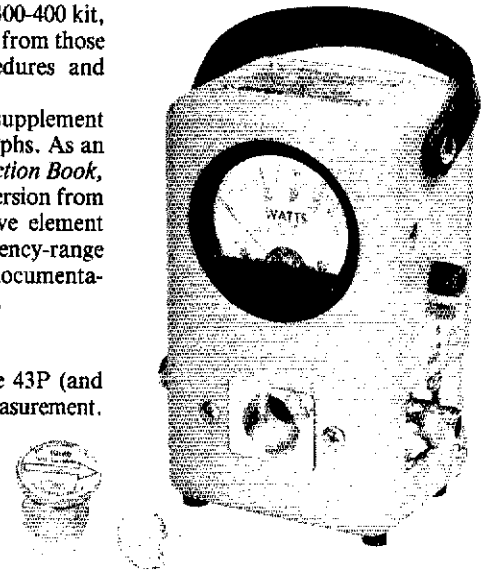
The Manual

The *Instruction Book* supplied with the 43P is well written and contains good detail. It covers the 43, 43P and other Thruline wattmeters, and includes sections on safety precautions, installation, operating instructions, theory of operation, maintenance and replacement parts. The 43P also includes a supplement that covers installation of the 4300-400 kit, specifications for the 43P (where they differ from those of the 43), peak-mode calibration procedures and battery-replacement instructions.

Both the *Instruction Book* and the 43P supplement include high-quality graphics and photographs. As an illustration of the completeness of the *Instruction Book*, it includes graphs and nomographs for conversion from power ratios to SWR, frequency v relative element response (for interpolating out-of-frequency-range power readings), and others. In short, the documentation provided with the 43P is outstanding.

Using the 43P

Unlike most commercial wattmeters, the 43P (and the 43) have no provisions for direct SWR measurement. SWR must be calculated based on ratios of measured forward and reverse power. This isn't a major detriment, as 43 users know, because you quickly memorize power ratios that correspond to different SWR levels. For instance, a forward- to reverse-power ratio of 10:1 corresponds to an SWR of about 1.9:1. In most cases, hams are more interested in minimizing reflected power than in knowing the exact SWR, so *direct* SWR measurement isn't necessary for most of us. A nomograph in the 43P's documentation makes it easy to determine SWR from power measurements, which is useful in cases where knowing the exact SWR is important.



Bird's Model 43P peak-reading RF wattmeter, shown here with one of its power-measurement elements, is externally distiguishable from its non-peak-reading counterpart, the Model 43, only by the inclusion of the PEAK/CW switch and LED indicator on the right side of the 43P's case.

The 43P's peak-reading mode is very useful for SSB and other low-duty-cycle modes. For instance, tuning my 144- and 432-MHz amplifiers is considerably easier with the 43P in peak-reading mode. I can quickly adjust amplifier tuning for maximum SSB output, and then set the exciter-drive levels to provide the maximum linear output that I know the amplifiers are capable of providing, all without pushing the tubes to their limits with a single-tone tune-up signal.

The 43's meter movement is rather heavily damped, so stable meter readings don't occur for a few tenths of a second after power is applied to a load through the meter. (This relatively heavy damping is part of what makes the 43-series meters so rugged; heavily-damped meter movements resist damage resulting from physical impact much better than lightly damped movements.)

Table 1

Bird Model 43P Wattmeter, Serial No. 354

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Measurement-frequency range: 450 kHz to 2300 MHz, depending on element used.	As specified.
RF Power-Measurement Range: 100 mW to 10 kW, depending on element used.	As specified.
Accuracy: CW mode, ±5% of full scale; PEP mode, ±8% of full scale.	As specified.
Insertion SWR: Less than 1.05:1	As specified.
Operating modes: All modes, including pulse modes with duty cycles of at least 2%, pulse durations of at least 200 μs and repetition rates of at least 100/s.	As specified.
Impedance: 50 Ω nominal.	
Power source: Two 9-V alkaline batteries.	
Battery life: Approx 48 hours.	Not tested.
Dimensions (HWD): 6-7/8 x 4 x 3-5/8 inches.	
Weight: 4 lb.	

The difference between average and PEP SSB output is quite substantial, and the 43P's meter-movement damping severely limits the usefulness of readings taken on low-duty-cycle (ie, SSB) signals in average-reading mode. For these reasons, the peak-power measurement capability of the 43P drastically improves the utility of the 43 in measuring power levels of SSB signals. For instance, in average-reading mode, the 43P indicates only about 200 W output (with a 1-kW element) from my 2-meter amplifier, but when I switch the 43P into peak-reading mode, the output indication heads right up to the 500-W level, near the maximum linear output for that amplifier. Used on key-down CW signals, of course, the 43P reads the same in its PEP- and average-reading modes.

No modifications to the meter's case are required before installing the 4300-400 peak-reading conversion kit in a 43, making conversion of a 43 to a 43P appealing. The conversion kit costs about $95. (There's no simple way to clone the peak-reading circuit, either: All the electronics, less a few diodes and other discrete devices, are sealed in a black blob.)

Bird's 43-series wattmeters share a couple of features that are worth noting. One such feature is a line section (the part of the meter in which the elements mount) that can be removed from the meter case, to facilitate remote mounting of the line section. A shielded cable (RG-58) carries coupler signals from the line section to the meter. The 43-series meters are also equipped with quick-change connectors (which allow rapid and easy changing of the connectors mounted to the meter case; they don't affect the ease of cable-changing). Quick-change connectors are available in a variety of types, including male and female UHF, N, BNC, HN, TNC and others.

Summary

If you're looking for a directional wattmeter that will serve you well for years to come, and you don't mind the rather high cost of elements to make measurements possible over the range of frequencies and power levels at which you operate, the 43P is a great value. This is especially true because when you buy a Bird 43, you're buying a piece of laboratory-grade test gear. Considering that the 43P uses the same elements as the 43, and is otherwise compatible with the 43 in every way, the higher initial cost of the 43P is pretty easy to justify for the utility that peak-reading capability affords. For those of you who already own a 43, conversion to the 43P's capabilities is also reasonable, although pricey.

Price class: Bird 43P, $295; 4300-400 retrofit kit (converts 43 to 43P), $95; elements, $55 to $95 each, depending on frequency and power-measurement range. Manufacturer: Bird Electronic Corp, 30303 Aurora Rd, Solon, OH 44139-2794, tel 216-248-1200.

CUSHCRAFT 225WB 220-MHz YAGI

Reviewed by Mark Wilson, AA2Z

Cushcraft's initial VHF "Boomer" antenna lineup included two Yagis for 144 MHz—a 3.2-λ, 19-element job and a shorter 15-element "Junior Boomer." Only one 220-MHz Boomer was offered, though, and it was a *long* antenna (almost twice as long as the 225WB). Last year, Cushcraft filled the need for a shorter 220-MHz Yagi with the 15-element 225WB. Think of the 225WB as a Junior Boomer for 220 MHz. With a 10-foot boom (and no boom brace), the 225WB can be added to a crowded VHF antenna mast or be taken on portable operations. It's designed to cover the entire 220- to 225-MHz range, so it can be mounted vertically for FM-voice and/or packet-radio operation.

Construction

Inside the shipping container, the elements were securely bundled together, and the hardware was packaged in sturdy plastic bags. Cushcraft provides first-class hardware with this antenna. The nuts, bolts and lock washers are all stainless steel.

All parasitic elements are made from 3/16-inch aluminum rod. These elements are secured to the boom with no. 8 machine screws and aluminum brackets. The 225WB has three reflector elements in the classic Cushcraft "trigon" configuration. The driven element is made from ½-inch tubing, and a T match with a ½-λ balun is used to match the antenna to 50 ohms. A female UHF connector is provided for attaching the feed line.

The 10-foot boom is made from a 48-inch piece of 1-1/8-inch-diameter tubing with 48-inch lengths of 1-inch-diameter tubing telescoped in the ends. The aluminum boom-to-mast bracket and plated-steel U bolts will accommodate masts up to 2 inches in diameter.

It takes about two hours to assemble the 225WB. The job is eased by the fine machine work done at the factory. All holes had been deburred, and everything lined up well. The instruction manual is one of the best I've seen. In addition to clear, well-written instructions, the manual features detailed assembly drawings and an illustrated parts list.

On-the-Air Performance

The 225WB got its first workout during the September 1989 VHF Contest at W1XX/3 in grid square FN00 in Western Pennsylvania. In planning our expedition, we decided to erect separate vertically polarized antennas for FM operation. A pair of 225WBs seemed ideal for this purpose because they are relatively small and are designed to work over the entire band. Although we worked only a handful of stations on 223.5-MHz FM during the contest, the highlight was a contact with Rus Healy, NJ2L. [*Who?—Ed.*] Rus was set up on a mountaintop more than 300 miles to the east of us and was using 10 watts and a mag-mount vertical! (He was set up better on the other bands!)

After the contest, I installed the 225WB on my 100-foot tower at home (horizontal polarization this time, for weak-signal work at the bottom of the band). It has a clean pattern, which is helpful for attenuating strong local signals. On all but the weakest signals, there was little practical difference between the 225WB and the 30-foot-long 220-MHz Yagi it replaced.

The 225WB is a versatile antenna and a solid performer. It's just the right size for portable or fixed-station operation, and can be installed for vertical or horizontal polarization.

Price class: $95. Manufacturer: Cushcraft Corp, 48 Perimeter Rd, Manchester, NH 03108, tel 603-627-7877.

UPI COMMUNICATION SYSTEMS CLIMBING-SAFETY BELT

Reviewed by Rus Healy, NJ2L

When it comes to climbing safety, there is *no* room for error. One bad step or unanticipated equipment failure can mean *the* end, so your climbing-safety gear must be many times stronger than you ever expect to need it to be. UPI Communication Systems has been selling safety belts for some time, and they are one of the few regular Amateur Radio-magazine advertisers of climbing-safety equipment. Plus, UPI's prices are reasonable.

You can buy a lineman's belt, tool pouch, hard hat and other requisite climbing gear from any of several industrial outfitters and suppliers, but most of these dealers don't cater to individuals, and their prices are generally substantially higher than UPI's.

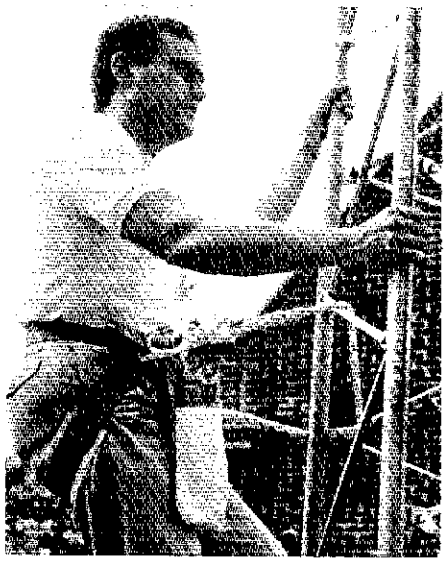
Is UPI's climbing-safety gear a good deal, or do their prices reflect a shortage in quality and durability? In my opinion, UPI's belts are good—but not great. They're a good value for the money, and will serve you well in the long run if you perform a little preventive maintenance and regular before-use inspections. My reservations about UPI's belts are relatively minor (I'm picky about some little things, as you'll see).

Table 2

Cushcraft 225WB 220-MHz Yagi

Manufacturer's Claimed Specifications	*ARRL Evaluation*
Frequency of operation: 220-225 MHz.	As Specified
Longest element: 26.3 in.	As Specified
Boom length: 10 ft.	As Specified
Weight: 5.25 lb.	As Specified
Turning radius: 70 in.	As Specified
Wind surface area: 0.95 sq ft.	Not Measured
SWR: 1.2:1 typical.	As Specified

UPI offers two versions of the same basic belt: one with only a hip belt, and one with a hip belt and with a fanny strap that serves as a seat. The fanny strap does much to increase comfort on those long tower jobs by distributing your weight over about twice the area of a hip belt alone. I reviewed the belt with the fanny strap, and I recommend such a belt to anyone who expects to spend more than a few minutes at a time on a tower, and to everyone who's not at or very near the ideal weight for his or her frame.



Construction

The belt's materials are sturdy and well assembled. The two **D** rings for the safety rope are heavy cast steel, and the safety rope itself is ½-inch-diameter nylon spliced to a steel clip (for attachment to the belt). The belt is made of a strong nylon-web material with heavy cotton-web reinforcements on the load-bearing areas (where the belt contacts your body), and is adequately stitched.

Many climbing belts are equipped with safety ropes or straps that can be detached from the belt's rings at both ends, but the UPI belt's strap is permanently connected to one of the belt's **D** rings, and to the clip at the other end, by means of eye splices in the rope. The rope splices are protected from the ring and clip by thin plastic thimbles. (The surfaces of the **D** ring and clip on which the rope bears are smooth, but are thinner than the rope's minimum bending radius; the plastic thimbles serve to increase the rope's bending radius.)

The eye splices in the rope look secure, but they're not as solid as I'd like. By twisting the rope slightly (by hand), I was able to begin to unravel the splices. This is not to say that the splices are likely to come undone under load, but I'd be more comfortable with a more solid rope-end-securing method, or some form of ensuring that the splices *cannot* come undone. Only one end of the rope can be detached from the belt—the other end is permanently spliced to the **D** ring.

The 32-inch (splice to splice) safety rope supplied with the belt is too short. It is *just* long enough to go around Rohn 25 tower (12½ inches on each face), and is not long enough to allow for adequate movement range while you're hooked around such tower. The rope is not long enough to go around Rohn 45, nor around the lower sections of most free-standing towers. When you're hooked onto a tower, though, you can choose the way you attach the rope to provide maximum flexibility.

I like to hook the safety rope around the tower while I'm climbing, which is simply impossible with this rope. A longer safety rope—that's detachable at both ends—would be welcome. (Longer safety ropes are available from UPI by special order.)

The UPI belt has one feature that many belts do not: it fits waist sizes between about 30 and 46 inches (larger sizes are available by special order). This has both good and bad implications; the belt fits a lot of people, but its buckle is a continuously adjustable friction type, and thus initially appeared to be more prone to slippage than a belt with the more common pin-through-a-hole-over-a-bail retention method. Good news, though: My reservations about the closure method were not substantiated during the review period. The buckle works just fine. I've also learned that this closure method is standard on many types of climbing-safety gear, such as rock-climbing harnesses. There is a statement appearing in the instruction manual that concerns me, though: "Repeated buckling and unbuckling causes heavy wear." I haven't seen any signs of heavy wear in the six months over which I've used this belt, so I suppose that statement is a conservative warning that applies more to daily safety-belt users than to us weekend-warrior, tower-climbing hams.

One of the UPI belt's features that I initially found unsettling is the way that the belt is attached to the **D** rings. In the fanny-strap-equipped version, the hip and fanny belts are a continuous 1-7/8-inch-wide strap (with 3-inch-wide cotton-web reinforcement) that runs through both **D** rings. This construction method allows the belt to travel through the **D** rings slightly while you're strapped into the belt. Fortunately, though, when you strap the belt onto a tower, the load that your body places on the belt is transmitted to the tower through the **D** rings and the safety rope such that the rings don't move at all with respect to the belt when they're bearing your weight.

The small instruction sheet supplied with the UPI belt does not go into much detail. In fact, it provides very little useful information to the inexperienced climber. The sheet basically explains the features of the belt, and includes care information and—most importantly—inspection instructions. It is not particularly well written or organized. This is a minor point, but it's one of some concern to me. I feel that each new or prospective tower climber should be educated about the safety concerns related to tower work, and to the proper procedures to use in such work. See the references at the end of this review for more on these subjects.

The Tool Pouch

UPI's optional tool pouch costs $15.95. It is made of a heavy, coated-nylon material, and is hefty enough to hold several tools. The pouch is not large; I'd say that its capacity is around ½ gallon. That's enough for a few tools that I commonly use in tower work, but the pouch isn't as large as I'd like.

The pouch has a single seam at the bottom, and a pleat on one side. When heavy tools are in the bottom of the pouch, they can't be seen without holding the bag open at the top by hand. A rigid bottom, or a reinforced one with two seams (like a grocery bag), would make this pouch more ergonomically acceptable.

The tool pouch attaches to the belt via two 1-7/8-inch-wide flat nylon-web-loop straps, so the pouch must be attached to the belt *before* you put the belt on. This is somewhat inconvenient, but isn't a major detriment. What *is* a major problem is that the pouch hits you in the crotch as you climb a tower with the belt on and with a pouch full of tools! This may not be much of a problem for women, but for men, it's simply intolerable. Another serious problem with this pouch is that it's easy for tools to fall out of the pouch while you're climbing; again, unacceptable.

I'd prefer a deeper, removable tool pouch—with a clip—that can be hung from the tower when you reach the location of the work (so that you don't have to bear the weight of the tools while you're working). Because it's not safe to clip anything other than the safety rope to the **D** rings intended for that purpose (other clips can foul the operation of the safety-rope clips), another ring attached to the belt for the tool container is a must. In sum, the tool pouch seems expensive for what it is, and a bit of shopping can probably net you a better alternative.

Summary

If you feel as strongly as I do about tower-climbing safety, you'll want to buy a climbing-safety belt that is made of first-class materials and with good construction techniques. UPI Communication Systems belts meet these qualifications, and are reasonably priced. That's only half the climbing-safety story, though: There's no substitute for an informed and educated climber. Be sure to check out the references at the end of this review *before* heading up a tower for the first time, and *always* use common sense. If you have questions, get the answers from an experienced climber before you attempt any tower work.

Price: safety belt with fanny strap, $89.95; belt without fanny strap, $74.95; tool pouch, $15.95. Manufacturer: UPI Communication Systems, Inc, PO Box 886, Saddle Brook, NJ 07662, tel 201-368-3655.

Thanks to Mark Wilson, AA2Z, for his help with this review.

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G. Hall, ed, *The ARRL Antenna Book*, 15th ed, (Newington: ARRL, 1988), Chapter 1.

K. Kleinschmidt, ed, *The 1990 ARRL Handbook* (Newington: ARRL, 1989), Chapter 37.

Hints and Kinks

Conducted By David Newkirk, AK7M
Assistant Technical Editor

A 12-V DC POWER SYSTEM FOR FIXED-STATION USE

☐ The 12-V power system that we now use in our shack was created like many other projects—the need finally overwhelmed the laziness. My father (Ed Kabak, KA3DRD) and I share the same shack. After many years, we had accumulated many rigs, but never enough power supplies to operate them. The most direct solution would have been to buy more supplies, but this has certain disadvantages: Power supplies are costly in quantity, especially supplies capable of operating high-power transceivers, and are unusable during mains-power failures.

We assembled our present power system (Fig 1) after carefully considering our options. It was somewhat costly and time-consuming to build, but its payoff is smoother operation of our ham shack. We no longer waste time trying to "find the power" for each of our 12-V-dc-powered rigs. Each rig now has a permanent position and a permanent power feed. We also have uninterrupted power when commercial power is lost, with no switching circuitry. The system is intended to be used in a reasonably permanent installation; we have lived in the same location for many years.

Most of the Fig 1 components are housed in the bottom of a 5-ft-high, 19-inch-wide rack. For energy storage and power-supply time averaging, we use an automobile battery (BT1) retired from service in my car. It's connected as if it's a power supply: It has an isolation switch (S1, **BATTERY OFF**) and is externally fused. BT1 is located external to the rack because of space limitations and the possibilities of acid spills and gas buildup if the battery is charging. (Automotive lead-acid cells must be handled with care because of their acidic electrolyte and their ability to source dangerously high currents when shorted.) The advantage in using an old auto battery is its low cost (its trade-in value when you have to buy a *new* battery), its relative simplicity, and its large energy-storage capacity. We can operate our station for several hours without commercial power; how long depends on exactly how much transmitting we do. Higher battery capacity

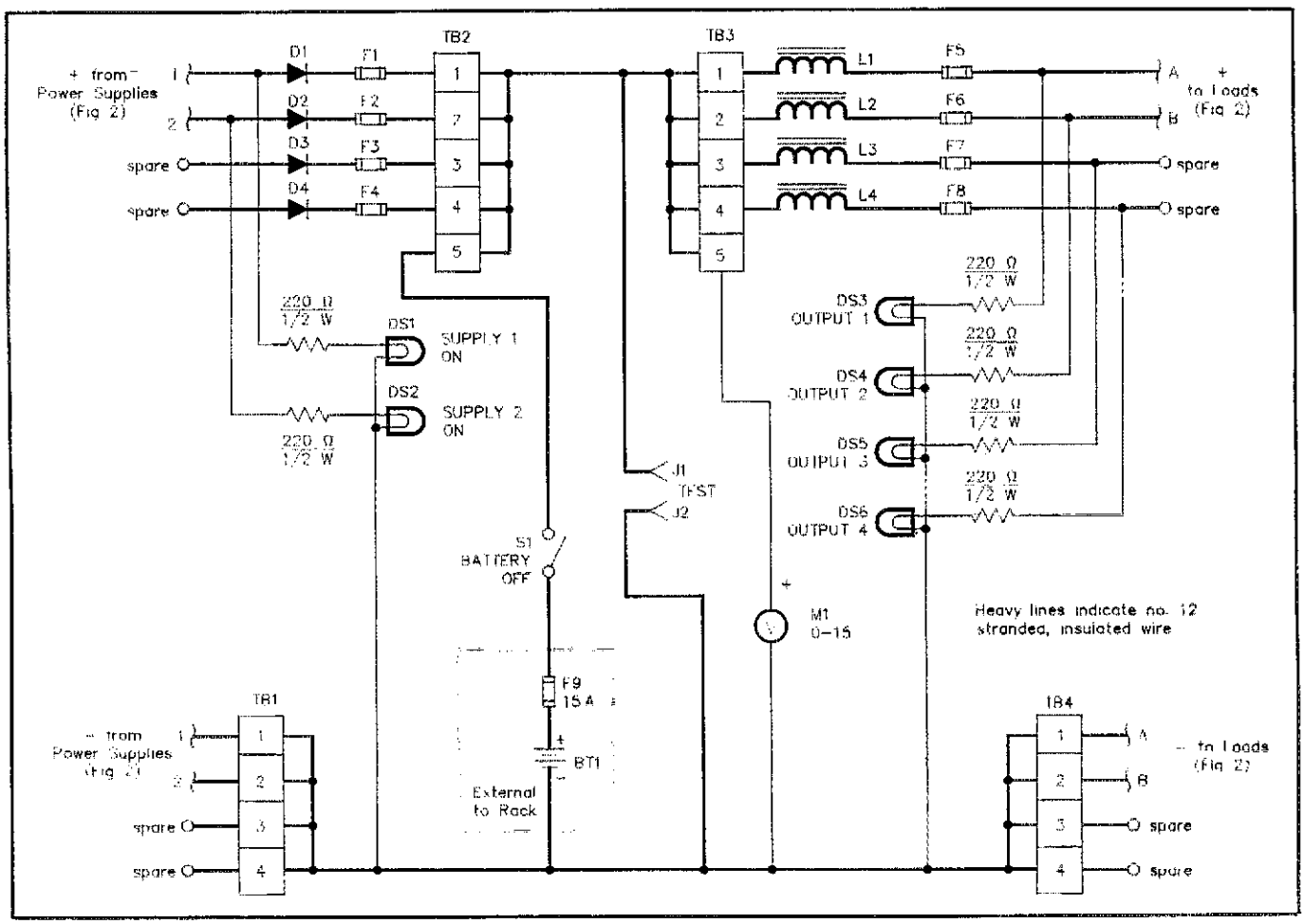


Fig 1—Schematic of the 12-V dc power system. Except for the components shown in the screened box, this circuitry is housed in an equipment rack. See text and Fig 2.

BT1—Used, 12-V lead-acid automotive battery.
C1, C2—0.1-μF, 50-V, disc-ceramic capacitor (Radio Shack® no. 272-135).
D1-D4—Power-rectifier diode capable of safely handling load current, 15 A minimum.
DS1-DS6—12-V, high-brightness, incandescent-lamp assembly (RS no. 272-331).
F1-F8—Dc fuse rated to provide protection at the bus load current.
J1, J2—Nylon binding post (RS no. 274-662).
L1-L4—Approximately 100 mH, 10 A: As many turns of no. 12, insulated, stranded wire as can be wound on a snap-together, toroidal choke core (RS no. 273-104).
M1—0-15 V dc voltmeter (RS no. 270-1754).
S1—SPST toggle switch, rated at 20 A or more at 12 V (or more) dc.
TB1-TB4—Heavy-duty barrier strip with no. 8 screws.
F1-F8 are held in four-position fuse blocks (RS no. 270-742).

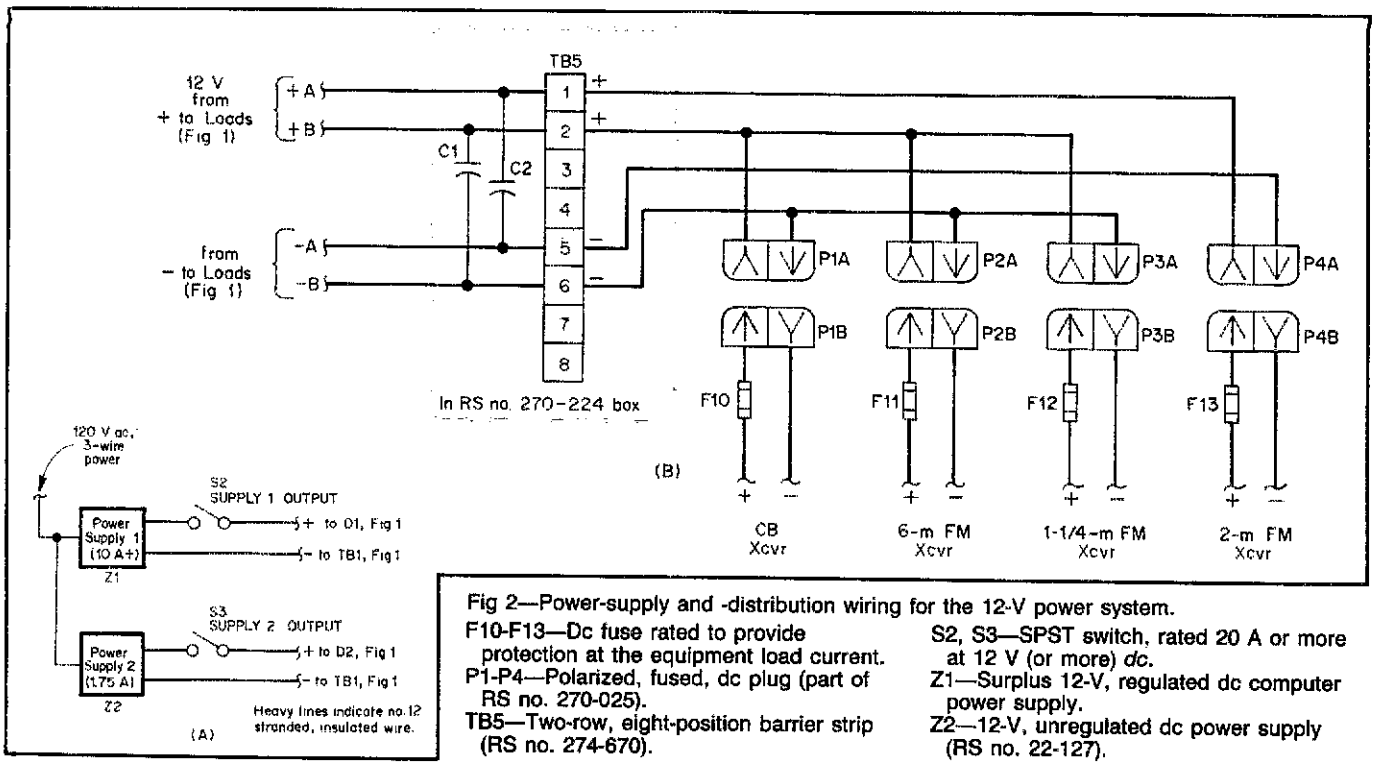


Fig 2—Power-supply and -distribution wiring for the 12-V power system.
F10-F13—Dc fuse rated to provide protection at the equipment load current.
P1-P4—Polarized, fused, dc plug (part of RS no. 270-025).
TB5—Two-row, eight-position barrier strip (RS no. 274-670).
S2, S3—SPST switch, rated 20 A or more at 12 V (or more) *dc*.
Z1—Surplus 12-V, regulated dc computer power supply.
Z2—12-V, unregulated dc power supply (RS no. 22-127).

translates into more operating time, of course.

A plastic utility box (represented by the shaded line in Fig 2) serves as a distribution panel local to the individual rigs. Each distribution circuit is limited to 10 A, maximum, and the circuit fuses (F5-F8, Fig 1) are located in the rack, with a pilot lamp (DS3-DS6, Fig 1) on each to indicate that output circuit power is available. (We used pilot lamps, but if power consumption is a factor, LEDs can serve as indicators.) Each rig's power plug includes an in-line fuse (F10-F13, Fig 2) of the appropriate rating in its positive lead. These in-line fuses allow each rig to be moved elsewhere (such as into mobile use) accompanied by its fuse. For this purpose, we selected a fused connector assembly (Radio Shack® no. 270-025) that is simple, sturdy, and polarized. All of our 12-V rigs now use this same connector.

The power supplies (Power Supplies 1 and 2, Fig 2) are connected so that they can be enabled or disabled at any time with little impact on the system. Each supply must have internal protection—fuses, circuit breakers, crowbars or other protective circuitry—and is connected to the bus via a switch (S2 and S3, Fig 2), an isolation diode (D1-D4, Fig 1), and a fuse (F1-F4, Fig 1) in the rack. The rack fuses provide additional protection, and the combination of the diodes and supply-output switches allow the power supplies to be connected to or disconnected from the power bus at any time. The diodes are *necessary*; they prevent current flow back into a turned-off supply—especially important when the power fails. Pilot lamps (DS1 and DS2, Fig 1) indicate that power is being fed to the bus. We match the power-supply output voltages (the output voltage of one supply is adjustable). The isolation diodes allow a variety of different power sources to feed the bus at the same time—all of those creative Field Day ideas can now follow you home!

We use Power Supply 2 to keep BT1 charged, or when we have only small loads operating. Supply 2 is capable of sourcing 1.75 A and is frequently left on line, but is occasionally turned off when the system is unloaded and the battery is fully charged. Our present Power Supply 1 is a much larger, regulated, surplus, computer power supply, and is only brought on-line during transmitter operation. We shut it down when we're not using our rigs, or when the rigs are on but we don't intend to transmit. With both supplies on line—that is, operating in parallel—much more current is available than our transceivers require in receive, and the battery does not supply current; if necessary, it can charge during these periods. As the load on the system increases beyond the capacity of the supplies, the battery provides the balance. This arrangement allows us to time-average the power from smaller supplies, rather than buying large-capacity power supplies just to meet the transmitters' instantaneous current drain. The battery normally remains connected to the bus at all times, so a power failure disables only the supplies. In such a situation, the battery supplies all of the current. With external power available, the battery takes current from or supplies current to the bus as needed.

The only routine maintenance the system requires is an occasional check of the supplies, batteries and other components; routine voltage monitoring—especially after any changes are made in the system; and routine testing of the system's emergency capability by shutting the power supplies off. Usually, a few hours operating independently of the mains is enough to prove the system's soundness.

Before building a system similar to this one, consider your power needs and priorities. Our system is a compromise between cost, flexibility, current-handling capability at various points in the system, and battery capacity. I encourage that you thoroughly read Chapter 6, Power Supplies, in *The 1990 ARRL Handbook*. It explains the power-supply basics and contains good information on batteries.

Many good power-supply and battery-charger schematics have been published; we decided to keep our system simple and take a more brute-force approach. Our power-supply system is very much like that in an automobile: It's relatively foolproof, but it requires more operator attention—especially to voltage levels—than a smart system. Most "12-V" gear should not be operated below 10.5 or 11.0 V, nor above 15 V, for instance; we monitor this manually, but a voltage-warning alarm, and low-voltage shut-off circuit, are features that may be worth adding.

In our daily operating, we have come to rely on this system. It's intentionally easy to operate, simple and flexible. We built it specifically for our ham shack, but it can be modified as our needs change. We also have sufficient spare capacity to add our future hamfest conquests to the system!

—Edward R. Kabak, N3AZE, 551 Arch St, Royersford, PA 19468-2530

NOTES ON BAND-SCOPE OPERATION WITH THE KENWOOD SM-220 STATION MONITOR

☐ I enjoy using the SM-220 station monitor very much. I have, however, found a few rough edges in its operation as a panoramic display.[1] Here are my observations and several suggested solutions.

Using the SM-220 with the TS-830S Transceiver

Plugging the SM-220 cable into the TS-830's **IF1** IF-output jack causes all received-signal levels to drop by about 3 dB. This occurs because connecting the '220 increases the load on the TS-830's 8.83-MHz IF amplifier. I solved this problem by installing a 510-Ω resistor in series with the center conductor of the coaxial cable between the TS-830S and the SM-220. Install the resistor inside the TS-830S as follows: Remove the transceiver's top cover. Unsolder the coax lead to the center pin of the '830s rear-panel **IF1** jack. Install the resistor between the connector pin and the cable center conductor. Reinstall the TS-830's top cover. I found that this change does not detune the IF transformer associated with **IF1** (L2 on the TS-830's IF Unit).

Using the SM-220 with the TS-940S Transceiver

Used for Band Scope operation with the TS-940S, the SM-220 sometimes displays ghost signals that are apparently very strong—but which are inaudible in the TS-940S! (As a result, the many strong shortwave-broadcast signals in the 15-MHz range severely compromised the display's usefulness at 14 MHz.) Turning on the TS-940's 100-kHz calibrator generated markers every 100 kHz and a ghost signal about 10 kHz lower than each legitimate marker. Investigation revealed that each of these ghosts was associated with a strong signal 910 kHz higher than the transceiver operating frequency. (I verified this with a signal generator.)

The TS-940's **IF1** output is heavily damped by a 56-Ω resistor across the signal source connected to the **IF1** jack. The bandwidth of the '940's 45.05-MHz, first-IF amplifier is so wide that signals significantly far from the IF center are present at the **IF1** jack. (A filter later in the TS-940's signal path removes these so they do not affect reception of desired signals with the TS-940S. They appear in the TS-940's **IF1** output, however, and cause image responses [910 kHz removed from the desired signal] when heterodyned to 455 kHz [2 × 455 = 910] in the SM-220.)

The heavy loading on the **IF1** line in the '940 severely damps the input tuned circuit (T201) in the SM-220, lowering its Q and making it too broad-band. The solution: Install a 24- or 27-pF capacitor in series with the center conductor of **IF1** cable between the TS-940 and SM-220. Next, retune T201 (see the SM-220 manual) to peak a calibrator marker near the display's center frequency. Use a plastic or wooden tuning tool. (Because the slot in T201's core is tiny, you'll probably need to shape the tuning tool to a small, chisel point about 1/16 inch wide.) With the capacitor in place, T201's peak is considerably sharper than in an unmodified SM-220, but is sufficiently wide to allow proper display in the SM-220's ±100-kHz mode.

Modified in this way, my SM-220 displays ghosts of only the very strongest 15-MHz stations. Ghosts that occurred on other bands, and those produced by the TS-940's 100-kHz calibrator, are unnoticeable or unobjectionable in the presence of normal band noise.

Some further comments: Although a 24- to 27-pF capacitor should suffice to reduce the loading on T201, you may need to experiment with the value of this capacitor. Too much capacitance fails to eliminate the images; too little capacitance reduces the amplitude of the displayed signal.

I suspect that further improvement of this image-reduction fix could be made by replacing the TS-940's on-board **IF1** damping resistor with one of a higher resistance. When my TS-940S is out of warranty, I'll probably try this. Meanwhile, I'd appreciate hearing from anyone who tries this.—*Charles J. Michaels, W7XC, 13431 N 24th Ave, Phoenix, AZ 85029*

[1]A *panoramic display* (Band Scope in SM-220 terminology) is a cathode-ray-tube (CRT) display of received signals in terms of frequency (on the X, or horizontal axis, of the display) and amplitude (on the Y, or vertical axis, of the display). Panoramic displays intended for on-the-air use—such as the SM-220 in its Band Scope mode—are generally arranged so that the receiver's operating frequency (the frequency shown on the receiver's digital display) appears at the exact center of the X axis, with signals below and above the operating frequency appearing to the left and right of the operating frequency, respectively. General-purpose panoramic displays capable of being hooked to an Amateur Radio receiver or transceiver are usually usable for little more than checking band activity and noting the relative amplitude of signals on a small segment of an amateur band. Laboratory-quality panoramic displays called *spectrum analyzers* are usually calibrated accurately enough to measure relative and absolute amplitude and frequency characteristics of displayed signals over a wide range of frequency spans. Chapter 25 of *The 1990 ARRL Handbook*, Test Equipment and Measurements, covers spectrum analyzers in detail.—*AK7M*

AK7M: Because the SM-220 contains a CRT and operates from the 120-V ac mains, portions of its circuitry operate at dangerous ac and dc levels. Don't attempt to modify a plugged-in SM-220, don't work on an unplugged SM-220 until its power-supply filter capacitors have discharged, and make "live" adjustments only after taking the precautions specified by Kenwood in the SM-220 documentation.

MORE SM-220 MODIFICATIONS

Automatic Trace Shift During Band Scope Operation

☐ The SM-220's display is most useful in its Osc/RTTY and Moni/Trap modes when centered vertically on the display graticule. In the Band Scope (panoramic-adapter) mode, though, the display is more useful when repositioned two scale divisions below center. This provides more room for display of signal amplitude. A one-resistor modification can provide this shift—when you set the SM-220's **FUNCTION** switch to **BAND SCOPE**, or automatically if you've modified your SM-220 as per Wade A. Calvert's "Automatic TR Switching for the Kenwood SM-220 Monitor Scope" (*QST*, Nov 1988, pp 24-27).

See Fig 3. On the foil side of the SM-220's main PC board, solder one lead of a 1-kΩ, ¼-W resistor to the junction of R126 (220 Ω) and VR103 (500 Ω, the **V.POS** control). Solder the other resistor lead to pin 1 of P103. To avoid short circuits, slip insulating tubing over the resistor leads before soldering.

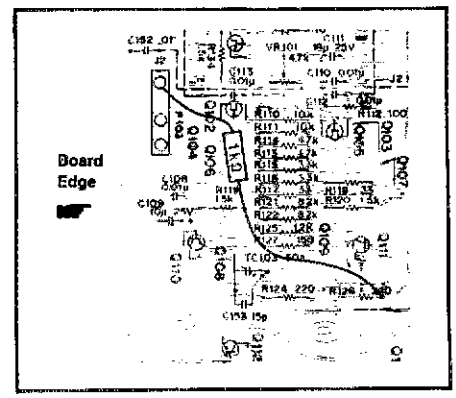


Fig 3—Eldad Benary added Band Scope display shift to his SM-220 Station Monitor by installing a 1-kΩ, ¼-W resistor on the SM-220's main PC board as shown here. See text.

Curing Horizontal Shrinkage of the Band Scope Display

The SM-220's horizontal trace shrinks when its **SYNC/MKR** switch is set to **INT/OFF**. This shrinkage does not occur when **SYNC/MKR** is pressed to **EXT/ON**, but then the Band Scope marker comes on, masking signals at the display's center.

To solve this problem, remove the SM-220's top cover. The **SYNC/MKR** switch is a DPDT unit. The side of the switch with two wires controls the marker; the other side of the switch—with three wires—switches the sync. Disconnect the two outer wires on the sync side of the switch, transpose them, and reconnect them in their transposed positions. Now, you can enjoy shrink-free Band Scope operation with the SM-220. With this modification in place, the functions of the **SYNC/MKR** switch are **EXT/OFF** (out) and **INT/ON** (in).

Calibrating the SM-220's Band-Scope Display

If you adjust the SM-220's ±20 kHz scan width to ±25 kHz, you'll have a very convenient 5 kHz/div scan that simplifies estimation of signal spacing. See pp 18-19 of the SM-220 operating manual, or p 22 of the SM-220 service manual, for how to adjust the SM-220's scan width and display center frequency. The ±20 kHz scan width can be adjusted to ±25 kHz by adjusting the ±100 kHz control (TC201). (This does not much degrade the limited accuracy of the ± 100 kHz range.) Alternatively, installing a 330-kΩ, ¼-W resistor (this value may require experimentation) in parallel with R245 (68 kΩ) on the BS-8 (or BS-5) module should accomplish the same thing.

Quieting an SM-220 Equipped with WA9EZY's Automatic TR Modification

After installing WA9EZY's SM-220-TR-switching modification (*QST*, Nov 1988, pp 24-27), I quickly became annoyed with its relay noise. I use VOX most of the time, and a relay clicking on every TR transition is an unwelcome side effect to a very nice operating convenience. The solution is simple: I replaced the WA9EZY-modification relay with a reed relay.

If you cannot find a 3PDT reed relay (I couldn't), don't despair. You can use three SPDT, or one DPDT and one SPDT, or two DPDT, relays. If you don't have these in your junk box, get them from Digi-Key,® Radio Shack or other suppliers. The combined coil resistance of the added relays should be 200 Ω or more (12-V, SPDT reed relays usually have coil resistances around 1 kΩ; 12-V, DPDT reed relays usually have coil resistances around 500 Ω).

Twelve-volt reed relays generally pull in at about 8 V and up, so you can connect two 12-V, or three 6-V, relays in series and supply their solenoids from the unfiltered +20 V available at the positive terminal of C143, a 220-μF, 25-V electrolytic capacitor in the SM-220's low-voltage power supply.

One of two approaches can be taken to quiet the SM-220's built-in relay, RL101:

(1) Install a 180-Ω, ¼-W resistor in series with, and a 100-μF, 10-V electrolytic capacitor in parallel with, RL101's coil. You can install these components under the PC board and near the relay—the resistor, by cutting the copper trace between D101 and the RL101 solenoid, and soldering the resistor across the cut; the capacitor, by installing it across the solenoid-terminal pads, with its negative lead to ground.

(2) If you want to silence RL101 completely, replace it with a 12-V, SPDT reed relay. You can remove RL101 from the board by desoldering its leads with desoldering braid and working it loose from the board. There's enough space underneath the circuit board for a reed-relay RL101 substitute.—*Eldad Benary, NZ2F, 7510 George Sickles Rd, Saugerties, NY 12477*

AK7M: See the caution at the end of W7XC's SM-220 item, above.

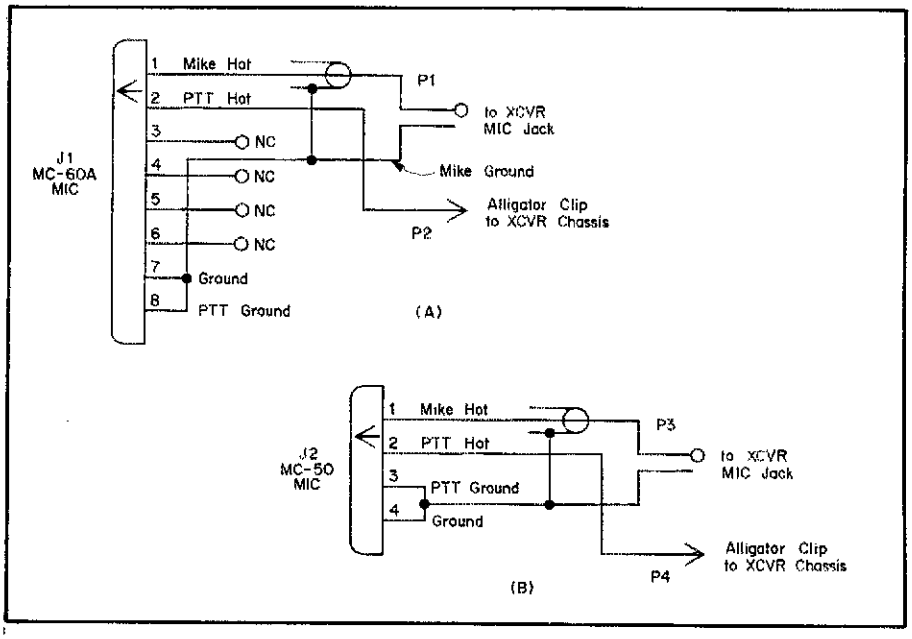


Fig 4—Maurice Sasson connects his desk mikes to his hand-held transceiver with the adapters shown here. These pinouts are correct for Kenwood MC-60A (A) and MC-50 (B) mikes; mikes of other manufacture may require different pin connections. Radio Shack carries the four-pin male jack (J2) called for at B (no. 274-002). The eight-pin mike jack (J1) required at A may be considerably harder to find, though; Amateur Electronic Supply, for one, carries such connectors under the part no. CBC-8P. P1 and P3 are 1/8-inch-diam phone plugs; P2 and P4 are alligator clips.

USING DESK MIKES WITH THE KENWOOD TR-2500 AND OTHER TRANSCEIVERS

☐ The MC-60A and -50 microphones, and many other desk mikes intended for use with Amateur Radio transceivers having four- or eight-pin mike connectors, can be used with the TR-2500 and other hand-held transceivers by installing a simple adapter in the mike line. This is especially convenient for fixed-station operation because desk mikes generally allow "lock-to-talk" operation that hand-helds' PTT buttons don't.

The adapter (Fig 4) consists of a four- or eight-pin male mike jack, a suitable length of mike cable, a piece of insulated, stranded hookup wire the same length as the mike cable, a miniature phone plug (to match the hand-held's mike jack) and a small alligator clip.

Wire the adapter as shown in Fig 4 and wind the ground wire around the mike cable. Attach the alligator clip to the transceiver chassis ground at the rig's antenna jack or carrying-strap bracket. If your transceiver ground is common to that of your MF/HF station, you can connect the alligator clip to any station ground terminal. If you use an external speaker with your hand-held, you can connect the adapter ground wire to the speaker ground terminal.

Once you've installed the adapter, try setting the mike to its various output impedances (if it affords a choice) to discover which impedance produces the best transmitter audio with your hand-held transceiver. If the mike has a built-in preamplifier, try switching it on and off to see which configuration provides the best transmitter audio.—*Maurice I. Sasson, MD, W2JAJ, 75 Gail Dr, New Rochelle, NY 10805*

New Products

CODE-TEST-PREPARATION TAPES FROM RADIO SCHOOL

☐ Gordon West's Radio School has announced Morse code practice tapes aimed at those preparing for ARRL-VEC-administered Morse code exams. These Radio School tapes use the Farnsworth technique: CW characters spaced farther apart than their usual rate (ie, 18 WPM characters with an overall code speed of 13 WPM). The tapes are available from local dealers and from Radio Amateur Callbook, Inc, 925 Sherwood Dr, Lake Bluff, IL 60044, tel 312-234-6600. For more information, contact Gordon West's Radio School, 2414 College Dr, Costa Mesa, CA 92626, tel 714-549-5000—*Rus Healy, NJ2L*

Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Associate Technical Editor

MORE ON CALCULATING WIRE DIAMETER

☐ The item in June 1989 *QST* on calculating wire diameter by computer is interesting.[1] There's another way to calculate wire diameter that doesn't require the use of a computer. Just remember the following:

- The resistance of no. 10 AWG wire is very close to one ohm per thousand feet.
- The diameter of no. 10 AWG wire is very close to 1/10 inch.
- Wire resistance doubles for every third wire number, and increases by a factor of ten for every ten wire numbers. (For instance, no. 16 AWG has a resistance of four ohms per one thousand feet, and no. 20 AWG wire has a resistance of 10 ohms per one thousand feet.)
- Wire diameter halves for every six wire numbers and decreases by a factor of ten for every 20 wire numbers. (No. 16 AWG wire is 0.05 inch in diameter; no. 30 AWG wire is 0.01 inch in diameter.)

With these four facts, you can generate the entire AWG copper wire table from no. 36 to no. 000 without a calculator, to the absolute amazement of your fellow hams! I learned this from Dr Malcomb R. P. MacPhail at Rice University. This information is also published in Giacoletto's *Electronic Designer's Handbook*.[2]—*Timothy L. Bratton, K5RA, 721 Parkview Circle, Richardson, TX 75080*

☐ I can certainly relate to Allen Harbach's problem of calculating wire diameter (see note 1). After working with magnet wire for many years, I, too, wanted to develop formulas that could be used as a subroutine in computer programs or as a stand-alone reference.

I used the slide rules provided by several wire manufacturers to determine that the circular mil area (CMA) changes by a factor of two for every three wire-gage numbers. Therefore, the change for one wire gage is the cube root of 2. Because the wire diameter is the square root of the CMA, it changes as the sixth root of 2 for each gage number, or about 1.123 as Mr. Harbach states.

In order to minimize the errors throughout the range of wire gages 10 to 44, I now use the cube root of 2.005 and 105515 CMA (for wire gage 0) as the basis of all calculations. Once the CMA has been calculated, the bare-wire diameter and resistance in ohms per foot can be derived.

[1]A. Harbach, "Calculating Wire Diameter," Technical Correspondence, *QST*, Jun 1989, p 46.
[2]L. Giacoletto, *Electronics Designers' Handbook*, 2nd ed (New York: McGraw-Hill, 1977), pp 3-110 to 3-111.

Table 1

Formulas for Calculating Wire Parameters

Using the US system of measurement:

CMA = 105515 ÷ ($2.005^{[gage + 3]}$)
bare wire diameter (in) = $CMA^{0.5}$ ÷ 1000
resistance (in ohms/ft at 68 °F) = 10.37 ÷ CMA
insulation thickness (in) = 0.0025 ÷ ($[1 + (gage \div 840)]^{gage}$)
total diameter = bare wire diameter + insulation thickness
turns per linear inch = 1 ÷ total diameter
gage = (log [0.32483] − log [bare wire diameter]) ÷ log 1.1229

If you're using the metric system, these formulas apply:

bare wire diameter (mm) = $CMA^{0.5}$ ÷ 39.37
resistance (ohms per meter at 20 °C) = 34.022 ÷ CMA
insulation thickness (mm) = 0.0635 ÷ ($[1 + (gage \div 840)]^{gage}$)
turns per linear centimeter = 10 ÷ total diameter
gage = (log [8.2507] − log [bare wire diameter]) ÷ log 1.1229

Insulation thickness is a function of wire diameter, increasing as the wire diameter increases. The expression I use to calculate the insulation thickness is shown in Table 1. Because one usually deals with diameter rather than radius, the formula is structured to include a factor of 2.[3] The value determined must be added to the bare-wire diameter to obtain the total diameter of the insulated wire.[4] When the total diameter is known, the turns per linear inch can be calculated. (These insulation-thickness and total-diameter calculations are valid only for *single-layer* insulation.)

Mr Harbach's formulas and those shown in Table 1 will work for half-gages of wire, too, if programming fixes at least one decimal place. Although half-gages of wire are rare, a spool will occasionally show up at a surplus store.—*R. Louis Sheekanoff, WØBPR, 8106 W 34½ St, Minneapolis, MN 55426*

[3]One could make the argument that *insulation thickness* is a misnomer because the formula actually calculates 2 x insulation thickness. Feel free to use any name that is not confusing to you.

[4]The constants used in this formula are chosen to produce *plus-tolerance* results, so that when added to the bare-wire diameter, the total diameter is equal to, or larger than, most wires encountered. Therefore, turns-per-linear-inch computations will always be on the *minus-tolerance* side, assuring the coil designer achievable results.

EXTENDED DOUBLE ZEPP CALCULATOR

☐ John Reh's article renewed my interest in the extended double Zepp (EDZ) antenna.[5] If you're thinking about erecting an EDZ, the simple BASIC program shown in Table 2 may come in handy.

The program calculates the length of each leg of the EDZ and the length of the matching stub required. You simply supply the program with the desired frequency of operation. As shown, this program works on IBM® PC-compatible computers. With a minor modification or two (such as eliminating program lines 20 and 30), you should be able to use this program on most home computers.—*David F. Eisenberger, K8KEM, 3670 Sea Ray Cove, Aurora, OH 44202*

[5]J. Reh, "An Extended Double Zepp Antenna for 12 Meters," *QST*, Dec 1987, pp 25-27.

Table 2

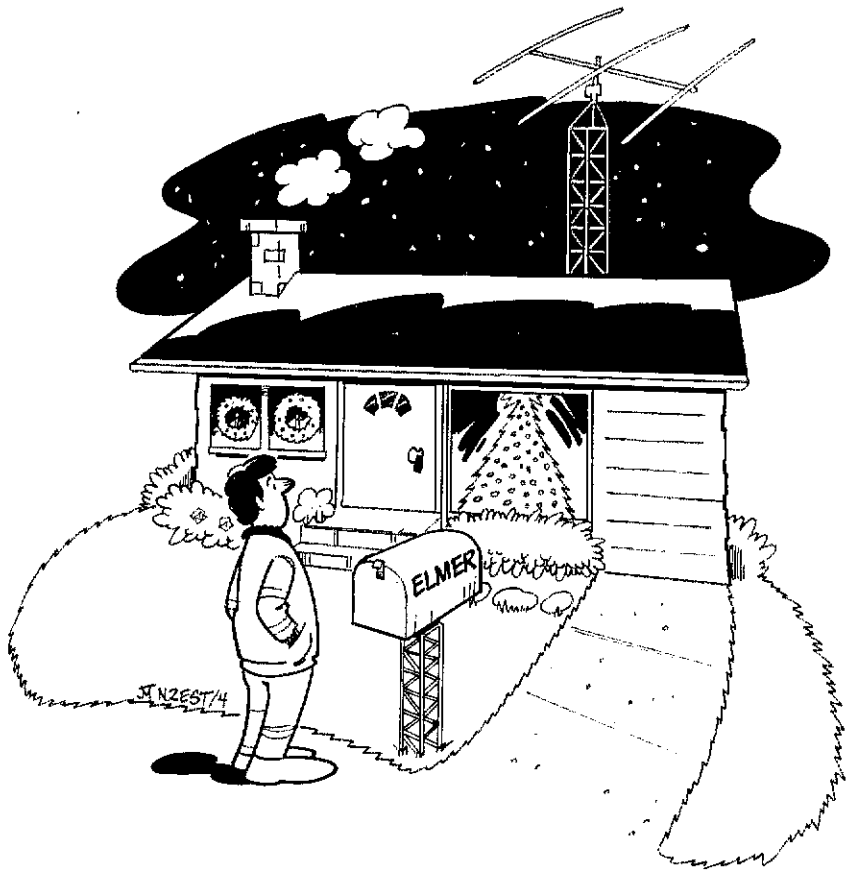
Extended Double Zepp Calculator

```
10 REM <EDZ>
20 KEY OFF
30 CLS
40 PRINT : PRINT " Calculations for an Extended Double Zepp with Stub"
50 LT$ = "##."
60 FOR X = 1 TO 5 : PRINT : NEXT
70 INPUT "Frequency (in MHz) for flat top "; FO : IF FO < 1 THEN 20
80 PRINT
90 L = 984 / FO * .64 : L1 = INT (L) : L2 = L - L1
100 PRINT "Each leg of the flat top = " ; INT (L);"ft ";
    : PRINT USING LT$ ; L2 * 12 ; : PRINT "ft "
105 PRINT "      ---"
110 S = 936 / FO * .145 : S1 = INT (S) : S2 = S - S1
120 PRINT
130 PRINT "                    The stub = " ; INT (S) ;"ft "; :
    PRINT USING LT$; S2 * 12; : PRINT "inches"
140 FOR X = 1 TO 10 : PRINT : NEXT X : LINE INPUT X$ : GOTO 20
```

Christmas for an Elmer

After helping so many others, it was ironic he couldn't get on the air.

By Bruce Vaughan, NR5Q
PO Box 203
Springdale, AR 72765



In the years immediately following World War II, it was called the "GI Hill." Now, 40 years later, the original name was no longer used; now it's known by its correct name: Skyline Drive. The name is appropriate.

Unlike neighborhoods down the road and nearer the city, Skyline Drive had no fireplugs; instead, rural mailboxes stood by each driveway. Most were mass produced, but others were handmade and designed to express something about the individual living there. Joe's mailbox was proudly placed on top of a miniature radio tower. Under his name were the call letters W5BQI.

There were a few well-landscaped lawns along this street and many neat vegetable gardens. Fishing boats on trailers and pick-up campers outnumbered imported automobiles. It was a good neighborhood —comfortable, middle class, solid.

Joe and Irma had bought their home in 1947. Joe liked the place because it was near the top of the drive. Irma liked the view from her kitchen window. The house had two bedrooms, one bath and a $10,000 mortgage secured by a GI loan. Payments on the house were about $80.00 per month; about a week's salary for Joe then.

For Joe and Irma, and for the neighborhood, the following years would be a time of increases. The family increased; a boy in '48 and a daughter two years later. Joe's salary increased along with the size of the house. First, Joe turned the garage into a den, then a carport was added to the side of the house. Three years later, two rooms and a bath were added to the back of the house. This did little for Irma's view from her kitchen window, but it gave Joe a nice room for his shack. A 50-foot tower with a 3-element tri-bander was installed the following year.

Even with the growing family and longer hours at work, Joe always found time for radio. His greatest satisfaction came from helping others—especially young people who wanted to become hams. Never satisfied with just teaching his "boys" (and one girl) code and theory, he stayed with them until they were actually on the air making contacts. This usually included helping them build their first rig—with Joe doing most of the work. I was one of Joe's "boys."

I remember the hours Joe spent teaching me how to build equipment without spending a lot of money. Dials were made from ten-cent-store protractors and old pointer knobs. Panels were cut from hardboard, then carefully sanded and painted. Tank coils were wound with copper gasoline-line tubing removed from junk cars. Wooden dowel spreaders for the 600-ohm open-wire line were boiled in paraffin for waterproofing. Coil forms were fashioned from old tube bases, and a professional-looking rack was made from old bed rails carried from the city dump. With Joe's help and less than ten dollars, I was on the air with a neat-looking rig. Joe's junk box and a couple of old radios provided the necessary parts and tubes.

Joe was getting along in years now, and those he had taught seldom thought of him. They were concerned with jobs, family, and of course, their own ham activities. Many of Joe's boys were now Elmering other young hams—helping them the way they had been helped.

I drove by Joe's place once in awhile and often thought about stopping for a visit and a cup of coffee. I was always in a hurry and just kept putting it off until "next time." I did notice that Joe's beam was always pointing northwest. Guess he liked working JAs. I also noticed that the reflector had one arm broken off at a trap. I wondered if, perhaps, he was using his inverted V instead of the Yagi.

Irma wished Joe felt better. His arthritis was making it difficult for him to do much walking. They managed grocery shopping and could still keep the house neat and clean, but both realized that the days of normal activity were over.

Tomorrow they would go to town and buy a small Christmas tree and some new decorations. Their children and grandchildren would be home for the holidays, and they wanted the house to look warm and inviting. A home should be filled with the sights and sounds of Christmas this time of year.

They put the tree up the following afternoon. That night, they went outside and looked at the house from the street. Joe was tired, but he had to admit that it was worth the effort. The tree glowed with the rows of colored lights, blinking on and off like a hundred fireflies. In each window hung a colored wreath with a lighted candle in the center. They stood admiring their handiwork until the cold began to penetrate their clothing.

"Why don't we go in and have a hot cup of coffee?" asked Joe.

(continued on page 49)

A Tipsy Windom on Evans Hill

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

The recent passing of Loren Windom, W8GZ, tugged sharply on many an old-timer's memories. "Windy" surely qualified as a radio legend in his own time. The skywire he championed long ago, also called the off-center-fed Hertz, is still to be heard among the faithful, still working DX. My first Windom was a low 20-meter model strung between army tents in the Philippines. We needed something quick and simple to radiate five or six watts from a loafing 807. Friend W8YNY and I were completely gratified by the results. Almost anything we could hear we could work.

Windom no. 2 was an 80-meter version in Chicago's QRN-ridden North Side. A single-wire feed *à la* W8GZ was just right for a short, straight run to the shack. The thing was a marvel all the way through 10 meters. My third Windom ran the length of a Chicago apartment hallway. Once again, the feed point was a natural, right outside my bedroom door. Impedances and fields of indoor antennas are distorted by stray couplings, but this one helped clinch DXCC.

Ah, but Windom no. 4 I recall most fondly. That skyhook actually grew as though possessing a mind of its own. The location was on the lower eastern slope of a hill in Hartford, Connecticut: Mrs Sally Evans' boarding house, to be precise. It was a delightful QTH, aesthetically and propagationally (there's a difference?), with a gorgeous overview of Trinity College. Nice clear shot to the east, although western DX would be uphill all the way. 'Twas summertime, 1947.

Six continents poured through on the 3-tube regen receiver of my home-made suitcase portable. I wasted little time getting my feet wet, quickly raising Europe with a 20-watt 6L6. Thirty feet of wire draped around the second-floor room was all I needed to cut the 14-MHz mustard. My new employment would be manning the kilowatts and rhombic at W1AW in nearby Newington, but this low-power, low-profile approach to hamming is hard to beat for pure sport. Now for a real antenna.

Mrs Evans, however, demurred. The grand old house, you see, was a duplex. That is, half of it was inhabited by a second family. There was fierce competition for fastidiousness among the occupants. My landlady was not about to have any copper hanging around her share of the premises. Wasn't it already bad enough that she was renting rooms to strangers? From Chicago?

Okay, okay. So I planned to make do with the indoor deal. The challenge itself was fun, anyway. Then my "big" rig arrived from Chicago, parallel 6L6s running 90 watts. After a night shift at W1AW, I came home to find 20 meters flat as a pancake. So I loaded up on 7 MHz for a local chat before sacktime. Big mistake. Around 2 AM, Mr and Mrs Evans came dashing up the stairs in their nighties, with stark terror in their eyes. The overhead light in their bedroom was glowing intermittently, a very eerie orange.

I finally got to sleep that night, firmly convinced that my wireless career at 8 Fern Street was at an abrupt end. Then, much to my amazement, I awoke next morning to the sounds of uproarious merriment. The Evanses, having their breakfast coffee downstairs, were reliving their harrowing adventure amid bursts of laughter. When they heard me moving around, they insisted that I join them. Mr Evans wanted me to explain why turning the light switch on and off had very little effect on that spooky glimmering.

So now I was, you might say, a member of the family. I didn't fail to point out that indoor ham antennas sometimes make bedroom lights blink. But Sally Evans, apparently visualizing something like the Eiffel Tower, remained adamant. No outside installations—and no more light-blinking, either. Naturally, now that I had softened them slightly, I hadn't really given up. There was this giant old tree in the front yard...

One thing about granddaddy oaks is their unflappability. Another fortunate feature is their paucity of branches; the few they do have are solid and far-reaching. One such massive limb soared over my shack window, about 12 feet away, some 40 feet above the immaculate lawn. It was no big deal to rig a tiny insulator, flick some no. 22 magnet wire over the branch, snug it, and slip it through the upper window. I left plenty of slack for stormy days. This netted me about 20 feet of drooping skywire.

When next I encountered Mrs Evans I asked her if my new *al fresco* aerial was acceptable. She dashed outside, probably envisioning a 160-meter log-periodic, looked in all directions and hollered, "What aerial?" So all was well. Except that the operational improvement over the inside wire, if any, was hardly significant. Moreover, the shack was still alive. Show me a second-floor station at the end of a random wire and I'll show you a ham with RF coming out his ears. Or somewhere else in the house.

I pondered the situation deeply, considering such measures as a counterpoise, series inductances, or additional wire hanging down from the far end to reach 14-MHz resonance. (We had no 15-meter band then, and my heap worked miserably on 10.) Suddenly came one of those fits of inspiration for which we radio amateurs are famous: If I used the present near end as a single-wire feed point, added 10 or 11 feet from that junction downward, and pushed the whole thing out the window, I'd have a vertical 20-meter Windom—about 33 feet of wire fed one-third of its length from the free-swinging bottom.

It worked! DX began answering *my* CQs. Shack RF could scarcely be detected. True, the free-hanging end swung and gyrated with every breeze, but the effect on its loading was negligible. The next day, I saw OM Evans batting away at it with a broom handle, wondering what the heck it was. On my explanation, he tolerated the barely visible strand. At nine feet above ground it was reasonably out of harm's way. In this case, its near invisibility was crucial, as well as diminished feed-line SWR. Results were phenomenal. A feature that stands out in my

Rod Newkirk's 1948 QTH—8 Fern St, Hartford, Connecticut—birthplace of the "Tipsy Windom on Evans Hill." As W9BRD/1, Newkirk worked some 50 countries on a vertical Windom hung from a tree just out of view to the left of the photo. *(1948 photo courtesy of Sophie Evans)*

Major General Loren G. Windom, W8GZ: The End Of An Era

The Amateur Radio world lost one of its true pioneers on February 1, 1988 with the passing of "Windy," W8GZ. Active in radio since 1917, and first licensed in 1919, Windy's career in Amateur Radio spanned 71 years. Having held a long string of calls including 8AOI, 8AIH, 8ALG, 8ZO, and 8Z6. The 8GZ call (later W8GZ) was held by Windy until his death.

By late 1919, the 8ZG station was a ½-kW rotary spark, which by 1925 had grown into a full kW CW rig. In 1925, operating from his father's garage in Columbus, Ohio, 8ZG set a world "low-power" record in the Jewell Meter Contest. The following is a report of that contest published in "Fifty Years of the ARRL":

"The Jewell Electric Instrument Company sponsored a contest for low-power work, the winner to be that ham who achieved the greatest miles-per-watt. The wattage was to be the *total* input to *all* the tubes in the transmitter, *including* the filaments. Loren Windom, 8ZG, was the winner, and his outstanding achievement was the QSO with Australian 5BG, using an input power of 0.567 watts over a distance of 10,100 miles. This gave a record-breaking 17,820 miles per watt. The tube was a 199 with 4 volts on the filament and 70 volts on the plate."

Windy was a frequent contributor to *QST* from 1926 until his death. His first article was probably his most famous. In the September 1929 issue of *QST*, Windy described the off-center-fed Hertz antenna, which to this day is known worldwide as the "Windom" antenna. Windy had been using these antennas for several years and finished 2nd in the 1927 DX content and 3rd in 1928. In 1928, 8GZ was the keynote speaker at the Ohio State ARRL convention, where he discussed the single-feeder Hertz (Windom) antenna.

Windy served two terms as ARRL director from the Central Division, being elected in 1931 and reelected in 1933. In the 1930s, the Central Division was composed of IL, IN, KY, MI, OH and WI.

World War II found Lt Colonel Loren G. Windom serving with the 37th Division in the Pacific theater. During the Pacific campaigns of 1942-1945, Windy served his country with the same competitive spirit he exhibited in Amateur Radio. His battlefield decorations include the following: combat infantry badges, four Purple Hearts, two Legions of Merit, two Bronze Stars, two Silver Stars, and two Distinguished Service Crosses.

Following WW II, Windy returned to his civilian job as Assistant US Attorney for the Southern District of Ohio. With the war behind him, he now had time for his first love—Amateur Radio. In June 1949 he published an article in *QST* on modernizing the HRO receiver, containing design changes which were later incorporated by the National Radio Company. In Volume Five of *Hints and Kinks*, Windy described the construction of 6-meter coils for the HRO receiver.

In 1950, W8GZ returned to the DX scene. By 1957, Windy had achieved the first DXCC on SSB. His stated goal was to lead the DXCC Honor Roll on phone. During the 1950s, his military career also advanced. In 1954 he was made a Brigadier General (one star), and in 1959 he received his 2nd star to become a Major General. Windy served as Adjutant General of the State of Ohio from 1959 to 1963, and Commanding General, 37th Infantry Division, from 1959 to 1965.

In 1964, two more articles by W8GZ appeared in *QST*. The first article concerned the construction of a 400-cycle power supply for the selsyn indicators on prop-pitch rotor systems. His second article described a product detector for the HRO receiver. His final article for *QST* was published in November 1966, and dealt with overload protection for electronically regulated power supplies.

During the 1960s, Windy replaced his rotary 8JK antennas with Hy-Gain® Long John Yagis. These were the biggest Hy-Gain monobanders ever made (the 10-meter monobander weighed 147 pounds). In typical Windom fashion, he redesigned the antennas. Hy-Gain subsequently published new assembly instructions based on his dimensions.

In June 1968, W8GZ achieved his DX goal. He held the no. 1 position on the phone DXCC Honor Roll. Though he shared the spot with another legend, Don Wallace, W6AM, no one exceeded his country totals on phone. The December 1987 DXCC listing shows W8GZ at the top of the phone DXCC Honor Roll with 368 countries. As a point of interest, the three countries he never worked on phone were CR8, Damao; FI8, French Indochina, and FN, French India.

The announcement of 5BDXCC in 1968 was just the sort of challenge that Windy liked. At 63 years of age, he started on 5BDXCC and was issued award no. 4 in December 1969. He, in all likelihood, would have had no. 1, but he suffered a heart attack in mid 1969 and was not able to pursue the QSL cards he needed.

During the late '60s and '70s, Windy devised a variety of modifications for the Collins 75-A4 receiver, which he shared with many DXers. He also worked toward DXCC on 6 meters. His final total toward DXCC on 6 was 54 worked and 51 confirmed. In 1979 he received 6-meter WAS no. 305.

In 1980, Windy decided to retire his faithful Collins 75-A4 and Central Electronics 200V. He replaced them with a Drake TR7/R7 combo. He also made numerous trips to 100 feet in a crane chair to repair and adjust his antennas.

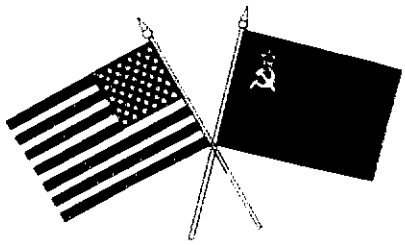
Windy leaves behind him not only 71 years of Amateur Radio operation with numerous records and awards, but a family of which anyone would be proud. His wife of 58 years, Dottie, is now living in a retirement village. His son David, W8ZG, lives in Virginia, and his daughter Diane lives in Washington.

It has always been my belief that in any endeavor, be it science, war, politics or Amateur Radio, we can learn much by studying the history of the subject. The death of Windy, W8GZ, brought to a close another chapter in the history of Amateur Radio. W8GZ is missed by his friends and competitors, and I feel privileged to have known him and called him a friend.—*Dr J. R. Sheller, KN8Z, ex-WA8ZDF*

memory (and logbook) was how surprisingly well the darned thing worked up the hill to the west. My dinky dangler usually was working the VK/ZL gang half an hour before Al, W6JQB/1, burning midnight DX oil at ARRL's West Hartford club station, W1INF, with a fairly high horizontal antenna, could even copy 'em. It was truly a one-element beam.

At the time, I didn't realize that W9BRD/1 was close to hallowed ground. Many years later, browsing through a 1923 *QST*, I found this item: "Probably by the time you read this, two new stations will be heard on the air. One will be that of K. B. Warner, 1BHW; the other will be that of F.H. Schnell, 1MO. The QRA for both stations will be the same, 282 Fern St, West Hartford, CT. On October 2, the whole crew, including French 8AB, poked a hole in the air with a 72-foot mast." Three Amateur Radio pioneer immortals at the top of Evans Hill! I doubt that OMs Warner, Schnell and Deloy ever could have imagined that one day, another ham would be working every continent with a small piece of wire and a handful of watts near the bottom of that hill.

As for the Evanses, I said good-bye to them a second time in 1952 and eventually lost touch. Because they weren't exactly kids back then, I concluded that by now both had long since passed on. Wrong! My old friend and former ARRL colleague Joe Moskey, W1JMY, with wife Norma, W1MUW, discovered Mrs Evans in a Connecticut seniors' home last Christmas. Just by chance, Sally, comfortably retired, overheard Joe mention ham radio. She perked up and asked him if he knew her bizarre boarder of long ago. Their resultant ragchew rolled away the 40 years gone by since two 6L6s and a tipsy Windom made DX hay on Evans Hill. QST



Tune in to Glasnost

Part 4: Hams across the water.

By James D. Cain, K1TN
ARRL Contributing Editor
PO Box 42
Andover, CT 06232

In August 1940, the Baltic countries of Lithuania, Latvia and Estonia were "annexed" by the Soviet Union, a takeover never officially recognized by the United States. Now the Baltic states are calling for more autonomy from Moscow, and we are about to hear some results on the amateur bands.

According to Bob Sherin, W4ASX, a reporter for *Florida Skip*, a return to pre-WW II call signs is in the works for the Baltics. UQ1GXX has announced, according to Sherin, that the three Soviet republics will be signing LY, YL, and ES. In fact, Lithuania began making the permanent changes late in October, and Estonia and Latvia are expected to have switched over by early 1990. According to one of the LY2WW operators, their new call sign is "forever."

These are the prefixes originally assigned in 1929, prefixes used occasionally for special events the past couple of years. UA6LA, visiting Sherin in October, confirmed the changes.

Call signs aren't the only surprises on the bands today. "One can feel the outpouring of friendship, or whatever unites hams, from the USSR," writes K5AAM. "Many times one can hear CQ USA, and a certain eagerness prevails to contact US hams."

"Language classes" conducted in English and Russian on the ham bands also are bringing down barriers. "UB4MZL was overheard teaching Stateside ops how to speak in Russian, and his English was better than mine," K2SWZ relates.

Of course this didn't happen overnight. Jean and Charles Shaffer (KM7E and K7NW respectively), who visited the Soviet Union six years ago, describe their reaction to meeting hams there:

"What we remember most from our 12,000 mile journey are not the vodka toasts nor gift exchanges, but rather the twinkle in someone's eye when he tried to kid around, the thoughtfulness of hams in planning special events for us, and the sacrifices people made just to meet us. Even before glasnost, we witnessed widespread warmth toward Americans and a curiosity that matched our own.

"When all was said and done, we found the Soviets we met were more like us than most people would assume. We built some very personal bridges, bridges anchored by Amateur Radio."

Changes on the Volga

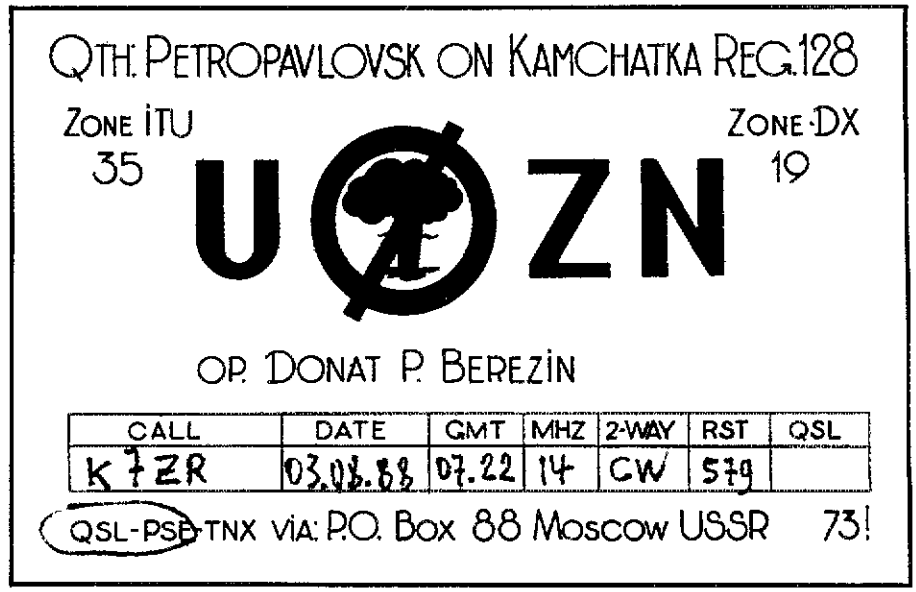
Following their DXpedition to the Volga River area last July,[1] the Western Washington DX Club received a list of proposals from their hosts, the Zilan DX Club, including continuing and expanding such visits, on-the-air gatherings and videotape exchanges.

The Zilan members also asked for assistance in organizing emergency response teams and encouraged sending groups of children to summer camps in the respective countries (not exactly Amateur Radio!). They also touched on another matter: "We would likewise want to touch on the question of obtaining from you Amateur Radio equipment on a noncurrency basis, (as) almost all of us are forced into using home-made equipment," the Zilan group wrote.

Initiatives such as this on the part of voluntary associations—"informals"—are sharply at odds with traditional Communist thinking, and they strain glasnost to its limit. While Amateur Radio may not seem as important as, say, the formation of a new political party or a push for more

Jean Shaffer, KM7E, and Nick, UB5UT, at club station UT4UWV, in Kiev. *(K7NW photo)*

[1] J. Cain, "Tune in to Glasnost," *QST*, Oct 1989, pp 44-48.



The New Soviet Amateur

It took determination, desire, planning, and patience. Two years after their first QSO, Sergei Zimin, RAØFC, and Wayne Peterson, K6ZSJ, met face to face at San Francisco International Airport.

When Wayne's personal invitation finally brought Sergei to California, the two already felt acquainted from the bond of their radio contacts. Sergei had polished his English in many of hours of persistent practice with Wayne, who speaks almost no Russian.

Sergei, 25, his wife Natasha, 23, and their two-year-old daughter Irina share an apartment with Sergei's mother, in Yuzhno Sakhalinsk. Like Natasha, Sergei was born on Sakhalin Island in the Soviet Far East, he into a family of engineers. From age 13 to 15 he was an active radio amateur. At 16 he got a job at the radio center for a fishing fleet.

"This established my profession," he said.

"At 18 I went into the Army, as all young men are required to do." Army service allowed Sergei to visit many Soviet cities and participate in "radiosport and lots of CW competitions."

After the Army, he returned to his work at the radio center for a year, before entering the Teachers Institute of Geography, where he met Natasha. Sergei now studies to be a secondary school teacher.

Married, With Radio

"Most of my friends are hams," says Sergei. "Only one wife is a ham. Being a ham usually causes big problems in the marriage."

Natasha agrees that "the women in Sakhalin have trouble in the family with radio-hubbys. The husband often gives all of his free time to his hobby and the wife has no time for her interests. The wife often feels the husband likes the radio more than her."

Sergei admits, "At first (radio) seemed like a drug. I felt badly if I was away from it for a week. I was very curious about everything—wanted to know more and more." Sergei explained his deep attraction to radio. "I wanted to get more information. Each ham brings his country, customs, language to a QSO. It makes me feel good."

"The ham radio friendship with Wayne means a lot," Sergei continues. "It allowed me to open myself to another half of the planet, to the other side of the world. It allowed me to get information from more than just newspapers and TV. It provided an opportunity to ask direct questions and get direct answers without a third person."

Sergei measures his life in ham radio with landmarks.

"On my island we hams are popular people. . . we are bringers of information." —RAØFC

Sergei Zimin, RAØFC, is flanked by his wife Natasha, Libby Traubman, and Irmgaard Peterson, in the shack of Wayne Peterson, K6ZSJ. *W6HJK photo*

"There was life before the USA, and then life after the USA. Five years ago I never could think about coming to America. Now I have a lot of things to think about and to do. "Fighting for peace" was only a phrase before.

"Today, on my island, we hams are popular people. We (know) more about what is going on outside of the USSR. We are bringers of information.

"On Sakhalin there are 300,000 people and 200 licensed hams. Of the 200 with a license only 25 or 30 are very active hams. These people have equipment at home and are connected."

Changing Amateur Radio

"A year ago it was proclaimed—direct QSL addresses on the air. But there are no new instructions on what we can or cannot do today," Sergei said. He also noted that more freedoms of expression have come on their own—from glasnost.

"This is a new and interesting time to be in the center of this, to be part of what is happening. "There are very many troubles, but it is an important time.

"I can't change a lot by myself. I can change the family. People can see how change occurs and works. I can feed the family, bring up my daughter, be useful to my friends."

—Len Traubman, W6HJK, with assistance from Libby Traubman, Wayne Peterson, K6ZSJ, and Irmgaard Peterson.

autonomy from Moscow, when a Soviet ham group begins looking for ways to obtain commercial amateur gear, "on a noncurrency" basis, it is time to take notice.

The Parts Dilemma

How do Soviet hams get equipment and parts? Government-made equipment generally is held in disdain. The immediate solution is for them to produce their own amateur gear. In October 1988, *Radio* reported on new cooperatives in Moscow, Kiev, Kharkov and Gorky. Forty-three DOSAAF stores were "ordered to accept and sell products made by the cooperatives," that is, by private competition.

Last March, the Krenkel Central Radio Club and DOSAAF went even further, opening a *nonsubsidized* Experimental Creative Association Radiocenter in Moscow, to "draw radioamateur collectives together and satisfy the needs and interests of the country's radio amateurs."

The Center would be an umbrella organization for Amateur Radio and computer "informals," a clearinghouse for ideas, and a retail outlet for both state- and cooperative-made gear.

Meanwhile, some amateurs are turning professional. According to *Radio*: "In Volgograd, the Production Technical Association is in business" (under the direction of UA4AHG).

"The Volgograd superior category transceiver, designed and made by radio amateurs and sold by the Association, costs about half what one being planned by an industrial enterprise will cost.

". . .orders are streaming in. About 100

RW3DZ, Dr Alex Zaitzev, at the UZ3DWX club station of the Institute of Atomic Energy at Troisk, south of Moscow. Dr Zaitzev spent 400 days at KC4AAA in 1977 as a geomagnetic physicist. *(WA2LQQ photo)*

Aiming for the Moon

The high-technology sector of Amateur Radio has benefited from the new openness in Soviet society. Although Western Europe and the United States dominate 432-MHz Earth-Moon-Earth (moonbounce) operation, tenacious Soviets are working to close the gap.

EME operation remains one of Amateur Radio's greatest technical challenges, limiting activity primarily to Japan and the Western countries. They possess the technology and also have Amateur Radio enthusiasts with not only the means to purchase the parts required for building, but also the leisure time to complete the task.

There is little doubt that many Soviet amateurs are capable of overcoming the barriers of precision that define operation at 432 MHz and above, but the necessary hardware—low-noise GaAsFETs, antenna-aiming equipment, special cable and connectors, and even computers to accurately track the moon—are still beyond their grasp.

The first successful 432-MHz EME activity from the USSR took place around 1980, lagging Western countries by almost 10 years. Early Soviet activity consisted of only three or four successful operations, from club stations with several operators.

During the past two years this has changed. There is a dramatic increase in 432-MHz EME activity, with several individual operators from the USSR joining the ranks. This is not totally by chance, as "central planning" continues. The government can supply parts and special authorization for higher power if a need is shown.

The USSR publication *Radio* has referred to a government five-year plan to increase activity on the 430- and 1260-MHz amateur bands. However, there has yet to be any Soviet EME activity on 1296 MHz.

The opening of Soviet society has made available modern amateur equipment designs such as the DL6WU and K1FO Yagis, along with the GaAsFET preamplifiers that have been commonplace in Western countries for almost 10 years. Yet, duplicating EME array designs seems to be the easy part for potential Soviet EME operators. GaAsFET transistors typically are obtained as gifts from Western Europe, and the final hurdles now are in obtaining high-power amplifier parts and receiving a high-power UHF operating permit.

While the 7- to 9-hour time difference from the US East Coast limits the time available to work Soviet stations, Soviet operators don't look for any favors, even though they are exotic DX. It is quite common to hear several USSR stations on in the wee hours of their morning.

Before long, Western EME operators will be dreaming of ways to encourage EME activity from DXCC rarities such as the Asian republics. With some Western European 432-MHz stations having worked more than 60 countries—and a few US operators crossing the 50-country mark—this increased Soviet EME activity will help pave the way for the first UHF DXCC award.—*Steve Powlishen, K1FO*

people now work at the Association, and there are enough orders for 200 more."

Also in its August issue, *Radio* reported complaints of radio experimenters aired at a conference in May.

"The most difficult problems are with building computers. Shortages everywhere. Shrewd dealers and speculators operating on the black market have become the principal suppliers to individual constructors. The only people who don't talk about parts are those who can 'acquire' them at their place of work."

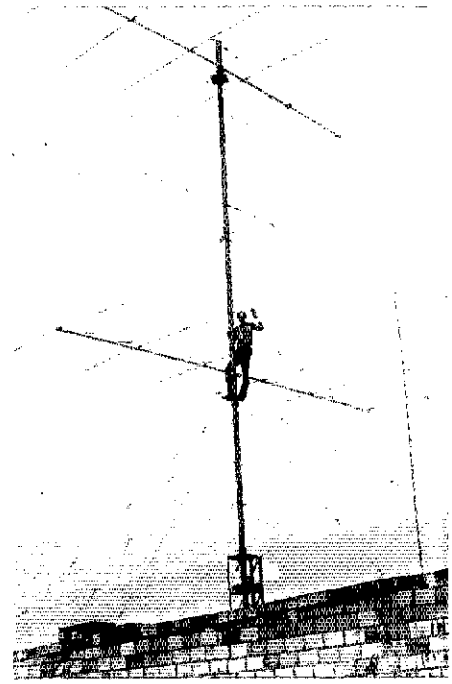
Shortwavers and the Law

Members of young collective station UM8MXX recently described how their club was shut down:

"The city SYuT (station of young technicians) allocated a basement to our radio club. Everything was going well. Suddenly, in late February 1989, we were informed that the administration of the SYuT had received information that alcoholic beverages were being consumed at the radio club, wild parties late at night, etc. We were able without difficulty to prove the absurdity and unsubstantiated nature of these rumors.

"However, on 27 February we were told the collective station was being closed down until September, allegedly 'in connection with repair of the premises,'" they said.

(continued on page 56)



Alex, UL7PCZ, poses on one of the towers at club station RL8PYL. The stacked 10-meter beams and 2-meter Yagi are just part of the extensive arrays used by a dozen club members. The club was the first UL7 station on RTTY, using computers they "hope to exchange for new models" soon. *(UL7PAE photo)*

Novice Notes:

Keys, Keyers and Keyboards

By Bruce Hale, KB1MW/7
14636 NE 38th Street
Bellevue, WA 98007

You probably used a straight key to learn Morse code for your Novice test. Now you've passed your test and you're setting up your first CW station. You could use your straight key, but all your new-Novice friends have "iambic" keyers. Your Elmer uses a "bug," the club president has a "keyboard" and another club member says he's using an "MCP" (whatever *that* is!). What a bewildering array of terms and equipment! Help is at hand, however; this article explains these terms and the "gadgets" hams use to send Morse code.

Straight Keys

Almost everyone starts out with a *straight key* like the one shown in Fig 1. A straight key is simple, and it can be used to key almost any transmitter. Some transmitters have a positive keying voltage (the key line is positive with respect to ground) and other transmitters have a negative keying voltage (the key line is negative with respect to ground). You can key either polarity with a straight key. It's best to connect the ground side of the key jack to the contact on the key lever; that way, the "hot" contact is safely out of the way under the lever.

Most straight keys have two adjusting screws. One screw sets the spring tension and the other adjusts the contact spacing. There's no "right way" to adjust these screws. Adjust them until *you* like the way the key feels. You will probably want to bolt the key to a strip of wood or plastic so it doesn't slide around too much. Some hams go so far as to bolt the key right to the operating desk!

The main disadvantage of the straight key is that it's slow. Most people find it difficult to use a straight key above about 15 words per minute. Using a straight key for long periods can also be tiring. When your arm gets tired, you make more mistakes, you get frustrated, you make more mistakes because you're frustrated and you end up trying to throw the straight key across the room (maybe this is why people bolt them to the desk!). This "speed barrier" is one reason why so many other ways of sending CW have been invented.

"Bugs" or Semiautomatic Keys

As you can see from Fig 2, a *bug* is a rather strange looking beast. If you press on one side of the key lever, a small spring vibrates against a contact. This makes and breaks the contact at regular intervals. Presto, automatic dots! This makes it easy to send CW characters consisting mainly of strings of several dots (characters like "B" "H" "5" and so on). Dashes must be formed manually by pressing and releasing the other side of the key lever.

Because they use mechanical contacts like straight keys, bugs are not polarity sensitive. Unlike a straight key, however, a bug can be difficult to adjust. Using a bug effectively usually takes *lots* of practice. If you must use a bug, *please practice off the air*! On-the-air QSOs are not the place to learn how to use your bug!

Keyers

An *electronic keyer* (like the one shown in Fig 3) forms both dots and dashes automatically. A keyer is usually connected to a pair of switches; one switch for dots and one for dashes. Together, these switches and the lever (or levers) that control them are called a *paddle*. If you press on one side of the paddle, the keyer sends a continuous string of dots. If you press on the other side, you get a continuous string of dashes. With a little practice and some natural rhythm, you can send perfectly timed code with just a slight movement of your hand.

Because most keyers use an electronic keying element (a bipolar transistor, a MOSFET or even a vacuum tube), keyers can be sensitive to polarity, voltage or current. If your transmitter has -80 volts on the key jack and you connect it to a keyer that expects $+5$ volts, you can probably kiss your keying transistor good-bye. You *must* read the manuals for the keyer and the transmitter to be sure they are compatible. Some keyers use relays for switching; polarity is not important with a relay (it's a mechanical switch). Other keyers can be modified to reverse the polarity, or you can use your keyer to key a relay and key the transmitter with the relay. The point is, *watch the polarity*!

There are many different kinds of electronic keyers. The only control you will find on *all* keyers is a **SPEED** control. Some keyers use low-power CMOS circuitry; these keyers use so little current that they don't even need an **ON/OFF** switch! Other keyers have an intimidating array of switches and knobs. As with any ham gear, you have to decide what you need based on what you want to use the keyer for. Talk to other hams about what they use, and read the ads and Product Reviews in *QST*.

Some keyers allow you to change the "weighting" of the CW elements. Weight is the ratio of dot length to dash length. Normal CW weighting is 1:3, meaning that

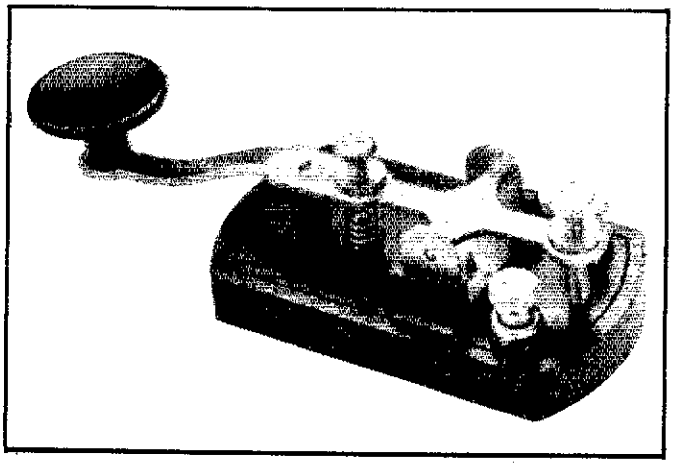


Fig 1—Most hams start out with a straight key like this one.

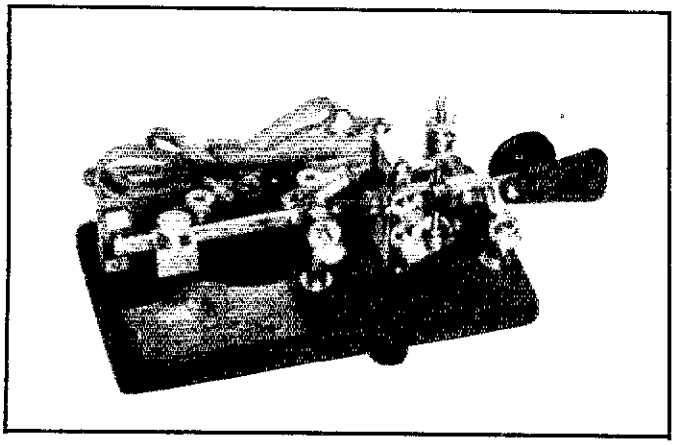


Fig 2—A bug uses a vibrating spring to form a string of dots. Dashes must be formed manually.

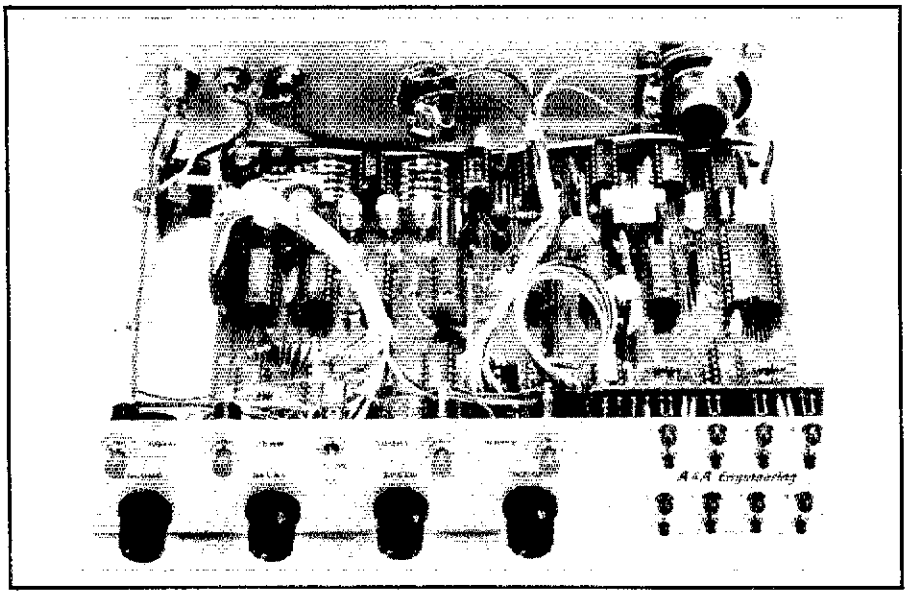


Fig 3—An electronic keyer makes it easy to send good code. This keyer features several memories for storing frequently sent messages and a paddle with separate levers for iambic operation.

a dash is three times longer than a dot. You can vary this a little, but don't go overboard. It is possible to adjust the weight so much that your code is impossible to copy.

Many keyers have a *sidetone oscillator* of some kind. This is nothing more than an audio oscillator connected in parallel with the key line. There are usually controls to set the sidetone level and pitch, either on the front panel or inside the keyer. A sidetone oscillator can be convenient if you build transmitters; you won't need to build a separate sidetone oscillator into each transmitter. If you are using a transceiver with its own built-in sidetone oscillator, however, you probably won't need one in your keyer.

Another feature you will hear about is *dot memory*. With dot memory, if you release the dash paddle and press the dot paddle before the keyer finishes sending the dash, the keyer will "remember" that you pressed the dot paddle. As soon as the dash is finished, the keyer will send the dot. Without this "memory," the keyer might miss the dot. Dot memory is a convenient feature, but not absolutely necessary.

Iambic Keyers

An *iambic* keyer can be used just like a regular electronic keyer. If you press on one side of the paddle, the keyer sends dots. If you press on the other side of the paddle, the keyer sends dashes. If you press *both* sides of the paddle at once, the keyer sends an alternating string of dashes and dots. Some people call iambic keying "squeeze keying."

Many CW characters consist of alternating dashes and dots (characters like "C" "Q" "K" and so on). With iambic keying, you can send a "C" by pressing the dash paddle first and then squeezing the dot paddle without releasing the dash paddle. When the last dot starts up, you release both paddles. It sounds complicated, but it is actually fairly simple. It does take practice, however, and you should always practice *off the air*.

If you decide you want to use the iambic feature of your keyer, make sure you get a paddle that has two separate levers; some paddles will not allow you to switch the dot contact and the dash contact at the same time. Remember that it is always possible to use an iambic keyer in a "noniambic" manner; just don't squeeze both paddles at once.

Memory Keyers

During a CW contest, you will send the same message (the "contest exchange") over and over. *Memory keyers* are one way to make CW contesting easier. The memory keyer contains a semiconductor memory; you can "load" this memory with a message and play it back simply by pressing a button.

Most memory keyers have several memories (see Fig 3). For a contest, you can load your "CQ contest" message in one memory, your "599 Connecticut" message in another memory and your "GL de KA9OLS/1" message in a third memory. Memory keyers are also used by EME, satellite and meteor-scatter enthusiasts; anywhere a repetitive message is sent, a memory keyer can be used to automate it. This leaves your hands free for the antenna rotator or the log book.

No matter what type of electronic keyer you decide on, think about building your own. A keyer is still a relatively simple project, even for a beginner. There are many circuits in *The ARRL Handbook for the Radio Amateur*, and some keyer kits are available.[1]

Keyboards

Another way to send CW is with a *CW keyboard*. A CW keyboard lets you type characters on a keyboard like a typewriter. The machine then converts the typed characters into Morse code and keys your transmitter. Some keyboards include buffers for storing messages like a memory keyer.

It is also possible to program a personal computer to send Morse code. There are

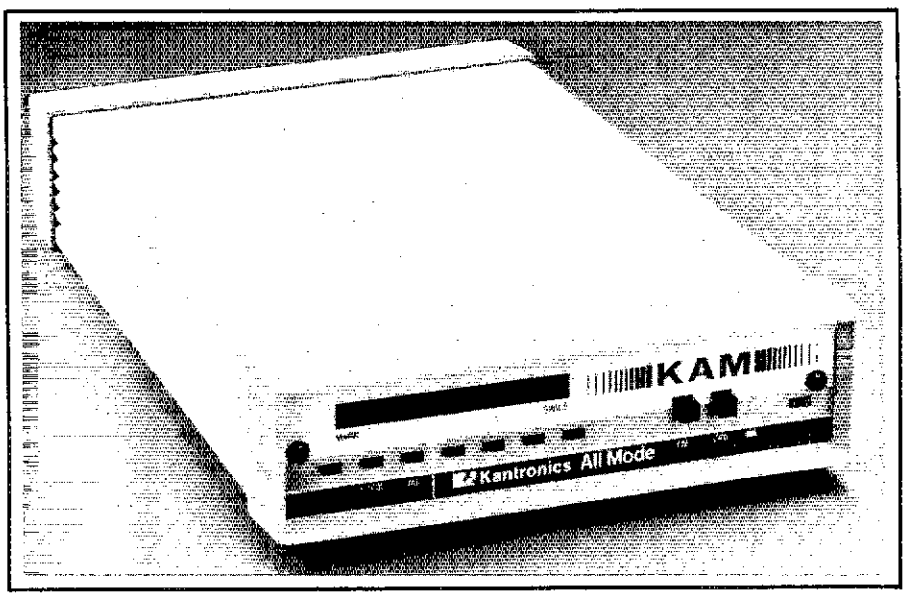


Fig 4—This Multimode Communications Processor (MCP) can send and receive packet, RTTY, AMTOR, FAX and Morse code.

[1]Notes appear on page 49.

many programs available.[2] One nice thing about using a computer is that if you don't like the software, you may be able to customize it to your liking. You might also write your own software, or try two or three programs until you find one you like.

Remember that you must be careful about the keying polarity if your keyboard or computer uses an electronic interface. Read the manuals for your transmitter and your keyboard before you connect the keyboard.

Multimode Communications Processors (MCPs)

The pinnacle of the "CW machine" pyramid is a device called a *Multimode Communications Processor (MCP)*. As its name implies, this device is a jack of all trades. A box like the one in Fig 4 can send and receive packet, RTTY, AMTOR, FAX and Morse code.

Most MCPs require that you use a computer or ASCII terminal with them. The MCP does the hard work, converting all the different modes to ASCII, and then your computer acts as a display and input device. You type on your computer and the MCP sends code. The MCP receives the code and sends it to your computer for display.

Choosing an MCP can be almost as difficult as choosing a transceiver. There are many models, each with different features. Most incorporate buffers for frequently sent messages, but some also allow you to use a paddle to send code, and others feature "random" CW practice sessions. The best way to choose an MCP is to read the Product Reviews in *QST* and talk to people who use them on the air.

Like keyboards and Morse-code computer software, an MCP makes it easy to send perfect code. Receiving is another story, however. Most MCPs can handle S-9 signals with no interference, but their receive performance degrades rapidly in the presence of heavy QRM. You can use one for daily ragchews, but don't expect it to pull a DXpedition out of the pileup.

Finally, remember that most MCPs switch the keying line electronically. This means that all the warnings about polarity apply to MCPs as well. Read the manual! An MCP is a complex machine; too much voltage or current at the key jack may damage more than just the keying transistor.

All of these "CW senders" are just means to the same end. Remember: hams love gadgets. If there's a way to automate, mechanize or computerize something, hams will do it! You should *enjoy* CW; pick a tool that helps you enjoy sending Morse code. Better yet, pick two or three; use a memory keyer for contests, a computer for ragchews and a straight key every New Year's Eve for Straight Key Night.

Notes

[1]Write to A&A Engineering, 2521 W LaPalma Ave, Unit K, Anaheim, CA 92801, for more information about keyer kits.

[2]Some program listings are available from Department PX, ARRL HQ, 225 Main Street, Newington, CT 06111.

Christmas for an Elmer

(continued from page 41)

The logs crackled in the fireplace and gave off a nice aroma The tree in the corner of the room, dressed in its new decorations, radiated warmth and cheer. Joe, looking around the room, enjoyed his second cup of coffee. He felt at peace with himself and with the world.

"Irma," said Joe, "there's only one thing missing this Christmas—my radios. I'd really like to get on the air and say hello to some old friends."

"What would it take to do that?" asked Irma.

"A small miracle," replied Joe. "The rotator is stuck and the SWR is sky-high. Even the lead to the inverted V is open somewhere, and on top of all that, my old Drake is acting up—sounds like a front-end problem. Guess I'll just forget it. It's been six years since I dared climb the tower, and we really can't spare any money to have someone else do it."

"Let's not worry about it now," said Irma. "Perhaps next year we can afford a new rig and have someone work on your antennas. We better go to bed now, we've got to do our grocery and Christmas shopping tomorrow. We'll need plenty of rest tonight. You go on ahead. I'll be there just as soon as I clean up the kitchen."

"Okay," replied Joe, "don't work too long."

I was watching the 10 o'clock news when the phone rang. Irma and I had a nice long visit. I was so glad to hear from her. My Christmas would be so much better now. I wondered, why do we neglect to stay in touch with old friends who have meant so much to us? I hoped the other fellows were not in bed. They'd want to hear about my call. I grabbed the phone and started dialing.

Joe and Irma returned from town just as dark was coming to Skyline Drive. They carried the groceries into the kitchen and put them away. Then they carried packages into the house and placed them around the tree.

"Let's have coffee and some of my cookies in front of the fireplace, Joe," said Irma.

"The chocolate chip are my favorites," he answered.

Sitting by the crackling fire, Irma spoke softly, "Joe, it's only three days till Christmas, and it doesn't cost anything to wish. If you could have any gift you wanted, what would you wish for?"

Joe thought a minute. "Other than good health, my wants are pretty simple. I'd really love to to go in the shack and hear some of my ham buddies' distinctive fists again and wish 'em all a Merry Christmas and a year filled with rare DX."

"Why not give it a try?" replied Irma. "Maybe the old beam will unstick. Even if it doesn't, you might work someone in the direction it's headed."

Joe laughed, "You XYLs just don't understand radio. It's no use. The SWR is crazy, plus the Drake is one sick radio."

"Try it anyways Joe, just for me," said Irma, "please."

"Well okay, but it's no use," said Joe as he thought to himself that it'd be fun to twist the dial for old time's sake.

They carried their coffee into the shack. Joe pulled up a chair to the operating desk, while Irma sat back in the recliner.

Turning on the Drake, he was surprised to hear it come alive with dozens of signals.

"Sounds like a Christmas miracle to me," said Irma.

Looking puzzled, Joe reached for the knob on the rotator control. It also worked! Slowly he turned the beam from northwest to east, then back to north.

Turning on the transmitter, he checked the SWR. Unity. "It's working," said Joe, "it's working!"

"Why not try a CQ?" said Irma coyly. "With all those signals coming through, you should be able to work someone."

"Think I'll go to twenty," said Joe. "It should be a good quiet band for some cross-town QSOs. Maybe some of the locals will be on."

Joe rattled out a sharp CQ with the old Vibroplex. Switching the Drake to receive he was surprised to find a small pileup on the frequency. He picked out WA5HTX, WB5FKT and several others. The calls were very familiar to him. He had Elmered each and every one of them.

MERRY CHRISTMAS JOE BT THE ROTATOR IS FROM ME BT DE WA5HTX K

MERRY CHRISTMAS JOE BT HOPE YOU ENJOY THE DRAKE BT ITS JUST LIKE URS BT ITS MY SPARE ES UR WELCOME TO IT BT I WILL BRING URS HOME AS SOON AS I GET IT FIXED BT DE WB5FKT K

WE LOWERED UR BEAM AND REPAIRED THE REFLECTOR BT SHUD WORK BETTER NOW BT IT HAS NEW COAX TOO BT DE WA5HTD ES WA5GWA K

And so it went for the next hour.

As each operator broke in, Joe smiled, nodded and answered with TNX ES A VY MERRY XMAS. Copying the CW in his head, he closed his eyes and remembered when he was teaching each one of them code and theory.

When the QSOs were finished, Joe leaned back in his chair and didn't say a word. Turning away from Irma, he said, "I'm going to the basement and get some larger light bulbs for this room. This dim light is making my eyes water."

Irma pretended not to notice the tears in his eyes, as Joe hurried from the room.

• *At the Foundation*

'Tis the Season

By Mary Schetgen, N7IAL
Secretary
The ARRL Foundation

Doesn't it warm your heart to know that a contribution you made to one of our scholarship funds has enabled a student to continue his education? The 1989-90 ARRL Foundation scholarship recipients are well on their way to meeting educational and career goals because of your generosity throughout the year. In 1990, two new scholarships will join the roster of awards available to ham/students: The New England FEMARA Scholarship—regional preference for New England-based students; and, The Charles A. Fisher Memorial Scholarship—regional preference for California-based students.

This will bring our total to 10 awarding scholarship programs and 11 actual awards (Note: The Paul and Helen L. Grauer Scholarship is two scholarship awards). Other scholarships are in the planning stage and we'll promptly report each new addition to our line-up in plenty of time for you to apply.

Let's take a look at the comments of our scholarship recipients:

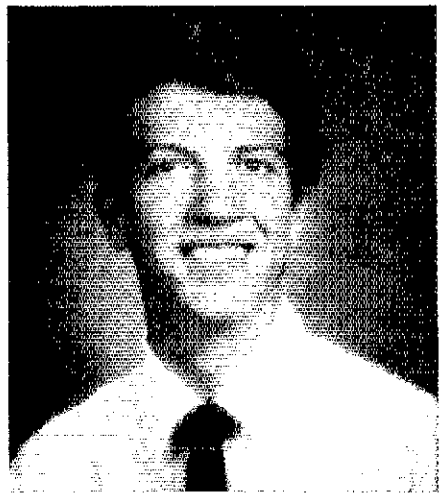
"This is a very great privilege and one of the most exciting in my academic and Amateur Radio years! Amateur Radio and ARRL have brought many good things to my life. The beauty of the field I am studying (computer science) is that it can be put to use in many ways to further Amateur Radio. Many thanks, all!"—*K1VUT*

David A. Clemons, K1VUT—The ARRL Scholarship Honoring Barry Goldwater—$5,000

"Thank you for selecting me as recipient of this award. It will greatly help finance my college education. I am studying electronics engineering and would like to design circuits for deep space probes."—*N7KWY*

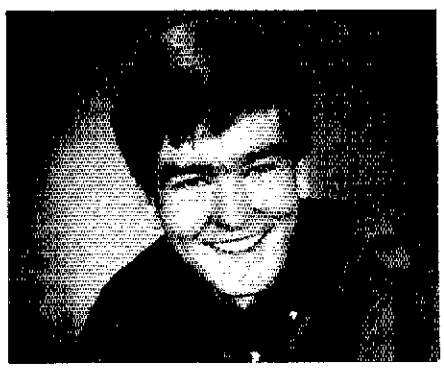
"I am pleased to have been selected to receive the Edmond A. Metzger Scholarship for academic year 1989-90. I attend Purdue University and hope to do research and development in the communications field as a result of my electronics engineering major."—*KD9UA*

"Thank you for this award. As a student at Mississippi State University studying mechanical engineering, I feel that this broad field will offer many opportunities in technological advancement and I appreciate the financial assistance that this scholarship affords."—*KA5YRK*



Troy A. Campbell, N7KWY—The Edward A. Jaikins Memorial Scholarship—$500

David M. Hulka, KD9UA—The Edmond A. Metzger Scholarship—$500



Cary E. Watkins, KA5YRK—The Paul and Helen Grauer Scholarship—$500

Other recipients include: William A. Kjontvedt, NØHZB—The Perry F. Hadlock Memorial Scholarship—$1,000; Robert N. Keenan, WU6L—The Paul and Helen L. Grauer Scholarship—$500; Jonathan J. Vidal, N3GUI—The You've Got A Friend In Pennsylvania Scholarship—$1000; Andrew D. Jackson, N4FUF—The L. Phil and Alice J. Wicker Scholarship—$1,000; and David A. Stein, KD2ZE—The Dr James L. Lawson Memorial Scholarship—$500.

TOWARD A LESS TAXING YEAR

Among your resolves for the up-coming year are undoubtedly plans to maximize every tax deduction you're entitled to. After all, you're paying more taxes. Wouldn't it be nice to know that you can kill two birds with one stone *and* do a lot of good for your fellow hams via a simple contribution of any size to the ARRL Foundation? Choose the program(s) you wish to support with the assurance that every dollar works to the betterment of Amateur Radio programs you and others can enjoy. And what's more, every dollar is tax-deductible—to the full extent permitted by the IRS—certainly a fact not to be overlooked when considering your tax return. Our address is: The ARRL Foundation, 225 Main Street, Newington, CT 06111.

Contributor's Corner

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

The Victor C. Clark Youth Incentive Program Fund
George Wessner, K4FOL
in memory of John Butterfield, W2CSK

The Don Riebhoff, K7ZZ Memorial Scholarship Fund
Donald P. Branda
and Rush Drake, W7RM

The Edmond A. Metzger Scholarship Fund
Six Meter Club of Chicago (IL)

The Goldwater Scholarship Fund
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Darrel L. Daley, KL7DN

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John Kirby, KC6BLW
Robert J. Collazo, WB5VOA
Harold A. Willett, WA5ESI
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Erik Eriksen, W2NZV
Stephen Thudium, N9ENO
Raymond M. Bendett, K2EZ
Else & Lee Baker
in memory of Andrew Coniff, WA7YDV

As received and acknowledged during the month of **September.**

Conducted By John C. Hennessee, KJ4KB
Regulatory Information Editor

Amateur License Fee Schedules Adopted by House and Senate; May be Dropped in Conference

In a matter affecting all amateurs, both the House and Senate have adopted legislation incorporating a schedule of fees for amateur licenses, but at press time there's still hope that the issue will be settled in our favor in the joint House-Senate Conference Committee. The House of Representatives Omnibus Budget Reconciliation Act of 1989 (HR 3299) was adopted on October 5, and included amateur fees as proposed (mostly $30 per transaction).

Our focus then shifted to the Senate, which on Friday, October 13, adopted a stripped-down version of the House bill, by a vote of 87 to 7. Senate leadership on both sides of the aisle strongly discouraged the introduction of amendments to their version of the budget reconciliation bill. The Senate version, S.1750, included a different schedule of fees for Amateur Radio licenses.

On October 3, Senator Carl Levin of Michigan made the following strong statement to the Senate on behalf of amateurs:

"Mr President, I have recently learned that the Commerce Committee has chosen to meet its reconciliation responsibilities, in part, by imposing unprecedented fees on our Amateur Radio operators. It is ironic that this proposal comes at a time when we have been able to witness the achievements of the Amateur Radio operators so prominently in our daily headlines.

"During some of the darkest hours of Hurricane Hugo, as it ripped through the Virgin Islands, the world relied on the abilities and commitment of our Amateur Radio operators to pick up the only bits of news available about the extent of the damage and the condition of the islands. For much of the critical time immediately after the hurricane, we were dependent upon what we learned from our Amateur Radio operators. And at that time, any information we could get was absolutely priceless.

"Amateur Radio operators, or hams as they are commonly called, are dedicated individuals who play a valuable role for our nation in public safety, disaster relief, and emergency communications for national defense, among other services. Although ham operations are primarily a hobby, in times of need Amateur Radio operators are transformed into a corps of highly trained public service communicators, who willingly work long hours as volunteers during disasters. And, the Amateur Radio operators provide these services at no personal profit. In fact, they use equipment that they have purchased themselves.

"Last year we passed legislation that required government agencies to take into account 'the valuable contributions made by Amateur Radio Service.' Yet in the past year the Amateur Radio community has had to face several setbacks.

"On August 17, 1989, the Federal Communications Commission (FCC) released a memorandum opinion and order reaffirming their action of August 4, 1988, reallocating the 220-222 MHz radio frequency band on an exclusive basis to the land mobile service despite the strong opposition and pleas of the Amateur Radio community. The Amateurs had objected strongly to prohibiting their use of this frequency [band], since they had used this band for some of their emergency assistance. Now they face this proposed budget reconciliation provision which would impose new license fees upon them.

"The proposed budget reconciliation of the Commerce Committee provides for approximately $43 million in additional revenues to the FCC to cover the FCC's administrative costs. $3.78 million of this amount would come from fees charged to Amateur Radio operators.

"The proposal would assess a $35 charge for an amateur license under the following categories: New License, Modification of License, Renewal of License, Reciprocal Permit for Alien Amateur License, Renewal or Modification of Amateur Club, RACES, or Military Recreation Station License and Special Temporary Authority (Initial, Modification, Extensions). Additionally, another category is proposed with an assessment of $105 for a request for a waiver, either routine or non-routine.

"Included in the list of fees is an assessment against a group called RACES. This stands for Radio Amateur Civil Emergency Services. RACES stations are licensed to local and state government entities and are very important for our nation's emergency communications. Also in this category are fees to be assessed against amateur clubs and military recreation stations. These include clubs that are in our nation's schools so our children can learn the importance of how to work on Amateur Radio equipment and participate in worthwhile volunteer work. Our military recreation stations also provide the very important public service of keeping our military forces in touch with those back home.

"At the present time Amateur Radio operators are exempt from license fees as are other non-profit organizations. The Commerce Committee has not included in its proposed fee schedule other non-profit organizations such as special emergency and public safety groups and public broadcasters. The reason for their exclusion is, in part, their important public service role. Mr President, our Amateur Radio operators also provide an important public service, and we should not treat them any differently than we do other non-profit, service organizations.

"In addition, Mr President, I have been informed that the Amateur Radio operator community has already been assuming much of their own administrative burdens. For example, the amateurs already administer, on a voluntary basis, license examinations at no cost to the FCC. From 1983 to the present, it is estimated that the Amateur Radio operators have saved the FCC $1 million a year by performing this function.

"And finally, I should add that these proposed fees are for the purpose of reimbursing the FCC for the actual costs it incurs in processing these various licenses. Yet, the FCC has admitted that the true costs for these licensing responsibilities may be as little as 35 cents in some cases."

Senator Levin spoke on the Senate floor on October 13, just prior to the vote. The Senator stated that he had intended to introduce an amendment exempting amateur licenses from fees with Senators Symms of Idaho and Lieberman and Dodd of Connecticut, but that in view of the resistance to any amendments, he would not do so. The amendment he would have introduced would strike what he called "a new tax on Amateur Radio operators." Senator Levin said he did not believe the framers of the bill had intended to levy a new tax on Amateur Radio volunteers, and had confirmed this with Senator Hollings of South Carolina, Chairman of the Commerce Committee.

Senator Danforth of Missouri, the ranking minority member of the Commerce Committee agreed, and said that the Committee had managed to exceed its instructions on budget reconciliation and would work with Senator Levin to drop the matter of amateur fees from the legislation in the conference committee. Senator Danforth went on to say:

"...what we have attempted to do in the Commerce Committee is to set up a general user fee scheme for people doing business with the FCC, but we never really focused on the question of the Amateur Radio operator, so as a matter of policy and also a matter of dollars, we would be prepared to work with the Senator from Michigan [Levin]. This is, of course, on the assumption that we do in fact go to the Conference with the House. If there is a Conference with the House, I want to assure the Senator from Michigan that I will do everything I can to work with him and I believe that we can drop this particular matter from the legislation."

Senator Levin added: "Amateur Radio operations serve as an an excellent educational tool for our young children. They demonstrate the excitement and practical rewards of applied science...Amateur Radio operators serve as an important but unofficial link to the rest of the world—allowing informal and directly personal communications between persons of widely divergent cultures—an Australian farmer and a Boston engineer. One enterprising American even communicated...with a Soviet cosmonaut orbiting the Earth. Such relations bring a tremendous advantage to our overall efforts of world peace and friendship."

Senator Levin went on to reiterate that amateurs are already saving the FCC $1 million a year through the VEC testing program. "A sizable proportion of these fees are a tax," the Senator said. "If we are to address their work in any way, it should be with praise and thanks, and not with new charges." The Senator inserted into the public record the text of an amendment he had planned to introduce, and also a letter from George Race, WB8BGY, ARRL Michigan Section Manager.

By the time you read this, the outcome of the amateur licensing fees will probably have been determined. Monitor W1AW bulletins and watch *The ARRL Letter* for late-breaking news.

ARRL AND DEPARTMENT OF JUSTICE PETITION FOR JUDICIAL REVIEW OF 87-14

Most amateurs are familiar with Docket 87-14 and the FCC's decision to reallocate 220-222 MHz to the land mobile service. As reported in last month's League Lines, on September 28, 1989, ARRL filed a Petition To Review Agency Order asking the US Court of Appeals for the DC Circuit to review the reallocation decision. In the petition, ARRL stated that "The FCC's reallocation decision of the 220-222 MHz band exclusively to the land mobile service was arbitrary, capricious, an abuse of discretion and not in accordance with the law...." It proceeded to list reasons that the decision should be set aside and the matter remanded to the Commission.

The ARRL said that the FCC has a duty to encourage the development of packet technology as much as land mobile technology, "yet it determined to encourage one potential user of narrowband technology by eliminating hundreds of existing packet radio operations in the 220-222 MHz band." ARRL also noted that the decision was made without adequately checking other frequencies which could have been used in introducing land mobile technology.

The Department of Justice, acting on behalf of the National Communications System, a body representing 23 government organizations (including the communications system used by the White House) has filed a similar petition in the US Court of Appeals requesting that the Court review the FCC reconsideration decision. NCS had filed a petition for reconsideration strongly supporting the amateur view and stating that the reallocation of 220-222 MHz was harmful to national security emergency preparedness.

PRB-1 HELPS IN COSTA MESA ORDINANCE

The City of Costa Mesa, California recently adopted an ordinance setting forth procedures and regulations for Amateur Radio antennas. The ordinance was developed with input from a number of hams, including ARRL Director Fried Heyn, WA6WZO, Vice Director Wayne Overbeck, N6NB, and Assistant Director Art Goddard, W6XD.

The new Costa Mesa ordinance recognizes the fact that PRB-1 preempts state and local zoning regulations which seek to preclude Amateur Radio communications. It did note that regulations based on health, safety or aesthetics must represent a reasonable accommodation for Amateur Radio communications and must constitute the minimum practicable regulation necessary to carry out the local agency's legitimate purpose.

All antennas and towers erected in Costa Mesa prior to September 6, 1989 must be registered by May 7, 1990 to be "grandfathered" in. Antennas erected after September 6, 1989 fall into three categories: (1) roof-mounted antennas that require no permit; (2) antennas and towers under 30 feet that require a permit (there is no limit on the number of antennas); (3) antennas and towers over 30 feet that require a permit (these can be no higher than 75 feet with a maximum of two towers). There is no limit on the number of antennas under 30 feet.

Amateurs involved in getting the ordinance rewritten learned several things: Use PRB-1—it's an excellent tool, be prepared, know your facts and most of all, be observant.

FCC ANNUAL REPORT AVAILABLE FROM GPO

The FCC's 54th Annual Report for the fiscal year 1988 is available from the US Government Printing Office. The price is $4.25 and the stock number is 004-000-00481-7. Orders for this and other FCC documents will be accepted by calling the Reference Desk at 202-783-3238. Written requests should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

MICROSATS PASS ENVIRONMENTAL TESTING; LAUNCH DATE RESCHEDULED

All four AMSAT Microsats (PACSAT, LUSAT, DOVE, and WEBERSAT) completed their environmental tests, that is, thermal vacuum and vibration tests, with flying colors. This means the Microsats are now certified to fly aboard the Ariane IV launch vehicle.

Official word received from Intelsat and Arianespace representatives indicates that the launch date has been rescheduled for January 19, 1990, so problems can be corrected with the Ariane IV launch vehicle. The AMSAT

FCC-ISSUED CALL SIGNS UPDATE

The following is a list of the FCC's most recently issued call signs as of October 1

District	*Group "A" Extra*	*Group "B" Advanced*	*Group "C" Tech/Gen*	*Group "D" Novice*
0	WX0B	KF0FO	N0LBX	KB0FGF
1	NY1Y	KC1QM	N1GZF	KA1UMA
2	WT2I	KE2PK	N2JXX	KB2IPO
3	NW3P	KD3PD	N3HNQ	KA3VFA
4	AB4QX	KM4YQ	N4WZL	KC4MPI
5	AA5OF	KG5YR	N5PHT	KB5KRX
6	AA6QX	KK6AG	N6WKV	KC6FYH
7	AA7BX	KF7XB	N7NPO	KB7ISH
8	WV8T	KF8BQ	N8LIH	KB8IEF
9	WK9P	KE9SI	N9IXW	KB9DKQ
Guam	KH2K	AH2CF	KH2EE	WH2AMH
Hawaii	**	AH6JW	NH6UN	WH6CFG
Alaska	**	AL7LO	NL7SS	WL7BVR
USVI	NP2F	KP2BR	NP2DJ	WP2AGZ
PR	**	KP4QJ	WP4WX	WP4IOD

**indicates that all 2 × 1 call signs have been assigned in those areas.

launch team will use this time to perform additional systems and software testing on the satellites.

FORMER ARRL VICE PRESIDENT PERCY NOBLE, W1BVR, SK

We're saddened to report that Percy Noble, W1BVR, of Lanesboro, Massachusetts, is now a Silent Key. Percy represented the best of Amateur Radio and was a gentleman to all. Known particularly in traffic circles, Percy's life was dedicated to public service.

Noble was elected New England director in 1936 (replacing George Bailey, W1KH, who was made vice president after the deaths of Hiram Percy Maxim, W1AW, and Charles Stewart, W3ZS), a post which he held until 1954. Percy was elected ARRL vice president from 1954 until 1960. He was also elected to several terms as Section Communications Manager in Western Massachusetts. First licensed in 1921, he was active in the Army Amateur Radio System (predecessor to MARS) from the late '20s. In 1949, he became the first manager of the then-fledgling National Traffic System's First Region Net.

Although Percy is no longer with us, many amateurs will remember this man who typified the loyalty and devotion of "traffic men" everywhere.

NEW TELEPHONE NUMBER FOR FCC SAN FRANCISCO FIELD OFFICE

Effective immediately, the FCC's San Francisco Field Office has new telephone numbers. They are: 415-705-1101, 415-705-1102 and 415-705-1100. The address remains: FCC Field Office, 424 Customhouse, 555 Battery St, San Francisco, CA 94111.

BEHIND THE DIAMOND: W1AW CHIEF OP RETIRES AFTER 38 YEARS

After 38 years "behind the diamond," Charles R. Bender, W1WPR, is winding down his half-a-lifetime career at ARRL. "Chuck" Bender is Chief Operator and Station Manager of W1AW, and has been involved with W1AW operations since 1952, giving Chuck the distinction of serving more years at HQ than any other person currently on staff.

As his call phonetics indicate, Chuck is a "Western Pennsylvania Refugee" since he hails from Pittsburgh, Pennsylvania. He was quite active from Pennsylvania as W3ODU. A graduate of Grove City College, Chuck enlisted in the US Army during World War II and saw service in the European Theatre. He came to ARRL HQ in September 1952. After the retirement of Murray Powell, W1QIS, in 1972, Chuck became Chief Operator of W1AW, supervising a crew of two W1AW operators and managing the station.

When asked how things have changed from 1952 to the present, Chuck stated that there have been great advances in the state-of-the-art in Amateur Radio. According to Chuck, "Back in 1952, everything had tubes and SSB was still evolving. W1AW used AM until about 1963 when we switched over to SSB. Back then, making contacts was a part of the job, and to me, it was the best job in the world."

About 10 years ago, FCC rules were changed and staff operators were prohibited from making contacts. W1AW had only one 45-minute code practice session, two CW bulletins sessions and two SSB bulletin sessions per day. "Now we transmit code practice 26 hours per week and send four CW, four RTTY and two SSB bulletin sessions per day. In 1952, W1AW used home-brew transmitters on each band; now we have separate commercial transceivers."

No visit to ARRL HQ would be complete without a visit to W1AW and, of course, a chat with "Mr W1AW." Although he doesn't get on the air from home very much these days, Amateur Radio continues to be very important to Chuck.

You might say that working at ARRL runs in the family; his wife Arline, WA1VMC, retired last year after a long career at HQ. Many members, particularly those involved with the Field Services Department, remember her cheery voice. Chuck plans on retiring at the end of December, bringing to an end a long and distinguished career at ARRL HQ "behind the scenes at W1AW."

8J6JBS OPERATIONS ANTICIPATE LAUNCH OF JAS-1b

The second Japanese amateur satellite, JAS-1b, is scheduled for launch in February, 1990. To commemorate the occasion, the Japan Amateur Radio League (JARL) set up a special station on September 28. The station is located in the Welfare Center of Minami Tane-machi, Nakajinai Minami Tanemachi, Kumagte-gun, Kagoshima Prefecture, Japan. 8J6JBS will continue operation through February 1990 on all HF bands between 1400-2200 UTC.

THOSE BLAZING SUNSPOTS

It appears that solar cycle 22 may be ready to peak. During September, the solar flux went on a "roller coaster ride" peaking at 305 twice in three days, then dipping to 155. Conditions improved during October, with the best days of the fall season expected to arrive during November.

The latest solar and geomagnetic field data is transmitted at 18 minutes past the hour by WWV in Boulder, Colorado. The same information is transmitted by WWVH in Hawaii, at 45 minutes past the hour. The K index is revised every three hours, and a K figure of 3 or more indicates poor propagation or even complete loss of communication on high-latitude paths. Trans-equatorial propagation is not usually affected and may even improve under high-K conditions.

Even the lowest solar flux readings for the next year or so should be high enough for good work on all HF bands. The next year or so should also provide ample opportunities for DX on 50 MHz.

NEW CANADIAN CALL PREFIX: VY2

Effective October 30, new amateurs on Prince Edward Island, Canada, were issued call signs with the prefix VY2. Present amateurs on Prince Edward Island will have the option of retaining their VE1 call signs or, upon request to a DOC District Office, substituting VY2 for the VE1 prefix. New Brunswick and Nova Scotia will remain VE1.

JAPAN'S HAM FAIR '89

The New Hall of the International Trade Center in Tokyo was the site of HAM FAIR® from August 25-27. HAM FAIR is one of the largest Amateur Radio events in the world. Over the three-day period, the total number of attendees reached approximately 58,000, including 90 people from 14 other countries. Noted guests this year included Dick Baldwin, W1RU, President of IARU, Cheng Ping, BZ1CP, Vice President of the Chinese Radio Sports Association (CRSA) and Wan Xun, BZ1WX, Vice President and Secretary General of CRSA.

US ENTERS INTO THIRD-PARTY TRAFFIC AGREEMENT WITH THE FEDERATED STATES OF MICRONESIA

On October 12, the US and the Federated States of Micronesia (V63) entered into a third-party traffic agreement. This agreement allows radio amateurs in both countries to relay personal messages on behalf of nonamateurs. The agreement also says that if public telecommunications services are not readily available in the event of an emergency, communications relating directly to the safety of life or property may be handled by amateur stations in the two countries. Commercial messages or conversations are strictly prohibited under the agreement.

NEW RSGB QSL BUREAU ADDRESS

The Radio Society of Great Britain informs us that the RSGB QSL Bureau has a new address: PO Box 1773, Potters Bar, EN6 3EP, United Kingdom. All cards for UK stations may be sent to this address.

GM ISSUES TRANSCEIVER GUIDELINES

General Motors Corporation has released a brochure entitled *Radio Telephone/Mobile Radio Installation Guidelines* for their late-model automobiles. GM states that "these guidelines are intended to supplement, but not to be used in place of, detailed instructions for such installations which are the sole responsibility of the manufacturer of the involved radio telephone or land mobile radio." They indicate that improperly installed transceivers may "adversely affect vehicle operations such as performance of the engine, driver information, entertainment and electrical charging systems."

The guidelines also go over such items as transceiver location, antenna installation, antenna coax routing, radio wiring and connection locations as well as troubleshooting. The brochure also includes a detailed pictorial showing the recommended placement of single-unit transceivers as well as those with remote-control heads. Copies of the installation guidelines are available by writing to the Electromagnetic Compatibility Department, EMC Building 40, General Motors Proving Ground, Milford, MI 48024-2001

Moved and Seconded . . .

MINUTES OF THE EXECUTIVE COMMITTEE
Meeting Number 435
St. Louis, Missouri
October 21, 1989

AGENDA

1. Approval of Minutes of June 24, 1989, Executive Committee Meeting
2. FCC Matters:
   2.1 Review of status of court appeal of FCC 220-MHz decision, and progress report on technical justification for secondary 216-220 MHz allocation
   2.2 Review of status of ARRL petition, RM-6995, seeking a codeless class of amateur license
   2.3 Review of status of amateur license fee issue in Congress
   2.4 Consideration of proposals for amendments to Part 97 to address League objectives not achieved in the rewrite
   2.5 Review of status of General Docket 87-389 (Revision of Part 15 of FCC Rules)
   2.6 Other FCC matters
3. International matters
   3.1 Report on IARU Region 2 Conference, Orlando, September 4-8, 1989
   3.2 Report on meeting of IARU Administrative Council, Orlando, September 9-11, 1989
   3.3 Other international matters
4. Report of the Election Committee on the Director and Vice Director elections for the 1990-91 term
5. Actions assigned to the Executive Committee by the Board at 1989 Annual Meeting
   5.1 Minute 80: Continuation of review of Standing Orders
   5.2 Minute 81: Action plan for FCC compliance with RFI legislation
6. Review of progress on Board directives:
   6.1 By the vice presidents and/or chairmen, for the committees
   6.2 By the Executive Vice President, on Headquarters action items
7. Local antenna/RFI matters
   7.1 The due-process issue (Minute 45, July Board Meeting)
   7.2 Other matters
8. Proposed change in pension plan to comply with Tax Reform Act of 1986
9. Field Organization matters
10. State scanner statutes and ordinances
11. Proposed Amateur Radio memorial
12. Recognition of new Life Members
13. Affiliation of clubs
14. Convention matters
   14.1 Progress report on 1990 National Convention and review of proposed program
   14.2 Approval of conventions
15. Date and place of next meeting
16. Other business
17. Adjournment

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc. met at 8:30 A.M. Central Daylight Time, October 21, 1989, at the Airport Marriott Hotel, St. Louis, Missouri. 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, Stephen A. Mendelsohn, WA2DHF, and Hugh A. Turnbull, W3ABC. Also present were Directors Frank M. Butler, Jr., W4RH, Jim Haynie, WB5JBP, Fried Heyn, WA6WZO, John C. Kanode, N4MM, Edmond A. Metzger, W9PRN, Marshall Quiat, AGØX, and Rodney J. Stafford, KB6ZV; Vice President George S. Wilson, III, W4OYI; International Affairs Vice President Tod Olson, KØTO; and Counsel Christopher D. Imlay, N3AKD.

1. On motion of Mr. Turnbull, the Minutes of the June 24, 1989 meeting were adopted as printed.

2. FCC matters:

2.1. Mr. Imlay reported on the status of the League's court appeal of the FCC decision to reallocate 220-222 MHz. The League's petition for review was filed with the U.S. Court of Appeals for the District of Columbia Circuit on September 28. Representing the National Communications System, the Department of Justice also has filed a petition for review of the FCC's decision. It is likely that the Court will consolidate the two appeals. A number of interested parties, such as United Parcel Service, are expected to file motions to intervene. With regard to the planned petition seeking a secondary allocation at 216-220 MHz for the Amateur Service, Mr. Imlay reported that work was progressing. The strongest opposition is expected to come from representatives of television broadcast interests, concerned about interference to the adjacent channel 13.

2.2. Mr. Imlay reported that ARRL had filed timely comments in support of its own codeless license petition, RM-6995. Other comments, mostly in support of the general concept of a codeless class of amateur license, have been received by the Commission.

2.3. Mr. Sumner reported that budget reconciliation legislation containing a schedule of fees for Amateur Radio licenses had been adopted by the both the House and the Senate. The House version calls for a $30 fee per transaction, while the Senate version is $35. However, floor statements by Senators Levin of Michigan and Danforth of Missouri had been made in support of deleting Amateur Radio from the fee schedule in conference committee, and other key Senators are known to support this action. The conferees are expected to meet on or shortly after October 24; ARRL efforts over the past week have concentrated on lining up support among the conferees.

2.4. A draft petition seeking those revisions to Part 97 that had been sought by the League, but not incorporated by the FCC in its recent proceeding to reorganize Part 97, had been circulated in advance to the Executive Committee. The draft was prepared by the Ad Hoc Part 97 Rewrite Committee with assistance from Counsel and staff. It did not propose new rules governing digital modes, these being addressed in a separate draft. On motion of Mr. Mendelsohn, the Executive Committee authorized Counsel to make minor modifications to the draft and then to file the petition with FCC. On motion of Mr. Turnbull, the Ad Hoc Part 97 Rewrite Committee was discharged with thanks to its members, and to Counsel and staff, for their work.

A draft petition seeking new rules to govern operation using digital modes had been prepared by the Committee on Amateur Radio Digital Communication and reviewed by the Membership Services Committee, and the draft circulated to the Executive Committee and the Board. On motion of Mr. Frenaye, it was agreed that the members of the Executive Committee would review the draft and offer their comments by November 4, with the other Board members being similarly invited to comment. The comments are to be reconciled and appropriate changes incorporated in the draft, which shall then be submitted for mail vote by the Executive Committee.

2.5. Mr. Imlay reported on the July *ex parte* presentation by ARRL to FCC Office of Engineering and Technology staff which demonstrated the basis for our concerns about aspects of the Part 15 rewrite proceeding, General Docket 87-389. There are inconsistencies between FCC policy which clearly gives priority to licensed radio services over nonlicensed users, and the way the policy is actually implemented by FCC field personnel in specific interference situations. ARRL efforts to bring implementation into line with policy are continuing. No action has been taken on our petition for reconsideration in General Docket 87-389.

2.6.1. The status of a case of alleged interference by an amateur station to a neighbor's pacemaker was reviewed. The case has been left unresolved much longer than is fair to the amateur concerned; recently, tests which might have cleared up the matter were cancelled at the last minute.

2.6.2. Robert McNamara, Chief of the Special Services Division of the FCC Private Radio Bureau, has written to numerous amateurs requesting information with regard to third-party traffic and one-way transmissions. A letter on behalf of the League is in preparation.

2.6.3. The Executive Committee discussed, without taking formal action, the status of the special exemption for AM transmitters in Section 97.313(b) of the Commission's Rules.

3.1. Those present who had attended the IARU Region 2 Conference hosted by ARRL in Orlando, September 4 to 8, were invited to share their impressions with the group. The meeting was reported to have been productive both in terms of the business accomplished and the personal relationships with delegates from overseas that had been nurtured and established. The closing banquet provided a fine setting for marking the League's 75th anniversary. The next Region 2 Conference is scheduled for Curacao.

The Committee was in recess for luncheon from 11:46 A.M. to 12:15 P.M.

3.2. Mr. Price reported on his first meeting of the IARU Administrative Council as its Secretary. The meeting was chaired most ably by IARU Vice President Michael Owen, VK3KI, in the absence of IARU President Baldwin who was travelling in Africa.

3.3. In response to a question, Mr. Price reported that the Canadian Radio Relay League was taking appropriate steps to encourage both the Canadian Department of Communications (DOC) and individual Canadian amateurs to take note of, and observe, voluntary band plans in the event DOC eliminates mandatory mode subbands from its amateur rules.

4. Mr. Metzger presented the report of the Election Committee. On motion of Mr. Holladay, the report was accepted and the Secretary was directed to publish it as an appendix to these Minutes.

5. By unanimous consent, agenda item 5 was deferred.

6.1. Messrs. Holladay and Quiat reported on behalf of the Membership Services Committee, which had met on the weekend of October 7. Since the July Board Meeting, controversy had arisen concerning the 902-MHz band plan adopted by the Board. Questions have been raised concerning both the weak-signal calling frequency and the portion of the band to be used for repeater inputs and outputs. Mr. Quiat reported that it appeared that, through oversight, the "Torrance" band plan that had been recommended to the Board by the Membership Services Committee in July had had the repeater input and output frequencies reversed from the plan actually agréed to in Torrance. On motion of Mr. Mendelsohn, the Executive Committee voted that, in view of the report of the chairman of the Membership Services Committee, the 902-MHz band plan be amended so that 906.0-909.0 MHz is designated for repeater *outputs* and 918.0-921.0 MHz is designated for repeater *inputs*, this being the reverse of what was adopted by the Board in July at Minute 57.

Mr. Metzger, as chairman, reported on behalf of the Administration and Finance Committee. The A&F Committee is addressing the assignments it has been given, and is preparing to review the 1990 budget next month.

Mr. Price reported on behalf of the officers, who are engaged in long-range planning at the direction of the Board. A number of "white papers" addressing various aspects of long-range planning were reviewed informally. In the course of this review, on motion of Mr. Grauer, it was voted that in the budget process for 1990, the Executive Vice President incorporate increased capability for telephone retail sales of publications and member supplies.

6.2. Mr. Sumner reported on financial and personnel matters, noting that the operating losses reported to the Board for the first six months of the year had continued as expected during July and August but had been reversed in September. The introduction of a new edition of *Tune in the World* in September, followed in October by a new edition of *The FCC Rule Book* and the 1990 *ARRL Handbook* along with the brand-new *Technician Class License Manual* and *General Class License Manual*, will provide considerable revenue during the last quarter of 1989. A commemorative 75th anniversary publication containing a number of previously unpublished photographs and other historic treasures from the League's past will make its debut toward year-end. The senior member of the ARRL

Headquarters staff, W1AW Chief Operator Chuck Bender, W1WPR, will be retiring at yearend. Now that the conversion to an IBM System 38 has been substantially completed, the Honeywell computer which has served as the League's primary data processing hardware since 1981 is to be taken off-line on November 1. W1AW is back on the air from its own building, on five bands and all regular operating modes; some antenna work remains to be completed, but signal reports received so far are very encouraging. During the course of Mr. Sumner's report, *QST* advertising policy was reviewed and affirmed without formal action.

The Committee was in recess for dinner from 6:25 to 8:00 P.M.

7.1. Mr. Imlay reported that the due-process issue has been pursued on a number of fronts since the July Board Meeting. FCC Field Operations Bureau personnel persist in denying that licensees have a right to a hearing before operating restrictions exceeding those spelled out in the Commission's Rules may be imposed; however, any time an amateur takes issue with that position, the Commission rescinds the restrictions before a legal challenge of its position can be mounted.

7.2. Mr. Imlay reported that the Supreme Court of Illinois has refused to rehear an appeal of *Winfield Village Cooperative v. Ruiz*, a case involving a nuisance complaint arising from RF interference. The case may now be moot, as it has been reported that the complainants have moved. Mr. Turnbull reported briefly on his work on the IEEE Standards Committee on Electromagnetic Compatibility, C.63, in which questions have arisen concerning the validity of FCC statistics on interference complaints. Mr. Turnbull also advised the Committee that no further word had been received from the FCC Baltimore Field Office concerning the presentation made to the Committee last December.

8. On motion of Mr. Turnbull, it was voted that, in compliance with the Tax Reform Act of 1986, ARRL policy with respect to pension vesting for its employees is amended to provide full vesting after five years of credited service.

9.1. The Executive Committee reviewed a report prepared by the Field Services Manager documenting the actions of a Section Manager which had resulted in numerous complaints from members. On motion of Mr. Mendelsohn, the President was directed to write to the Section Manager advising him that the expressing of personal opinions in the guise of official ARRL communications cannot be tolerated, in part because such conduct might jeopardize the agreement between ARRL and FCC establishing the Amateur Auxiliary; and that a repetition of this conduct will be grounds for immediate removal from office.

9.2. The Executive Committee reviewed a report prepared by the Field Services Manager concerning allegations of irregularities in an application for club affiliation that had been recently approved. On motion of Mr. Turnbull, the Field Services Manager was instructed to notify the club president in writing of the investigation, and to request that he show cause why the club's charter of affiliation should not be revoked.

10. After discussion, on motion of Mr. Mendelsohn, Counsel was instructed to file a request with FCC for a declaratory ruling preempting state statutes and local ordinances that restrict the possession or operation by licensed amateurs of Amateur Radio equipment having the incidental capability to receive frequencies outside the amateur bands.

11. The Committee was in receipt of a proposal, submitted on behalf of the 1991 ARRL National Convention Committee, for a memorial on the ARRL Headquarters grounds honoring those radio amateurs who have given their lives while providing public-service communications. On motion of Mr. Turnbull, the Executive Vice President was instructed, in coordination with the Director of the Great Lakes Division, to advise the Committee that the proposal was accepted in principle, but that ARRL must retain control of the design so as to ensure compatibility with the site and compliance with local regulations.

12. On motion of Mr. Frenaye, the names of 55 newly elected Life Members were recognized, and the Executive Vice President was directed to list their names in *QST*.

13. On motion of Mr. Grauer, the following clubs were declared affiliated:

Category 1

Amateur Radio Associates, Graniteville, Vermont
Autonetics Radio Club, Anaheim, California
Crescent Hill Amateur Operators Society, Orangeburg, South Carolina
DuPont Experimental Station Amateur Radio Club, Wilmington, Delaware
Florida Keys Amateur Radio Club, Big Pine Key, Florida
Johnson County Amateur Radio Club, Cleburne, Texas
Lakeland Amateur Radio Club, Inc., Lakeland, Florida
Livingston Amateur Radio Society, Walker, Louisiana
Lorain County Amateur Radio Association, Elyria, Ohio
Low Country Amateur Radio Digital Society, Goose Creek, South Carolina
Middle Peninsula Amateur Radio Club, Gloucester Point, Virginia
Mile High Mountain Radio Club, Idyllwild, California
Moreno Valley Amateur Radio Association, Moreno Valley, California
NODOT DX'ers, Barrington Hills, Illinois
Northwestern Illinois Amateur Radio Club, Freeport, Illinois
Pahrump Valley Amateur Radio Club, Pahrump, Nevada
Pleasant Valley Radio Club, Jonesboro, Tennessee
Puget Amateur Radio Society, Issaquah, Washington
Rusty Polecats VHF Society, Surprise, New York
St. Albans Emergency Services Amateur Radio Communications, St. Albans, West Virginia
Suffolk County VHF/UHF Association, Islip Terrace, New York
Three Amigos Radio Association, Wheelwright, Massachusetts
Top of Michigan Amateur Radio Club, Gaylord, Michigan
Washington County Amateur Radio Association, Exeter, Rhode Island
Wilson Amateur Radio Club, Lebanon, Tennessee

Category 3

Flour Bluff High School Amateur Radio Club, Corpus Christi, Texas
Leary Elementary School Radio Club, Warminster, Pennsylvania
Southern Methodist University Amateur Radio Club, Dallas, Texas

With the election of these clubs, the League has 1,782 active affiliated clubs in Category 1, 24 in Category 2, 145 in Category 3, and 5 in Category 4.

14.1. As host Director, Mr. Grauer reported on preparations for the 1990 ARRL National Convention to be held in Kansas City, Missouri. The speakers' program was reviewed by the Committee.

14.2. On motion of Mr. Mendelsohn, the holding of the following ARRL conventions was approved:

International DX, April 6-8, 1990, Visalia, CA; North Carolina State, April 8, 1990, Raleigh, NC; Iowa State, May 11-12, 1990, So. Sioux City, NE; Central Division, July 7-8, 1990, Indianapolis, IN; West Gulf Division, August 3-5, 1990, Austin, TX; Florida State, August 4-5, 1990, Jacksonville, FL; Alabama State, August 18-19, 1990, Huntsville, AL; Michigan State, September 22, 1990, Gaylord, MI; Roanoke Division, October 13-14, 1990, Virginia Beach, VA; Southeastern Division, February 2-4, 1991, Miami, FL.

15. December 11 was selected as the tentative date for the next meeting of the Executive Committee, to be held only if circumstances warrant.

16. On recommendation of the Volunteer Resources Committee and on motion of Mr. Mendelsohn, the 1988 Technical Excellence Award was bestowed upon John Grebenkemper, KI6WX, for his two-part *QST* article, *Phase Noise and its Effects on Amateur Communications* (applause).

Without objection, agenda item 5.1 was deferred to the next meeting. With regard to 5.2, Mr. Imlay noted Mr. Turnbull's report earlier in the meeting concerning the C.63 Committee and advised the continued monitoring of developments.

During the course of the meeting, without taking formal action, the Committee also discussed the need for greater use of *QST* in communicating to members what the League is doing in Washington on their behalf; possible improvements in procedures for developing and amending band plans; favorable comments received concerning *QST* content, notably the Shulman and Greer articles in the October issue; third-party traffic services for the military; availability of ARRL membership lists; and policies governing access to the National Repeater Data Base.

There being no further business, the Committee adjourned at 11:26 P.M.

Respectfully submitted,
David Sumner, K1ZZ
Secretary

REPORT OF THE ELECTION COMMITTEE

1989 ELECTIONS FOR ARRL DIRECTOR AND VICE DIRECTOR

The ARRL Election Committee for the 1989 elections (1990-1991 term) was appointed by President Price in accordance with Bylaw 42. Members are:

Edmond A. Metzger, W9PRN, Chairman
Thomas W. Frenaye, K1KI
Stephen A. Mendelsohn, WA2DHF

The Election Committee reviewed the eligibility of candidates for Director and Vice Director of the following Divisions: Atlantic, Dakota, Delta, Great Lakes, Midwest, Pacific, and Southeastern. The 300-word statements and candidates' photographs were also reviewed. The review was conducted entirely by mail, telephone, and electronic mail; there was no in-person meeting required. The following nominees were found by the Committee to be lawfully nominated and eligible:

Atlantic Division

For Director:

Hugh Turnbull, W3ABC,
and Robert B. Weinstock, KN1K

For Vice Director:

Kay Craigie, KC3LM,
and James M. Mozley, W2BCH

Dakota Division

For Director:

Richard Clem, WØIS,
George Frederickson, KCØT,
and Howard Mark, WØOZC

Delta Division

For Director:

Joel Harrison, WB5IGF,
and Arthur P. Kay, W5APX

For Vice Director:

James Amundson, W5TRD,
Henry R. Leggette, WD4Q,
and John Wondergem, K5KR

Great Lakes Division

For Director:

Leonard M. Nathanson, W8RC,
and Allan Severson, AB8P

For Vice Director:

George E. Race, WB8BGY

Midwest Division

For Director:

Paul Grauer, WØFIR,
and Robert S. McCaffrey, KØCY

For Vice Director:

L.C. Miller, WAØKUH,
and Laurance Staples, WØAIB

Pacific Division

For Director:

Rodney J. Stafford, KB6ZV

For Vice Director:

Charles P. McConnell, W6DPD

Southeastern Division
For Director:

Frank M. Butler, Jr., W4RH

For Vice Director:

Evelyn D. Gauzens, W4WYR,
and Alan H. Page, KE4WO

In the case of offices for which there was only one eligible nominee, the Election Committee declared the nominee elected to begin serving a two-year term at noon January 1, 1990, in accordance with Bylaws 19 and 22. In the case of contested offices, the Election Committee ordered the Secretary to mail ballots to all Full Members of the respective Divisions, also in accordance with Bylaws 19 and 22.

In addition to the names listed above, the Secretary had also received petitions containing the following nominations which were reviewed and disposed of as described below:

A petition was received nominating Bruce Meyer, W0HZR, for the office of Vice Director of the Dakota Division. However, the Secretary also received a letter from Mr. Meyer withdrawing his name from consideration. Accordingly, there is no eligible nominee for Vice Director of the Dakota Division. The resulting vacancy will be filled by appointment by the President of ARRL, in accordance with Article 7.

A petition was received nominating Bob Ideker, WB5VUH, for the office of Vice Director of the Delta Division. However, the petition contained only nine signatures and so was ruled defective.

A petition was received nominating Albert F. Gaetano, W6VZT, for the office of Vice Director of the Pacific Division. However, the Secretary also received a letter from Mr. Gaetano withdrawing his name from consideration.

Bylaw 20 requires that the Election Committee appoint a committee of three tellers, including at least one Director, to count the vote. The Committee of Tellers will consist of:

Director Metzger, Chairman
Director Frenaye
Director Mendelsohn

Ballot counting will take place at ARRL Headquarters on Monday, November 20, 1989.

Respectfully submitted,

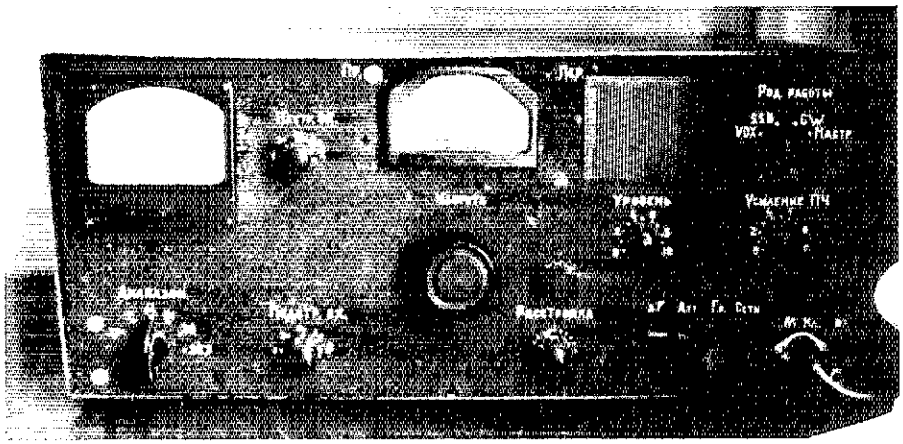
Edmond A. Metzger, Chairman
Thomas W. Frenaye
Stephen A. Mendelsohn

LIFE MEMBERS ELECTED

Tovan Adams, NL7MK; Robert J. Anderson, NX7N; David L. Avery, N0HEQ; Robert A. Banks, WB3BSN; Robert A. Berk, KC0OS; John E. Bertsch, KW1Y; Mark A. Blanton, WC5M; Daniel G. Bivins, KK4CP; Eugene Brand; John E. Bricoe, KF4RR; W. J. Burke, WA2NCH; Valentino R. Carolini, KN8O; Vicki Chinn, N6VZX; Steve J. Cembura, N6GVI; Janice M. Christopherson, KA7TYU; Robert J. Clark, N6JZN; Earl A. Daughtry, N4SNV; Donald W. Davis, WA5ZXB; Ronald E. Dean WB8NVX; La Wanda J. De Graff, WA6WGJ; Thomas A. Fuhrman, WB2JFX; Donnamarie R. Galipeau Jr, WA1LRL; Ronald Godschalk, N2GVJ; Virginia McGivern, WB1AVA; Larry C. Hall, N6TQV; William Hendrick, WD0GVY; John C. Kay, KA9CJG; Barbara P. Kent Jr, WB1EMZ; Chris F. Keilich, KE6CF; John R. Kitchens, NS6X; Frank Krozel, KG9H; Ira O. Laird, AA5JL; Ronald P. Luttringer, K6XC; John E. McConnell, KC6ESL; Charles R. McGlaughn, WB4JJB; Kevin B. Mayginneres, N0AIZ; Peter David Meyer, N0AFW; Russell C. Michaels, K8DXZ; W. Anthony Miller Jr, KA6CVY; William Z. Newark; Charles W. O'Hara, N7LXO; Carol L. Oliver, N6UZQ; Robert E. Osterloh, N4ICT; Stephen F. Paulsen, KA7PMD; Gary S. Pitts, AA4DO; Richard J. Sauer, N6CIZ; John A. Shoultz, N3HIS; Russ Stevens, K5HAT; Patricia A. Thaler, KB6YQY; Craig William Vagell, WR2G; Maryellen H. Vaughan, KA7ZRW; Thierry Winkfield, N8EHL/F6IIR. QST

Tune in to Glasnost

(continued from page 46)



The UW3DI Transceiver, a rig built and used by thousands of Soviet hams, usually covers 80-10 meters, CW and SSB. This one is at UW0CW. *(K7NW photo)*

In another case early this year, a well-known Soviet amateur was stripped of his call sign for alleged "improper actions" in connection with the December 1988 earthquake in Armenia. While extensively covering the charges, *Radio* had not, as of August, aired the accused's position.

But the magazine's editors recently have begun to suggest that rules for Amateur Radio still are enforced arbitrarily, hinting that cases such as this should be reconsidered.

"More and more the subject of the legal protection of our country's citizens is discussed in our newspapers and magazines. The time has come to speak of the legal protection of shortwavers," Deputy Editor UW3AX wrote.

For example, club station UK2BBB was disqualified from a Women's Shortwave Radiocommunication Championship when a government monitoring station mistook another signal for that of UK2BBB. "Several women," wrote *Radio*, "genuine Masters of Sport, left Amateur Radio. Couldn't things be looked into before imposing sanctions?"

The article suggests charges must be proven before being aimed at stations. Also "a legal study is needed on what is permitted and what is prohibited to say on the air." Apparently, more than just the internationally accepted "no politics, sex or religion" is prohibited. The call is for new rules more along international guidelines.

What You Think

W6HJK has published a booklet and audio tape called *Russian Phrases for Amateur Radio*, of which more than a thousand have been sold.

Here are some comments from users around the country:

...World peace depends on communication...Talking with friends overseas was one of my motivations for getting into Amateur Radio...Our [junior high] Russian language class has asked if we can contact some Russian hams...Some Soviet hams practice their English with me—I am looking forward to making them suffer the same way...It's apparent that interest in Soviet Amateur Radio activities has never been higher.

Finis

The author would like to hear what you think about this four-part series on the USSR. I am grateful to many people who assisted with this series, including: KR1S, W6HJK, K5AAM, KM7E, K7NW, WA2LQQ, WA6WXD, W3KW, K7LXC, NT2X, W2RSL, K7ZR, K2SWZ, W4ASX, K1MAN, UL7PAE, W4KM, OH2BH, K7JA, N1EOL, AB6Q, KC4EBX, K1FO, UW3AX, N4IA, K1KI, K6ZSJ, W6MKB, *Westlink Report*. QST

How's DX?

Conducted By Ellen White, W1YL/4
19620 SW 234 St, Homestead, FL 33031

Whatever the language used, our year-end theme remains the same: peace and goodwill for this world of ours through responsible and friendly use of Amateur Radio.

BOUVET

The LA DX Group December "special" requires ample schedule margins to allow for bad weather, a small number of operators over a relatively long period of time (because of severe limitations of animal life and terrain constraints), desire to use a helicopter to drastically cut time and risk in landing and departure operations, and the vital necessity to utilize the Christmas holiday season. The group couldn't join a second group of 12 Indiana (and other) DXers in the 3Y0B team to participate in a 10-12 day scientific research/radio operation beginning on or around February 2. Part of an 18-person research team leaving mid-January, 3Y0B will include well-known operators N9AZD, W6OAT, KA9AND, W9SU, WB9LTY, NE9O, K7JA, WA9NPM, WB9QPN/ZF2CK, WB9CEP, KA9OIH and W9RE. (By Spring next year everyone should have Bouvet!)

QSLING NOTES BY W6OAT

"Those in the QSL business for financial gain leave me cold. They truly are a disgrace to Amateur Radio as I grew up knowing it. These are the folks who require that you send your QSLs to them in such a way that they make a profit from you. They're the ones who require, say, a minimum of a "green stamp" (US $1) when the cost of return postage is only going to be a quarter, or who will not answer a card unless a "sufficient" donation is enclosed. To these folks, cards via the bureau are anathema because they don't make money on them. A key point here is the difference between *accepting* donations as contrasted with *requiring* them. I think it's great when hams include something extra to help offset the cost of printing QSLs or when they kick in an extra buck or two because they know the DX station encountered a lot of expense on a DXpedition. But these are voluntary donations from thoughtful DXers, not required fees as the *quid pro quo* for obtaining the DX QSL." (Excerpted from an editorial in *The DX Magazine*, October 1989.)

CHAGOS

There are five active hams on Diego Garcia, British Indian Ocean Trust Territories island, mostly Merchant Marine Radio Officers attached to the USN Military Sealift Command. This UK protectorate is leased by the US as a logistical support facility. Upon presentation of an original ham license from a country which has reciprocal privileges with the UK, an unissued call of your choice is issued on the spot, and is valid for a year. The current station is considered modest by the operators (an Atlas 210X, TH7DX at 100 feet and wire slopers for the low bands). Diego Garcia, a circular lagoon with about 10.5 square miles of land area, forms one of the world's best natural harbors and is part of the Chagos Archipelago which extends several hundred miles in a north-south direction in the Central Indian Ocean. The closest landfall is Sri Lanka, about 1000 miles away. As VQ9DM and VQ9TC report, the island is truly a hidden paradise. QSL info: VQ9DM, cards to N5DM direct or via the W5 bureau; VQ9TC, direct to NØJCV or via the WØ bureau.

CIRCUIT

☐ **XU1SS/DU6:** CQWW SSB by XU1SS, DU6BG, DU1TVS, W1RAN. US stations QSL contest contacts to W1RAN. YB3CN remains the manager for XU1SS. (See photo.)

☐ **HI500UD** will be operating all bands/modes December 2-3 celebrating the 500th anniversary of the discovery of the Americas, notes the Union Dominicana de Radioaficionados, Inc. Cards via HI8LC, Box 88, Santo Domingo, Dominican Republic.

☐ **CT3MAW/CT3M:** Madeira Activity Week (ending Nov 30) to include many European operators. Confirm to the bureau or directly to Luis Camacho, CT3EE, Box 4055, P-9051, Funchal Codex, Madeira, Portugal.

☐ **XF4T**, Socorro Island, in the Revilla Gigedo Archipelago, on till year-end by XE2s TCQ MRY BDG, XF1C.

☐ **V31:** KA1ILI/8 (V31EY) reports that V31BB and V31JO will be operating on Ambergris Caye (40 miles north of mainland Belize) in the town of San Pedro. Get QSL info on the air; no active V31 bureau is available.

☐ **ZD8:** Any ZD8 station can be confirmed for a US station with an SASE with 25-cent stamp to Box 4235, Patrick AFB, Florida 32925-0235. (Thanks ZD8IAN/G4KJD)

☐ **Prefixes:** KC6 Micronesia, now V63. KX6 Marshalls, V73. BZ represents individual Chinese stations.

☐ **VU:** Bob Blumberg, AA4U, expects to be on CW by now. His mail QTH is Robert Blumberg, USAID/New Delhi, Dept of State, Washington, DC 20521-9000.

XU1SS/DU1, QRV de QTH DU1TVS. See p 64 of September *QST* and the Circuit in this issue. *(photo courtesy W1RAN)*

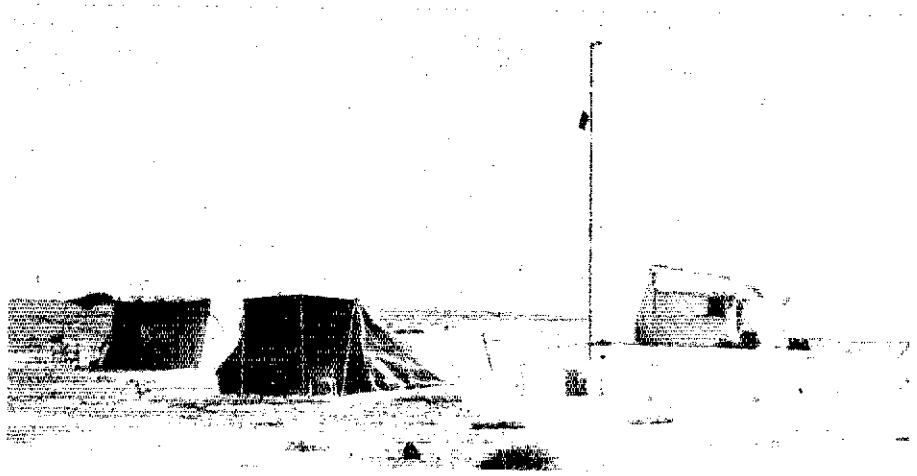
☐ **QSL Managering:** Linguist K3CHP guarantees a perfect job for some DX station. Write Joe Mikuckis, K3CHP, 6913 Furman Parkway, Riverdale, MD 20737. WBØYEA wants to assist a DX station: Gale Zeiler, 5042 Stanhope Dr, Houston, TX 77084. Please note that W5NZ is not the manager for the pirate 5R8ZX.

☐ **Routings:** VU2SJV cards go via N2HOS, who also handles VU2GI/VU2UGI. ZS6JR/ZS1/ZS3/H5/S8 September-October operations via John Rouse, 2703 Bartlett Lane, Bowie, MD 20715.

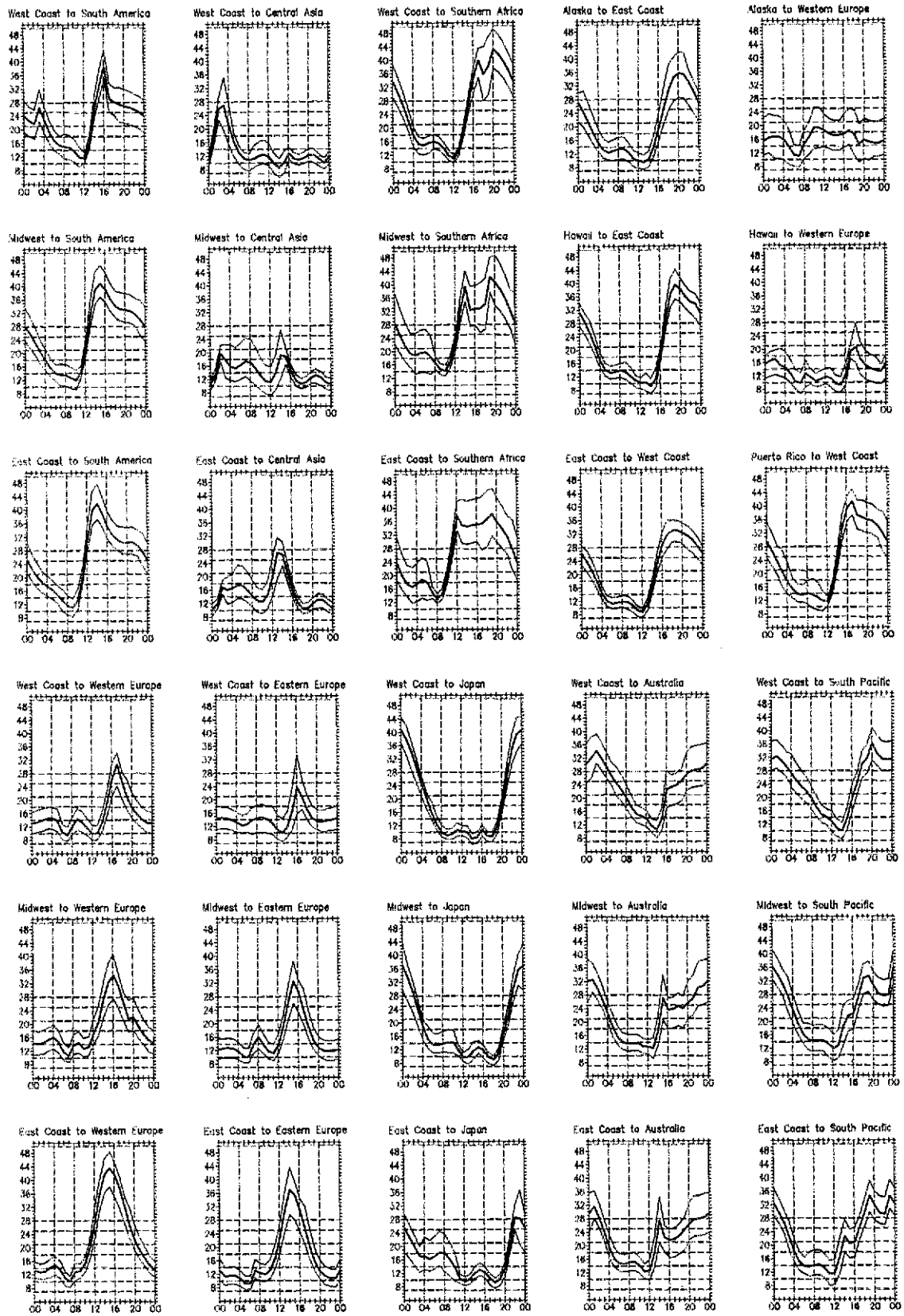
☐ **28 MHz:** The "300+ Countries on Ten Meters" annual DX meeting at K2ARO's QTH included K2OLG, WA2VUY, K3BEQ, K2ARO and was followed by a well-earned tour of the West Park Winery!

☐ **U2MIR's** log showed 1143 contacts with 42 DXCC countries between Nov 12 and Dec 19, 1988. (UW3AX has all the logs for U1MIR-U5MIR, but printed QSLs have been accidentally destroyed. The new ones should be in circulation about now.)

☐ **Clubs:** Telephone Pioneers in Alabama have a new club with W4AXO as director. The TPDXA produces a monthly *DX Digest* with hot DX info, its own 10 most wanted countries list and a phone alerting system. More info from the TPDXA at Box 26092, Hoover, AL 35226.



The picture epitomizing an island DXpedition, Mellish Reef, VK9ZM, January 1989. The combined Mellish-Willis operation netted 45,000 contacts. QSL via NM2L. *(KD2HE photo)*



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 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. Sunspot data is derived from *Solar Indices Bulletin*, National Geophysical Data Center (E/GC2), Boulder, Colorado. Curves are generated using IONCAP. These predictions, for December 16, 1989 to January 15, 1990, assume a smoothed sunspot number of 194, which corresponds to a smoothed 2800-MHz solar flux of 238.

Correspondence

Conducted By John C. Hennessee, KJ4KB
Regulatory Information Editor

HAMS HELP WITH HURRICANE HUGO RELIEF

☐ The South Carolina Emergency Net was in session from September 21 through September 28, 1989 during the Hurricane Hugo disaster. Coordinating and participating in this net was the most challenging and rewarding experience of my ten years as an amateur.

With the help of all of the hams who participated and those who monitored and were ready to help, I feel that our net, although not 100% perfect, accomplished its purpose as a general information net. Had there been more active HF operators in the affected areas, we could and would have encouraged more formal health and welfare traffic. I'm proud of and thankful for all the help we received with the net and would like to take this opportunity to convey my sincere thanks to everyone involved for giving your time and assistance to such a worthwhile endeavor.

From every bad situation comes some good. For me it was renewing old friendships, making many new friends, trying to help those concerned about the welfare of those in the affected areas and learning much from my experience. I wish I could write a personal note of thanks to each of you.—*Emmie Patience, KA4LRM, Belton, South Carolina*

☐ I wish to say how happy I am and many others are to have ham operators. You perform such a wonderful service in time of disaster and do so with such willingness and concern.

I am especially referring to Hugo's devastation of the Caribbean Islands and in particular to the Virgin Islands. There were no communications left on the islands, and those of us who had loved ones there had no idea as to how they were.

I contacted Mr Bud Henley, N4JIP, and told him my son lives on his boat near St John's Island in the Virgin Islands. Mr Henley got in touch with a ham operator on St John's and within a half an hour he called me back to say that my son was not hurt, his boat suffered only minor damage and that there were no casualties on the island.

Mr Henley's report was very gratefully received, and I think he and all the other ham operators who give of their time and help so freely should be highly commended. We should all be thankful we have such willing and eager folks out there who can and do help us.—*Merle R. Boller, Palm Harbor, Florida*

ROTTEN OPERATORS

☐ I would like to address a type of interference that some amateurs do not think about. While most hams take steps to keep from causing interference (such as not overdriving a transmitter or using a low-pass filter to reduce TVI), a lot of hams do not check to see if a frequency is in use before tuning up. Most of you have had the experience of someone tuning up on "your" frequency while having a QSO with someone else. In many cases, the tuner-upper completely covers the signal you are trying to copy. While this interference is not always intentional, it does cause problems. In the future, we should be a little more alert to the signals around us, and if you don't already have one, get a dummy load to tune up with.—*Jimmy Poole, KA5WRL, Van Buren, Arkansas*

THANKS FOR THE THANKS

☐ The comments I have received by mail and on the air about my recent *QST* article entitled "160 Meters: A Tribute" [which appeared in August 1989, p 49] have been very gratifying. One evening, Clive, G3ZFC, heard me on 17 meters and broke in to say he'd read the piece and liked it.

One of the most touching tributes to W1BB, though, came from a chap in Michigan. Like me, he had never met Stew, but had always admired his great contributions to the sport of DXing through the years. Not knowing Stew is now confined to a nursing home, this man drove all the way to New England on a recent vacation trip, just to meet W1BB. Unfortunately, he did not get to see him. But I thought it was a great testimony to the spirit of ham radio.

Unfortunately, I have received the sad news just last week that two of the 160-meter greats joined the Silent Keys this past summer: Nat, W2PN, and Horace, W1AB. I used to encounter them both in the pileups so often, and frequently, when the dust had settled, we would chat at length. I remember one QSO with Nat, especially. He told me of his long, long years as a ham and how the hobby meant as much to him today as it had so long ago. We'll miss them both.—*Drayton Cooper, N4LBJ, Bowling Green, South Carolina*

CODELESS LICENSE PETITION

☐ To listen to all the negative comments about the codeless license, you would think that we were proposing to turn 20 meters over to codeless licensees. In fact, the proposal for a codefree license would grant access only to UHF and microwave frequencies that most of us are not currently using anyway. I would like to know how many of those who oppose the codeless license have ever operated above 220 MHz or even possess equipment for these bands? If you are not using these frequencies, then what objection do you have to allow someone else to use them, or perhaps you don't care if we lose all of our UHF and microwave bands to commercial interests? AMSAT would like to launch a geosynchronous amateur satellite sometime in the 1990s, but this satellite will never fly if the microwave bands are lost in the meantime. If a codeless license will attract more experimenters and technical people, it may be the means to hold onto these bands.—*Daniel J. Schultz, N8FGV, Greenbelt, Maryland*

☐ I first learned code in 1921, so I should be suspected of having a strongly biased opinion toward a lot of code and theory requirements. However, I had a chance to get a personal view of the idea of having a codeless type license. I've had a long time friend who is a retired US Air Force Major. He has the knowledge, skill and intelligence to make a very good ham operator, but his ears have been around jet engines too long and he just can't hear the little variations between code characters. Why not put the codeless licensees on VHF/UHF frequencies?—*Lent A. Williamson, Albuquerque, New Mexico*

☐ A codeless entry-level license will serve a purpose, but it has to be given a chance. I'm sure that there are amateurs who will resist this action. We need to shape these new codeless licensees and guide them in their operating practices. Our responsibilities as amateurs is to set the example and to show the future operators the discipline which we use on all modes, not just one.—*Mike P. Williams, NL7QL, Anchorage, Alaska*

IS HAM RADIO HAZARDOUS?

☐ Dr Shulman's article entitled "Is Amateur Radio Hazardous to our Health?" appearing in October *QST* is well done. There are enough references quoted to indicate that he visited the Library of Congress. The article forgets that these studies are *not* saying ham radio will cause cancer, but they say radio *may*, or *might*, or *perhaps* can cause cancer. Regretfully, as it has been stated by Benjamin Franklin: "We are so concerned about preserving our health that we are neglecting to enjoy what we have." —*Howard K. Armstrong, MD, KA5DFT, Little Rock, Arkansas*

THE BARDSTOWN MIRACLE

☐ I was certainly impressed with the October 1989 *QST* article entitled "The Bardstown Experiment." I would certainly like to offer myself to a local school as an instructor, but I have no idea on how to start a class, how to make it interesting and how to keep it going. I guess that fear of failure is my biggest enemy. I haven't given, studied for, taken or been around ham exams since December 1981, so I'm green as to what this teaching method is all about. How's the best way to start? Who should I contact for more information on teaching classes? I'm fired up about this!—*Mark Foster, NW4Y, Huntsville, Alabama*

[Write the ARRL Educational Activities Branch for ideas on how to get started teaching ham classes.—Ed.]

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official DXCC Countries List. You may endorse your award in 25-country increments through 250, 10-country increments through 300, and 5-country increments above 300. The Satellite, 160 Meter, and 80 Meter DXCC awards are endorsable in 10-country increments through 200, and 5-country increments above 200. The totals shown below are exact credits given to DXCC members from July 11 to August 3, 1989. An SASE will bring you the rules and applications forms for participation in the DXCC program. Send $1.00 to request the ARRL DXCC Countries List.

NEW MEMBERS

Mixed

DF4IC/106
DL1ZU/129
DL5XAS/123
EI2GS/148
G3XMZ/107
HB9CFW/250
IK2FIQ/179
JF1JTQ/210
JI2CCF/154
JA3KWZ/224
JA3OW/110
JR3KQJ/106
JA6NQT/106
JA7IPB/112
LA1IE/135
LA3T/119
LX2KQ/277
ON4ACG/106
PA3ENO/112
PI4DEC/114
SM5APS/271
UZ4FWD/323
VE2HAR/110
VE2HBE/100
VE7COP/102
XE1IX/279
XE1JE/115
YT3TU/104
KA1NCN/107
KA1PMX/106
WA1GYS/101
N2AGO/106
N2COH/100
W2DE/265
N3FTT/104
NI3I/101
NT3B/109
WB3LHD/116
KK4MQ/106
KM4DW/110
N4JIP/111
WB4LTS/105
WS4F/188
N5DRV/152
N5IER/110
N5IIV/112
W5MTL/105
AA6MV/158
K6DUE/139
KB6PJU/108
NI6D/102
WA6ACX/114
WW6E/100
KA7PGS/179
NW7U/106
WO7F/110
K8VKI/100
K8ZZO/316
WD8NUD/104
K9ADJ/120
KD9RD/266
N9HFR/111
W9KVF/125
WB8CIF/104
KA8MQA/105
KD8IR/110
N8IWL/104
NU8P/107
WA8COA/105
WJ8C/108

Phone

DL3EAY/110
EI2GS/124
F6GEA/309
HK3NTI/184
IK2HKL/160
IK2LOL/115
IK2MLY/114
J88BS/108
JI2CCF/128
JA3KWZ/142
LX2KQ/271
PY2OO/159
SV8FC/159
UW8CW/305
VE2DLV/105
VP5LJ/104
XE1IX/279
XE1JE/110
YB8PHM/213
YV2NY/275
YV5LAS/161
AD1C/170
KA1NCN/100
KD3IL/110
W3FX/137
N4QGH/177
WB5IGF/143
AA6MV/158
KI6TZ/103
N6EBO/107
WA6ACX/104
WW6E/100
KA7PGS/166
K8CV/138
KA8QMU/117
KB8WT/115
KC8WR/209
N9HFR/111
WB9PTN/100
K8OUQ/100
KA8MQA/105
KD8OZ/125

CW

DF8PP/118
DJ6BW/132
DL5XAS/123
HB9BWB/100
HB9CFW/238
IK2FIQ/148
IK8ADY/102
JF1JTQ/179
JA3ASU/191
JA3JAZ/103
JA3KWZ/135
JA8PON/117
OK1MNV/110
SM5APS/261
SM7RFM/109
UR2RGN/105
KX1T/104
AA5DS/101
N5DRV/123
WA6CTA/101
K8CV/112
KI9G/107

RTTY

G3XON/104
JA7AB/107
SM5APS/118
YB5NOF/103
ZP5CY/102
KA1LMR/109
WA6AHF/114

160 Meters

SP9DH/101
UQ1GWW/121
UR2RGN/105
K4DLI/102

80 Meters

N1QY/113
NK3U/103
W6GVM/108
KR9O/116

40 Meters

CX1TE/133
SM6NJK/108
ZP5JCY/204
N1QY/139
K2SHZ/224
K4XI/187
W6GVM/106
W6ZKM/107
N7BSA/127
W9BEK/101
K8IYF/126

10 Meters

JA1XJA/120
JI2CCF/126
JA3DLE/121
SM0MC/131
YC0USJ/110
AD1C/172
K1YR/147
N1QY/130
K3PA/192
K3YL/107
W3NB/111
N4MCH/100
N4MQX/100
KA5YCM/104
W6GVM/133
N7IHI/101

5BDXCC

OZ1CZ
W6KTE
W6TUI
LA1IE
W7GB
EA4GT
LA9BM
LU2DKT
WD8KWT
JA7EDZ
LU3JCE
N1QY
W5FS
KE4HX

NEW HONOR ROLL MEMBERS

Mixed

314

KW2P/326

312

PY5CA/314
KB2HZ/314
WD5GJB/316
K6GXO/318
WX6M/316
W7GXC/323
K8ZZO/316
KB9OE/316

Phone

315

K1JO/330

313

SM4BOI/316

312

HB9RG/319
JA1RWE/325
K2AGJ/324
K2SGH/318
WB3GOP/314
N4JA/322
K6EID/322
WD6BSD/317
WX6M/316
W7GXC/322

CW

309

W2YY/312

308

K1JO/310
W6GO/312

ENDORSEMENTS

Mixed

DF1DB/320
DJ8ET/209
DJ9RR/183
DK2PS/250
DK3KD/323
DK6ED/301
DL2KBS/253
DL7AFV/305
DL7CW/341
DL7HZ/351
DL7XS/312
DL9EY/270
F6BFH/327
FD6ITD/293
G3BKG/225
G3KLL/311
G3UML/342
G4BWP/306
GM4KLO/260
HK3DDD/320
I2DEZ/336
IN3XAI/311
IV3TQE/317
IV3YYK/282
I5ARS/349
I5FLN/335
IT9ZGY/361
JA1ELY/330
JA1RLV/323
JR1CVV/283
JR1TNE/324
JA2AAQ/339
JA2LMA/310
JA2OZI/302
JA3CSZ/321
JA3DY/353
JA3JAZ/301
JA3PG/283
JJ3AFV/308
JN3OBF/266
JA4AFT/336
JA5BEN/304
JA5EYW/312
JH7BDS/312
JH7BRG/310
JH7NRE/290
LA1IE/237
LU1BDF/4X/127
LU6DJX/370
NL7HT/156
NL7J/280
OZ5KU/268
PA3DRZ/230
PY1HQ/359
PY4OD/355
SM5BOI/317
SM6CVX/338
SM6NJK/206
SP9PT/337
TF5BW/206
VE3OIT/279
VE6VM/324
XE1AE/354
XE1AMS/252
XE1GBM/317
XE1L/315
XE1MD/302
XE1MN/264
XE1OW/305
XE1OX/317
XE1VV/300
XE1XRC/231
XE3ABC/280
YB3ASQ/216
YU1SZ/303
YU3MA/304
YV5IVB/224
Z23JO/281
4X4DK/364
K1JO/336
K1OQG/125
K1RAW/328
K1YHM/289
K1YR/318
KB1ER/272
KB1I/313
N1BUR/184
N1CPC/260
N1IR/250
N1QY/237
NF1G/250
W1ESN/324
W1HOF/291
W1KDD/271
W1OPB/255
WA1JVV/157
WB1BVQ/285
AA2F/264
AA2X/275
K2AGJ/333
K2FB/353
K2HFW/162
K2OEA/357
K2QE/249
K2UFM/330
K2XU/152
KA2HTU/152
KB2CB/307
KR2J/257
KS2O/260
N2BAT/291
N2BIM/305
N2EDF/281
N2HOU/124
N2JD/313
N2KW/321
N2RR/315
N2VW/301
NA2G/301
NA2M/310
NA2R/260
NB2P/322
NC2O/225
W2BXA/370
W2FC/251
W2HN/331
W2HUG/297
W2LV/365
W2SM/331
W2TQC/359
W2YY/354
WA2AXD/150
WA2BOT/303
WA2CJO/152
WA2IKL/252
WA2WDJ/281
WB2CJL/312
WB2CZB/305
WB2PTH/206
WE2P/233
K3IE/311
K3JGJ/316
KA3RGF/158
KY3V/231
NN3Z/227
W3BZN/308
W3CRH/285
W3EEK/251
W3ENL/173
W3FTG/178
W3FX/217
W3KJ/301
WA3AFS/285
WA3CGE/320
AA4NC/293
AA4S/335
AA4SY/250
AA4WJ/127
AB4DU/177
AB4ES/252
K4IQJ/250
K4JAF/289
K4LNM/360
K4RA/333
KA4S/324
KB4NJ/204
KI4FW/281
KJ4MD/275
KK4BS/201
NE4A/326
W4FNS/325
W4MBD/251
W4NL/341
W4OUE/305
W4RA/303
W4RIM/333
W4UW/314
W4WMQ/321
W4XJ/345
WA4CMS/230
WB4QNP/329
WD4R/300
WD4REX/125
WN4M/275
WT4T/314
K5NV/305
KA5YCM/288
KG5EG/161
N5DC/323
NU5O/247
NY5E/203
W5INL/314
W5QKR/330
WA5TOS/291
WB5BIR/308
WB5IGF/179
WB5QBV/277
WV5S/261
AB6R/304
K6OJ/368
KE6KT/204
KI6BN/226
N6NXV/200
NQ6S/177
NV6L/261
W6CTL/320
W6DPD/308
W6GO/327
W6HIB/169
W6NLG/310
W6OSP/304
W6RT/363
W6TMD/318
WA6AHF/336
WA6HAT/321
WB6OKK/311
WQ6X/249
WR6R/300
K7KH/277
KM7E/230
W7KJJ/225
W7OC/290
W7QMU/302
WB7BWZ/205
K8ICE/294
KE8RO/150
N8FGH/291
N8HTT/265
W8ETU/293
W8MEP/291
W8RV/312
W8ZCK/343
WA8OSE/324
WB8HIW/240
WB8ZRL/313
WD8KWT/240
AJ9D/318
K9BG/324
K9EC/271
K9FD/321
KB9K/150
KD9M/304
KD9OT/253
KD9Q/311
KS9Y/288
NK9X/215
NX9H/204
W9AG/337
W9FU/333
W9LNQ/342
W9MCJ/303
W9OKL/318
WA9BXB/290
WA9USE/318
WA9YYY/225
WB9CPV/150
WB9RNF/270
WB9V/306
AB9G/126
AB9P/300
AB9X/321
K9SR/310
KY9A/329
N9JO/222
NI9C/139
NS9B/229
W9AIH/360
W9GW/155
W9HZ/345
W9MLY/367
W9RT/310
W9ZPM/156
WA9TKJ/323
WB8B/190

Phone

CP1BA/284
DF1DB/320
DJ2YE/202
DL6XV/230
DL7AFV/294
DL9EY/225
F6AJA/332
F6BFH/327
FD6ITD/293
G3KLL/310
G3UML/342
G4BWP/302
G4XGF/149
G4YRR/207
HB9AON/133
HK3DDD/320
I2BCU/225
I2DEZ/329
I2JQL/308
I2UPG/280
IN3XAI/310
IV3TQE/317
IV3YYK/281
I5FLN/335
I5MPN/318
I7UNX/305
IK8CNT/300
JR1CVV/231
JA2AAQ/338
JA2LMA/306
JI2KAR/200
JA3CSZ/315
JA3DY/326
JA3PG/275
JJ3AFV/305
JN3OBF/266
JR3JBA/151
JA4AFT/333
JA5BEN/298
JW6WDA/177
JA7FS/298
JE7JZT/231
JH7NRE/288
KP4GY/228
LU1BDF/4X/127
LU1JDL/267
NL7HT/154
OE1PC/324
PY4OD/321
PY5CA/313
SM6CVX/334
SM6NJK/143
TF5BW/206
VE3MR/348
VE3MRS/319
XE1AE/354
XE1AMS/252
XE1CI/310
XE1GBM/317
XE1JRV/181
XE1L/315
XE1MD/300
XE1MN/263
XE1ND/169
XE1NJ/255
XE1OW/305
XE1OX/317
XE1VV/301
XE1XM/305
XE1XRC/231
XE1YO/275
YB3ASQ/199
YV5IVB/208
ZL1AMO/317
ZL2AFT/311
4X4DK/364
K1MIZ/310
K1RAW/328
K1YHM/278
KB1I/310
N1IR/250
NF1G/250
NG1J/156
NM1B/270
W1ESN/288
W1FAB/302
W1OHJ/232
WA1KYW/319
WB1BVQ/284
K2EWB/300
K2PWG/300
K2UFM/329
KB2CB/306
KB2DE/227
KB2HZ/312
KB2XP/280
KZ2P/316
N2BAT/289
N2BIM/298
N2ERN/294
N2KW/318
N2RR/296
N2VW/301
NA2A/250
NA2O/128
NA2M/290
NA2R/254
W2BXA/368
W2FGS/348
W2HN/307
W2LV/356
W2ORA/155
W2SM/301
W2YTO/315
W2YY/349
WA2BOT/303
WA2WDJ/281
WB2SZH/310
K3IE/256
K3LDE/255
K3ZPG/251
KA3RGF/150
KD3CQ/157
KY3V/199
N3JM/174
W3KJ/301
WA3CGE/320
AA4NC/265
AA4S/302
AA4XT/321
KI4FW/272
KJ4MD/270
KT4P/314
N4BHJ/301
N4RFN/257
NE4A/319
W4MBD/215
W4OUE/305
W4RA/296
WA4BIM/317
WA4CMS/193
WB4FNH/306
WB4QNP/326
WB4SWI/313
WT4T/309
KA5YCM/274
KC5ZA/281
N5BCL/275
N5JPC/265
NU5O/203
NX5C/209
W5INL/314
WB5IUU/180
WV5S/256
K6DQ/310
K6GXO/312
KB6HW/239
KD6LV/198
N6NXV/200
W6CN/321
W6DPD/308
W6GO/326
W6ILH/311
W6MKB/290
W6NLG/316
W6PGK/308
W6QON/250
WB6OKK/309
WB6UBR/290
WD6GFF/258
WN6R/295
WR6R/289
K7KH/249
KB7TQ/290
KF7SH/283
KM7E/230
N7GMN/330
W7FJE/300
W7MI/340
W7UPF/340
WA7QOI/151
WB7BWZ/204
WV7S/306
K8IHX/175
K8MDU/263
K8REG/300
K9ZZO/315
KA8YSW/136
N8BDM/286
N8HTT/283
WA8OSE/320
WB8ZRL/308
K9DXO/326
K9FYZ/323
KB9ANR/178
KD9M/302
KD9NA/262
KD9OT/253
KD9Q/310
KD9RD/252
N9BOK/253
NX9H/201
W9AG/297
W9LNQ/324
W9OKL/318
WA9LLE/214
WB9V/302
KN8L/295
KY8A/309
N8BKL/302
W8JS/237
W8MLY/358
WK8I/205

CW

CX4CO/276
DK6ED/255
DL7AFV/272
DL7CW/291
DL7XS/271
DL9EY/186
G4BWP/289
IN3RZY/225
JA1ELY/323
JA2AAQ/312
JA3CSZ/312
JA3DY/317
JJ3AFV/298
JH7BDS/298
JH7BRG/310
LA1IE/205
OK1CZ/203
OZ1KWG/157
PP2WV/174
PY4OD/289
SM6CST/317
SM6NJK/177
UC2ACZ/133
VE3CKF/316
VE3OSZ/204
XE1MD/218
K1MEM/319
K1OQG/125
N1CPC/204
N1CYA/255
N1QY/233
WA1JVV/130
K2AGJ/304
K2UFM/302
KB2CB/174
N2KW/316
NA2M/270
NG2U/175
W2FC/302
W2HN/281
W2SM/315
W2TQC/302
WB2CJL/292
WE2P/219
K3IE/300
K3TEJ/130
W3BBL/282
W3FX/125
AA4NC/200
K4MF/285
KI4FW/160
N4RUM/178
NE4A/272
W4UW/125
WA4CMS/157
WD4AHZ/200
KC5M/294
AA6AY/154
AB6R/251
K6ATV/200
K6EID/275
K6GXO/258
W6HIB/168
W6TMD/294
K7KH/142
K7SLI/245
KY7M/276
N7HUS/210
W7MB/262
KF8N/267
WA8OSE/130
WB8ZRL/291
K9BG/307
KB9K/138
KB9OE/288
KD9M/220
NT9L/130
W9AG/273
W9LNQ/302
WA9YYY/202
WB9V/214
AB8X/289
K8VZR/229
KY8A/239

RTTY

DL7XS/152
I5FLN/292
LA7AJ/183
PY5ACP/127
SM0AJU/149
XE3ABC/162
W1EW/150
W2FCR/200
K6EID/151

160 Meters

IN3DEI/179
K1JO/126
K1MEM/195
W2FCR/150
W2SM/189
W2TQC/192

80 Meters

JA2AAQ/270
JA3CSZ/215
SM6CVX/223
K1MEM/270
K1NTR/156
N4ONI/127
WB8ZRL/124

40 Meters

SP6CDK/207
W1YY/253
K3UA/248
K6EID/237
W8AH/322

10 Meters

SM6CVX/271
K1YDG/134
KB1BE/230
N1IR/125
N2KW/180
W2FCR/160
WA2VUY/300
K3UA/254
K4KUZ/250
K4MF/203
N4MM/301
NE4A/164
W6CTL/158
N0SL/142

DXCC Notes

10-MHz contacts now accepted for DXCC credit: CW and digital contacts made on 10 MHz can now be submitted for **Mixed, CW, and RTTY DXCC awards** (there are no single-band DXCC awards for WARC bands). **10-MHz contacts will not be accepted for 5BDXCC.** Effective immediately, these changes are a result of policy changes adopted at the recent IARU Region 2 Conference in Orlando, Florida. Please refer to November *QST*'s League Lines for more information.

Conducted By Luck Hurder, KY1T
Deputy Manager, Field Services Department, ARRL

Idaho Amateurs Provide Forest Fire Communications

By Don Clower, KA7T, Idaho Section Manager

Idaho amateurs were asked by the US Forest Service to assist with communications during a series of forest fire emergencies in early August. The governor declared a state of emergency due to the large number of fires burning out of control. For the first time, Idaho hams were to be involved in a real state disaster situation.

We first went to the Lowman Complex fire near the small town of Lowman in the Boise National Forest. Six amateurs, including myself, went to the scene that night and found it somewhat intimidating, as we drove through the half burned-out forest. Trees were still burning on both sides of the road to the fire camp at the Warm Springs landing strip, 15 miles northeast of Lowman.

Our first task was to provide communications for the Forest Service security people. We manned the road barricades on both sides of the fire line to keep out unauthorized vehicles and people. The primary Amateur Radio setup was at security headquarters at the fire camp. Due to the extremely mountainous terrain which prevented line-of-sight communications, we brought along HF capabilities to complement our VHF setup.

KA7VIN and I flew by helicopter into spike camps located on the edge of the fire line and assisted with communications back to fire control HQ.

Hams worked for ten days on the Lowman Fire, while it was being contained. This particular fire destroyed over 46,000 acres of timber and 50 structures in the town of Lowman. Luckily, there were no deaths or serious injuries attributed to the fire.

While we were at Lowman, the Forest Service asked for a health and welfare station to be set up at the Warm Lake fire camp to provide the firefighters an opportunity to contact loved ones at home. KE7RT set up a station and ran 563 messages. Another health and welfare station was set up for the firefighters from the Partridge Complex fire.

Idaho is not a very populated state, and hams are few in number. The fires were in remote areas with few or no roads. As a result of our communications support efforts, we have begun negotiations with USFS officials who are pleased and surprised by the number of hams who volunteered and the professionalism that was demonstrated.

I believe that the hams who participated should feel proud of their efforts and the impressions that they left with those they served. We certainly showed that Idaho Amateur Radio operators can—and do—respond when needed.

Idaho Section Manager, Don Clower, KA7T, returning after a long day at spike camp during the Lowman fire.

Traffic Topix

By Pete Gellert, W2WSS

I have many interesting discussions with a certain Nestor of the airways. I won't identify him further, though I dare say that some of you will be able to make a pretty shrewd guess as to his identity. I think that the only time either of us doubts the absolute certainty of his position is when we agree!

One recurring topic is the obligation of the traffic-handling ham to accept messages that, for a variety of reasons, he may consider objectionable. The following are the major objections raised by some traffic handlers involving content, length, timeliness and other factors.

Content: There are, of course, certain texts which demand rejection. Chief among these are texts that have a clear commercial content. A reminder is in order here: a message need not recite dollars and cents or be addressed to a profit-making establishment to be commercial. Messages to any organization that relate to its normal pursuits is a no-no. A good example is a message to ARRL HQ with an address change. Note that the mere mention of money does not necessarily condemn the message. A message from your typical college student asking dad for money is probably okay, even though I am willing to argue that the principal business of a college student is spending money.

Timeliness: Our friend takes a particular dislike to messages that celebrate a holiday, but arrive days after the event, or even traffic that states "see you Tuesday," but arrives on Thursday.

Length: There's a loose and informal rule of thumb that texts should not exceed 25 groups.

When can the traffic handler, particularly the station that is likely to make the ultimate delivery, be justified in rejecting a message he deems objectionable? Our friend would argue that, as amateurs, we are not obligated to accept any message which, for whatever reason, we find objectionable. He always threatens to refuse late messages or traffic that has contents he regards as offensive, unduly trivial or perhaps showing undue concern with feline well-being.

Needless to say, I disagree. It is true we are amateurs. As I see it, that gives a free choice of the degree to which, at anytime, we choose to participate in traffic handling. Unless we have assigned NCS or liaison slots, we need not check into any net—even nets we usually check into. And, in the larger sense, we can set our overall level of participation. Many of us have to make adjustments from time to time as our personal circumstances change. But, as with any volunteer activity, when we do "enter the arena," other fellow volunteers rely on our obedience to the generally accepted practices, and we do in fact incur the obligation to meet those expectations.

So, when we check into a traffic net and a message comes our way, being an amateur does not give us the right to refuse messages that have texts that seem stupid or that reach us late. The ridiculous message may be meaningful, or at least amusing, to the recipient. It's not up to us to interpose our judgment or taste between the originator and the addressee. Mom will often be grateful for a message even a couple of days late—particularly with a tactful apology.

Refusing an unusually long message is on more solid ground, but even there I would argue for tolerance, particularly if the message reaches you after a long trip.

Yes, we are amateurs, but once we activate ourselves in traffic handling, we obligate ourselves to keep, to the best of our ability, our assignments and to handle all legitimate traffic that comes our way.

Field Organization Reports September 1989

Section Emergency Coordinator Reports

Twenty-four SEC reports were received, denoting a total ARES membership of 16,720. Those sections reporting were: EWA, GA, KS, KY, IA, ME, MI, MN, MO, NE, NFL, NLI, NM, NV, OH, PAC, RI, SD, SDG, UT, VA, WWA, WNY, WV.

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Telegraph Society	30	280	380
Early Bird Net	30	609	
Empire Slow Speed Net	30	89	360
Golden Bear Amateur Radio Net	30	83	1377
Great Lakes Emergency & Traffic Net	30	52	1183
Gulf Coast Hurricane Net	30	83	2901
IMRA	26	797	1534
Mission Trail Net	30	148	832
NYSPTEN	30	61	421
Southwest Traffic Net	30	250	1384
West Coast Slow Speed Net	30	81	381
7290 Traffic Net	30	357	3223
75 Meter ISSB Net			

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern				
TCC Central	83	93.00	292	318
TCC Pacific				
Summary				
Cycle Three				
TCC Eastern	60	100.00	36	72
Cycle Four				
TCC Eastern	109	90.83	502	1008
TCC Central	73	81.10	297	627
TCC Pacific	106	88.33	514	1009
Summary	288	86.75	1313	2646
August 1989 report:				
Cycle 2				
TCC Central	86	95.00	369	376
Cycle 3				
TCC Eastern	60	96.77	23	46
Cycle 4				
TCC Eastern	110	86.71	422	850

TCC Roster

Eastern Area Cycle 2: KW1U Director.

Eastern Area Cycle 3: KN1K Director. WA2SPL N3EMD W3JKX W3OKN AA4AT WT8L K8TPF KA8WNO

Eastern Area Cycle 4: KN1K Director. W1CE W1EFW N1FNN W1FYR KA1MDM W1NJM KY1T KW1U W1WCG W2FR W2GKZ NQ2H W2LWB W2RQ WA2SPL N3FM WB3GZU W3PQ KQ3T NC3V N4GHI N4SS N4TE W4UQ K4WJR K4ZK W8BO WT8L W8PMJ NJ8S KA8WNO N8XX VE3FAS VE3GSQ.

Central Area, Cycle 2: NØFBW Director. WA4JDH W5CTZ AE5I KD5KQ WB5OXE W5YQZ WB5YDD KE5ZB K5UPN KAØEPY NØFBW WØFE. Central Area, Cycle 4: K5GM Director. WB5J W5JDF KM5L K5MXQ N5TC K5TL W5TFB W5TNT KB5W W9CBE NR9K W9LKN KFØFI WØGRW AIØO NRØS NBØZ.

Pacific Area, Cycle 4: KØDJ Director. N2IC KA5NNG ND5T K6LL W6EDT W6VZT WF6O KA7CRT KN7B NN7H NR7E W7EP W7GHT W7LG W7VSE KØSN KØTER KCØD KJØG WG7H

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	30	883	29.40	843	91.7	
CAN	30	114	20.46	.469	98.6	
PAN*	62	365	6.18	.524	93.0	
Region Nets						
1RN	60	340	5.67	.407	78.0	100.0
2RN	53	154	2.90	.259	88.7	96.7
3RN	30	101	3.37	.380	97.5	96.7
4RN						93.3
RN5	60	494	8.23	.379	91.0	100.0
RN6	47	78	1.66	.187	91.9	
RN7	60	270	4.50	.408	80.5	95.1
8RN	60	290	4.83	.320	96.6	100.0
9RN	60	255	4.25	.289	89.8	100.0
TEN	60	488	8.13	.353	83.7	100.0
TWN	60	310	5.17	.437	84.0	91.9
ECN						83.3
Cycle Three						
Area Net						
EAN	30	248	8.26	.541	84.7	
Region Net						
1RN	30	121	4.03	.375	97.6	90.0
2RN	29	117	4.07	.308	96.6	80.0
3RN	27	32	1.18	.180	87.7	96.6
4RN						76.6
8RN						96.6
ECN						80.0
Cycle Four						
Area Nets						
EAN	30	1264	42.13	1.273	95.2	
CAN	30	990	33.00	1.172	100.0	
PAN	28	597	21.32	.878	96.4	
Region Nets						
1RN	60	597	9.95	.621	98.8	96.6
2RN	46	200	4.34	.491	72.3	93.3
3RN	60	262	4.36	.432	98.3	96.6
4RN	62	464	7.48	.339	96.4	93.3
RN5	60	406	6.77	.520	85.8	100.0
RN6	60	243	4.05	.405	99.2	100.0
RN7	60	302	5.03	.555	86.6	100.0
8RN	59	306	5.19	.386	92.0	100.0
9RN	60	295	4.91	.370	94.0	100.0
TEN	60	332	5.53	.479	63.5	100.0
TWN	58	229	3.95	.344	84.4	89.2
ECN						
ARN	30	363	12.1	.578	96.6	

*PAN operates both cycles one and two.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, EMA, ENY, EPA, GA, IA, IL, IN, LA, MDC, ME, MI, MN, NC, NFL, NLI, NNJ, NTX, OH, OR, ORG, PAC, RI, SB, SC, SCV, SD, SFL, STX, TN, UT, VT, VA, WI, WMA, WTX, WNY, WPA, WWA, WV.

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.

Call	Orig	Rcvd	Sent	Dlvd	Total
W8AKF	482	2082	1982	397	4943
W3CUL	754	799	1294	86	2933
W1WP	1317	56	1354	19	2748
W1PEX	0	503	1421	11	1935
WA2SPL	83	756	836	72	1742
KB4N	0	659	693	0	1352
W3VR	480	211	396	39	1126
WA2GYM	0	775	545	0	1320
KI4FL	3	578	575	3	1265
W9ZRX	0	543	543	0	1085
NM1K	265	354	425	38	1082
K1EIC	8	537	495	10	1050
W3IWI	0	484	471	0	955
KA1IFC	2	463	438	13	916
K5UPN	0	519	369	3	891
KY1T	1	405	410	2	818
K1UGM	0	389	389	0	778
N3AZW	15	369	370	15	769
N4QO	0	358	358	0	761
W1UD	42	321	362	31	756
WF8O	4	332	341	12	689
WA4JDH	0	332	351	1	684
AJ6F	0	314	314	0	628
N1GMU	2	301	303	0	606
WA5EQW	0	253	45	253	551
NR9K	21	186	289	9	505

BPL for 100 or more originations plus deliveries:
W4BFB 134

The following station qualified for BPL during the month of July, but was not listed in October's column: N3AZW with 636 points.

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.

796
KA2RGI
628
WD8V
414
W8AKF
354
K3RXK
206
KDØCL
193
KA4HHE
177
KA1GWE
173
WA2SPL
160
N4GHI
WB2OWO
KAØARP
150
W4ANK
134
KF6AU
132
WI2G
127
NM1K
123
WA9VND
122
KA2VZX
121
W2MTA
116
K4NLK
114
KJ4VT
K4ZK
N7JLC
W7VSE
WØOYH
112
KF5BL
WA7MEL
111
N1FLO
110
KD7ME
WA1TBY
109
N5NZH
WB1HIH
108
K9CNP
WF6O
107
AA4ZV
106
WA4PFK
KI6ZH
105
W4JLS
ND2S
WB2ZJF
WB7WOW
KA1GEP
KC4GCK
KB7LX
104
K5UPN
KW1U

WG7H
103
N1CPX
W3FA
N3EMD
WE2G
KA1RVN/T
102
K5MXQ
W4QAT
WA4JDH
WB2VUK
101
N4EXQ
N2XJ
WB4OVZ
100
W2RRX
K5CXP
99
WAØHTN
WA2ERT
KJ4NK
KA7AID
KI4YV
WD8KQC
KT1Q
98
WB4WII
WB8SYA
97
N4KFU
W9DM
WB2EAG
KØBXF
96
W4PIM
W4CKS
WB4ZTR
WA4EIC
KAØKPY
N8FOO
KR9K
WD5GKH
95
AA4AT
KT9I
W1KX
W1PEX
N5MEA
KA1IFC
94
KB1AF
W7GHT
93
KØERM
NN2H
W2GJ
92
WT7A
91
WB4VMX
W7TVA
90
WB4FDT
89
WD4LOO
88
KC4BHX
WB4WQL
WA1JVV
87
K4MTX
W7LNE
W1ALE

86
KA8WNO
KB9LT
85
K3JL
N4JTG
W5CTZ
NØJL
84
K2YAI
N2HLZ
82
N7BGW
N3DRM
N8FPN
81
K4IWW
N5ILI
80
WA2FJJ
N5KCL
79
NY8W
78
KI4W
K1EIC
N2EIA
WAØTFC
W9HBI
77
KB2EPU
76
KC4ESG/T
WI8J
75
N4KSO
N7CSP
N2IMP
WTØE
74
KA8ZGY
KC5NG
KC3Y
N3AZW
WA3UNX
K8CQF
WT8J
73
KA2INE
WA4LLE
N6NLW
N5NAV
WB5J
72
NJ3V
N4JAQ
KJ9J
NO3M
N7MAL
W1KK
71
KB5BNU
K2ZVI
70
N4ORZ
N1FNN
KA1UCU
KC2HJ
KA2KJF
WA9VLC
KA1QFV/T
69
NW3K
NM3K

68
KDØYL
WB2QIX
WB2OEV
WA2PAC
AC6Z
N2AKZ
67
KA4FZI
N4MEJ
W7LBK
W8SX
WB8YPG
66
K2VX
NDØN
NC3V
65
WA4RUE
N5PGZ
N7GGJ
WA8DHB
64
WT8L
WA4PUP
WA4RNP
K4ZUY
WB1BTJ
63
W2FR
KA7EEE
N6CRV
KA1KML
62
W9UMH
KA9CTW/T
NC9T
KE9DX
WB5YDD
NB2D
WA2UKM
61
K4BGZ
N2DXP
W1TC
KA8CPS
WBØZNY
NB1A
60
WS8A
N4RHV
WB2FTX
KDØNH
N4MWR
KA9QXI
K2TWZ
WS7U
KA1JXH
59
N6ADV/T
58
KA2ZNZ/T
56
KA6TND/T
50
WB2ZIE/T
48
KA8HJK/T
47
N2EVG/T
KA1HPO/T
45
KA9TVU/T
44
KA1RSY/T
40
KA2JMA/T

The following stations qualified for PSHR during the month of August, 1989, but were not listed in last month's column: KA3DLY 103, NM3K 95, N3AZW 78, KA3QYH 63, N3DRM 62, KA9QXI.

The World Above 50 MHz

Conducted By Bill Tynan, W3XO
Send reports to HCR 5 PO Box 574-334, Tierra Linda Ranch, Kerrville, TX 78028 or call 512-257-1296 to record late-breaking information.

The World Above 50 is 50

This month's column marks a milestone in *QST*'s reporting of events in the world above 50 MHz. It was in the December 1939 issue that "On the Ultra Highs," conducted by E.P. Tilton, W1HDQ, first appeared. Ed's first 3¼-page offering began with a concern for preserving our "u.h.f." bands in the light of new commercial advances such as "Frequency-Modulation broadcasting" and television. In this context, he made a plea for more people to operate 5 meters, even when the band appeared dead for DX. Sound familiar? W1HDQ's initial column also noted the improvement in coverage of the 56- to 60-MHz band, following FCC mandated stability requirements that went into effect at the beginning of the year. He noted, especially, the improved performance of 5-meter receivers, no longer required to provide for wideband signals, and the nearly complete disappearance, from the band, of noisy and insensitive super-regenerative sets.

Looking at 1939 from a propagation standpoint, W1HDQ commented that the summer season was not as good as the previous one, especially in the area of strong, short-skip openings. He noted, however, the first 56-MHz "Grand Slam," accomplished by W9ZJB of Kansas City, Missouri. A "Grand Slam" apparently involved working all nine US call areas. The lone photo was of Vince Dawson, W9ZJB, in his shack—showing his 120-W, rack-mounted rig that used a pair of Taylor T-20s, and his up-to-the-minute Hallicrafters Skyrider S-10 receiver. W1HDQ also observed that the "states worked" totals of many 5-meter stations had gone up by "leaps and bounds," and called for people to submit their records in this department. Thus began the various "standings boxes" that have been an integral part of this column ever since.

In addition to chronicling skip conditions, Ed also noted the improvement in nonskip coverage of 5-meter stations since stabilization and the advent of improved receivers, higher power, and more efficient transmitters. He commented, especially, on the opportunity these improvements provided to study the effect of weather conditions on beyond-line-of-sight paths. The column reported several instances of 56-MHz stations working over distances of 300 miles—and a record tropo distance of some 450 miles.

Also reported were attempts between US and South African stations to work each other on 56 MHz. No successful two-ways took place, but one Michigan station reported hearing a ZS during one of the skeds. Also reported on the international scene was the first 5-meter contact between England and The Netherlands, when G2AO worked PAØPN on "i.c.w." over a 250-mile path. In retrospect, it's sobering to note that this was less than two weeks before Europe was engulfed by World War II.

The higher bands were not ignored in this initial "u.h.f." column. W1HDQ asked for reports from around the country on 2½-meter activity and featured an account of a portable operation by W9WYX from Pike's Peak, and W9VTK, located on a hill south of Cheyenne, Wyoming. The two were successful in working over the 150-mile path, and sparked a lot of interest in the Denver, Colorado area. The rig at W9WYX ran 75 W, while W9VTK's ran 18 W to a 6A6 oscillator modulated by a 6N7. Ed noted that the simplicity of the equipment made the 112- to 116-MHz band especially suited to the beginner. W1SS reported plenty of nightly activity on the band in the Boston area, with distances up to 25 miles covered regularly. He commented that the "Q" type antenna seemed to be the most popular. W1HDQ supported the use of this radiator, especially in light of high losses associated with tuned feeders at this elevated frequency. George Bailey, W1KH (then ARRL vice president, and later president), reported on activity in the Boston area in the lofty world of 224 to 230 MHz. George said that some on the 1¼-meter band use the Western Electric 316A "doorknob" tube, capable of 8 W. In addition to such a rig, he had a pair of RK-32s running 300 W!

In the "U.H.F. Kink of the Month" section, W1HDQ contended that equipment for 2½ meters does not have to employ modulated oscillators. Another simple approach was to double the 5-meter signal—using one of the "newer" transmitting triodes. He noted W1HDF's use of a single HK-54 to double the output of an 807 on 56.088 MHz. The HK-54 was said to run 100 W, and put out a good-sounding signal on 112.176 MHz. Ed went on to say that he had tried this scheme using a TZ-40 with an 8-inch hairpin loop made of no. 8 wire in the plate circuit. To tune it, he simply "squeezes or spreads apart" the loop. He cautioned, however, that because of the lower efficiencies inherent at these frequencies, its best to run the tube at only 60% of the manufacturer's ratings. He claimed 15 "very respectable watts" from his TZ-40, running 90 mA at 600 V.

I thought readers of The World Above 50 MHz might be interested in a glimpse of what life on the VHF bands was like 50 years ago. I believe such knowledge helps us appreciate what we have today, and builds even more respect for the early VHFers who preceded us. We all owe a particular debt of gratitude to Ed Tilton, W1HDQ (now /4 in Florida), for getting the column started and conducting it in such a fine manner for many years. I will try to continue in the same tradition.

ON THE BANDS

The mail this month is dominated by reports of the huge tropo opening that enveloped the central part of the country in mid-September. Many characterize it as the best such propagation ever experienced. W5DFU, Tulsa, Oklahoma, comments that his VHF experience goes back 44 years, and that he has never experienced anything like it. Warren says that he worked 30 new grids on 2 meters between September 16 and 21, and a total of 50 new ones since August 1. The highlight for him, however, was working W9ZIH on 13 cm. NØLL, Smith Center, Kansas, reports that the big tropo session lasted from the 17th to the 21st, interspersed by a good aurora September 19. Larry's tropo contacts include N4VC, EM66, in Tennessee at 0318Z on the 17th, and NØHNM, EN06, in North Dakota at 1402Z. On the 18th, beginning about 0245Z, N5BHZ, EM22, was worked on 2 meters, along with WB5LUA, EM13, both in Texas, on both 70 cm and 23 cm. During the aurora, beginning about 0230Z on the 19th, Larry hooked up with a string of 2-meter stations in EN34, EN54, EN52, EN10, EN16, EN72, EN81, DN84, EM29, EM48 and EM35. The tropo persisted after the aurora disappeared, producing a contact with N5JBZ, EM31, in Louisiana. On the 20th, about 0300Z, N4VC was worked again, as was W5FYZ, EM32, in Louisiana. After five days of tropo openings, the 21st brought KD5BM, EM41, in Iowa, at 0012Z, followed at 0445Z by W4GJO, EM74, in Georgia—first on 2 meters, then on 1¼ meters and 70 cm. Soon afterward, KØIFL, EM45, in Missouri, was worked on 2 and 1¼ meters, as was KA9RZZ, EM59, on 2 meters and 70 cm; W2GU/4, in Tennessee, EM74, on all three bands; W9BN/5, EM34, on 2 meters and 70 cm and; on 2 meters, KD9DT, EM59; K9DZE, EN61; N9JF, EM49; KI8C, EM82; KC4GO, EM75; K9MRI, EN70; WA8WJW and KA8YZK, EM79. On 1¼, Larry contacted WA9JFM, EN52; K9VGE, EN52; KØDAS, EN42; and NN9K, EN41.

From WB3JYO's regular column in the Pack Rats monthly newsletter *Cheese Bits*, comes information on some good East Coast

tropo, as well as the September 19 aurora. As for tropo, Paul writes that, beginning September 1, and for the following week, a typical fall tropo opening brought good 2-meter signals into the Philadelphia area from stations in FM15, FM05 and FM06, as well as grids to the north. On the 6th, WC2K worked stations in FN96, FN86 and FN76 on 2 meters and 70 cm, as well as K1WHS, FN43, on 13 cm. This contact produced S-6 SSB reports both ways. WB3JYO's report also covers the aurora, which began for him about 2200Z September 18, with 6-meter signals from 8, 9 and VE1, 2 and 3. Later, the more southerly stations were heard as well. The aurora faded about 0300 on the 19th, but reappeared by 0430. By that time, WC2K was about the only station still on. Rick proceeded to work pile ups of 5s, 0s and 9s for the next three hours. He finally capped it off by hooking up with W3HQT/1 in Maine, FN43, on 1¼ meters.

The disturbed magnetic conditions resulting from the aurora once again worked their magic for the north-south path on 6-meters. This came at an excellent time for HC5K, who had journeyed to the Galapagos Islands, 800 miles west of Ecuador. It was great for many who still needed an HC8 contact. Ted had some 585 QSOs in 185 grids and 23 countries. A number of US stations were included in this impressive total. His best contact was with a station in Indonesia. For this part of the country at least, propagation was not limited to South American stations. On the afternoon of the 19th, a rather good opening to Australia took place. N5TX, in San Antonio, Texas, is known to have worked several VKs, and K5ZMS was able to complete a mobile contact with VK2BA while on the way home from work. W9AGH/5 reports that he and several other Houston-area stations worked VK5ZDR at 2307Z. Larry notes the selective nature of the propagation. Other than these, and a few other scattered openings, the band is still making most of us wait, as of early October. N6AMG did manage a QSO with ZK1CG at 0808Z October 8, and K7KV is reported to have worked ZK1RS in the Northern Cooks on October 5 at 0834Z. According to ZS6WB, the Africans have been having great success working into southern Europe and sometimes beyond, with TA4/G3SDL reportedly doing a "land office business" into southern Africa. I'll try to have a report on that station's activities next month. His stay in Turkey is due to end about the time this is being written.

FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

A National DTMF Tone Squelch Frequency?

Vern Gallinger, W7JAT, wrote recently to describe a problem he has noticed on his local repeater: when mobile stations seek assistance from base stations, their cries for help go unanswered.

Vern cites two examples that occurred on his local repeater that covers parts of four states and some 50,000 square miles.

A WB6 came up on the repeater one day, "This is WB6—. I need someone to call the California Highway Patrol for an elderly couple stranded on Interstate 40 at mile marker 17."

There was no answer. The WB6 repeated his request several times with the same result: no answer. (W7JAT has no phone, so he could not help.)

A W7 was heard on the repeater one night, "This is W7—. Can someone call the Arizona Highway Patrol to report a truck loaded with furniture on fire at milepost 44."

Like the WB6, the W7 received no assistance and drove 80 miles before he could find a telephone to report the fire.

So, why were no stations willing to help the mobile stations that were desperately seeking assistance? Vern claims that no one was willing to help because no one was monitoring the repeater!

Where Did Everybody Go?

Base stations tend to turn off their radios because sometimes they find the conversations on the repeaters distracting or annoying. On Vern's local repeater, a westbound mobile can talk with an eastbound mobile for 300 miles (or five to six hours!). It is hard to conduct a scintillating conversation for six minutes, much less six hours, so you can't blame base stations from pulling the plug after the first three or four hours of the same two stations conversing!

Under certain circumstances, I pull the plug because I can't concentrate on the task at hand with a radio conversation in the background. For example, the voice radio goes off while I write this column. The music radio also goes off. I just wish I could convince my daughter to turn off her Teddy Ruxpin® that is playing a tape of Mickey Mouse singing "Jingle Bells" (it's October as I write this).

On the other hand, while I drive, I monitor the local 220-MHz repeater, 146.52 MHz and broadcast station WFAN simultaneously.

Anyhow, as Pogo once said, "We have met the enemy and he is us!" Mobile stations yacking cause base stations to tune out, leaving the mobile stations high and dry when they need assistance.

Squelching the Conversation

W7JAT does not leave us high and dry by posing a problem without a solution. Vern suggests that a "National DTMF Tone Squelch Frequency" be selected and publicized in *QST*, *The Repeater Directory*, etc. The idea is that base stations could install DTMF decoders in their transceivers to keep the transceiver's squelch closed until the National DTMF Tone Squelch Frequency was received. When a station requires assistance, he simply sends the National DTMF Tone Squelch Frequency using his radio's Touch Tone® keypad, causing the base station's squelch to open momentarily to alert the operator that assistance is requested. Such a system would permit base stations to tune out incessant yacking on the local repeater, yet allow them to be available when their assistance is required. It would also permit stations to yack on the repeater to their heart's content.

Such a system would be relatively inexpensive to implement. The price of DTMF decoders has fallen significantly. Recent editions of *The ARRL Handbook* describe a "simple DTMF decoder" that consists of a handful of components that can be built in a few hours. DTMF encoders are standard equipment on most of the FM transceivers sold today, so no added expense is required at that end. If the idea catches on, radio manufacturers would probably start including DTMF decoders in their radios as well.

Vern suggested running his idea up the FM/RPT flag pole to see if anyone salutes. What do you think? Is it an idea whose time has come? The FM/RPT mailbox awaits your input. In the meantime, Vern is trying to get a phone installed at his QTH so that he can lend a hand when needed.

VHF/UHF Century Club Awards

The ARRL VUCC numbered certificate is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators indicated in *italics* for each band listing. Numbers listed after calls refer to endorsements. The following annual listing of the VUCC membership includes totals as of October 10, 1989. An SASE will bring you the rules and application forms.

Compiled by Tom Vesci, WB1CRH

6 M

50 MHz

100

1	K8WKZ	525
2	KB4CRT	325
3	W1QXX	275
4	N4MM	400
5	WB8WXZ	200
6	WB7OHF	325
7	WB1FVS	
8	WD4FAB	250
9	WA3DMF	375
10	WA6BYA	475
11	W4OO	375
12	KA1DHO	225
13	W3WFM	450
14	N3COG	275
15	N2DXP	250
16	K1TOL	500
17	WA1OUB	475
18	W3EP/9	250
19	N5DDB	300
20	W1WHL	250
21	WB4SLM	200
22	N2CEI	175
23	W8MVE	125
24	NØLL	450
25	KI3L	
26	WB4NMA	125
27	KØTLM	400
28	K8TGC	300
29	W1JR	325
30	KC8PS	
31	WB4OOJ	225
32	KC7QY	
33	N2BMN	
34	WA4UAS	
35	N8EDL	
36	W5JME	300
37	WA6CRA/4	175
38	N9CEX	
39	KØUS	
40	WB8BKC	400
41	NZ5W	150
42	KAØJGH	375
43	N9ANO	
44	WBØZKG	250
45	K8YAH	175
46	KA9MGR	350
47	KY9P	250
48	AK4T	150
49	N2BMN	
50	KD9QU	150
51	AA2Z/3	
52	WD5ICC	300
53	WA1AYS	
54	KB2XJ	
55	N2WK	250
56	WB2EBS	
57	K2YOF	
58	WBØPKN	350
59	WB2NPE	
60	K5WE	
61	KX9N	
62	N9DCA	
63	WA8LLY	200
64	WB8KAY	325
65	K9HEK	200
66	W5FF	550
67	WB4NJG	175
68	KD5RO	125
69	W3ZZ	300
70	W2SZ/1	125
71	KE4PE	
72	WØJRP	350
73	N2BJ	188
74	WØKEA	175
75	W3OTC	275
76	WDØCKF	
77	K5IS	150
78	W9VNE	
79	WAØDYU	250
80	K8EID	250
81	KA5LVP	
82	K8GQB	250
83	K8IXU	
84	KD6PY	
85	KS5M	
86	KAØNVT	
87	W2CUK	125
88	WB8KRY	175
89	WB6KLL	150
90	KA3B	150
91	KC2OG	
92	KA9JYZ	
93	W2HRW	300
94	N9FDS	150
95	W9NO	
96	KA2LIM	
97	KCØQR	
98	K2OS	
99	N5DDT	
100	KF5DB	
101	K4LHB	
102	WA3IAX	
103	K5UR	400
104	WD8CTX	175
105	K2OVS	200
106	KD7IY	
107	W5NZS	
108	NB9L	
109	WA1WIF	125
110	WD6BCN	150
111	NC9F	200
112	VE3FGU	
113	W9UD	
114	NN9K	225
115	KI3L/5	200
116	N3BBI	300
117	K4RWP	250
118	N7BUP	175
119	K9LCR	225
120	WD9FFC	175
121	K4CKS	350
122	N4VA	
123	WA9FYB	175
124	AC3T	250
125	K2GK	
126	KB3QM	
127	WB2MKN	175
128	W6RXQ	
129	KA9DZM	200
130	KA9LDS	250
131	KU8Y	
132	W7US	200
133	WB8TGY	250
134	W7HAH	400
135	AA4FL	150
136	KS4S	200
137	W4HJW	
138	WA4JNE	
139	WDØBQM	
140	NA4I	250
141	WB0TEM	125
142	AIØO	125
143	KA2GOJ	275
144	WB9MSV	200
145	KD9IV	250
146	KA5EBL	
147	WA3CKA	
148	W5OZI	400
149	N2AHN	275
150	KF5AL	300
151	WBQXO	200
152	WB9UQE	
153	W8QOI	
154	KI6O	300
155	AB9W	175
156	W9UB	
157	KB4DZX	125
158	W1GXT	175
159	W5DXN	
160	N5HVJ	200
161	K9RRS	
162	W9XT	
163	KA9SPD	
164	K1ISW	
165	KA4CRT	
166	K6EJO	150
167	W5RCI	225
168	N4MW	300
169	WA6IJZ	
170	W3BWU	150
171	WA2PDI	175
172	AA4FQ	150
173	W7ABX	250
174	K1RSA	175
175	WBØYZN	
176	NW5E	175
177	AA5C	150
178	KF6ZB	
179	K1TMM	
180	WB8YFE	350
181	N2AVR	
182	K3YTL	
183	K6CH	225
184	WB5ROR	200
185	K4DZP	
187	WBØVZW	125
188	KC9NV	
189	N7DB	300
190	AA4FS	
191	N4AVV	
192	K3QM	
193	WA9FIH	125
194	N9CC	
195	WB4NIX	
196	N5HYV	125
197	WA5S	200
198	K1GPJ	300
199	K7ICW	
200	W7JXU	
201	KI3W	150
202	N4LTA	225
203	WAØNOK	
204	WA4IAX	
205	WDØFOY	125
206	WB4WXE	
207	WØVD	125
208	K2DNR/7	175
209	KN8B	225
210	WBØCGH	
211	WA7TUX	
212	WØRTZ	
213	W5HUQ	150
214	KA9SOW	175
215	WA1TRE	275
216	N5HHS/5(EM10)	300
217	N5HHS(EL29)	150
218	AFØT	
219	N5JHV	
220	KBØHH	125
221	W7KYT	175
222	KB9QC	150
223	KMØA	325
224	WØRT	
225	NØFFO	225
226	WA5DJJ	
227	WB3LJK	
228	K5HYE	175
229	N2CG	
230	WB5MTU	150
231	WB8PAT	150
232	NØCMW	
233	W7LQV	150
234	WØFY	225
235	WB5RUS	175
236	N2GBY	175
237	WA2HYC	
238	N1ABY	
239	VE3EVW	
240	KB4OLM	175
241	VE3LNX	225
242	WB4AYE/6	150
243	N9KS	
244	W7KNT	
245	W7IDZ	
246	WA6UZR	
247	W5AL	300
248	WD5JDI	
249	KA2TVA	125
250	KF4FL	200
251	KD4LT	
252	KB4TZX	
253	KA1ZX	200
254	KK6C	300
255	K3AKR	
256	KØIFL	225
257	VE4CW	200
258	K7CW	125
259	AF2K	
260	KVØR	
261	WA4CAK	125
262	KB4CSE	200
263	WBØWAO/8	250
264	WAØOZP	150
265	NØGPD	125
266	N2AAZ	
267	N6EIO	
268	WA1TBV	
269	KD2YB	125
270	WBØHYV	200
271	W4CYC	200
272	KU2A	150
273	KB4XK	200
274	WA4NJP	
275	WD8OXK	150
276	N8CCC	175
277	AA4LB	125
278	KA8FKY	
279	KQ4Z	125
280	KB6OK	175
281	WB5AFY	
282	WØGN	175
283	KA1MVB	300
284	N4HB	175
285	NØCW	125
286	W7FIV	225
287	KX4R	225
288	WA5UFH	200
289	KA3ETI	
290	KA6EYQ	
291	AG9S	225
292	W1EXC	
293	KBØZQ	125
294	N5CTE	200
295	KA5DWI	
296	KØFKJ	
297	N5EPA	250
298	KDØSU	
299	KB8ZW	125
300	N8CW	400
301	KC7IJ	275
302	WA3YON	
303	KA9LLF	125
304	KB8BSW	150
305	W2CNS	250
306	K7NN	175
307	KE9I	175
308	N5DGQ	125
309	N7GXS	150
310	K7VAY	
311	NKØP	
312	WB5NAA	
313	KB5QA	
314	N5JWD	
315	KB8JI	
316	WBØCQO	200
317	WA5OLT	200
318	AB5T	
319	K1FJM/4	
320	KAØKUY	150
321	KH6CP/1	
322	KC4IS	150
323	W1GRW	125
324	WB8CCL	150
325	WA9ABB	
326	WW4T	150
327	WD5BJT	
328	KØRZ	
329	K6BEM	125
330	JO1HOQ	
331	W7IDZ	175
332	WD4AFY	150
333	WØPVL	200
334	K8SHO	150
335	NC9L	
336	N5ISA	
337	WBØKEK	
338	WA6DAW	
339	N5JYX	125
340	WAØTKJ	
341	NJØX	125
342	WQ5S	150
343	WB4TWX	
344	KB3PD	
345	WA1NQV	150
346	WA8R	125
347	WA7OEU	175
348	G4IJE	
349	KA7MCX	300
350	G3CCH	
351	W3TFA	
352	W8WG	
353	WA7KHO	
354	WBØHUO	125
355	N1ETT	175
356	NØAKC	
357	W4USW	
358	KH6IAA	
359	KD9OT	
360	KXØO	125
361	WA5JCI	225
362	AA5AM	275
363	WD5K	300
364	KA9QLP	
365	KA9RQC	150
366	AJ9C	
367	WA9PWP	150
368	JN1BPM	
369	NW7O	
370	WA3FYJ	
371	K3ZO	250
372	K2MP	
373	CX8BE	
374	WA2FUZ	
375	KC8IM	
376	VE5LY	225
377	WB5IGF	
378	WAØGOZ	
379	KB5IUA	
380	KD8FO	
381	W8TN	
382	KØDAS	
383	NØHJZ	150
384	W4LMJ	
385	K2QE	
386	KC7MJ	
387	N6VI	
388	N4EQT	125
389	K1CLN	
390	W8CM	225
391	W2IDZ	
392	N9QX	
393	KB7FUV	
394	W4FSO/4	
395	K4RZB	
396	K6LMN	
397	KØCS	200
398	NW7O(DM25)	125
399	NW7O(DM18)	
400	KC4B	
401	K9SM	
402	WAØFQK	

2 M

144 MHz

100

1	K9MRI	325
2	WB9MSV	225
3	KD8SI	325
4	N9KC	125
5	NØLL	225
6	WB4NMA	125
7	WA4NJP	200
8	K2LWR	175
9	KFØM	225
10	W4GJO	200
11	N9AQ	200
12	SM4GVF	
13	WA6MGZ	200
14	KB5MR	125
15	K5WE	150
16	KCØQR	125
17	WA3HMK	
18	K7CW	
19	W5SUS	125
20	W3EP	
21	K8WKZ	
22	N4AR	150
23	NR5O	
24	K5YY	375
24A	WD4DGF	150
25	K4CAW	150
26	WB8BKC	150
27	K3MD	
28	WB8KAY	150
29	KA9LDS	175
30	W1JR	150
31	WA1OUB	175
32	NN9K	175
33	N9BD	125
34	K2TXB	
35	WBØYWW	
36	K3RX	125
37	WB8ART	200
38	WDØFOY	
39	WBØTEM	225
40	NØAJU	
41	K2OS	
42	WAØTKJ	275
43	W5RCI	200
44	WBØOGF	125
45	WA2FXB	
46	N8BJN	125
47	KØTLM	175
48	KØUS	
49	SM3AKW	
50	NOØY	
51	WB4NXY	125
52	W3ZZ	125
53	NI8O	150
54	KAØABA	125
55	KXØO	125
56	W9HAD	
57	AA5V	
58	WBØZKG	
59	N8CKH	150
60	W8LSC	
61	W5FYZ	175
62	KCØOG	
63	K5UR	350
64	W5FF	150
65	WØRT	
66	NØEKT	
67	WBØYZN	
68	KD9QU	125
69	WB9OJR	150
70	N5BHO	
71	WB2NPE	
72	WB9CAS	
73	K8TL	
74	WB4NJG	
75	AA4FS	150
76	VE1UT	
77	KU8Y	125
78	WB4GFO	
79	K4CKS	150
80	KB7Q	
81	K2GK	
82	KB9QC	
83	WB9UQE	
84	W2SZ/1	
85	WB3LJK	
86	G6JNS	
87	G4UXC	150
88	K8RZB	
89	AF9Y	275
90	G6DZH	125
91	G4WAD	125
92	G6HKM	
93	W9UD	
94	N4AVV	125
95	DL6LAU	250
96	W9YCV	
97	W7HAH	250
99	K9VGE	
100	G4XEK	
101	W2RS	125
102	KE2N	
103	W8NJR	
104	N8DEJ	
105	WBØSWD	
106	WA3FYJ	
107	KD4LT	
108	W3CWG	175
109	KB4FQ	125
110	N2WK	125
111	W5NZS	
112	LA9FY	
113	WA4VCC	200
114	GØCHE	125
115	KR9U	
116	G6XVV	150
117	N2AHN	125
118	YO2IS	
119	WA5DBY	
120	KMØA	275
121	W9JGV	150
122	WA9JFM	125
123	W7ID	
124	WØZ	175
125	WØJRP	
126	KB4CSE	175
127	K3JFL	
128	KU9L	
129	WBQXO	125
130	WB4TWX	150
131	W4CPZ	125
132	W4ZD	325
133	WØEMS	
134	K4JQU	125
135	WA8MIL	
136	WA8NPX	125
137	N5HYV	
138	KD9JQ	
139	NC9F	125
140	K8UC	
141	W2GU	175
142	HB9RUZ	
143	NB9F	150
144	WØFY	175
145	AA4FQ	125
146	AB5T	
147	KB3QM	
148	KB4WM	150
149	W7IUV	125
150	W9UB	
151	NØBTN	
152	WD4EWX	
153	K3QM	
154	N5HVJ	
155	KI4CI	
156	KBØZQ	
157	W3WVG	
158	VE1ALQ	
159	NW5E	
160	N4MW	125
161	KB3PD	
163	WD4AHZ	175
164	W3ZR	
165	W5HUQ	
166	W2DRZ	
167	WAØNOK	
168	KA9SPD	
169	WØVD	150
170	YU4WEU	150
171	KJ4GK	
172	K6PVS	
173	K3NXH	
174	N4EJW	
175	Y22SA	
176	NY4T	175
177	WB4OOJ	
178	KAØGGI	
179	NE4C	125
180	KØIFL	175
181	KBØHH	
182	DL8AAV	
183	WØRTZ	
184	N5WS	200
185	K4RWP	
186	KB4CRT	125
187	K5IS	
188	AA2Z	
189	W3WFM	
190	YU3OV	
191	NØFQW	125
192	WA4SBC	
194	WB5ROR	125
195	W5AL	175
196	KD7IY	
197	K7CW	
198	N5HHS	
199	WA8EOU	150
200	K4HJE	125
201	NI4Z	

202	KD9IV	
203	KI3W	200
204	GI1JUS	
205	N2BJ	
206	N6CW	
207	K6CH	
208	N4MM	
209	DK2LM	
210	WC4G	
211	WB4TBF	
212	KQ8Z	
213	KD5RO	
214	KB8JI	
215	GM4ILS	125
216	N5CTE	150
217	W5UUM	125
218	WA5PUP	
219	W7RV	
220	AA7A	125
221	N8GWG	
222	N4HB	
223	WBØHUO	
224	WB5NAA	
225	N4VC	125
226	N8CGY	
227	AA4TJ	
228	WA8EQP	
229	NU5F	125
230	WA1VRH	
231	G6IJM	150
232	DL4OL	
233	KX4R	125
234	WD9IIC	
235	W4FF	
236	WB4MJE	150
237	KA5DWI	
238	W2HRW	
239	KB5RF	150
240	W5ASH	
241	YU7CV	200
242	WB8CCL	150
243	WD4FAB	
244	K9MK	
245	KAØJGH	
246	KE9I	
247	WA4MJD	
248	W1AJR	
249	KC4IS	
250	WB8CPW	125
251	WA2SLY	
252	WBØHYV	
253	KD8JQ	
254	WB9PAT	
255	W4EMB	
256	KAØKUY	
257	WW4T	
258	KA2WKA	
259	WB8YFE	
260	WB4SLM	
261	WD5ICC	
262	KF5PE	
263	N4FWE	
264	W1AIM	
265	N5JYX	
266	VE3PCW	
267	KE8FD	
268	N1BUG	
269	K7ICW	
270	KB8ZW	
271	NØFFO	
272	KØLIA	
273	WA4VLQ	
274	WBØWAO/8	
275	G3JMB	
276	WA8MZQ	
277	K1FJM/4	
278	KA5EBL	
279	VE5LY	
280	WØRAP	
281	WA4GBE	
282	KI8G	
283	WD4AFY	125
284	KB5QA	
285	KA5ULI	
286	VE3LNX	
287	NØCIH	
288	WDØG	
289	G4RRA	250
290	AA5AM	
291	K3ZO	
293	KC4YO	
294	W2CNS	
295	K3HZO	
296	WA5NFC	
297	KD8FO	
298	KB4XK	
299	GWØETM	
300	WA5UAJ	
301	W5SFW	125
302	W5UGO	125
303	W8RQQ	
304	KAØYMZ	
305	W8CM	
306	W4FSO/4	
307	K1TR	
308	KØDAS	
309	KG5VE	
310	NS4W	
311	WQØP	

1¼ M
220 MHz
50

1	W1JR	80
2	WØSD	
3	WBØTEM	120
4	WB8BKC	100
5	VE3EMS	
6	WD4DGF	
7	N9HH	
8	W2SZ/1	
9	W9UD	
10	KC4EG	
11	WB3LJK	
12	W5RCI	60
13	WB2NPE	
14	K5UR	110
15	WA4PCS	
16	N2WK	60
17	KFØM	
18	WB8ART	
19	WS4F	
20	KØTLM	
21	W2DRZ	
22	K2GK	
23	K3HZO	
24	WB8KAY	
25	VE3LNX	
26	W4GJO	
27	WB9MSV	60
28	KØIFL	60
29	KCØQR	
30	K4LHB	
31	WB9OJR	
32	KB8ZW	60
33	WB8PAT	
34	KB8JI	
35	WAØTKJ	
36	KA9MGR	
37	WB9CAS	
38	W3ZZ	
39	W2GU	
40	WB4SLM	
41	N3AHI	
42	NN9K	
43	NC9F	
44	KB3QM	
45	WA9JFM	
46	WBØWAO/8	60
47	WØFY	
48	WA4NJP	
49	KMØA	
50	K5UGM	
51	KØDAS	
52	W5NZS	
53	NØCIH	
54	N4MW	

70 cm
432 MHz
50

1	W1JR	170
2	K8WW	180
3	WB3ESS	
4	WB8BKC	130
5	W4GJO	130
6	W2VC	70
7	WA9JFM	90
8	KB5MR	100
9	WB4NXY	90
10	K4CAW	80
11	W2SZ/1	70
12	KD8SI	90
13	WBØTEM	
14	VE3CRU	70
15	W9UD	
16	WB9MSV	100
17	WB5AFY	150
18	W5RCI	160
19	KØTLM	100
20	SM3AKW	
21	K5YY	130
22	WB8ART	100
23	K1FO	240
24	W3ZZ	60
25	WØRAP	200
26	KFØM	80
27	K8TL	70
28	WBØDRL	
29	NI8O	120
30	KC4EG	
31	KCØQR	70
32	VE3BFM	
33	W8LSC	60
34	KR9G	60
35	AF9R	
36	WB8KAY	70
37	NZ5W	
38	NC9F	70
39	WB2NPE	
40	W1XX/2	
41	W5NZS	
42	K2GK	
43	K5UR	150
44	WØRT	
45	G6JNS	
46	N9KC	
47	G6DZH	70
48	G6HKM	
49	KE5EP	70
50	K3YTL	
51	WA5DBY	
52	KB3QM	
53	WB3LJK	
54	WB9SNR	
55	N5BHO	
56	N8DJB	70
57	WØRRY	150
58	N4AVV	
59	KØUS	
60	K6JJA	
61	AA4FS	60
62	VE3LNX	60
63	N4WM	70
64	KCØOG	
65	KAØABA	
66	K8UC	
67	KB8ZW	80
68	NØEKT	
69	WB9UQE	
70	K3QM	
71	WØFY	70
72	WA8MIL	
73	G4NBS	70
74	K5WE	
75	WB9OJR	70
76	WBØDGF	
77	W5DFU	
78	KMØA	70
79	K9VGE	
80	K3HZO	60
81	N2AHN	70
82	WØJRP	70
83	W8YIO	110
84	W2GU	80
85	WS4F	
86	W2DRZ	
87	W5ASH	60
88	WAØNOK	70
89	W5HUQ	80
90	WØVD	70
91	K9DZS	
92	WB9CAS	
93	KD5RO	
94	W5HN	60
95	W9HAD	
96	KA9SPD	
97	N8BJN	
98	DF8ZW	
99	NØLL	70
100	WA5TKU	
101	K14CI	
102	W3WFM	
103	WØYPT	
104	KA9LDS	60
105	KØIFL	
106	G3XDY	80
107	NØFFO	
108	N2WK	
109	KBØZQ	
110	K4CKS	90
111	W7HAH	90
112	N4VC	
113	WAØTKJ	80
114	WB2DNE	
115	WA8OXG	60
116	KL7WE	80
117	WA4OFS	
118	G1EHJ	
119	WA4PCS	
120	N5HVJ	
121	WB5ROR	
122	WD4FAB	
123	WB8PAT	
124	WD4AHZ	
125	WA4VCC	
126	WB4OOJ	
127	KD9GT	
128	KØRZ	
129	G4FRE	110
130	KB3PD	
131	KC4IS	
132	K2OS	
133	G6DER	100
134	KD9IV	
135	KB9QC	
136	KØSMI	
137	AA2Z	
138	JA4BLC	
139	KB4CSE	
140	KX4R	60
141	WB4SLM	
142	KC5SH	
143	KB4WM	60
144	GW8TIX/P	70
145	WB5NAA	
146	JHØYSI	
147	N5JYX	
148	WA4BGE	
149	WA4NJP	60
150	W5AL	60
151	KB5QA	
152	N2BJ	
153	KA5ULI	
154	G4XOL	100
155	WØKJY	
156	WA3FYJ	
157	N4EQT	
158	W5UGO	60
159	W7RV	
160	N5CTE	
161	W4FSO/4	

33 cm
902 MHz
25

1	AA2Z	
2	VE3LNX	35
3	WB8BKC	35
4	W1JR	
5	WB2NPE	
6	VE3CRU	
7	N3CX	
8	KD5RO	30
9	N2WK	

23 cm
1296 MHz
25

1	WB8BKC	65
2	K8WW	50
3	N6CA	40
4	WB5LUA	110
5	W8YIO	45
6	W1JR	35
7	W2VC	35
8	W2SZ/1	
9	W5HN	30
10	WBØDRL	
11	WA5TKU	30
12	WØRAP	60
13	VE3BFM	
14	WA8TXT	
15	VE3LNX	35
16	WB2NPE	
17	KD5RO	55
18	K3YTL	
19	G4PRJ	35
20	WB5AFY	50
21	WAØTKJ	45
22	KE5EP	35
23	WA5DBY	
24	KØNG	
25	WB9SNR	
26	WB4NXY	30
27	NOØY	45
28	W7CNK	
29	W5RCI	45
30	W5DFU	
31	W5NZS	
32	NI8O	45
33	KØSMI	
34	G4NBS	50
35	K3HZO	40
36	N8DJB	30
37	K2TXB	
38	W2DRZ	
39	W5ASH	
40	WA5VJB	
41	KDØGT	30
42	W4GJO	30
43	N5WS	30
44	KCØQR	
45	KØRZ	30
46	WD5AGO	55
47	NØEKT	
48	KØTLM	35
49	WA1OUB	35
50	G3XDY	55
51	WA1JOF	
52	KD8SI	
53	W3KWH	
54	K5UR	40
55	AA2Z	
56	KF5PE	30
57	W2GU	
58	WØOHU	
59	N2WK	30
60	KØFQA	
61	KD5RO/2	50
62	G6DER	70
63	KØIFL	
64	N2BJ	
65	KB3QM	
66	WØYPT	
67	G4RGK	
68	WB9MSV	
69	G6HKM	
70	WA9JFM	
71	WB4SLM	
72	WØKJY	
73	KB8ZW	

2.3 GHz
10

1	WB5LUA	30
2	WA5DBY	
3	WA3AXV	
4	WA3JUF	
5	WA5VJB	
6	W5HN	
7	W2SZ/1	
8	WB5AFY	15
9	KD5RO	20
10	W7CNK	
11	W5UC	
12	W8YIO	20
13	W5DFU	
14	K7AUO	
15	WB2NPE	
16	W4HHK	
17	N3CX	
18	WB8BKC	
19	WB8TGY/8	
20	KØRZ	
21	WA5TKU	
22	G3XDY	15
23	KDØGT	
24	KB8BSW	
25	VE3LNX	15
26	W1RIL	
27	KØKE	
28	W5ASH	
29	KXØO	
30	KD5RO	25
31	G6DER	35
32	N2WK	
33	W1JR	
34	WAØTKJ	
35	W5RCI	

3.4 GHz
5

1	W2SZ/1	
2	WA5DBY	
3	WB5LUA	10
4	W5UC	
5	KD5RO	10
6	WA5VJB	10
7	WB7UNU	
8	WA3RMX	
9	KØRZ	
10	W7CNK	
11	WB5AFY	10
12	K7AUO	
13	WB5LUA/5	
14	KDØGT	
15	WØKJY	
16	KØKE	
17	KXØO	
18	G6DER	10
19	KD5RO	
20	W5UGO	

5.7 GHz
5

1	W2SZ/1	
2	K5PJR	35
3	WA5ICW	30
4	WD5AGO	
5	W5UGO	20
6	WB7UNU	
7	WA3RMX	
8	K7AUO	
9	WB5LUA	10
10	KØRZ	

10 GHz
5

1	W2SZ/1	
2	K2DNR/7(DM41)	
3	KCØW	
4	K2DNR/7(DM42)	10
5	WA7BBM	
6	WB7UNU	
7	WA3RMX	
8	N6CA	10
9	WA6EXV	10
10	KB7CI/7	10
11	WB2ELB	
12	KS2Z	
13	W7UDM	
14	K7AUO	
15	WA6QYR	
17	K6UQH	
18	KØRZ	
19	W6RXQ	
20	N6XQ	
21	WBØHLC/6	
22	W6OYJ	
23	WB2ONA	
24	W2TTM	
25	W2VC	
26	W6CPL	
27	K2GQI	
28	K6HLH	
29	WB5LUA	
30	W6OYJ	
31	WA5BNH	
32	G3JMB/P	
33	W6HDO	
34	W6HCC	10
35	G8LSD	
36	NW7O	
37	WA7JUO	
38	KG2K	

24 GHz
5

1	W2SZ/1	
2	WA3RMX	
3	WB7UNU	

>300 GHz
5

1	KY7B	

Hamfest Calendar

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.

†**Florida (Okeechobee)—December 2.** *Sponsor:* Okeechobee ARC. *Time:* 8 AM-4:30 PM. *Place:* Agriculture Center, US Hwy 441 N, 1 ½ miles N of intersection of US Hwy 441 N and S, Rte 70. *Talk-in:* 147.795/195. *Admission:* advance $2, door $3. *Tables:* $10 reserved. *Contact:* Sue Jackson, KC4CVE, 7200 Hwy 441 N, Okeechobee, FL 34972 or Dot, 813-763-2906.

Indiana (South Bend)—December 31. *Sponsor:* Repeater Valley Hamfest Committee. *Place:* Century Center, downtown on US 33 (northbound one-way) between Trustcorp Bank Building and the river. *Talk-in:* 146.52 and area repeaters. *Tables:* $5 for 5-ft round; $15 for 8 × 2.5-ft rectangular; $20 for 8-ft wall locations. *Contact:* Wayne Werts, K9IXU, 1889 Riverside Dr, South Bend, IN 46616, 219-233-5307.

†ARRL Hamfest

Coming Conventions

ARRL NATIONAL CONVENTIONS
June 8-10, 1990—Kansas City, Missouri
August 23-25, 1991—Saginaw, Michigan

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance.

IARU News

Conducted By Richard L. Baldwin, W1RU
HC 60, Box 60, Waldoboro, ME 04572

ITU-COM 89

In Amateur Radio there are, fortunately, some who give more than they receive. They are the ones who, for example, teach courses for the benefit of others who wish to become radio amateurs, or who practice in order to be ready to handle emergency communications in times of natural disaster, or who take part in the Monitoring System. Having obtained a great deal of personal pleasure from Amateur Radio, these people are, in a sense, paying their dues.

Such a group was much in evidence in Geneva, Switzerland, during the early days of October 1989. The IARU Exhibit Team was formed during late 1988 to plan for and erect an Amateur Radio exhibition at ITU-COM 89. ITU-COM 89 was a symposium and exhibition of various aspects of communications organized by the International Telecommunication Union and was held at the Palace of Expositions in Geneva from October 3 to 8.

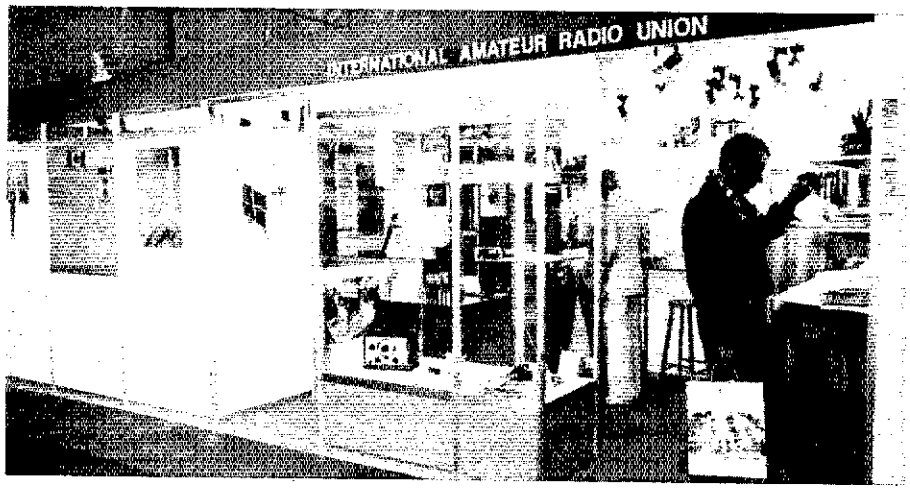
The purpose of the Amateur Radio stand was to demonstrate the value of the Amateur and Amateur-Satellite Services to nonamateurs, particularly to those people who were somehow involved in the administration of telecommunications in their respective administration.

Coordinator of the IARU Exhibition team was Henri Schaerer, HB9PAS. He was assisted by the following advisors (with additional duties noted in parentheses): Jaap den Herder, F6FYI; Han Broere, PAØNOS; Bo Lofstedt, HB9BFQ; Claude Repond, HB9ARH; Edmund Jilli, HB9ASD; Enrique Gutierrez, HB9DCM (Secretary); Claude Chassot, HB9DIV; Rodolphe Schoeneburg, HE9VAB (Treasurer); Renato Brossa, HE9RMH; Erwin Jungo, HE9HDB (Photo Management); Rosella Strom, I1RYS (Press Liaison); Christian Poudou, HE9VHZ; Joseph Camuglia, HE9VHX; Ted Robinson, F8RU; Fritz Szoncso, HB9CUH; Claudia Szoncso-Wulz, HB9CUY; Jean Paul Masmejean, HB9AMF (Video Management); and Philippe Capitaine, HB9RKD.

Except for Rosella Strom, I1RYS, who was the on-site representative of IARU, all of the above individuals live in the Geneva area. Some are members of various Amateur Radio Organizations including USKA (the IARU member-society in Switzerland), the CERN Amateur Radio Club, and the International Amateur Radio Club (4U1ITU). Some hold dual or triple affiliation.

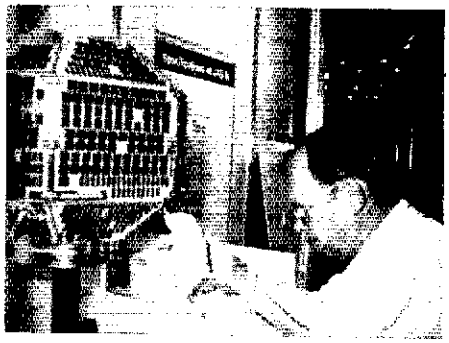
The IARU Amateur Radio stand was extremely well organized and executed. Briefly, it had a number of static exhibits describing some of the activities which enhance the value of Amateur Radio, particularly those activities which enhance the value of Amateur Radio on the International scene. An operating packet-radio station was set up. There was a video room, with continuously running videos supplied by ARRL, RSGB, WIA and JARL. A model of the soon-to-be-launched JAS-1b satellite was on display. There was a multiscreen slide show running continuously. And there was always a group of radio amateurs on hand to greet guests and further explain the Amateur Service. These hosts at the exhibit included not only members of the IARU Exhibition Team, but also representatives of IARU Region I; SP5FM, YT7MM, G3FKM, and DF5UG, plus W1RU.

The accompanying photos will give you a little of the flavor of this IARU Amateur Radio stand, whose organizers deserve the highest accolades.



One view of the stand, which actually had three entrances. Here, the display cabinet had examples of antique and modern amateur equipment construction.

His Excellency A. Al-Balushi, A44FK, Minister of Communications of the Sultanate of Oman, is greeted by Dr John Allaway, G3FKM.



Bo Lofstedt, HB9BFQ, makes a careful adjustment to the JAS-1b satellite model.

Henri Schaerer, HB9PAS, at the packet station, with Rodolphe Schoeneburg, HB9VAB, looking on.

Shozo Hara, JA1AN, president of JARL; Masayoshi Fujioka, JM1UXU, secretary of IARU Region III; and Claudia Szoncso-Wulz, HB9CUY, of the Exhibition Team, look over one of the Amateur Radio publications on display.

Silent Keys

Administered by Nancy A. Slipski

It is with deep regret that we record the passing of these amateurs:

W1AB, Horace B. Goss, Essex, CT
N1AP, Raymond W. St Jean, Leominster, MA
W1BLX, Standish L. Smith, Fairhaven, MA
W1BVR, Percy Noble, Lanesboro, MA
WA1CPG, Paul Higinbotham, Chelmsford, MA
W1LY, John H. Pitman, Quechee, VT
W1RZQ, Edwin I. Saunders, Carolina, RI
KG1T, Peary L. Woodruff, Deerfield, NH
AE1Y, Carl L. Noelcke, Wilmington, MA
WA1YAK, Paul A. Mercauto, Sr, Boston, MA
NP2AR, Cecil F. Wilson, Statesville, NC
W2BFT, J. C. Costello, Uniondale, NY
W2CSK, John V. Butterfield, Rochester, NY
N2EAS, John T. Casey, Locust Valley, NY
WA2FEE, Louis S. Luisa, Clifton, NJ
WA2GUH, Clarence Rivest, Keansburg, NJ
K2HOI, Louis Sidrer, Plainsboro, NJ
WA2HSB, William E. Goff, Plattsburgh, NY
K2IDB, Blaine S. Johnson, Massapequa Park, NY
WB2IQE, John R. Fickeisen, Moravia, NY
W2JAM, Horace L. Walters, Purdy, NY
KK2J, Hugh P. Dickinson, Rapidan, VA
W2JLY, Peter T. Maresca, Jupiter, FL
KA2LCW, Charles F. Schifano, Rochester, NY
WB2LMB, Frank D. Freeman, Summerfield, FL
W2WEY, Ross B. Hunt, Livingston, NJ
WA2WYI, Peter B. Schmidt, Syracuse, NY
KA3QYG, Herman Grant, Slickville, PA
W3TA, R. Glenn Corbin, State College, PA
WA3ZQF, William J. Simpson, Erie, PA
W3ZWK, Harry H. Wheatley, Erie, PA
W4BQW, Robert E. Cain, Tavernier, FL
KC4BX, Grover Meinert, Atlanta, GA
N4CPJ, James T. Lynch, Fort Walton Beach, FL
WD4EEZ, Gary R. Snyder, Jr, Pompano Beach, FL
W4EIZ, James B. Petty, Gastonia, NC
WB4FME, W. E. Gary, Harriman, TN
W4GGZ, Henry L. Ivie, Cornelia, GA
W4IV, William C. Montgomery, Jr, Franklin, TN
K4JFX, Jennings B. Beam, Fort Myers, FL
N4KVY, Gordon L. Wickland, Myrtle Beach, SC
*KB4MO, Ronald H. Butcher, Richmond, VA
W4ORI, Doyle M. Hurley, College Park, GA
N4ORT, Gerald E. Smyder, Alachua, FL
K4PEF, Lester L. Myers, Spartanburg, SC
W4POP, Alan J. Winslow, Zephyrhills, FL
WB4QZY, Joseph W. Lowe, Sr, Springfield, TN
*WK4R, Billy C. Primm, Bruceton, TN
W4SOY, Henry A. Stone, Sr, Lakeland, FL
WB4SWL, Robert C. Gullion, San Antonio, TX
K4YFF, Lee R. Welch, Knoxville, TN
WA4YJR, G. M. Cooley, Tampa, FL
N4ZN, Emery J. Mallory, Tallahassee, FL
K5ABG, Floyd O. Naylor, Wichita Falls, TX
W5DSV, Hubert F. Nelson, Lamesa, TX
W5FW, Richard L. Hawkins, Lawton, OK
KB5HRM, James O. Allen, Sherman, TX
K5JEA, Kermit W. Kruger, Oklahoma City, OK
KF5JO, Charles T. Willett, Monticello, MS
W5SCJ, Edward B. Lagucki, New Orleans, LA
W5SWK, Charles E. Pennington, San Angelo, TX
W5UMF, Robert J. Mulholland, Norman, OK
*W5VOX, Ray L. Jones, Plano, TX
KE5XP, Harry A. Davidson, Robstown, TX
K6AQM, Le Roy T. Cushman, Arroyo Grande, CA
W6BE, George J. Maki, Santa Barbara, CA
KB6BIC, Jesse B. Hess, Santa Ana, CA
K6BV, Forrest L. Barr, North Hollywood, CA
W6DWE, Claude L. Kirkpatrick, San Diego, CA
WD6EYA, Ralph L. St John, Mount Aukum, CA
W6GJI, Gerald Hiltz, Napa, CA
N6HON, Donald P. Burcham, Flintridge, CA
W6OSN, Donald E. MacLeod, Mill Valley, CA
N6QFP, Robert A. Hoegee, San Juan Capistrano, CA
WA6RHW, Jane E. Massie, Fresno, CA
W6RRS, Robert L. Meister, Colton, CA
W6SKU, Neil W. Scanlan, San Juan Capistrano, CA
KA6SOP, Irwin L. Lans, La Mirada, CA
W6TYR, John I. Tiffin, San Luis Obispo, CA
N6UG, Thomas R. Stand, San Francisco, CA
W6WWO, Ronald H. Schlund, Anaheim, CA
W6WWU, James E. Palmer, Santa Maria, CA
WB6WXS, William J. Bradley, Porterville, CA
W6YSK, Robert Garner, Santa Clara, CA
W7AKP, Charles B. Ransopher, Bothell, WA
WB7BPC, Allen R. Fultz, Prescott, AZ
W7CSW, Ryder W. Chronic, Spokane, WA
W7FFC, Frederick J. Carr, Oak Harbor, WA
W7FYY, William Sykes, Mesa, AZ
K7GTK, Roger C. Fitch, Boise, ID
WA7YDV, Andrew W. Coniff, Phoenix, AZ
WA8FXR, Gerald Wollmartz, Sparta, MI
W8GIR, Ivan L. Burdett, West Liberty, OH
W8JC, Chalmer O. Miller, Caseville, MI
K8LXL, Boyd Lofgren, Mentor, OH
W8LYY, Earl D. Jolley, Jr, Elyria, OH
W8LZN, Paul F. Zieger, Grosse Point, MI
W8TC, Theodore R. Cage, Ann Arbor, MI
WA8UEE, Kenneth J. Rosar, Brady Lake, OH
W9BM, Edward H. Nadolny, Palatine, IL
*K9GX, William J. Gochee, Joliet, IL
W9MTV, Delbert C. Maynard, Anderson, IN
WB9NYC, Robert Earl Henley, Aurora, IL
KA9UMC, John M. Coyne, Lombard, IL
WA9YNH, Herbert E. Cleave, Hayward, WI
KØGBL, Luverne R. Wharton, Sioux City, IA
KØJNB, Charles W. Lyon, Pelican Rapids, MN
WBØKIS, Warren J. Koppy, St Paul, MN
WØKKS, Paul Spaulding, Emporia, KS
WØLXQ, Ross S. Fenn, Sioux Falls, SD
KAØSDJ, Vicki Gooch, Belton, MO
KQØV, Sid Schomay, Denver, CO

*Life Member, ARRL

**Charter Life Member, ARRL

Notes: All Silent Key reports sent to HQ must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in *QST*.

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from HQ. Canadian reports should be sent to the CRRL HQ address on page 9.

Many hams have remembered a Silent Key with a memorial contribution to the ARRL Foundation. Should you wish to make a contribution in a friend or relative's memory, you might designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund or for the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation, Inc, 225 Main St, Newington, CT 06111.

50 Years Ago

December, 1939

☐ What's the prow and mast of a large sailing ship doing on the cover of *QST*? Because the main message inside is that amateur radio is again going with Admiral Byrd to the South Pole! "We will be depending on hams to handle all our personal traffic," says the expedition's chief of communications. W1CBD describes the entire setup.

☐ We have a new *QST* column, "On the Ultra Highs," conducted by long-time 5-meter enthusiast Ed Tilton, W1HDQ. His "kink of the month" encourages the brethren to use one of the newer triode transmitting tubes as a doubler for output on 112 Mc., which badly needs activity. An 8-inch piece of wire bent in hairpin form serves as Ed's tank circuit for that higher band.

☐ Ever the seeker of better receiver performance, W1JPE shows us a four-tube superhet with excellent performance, including 1600-kc. i.f. amplification for selectivity and image reduction.

☐ Discouraging news: hams in Michigan last year persuaded their state to issue call letter license plates, but the word is that the program will not continue a second year. There are claims by peace officers that identification is a problem.

☐ Field Day has now become amateur radio's number one operating activity, with more than 1,700 taking part in the June test of emergency communication preparedness. The Egyptian Radio Club, W9AIU/9, took top scoring honors for the third year running.

☐ W1LJI has improved on his last month's article design of single-control tuning. No plug-in coils, no switches—but any frequency in any amateur band from 1.75 to 30 Mc. simply by setting the tuning dial.

☐ The war is heavily impacting amateur radio outside this hemisphere. In addition to general shutdowns, some of the smaller national societies have had to cease operations because of financial considerations and the fact that staff personnel have gone into uniform. Hq. is receiving many pleas from overseas to keep amateur radio alive. "Only your organization and immense strength can save us any bands after this catastrophe."

☐ "Copy what you hear" is the essential rule to score in the League's annual Copying Bee, scheduled this month. Six high-power stations, from W1AW to W6AM, will transmit trick words and misspellings to test your skill. Commercial ops are not eligible to participate.

25 Years Ago

December, 1964

☐ In the past dozen years or so, it seems everybody and his brother have been starting new contests—some worthy, some of questionable usefulness. Responsive to Board-expressed concern, the Editor asks our opinions, seeking to find a balance between the enjoyment and the operating skills developed during contests, against the inconvenience or disruption of "normal" amateur activity on those weekends.

☐ Transistors have pretty well replaced the vacuum tube in most ham applications. This month's issue includes descriptions of W1OOP's 6-meter portable-mobile rig; a 375-watt mobile power supply made from bargain components by KØLMZ; KØHZF's keyer/muter for the Collins S-line; and a high-power version of VE3AU's keyed antenna relay.

☐ *QST* takes sad note of the passing of former U.S. President Herbert Hoover, who as Secretary of Commerce in the early 1920s brought reasonable order out of complete chaos in communications (primarily broadcast) resulting from Congress' failure to enact controlling legislation. The entire spectrum was managed solely through informal, cooperative, voluntary compromises between the various radio services, in tribute to Mr. Hoover's leadership.

☐ Another pioneer has joined Silent Keys. John L. Reinartz, K6BJ, one of the men most responsible for opening up the vast short-wave territory below 200 meters, was awarded the first Hiram Percy Maxim Gold Medal, presented by League President Herbert Hoover, Jr., shortly before K6BJ's passing.

☐ The Old Old Timer's Club is seeking to expand its membership; any amateur who made a two-way contact by wireless at least forty years ago is eligible to join.

☐ Field Day is still the big event of the year. This past June brought out nearly 15,000 participants, maintaining almost 3500 transmitting setups.

☐ A Citizen Band group has requested FCC to allow CB ops use of 28.0-28.32 Mc. for their hobby-type communications. The League is not overly concerned inasmuch as the frequencies are under international agreement as amateur only, but nevertheless has filed in opposition.

☐ Primarily for the beginner and novice, W1ICP shows a simple multiband trap dipole made from standard transmitting coil stock.—*W1RW*

Results, 1989 June VHF QSO Party

By Billy Lunt, KR1R and Mark R. Burke, KA1MIS
Contest Manager Contest Assistant

E-skip and June...they go together, don't they? Usually they do. This time around, June 10-12, 1989, E-skip—that propagation medium that projects 6-meter signals long distances—took an unexpected vacation. We don't know where it went for R-and-R, but it sure put a damper on what is usually a very exciting VHF contest.

"Who forgot to turn on the switch? Bands were dead both days!"—KB1EM. "In the eleven years that we have done the contest, this has to be the worst conditions ever on 6 meters."—WØKEA. "Good location, good equipment, good weather, good food, good friends, good operators, but bad E_S."—WD7Z.

There were a few bright spots propagation-wise, however, as WA1NLD noted that "it is always nice to have 'Auntie Aurora' visit during the contest." Meanwhile, the voice of northern New York state and FN24 (W9IP) "spent the weekend on a rain-soaked hilltop...if the aurora had not occurred, the contest would have been a complete washout."

Washouts did indeed occur for some planned operations, including this writer's unsuccessful team assault of Cadillac Mountain in Maine. Congratulations to those who persevered.

The QRP-portable category continues to attract more attention as attested to by KB6MEG: "Contesting QRP portable in the pines of Southern California was fun!" And QRP-portable regular, K6LMN, "found it difficult to fight the kW stations, but the rare grid really helps." We continue to seek your input on how to best tailor the rules to promote operation from rare and remote grids.

In spite of all the propagational obstacles, some pretty good scores resulted.

Robin, WB7VLJ, operated 6 meters from Utah.

Plaque Winners

Single Operator

Position	Winner	Score	Donor
1st	K5UR	185,049	John Kanode, N4MM
2nd	WA2FGK (K2LNS,op)	166,920	Bald Knob VHF Contest Group
3rd	K5CM (N5CG,op)	153,468	Cushcraft
4th	N4DT	132,057	Terry Netzley, W8NJR
5th	WA2TEO	126,707	Delaware Valley VHF Society
6th	VE3ASO	124,070	Down East Microwave
7th	K1RZ	97,110	Mt Greylock Expeditionary Force—W2SZ
8th	KØTLM	90,738	Wellesley ARS VHF Contest Group—W1TKZ
9th	N2WK	90,168	Kenwood Employees ARC, WD6DJY
10th	WB9MSV	77,172	Kenwood Employees ARC, WD6DJY

Multioperator

Position	Winner	Score	Donor
1st	W2SZ/1	712,897	Randy Stegemeyer, W7HR
2nd	N6CA	643,920	Cushcraft
3rd	W3CCX/3	479,740	In Memory of Morris Tillotson, W4OKN—WB4FDT
4th	AA9D	462,078	Frank Potts, NC1I
5th	K1TR/3	431,613	Mt Airy VHF Radio Club
6th	WBØDRL	422,417	Jon K. Jones, MD, NOØY
7th	K3YTL	294,400	Mark Wilson, AA2Z
8th	N8FMD	268,068	Down East Microwave
9th	WD8ISK	256,785	Rochester (NY) VHF Group
10th	WB8BKC	253,236	W1XX (+WB1AVA,K1GX,K1JX,KB9NM) Contest Team

QRP Portable—Single Operator

Position	Winner	Score	Donor
1st	NOØY	17,730	K2OVS and K2RIW
2nd	WB2ELB (FNØ3)	13,140	Peter Putman, KT2B
3rd	N1DJB	5,372	Contest Committee—LIMARC
4th	K6LMN (CM94)	4,392	West Coast VHFer
5th	NM1K	4,116	Sunrise Radio Club—W2SV

Division Leaders

Single Operator			Multioperator	
Call	Score	Division	Call	Score
WA2FGK (K2LNS,op)	166,920	Atlantic	W3CCX/3	479,740
VE3ASO	124,070	Canada	VE6NOV	30,528
WB9MSV	77,172	Central	AA9D	462,078
KØIR	25,300	Dakota	KØDD	72,954
K5UR	185,049	Delta	KC4YO	143,994
KB8ZW	50,728	Great Lakes	WD8ISK	256,785
N2BJ	68,034	Hudson	N2GHR	157,170
KØTLM	90,738	Midwest	WBØDRL	422,417
WA2TEO	126,707	New England	W2SZ/1	712,897
N7ML	35,392	Northwestern	NU7Z	45,200
W6RXQ	12,654	Pacific	NU6S	74,592
WØETT/7	17,100	Rocky Mountain	WØKEA	75,712
N4DT	132,057	Roanoke	N8FMD	268,068
WD4MGB	37,392	Southeastern	WA4CQG	54,576
W6CPL	51,086	Southwestern	N6CA	643,920
K5CM (N5CG,op)	153,468	West Gulf	K5JL	233,345

Single Operator QSO Leaders By Band

50 MHz

K5CM (N5CG,op)	288
K1FJM/4	253
WD4MGB	236
WA1OUB	211
N7ML	206
W4NVV	205
N5HHS	204
KN5S	201
W9IP/2	191
K5UR	186
VE3RM	185
WA1TRE	184
W3EP/1	183
W3WFM	180
VE5UF	180

144 MHz

K2TXB	368
N8UM	271
WB2QOQ	264
WA2FGK (K2LNS,op)	261
KA1KRJ	259
N4DT	245
NS4W	245
K3NXH	242
K5UR	232
WA2TEO	226
K3ZO	210
WA4VWV	199
KAØTLJ	189
KD9JQ	188
W1QK	185

220 MHz

N6UII	92
WA2TEO	78
N2BJ	63
W6CPL	56
WA2FGK (K2LNS,op)	52
N2WK	48
VE3ASO	47
N2CEI	46
N4DT	45
W3ZZ	44
NN9K	43
K1RZ	42
K2UOP/4	41
WA1HYN	40
W3IP	40

432 MHz

K1FO	141
K2TXB	109
WB3ESS	91
N2BJ	86
WA2FGK (K2LNS,op)	84
NS4W	82
WA2TEO	81
K1RZ	81
N4DT	78
K5UR	73
K2UOP/4	67
KX4R	65
K4QIF	65
WB9MSV	59
W3ZZ	58

902 MHz

WA2FGK (K2LNS,op)	18
W6CPL	18
N2BJ	14
N5WS	14
WA2ONK	13
N2WK	13
KD5RO	13
KB8ZW	12
K9MK/5	10
WA2TMC	9
K2UOP/4	9
VE3ASO	8
N2GAZ	6
VE3CKU/W8	6
NOØY	6

1296 MHz

W6CPL	33
WA4VHF	31
WA2LTM	30
WA2FGK (K2LNS,op)	29
WA2TEO	26
K1FO	25
K5UR	23
NØLL	23
W2CNS	22
N1DPM	21
N2BJ	21
WA1OUB	20
W3IP	20
N2WK	19
K4QIF	18
N2CEI	17
VE3ASO	17

just ahead of the voice of the Midwest, AA9D, at 462k. K1TR also tried a new operating site in 3-land, finishing fifth at 431k, just squeaking past the usual strong effort by WBØDRL at 422k.

The QRP-portable roost was ruled by NOØY with 17k. Jon continues to make a habit of posting high scores in this fun category.

There are lots of plaque winners in this year's contest. A new plaque will be offered in June 1990 for the top DX score. Let's hope for better E-skip conditions in the coming year, and especially during the next running of the June contest—*W1XX*.

SOAPBOX

Aurora for the third VHF contest in a row, but less than half an hour of sporadic-E, ionospheric scatter was quite good Sunday morning, but it didn't make up for the loss of sporadic-E. There was a great auroral-E opening to western Canada on 6 meters after midnight, but many had already given up for the evening (W3EP/1). What if you held a party and nobody came? Activity was the worst that I have heard in 10 years (K1FO). A fair contest, but Sunday was too beautiful to operate. I would rather be sailing—which I did! (K1PLR). I could have done better, but I didn't want to rack up so many points that I couldn't beat my score next year (KA1MWU). Pretty dull June test, but I worked four new grids (WA1TRE). Pretty slow contest. Not much propagation on any band. I just missed some 6-meter DX to VE8. The VE8s were not audible at this QTH (K1WHS). I was on the tower putting up 220-MHz antennas while the aurora was on 220! (WA1HYN). Mountaintopping in northeast Vermont makes one aware of just how much effort is required! Even a modest 4-band operation takes work! (W1AIM). One word describes this contest: MISERABLE. Miserable band conditions... miserable activity...miserable equipment...etc (K1LPS). Sure is hard to get people to turn their beams toward VT! (KC1MC). The local QRM on

Single Operator Multiplier Leaders By Band

50 MHz

K5CM (N5CG,op)	154
VE5UF	113
K5UR	111
N5HHS	110
KØTLM	110
KN5S	109
WD4MGB	105
K1FJM/4	99
W4NVV	96
N5JHV	92
W5SXD	89
W5FF	88
W7HAH	87
N7ML	87
W9IP/2	84

144 MHz

N4DT	83
NS4W	78
N8UM	77
K2TXB	69
KF4FL	62
KE8FD	61
KD9JQ	59
K5UR	58
WB9MSV	58
WB4JGG	57
WA2FGK (K2LNS,op)	55
K3NXH	55
W9JGV	55
WA4VWV	55
KØBI/8	54

220 MHz

N4DT	33
WA2TEO	31
K5UR	29
NN9K	26
VE3ASO	26
WA2FGK (K2LNS,op)	24
W3ZZ	24
K5CM (N5CG,op)	24
K4LHB	23
K8DIO	23
N2WK	22
WB2PSI (WB2QCJ,op)	22
K1RZ	22
W2GU	22
NØLL	22

432 MHz

NS4W	49
N4DT	48
K5UR	45
KX4R	38
K1FO	37
WB9MSV	37
W2GU	36
WB4MDX	35
KF4FL	33
K4QIF	33
K1RZ	32
NØFQW	32
NØLL	31
WA2FGK (K2LNS,op)	30
KØTLM	29

902 MHz

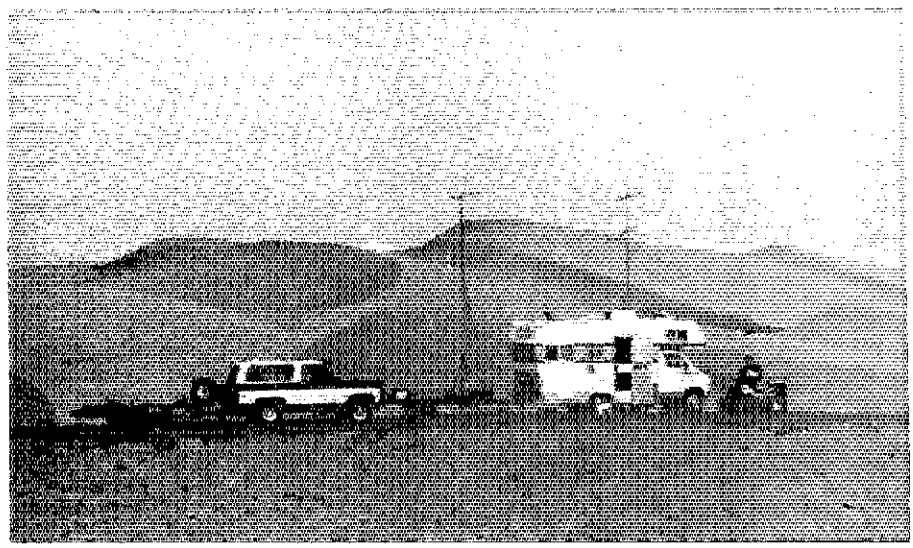
W2SZ/1	59
KD5RO	12
WA2FGK (K2LNS,op)	12
N2WK	11
KB8ZW	10
W6CPL	9
N2BJ	7
WA2TMC	7
VE3ASO	7
WA2ONK	6
K2UOP/4	6
VE3CKU/W8	5
NOØY	5
WRØI (EM17)	5

1296 MHz

K5UR	18
NØLL	17
WA4VHF	15
K4QIF	15
WB9MSV	15
W2CNS	14
K1FO	12
KD5RO	12
WA2FGK (K2LNS,op)	12
K5CM (N5CG,op)	12
KØTLM	12
N1DPM	11
WA2LTM	11
N2WK	11
K1RZ	10
W3IP	10
NOØY	10
VE3ASO	10

K5UR continues to make magic in this June contest with a winning effort of 185k. In flat conditions, it takes some doing to beat out an East Coast station, and Rick did just that, finishing ahead of K2LNS at the controls of WA2FGK's station (who weighed in at 166k points). Similarly, N5CG guided K5CM's station to third place with 153k points. Other top-ten finishers (see box) represent different geographical call areas, once again showing that the June contest brings out the best competition.

In the multiop category, W2SZ/1 put on its usual solid performance from Mt Greylock in Massachusetts to cop top honors. Twenty-three operators on 11 bands provided the winning formula. It took a Herculean effort to stay out front, as the West Coast N6CA (from California) team put on a magnificent effort to finish second with 643k—right behind W2SZ's 712k. W3CCX ventured into new territory in rare grid FN01, finishing third at 479k,



Ken, WB6DTA, and Jerry, K6DYD, scored 11k points from this remote location in SDG (DM22).

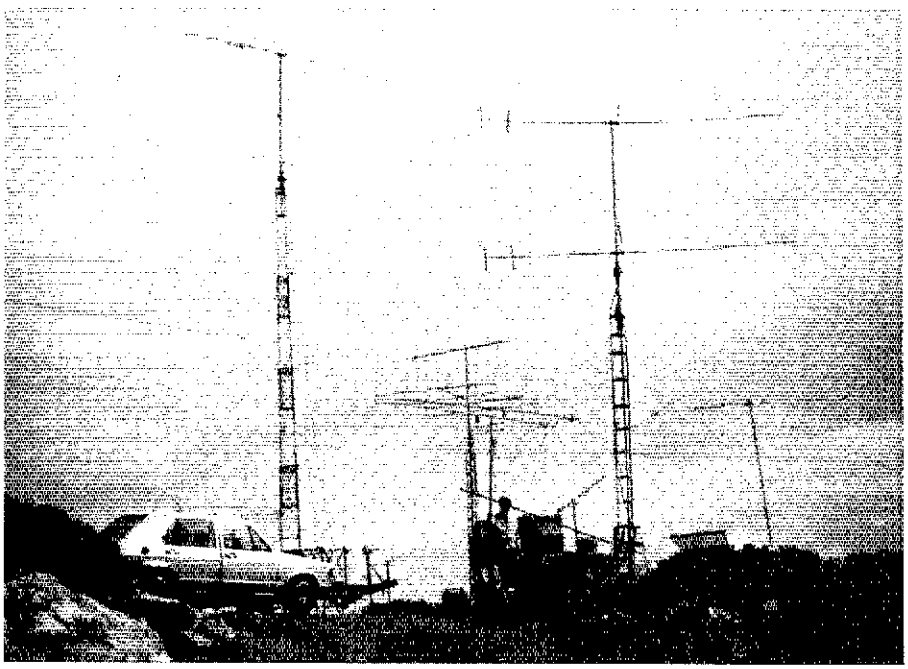
Multioperator QSO Leaders By Band

50 MHz		432 MHz	
K1TR/3	366	N6CA	238
W2SZ/1	347	W2SZ/1	219
WØUC/9	347	K3YTL	188
W3CCX/3	321	K1TR/3	160
AA9D	319	W3CCX/3	145
N6CA	296	N8FMD	116
WBØDRL	269	AA9D	116
WA7JTM	262	K5JL	106
WØKEA	259	K6MEP	105
WB8BKC	255	WBØDRL	102
WD7Z	251	WC2F	100
K5JL	238	N2GHR	99
KC4YO	222	KC4YO	98
N2GHR	219	N4EQT	97
N4EQT	213	WD8ISK	92
144 MHz		**902 MHz**	
W2SZ/1	574	W2SZ/1	59
N8FMD	492	K3YTL	36
N6CA	464	W3CCX/3	32
K1TR/3	420	K1TR/3	31
K3YTL	370	N6CA	30
WC2F	364	WBØDRL	21
W3CCX/3	361	AA9D	19
N8FWL	326	N2GHR	18
W3KWH	307	WC2F	17
N4EQT	298	K2XR	15
WD8ISK	298	WB8BKC	15
AA9D	286	WD8ISK	11
NV2D	283	K3LNZ/8	10
K3LNZ/8	276	W3KWH	9
WB8BKC	238	K5JL	9
220 MHz			
N6CA	419	**1296 MHz**	
K6MEP	209	N6CA	97
W2SZ/1	173	WBØDRL	56
K3YTL	130	K3YTL	55
K1TR/3	110	W2SZ/1	53
W3CCX/3	103	K1TR/3	42
N2GHR	78	W3CCX/3	37
AA9D	72	K2XR	33
K2XR	67	AA9D	33
WB8BKC	60	K1WHS	31
W3KWH	59	N2GHR	29
N4EQT	57	WD8ISK	23
N8FMD	57	W1BCG	22
K3LNZ/8	57	W3KWH	22
WB6PFJ	55	K5JL	22
		WB8BKC	22

Multioperator Multiplier Leaders By Band

50 MHz		432 MHz	
WØUC/9	168	AA9D	67
AA9D	151	K5JL	60
WBØDRL	147	N8FMD	59
K5JL	136	KC4YO	57
WØKEA	133	W3CCX/3	53
WA7JTM	124	WBØDRL	52
KØDD	117	N4EQT	47
WD7Z	114	WD8ISK	47
N4EQT	104	N8FWL	44
KC4YO	103	WB8BKC	42
K1TR/3	102	K3LNZ/8	40
WB8BKC	102	W2SZ/1	38
W3CCX/3	99	W3KWH	38
K7CW	95	K1TR/3	36
N6CA	93	WØUC/9	36
144 MHz		**902 MHz**	
N8FMD	105	W2SZ/1	19
AA9D	89	WBØDRL	18
N8FWL	85	W3CCX/3	17
N4EQT	81	AA9D	16
WD8ISK	81	K1TR/3	14
W3CCX/3	80	N6CA	14
W3KWH	75	WB8BKC	13
K3LNZ/8	74	K3YTL	12
KC4YO	73	WD8ISK	10
WB8BKC	66	W3KWH	9
WØUC/9	65	K5JL	9
WBØDRL	63	K3LNZ/8	9
K1TR/3	61	N2GHR	8
W9CSF	58	K2XR	7
WC2F	57	WC2F	7
220 MHz		**1296 MHz**	
W3CCX/3	47	WBØDRL	31
AA9D	45	AA9D	26
WB8BKC	42	W3CCX/3	21
N8FMD	40	W2SZ/1	20
K3YTL	39	K1TR/3	19
W3KWH	39	N6CA	19
N4EQT	37	K3YTL	18
WD8ISK	36	WD8ISK	18
K1TR/3	34	W3KWH	17
WBØDRL	33	K5JL	16
W2SZ/1	32	WB8BKC	16
K3LNZ/8	30	K2XR	12
N2GHR	28	K1WHS	11
NA2O	28	N2GHR	11
N8FWL	27	N1BCG	9

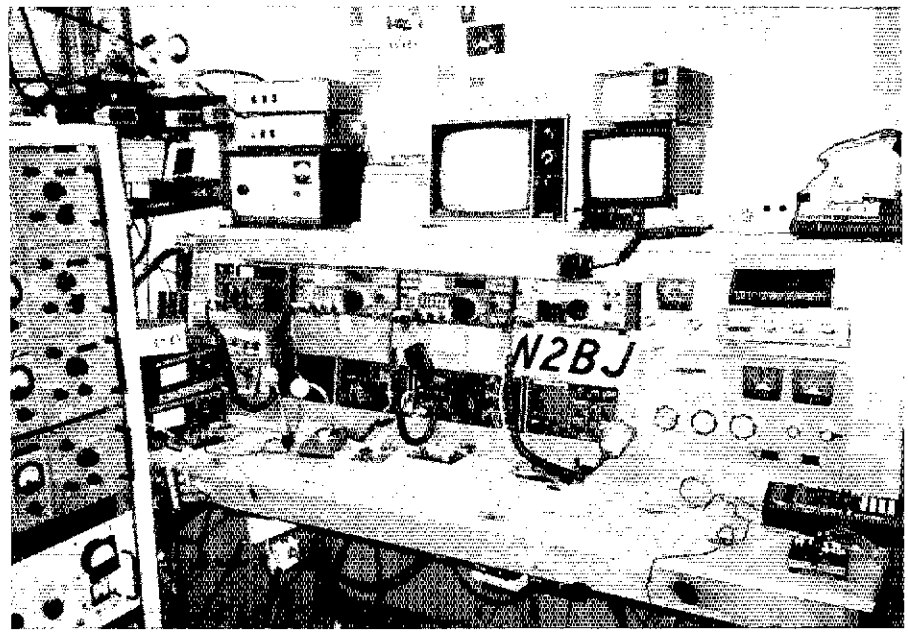
2 meters was unbelievable! Too bad W6JKV only had a few people to work in the middle of the night from DP22. He was S-9 for almost an hour! What a thrill to work VE3ASO in FN25 on 1296! It was roughly 275 miles and I was using 10 watts and a 45-element looper (N1DPM). Now that 432 works, my goal for the next contest is to get 6 meters fixed up! (NQ1C). Old Murphy and I became the best of friends. In fact, I let him have the 432 rig for most of the contest. Do I have to enter multiop? (NA1W). Conditions Saturday were great, but on Sunday they were the pits (WA2FUZ). For the next contest, I hope to have my home-brew linear up and running (KB2EEU). First contest on 1296! (WA2EIO). After two years, another new house and another new baby, I finally got my equipment on the air (KA2ZYX). Neither the heavy rain nor the high winds could keep Murphy away from the equipment! (NV2D). I enjoyed the contest even though my antennas are stuck northeast. Worked my first VE1 on 6 meters. (WA2VYA). Activity on 220 was nil! (K2GK). Unexpected conditions—aurora and no E_S! Very little doubt in my mind that the Northeastern stations were favored (WB2ELB). Crude equipment, but no failures! (KU2A). The short aurora in the beginning of the contest was the downfall. A cold front blew in and destroyed the UHF and microwave conditions. Stations worked on 1296 for ten years were never heard (K2LNS). Lowest activity in many years! (W3CL). This was my first portable VHF contest, and I learned a lot about portable operation. The downfall was a poor antenna system and low power on 6 meters. Next year, I am planning to double the elements on all bands, adding stations for 220 and 902 and running 10 W on 6 meters (N3FTI). I was surprised at the number of stations that could not copy my PTT-sent CW—I was also surprised at those who could! (W2TI). A great contest! We operated from a field on K3UZY's property at 2300 ft above sea level. The aurora on Saturday helped us to work 50 grids on 2 meters with low power and not much of an antenna. We hope to be back next year with a more competitive station (N3AHF). There was 2-meter tropo to W9 land exactly 30 seconds after the contest ended (K3NXH). Good tropo! Just in time! In a few weeks, I am going to tear my station down. I have been transferred to the UK for a five year assignment (WB4SLM). What happened to the E-skip on 6 meters? There was good propagation on 2 meters and 432 for most of the contest (AA4FQ). The bands were marginal, but



NU6S and crew operated on Signal Peak (DM07), scoring 74k points to secure first place in SJV and the Pacific Division.

Mark, KN5S, had fun operating from his van. He put DN75 on the air and won first place in MT.

I still enjoyed my first VHF contest! (N4ILE). There were good conditions to W8 and W9 land during Saturday night and Sunday morning (N8UM). I had fun—always do! But where was everyone? The bands were wide open but nobody was there (KB4OLM). Here is the contest run-down on a scale of 1 to 10: E-skip—2; aurora—0; tropo—6; activity—5 (N4VC). I saw some great sunspots using a telescope, but 6 meters never opened (KØRI). Just about the only thing 6 meters opened was QRM from a thunderstorm! (WB5IGF). It was good to hear all the new stations on 220 (N5KWB). Condition were very poor. I never heard call areas 1, 2 or 3! (W5FF). I wish that I had the tower up. Dipoles are lousy contest antennas! I still managed a few new grids (KY5N). I thought it would never end. It was boring, no decent opening and not enough folks on, but we all endured and are not really complaining (AA5DS). This was my first contest! It was great! Let me tell you, 220 is not dead in LAX (N6UII). If 6 meters hadn't opened up, it would have been the worst effort ever by our group (WA6HXD). I went to CM94 to help out the local VHFers. It was difficult with QRP power to fight the kW stations, but a rare grid really helps (K6LMN). Contesting QRP portable in the pines of Southern California was fun! (KB6MEG). We had a lot of fun operating portable near Yosemite, CA, although it was dead, dead, dead! (NU6S). Who turned off the DX switch on Sunday? Things can't get worse, can they? (WA7JTM). I had a lot of fun. The bands were so-so (N7FJM). Everything was OK until I put water into the generator gas tank—thank goodness for batteries (W7VXW). Great weekend! I worked nine new grids and three new states. My quagi works very well (W8OUD). Very strange conditions—not the best but not the worst. I did so much listening to white noise that if I hear a frying egg I will go bananas! (KB8JI). This is my favorite contest (WA9GCB). Some of the usual grids were missed, but the mid-Atlantic gang helped pick up the multiplier count (WA4VWV). I had a good time, but the wood ticks were bad (K9VGE). Sporadic-E conditions were some of the worst on 6 meters from this area in recent memory (K9DZE). Very good conditions and there were plenty of operators on the bands (NØCIH). What happened to the Northeast? Six meters wasn't too bad, but 144 and 432 were pretty bleak (NØGPD). Six-meter openings were down and QRM to channel 2 audio was up! Still, it was a lot of fun, and we are getting better (WBØGGM). Even when conditions are bad, the ARRL June VHF QSO Party is the one to be in! (KAØGGI). The 220 activity on aurora Saturday was spectacular. The band is probably the most interesting of them all (VE3DSS).



Barry, N2BJ, used this nice console station on six bands to score 68k points. He finished as first-place single operator in ENY and was Hudson Division Leader.

Scores

Call, score, QSOs, multipliers, bands worked (A = 50 MHz; B = 144 MHz; C = 220 MHz; D = 432 MHz; 9 = 902 MHz; E = 1296 MHz; F = 2.3 GHz; G = 3.4 GHz; H = 5.7 GHz; I = 10 GHz; J = 24 GHz; K = 48 GHz; L = Light). An asterisk before the call sign denotes a QRP-portable station; an (N) after the call sign indicates a Novice.

W/VE

1

Connecticut

WA2TEO	126,707	576	161	ABCDE
W3EP/1	41,285	332	115	ABD
AA2Z	23,655	240	83	ABCD9
K1FO	17,493	166	49	DE
WA1VRH	8,352	174	48	A
WA1UQC	5,206	101	38	ABCDE
W1QK	4,995	185	27	B
*NM1K	4,116	123	21	BCDE
WA1NLD	1,740	87	20	B
W1FAJ	1,701	81	21	ABCD
W1WHL	1,083	57	19	A
*KH6CP/1 (FN31)	756	28	18	ABCD9EF
N1ABY	462	42	11	AB
K1WVX	396	37	8	B
*K1PLR	280	34	8	BD
NJ2L	60	12	5	A
KH6CP/1	10	5	2	A
KA1MWU	1	1	1	B
W1BCG (K1VYU,KA1s PFP,PQS,SXJ,N1s CTF, CWD,NI1U,K2LME,ops)	11,797	187	41	BCDE
AE1H (+KA1s OF,SMN,KB1ZB,WB8TSL)	2,725	83	25	ABD

Eastern Massachusetts

W1JR	8,977	61	41	ABCD9EF
K1VZI	1,869	64	21	ABCDE
K1CLN	1,604	69	22	ABD
WA1NPZ	704	44	16	A
*N1EWB (FN42)	273	18	13	ABCD
K1DAT	210	30	7	A
WA1CRE	210	30	7	A
W1XM (AD1C,KX1Z,N1GSC,W1GSL,NØGSZ,ops)	5,766	133	31	ABCDE

Maine

WA1TRE	14,352	184	78	A
W1PLX	1,200	50	24	B
K1WHS (+AF1T,AV1S,K1MNS,KY1K,WA1NIE, W3HQT)	123,840	559	180	ABCD9EFGI

New Hampshire

WA1OUB	49,491	383	117	ABE
AC1J	11,501	169	53	ABCDE
*KA1LMR	804	58	12	ABCD
KC1HH	196	28	7	B

Rhode Island

WA1HYN	6,290	88	34	CDE
*N1EWB (FN41)	225	18	9	ABCDE
W1AQ (K1s AGA,CH,KA1SFJ,KM1X,NI1S,NO1U, WA1VPC,ops)	15,925	214	65	ABCD
KB1EM (+N1FGJ)	3,120	120	26	AB

Vermont

W1AIM	15,048	157	72	ABCD
K1LPS	5,200	75	50	ABCD
KC1MC	925	34	25	ABD

Western Massachusetts

N1DPM	37,927	281	97	ABCDE
WA1MBA	9,360	123	48	BD9EF
KA1KRJ	9,065	259	35	B
NQ1C	8,602	151	46	ABCD
NA1W	7,334	134	38	BDE
K1ISW	6,660	134	37	ABCDE
*N1DJB	5,372	131	34	ABD
W1NY (W1KK,op)	1,725	75	23	A
K1JG	686	49	14	B
WA3EEC	288	27	9	ABCD
W2SZ/1 (K1DH,KA1s DZV,PRT,KJ1K,N1FGY,NC1J, WA1s UGE,ZMS,ZYV,K2s JXU,TR,KA2s FWN,LIV, UWD,KB2s DGA,HIG,HQ,KE2NB,N2s BNY,DCM, DU,GXH,HPA,HVC,W2s ARQ,JVF,WA2s AAU, GFP,SCA,SPL,ZPX,WB2s POB,JSJ,KMY,UJC,WM2Y, WO2V,KD3NC,WA3INC,N8AFM,WA8USA,ops)	712,897	1549	281	ABCD9EFGHIJ

2

Eastern New York

N2BJ	68,034	448	102	ABCD9E
K2CBA (WB2DNE,op)	55,675	355	131	ABCD
WA2FUZ	18,088	187	76	ABCDE
WA2BAH	13,115	177	61	ABCD
W2XL	4,773	89	43	ABD
KD2IX	765	48	15	BD
KB2EEU	280	28	10	A
KA2MCU	24	4	4	ABCD
AB2I (+AB2J,KC2JS,W2AWX,WA2IID,WB2CWA, WN2Y)	31,737	340	71	ABCDE

NYC—Long Island

N2GAZ	25,234	231	74	ABCD9E
WA2EIO	8,697	125	37	BDE
WA2SLY	3,556	127	28	B
WB2JKJ	2,717	143	19	B
WB2ZSY	1,463	77	19	B
KA2ZYX	1,328	64	16	BD
K2OVS	920	38	20	ABD
N2GHR (K2VL,N2s BFJ,FRB,W2s AAF,HPM,WA2s HTV,ODO,QLL,VNV,WB2s AVE,TQE, YZV,ops)	157,170	659	189	ABCD9E
N2FXE (+N2FXF)	2,304	65	24	ABD

Northern New Jersey

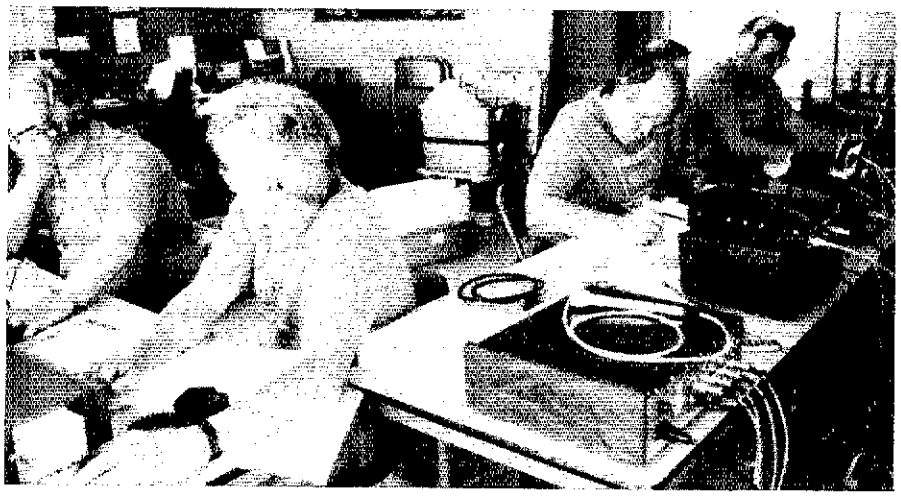
N2CEI	48,348	347	102	ABCDE
KA2BTD	12,852	238	54	AB
WB2QOQ	9,240	264	35	B
KD2YL	5,468	136	42	ABD
WA2UDT	5,168	115	34	ABCD
WA2LTM	1,824	96	16	EF
NV2D (KA1LHZ,KB2EVB,N2EWV,N2WM,WE2Z,ops)	85,410	543	120	ABCD9E
K2XR (+K2s JWE,OWR,KT2B)	26,078	197	56	CD9E
K2BJG (+WB2RFB)	6,643	107	33	BCDE

Southern New Jersey

K2TXB	56,842	477	97	BD
W2HRW	19,314	284	68	ABD
WA2ONK	11,180	195	43	BD9
W2PAU	5,940	106	45	ABD
WA2VYA	2,576	107	23	ABD
N2GBY	2,288	88	26	AB
WC2F (+KA2WKA,KC2TA,KY2T,N2HOX,N3GEX)	124,656	640	147	ABCD9E
K2BWR (+K2ZRJ)	35,524	220	107	ABCDE

Western New York

N2WK	90,168	404	158	ABCD9EF
W9IP/2	76,028	378	158	ABCDE
W2GNS	74,745	360	151	ABCDE



Pictured from left to right are the IA multiop winners at WØRPK: KØVM (432 MHz), W5IMJ (220/1296 MHz), WRØG (144 MHz), NØJAS (logging) and WØRPK (50 MHz).

Ed, K1TR, mans the 220-MHz station at the K1TR multiop setup and helps to pile up the points for a 5th place finish.

WA2TMC	52,338-	317-	122-ABCD9EF
KD5RO	47,864-	247-	124-ABCD9EF
K2GK	24,206-	186-	91-ABCDE
NM2J	21,060-	182-	90-ABCD
*WB2ELB (FN03)	13,140-	137-	73-ABCDL
KU2A	11,786-	116-	71-ABCD9E
WA2BPE	9,870-	141-	70-AB
*KE2DI (FN12)	3,799-	117-	29-ABD
WA2MSA	2,910-	97-	30-AB
W2WGL	2,415-	61-	35-BD
WB2PSI (WB2QCJ,op)	1,716-	39-	22-C
KE2DI (FN13)	480-	29-	15-ABD
N2DM	240-	20-	12-A
*WB2ELB (FN02)	170-	12-	10-ABCD
KE2NE	128-	32-	4-B
N2IDM	51-	17-	3-B
NA2O	32,239-	227-	103-ABCDE
K2SPO (+AF2K,K2MPE,N2TW)	26,226-	223-	94-ABCD
N2CZL (+ops)	4,875-	109-	39-ABD

3

Eastern Pennsylvania

WA2FGK (K2LNS,op)	166,920-	614-	195-ABCD9EF
K3ONW	18,557-	241-	77-AB
WB3ESS	5,096-	91-	28-D
W3CL	4,653-	97-	33-ABCD
W3CWG	3,783-	97-	39-B
KZ3X	2,573-	72-	31-ABD
*N3FTI	1,472-	55-	23-ABD
KB3XG	874-	36-	19-ABCD
KC3ZG	570-	32-	15-BD
WA3LGG	30-	10-	3-B
*W2TI/3	16-	4-	4-B
KA3MLY	12-	3-	2-C
K1TR/3 (+K1s BA,EA,KA1GD,N1AFQ,NR1E, WA1PBU,K3II,KM3T,NU3Y,W3FW,WB3ESS,K5ZD, WØØV)	431,613-1138-		273-ABCD9EFGHIJ
K3YTL (WA1MKE,NA2T,K3MKZ,KA3EEO,KO3JG, WA3s JWF,JWP,WB3s FAA,FYT,IWZ,ops)	294,400-	897-	200-ABCD9EFGHI
K3UZY (+N3AHF)	8,400-	168-	50-B
W3GF (+AC3I,K3s EEL,SQO,N3FYW,WA3SDQ)	7,956-	148-	51-ABD
W3HZU (K3GDI,KA3LJL,KB3CU,N3s GKP,GPF, WB3AWJ,ops)	5,754-	122-	42-ABD

Maryland—DC

K1RZ	97,110-	440-	166-ABCDE
W3ZZ	63,142-	374-	131-ABCDE
W3IP	54,621-	312-	119-ABCD9E
K3ZO	20,794-	281-	74-AB
K3NXH	13,310-	242-	55-B
W3WFM	11,880-	180-	66-A
K3AKR	7,920-	136-	48-ABCD
K3YDX	1,680-	84-	20-B
WA4VHF	1,395-	31-	15-E
W3TMZ	1,380-	35-	23-BD9
W3MSN	492-	36-	12-ABD
W3LMC	330-	30-	11-B
WI2T/3	216-	24-	6-BI
WF4U (+KB3ZM)	518-	37-	14-B

Western Pennsylvania

WA3DJG	63,325-	343-	149-ABCD9E
KA3RWP	5,310-	107-	45-ABC
NI3B	2,739-	83-	33-B
W3KH	851-	28-	23-BDE
KA3NHF	390-	26-	15-AB
W3KJM	325-	25-	13-A
W3CCX/3 (K3ESJ,KA3s MGB,OYH,N2JB,N3CX, WB2YEH,WA3s AXV,FFC,JUF,NUF,YUE, WB3JYO,ops)	479,740-1014-		332-ABCD9EFGHIJL
W3KWH (KA3KSD,N3EQP,W3SVJ,WA3s FYJ,TTS, WB3EML,NI8O,ops)	229,414-	684-	251-ABCD9EFHI

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Alabama

WB8RDY	448-	28-	16-A
WA4VUG	130-	13-	10-B
WA4CQG (+KB4QOW,KM4LK)	54,576-	341-	144-ABD
WA4RHK (+AA4YB,KB4PON,KK4NZ)	5,610-	68-	55-ABD

Georgia

WB4SLM	33,439-	207-	119-ABCDE
KX4R	21,271-	174-	89-BD
WD4AFY	4,284-	70-	51-ABD
WD4MBK	2,548-	49-	26-D
W4VHH	231-	11-	7-E
W4CMA (K4s AEK,WJB,WB4LRA,ops)	48,990-	297-	138-ABDE

Kentucky

AA4FO	19,206-	164-	97-ABD
N4EQT (+KA8SSB,N8CRB,W8ULC,WF8Z)	225,216-	668-	272-ABCDE

North Carolina

N4DT	132,057-	454-	219-ABCD9EFI
WA1EHU/4	10,728-	113-	72-ABDE
W4FSQ	4,928-	84-	44-ABD
K4TP	3,040-	80-	38-B
N2CJP	2,800-	66-	35-ABCD
KJ4BF (EM85)	60-	5-	5-BEI
W4BFB (N2AAZ,AA4ZZ,K4s JQU,PDY,WYC,KC4s FSC,KJU,KK4L,W4YPY, WB4s PCS,TLX, W4/G4GKK,ops)	36,162-	230-	126-ABCDE

Northern Florida

W4NW	24,289-	227-	107-AB
WA4JNE	6,099-	98-	57-ABD
WB4JEM	4,560-	90-	48-ABD

South Carolina

NB4S	4,928-	88-	44-ABD
KJ4BF (EM95)	184-	13-	8-ABCDE
KJ4BF (EM94)	160-	11-	8-ABCDE
KJ4BF (EM84)	15-	3-	3-BCD

Southern Florida

WD4MGB	37,392-	291-	123-ABD
K1FJM/4	35,264-	292-	116-ABCD
WB2QLP	12,402-	159-	78-AB
K9RY	10,703-	134-	77-ABD
WB4BKC	9,028-	138-	61-ABC
K4KUZ	6,985-	127-	55-A
N4TL	6,496-	112-	58-A
WB4MJE	2,952-	91-	24-BDE
WD4AHZ	2,538-	76-	27-BD
W4FNR	1,551-	47-	33-A
N4ILE	1,404-	51-	26-ABC
K4SC	1,353-	41-	33-AB
W4FF	660-	55-	12-B
N2JS	330-	30-	11-B

Tennessee

W2GU	53,856-	251-	153-ABCDE
NS4W	51,943-	327-	127-BD
KF4FL	42,884-	257-	142-ABD
WB4JGG	40,348-	286-	131-ABD
N8UM	20,867-	271-	77-B
K4RWP	6,585-	93-	66-ABD
WB4MDX	3,920-	56-	35-D
*KI4JU	2,964-	65-	38-ABD
KA4AHU	4-	2-	2-A
KC4YO (+K4RDD,KB4PIW,KD4XJ,N4RJY,N4TCF, WA4GBE,WB4GFO,WD4EWX,ops)	143,994-	520-	233-ABD
N4VC (+WB4KNF)	34,545-	200-	141-ABCDE

Virginia

K2UOP/4	60,762-	344-	123-ABCD9E
K4LHB	33,784-	229-	103-ABCDE
N4MM	26,754-	250-	91-ABD
KB4OLM	18,204-	186-	82-ABCD
K9OYD/4	14,948-	163-	74-BD
K4QIF	8,832-	83-	48-DE
W4DR	5,655-	101-	55-A
WA4SBC	874-	28-	19-BCD
N4KWX	816-	48-	17-AB
KC4B	768-	48-	16-A
WA4VXR	697-	41-	17-B
N4BDH	640-	32-	20-B
KEØYG/4	442-	26-	13-ABD
KB4LCI	432-	27-	16-B
W4IY (K4HWG,KA4CKI,WB4s EIY,NFS,KØRI,ops)	31,328-	238-	89-ABCDEIL
N4HB (+WB4BVY)	27,423-	200-	99-ABCDE
N4EHJ (+AB4U)	2,574-	77	33-ABD

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Arkansas

K5UR	185,049-	552-	261-ABCDE
WB5IGF	22,644-	197-	102-ABDE
N4QXT/5	740-	37-	20-B

Louisiana

WB5NAA	13,650-	149-	78-ABD
N4AZI	10,318-	124-	67-ABCDE
W5FYZ	4,452-	106-	42-B
K5TNP	3,196-	94-	34-B
N5KWB	2,276-	60-	34-BC
WA5DRK	208-	16-	13-A

Mississippi

N5JYX	7,085-	91-	65-ABCD

New Mexico

W5FF	16,800-	150-	106-AB
N5JHV	15,384-	167-	92-A
N5EPA	3,400-	68-	50-AB
W5IXR	1,961-	51-	37-ABC
K5MAT	1,952-	50-	32-ABCD
K5TA	1,457-	47-	31-A
W5WOX	675-	25-	25-ABD

North Texas

K9MK/5	45,696-	312-	112-ABD9E
N5WS	30,600-	223-	100-ABD9E
KM5X	16,954-	173-	98-AB
WQ5S	14,256-	149-	81-ABCE
WD5K	7,006-	113-	62-A
AA5AM	5,472-	100-	48-ABCD
KY5N	882-	42-	21-AB
WB5AZI	7,085-	99-	65-ABD
N5MUJ (+K5JRN,NQ5X)	714-	42-	17-AB

Oklahoma

K5CM (N5CG,op)	153,488-	501-	252-ABCDE
W5NZS	8,001-	94-	63-ABCD
W5UGO	6,696-	89-	54-BD
AA5DS	1,944-	72-	27-B
K5JL (+AD1S,K5CBL,N5DDB,WA5s ETV,WCP, WD5AGO)	233,345-	556-	295-ABCD9EFI
WB5VYE (+WA5ZKO)	19,046-	164-	89-ABCD9E

South Texas

N5HHS	63,140-	342-	164-ABCD
W5SXD	26,775-	207-	119-ABDE
W5OZI	11,205-	135-	83-A
KB5IUA	7,085-	109-	65-A
WD5ERG	4,560-	65-	48-ABD
W5UWB	560-	35-	16-B
WA5S (+KC5FP)	5,488-	92-	58-ABCD
K5LZO (+WB5RUS)	3,168-	72	44-A
W5EHM (KA5WSS,KB5JPB,ops)	280-	20-	14-A

West Texas

W5AL	7,910-	100-	70-ABCD
W8CM	7,625-	109-	61-ABD
WD5DCZ (+K5BZH)	544-	26-	16-BD

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East Bay

WA6LHD	2,756-	106-	26-B
KD6QE (KB6SL,NI6V,ops)	34,967-	360-	73-ABCD
WB6PFJ (+WB6LRV)	25,740-	320-	60-ABCD

Los Angeles

W6CPI	51,086-	308-	89-ABCD9EFI
AA6LJ	5,678-	167-	34-AB
*N6UII	3,536-	179-	13-BCD
W6PFE	2,415-	92-	21-ABCD
*K6LMN (DM04)	2,020-	68-	38-ABCD9EF
KI6BU	1,716-	78-	22-A
*K6LMN (DM03)	492-	19-	12-BCD9EF
KI7F/6	427-	61-	7-B
K6MEP (K2LCT,N3CFX,N6LHZ,N6QOA,WA6DJS, WA6FPX,WB2ODH,ops)	114,770-	645-	115-ABCDEI
WB9AJZ/6 (+KB6FYG) (DM04)	595-	41-	16-AB
WB9AJZ/6 (+KB6FYG) (DM03)	170-	17-	10-AB

Orange

K6CH	17,664-	212-	64-ABDE
WB6FCS	10,017-	131-	63-ABCD
K6IBY	2,666-	59-	31-ABCD
KI6FF	2,058-	98-	21-B
N8QYQ	1,602-	106-	17-B
K6UNR	1,494-	83-	18-B
W6XD	1,000-	50-	20-AB
N6NVF	693-	63-	11-AB
*W6HCC	220-	11-	5-I
W6SX	18-	6-	3-B
K6UY (+KB6TMW,N6s OWS,RUB,UJM,VDO,VIX, WA6BCN,WY6Z,WB9ZDI)	34,276-	313-	76-ABCDEI
N6RMJ (+N6MI,WA6HXD,WB6YVP)	11,914-	121-	74-ABCDE

Pacific

KH6HME	105-	13-	7-ABD
KH6/NI6E	15-	5-	3-A

Santa Barbara

K6HXW	11,554-	145-	53-BCDE
*K6LMN (CM94)	4,392-	85-	36-ABCD9E
WD6BCN	1,380-	48-	23-ABD
N6CA (AE6E,AJ6F,K6ZMW,KB6RAA,N6s DBS,DLU, KN,LL,VI,W6s OSM,YLZ, WA6s MEM,OTU,TMJ, WB6KWU,NØKV,ops)	643,920-1601-		240-ABCD9EFGIL

Santa Clara Valley

W6RXQ 12,654- 158- 57-ABCDEF
WA2YWP 5,840- 130- 36-ABCD
K6KM 2,840- 88- 28-ABD
WA6HRK 2,408- 86- 28-AB
KG6AO 2,106- 75- 26-ABC
WD6EPV 794- 64- 11-B
WA6PZL (+N6s ENU,HBI)
48,450- 348- 114-ABCD
W6AMT (KB6s FYG,OWN,WB6s ASR,RAL,WD6E, WB9AJZ,KK9G,ops)
22,869- 237- 77-ABCDE
WB9AJZ/6 (+KB6FYG) (CM98)
400- 25- 16-AB
WB9AJZ/6 (+KB6FYG) (CM88)
322- 23- 14-AB
WB9AJZ/6 (+KB6FYG) (CM97)
204- 17- 12-AB

San Diego

KI6SG 5,800- 168- 29-BC
*KB6MEG 2,109- 85- 19-BC
W6OYJ (DM12) 1,780- 60- 20-BCDI
WA6OSB 612- 36- 17-A
WA5BNH 518- 20- 12-BCDE
W6OYJ (DM13) 32- 5- 4-BI
WB6DTA (+K6DYD)
11,040- 153- 60-ABCD
WA6OYS (N6LFI,WB6s SWS,YQN,ops)
9,256- 122- 52-ABC9EI

San Francisco

WA6KLK 11,424- 164- 56-ABDE
WA6JYU 520- 29- 10-BDE
WA6LLY 260- 20- 13-A

San Joaquin Valley

W7KMS/6 1,350- 50- 27-A
W6SQN 672- 48- 14-B
KI6MI 462- 33- 11-BD
NU6S (+KI6CG,NR6E,WA6AZP,WB6YIY)
74,592- 470- 126-ABCD9E
WB6TM (+KA6GQK,KC6CXV,KC6DSE)
11,638- 179- 46-ABCD
WB9AJZ/6 (+KB6FYG) (DM05)
276- 23- 12-AB
WB9AJZ/6 (+KB6FYG) (CM95)
120- 15- 8-AB
WB9AJZ/6 (+KB6FYG) (DM06)
80- 10- 8-AB

Sacramento Valley

W7IUV/6 1,914- 87- 22-B
W6LLP 442- 24- 13-BCD
N6TIB 69- 23- 3-B

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Arizona

AA7A 17,460- 176- 97-ABD
K1SC 5,104- 87- 58-ABD
WB7VVD 3,780- 75- 45-ABCDE
W2GFF 54- 9- 6-B
WA7JTM (+N7AMA,WW7B)
52,920- 342- 147-ABD
WD7Z (N7LPV,WB7WMI,ops)
44,289- 333- 133-AB
N7FJM (+KB7CI,W7GZ)
11,984- 136- 68-ABDI
KC7MJ (+WA5TLP)
7,728- 117- 66-A

Eastern Washington

WA7VHW 6,726- 114- 59-AB
KA7MCX 5,394- 93- 58-A
W7IDZ 1,452- 44- 33-AB
K7CW (+W7WA,WA7UQV)
22,048- 204- 106-ABD

Idaho

W7ID 3,168- 67- 44-ABDE
W7ZRC 3,168- 66- 48-AB
*N7GXS 2,790- 62- 45-A
KC7IJ (KB7FUV,WA6OYU,ops)
6,936- 102- 68-A

Montana

KN5S 25,228- 212- 119-AB
W7HAH 14,600- 146- 100-AB

Nevada

K7ICW 10,792- 125- 78-ABD
KK6C/7 560- 35- 16-A
WA6YPL/7 480- 32- 15-B
W7ABX 143- 13- 11-A
NW7O (+WB5ROY,N7BPA,N7CFC,W7TVF, WA7JUO) 26,438- 213- 118-ABDI
K8KL (+DF5ZL) 1,125- 38- 25-BD

Oregon

KE7CX 21,672- 212- 84-ABCD9E
WA3RMX 1,120- 31- 20-ABCDEFGHI
*WA7IQH 851- 34- 23-ABC
W7TYR 588- 20- 14-ABCDEFGHI
K7HSJ 338- 23- 13-ABCD
WA7TDZ (+KO7N,N0XX)
18,549- 229- 81-AB

Utah

WBETT/7 17,100- 162- 100-ABD
WB7REL 3,450- 69- 50-AB
NJ7A 2,795- 61- 43-ABD
WB7VLJ 2,494- 58- 43-A
WA4GPM (+W7VXW)
16,434- 164- 99-ABD

Western Washington

N7ML 38,392- 268- 112-ABCD
W7YOZ 25,920- 235- 80-ABCDEFIJ
WA1KIR/7 (CN96) 162- 15- 8-BE
WB7ATP 105- 15- 7-B
*WA1KIR/7 (CN97) 27- 9- 3-B
NU7Z (+K7ND) 45,200- 341- 100-ABCD9EFIJ
WB7PEK (+KA7ICT,N7COU)
13,467- 167- 67-ABCDE
W7DG (N3EG,N7s JXC,JXD,JYW,MOW,LYO, WA7ILC,ops) 11,115- 170- 57-ABCD

Wyoming

WA7KYM 9,513- 120- 63-ABCD
W8SII 3,780- 68- 35-BDE

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Michigan

KB8JI 20,758- 161- 97-ABCD
WD8WAO/8 18,513- 145- 99-ABCD
WB8TGY 13,962- 136- 78-ABDF
KB8I/8 13,365- 149- 81-ABD
VE3CKU/W8 8,246- 121- 62-A9
WB8CPW 5,151- 101- 51-B
KK7B 396- 13- 12-ABDEFG
*KA3NTX/8 (EN57) 46- 4- 4-BEFG
*KA3NTX/8 (EN58) 33- 3- 3-EFG
WB8BKC (+K8VON,KB8AGJ,KC8Z,N8KSR,NE8I)
253,236- 676- 282-ABCD9EF
WG8Q (+WO2R)
36,777- 239- 123-ABCD
N8HNS (+N8s IMO,IRT,IUF,JTV,NY8D,WA8TON)
17,945- 163- 97-ABCD
WB8IGY (+WA8NJR) (EN82)
1,300- 32- 25-ABCD9E
WB8IGY (+WA8NJR) (EN74)
494- 20- 19-ABCD
WB8IGY (+WA8NJR) (EN73)
312- 13- 13-ABCD9E

Ohio

KB8ZW 50,728- 314- 136-ABC9
WA8TJL 29,304- 194- 111-ABCDE
K8DIO 26,136- 186- 108-ABCD
WA8TTE 25,740- 197- 110-ABDE
KE8FD 17,940- 195- 92-AB
W8AC 10,626- 138- 66-BD
WB8TDG 9,920- 113- 64-ABCD
K8TL 9,815- 104- 65-ABCDE
N8CCC 9,295- 122- 65-ABCD
K8NXI 7,320- 120- 61-A
KA8BTJ 6,148- 116- 53-AB
WD8DCX 5,076- 92- 47-ABD
W8CBR 3,636- 101- 36-AB
W8OUD 3,230- 85- 38-B
K8MR 1,456- 56- 26-B
W3MMM 700- 35- 20-B
K8KR 656- 41- 16-B
*W8XT (EM88) 120- 19- 4-BCD
W8XT (EM79) 93- 19- 3-BCD
KA8PQC 49- 7- 7-B
*W8XT (EN70) 27- 6- 3-BCD
WD8ISK (KB4QZH,KA8IFC,KD8SI,N8CGH,WA8s OGS,R,WB8HTN,W9VNE,ops)
256,785- 679- 285-ABCD9EFGI
WB8IGY (+WA8NJR) (EN75)
1,050- 35- 21-ABCD9E
WB8IGY (+WA8NJR) (EM78)
363- 20- 11-ABCD9E

West Virginia

K8UC 4,750- 81- 50-ABD
KT8W 1,470- 35- 21-D
WB8BEL 1,134- 42- 27-A
*W8FK 858- 39- 22-AB
N8FMD (+K8OHH,KA8s TTX,ZXP,KB8s CMY,EUN, FSD,HLH,N8s GGU,HON,WD8s IBN,LND,WJ8G)
268,068- 615- 267-ABCDE
K3LNZ/8 (K3DUA,K3ICH,W4PSJ,WA3s EOQ, OYW,NZL,ops)
189,154- 642- 229-ABCD9E
N8FWL (+KA9OTX,KB8s DPX,GDU,KC8OQ, KE8s VS,VT,N8s BZS,FCJ,HTR,IZS,QUK,WB8CNN)
165,205- 599- 235-ABCD
KC8FI (+K8SA,KD8s IP,IQ)
12,168- 156- 78-AB

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Illinois

WB9MSV 77,172- 311- 177-ABCDE
NN9K 23,463- 194- 99-ABC
KA9LDS 23,088- 182- 104-ABD
WA9GCB 19,504- 179- 92-ABD
KA9RQC 12,740- 154- 70-ABD
KD9JQ 11,092- 168- 59-B
W9JGV 8,965- 163- 55-B
NC9F 8,178- 100- 58-ABCD
N9BJG 4,956- 84- 59-AB
N8HWK 2,366- 91- 26-B
WD9DCW 540- 36- 15-B
KA9JYI (EM57) 72- 6- 6-ABCD9E
KA9JYI (EM47) 72- 6- 6-ABCD9E
KA9JYI (EM58) 72- 6- 6-ABCD9E
KA9JYI (EM56) 60- 6- 6-ABCD9
WD9BJN 45- 9- 5-B
KA9JYI (EM48) 45- 5- 5-ABCD9
N9AQ (EN51) 1- 1- 1-B
AA9D (+AF8Z,K9s PW,RO,KA9s CKI,HKL,N9s EDT,KC,W9s WI,XA)
462,078- 851- 398-ABCD9EFIJ
NG9R (+KB9CER,N9JF,NM9C)
44,556- 266- 141-ABD
WB9SKE (+KA9HNT,WB8EJN,WB9GCJ)
9,660- 123- 70-ABD

Indiana

KE9I 48,642- 273- 134-ABCDE
NE9O 25,647- 204- 103-ABCDE
WA4VWV 10,945- 199- 55-B
W9YB (KC9RG,op)
3,731- 74- 41-BD
K9DZS 3,330- 63- 45-ABD
KA9ZFG 880- 36- 20-ABCDE
K9VGE (K1TMM,KA9s SMD,SPD,WB9STM, WF9X,ops) 77,526- 341- 177-ABCDE
W9CSF (K9DZE,NA9N,NU9H,NY9B,W9LVW, WD9EIX,ops) 50,901- 305- 141-ABCD

Wisconsin

N9OO 5,586- 114- 49-B
WA9LZM 4,800- 91- 50-ABD
W9YCV 1,856- 48- 32-BD
N9GNQ 836- 44- 19-B
W9UC/9 (+K0s FVF,GJX,N0s AKC,BSH,WB9QNX)
221,265- 633- 287-ABCDE

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Colorado

K0CS 6,431- 109- 59-AB
KD0SU 1,050- 42- 25-A
W0MXT (DN80) 861- 23- 21-BDE
K0OST 851- 37- 23-A
W0MXY (DM89) 595- 20- 17-BDE
*W4RDI 280- 35- 8-B
W0MXY (DM88) 88- 8- 7-BDE
N0HAX 27- 9- 3-B
W0KEA (+K0CL,N0BRI,N0DVL)
75,712- 380- 182-ABCD
W0IA (W1XE,KA0DXM,KR0U,ops)
40,752- 245- 144-ABCDE
WD0HNP (+WN0NZ,KA7TYU,K0WIQ,KA0VOY)
2,660- 70- 38-AB
WS0D (+WJ8G) 500- 36- 10-ABCI

Iowa

N0CIH 24,541- 193- 97-ABCD
N0GPD 17,100- 154- 100-ABD
KA0TLJ 8,127- 189- 43-B
WD0FOY 7,242- 93- 71-ABD
WB0CQO 6,298- 94- 67-A
K0DAS 5,355- 76- 51-ABCD
W0IZ 2,920- 73- 40-B
KD0RN 2,050- 50- 41-A
N0AQ (EN42) 99- 11- 9-B
KA0VBA (EN21) 84- 12- 7-B
*WB0B (EN40) 60- 10- 6-B
N9AQ (EN41) 36- 9- 4-B
KA0VBA (EN31) 24- 6- 4-B
*WB0B (EN30) 12- 4- 3-B
N9AQ (EN43) 4- 2- 2-B
W0RPK (+WS0MJ,K0s IQR,VM,N0JAS,W0ZVY, WA0JFS,WB0OEU,WR8G)
58,214- 279- 162-ABCDE
N0JAQ (+KF0AU,N0KAD,NC0P,NN0I)
15,811- 163- 97-AB
N0GHY (+WN0T) (EN20)
128- 13- 8-ABD
N0GHY (+WN0T) (EN21)
70- 9- 7-ABD
N0GHY (+WN0T) (EN22)
24- 4- 4-BD
N0GHY (+WN0T) (EN30)
24- 5- 4-ABD
N0GHY (+WN0T) (EN32)
20- 4- 4-ABD
N0GHY (+WN0T) (EN31)
12- 6- 2-AB

Kansas

N0LL 73,260- 289- 180-ABCDE
*NO0Y 17,730- 128- 90-ABCD9E
W0RT 4,300- 73- 50-ABD
WC0P (EM29) 4,050- 71- 45-BD
WR0I (EM17) 1,612- 27- 28-BD9EF
WC0P (EM19) 1,431- 39- 27-BD
K0VUA 736- 28- 21-BD
W0MXY (DM99) 420- 15- 15-BDE
WR0I (EM16) 297- 12- 11-BD9E
W0MXY (DM98) 180- 10- 10-BDE
WR0I (EM18) 105- 7- 7-BD9EF
WR0I (EM15) 40- 4- 4-D9E
WR0I (EM08) 24- 3- 3-D9E
WB0DRL (+WB5VZL,KB0HH,KD0GS,K0BO,N0KSC, WA0TKJ) 422,417- 745- 367-ABCD9EFGI

Minnesota

K0IR 25,300- 188- 115-ABCDE
WA0BWE 22,422- 191- 101-ABD
N0HJZ 9,588- 121- 68-ABD
WD0EKL 1,750- 50- 35-A
WT0W 225- 25- 9-B
N0GEH (EN24) 21- 6- 3-BD
N0GEH (EN34) 12- 4- 2-BD
WB0GGM (+WA2PHW,KB8ZQ)
45,158- 253- 142-ABCDE
KA0UZZ (+KC0P,N0s BSG,JFH,W0s CHU,VB)
33,528- 195- 132-ABCDE

Missouri

K0TLM 90,738- 330- 213-ABCDE
N0FQW 36,745- 238- 135-ABD
KM0A 36,544- 224- 146-ABCD
W0FY 33,075- 197- 135-ABCD
KD0GT 19,600- 148- 100-ABCD9E
W0JRP 15,552- 139- 98-ABCD
W0RWH 11,040- 134- 89-BD
KA0GGI 6,814- 102- 57-AB
WA0WPJ 5,350- 84- 50-ABCDE
WB0RJR 2,240- 64- 32-ABCD
WB0CLL 1,242- 54- 23-B
W0AV 1,104- 48- 23-B
W3HDH/0 540- 27- 20-A
N0IXH 207- 18- 9-ABCD
WA0FQK 60- 12- 4-ABD

North Dakota

WA0CSL 7,752- 102- 76-A
KA9IZP 108- 12- 9-B
K0ALL (+WA0ZOK)
6,695- 95- 65-ABDE

Nebraska

KD0HE 17,557- 157- 97-ABD
N0AJU 5,340- 89- 60-AB
AE0G 3,640- 70- 52-AB
N0BTN 3,510- 66- 39-BCD
W0MXT (DN90) 1,378- 28- 26-BDE
WB0RMO 1,075- 43- 25-AB
W0MXY (DN91) 990- 26- 22-BDE
K0US 918- 34- 27-AB
K0YMQ 135- 15- 9-B

South Dakota

K0DD (+NS0N,WA0PEV)
72,954- 351- 189-ABD

VE

Maritime—NFLD

KA1ICR/VE1 (+K1CF)
828- 46- 18-A

Quebec

VE2DUB 12,460- 137- 70-ABCDEI
VE2BLX 33- 11- 3-B

Ontario

VE3ASO 124,070- 462- 190-ABCD9EFI
VE3FGU 23,364- 236- 99-AB
VE3EMS 18,675- 155- 83-ABCD
VE3RM 15,280- 191- 80-AB
VE3KKL 14,985- 158- 81-ABCD
VE3VAL 7,176- 156- 46-B
VE3DSS 6,962- 88- 58-ABCD
VE3JAR 5,045- 93- 65-A
VE3PCW 4,278- 93- 46-A
VE3AQG 1,240- 62- 20-B
VE3EVW 960- 40- 24-A
VE3DJ 731- 34- 17-BD
VE3BXY 629- 37- 17-B
VE3FVW 390- 21- 15-ABD
VE3GBA 44- 11- 4-B
VE3DNR 18- 5- 3-BD
VE3SAU (VE3s FHK,FHU,OJN,ops)
2,048- 80- 32-ABD
WB8IGY/VE3 (+WA8NJR) (EN63)
1,540- 43- 35-ABC
VE3UOW (VE3s NPB,OIL,RKS,ops)
513- 27- 19-AB
WB8IGY/VE3 (+WA8NJR) (EN76)
180- 12- 12-ABCD
WB8IGY/VE3 (+WA8NJR) (EN78)
1- 1- 1-B

Saskatchewan

VE5UF 20,340- 180- 113-A
VE5LY 6,887- 97- 71-A

Alberta

VE6KZ 30,528- 254- 106-ABCD
VE6JW (K2JFV,op)
11,096- 148- 73-ABD
VE6AFO 10,530- 166- 54-ABCD
K7IDX/VE6 8,307- 117- 71-A
VE6NOV (VE6s CAO,EY,KC,KZ,ops)
30,528- 254- 106-ABCD

British Columbia

VE7XF 6,986- 117- 54-ABC
VE7ASI 3,990- 81- 42-ABCD
VE7VHF (VE7s ACI,BFQ,CIM,CUA,FIN,FYC,FYN, FZX,HDL,PTR,ops)
2,548- 75- 28-ABD

Marine Mobile

VE3YRA/MM (VE3s AAY,OXD,SST,WHY,ops)
5,252- 101- 52-AB

DX

Bahamas

KB4CRT/C6A 2,730- 70- 39-A

Belgium

ON8WN 1- 1- 1-B

Turks and Caicos Islands

VP5S 9,815- 151- 65-A

Mexico

XE1GE 4- 2- 2-A
XE2GFH (K6STI,N6XQ,K9VV,XE2s MX,UZL,ops)
12,600- 185- 56-ABCD9EI

Cayman Islands

ZF2NV/ZF8 (KA3B,op)
3,168- 72- 44-A
ZF2BL (K4QF,N5DF,ops)
9,165- 141- 65-A

Checklogs

WA3GYW, K8JQA, VE2XL

Results, 1989 UHF Contest

By Billy Lunt, KR1R and Mark R. Burke, KA1MIS
Contest Manager Contest Assistant

Success can be measured in small victories, especially in a lower-key activity like the ARRL UHF Contest conducted each August. In discussing the joys of VHF (and UHF) contesting with a fellow compatriot recently, this notion hit home. "You know," he said "you work 500 stations on 2 meters, and yet it is only the unique contact you remember—maybe a rare grid square. The rest is all a blur."

In the UHF Contest of last August 5-6, WA1MBA's unique victory was "to finally get the 902 amp on the air just in time for the contest." Great signal, Tom. KØRI worked some "exceptional distances" that he will remember for a long time. W5UGO finished his VUCC on 3456 and had a 5760 QSO of 210 miles. Those are the things you remember in a contest.

Similarly, K7HJS was surprised by a contact "with a mobile on a ridge north of Mt St Helens with good copy on 220 FM simplex, 141 miles away." WQØP was simply glad to be on. He put up his antennas the day of the contest and had a blast.

These are the little encounters that breed the ultra highs from contesting. Sharing the experience involves introducing others to the UHF Contest. Thanks to NS2P, N8DJB and W8XT who took the time to detail their successful recruitment efforts in getting more folks on for the contest.

Of the 108 total submitted entries, WA2FGK (operated by K2LNS) copped single-op honors, with W2SZ/1 by far the top multiop scorer. Check the top-five box for the other top scorers, but don't neglect to look through the score listings for the heroes of this contest—each with a tale of victory in the ARRL UHF Contest. See you next August.—*W1XX*

Operators, WA6VNN (at the mike) and WB9KMO, at the controls of the 10-GHz station of multiop station K6TZ, are busy making another QSO.

SOAPBOX

I operated three hours from West Peak State Park but didn't hear the 1296 southern DX that I worked the night before in a parking lot in Newington (KH6CP/1). I missed my own grid on 220! I missed prime time on Saturday evening, and the score shows it (WA1HYN). The weather was against us for the second contest in a row, so we did not go mountaintopping. But for a home station, I did quite well. I finally got the 903 system going and the 1296 system back on line. I worked RI on 1296 for a new state and grid (K1LPS). Activity down—conditions above 432 were up! (W1RIL). Conditions were fair to poor. Many thanks to the hilltoppers for the extra grids (WA1MBA). Had a ball! I haven't been in a contest since 1978. It was a lot of fun. See you in September (WA1LWC). Low activity! (N2BJ). Wow! What a slow contest! I thought something big was going to happen Saturday afternoon after working FN42 on 2304, then EN90 and FN00, but whatever enhancement we had, dissipated down to the usual "scratch and dig" type contacts (KD5RO). I had equipment and op problems. I was on the right bands at the wrong times (K2GK). A successful contest is getting through the contest with all your equipment still running. It didn't work out for me this time—1296 failed! (K2LNS). This was my first UHF contest. I just got on 220 MHz a few months ago. I made a few contacts here and there. There was not much activity from FN00. I just tried to keep the grid square active (KA3RWP). Excellent band conditions on 2304 MHz on Saturday afternoon and early Sunday morning. The lower bands seemed only average. Our only equipment failure was a 5.7-GHz transverter that would not lock after being outside in the heat and direct sunlight. By the time we got it cooled down and working, the contest was over (WA3TTS). We had excellent propagation to the northwest and southwest (KØRI). We got chased off by lightning Saturday! (WD5AGO). Activity in the Silicon Valley area was a little sparse. Hopefully next year will be better, and I will be on more bands by then (K6KL). I was leaving

LAX on vacation and decided to give out a few points. I gave out contacts from 5 different grids (K6LMN). The low activity this year left me with plenty of time to wire up a new microphone and to DF some loud local line noise on 432 MHz (AJ6T). Thanks to K6LMN for the rare grid squares (KB6MEG). It was disappointing that there was little activity, but I had a nice weekend in the mountains (W6HAB). Not much activity, but then there are not many of us out here on UHF! (NJ7A). I wish band conditions had been better. By next year, I hope to have 1296 and 3456 going (WB8TGY). Unfortunately, the contest started a day or two late! There was a nice enhancement both mornings prior to the start (NØBSH/9). There was good 220 and 1296 activity—up 100% over last year! I got my VUCC (WØKJY). This was my first UHF contest. There were not too many stations on the bands. I am looking forward to the next one (NØIGZ). This was a very slow contest. I guess everyone was enjoying holidays (VE3LNX).

Single Operator Top Five

Call	Score
WA2FGK (K2LNS,op)	77,832
WA2TEO	59,013
VE3LNX	53,136
W1RIL	49,920
KD5RO	48,600

Multioperator Top Five

Call	Score
W2SZ/1	312,900
W3KWH	71,442
N2CEI	46,656
W4IY	31,155
NM8X	28,380

Scores

Score lines indicate call sign, total score, QSOs, multipliers and bands operated (C = 220 MHz, D = 432 MHz, 9 = 902 MHz, E = 1296 MHz, F = 2.3 GHz, G = 3.4 GHz, H = 5.7 GHz, I = 10 GHz, J = 24 GHz, K = 48 GHz, L = Light) and ARRL/CRRL Section. Example: WA2FGK (K2LNS,op) had a total score of 77,832, with 66 QSOs and 28 multipliers on 220 MHz, 88 QSOs and 31 multipliers on 432 MHz, 26 QSOs and 16 multipliers on 902 MHz, 22 QSOs and 11 multipliers on 1296 MHz and 8 QSOs and 6 multipliers on 2.3 GHz. He is located in the Eastern Pennsylvania Section. Call signs of Division leaders and band indicators of band winners are printed in bold type.

Atlantic Division

WA2FGK (K2LNS,op)	77,832	66	28	**C-EPA**
		88	31	**D**
		26	16	**9**
		22	11	**E**
		8	8	**F**
KD5RO	48,600	26	17	C-WNY
		40	21	D
		16	13	9
		27	19	E
		11	10	**F**
		1	1	**G**
W3IP	35,442	34	17	C-MDC
		53	22	D
		13	10	9
		33	17	E
KE2MR	18,492	76	28	D-SNJ
		9	7	9
		20	11	E
W2CNS	11,280	52	25	D-WNY
		21	15	**E**
K2GK	8,766	25	15	C-WNY
		30	14	D
		12	8	E
WA3EOQ	6,336	19	12	C-MDC
		27	15	D
		9	8	E
K4JSI	5,940	29	15	C-MDC
		37	15	D
WA4VHF	5,292	42	21	**E**-MDC
WA3JUF	5,220	9	8	C-EPA
		13	9	D
		5	4	9
		12	7	E
		1	1	F
WB3FAA	4,608	26	9	C-EPA
		18	10	D
		6	3	9
		5	2	E
WA2ONK	2,550	40	14	D-SNJ
		5	3	9
K3AKR	2,400	20	11	C-MDC
		20	9	D
KA3RWP	1,566	29	18	C-WPA
KD2YB	1,479	29	17	D-WNY
NS2P	54	7	1	C-WNY
		2	1	D
N4TW	9	5	1	C-WNY
W3KWH (KA3KSD,N3EQP,WA3s FYJ, TTS,WB3EML,ops)	71,442	51	30	C-WPA
		84	30	D
		18	13	9
		26	18	E
		5	6	F
		4	1	I

Central Division

NC9F	3,588	15	3	**C-IL**
		37	14	D
WB9MSV	2,142	9	8	C-IL
		15	10	D
		5	5	**E**
NØBSH/9	1,632	34	16	-
				D
				- WI
N9DVS	936	24	13	D-IL
NN9K	264	11	8	C-IL

Dakota Division

KØIR	1,392	8	5	**C-MN**
		13	7	**D**
		4	4	**E**
WTØW	486	4	3	C-MN
		12	5	D
		1	1	E
KBØZQ	72	8	3	D-MN

Delta Division

WA5NFC	1,872	9	8	**C-AR**
		17	16	**D**

Great Lakes Division

WB8BKC	39,375	31	19	**C-MI**
		64	30	**D**
		8	7	**9**
		26	16	**E**
		3	3	**F**
N8DJB	14,112	24	15	C-OH
		44	21	D
		4	4	9
		11	8	E
WA8VPD	10,332	12	9	C-MI
		34	21	D
		5	5	9
		11	8	E
		1	1	F
KD8SI	8,256	7	2	C-OH
		47	18	D
		16	12	E
WB8K	3,174	46	23	D-OH
K8TL	2,987	4	4	C-OH
		27	14	D
		6	5	E
K8DW	2,052	2	1	C-OH
		20	11	D
		8	6	E
WB8TGY	1,914	25	21	D-MI
		1	1	F
WBØWAO/8	1,512	15	9	C-MI
		13	9	D
W8VO	1,215	17	11	C-MI
		4	2	D
		3	2	E
W8XT	54	5	1	C-OH
		4	1	D
NM8X (+AC8W,NR8S,VE3s CKU,DGR, NMT)	28,380	42	17	C-MI
		68	21	D
		9	8	9
		22	9	E

Hudson Division

N2BJ	39,617	60	20	**C-ENY**
		81	20	**D**
		14	6	**9**
		29	11	**E**
WB2YZV	4,875	22	10	C-NLI
		19	9	D
		12	6	E
AB2I	2,709	9	4	C-ENY
		26	14	D
		4	3	E
W2AWX	768	16	8	E-ENY
WA2BAH	576	6	1	C-ENY
		18	7	D
KA2MCU	24	2	1	C-ENY
		2	1	D
N2CEI (NK1P,KA2UFO,N2EOC,ops)	46,656	67	25	C-NNJ
		57	20	D
		17	12	9
		29	15	E

Midwest Division

N9CIH	819	10	6	**C-IA**
		11	7	D
WC9P	468	13	12	-
				D
				- KS
N9IGZ (+W8JRP)	855	4	4	C-KS
		15	11	D

New England Division

WA2TEO	59,013	60	27	**C-CT**
		91	28	**D**
		21	13	**9**
		28	11	E
W1RIL	49,920	43	17	C-WMA
		59	17	D
		23	10	9
		38	13	E
		8	8	**F**
		1	1	**G**
WB1FKF	10,080	19	10	C-EMA
		21	11	D
		9	8	9
		7	4	E
		5	3	F
		1	1	**G**
WA1HYN	8,019	24	12	C-RI
		35	14	D
		11	7	E
WA1MBA	7,980	23	11	D-WMA
		12	8	9
		18	7	E
		3	2	F
K1TR	6,750	33	14	C-NH
		42	16	D
WA2TIF	6,612	29	13	C-WMA
		47	16	D
K1LPS	3,240	18	11	C-VT
		17	8	D
		2	2	9
		3	3	E
KH6CP/1	3,000	3	3	C-CT
		15	8	D
		2	2	9
		12	6	E
		1	1	F
K1VYU	2,916	40	14	D-CT
		7	4	E
AC1J	2,850	17	7	C-NH
		21	9	D
		6	3	E
WA1LWC	1,485	20	9	C-WMA
		13	6	D
WA1OUB	972	18	9	E-NH
W3EP/1	630	21	10	D-CT
KA1CDZ	234	8	4	C-NH
		3	1	D
		1	1	E
W2SZ/1 (K1NKR,KA1s DZV,FZY,JFW, PRT,WA1ZMS,K2JXU,KA2FWN, KB2DJD,N2s BNY,GXH,HPA,JNT,WA2s AAU,SCA,WB2s KMY,WHD,WA8USA,ops)	312,900	97	27	C-WMA
		114	37	D
		35	19	9
		35	17	E
		30	12	F
		26	10	G
		23	10	H
		18	7	I
		1	1	J
WA2WEB/1 (K2TXB,WC2F,ops)	9,548	22	10	C-ME
		35	17	D
		6	4	9
		7	6	E

Northwestern Division

WA7RMX	6,336	9	4	C-OR
		7	2	D
		1	1	**9**
		5	3	E
		5	3	**F**
		5	3	**G**
		2	1	**H**
		3	3	**I**
		1	1	**J**
		1	1	**K**
KE7CX	2,064	11	5	**C-OR**
		20	5	**D**
		1	1	**9**
		5	5	**E**
W7VOK	150	5	3	C-OR
		5	2	D
K7AUO (CN95)(K7RUN,W7ADV, WA7NBF,ops)	1,512	2	2	C-OR
		2	2	F
		3	3	G
		1	1	H
		4	4	I
K7HSJ (+K7YLO,KA7NAA)	495	6	6	C-OR
		3	2	D
		3	3	E
K7AUO (CN85)(K7RUN,W7ADV,ops)	240	2	1	C-OR
		2	1	D
		1	1	F
		1	1	G
		1	1	H

Pacific Division

W6RXQ	576	4	2	**C-SCV**
		6	2	D
		3	2	**E**
		1	1	F
		1	1	I
AJ6T	144	12	4	-
				D
				- SCV
K6KL	132	11	4	D-EB
W6HAB (+K6LRE)	24	2	1	D-SJV
		1	1	E

Roanoke Division

K2UOP/4	18,081	29	15	C-VA
		40	18	D
		9	8	**9**
		18	10	**E**
WD8ISK	17,934	29	20	**C-WV**
		37	28	D
		2	2	9
		14	11	E
N4HB	9,072	24	13	C-VA
		40	15	D
		10	8	E
WA4ZIA	7,580	50	28	-
				D
				- NC
		10	8	E
W4DO	4,998	22	12	C-VA
		32	17	D
K4CAW	3,975	23	16	D-NC
		15	9	E
K2BSA/4 (NJ2L,op)	1,890	10	7	C-VA
		25	11	D
W4IY (K4HWG,WB4RDV,KØRI,ops)	31,155	34	20	C-VA
		89	37	D
		16	10	E
WB2ONA/4 (+WB2HKK)	7,875	13	9	C-NC
		22	13	D
		5	5	9
		15	8	E

Rocky Mountain Division

WØKJY	5,628	6	6	**C-CO**
		17	11	**D**
		14	9	**E**
		2	1	**F**
		2	1	**G**
NJ7A	24	4	2	D-UT

Southeastern Division

WS4F	7,956	18	10	C-GA
		32	13	**D**
		1	1	**9**
		13	10	**E**
WB4SLM/M	900	11	8	D-GA
		7	4	E
WD4MBK	252	7	6	E-GA

Southwestern Division

W6CPL	6,489	33	6	C-LAX
		34	8	**D**
		3	2	**9**
		9	4	**E**
		3	1	**I**
WA5BNH	2,736	22	6	C-SDG
		13	6	D
		7	3	E
		2	1	I
W6OYJ	1,089	5	4	C-SDG
		8	5	D
		5	2	**I**
KB6MEG	1,080	45	8	**C-SDG**
K6LMN (DM64)	150	9	4	C-LAX
		1	1	D
K6LMN(DM14)	105	7	5	C-ORG
K6TZ (W1UUO,WA6s GNY,MBZ,VNN, ZZS,WB9KMO,ops)	24,921	61	10	C-SB
		38	10	D
		3	3	9
		20	8	E
		9	4	I
		8	4	J

West Gulf Division

WB5LUA	18,765	12	7	**C-NTX**
		39	22	**D**
		4	2	**9**
		14	5	**E**
		6	3	**F**
		3	2	**G**
		3	3	**H**
		1	1	**I**
K5SW	2,250	8	7	C-OK
		22	18	D
W5UGO	2,188	26	16	D-OK
		1	1	G
		2	2	H
AA5AM	459	3	3	C-NTX
		14	7	D
W5AL	330	3	2	D-WTX
		8	8	D
WD5AGO	120	5	4	E-OK

Canada

VE3LNX	53,136	27	18	C-ON
		41	21	D
		22	17	**9**
		26	17	**E**
		13	9	**F**
VE3ASO	31,878	33	20	**C-ON**
		42	23	**D**
		12	9	9
		15	10	E
		2	2	F
		6	2	I
VE3BFM	6,105	11	11	C-ON
		18	13	D
		6	7	9
		7	6	E
VE2DUB	1,050	8	6	C-PQ
		9	6	D
		1	1	I
		1	1	**J**

Checklogs

K7RUN, W7TYR

Rules, 43rd January VHF Sweepstakes

1) **Object:** To work as many amateur stations in as many different 2° × 1° grid squares as possible using authorized frequencies above 50 MHz. Foreign stations work W/VE amateurs only.

2) **Contest Period:** Begins 1900 UTC Saturday, Jan 20 and ends at 0400 UTC Monday, Jan 22.

3) **Categories**

(A) *Single Operator, Single Band:* One person performs all operating and logging functions. All QSOs for score listings in *QST* must be made on one band. Single-band entries may, however, submit QSOs made on other bands for credit in ARRL-affiliated club competition.

(B) *Single Operator, All Band:* One person performs all operating and logging functions.

(C) *Single Operator, 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.

(D) *Multioperator:* Those obtaining any form of assistance, such as the use of relief operators, loggers or spotting nets. All equipment (including antennas) must be located within a 300-meter-diameter circle.

4) **Exchange:** Grid-square locator (see Jan 1983 *QST*, p 49). Example: W1AW in Newington, Connecticut would send FN31. Exchange of signal report is optional.

5) **Scoring**

(A) *QSO points:* Count one point for each complete two-way 50- or 144-MHz QSO. Count two points for each 220- or 432-MHz QSO. Count four points for each 902- or 1296-MHz QSO. Count eight points for each 2.3-GHz-or-higher QSO.

(B) *Multiplier:* The total number of different grid squares worked per band during the contest. Each different 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 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.

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
902	36 (×4)	144	9
1296	5 (×4)	20	3
2304	1 (×8)	8	1
5760	1 (×8)	8	1
Totals	133	295	59

Final Score = (QSO Points) × (Total no. of Grid Squares) 17,405 = 295 × 59

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 call sign from each different grid square. Crossband QSOs do not count. Aeronautical mobile contacts do not count.

(B) Partial QSOs do not count. Both calls, the full exchange and acknowledgment must be sent and received.

(C) A transmitter 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 the 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 (transmitter, receiver and antenna) 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.

(I) Marine Mobile (and Maritime) entries will be listed separately as "Marine Mobile" in the listings and compete separately for awards.

(J) Participants are reminded that the segment 50.100-50.125 MHz is by convention reserved for intercontinental QSOs only.

8) **Reporting**

(A) Entries must be postmarked no later than 30 days after the end of the contest (Feb 22, 1990). No late entries can be accepted. Use ARRL January VHF Sweepstakes forms, a reasonable facsimile or submit entry on diskette.

(1) Official entry forms are available from HQ for an SASE with 2-units of first class postage.

(2) You may submit your contest entry on diskette in lieu of paper logs. The floppy diskette must be IBM compatible, MS-DOS formatted, either 3.5 or 5.25 inch (40 or 80 track). The log information must be in an ASCII file and contain all log exchange information (band, date, time in UTC, call of station worked, exchange sent, exchange received, multipliers (marked the first time worked) and QSO points) with spaces as delimiters. The summary sheet must be in a separate ASCII file. One entry per diskette.

(B) Logs must indicate band, date, time in UTC, calls and complete exchanges (sent and received), multipliers and QSO points. Multipliers should be marked clearly in the log the first time they are worked. Entries with more than 200 QSOs total must include cross-check sheets (dupe sheets).

9) **Awards**

(A) Single operator.

(1) Top single operator in each ARRL/CRRL Section.

(2) Top single operator on each band (50, 144, 220, 432, 902, 1296 and 2304-and-up categories) in each ARRL/CRRL Section where significant effort or competition is evident. (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.

(B) Top single-operator QRP portable in each ARRL/CRRL Section where significant effort or competition is evident.

(C) Top multioperator score in each ARRL/CRRL Section where significant effort or competition is evident. Multioperator entries are not eligible for single-band awards.

10) **Club Competition:** ARRL-affiliated

clubs compete for gavels on three levels: unlimited, medium and local. Details are in January *QST*.

11) **Condition of Entry**

(A) 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.

(B) *Disqualifications:* For excess duplicate contacts and call sign or exchange errors. See January *QST* for complete details.

Rules, 2nd ARRL RTTY Roundup

Packet—RTTY—AMTOR—ASCII

1) **Object:** Contact and exchange QSO information with as many stations as possible on digital modes. Any station may work any other station.

2) **Contest Period:** First full weekend of January. Begins 1800 UTC Saturday, Jan 6, and ends 2400 UTC Sunday January 7, 1990. Operate no more than 24 hours. Two rest periods (for a combined total of 6 hours) must be taken in two single blocks of time, clearly marked in the log.

3) **Modes:** Baudot RTTY, ASCII, AMTOR and packet (attended operation only!)

4) **Bands:** All amateur bands 3.5 to 30 MHz (excluding 10, 18 and 24 MHz).

5) **Entry categories**

(A) *Single Operator, multi band*—One person performs all operating and logging functions. Use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc) is not permitted. Single-operator stations are allowed only one transmitted signal at any given time.

1) less than 150-W output
2) 150-W output or more

(B) *Multioperator, single transmitter only*—More than one person operates, checks for duplicates, keeps the log, etc. Once the station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Multioperator stations are allowed only one transmitted signal at any given time.

6) **Exchange**

United States: Signal report and state.

Canada: Signal report and province.

DX: Signal report and serial number, starting with 001. *Note:* Both stations must receive and acknowledge the complete exchange for the contact to count.

7) **Scoring**

(A) *QSO Points:* Count one point for each completed QSO (anyone can work anyone). A station may be worked once per band for QSO credit (but not for additional multipliers).

(B) *Multiplier:* Count only once (not once per band), each US state (except KH6 and KL7), each VE province (plus VE8 and VY1) and each DXCC country. KH6 and KL7 count only as separate DXCC countries. The US or Canada do not count as DXCC countries.

8) **Miscellaneous**

(A) Crossband and crossmode contacts are not permitted. Packet radio contacts made through digipeaters or gateways are not permitted.

(B) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

9) **Reporting**

(A) Entries must be postmarked no later than 30 days after the end of the contest (Feb 7, 1990). Any entry making more than 200 total QSOs must submit duplicate check sheets (an alphabetical listing of stations worked). No late entries can be accepted. Use ARRL January VHF SS forms, a reasonable facsimile thereof or submit entry on diskette.

(1) Official entry forms are available from HQ for an SASE with two-units of first-class postage.

(2) You may submit your contest entry on diskette in lieu of paper logs. The floppy diskette must be IBM compatible, MS-DOS formatted, either 3.5 or 5.25 inch (40 or 80 track). The log information must be in an ASCII file and contain all log exchange information (band, mode, date, on and off times, time in UTC, call of station worked, exchange sent, exchange received multipliers (marked the first time worked) and QSO points) with spaces as delimiters. The summary sheet must be in a separate ASCII file. One entry per diskette.

10) **Awards:** Distinctive certificates will be awarded to: Top high-power and low-power single-operator and multioperator scorers in each ARRL/CRRL Section; Top high-power and low-power single-operator and multi-operator scorers in each DXCC country (other than W/VE); each Novice and Technician entrant; each entrant making at least 50 QSOs.

11) **Conditions of Entry:** Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

12) **Disqualifications:** For excess duplicate contacts and call sign or exchange errors. See January *QST* for complete details.

Recommended Novice Digital Operating Frequencies (kHz)

10 meters: 28100-28150*

suggested simplex packet-radio frequencies:
28102.3 28104.

*Authorized power output 200-watts maximum for Novices/Techs only on the 10-meter Novice subband.

Canadian Multipliers

Prefix	*Province*		
VO1/VO2	NFLD/LAB	VE4	MB
VE1	NB	VE5	SK
VE1	NS	VE6	AB
VE1/VY2	PEI	VE7	BC
VE2	PQ	VE8	NWT
VE3	ON	VY1	YUKON

Starting/Ending Time Conversion

	UTC	*EST*	*CST*	*MST*	*PST*
Starts Saturday, January 6, 1990	1800	1:00 PM	12:00 PM	11:00 AM	10:00 AM
Ends Sunday, January 7, 1990	2400	7:00 PM	6:00 PM	5:00 PM	4:00 PM

Rules, 1990 ARRL International DX Contest

1) **Eligibility:** Amateurs worldwide.

2) **Object:** W/VE amateurs work as many amateur stations in as many DXCC countries of the world as possible on 1.8 to 30 MHz, excluding the 10, 18 and 24-MHz bands. Foreign amateurs work as many W/VE stations in as many states and provinces as possible.

3) **Dates**

(A) **CW**—Third full weekend in February (February 17-18, 1990).

(B) **Phone**—First full weekend in March (March 3-4, 1990).

4) **Contest Period:** 48 hours each mode (separate contests). Starts 0000 UTC Saturday; ends 2400 UTC Sunday.

5) **Categories**

(A) **Single Operator**—One person performs all operating and logging functions. Use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc) is not permitted. Single-operator stations are allowed only one transmitted signal at any given time. (Note: This does not permit multiple single-band entries from the same station).

(1) *All band.*

(2) *Single band (one only).* Single-band entrants who make contacts on other bands should submit logs for checking purposes.

(B) **Single Operator Assisted**—One person performs all operating, monitoring and logging functions. The use of spotting nets and assistance through other alerting systems not physically located at the station (operating arrangements involving assistance through DX-alerting nets, etc) are allowed. There are no restrictions on the number of band changes or the length of time spent on a band. (This new category is the same as Single Operator but allows the use of spotting nets, etc.)

(C) **QRP**—Single operator, all band only. QRP is defined as 5-W output or less.

(D) **Multioperator**—More than one person operates, checks for duplicates, keeps the log, etc.

(1) *Single Transmitter.* One transmitted signal at any given time. Once the station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Multioperator, single transmitter stations must keep a single, chronological log for the entire contest period. Violation of the 10-minute rule or improper logging will result in an entrant's reclassification to the unlimited multi-multi class (see below).

(2) *Two transmitter.* A maximum of two transmitted signals at any given time, on different bands. Once either station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Both transmitters may work any and all stations; the second transmitter is not limited to working new multipliers only. Each of the two transmitters must keep a separate, chronological log for the entire contest period. Violation of the 10-minute rule by either or both transmitters or improper logging will result in an entrant's reclassification to the unlimited multi-multi class (see below).

(3) *Unlimited.* A maximum of one transmitted signal per band at any given time. Unlimited multi-multi stations must keep a separate, chronological log for each band for the entire contest period.

6) **Contest Exchange**

(A) W/VE stations (including 48 contiguous United States and does not include Canadian islands of St Paul and Sable) send signal report and state or province.

(B) DX stations send signal report and power (three-digit number indicating approximate transmitter output power).

7) **Scoring**

(A) **QSO Points**—W/VE stations count three points per DX QSO. DX stations count three points per W/VE QSO.

(B) **Multiplier**—W/VE stations: Sum of DXCC countries (except US and Canada) worked per band. DX stations: Sum of US states (except KH6/KL7) and District of Columbia (DC), VE1-8, VO, VY1 (Yukon is separate from VE8) worked per band. Maximum of 59 per band.

(C) **Final Score**—QSO points × multiplier = final score.

8) **Miscellaneous**

(A) Call signs and exchange information must be received and logged by each station for a complete QSO.

(B) All operators must observe the limitations of their operator licenses and station licenses at all times.

(C) Your call sign must indicate your DXCC station location (KH6XYZ/W1 in Maine, FGØAAA/FS on St Martin, etc).

(D) One operator may not use more than one call sign from any given location during the contest period.

(E) The same station may be worked only once per band—no crossmode or repeater contacts.

(F) Aeronautical and maritime mobile stations outside the US and Canada may not be worked for QSO or multiplier credits by W/VE stations.

(G) All transmitters and receivers must be located within a 500-meter-diameter circle, excluding directly connected antennas. This prohibits the use of remote receiving installations. Exception: Multioperator stations may use spotting nets for multiplier hunting only.

(H) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

9) **Reporting**

(A) Use ARRL International DX Contest forms, a reasonable facsimile thereof or submit entry on diskette.

(1) Official entry forms are available from HQ for an SASE with 2-units of first-class postage.

(2) You may submit your contest entry on diskette in lieu of paper logs. The floppy diskette must be IBM compatible, MS-DOS formatted, either 3.5 or 5.25 inch (40 or 80 track). The log information must be in an ASCII file and contain all log exchange information (band, date, time in UTC, call of station worked, exchange sent, exchange received, multipliers [marked the first time worked] and QSO points) with spaces as delimiters. The summary sheet must be in a separate ASCII file. One entry per diskette.

(B) Logs must indicate times in UTC, bands, calls and complete exchanges. Multipliers should be clearly marked in the log the first time worked. Entries with more than 500 QSOs total must include cross-check sheets (dupe sheets).

(C) All operators of multioperator stations must be listed.

(D) Entries must be postmarked within 30 days after the last contest weekend (April 4, 1990). Logs not postmarked by the deadline will be classified as checklogs; no extensions, no exceptions. All stations are requested to send their entries in as early as possible. Entries received after mid-July will not make *QST* listings.

10) **Awards**: Plaques will be awarded in the following categories for both the CW and phone contests.

(A) Top W/VE scorer in each entry category—single operator-all band-high power, single operator-all band-low power, single operator-single band (1.8-28 MHz) single-operator assisted, QRP, multioperator-single transmitter, multioperator-two transmitter, multioperator-multitransmitter.

(B) Top scorer in the single operator-all band category worldwide and on each continent. In addition, worldwide leaders in the single operator-single band, single operator assisted, QRP, multioperator-single transmitter, multioperator-two transmitter and multioperator unlimited categories will receive plaques.

(C) Additional special plaques will be awarded as sponsored. See January 1989 *QST*

Contest Branch now accepts entries on disk!

The Contest branch can now accept contest entries on floppy diskettes. The disk must be an IBM compatible, MS-DOS formatted disk, either 3½- or 5¼-inches, and the log information must be in a true ASCII file. The summary sheet should be in a separate true ASCII file or included as hard copy. The log file should exactly follow the layout of the official forms (containing band, mode, date, time in UTC, call of station worked, exchange sent, exchange received, multipliers and points). Do not forget to include your "report sent." Each entry should be on a separate diskette.

for current list.

(D) Certificates will be awarded to top single operator-all band entries from each country and ARRL Section; top single-band entries in each US call area and each country; top single operator assisted entries in each country, US call area and in Canada; top multioperator entries (single, two and multi-transmitter) in each country, US call area and in Canada. Additional single-band and multi-operator certificates will be awarded if significant effort or competition is displayed. DX entrants making more than 500 QSOs on either mode will receive certificates.

11) **Club Competition**: ARRL-affiliated clubs compete for gavels on three levels: unlimited, medium and local clubs. Details will be listed in January 1990 *QST*.

12) **Condition of Entry**

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, by regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) **Disqualification**: An entry may be disqualified if the overall score is reduced by more than two percent. Score reduction does not include correction of arithmetic errors. Reductions may be made for unconfirmed QSOs or multipliers, duplicate QSOs or other scoring discrepancies. An entry will be disqualified if more than two-percent duplicate QSOs are claimed for credit. For each duplicate or miscopied call sign removed from the log by ARRL, three additional QSOs will be deleted as a penalty. The penalty will not be considered as part of the two-percent disqualification criterion. If a participant is disqualified, that operator will be barred from entering the contest on that mode the following year. The calls of all disqualified participants will be listed in the *QST* contest results.

Season's Greetings

FROM THE ARRL/IARU STAFF AND CONTRIBUTING EDITORS

Nao Akiyama, NX1L/JH1VRQ
Jo-Ann Arel
Vicky Armentano
Richard Baldwin, W1RU
Shel Ball, KC1MP
Leslie Bartoloth, KA1MJP
Mary B. Basch, KA1UGC
Angela M. Beebe, KA1SER
Charles R. Bender, W1WPR
Jon Bloom, KE3Z
Tammy Boscoe
Fran A. Bramon
Zoe Brodeur
Mark R. Burke, KA1MIS
James D. Cain, K1TN
Laird Campbell, W1CUT
Steve Capodicasa
Joe Carcia, NJ1Q
Rose Cavanaugh
Shelly Chrisjohn, WB1ENT
Cyndi Clark
Lisa Clark
Ferne Collin
Suzanne Corliss
Rose Cyr
Sandi Damato
Doug DeMaw, W1FB
Carole Dimock
Chuck Dorian, W3JPT
Ruth Doucette
Bernice Dunn, KA1KXQ
Steve Ewald, WA4CMS
Sue Fagan
Kathy Fay, N1GZO
Mark Forbes, KC9C
Joyce Furman
Scott Gee, WB9RRU
Eric Grenier
Gerald L. "Jerry" Hall, K1TD
Robert J. Halprin, K1XA
Ed Hare, KA1CV
Penny Harts
Rus Healy, NJ2L
John Hennessee, KJ4KB
Jackie Hernandez
Tom Hogerty, KC1J
Berta Hould
Stan Horzepa, WA1LOU
Anthony L. Howze
John Huntoon, W1RW
Luck Hurder, KY1T
Christine Hushin
Joanna Hushin, KA1IFO
Chuck Hutchinson, K8CH
Chris Imlay, N3AKD
Bart J. Jahnke, KB9NM
Debbie Jahnke
Jeff Kilgore, KC1MK
Magella Kilgore
Joel P. Kleinman, N1BKE
Kirk Kleinschmidt, NTØZ
Geoffrey H. Krauss, WA2GFP
Ginny Koza
Lisa Kustosik, KA1UFZ
Greg Kwasowski
Suzanne LaPolt
Zack Lau, KH6CP
Robin Levin
Robert Lincoln
John Lindholm, W1XX
Billy Lunt, KR1R
Jay Mabey, NUØX
Rita Maloney
Doris Mangiafico
Robert Mazzotta
Martha McCarthy
Thomas McCarthy
Kathy McGrath
Jodi Morin, KA1JPA
John Nelson, W1GNC
Steffie Nelson, KA1IFB
David Newkirk, AK7M
Glen F. Norton, KC1MM
Bill Olson, W3HQT
Helen Pacyna
Paul K. Pagel, N1FB
Rick Palm, K1CE
Linda Pfister
David Pingree
Ann-Marie Pinto
Sal Prado
John Proctor
Paul Rinaldo, W4RI
Vern Riportella, WA2LQQ
Kimberly H. Rochette
Carmelo Rosado
Carmen Rosado
Dianna Roy
Doug Santoli
Eileen Sapko
Cathy Scharr
Bob Schetgen, KU7G
Mary Schetgen, N7IAL
Don Search, W3AZD
Chris Settembri
Paul R. Shafer, KB1BE
Joe Shea
Nancy Slipski
Maria A. Somma
Cathy Stepina
Dave Sumner, K1ZZ
Tom Taormina, K5RC
MaryAnn J. Taratula
Chetty Tardette
Lisa Tardette
Ed Tilton, W1HDQ
John Troster, W6ISQ
Bill Tynan, W3XO
Frank Vesci, NG1J
Thomas J. Vesci, WB1CRH
Lori Weinberg
Ellen White, W1YL/4
Rosalie White, WA1STO
Perry Williams, W1UED
Jean Wilson
Mark Wilson, AA2Z
Larry Wolfgang, WA3VIL
Gerrie Wood

Contest Corral

Conducted By Billy Lunt, KR1R
Contest Manager

DECEMBER

1-3

ARRL 160 Meter Contest, see Nov *QST*, p 80.

2-3

TOPS Activity Contest, see Nov *QST*, p 81.

5

West Coast Qualifying Run, 10-35 WPM, at 0500Z Dec 6 (9 PM PST Dec 5). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of 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.

9-10

ARRL 10 Meter Contest, see Nov *QST*, p 79.

Garden City Contest, part 1, sponsored by the Vivesvaraya Industrial and Technological Museum and the Bangalore ARC in 2 parts. CW from 1200Z Dec 9 until 1200Z Dec 10; phone from 1200Z Dec 16 until 1200Z Dec 17. Single operator only. Use separate logs for CW and phone. Work VU2 stations only (VU2 stations work the world). Work stations once per band. 40 and 20 meters only. Exchange RS(T) and serial number. North and South American stations count 3 points per QSO with VU2 stations. Count 1 bonus point per QSO made using home-brew TX/TRX. No multipliers. Certificates. Mail logs before Jan 17 to The Convenor, Garden City Contest 1989, Bangalore ARC, PO Box 5053, Bangalore 560001, India.

10

QRP ARCI Holiday Spirits Home-brew CW Sprint, see Nov *QST*, p 81.

12

W1AW Qualifying Run, 10-35 WPM, at 0300Z Dec 13 (10 PM EST Dec 12). Transmitted simultaneously on 1.818 3.5815 7.0475 14.0475 18.100 21.0775 28.0775 50.08 147.555 MHz. See Dec 5 listing for further details.

16-17

Garden City Contest, part 2, see Dec 9-10 listing for more details.

27

W1AW Qualifying Run, 10-35 WPM at 1400Z Dec 27 (9 AM EST Dec 27). See Dec 12 listing for further details.

31

Canada Day Contest, see Nov *QST*, p 82.

31-Jan 1

ARRL Straight Key Night, 24-hour period UTC (from 7 PM EST Dec 31 until 7 PM EST Jan 1). This is a friendly meeting on the air using straight keys. Suggested areas of operation of 80, 40 and 20 meters are 60 to 80 kHz from the lower band edges and 10 kHz from the lower Novice band edges. When participating in SKN, use SKN instead of RST preceding the three-digit report to clue in passersby. Following SKN, send a list of stations worked plus your vote for best fist heard (not necessarily one you've worked) during that period. This is not a contest; quick contest-like exchanges are discouraged. Vote also for the most interesting QSO. Mail your report by Jan 10 to ARRL HQ.

JANUARY

3

West Coast Qualifying Run, 10-35 WPM, at 0500Z Jan 4 (9 PM PST Jan 3). See Dec 5 listing for further details.

6-7

Hunting Lions in the Air Contest, CW, sponsored by Lions Clubs International from 1200Z Jan 6 until 1200Z Jan 7 (phone: 1200Z Jan 13 until 1200Z Jan 14). Open to all amateurs worldwide, 80-10 meters (excluding WARC bands). Categories are single op and multiop, single transmitter. Multiop must be club or association of ham radio operators. Exchange signal report and serial number. Lion, Lioness and Leo club members will also send their club name and Lion district. Work stations once per band. QSOs with stations on the same continent count 1 point; QSOs with stations on other continents count 3 points. Bonus points: 10 points for QSOs with Leo, Lioness and Leo Club from different countries (5 points for same country); 20 points (5 points if in Brazil) for QSOs with Rio de Janeiro Arpoador Lions Club members. 20 points (5 points if in US) for QSO with Melvin Jones Memorial Radio Club of US. 25 points for QSO with Arpoador Official Station PY1LCA or ZY1LCA. (This doesn't apply to the Rio de Janeiro Arpoador Lions Club or the Melvin Jones Memorial Radio Club). No multipliers. Mail logs by Feb 15, 1990, to the Contest Committee of Rio de Janeiro Arpoador Lions Club, PO Box 2155, Rio de Janeiro 20011, RJ, Brazil.

ARRL RTTY Roundup, see this issue, p 78.

10

W1AW Qualifying Run, 35-10 WPM, at 0300Z Jan 11 (10 PM EST, Jan 10). See Dec 12 listing for further details.

13-14

Hunting Lions in the Air Contest, phone, see Jan 6-7 listing for further details.

15

QRP ARCI Fireside Sprint, phone, sponsored by QRP ARC International, from 2000Z to 2400Z Jan 15. Phone only. Single band or all band. Work stations once per band. Exchange signal report, HB (home-brew) or C (commercial), state/province/country and QRP number if member. Nonmembers send power output. Suggested frequencies: 1.860 3.985 7.285 14.285 21.385 28.385 28.885 and 50.885. Count 5 points for QSO with ARCI member. Others count 2 points for same continent and 4 points for different continent. Multiply QSO points by states/provinces/countries worked per band by power multiplier (2-10 W output ×7; 0-2 W output ×10). More than 10-W output counts as checklog. If 100% natural power, multiply final score by 2; if 100% battery, multiply by 1.5. Include a description of home-brew equipment, commercial equipment and antennas used. Mail entries before 30 days after contest (SASE for results) to QRP ARCI Contest Chairman, Red Reynolds, K5VOL, 835 Surreyse Rd, Lake Zurich, IL 60047.

20-21

AGCW-DL QRP Winter Contest, sponsored by the Activity Group CW-DL, from 1500Z, Jan 20 until 1500Z, Jan 21. CW only, 160-10 meters. Classes are: A—less than 3.5-W input (2-W out), single operator; B—less than 10-W input (5-W output), single operator; C—less than 10-W input (5-W out), multioperator; D—QRO stations, more than 10-W input (5-W out), only contact QRP stations; E—SWL. Class C stations may operate the full time of contest; classes A, B, D and E must break for 9 hours, which can be split into two 4.5-hour segments. Exchange RST, QSO number and input, adding X if crystal controlled. QRO stations send QRO. Operations are limited to one class per band, VFO or crystal-controlled. No more than 3 crystals may be used on one band. Work stations once per band. Count 1 point per QSO with own country, 2 points per QSO with own continent, 3 points per QSO with different continent. Multipliers equal DXCC countries and call areas in JA, PY, VE, W and ZS. Band score equals QSO points times multipliers. Total score equals sum of band scores. Separate logs per band. Send logs within six weeks to Sigfried Hari, DK9FN, Spessartstrabe 80, D-6453 Seligenstadt, West Germany.

HA-DX Contest, sponsored by the Hungarian Radioamateur Society, from 2200Z Jan 20 until 2200Z Jan 21. 80-10 (excluding WARC bands), CW only. Work stations once per band. Exchange signal report and serial number. HA stations will also send a two-letter code corresponding to their location (county). Possible codes: BA BE BP BN BO CS FE GY HA HE KO NO PE SA SO SZ TO VA VE ZA. Count 6 points per HA QSO, 3 points per QSO with non-HA stations on other continents. Multiply by sum of HA counties worked per band. Mail entries within six weeks to Hungarian Radioamateur Society, PO Box 86, Budapest H-1581, Hungary.

Michigan QRP Club CW Contest, sponsored by the Michigan QRP Club, from 1200Z Jan 20 until 2400Z, Jan 21. Four entry categories: A—250 milliwatts or less output; B—1 W to 250 milliwatts; C—5 W to 1 W; D—Over 5 W. Exchange signal report, QTH (state/province/country) and MI QRP number (power output if nonmember). CW only. Work stations once per band. 160-10 meters excluding WARC bands. Suggested frequencies: 1.810 3.560 7.040 14.060 21.060 28.060 50.060. Novices: 3.710 7.110 21.110 and 28.110. Count 5 points per member QSO and 1 point per nonmember QSO. Multiply QSO points by the number of states/provinces/countries worked per band. Multiply total by 1.25 if using 100% battery power or × 1.5 if using 100% natural power. Mail logs to L. T. Switzer, N8CQA, 654 Georgia, Marysville, MI 48040.

Texas QSO Party, sponsored by the West Texas DX Assn, from 0000Z Jan 20 until 1800Z Jan 21. Phone and CW. Single operator only. Work stations once per band and mode. Mobiles may be worked again in each county. Exchange serial number and state/province/country (county for TX stations). Score 1 point per phone QSO, 2 points per CW QSO, 5 points per phone QSO with Texas mobile station (non-Texas stations only) and 7 points per CW QSO with Texas mobile station (non-Texas stations only). Texas stations multiply by total number of states/provinces/countries and Texas counties. Others multiply by total number of Texas counties worked (max 254). Suggested frequencies: CW—3.565 3.710 7.065 7.110 14.065 21.065 21.110 28.065 28.110; phone—3.940 7.260 14.280 21.370 28.375 28.600. Certificates and plaques. Send logs to be received before Mar 14 to Les Bannon, WF5E, 3400 Bedford, Midland, TX 79703.

20-22

ARRL January VHF Sweepstakes, see this issue, p 77.

25

W1AW Qualifying Run, 10-35 WPM, at 2400Z Jan 25 (7 PM EST, Jan 25). See Dec 12 listing for further details.

26-28

CQ World Wide 160 Meter DX Contest, CW, sponsored by *CQ Magazine* from 2200Z Jan 26 until 1600Z Jan 28. CW only (phone Feb 23-25). Count 2 points per QSO with own country, 5 points per QSO with another country in the same continent and 10 points per QSO with another continent. Multiply by sum of US states (48), Canadian provinces (13) and DXCC countries (including KH6/KL7). Canadian provinces are VO1, VO2, VE1-NB, VE1-NS, VE1-PEI, VE2, VE3, VE4, VE5, VE6, VE7, VE8 NWT AND VY Yukon. Exchange signal report and QTH; W/VE stations also send state/province. Mail entry by Feb 28 (phone, Mar 31) to Don McClenon, N4IN, 3075 Florida Ave, Melbourne, FL 32904.

27-Feb 4

ARRL Novice Roundup

27-28

UBA Contest, CW, sponsored by the Union of Belgium Amateurs from 1300Z Jan 27 until 1300Z Jan 28 (phone is from 1300Z Feb 24 until 1300Z Feb 25). Categories: A—Single operator single band; B—Single operator multi band; C—Multioperator single transmitter all bands; D—QRP 10-watts input as class B; E— SWL as class B. Suggested frequencies: 80, 40, 20, 15, 10 meters according to IARU Region 1 band plan. Exchange RS(T) and serial number (starting with 001). Belgium stations also must give province abbreviation. QSOs with ON, DA1 and DA2 count 10 points, QSO with other European Community members stations count 3 points, QSOs with other stations count as 1 point. European community is listed in multiplier list. All Belgium provinces (AN, BT, HT, LB, LG, LU, NR, OV, WV); each of the prefixes: ON4-ON9, DA1, DA2; and European communities (CT, CU, DL, EA, EA6, EI, F, G, GD, GI, GJ, GM, GU, GW, I, IS, LX, OZ, OY, PA, SV, SV5, SV9, SY, TK, ZB2) count as multipliers. Total the QSO points times the multipliers for the final score. All logs must show the date, time (UTC), station worked and exchange. Declaration also required. Mail logs, within 30 days of contest end, to UBA HF Contest Committee, Glaicia Jan, ON6JG, Oude Gendarmeriestraat 62, B-3100 Heist Op Den Berg, Belgium.

YL-ISSB QSO Party, CW, coordinated by Bill Early, WA9AEA, from 0000Z Jan 27 until 2400Z Jan 28. (Phone is from 0000Z Mar 24 to 2400Z Mar 25.) Suggested frequencies are in the General portion of 80, 40, 20, 15 and 10 meters. Single operator, DX-W/K partners, YL-OM teams. Logs shall indicate two 6-hour rest periods. Exchange call, signal report, state/province/country, name, ISSB number (if member) and DX-W/K partner. Score 3 points per member QSO within same continent, 6 points per member QSO in different continent, 1 point per nonmember QSO. Member stations only count as multipliers. Multiply by 1 for each DX-W/K partners; YL-OM team; US, VK, ZL, VE state or province; DXCC country. Bonus multipliers: 1 for working 15 or more members on a second band; 2 additional for 15 or more members on a third band. Multiply by 5 for maintaining a dc input power under 250 watts throughout contest. Mail logs before April 30 to Bill Early, WA9AEA, PO Box 401, McHenry, IL 60050-0401.

28-29

Winter Classic and Homebrew Radio Exchange, from 2000Z Jan 28 until 0400Z Jan 29. Object is to restore, operate and enjoy older equipment. Exchange name, signal report, state/province/country, receiver and transmitter (home-brew send PA tube or transistor) and other interesting conversation. The same station may be worked with different equipment combinations on each band/mode. Suggested frequencies: phone—3.880 7.290 14.280 21.380 28.580; CW—60 kHz up from lower band edges; Novice/Tech 20 kHz up from lower band edges. Add the number of all the different transmitters and receivers worked plus the different states/provinces/countries worked per band and mode. Multiply that number by total number of QSOs. Multiply that total by total years old of all your transmitters and receivers used (minimum three QSOs per unit). For transceivers, multiply years old by 2. Mail logs (include SASE for results) to Marty Reynolds, AA4RM, PO Box 13354, Atlanta, GA 30329.

Computer Diskette Media: Items for this column can now be sent on a standard 3.5- or 5.25-inch MS-DOS formatted floppy disk to ARRL HQ. The file must be in an ASCII format and must contain all information as listed below. The file can also be sent via modem to the ARRL Bulletin Board at 203-665-0090.

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 **January 1** to make the **March** issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Special Events

Conducted By Billy Lunt, KR1R
Contest Manager

Fort Lewis, Washington: The Ft Lewis ARA will operate W2USA during the **month of Dec** to celebrate the Washington State Centennial. Suggested frequencies: 7.235 18.150 21.425 28.350 and the General 20-meter band. For QSL, send business size SASE to Commander, I Corps and Ft Lewis, AFZH-PAM (CPT Godlewski), Ft Lewis, WA 98433.

Bethlehem, Connecticut: The Hen House Gang ARC will operate W1FHP during the **month of Dec.** Operation will be 80-10 meters. For QSL, send regular size SASE to Robert J. O'Neal, W1FHP, Hard Hill Rd, Bethlehem, CT 06751.

Flamingo, Florida: The Everglades ARC will operate W4SVI from 1400Z **Dec 2** until 1900Z **Dec 3** to celebrate the 42nd anniversary of Everglades National Park. Suggested frequencies: phone—7.230 14.240 21.330 and 28.375; CW—7.030 14.030 and 21.130. Send QSL and two units of postage for unfolded certificate to EARC, PO Box 113, Homestead FL 33090-0113.

Sacramento, California: The Sacramento ARC will operate W6AK from 1730Z **Dec 2** until 2330Z **Dec 3** to celebrate Sacramento's sesquicentennial. Suggested frequencies: SSB—14.300 21.400 28.450 during the day and 3.962 7.270 14.300 at night; CW—14.050. For QSL, send SASE to Sacramento ARC, PO Box 161903, Sacramento, CA 95816.

Bethlehem, Indiana: The Clark Co ARC will operate W9WWI **Dec 9-10** to commemorate the Christmas holiday season. Operation will be in the General portions of the 80, 40, 20, 15 and 10 meter bands. For certificate, send SASE to Clark Co ARC, PO Box 532, Jeffersonville, IN 47150.

Annapolis, Maryland: The ARINC ARC will operate W3ZH **Dec 11-15,** 1700Z-1800Z each day, and **Dec 16** all day to commemorate the 60th anniversary of the company's dedication to the airline industry. Operation will be on all bands. For QSL, send SASE to ARINC ARC, 2551 Riva Rd, Annapolis, MD 21401.

Lantana, Florida: The Palm Beach RC will operate W4SS **Dec 18-23,** 2100Z-0500Z each day, from the world's tallest Christmas tree. Operation will be on 14.343, 21.305 and 28.495. Certificates will be awarded.

Providence, Rhode Island: The Providence RA will operate W1OP 0000Z-0500Z **Dec 20** to celebrate their 70th anniversary. Operation will be on 1.825. For certificate, send SASE to PRA, W1OP, 1 Ludlow St, Johnson, RI 02919.

Moffett Field, California: The Ames ARC will operate a special-event station from 1600Z **Dec 20** until 0100Z **Dec 21** to commemorate the anniversary of the ground breaking for Ames Research Center. Suggested frequencies: 14.280 21.380 28.420. For QSL, send business size SASE to Ames ARC, PO Box 73, Moffett Field, CA 94035.

Troy, New York: The area hams will operate KA2TFM **Dec 20-24,** 1400Z-2100Z each day, to commemorate the poem "A Visit from St Nicholas." Suggested frequencies: 7.250 14.250 21.350 28.450. For certificate, send business size SASE to Arnie Fowler, 237 Belleview Rd, Troy, NY 12180.

Christmas, Florida: W1TRB will operate **Dec 22-23,** 1700Z-2300Z each day, to celebrate the Christmas season. Operation will be on 7.225, 21.300 and 28.400. For certificate, send QSL and SASE to Lou Hoekstra, W1TRB, Box 430, Christmas, FL 32709.

Albany, New York: The tenth annual Number One Christmas Carol (N1CC) operation, on Christmas Eve and Day **(24-25),** in conjunction with the Albany ARA as K2 Christmas Tree (K2CT). Suggested frequencies: 3.907 7.238 14.280 21.365 and 28.480. Send QSL with SASE to John Yodis, K2VV, PO Box 460, Hagaman, NY 12086.

San Benito, Texas: The San Benito ARC will operate WA2VJL **Dec 26-31** to celebrate the "R and R" of Santa and Rudolph. Operation will be SSB on 21.350 and 28.325. For certificate, send 9- × 12-inch SASE to Santa Claus, c/o San Benito ARC, PO Box 1382, San Benito, TX 78586-1382.

Pasedena, California: The Relay Repeater Club will operate KE6PE **Dec 30-Jan 1,** 1600Z-0400Z each day, to commemorate the 101st anniversary of the Tournament of Roses, 101 years of the Rose Parade and 76 years of the Rose Bowl. Suggested frequencies: 14.260 21.335 28.450. For certificate, send QSL and 9- × 12-in SASE to Relay Repeater Club, PO Box 81, Arcadia, CA 91006-5019.

Pitcairn Island: The amateurs of Pitcairn Island will operate VR2ØØPI/(2 letters of operator's call) throughout the **year of 1990** to celebrate their island's bicentennial. For an application for certificate and awards, send SASE to Dr G. O'Toole, KB6ISL, 9605 San Gabriel Ave, South Gate, CA 90280.

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 **January 1** to make the **March** issue. Please include the name of the sponsoring organization, the call sign of the special-event station, the city location, dates and times (Z), suggested frequencies and QSL information. Requests for donations will not be published.

QSLing Special-Event Stations: To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9- × 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.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM: Walt Dabell, KD3GS— ASM: Bill Ryan, WA3DPJ. With the holiday season approaching we should start to see an increase in NTS traffic into and out of the state. It is important during these high traffic times to have representatives from all three counties check into the Delaware Traffic Net. Kent and New Castle counties have been rather sporadic in representation. The Delaware Traffic Net meets at 6:30 PM local time on 3.905 MHz Monday through Friday and the Delaware Emergency Phone Net meets Saturdays at 6 PM local on the same frequency. Don't worry if you have never checked in before, or never handled traffic, we will be more than happy to give some OJT to new recruits. SEP net rpt: DTN stns 337 tfc 26 in 21 sessions, DEPN stns 57 tfc 15 in 5 sessions, SEN stns 56 tfc 0 in 4 sessions. Traffic: W3QQ 80, KA3GRQ 27, WB3DUG 21, W3FEG 20, WA3WIY 16, KD3GS 15, K3JL 13, KQ5G 4, KC3FW 4, N3FLD 3. TOTAL 203

EASTERN PENNSYLVANIA: SM, Kay Craigle, KC3LM— ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO. STM, BM: KB3UD. PIO: W3ZXV. TC: W3FAF. Happy holidays to all! Thanks to KC3QB and the club leaders, all our Special Service Clubs successfully completed the renewal process in 1989: C-CARS, Delaware-Lehigh, Mid- Atlantic, Murgas, Penn-Mar, Phil-Mont, RF Hill, Reading, Susquehanna Co., Tamaqua Transmitting, Warminster, and West Branch. Of our 63 active affiliated clubs, 87% submitted a 1989 annual report — that's the best rate in several years. In early October, we had not heard from Hilltoppers, Lebanon Valley, Mt. Airy VHF, Overbrook, Penn State/York, PECO, Tioga Co., or York in 1989. Please let the SM know if the records are in error. We value all our affiliated clubs and want to keep every one in the family. In ARES activities, DEC's K3AUS, N3ECL, and KA3MVM, and ECs KA3OGL and K3DCU were among those attending a small but lively ARES discussion group at the York hamfest. New ECs in Dist. 11 are N2DYK (Lancaster), N3GTZ (Lebanon), and N3GFM (Dauphin). We salute K1PZU for his continuing service of recording Amateur publications for the blind. If your club is considering a new meeting site, please put access for the handicapped among the specs. Congrats to Frankford for winning the '89 DX contest and to Dauberville DXers for a no-joke finish in the medium category. Did you see the story on W3GM (ex-W3BES, ex-SCM EPA) in the October "How's DX?" RF Hill ARC sponsors a technical roundtable Tuesdays at 7:30 PM on 145.31/R. It's an informal session with W3PNL as moderator. Also in the Philadelphia area, Penn Wireless holds a technical net on 147.00/R on Thursdays at 9 PM. Many thanks for the clippings showing good press for EPA radio groups during Hurricane Hugo. We hope all in EPA cooperated with officials in the affected areas by not introducing welfare inquiries while the disaster was at its worst. We need to tell the public that hams put all our communications resources at the disposal of government and relief agencies to help them save lives. If we explain what hams are doing, frightened relatives can usually understand communications priorities and won't suppose we're insensitive to their feelings. Our sincere 73 to our brother and sister Amateurs in the Virgin Islands, Puerto Rico, and South Carolina Sections! Traffic (September): N3AZW 769, N3DRM 260, W3JKX 156, AA3B 103, N3CD 87, WA3EHD 86, W3IPX 74, W3NNL 57, W3KOD 49, K3TX 49, KD3AO 48, KU3R 35, KA3MVM 35, W3DP 29, WB3EVL 22, W3ZID 22, KA3QYH 20, N3EFW 17, K3NB 16, WA3CKA 16, K3ARR 13, W3BNR 13, W3CL 12, W3FAF 10, W3GJC 10, WB8KPE 10, N3GXK 10, N3FGC 8, KC3TD 7, KA3RGF 6, W3HK 3, W3ADE 3. NETS (QNI/QTC): EPA 498/186, EPAEPTN 436/194, PTTN 177/56, D6ARES 89/6, MARCNET 48/4, MARTON 187/49, SEPATN 98/22. @BBS: @K3RLI 535, @WA3TSW 410, @WB3JOE 386, @N3ET 7.

MARYLAND-DC: SM, Ken Cohen, NI3F—ASM/PKT: KJ3E. ASM/ACC: WA3YLO. OOC/BM: NB3P. PIO: N3BMB. SEC: KN3U. TC: W3VNN. STM: N3EGF. SGL: KW3X. Hurricane Hugo just missed MD/DC, but local hams were on the front line maintaining contact with the stricken areas. Our efforts paid off, not only in the gratitude of the people we aided, but in much positive publicity, including front page headlines in the "Washington Post." If emergency strikes, by all means, tune in the net frequency, but DON'T transmit, turn off your VOX and sit tight unless called. Traffic from the affected area takes priority. Silence is golden! If there is a power failure, do you have emergency power? Extra batteries for your HT? Don't throw out your old car battery, it might have enough kick left in it to run your HF rig! Do you have plans for a makeshift antenna in case your present one blows down? Public service types ought to read KN3U's newsletter; it is first rate! WB3EFG has stepped down as OOC, but promises to rejoin our active ranks in a few years. Know a worthy operator? Send nominations for the Atlantic Division Ham of the Year to W3ABC. Know of a Silent Key? Help the family by getting them in touch with FAR's widow assistance program. 73 'till next month! With the nets: WITH THE NETS: NET/MGR QND/QTC/QNI: MSN/KC3Y 30/51/257, PON/WB3BFK 26/23/236, MDD/W3FA 59/199/416 (TOP BRASS, W3FA/147, W3QQ/94, K3GHH/81, KC3Y/82), MEPN/K3RXK 31/125/743. Traffic: W3IWI 955 (BPL), N4QQ 716 (BPL), K3RXK 246, KC3Y 219, NC3V 210, K3GHH 173, NB3P 148, W3FA 129, NR3Q 70, KJ3E 64, KD9M 62, WB3BJM 48, K3NNI 44, KA3RFE 32, K3USO 32, KD3JK 29, N3GIY 27, W3YVQ 25, W3FZV 22, WB3BFK 22, N3EGF 21, NC3Z 16, K1LNJ 15, NF3X 13, K1BGT 12, WA2WDT 3. PSHR: K3RXK 354, W3FA 103, KC3Y 74, NC3V 66.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB— SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: N2BQT. PIO: KA2RAF. SGL: Vacant. BM: WB2UVB. OOC: WA2HEB. ATC's KA2RJA and WB2MNF. VE testing will be given in Bellmawr on Dec. 21. See Jan., 1989, QST for full info on this session. Congratulations to Bill Datz, NJ2D, of Pitman for coming in first place in our section during August's annual NJ QSO Party. Bill will probably have received his plaque by the time you read this. Well, it's hard to believe that another holiday season is upon us. Why not send a special greeting to your friends or family via amateur radio in the form of a radiogram? In fact, sending messages for your neighbors can also be a great way to foster goodwill during this time of year. There are traffic nets held every day of the year, on virtually every band, at a time that should be convenient for everyone. Are you interested? If so, and you are not familiar with traffiking, please contact our STM, Gene Bond, WB2UVB, at 15 E. Camden Ave., Moorestown 08057. I hope all of you and your families have a very happy and safe holiday season. 73. Traffic: WB2ZJF 184, WA2CUW 33. (Aug.) WB2UVB 166, KB2CDB 36, K4FFM 19, WA4JRP 14, WA2GYF 10, KA2CQX 9, KA2YKN 4, N2EPH 2, WB2SYJ 1, N2HQL 1, KE2EH 1.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—ACC: N2EH. BM: K2KWK. OOC: W2MTA (acting). PIO: WA2PUU. SEC: NN2H. STM: N2EIA. SGL: WB3CUF. TC: K2QR. ASMs: W2GJ, W2GLH. All I can say is—who needed HUGO? Nevertheless, a lot of hams provided excellent public service for a number of weeks after that widespread catastrophe! Both in the US and throughout the Western Hemisphere. PSHR: N2EIA N2EVG WA2FJJ W2FR W2GJ KC2HJ W2MTA WB2OEV WB2OWO WB2QIX ND2S NJ3V K2YAI KA2ZNZ. No Sept. BPL. The NTS Service Award was presented to WB2ACV for two and one-half years of dedicated effort as a Section Packet Node Station on 145.07 MHz.

NET NAME	QNI/QSP/QND	NET NAME	QNI/QSP/QND
NYSEMO	058-006-03	NYSR	010-004-04
NYS/M*	280-169-30	NYS/E*	308-176-30
WDN/M*	359-110-30	Blueline	202-016-28
NY PHONE*	104-053-29	JCRACN	430-007-29
ESS	-30	OARC NET	061-003-04
NYPON*	427-285-30	TIGARDS	033-005-04
NYSPTEN	421-081-30	VHF THIN	033-000-04
Lewis Co	033-000-04	BRVSN	354-002-30
OCTEN/E*	669-096-30	OCTEN/L*	277-046-30
Q Net	409-001-29	Oneonta	022-000-04
STAR*	327-036-30	CNYTN*	290-059-30
WDN/E*	432-136-30	WDN/L*	362-105-30
NYS/L*	310-199-30	EBN	198-000-21
*NTS Net.		Pathfind	308-000-29

Chenango ARES Wed 730 PM 146.685R. SPNS reports from KA2JXI and NA2B. CLUB OFFICERS: RDXA KM2P NQ2O WE2T. ARATS has formed a packet committee to operate 24 hour mailbox (PBBS) on the Niagara Frontier for NTS/ARES/RACES. OO Reports: N2FHT. Appointments: (OO) KC2JO. CLUBS PUBLIC SERVICE: Oneonta ARC and Otsego ARA jointly provided 20 operators in support of the Glimmerglass Triathalon at Cooperstown, WB2PEF. OCARA also supported Lions 10 K run at Richfield Springs- WB2OTC. The "Ol' Horsethief" will be missed on the Auburn "double oh" machine; W2ILQ joined the Silent Keys. Up Peru way, Al, WA2JPB, longtime traffic handler also joined Silent Keys. Bulletin Manager K2KWK is now on packet in the Rochester area. Send bulletin-related info to Dwight at K2KWK @ WB2WXQ mailbox. Traffic (Sept.): WB2OWO 393, W2MTA 334, NJ3V 276, WA2FJJ 272, ND2S 222, N2EIA 195, W2FR 188, K2YAI 185, KC2HJ 158, NN2H 149, KA2QOO 143, WB2QIX 104, WB2NLU 94, KG2D 86, KA2ZNZ 85, WB2IJH 71, WB2OEV 70, KA2SJG 64, KA2DBD 63, W2GJ 51, N2DLN 33, W2UYE 28, NA2B 24, KB2EOQ 19, N2EVG 19, AF2K 19, W2PPS 19, KE2EA 18, KA2JXI 18, WB3CUF 9, KA2TWY 2. (Aug.) N2IKR 20, WB2IJH 17, KA2TWY 7. (July) WB2IJH 29. Seasons' greetings to all!

WESTERN PENNSYLVANIA: SM, John T. Fleming, NO3M @ NO3M—ASM/SGL: KA3OEM @ NM3G. SEC: WA3UFN @ WA7SSO. STM: K3SMB. BM: KC3ET @ KA3NVP. TC: N3EFN. ACC: AK3J.

NET	QNI	QTC	SESS	kHz	T/D	Mngr
WPACW	260	152	30	3585	7:00P/D	WA3UNX
WPAPTN	470	77	30	3983	6:00P/D	WA3HLN
KFN	96	43	21	3983	1:30P	N3EMD
PFN	165	186	30	3958	5:00P/D	WA3THT
WPA2MTN	278	39	30	14688	8:00P/D	KA3BGC
NWPA2MTN	555	35	26	14513	9:00P/D	KC3NY

I enjoyed meeting many of the people at the Butler hamfest. Congratulations to NO3Y on winning the BIG prize. I am sorry to announce the passing of W3TA and W3RXC. Our sympathies are with their families. WB3KGT, N3EOY, and KA3FZO from Erie were in the Caribbean to help with the disaster from Hugo. Many more from the Erie area manned the Erie Red Cross station during that time to help with their traffic. About 15 hams from the Pittsburgh area participated in the Children's Aid Home Challenge footrace. Line of sight coverage was required for the 1 mile loop to ensure safety of the many handicapped participants. Many amateurs from Pittsburgh supported the Red Cross in the evacuation of a section of Bethel Park after approximately 4000 gallons of gasoline leaked into the sewer system. The hams were questioned by the police as to what they were doing there, but by the end of the operation, the hams had received the respect of the authorities and asked if they could be included in their disaster plans. I have distributed my first section newsletter via packet within the section. By the time that you read this, there will be a few more distributed. If you don't have access to packet or a club newsletter which is including the section newsletter, send me a message and I will be glad to mail a copy to you. We are trying to get a slow CW net started on 3708 at 7:30 local time with liaison to the 3rd region net at 7:45. N3GLK has offered to be net manager. Look for the WPANN. Please be sure to send your appointment and station activity reports so I can keep abreast of the activity in the section. September traffic - N3FM 279, N3EMD 249, KQ3T 208, NO3M 169, W3OKN 150, WA3UNX 113, WA2QXA 86, W3NGO 71, N3AES 70, W3RUL 25, WA3QNT 18, KA3VBY 17, WA3DBW 16, W3AHH 8, N3GLK 4, KD3AC 2.

CENTRAL DIVISION

ILLINOIS: SM, Dave Carlson, AA9D—SEC: W9QBH. BM: K9EUI. ACC: WB9SFT. STM: K9CNP. SGL: K9IDQ. TC: N9RF. OOC: W9TT. PIO: W9EWA. DEC: WD9EBQ.

ILLINOIS SECTION NETS

NET	FREQ	TIME
ISN	3905	1800 DAILY
ILN	3690	1830,2200 DAILY
ITN	3705	1900 DAILY
GTN	147.69/09	2100 DAILY
ILARES	3905	1630 1ST, 3RD SUNDAYS

ILLINOIS INDEPENDENT NETS

IEN	3940	0900 SUNDAYS
ILPN	3855	1645 M-F; 0830 SUNDAY
NCPN	3915	0700 M-SAT
NCPN	7270	1215 M-SAT

Amateur Radio Awareness Day was held on September 16th. The Fox River Radio League and the North Shore Radio Club put on displays for the event. There were probably others, but I haven't received word from other groups. Hurricane Hugo produced the need for emergency and health and welfare traffic handling, especially to Puerto Rico and the US Virgin Islands. KB9DEV and WV7T at Naval Station Great Lakes, and W9RCJ and KA9VPH from Joliet and W9HBI from Bourbonnais participated. The next news is a bit old, but deserves some space. On July 9th, there was a protest march held in downtown Chicago at the Federal Building. The purpose was to voice concern over FCC Docket 87-14, the reallocation of 2 MHz from our 220 band. The march also protested the potential conflict of interest in the nomination of Sherry Marshall to an FCC Commissioners' post. In a city of 3 million people, almost 10,000 of them Hams, a march like this should have no problem being a huge success. A total of 20 people showed up, including 2 XYLs. The twenty stayed a full 3 hours, marching, chanting about FCC being unfair. Twenty marchers and five federal guards looked so tiny in a plaza that could hold 500 people easily. Where was everyone? Maybe they were back home writing their Congressmen. Those in attendance were: W2TO, KA9MJE, WD9GEH, K9XI, K9GYO, K9JRY, KB9AJM, KA9GQE & XYL, KA9FHR & XYL, N9HHR, N9FRT, N9IPF, KA9ATS, WB9ZDZ, N9EWA, and N9HFE. Traffic: KA9FEZ 342, W9HLX 200, K9CNP 131, W9HOT 113, W9HBI 92, WA9VLC 82, WD9HQW 61, W9LWH 56, NS9F 51, WD9CIR 44, WB9TVD 43, KA9CTW/T 42, KA9JNE 38, NC9T 38, W9KR 29, KA9QXI 29, KE9DX 22, KA9TVU/T 22, WD9EBQ 21, K9EHP 18, WA9SLT 17, WA9AXL 12, WA9RUM 11, N3AIA 7, W9VEY/M 7. @WB9MJN-BBS 100, @N3AIA-BBS 23. (Aug.) KA9QXI 45, WD9EBQ 18, @WB9MJN-BBS 151.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: WD9AVQ. STM: WA9OHX. ACC: NX9I. TC: WA9JWL. SGL: WA9VQO. BM: W9OCL. PIO: N9IPA. OOC: W9IL. PM: WB9AHJ. Net Managers: ITN: KA9EIV, QIN: KJ9J, ICN: NR9K, VHF: W9PMT, IWN: KA9ERC. SEPTEMBER Net Reports:

NET	FREQ	TIME/DAILY/UTC	QNI	QTC	QTR	SES
ITN	3910	1330/2130/2300	2736	411	2177	90
QIN	3656	1430/0000/0300	267	186	805	58
ICN	3705	2315	51	22	347	24
IWN	3910	1310	1392		352	30
IWN VHF Bloomington			818		455	30
IWN VHF Kokomo			995		208	30
IWN VHF Ligonier			713		595	30
Hoosier VHF Nets (17)			2939	184	4252	137

D9RN for SEPTEMBER 255 QTC 60 ses. IN 95% by WA9OHK, K9ZLS, W9UEM, K9GBR, N9DWU, K9CGS, KC5DM. CAND 614 QTC in 30 ses. D9RN 96% by NR9K, K9ZLS, N9DWU. Note the time change for the Indiana Code Net. They have returned to the 2315 (6:15 local) time. SILENT KEYS: Frances G. Arnholt, W9SIO, Elizabethtown; Marvin Dice, K9UPM, South Bend, IN. Ronald M. Adams, W9JBV, Bluffton, IN. Paul Russell, N9CPZ, Warsaw, IN. Appointments: DEC for District 3 Michael Oakley, N9GSX; EC, Noel A Taylor, N9CJT; ORS, Paul W VanDyke, KB9AVO; ACC, Benton Mullins, NX9I; OOC, Barry D Gose, WB9L; ATC, Steve Wrightsman, N9HQO. EC Reports: N9DUZ, WD9X K9ET WA9DOL KD9HB N9DTG WA9OQT WA9HEE WB9NCE KC9CU W9CFI N9ADS N9GSX WB9UNL KA9ZOR KB9AVS KA9KOG W9EPT KA9WCQ KA9DZM WD9BKA WB9L N9ADS NX9I W9YDP N9FMO. Packet BBS reports: W9ZRX 6630, WB9SYK 1851, KD9QB 1664, WA9UXP 1574, KA9LQM 1480, N5AAA 975, N9BAC 658, N8GTC 71. PUBLIC SERVICE REPORTS: DeKalb County, W9QWI, Nursing Home fire; Marshall County, N9EER, Blueberry Festival Canoe Race; Jefferson County, KA9ZOR, Mock chemical spill; Saint Joseph County, W9EPT, St Joe Med Center 10K Run. N9FOZ reports 238 hours with 5 accidents, 2 weather nets, 3 traffic lights, 2 auto fires, 3 directions, 2 stalled (road hazard) cars. It was reported that Lafayette and the 145.25 repeaters are also monitoring. Traffic: W9ZRX 1085, NR9K 505, W9UMH 156, KJ9J 150, WA9OHX 137, W9UEM 96, W9CNE 89, N8GTC 71, W9OCL 68, N9EER 56, N9BAC 56, N9BS 54, K9GBR 46, WB9QPA 40, K9SBW 38, W9PPO 38, KA9QME 37, NX9A 34, WA9QCF 31, NX9I 31, KA9LQM 30, N9DWU 29, N9FOZ 29, K9DBY 28, WB9IHR 28, KB9SU 26, WA9UXP 25, K9ZLS 24, KD9QB 20, KA9QWV 15, N9DTG 15, K9ZBM 14, KD9DU 13, W9PMT 12, WB9OZZ 12, N9HZ 10, N5AAA 10, N9GSX 9, K9OUP 9, K9ET 9, W9XD 7, K9DIY 6, W9OZJ 5, W9RTH 5, W9BTZ 5, N9FMO 5, WD9CIV 5, AB9A 5, W9KMY 5, KB9GK 5, NZ9S 4, WD9DWD 4, KA9ZOD 3, WB9SYK 3, W9EPT 3,

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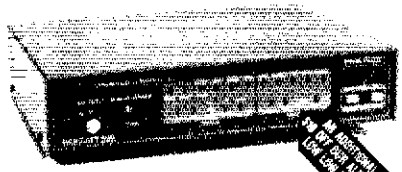

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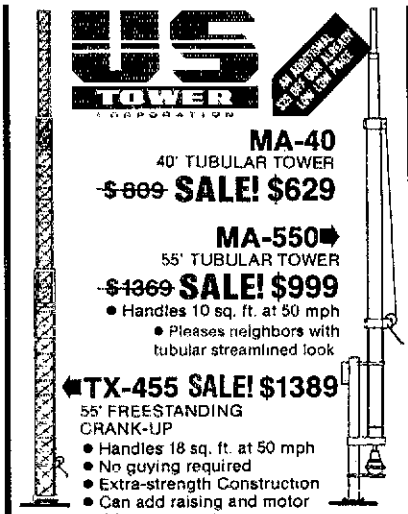

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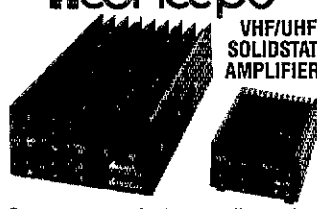

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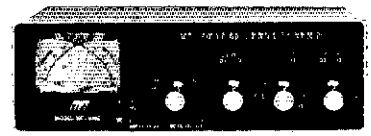

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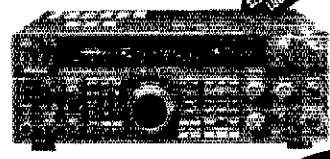

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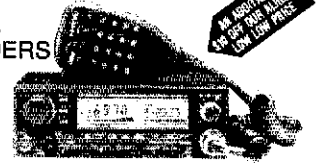

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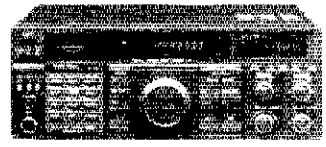

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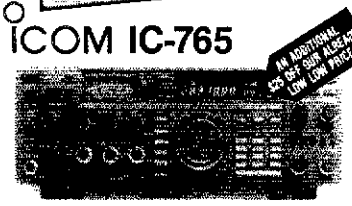

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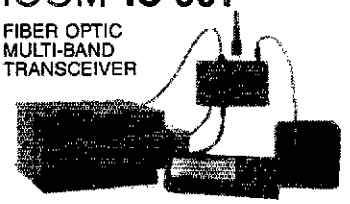

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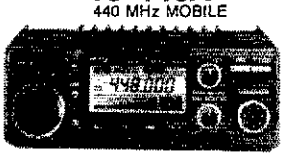

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Rich, Mgr. WA9WYB
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(602) 242-3515
Gary WB7SLY, Mgr.
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225 N. Broadway
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Curtis, Mgr. WB4KZL
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14803 Build America Drive
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Exit 54, I-95 South to US RT 1

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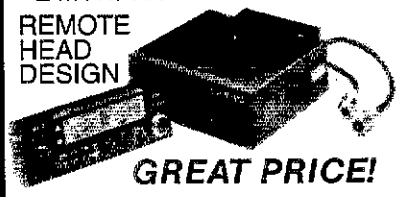

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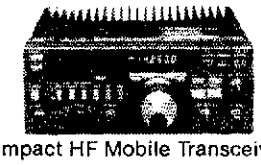

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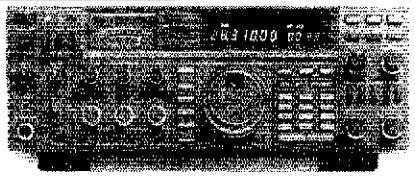
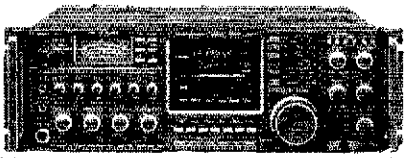
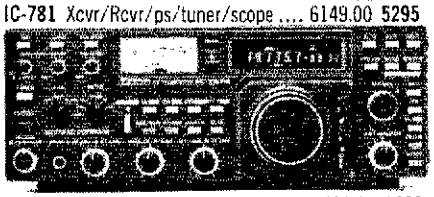


HF Equipment — Regular — SALE

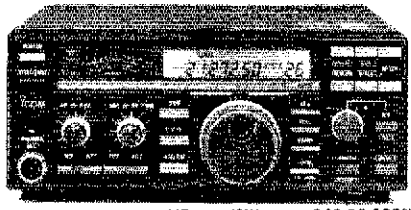
IC-765 Xcvr/ps/keyer/auto tuner..... 3149.00 2699



IC-781 Xcvr/Rcvr/ps/tuner/scope 6149.00 5295



IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	1469
PS-35 Internal power supply.....	219.00	199.95
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...	1149.00	999.95
PS-55 External power supply	219.00	199.95
AT-150 Auto. antenna tuner *(Special)*	445.00	369.95
FL-32A 500 Hz CW filter.....	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	



IC-725 Ultra compact HF xcvr/SW rcvr 949.00 829.95

Other Accessories	Regular	SALE
IC-2KL HF solid state amp w/ps	1999.00	1699
IC-4KL HF 1KW out s/s amp w/ps.....	6995.00	5999
EX-627 HF auto. ant. selector *(Special)*	315.00	269.95
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. ant. tuner...	445.00	389.95
AT-500 500W 9-band auto. ant. tuner ...	589.00	519.95
AH-2 8-band tuner w/mount & whip	758.00	689.95
AH-2A Antenna tuner system, only.....	559.00	499.95
GC-5 World clock *(Special)*.....	91.95	69.95

Accessories for IC-765, 781, 725 - **CALL for Prices**

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VHF/UHF base multi-modes	Regular	SALE
IC-275A 25w 2m FM/SSB/CW w/ps...	1299.00	1099
IC-275H 100w 2m FM/SSB/CW.....	1399.00	1199
IC-375A 25w 220 FM/SSB *(Closeout)*	1399.00	799.95
IC-475A 25w 440 FM/SSB/CW w/ps	1399.00	1199
IC-475H 75w 440 FM/SSB/CW.....	1599.00	1369
IC-575A 25w 6/10m xcvr/ps *(Special)*	1399.00	1129
IC-575H 100w 6/10m xcvr	1699.00	1499
VHF/UHF/1.2 GHz Mobiles	Regular	SALE
IC-47A 25w 440 FM/TTP mic *(Closeout)*	549.00	369.95
PS-45 Compact 8A power supply....	145.00	134.95
UT-16/EX-388 Voice synthesizer....	34.99	
SP-10 Slim-line external speaker....	35.99	
IC-28A 25w 2m FM, TTP mic *(Special)*	469.00	379.95
IC-28H 45w 2m FM, TTP mic.....	499.00	439.95
IC-48A 25w 440-450 FM, TTP mic.....	509.00	449.95
HM-14 Extra TTP microphone	59.00	
UT-28 Digital code squelch	39.50	
UT-29 Tone squelch decoder	46.00	
HM-16 Speaker/microphone	34.00	
IC-228A 25w 2m FM/TTP mic *(Special)*	509.00	429.95
IC-228H 45w 2m FM/TTP scan mic ...	539.00	479.95
IC-448A 25w 440 FM/TTP mic.....	509.00	449.95
UT-40 Pocket beep function	45.00	
IC-900A Transceiver controller.....	639.00	569.95

★ ***Closeout Special . . .***
IC-900A Transceiver controller with **UX-29H** 2m/25W and **UX-39A** 220/25W band units.
Package Price • $949.95

UX-19A 10m 10w band unit.....	299.00	269.95
UX-29A 2m 25w band unit.....	299.00	269.95
UX-29H 2m 45w band unit	349.00	319.95
UX-39A 220MHz 25W band unit....	349.00	299.95
UX-59A 6m 10w unit.....	349.00	319.95
UX-129A 1.2GHz 10W band unit....	549.00	499.95
IC-901 Fiber Optic 2m/440 xcvr	1199.00	1069
IC-1200A 10w, 1.2GHz FM *(Closeout)*	699.00	599.95
IC-2500A 440/1200MHz FM mobile	999.00	869.95
IC-3210A 25w 2m/440 FM/TTP	739.00	649.95
IC-2400A 45w 2m/35w 440 FM/TTP	899.00	789.95
AH-32 2m/440 Dual Band mobile ant	39.00	
AHB-32 Trunk-lip mount.....	39.00	
Larsen PO-K Roof mount	23.00	
Larsen PO-TLM Trunk-lip mount.....	24.70	
Larsen PO-MM Magnetic mount	28.75	
RP-1510 25w 2m repeater.....	1849.00	1649
RP-2210 220MHz 25w rptr *(Special)*...	1649.00	1399
RP-1210 1.2GHz 10w 99 ch FM rptr.....	1529.00	1349

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IC-2A 2m HT *(Closeout)*	289.00	259.95
IC-2AT 2m/TTP *(Close)*	319.00	279.95
IC-02AT/High Power...	409.00	349.95
IC-04AT 440 *(Closeout)*	449.00	389.95
IC-u2AT 2m *(Closeout)*	329.00	279.95

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IC-u4AT 440 *(Closeout)*	369.00	199.95
IC-2SA 2m HT	419.00	369.95
IC-2SAT 2m HT/TTP...	439.00	389.95
IC-3SAT 220 HT/TTP	449.00	399.95
IC-4SAT 440 HT/TTP	449.00	399.95
IC-2GAT 2m HT/TTP	429.00	379.95
IC-4GAT 440MHz, TTP	449.00	399.95
New! IC-2SA 2m HT *Special . .* IC-32AT 2m/440 HT	629.00	549.95
IC-t2AT 1w 1.2GHz FM HT/TTP *(Special)*	473.00	349.95
IC-12GAT 1w 1.2GHz HT/batt/cgr/TTP	529.00	469.95

Aircraft band handhelds	Regular	SALE
A-2 5W PEP synth. aircraft HT.....	525.00	479.95
A-20 Synth. aircraft HT w/VOR.....	625.00	569.95

Accessories for all except micros	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	79.00
BP-8 800mah/8.4V Nicad Pak - use BC-35...	79.00
BC-35 Drop in desk charger for all batteries	79.00
BC-16U Wall charger for BP7/BP8.....	21.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35....	49.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	39.50
BP-4 Alkaline battery case	16.00
BP-5 425mah/10.8V Nicad Pak - use BC35	65.00
CP-1 Cig. lighter plug/cord for BP3 or Dlx....	13.65
CP-10 Battery separation cable w/clip.....	22.50
DC-1 DC operation pak for standard models	24.50
MB-16D Mobile mtg. bkt for all HTs.....	25.99
LC-2AT Leather case for standard models.....	54.50
HM-9 Speaker microphone.....	47.00
HS-10 Boom microphone/headset.....	24.50
HS-10SA Vox unit for HS-10 & Deluxe only	24.50
HS-10SB PTT unit for HS-10.....	24.50

For other HT Accessories not listed please CALL

Receivers	Regular	SALE
R-71A 100kHz to 30MHz receiver.....	$999.00	869.95
RC-11 Infrared remote controller....	70.99	
FL-32A 500 Hz CW filter.....	69.00	
FL-63A 250 Hz CW filter (1st IF).....	59.00	
FL-44A SSB filter (2nd IF).....	178.00	159.95
EX-257 FM unit.....	49.00	
EX-310 Voice synthesizer.....	59.00	
CR-64 High stability oscillator xtal	79.00	
SP-3 External speaker	65.00	
CK-70 (EX-299) 12V DC option	12.99	
MB-12 Mobile mount.....	25.99	
R-7000 25MHz-2GHz rcvr *(Special)*.....	1199.00	999.95
RC-12 Infrared remote controller....	70.99	
EX-310 Voice synthesizer.....	59.00	
TV-R7000 ATV unit.....	139.00	129.95
AH-7000 Radiating antenna.....	99.00	
R-9000 100KHz-2GHz all-mode rcvr ...	5459.00	4699

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WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9ZAG. STM: KC9CJ. ACC: KA9FOZ. BM: WB9JSW, OOC: NC9G. PIO: K9ZZ. TC: K9GDF. Season's Greetings. Exams December 2nd at Stevens Point, Madison and Racine: December 7th and 16th in Milwaukee; and December 9th at Appleton. Ten members of the Rock River RC helped KF9V of Horicon to put up a tower, rotor, beam and coax cable. KA9FNE and other RRRC members greatly helped in reporting overturned gasoline truck accident. New officers of Wisconsin Nets Association: Chairman WA9W; Sec KA9KLZ, Treas. W9CBE. New officers of QCWA Chapter 55: Chairman W9BTY; V. Chairman W9DU; K9FHI Sec; AJ9P Treas. New officers of W/K ARC: Pres. NK9G, Sec./Treas AE9K. W9SFK received 50 year ARRL plaque and 55 years licensed QCWA certificate. K9FHI presented a plaque to K9UTQ at QCWA meeting for his 10 years of excellent volunteer work as STM; current STM KC9CJ snapped some photos as 96 hams and guests applauded. Traffic handler W9YCV has several traffic tips suitable to print in your club newsletter for sase. KA9QLP of Ozaukee RC encourages everyone, especially Novices, to use their repeater on 224.18 MHz. Any volunteers for Affiliated Club Coordinator or State Government Liaison? Ask me for job descriptions. WB9ZRE attended Albuquerque International Balloon Festival but couldn't reach Wisconsin on two meters while aloft. KW9K is also a hot- air balloon enthusiast who has unique antenna arrangements. Watertown ARC has portable generator handy for emergencies. Sorry to report Silent Keys N9AGH, W9CJN and W9SFL. Congratulations to newly qualified Official Observer WB9YSG in Delafield. Milwaukee RAC, oldest continuously active ARRL affiliated club, celebrates 70 years on December 5th. MRAC Christmas Party December 14th at Tanner Paul Restaurant in West Allis begins at 5:30 PM. Greater Milwaukee DXA surveyed club members about their meetings to keep interest high; program with best rating was DXpedition video tape, lowest rating was program by ARRL Officials (are they trying to tell me something?) Thought of the month: if a situation requires undivided attention, it will occur simultaneously with a compelling distraction. Traffic: WB9YPY 2195, KC9CJ 1209, WG9J 809, WA9W 564, N9IAI 245, W9KLN 227, W9KLN 227, W9CBE 209,K9GDF 159, W9YCV 157, N9BDL 128, KA9BHL 88, W9UCL 81, KA9FVX 78, K9AKG 74, KA9KLZ 69, AG9G 64, W9IEM 62, AD9G 64, W9IEM 62, AD9X 58, W9NGP 46, NS9Q 45, WB9ICH 42, W9ODV 42, N9BCX 34, K9UTQ 33, K9EP 31, KA9VIA 30, KG9B 29, K9GV 27, K9FHI 23, W9UW 15, W9PVD 2.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KCØT—By this time of the year, Mel, NØFOO, has the usual six inches of leaves in his boat. I appreciate the 25 reporting stations with SARSs. That's up from previous months. Now what we need is 25 more to report! Thanks to all for a good traffic month with traffic handled totaling 1723. Congratulations to those stations who did such a great job helping out with Hurricane Hugo and its aftermath, namely: NØBSG, KAØARP and KDØCL- those are the ones I know about at least. Congratulations to Don, WAØLUT, of Worthington as the Amateur of the Month for September. Thanks, Don, for all the great work you do, and thanks to all MSN participants as well. As you know by now, having upgraded about 2 1/2 years ago, I finally decided to get a call-sign to go with it. So, I am now KFØFI. But, I am still having problems getting used to it. It rattles off pretty good on CW- but when the NCS sends "FI," I hear it, but don't recognize it as me yet. Slow on the uptake. Hi! Kind of embarassing, but I will get there, I am sure. That's about it for this time, gang...so again thanks, and until next time, 73 es CUL. Jim Swisher, KFØFI, STM MN

NET	FREQ	TIME	ONI/QTC/SESS	NET MGR
MSN/1	3685	6:30P	311/67/30	KFØFI
MSN/2	3685	10:00P	271/63/30	KDØNH
MSSN**	3710	6:00P	368/38/30	KAØSBY
MSPN/N	3860	12:05P	274/105/28	
MSPN/E	3860	5:30P	719/152/30	KCØT
PAW	3920	9:00A	2431/243/118	WDØBAC
MAW	3860	6:00P	266/144/20	KDØCI

**MSSN additionally sent 45 training messages. Alt. Freq. MSN/1 and MSN/2- 7070; MSPN/N-7232. Traffic: WAØTFC 329, KFØFI 243, WØGRW 195, KT9I 143, KDØCL 116, NØFOO 111, KAØARP 104, W9DM 78, KCØCI 53, KAØSBY 53, WAØONE 47, NRØS 39, KCØT 38, KDØNH 37, NFØG 33, KØQBE 21, NØJP 18, WØRIQ 16, WDØGUF 13, NØFKU 9, KN9U 8, NØKCM 7, NØBSG 4, KØOGI 4, KØWPK 4. Total Traffic: 1,723.

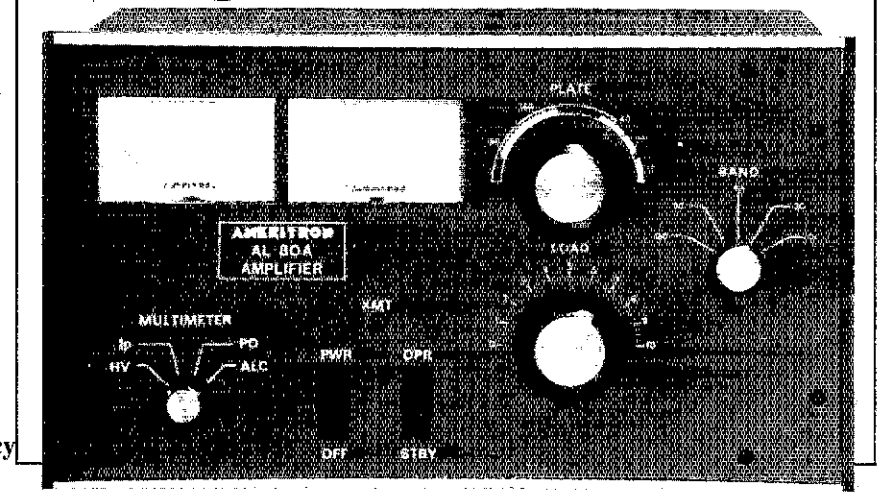
NORTH DAKOTA: SM, Bill Kurtti, WCØM—Got a long winter coming up, but everyone on 3854 kHz is happy that WØGH finally got his dipole up again after many years of straining our ears listening to John on his vertical. I am sorry to report the passing away of Lloyd Craft, KBØBHZ. Congratulations to the following upgraded, General KB7HYI, Advanced NØKS & N7NIN Extra, N7NFT & KAØZAL. The fellows at Dickinson have been busy getting their repeaters & digipeaters ready for the winter. Also they gave their emergency vehicle a work out by taking it to the park and showing it off at Pioneer days. The Superlink has been working well all summer with improvements in audio and reliability happening regularly. We expect to hear it in the Minneapolis area yet this year. RRRA is going to take over the Corn Feed at Ft Abercrombie & are renaming it The Jerry and Lois Jorgenson Memorial Corn Feed. Traffic: KAØFSM 315.

NET	FREQ	TIME	SESS/ONI/QTC	MGR
GOOSE RIVER	1990 kHz	9AM SU	4/58/2	NTØV
DATA	3941 kHz	6:30DA	27/494/18	NØJR
WX NETS	3941 kHz			WØGFE

WINTER ONLY 9AM-12:30PM MONDAY-FRIDAY STORM NET 3941 DURING STORMS ONLY WCØM

SOUTH DAKOTA: SM, R. L. Cory, WØYMB—ASM: NØABE, WAØFPR. STM: KDØYL. SEC: KAØKPY. The South Dakota Centennial Wagon Train made a total of 5686 contacts and as of this date over 1600 QSL cards have been mailed out. Stateside QSL deadline is Dec. 30 Thanks to all the operators who took part in the wagon train. KØCX has been elected President of the Black Hills ARC and has also just received his DXCC award from HQ. Pierre ARC has received their interconnect and will either Link with Midland or to Fort Pierre to give handheld coverage in downtown Pierre. Congratulations to Stan Burghardt, WØIT and XYL on their 50th wedding anniversary. A joint effort between Pierre ARC and Black Hills

Ameritron gives you . . . a full Kilowatt from a *quiet desktop* linear . . . for $995



Ameritron gives you a full

Kilowatt *output* of peak envelope power for only $995 -- from a whisper quiet linear that's perfect for your operating desk because it measures just 8¼" H x 14" D x 14¼" W.

You could spend over *twice* the money for a legal power limit amplifier *twice* the size -- and all you'll get is an additional 1/3 S-unit -- a difference you won't ever notice.

You also get 850 watts output on CW and even 500 watts on RTTY.

All Band Coverage

You get all band coverage: rated output on 160, 80, 40, 20 and 15 meters (10 meters with user mod/export) as well as 80% rated output on MARS and WARC bands.

Tuned Input lets solid state rigs deliver full output

The Ameritron AL-80A uses a direct switched, 100% shielded pi-network tuned input circuit that provides an excellent load for any rig. Even the fussiest solid state transmitter works flawlessly with the AL-80A.

Pi-L Output Tank

A carefully designed Pi-L output tank using the optimum Q for each band gives you exceptionally smooth tuning, extremely wide range load impedance matching and full band coverage -- even on 160 and 80 meters -- *plus* you get an extra 10 to 15 dB of harmonic suppression.

You also get peak performance at different power levels from one end of the band to the other.

Ball bearing vernier reductions drives on both the plate and load control makes tuning precise and easy.

3-500Z Tube in shielded RF compartment gives you nearly 70% efficiency

You get the rugged time proven 3-500Z tube with an estimated life of 20,000 hours ICAS. That's nearly 20 years operating 20 hours a week -- you may never have to replace your tube.

The AL-80A is built on a rugged steel chassis. It has a separate RF compartment that's fully shielded to keep unwanted RF from leaking out. This keeps RFI and TVI to an absolute minimum.

A superb RF design and layout, a Hi-Q tank circuit and commercially rated RF power components give you nearly 70% plate efficiency over the entire operating range. This puts maximum power into your antenna instead of heating up your amplifier.

A whisper quiet internal computer style fan draws in cool air over the power supply components and blows it around the 3-500Z tube. This removes excessive heat and gives you reliable performance.

Built-in adjustable ALC circuit keeps your exciter from overdriving your AL-80A. The result? A clean signal without flat-topping.

A standby switch prevents harmful thermal shock to your 3-500Z filaments by keeping them lighted when you're operating barefoot.

Gutsy Heavy Duty Power Supply

The guts of the AL-80A is its heavy *heavy* duty power supply.

A husky 22 pound power transformer using a high silicone steel core, computer grade filter capacitors totaling 26 ufd, heavy duty bleeders and ten 3 amp, 1000 V power rectifiers give a stiff 2700 volts fully loaded.

Some competing high priced amplifiers using *two* 3-500Zs *can't* give you any more power output than the AL-80A. Why? Because the lighter power supplies they use can't deliver enough high voltage for the tubes.

Step-Start Inrush Protection™

When you first turn on your amplifier, a massive inrush current flows.

Your house lights flicker as you hear a loud "thump" from your amplifier. This terrible inrush current stresses *all* your power supply components to their limits. Your cold tube filament suffers abusive thermal shock.

Eventually, this massive inrush current will damage your amplifier.

The AL-80A special ***Step-Start Inrush Protection™*** *stops* damaging inrush current.

By starting your AL-80A through a 10 ohm current limiting resistor, then shorting the resistor with a relay, the AL-80A gives you a start up sequence that is ***easy*** on your tube and power supply components.

Don't consider a linear amplifier without this critical crucial protection.

Multi-Voltage Primary protects your amplifier and gives you peak performance

Too high a line voltage stresses components and causes them to wear out and fail. Too low line voltage causes a "soft-tube" effect -- low output and signal distortion.

The Multi-Voltage Primary in the AL-80A transformer lets you compensate for too high or too low line voltage.

With the AL-80A you get the longest component life and peak operating efficiency -- regardless of your line voltage.

Before you buy an amplifier make sure it has a multi-voltage primary.

Dual Illuminated Meters

Two large meters give you a complete picture of the operating condition of your AL-80A. They let you know right away if there is a problem.

Grid current of the 3-500Z is monitored continuously by one meter. Grid Current indicates proper amplifier operation better than any other parameter.

You also get a multi-meter that measures plate voltage, plate current, ***peak*** RF watts output and drive power/ALC detector voltage.

Comes completely factory built, tested and guaranteed to work . . . *. . . not a kit you have to build*

You get a full kilowatt out of the box -- ready to plug in and bust through QRM in minutes.

A kit could actually end up costing you more than your best price on the AL-80A -- and leave you frustrated when you can't get it to work.

A factory built AL-80A has much higher resale and trade-in value than a kit. Why? Because Ameritron's reputation for consistent quality and workmanship is known by hams everywhere.

Full Two Year Warranty: Twice the protection of our nearest competitor

No other kilowatt amplifier comes with a full 2 year warranty. In the unlikely event that there are defects in materials or workmanship, we'll fix it free for 2 full years from the date of purchase.

The 3-500Z is covered by the tube manufacturer's warranty.

Committment to Service

Even after the 2 year warranty period, Ameritron Customer Service Technicians are available to help you keep your AL-80A performing flawlessly -- no matter how long you have it. Just call 419-531-3024.

Bust through QRM

Bust through QRM with a full kilowatt from the Ameritron AL-80A -- right out of the box. Call your favorite dealer for your *best* price and order today!

Lightning Fast QSK Switch

The optional Ameritron PIN-5 QSK switch gives you lightning fast T/R switching for full CW break-in, AMTOR, Packet and other QSK modes for only $189.50.

It lets you switch the legal limit in microseconds into 2:1 VSWR loads with less than 0.5 dB receive attenuation.

Factory installation is available.

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ARC has resulted in a digi being installed on ETV tower at Phillip with a good path to Terry Peak KE0X Arthur Mellette House special Events station at Watertown made 388 Contacts on Sept 30. Sept Traffic 242.

DELTA DIVISION

ARKANSAS: SM, Bob Harmon, W5SEP—Sorry for missing last few issues but have been busy getting new business started. Tom Spencer, W5IGM reports that he will be teaching CAREN sponsored Novice class in the near future. Tom participates in the Razorback, OZK, and RN5 nets regularly. Received a letter from HB9AQZ who lives in Switzerland. He would like very much to work an Arkansas station on satellite. If we have anyone out there on satellite please contact me for details. The Russellville gang had a work party up at the Mt. Nebo repeater site including brush cutting and antenna maintenance. For the second time Paul K5TCK had lightning hit strike, first was the packet station and second was the big oak tree in his yard. That's the disadvantage of living on a hill. I have had three strikes with lots of equipment lost and two large trees. For Paul and I, maybe a 200 ft. lightning rod would help. Don, W9OK who is very active at traffic handling reports station activity for September as receiving 41, sending 40, delivering 3 for a total of 84. Keep up the good work Don. It looks that the Forest Service has finally agreed on a reasonable price for use of their towers for Amateur repeaters. The price-$75 year.

LOUISIANA: SM, John "Woody" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5KR. SGL: KD5SL. TC: W5RWF. OOC: WB4ICV. PACKET: WB5ASD. STM: WB4FDT. Phil Sager - WB4FDT recently appointed as La. Section Traffic Manager provided the following report. "The Louisiana CW Net has been reborn! The first five sessions have seen 12 different stations from La. checking in. At least half of these stations have not been recently active in any La. NTS Net so the number of active traffic hounds in La. has increased by nearly 20% this month. The first session had WB4FDT/NTS and W5GHP, WA5WBZ and WA5TQA as QNI. Since the first session there have been 6-8 checkins each night. THANK YOU ALL FOR CHECKING IN!! Now to keep the net going, we need some volunteers. Firstly, we need some net controls. So far WA5TQA has volunteered for Tuesdays and K5TL has volunteered for Thursdays. Secondly, we need some RN5 reps. Presently, RN5 is meeting on 7052 at 7:45 and 9:30 PM. There is rarely more than a message or two for Louisiana, so usually net sessions last only 10 minutes or so. So please let me know if you can help us once a week. If you don't want to be an NCS or RN5 rep, you can still help the net out by originating some traffic. All out of state traffic is handled by RN5, so start sending some traffic to your long lost relatives or ham cronies! This applies to the LTN gang also. 73 WB4FDT Net Manager.

MISSISSIPPI: SM, Butch Magee, KF5DE—ASM: WD5GHW. SEC: N5DVR. SGL: KA5WRX. TC: W5VZF. STM: KB5W. BM: W5EPW. If you made it to the Mississippi ARRL Convention in Biloxi you know what a great time every one had, and if you made it to the meetings and the League Forum you know how much business we covered for our section. Probably the best news we received and a very healthy indicator has been in the Section traffic nets. The total number of check-ins and amount of traffic moved is indeed impressive. Many thanks to the movers and handlers and the record making QNIs. If you have not returned your ballots to the League for our Division election of Director and Vice Director please do. November 20 is the day they are totaled. If you don't vote, don't complain if your favorite doesn't win.

NET	MGR	SESS	QNI	QTC	BULLETINS
MSPN	W5OXA	30	2118	56	11
GSBN	WD5JXT	30	1763	17	
MAG.SN	N5HBB	30	714	8	
MTN	KB5W	30	217	102	
MSN	W5YRX	21	141	5	
DRN5	WB5YDD	60	NA	494	NA

(MISSISSIPPI REPRESENTED 100% BY: KT5Z, W5HKW, KB5W, NS5M) CAND K5UPN 30 NA 614 NA (MISSISSIPPI REPRESENTED 100% BY: NS5M) That's all folks. See you on 3862.5, 73 Butch Magee, KF5DE, SM

TENNESSEE: SM, Harry Simpson, W4MI—Eastern Assistant SM and PIO: W4TYU. Central Assistant SM WA4GLS, Western Assistant SM and ACC K4CXY. STM: NG4J. SEC: K4UVH. OOC: K4LSP. SGL: N4PQY. TC: W4HHK. The TN Phone Net is on 3980 kHz with early sessions at 6:40 AM Eastern, Regular sessions at 7:45 AM Eastern Monday thru Friday, at 9 AM Eastern on Saturdays, Sundays and Holidays. Evening sessions are Monday thru Saturday at 7:30 PM Eastern. CW Net Sessions are on 3635 kHz at 8 PM Eastern, Monday thru Friday. Regretfully I record the passing of Jane "Billie" Hill, N4EON, of Monteagle and Sunny Skidmore, KE4RX, of Kingston. They will be sorely missed by their host of friends. DRN5 Net Manager WB5YDD reports 494 messages during 60 sessions, with TN representation totaling 78% by NG4J, K4WWQ and WD5GYT. The TN CW Net continues to gain new members. Please don't be afraid to enter this fun net—Net Manager WB4LAL promises not to burn you out, to answer you at your check-in speed. Sincere thanks to my dedicates assistants for their splendid work during the past two years. They are all excellent workers and a credit to Tennessee. As this is being written, plans are going forward for three super hamfests: Memphis, Gray and Chattanooga. I will report on them next issue. Meanwhile, I trust that you will have happy holidays. If there are any ARRL matters with which I can help you, please call, write or contact me on a TN Net. It's not too difficult, since I meet just 91 nets each month! Traffic: WA4FMR 138 and BPL, K4WWO 69, WA4GZZ 57, WB4LAL 49, W4MI 48, W4TYV 41, K4CXY 40, K4WOP 40, W4DDK 37, KA5KDB 29, W4PFP 25, WA4HKU 16, W4PSN 5.

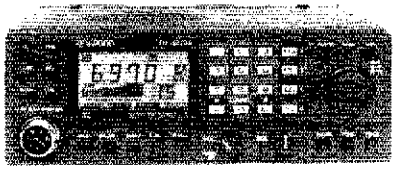
GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, WM4T—ASM: KC4WN. SEC: WB4NHO. STM: KA4MTX (SEPT). The Louisville Hamfest was well attended as were the forums. The Kentucky Emergency Response Plan was announced (KERP) and is effective October 1st. Copies of the KERP went to each DEC and Affiliated Club. K4YZU is now a net manager for packet. KB4UJA replaces WA4EBN as Net Manager of the KNTN in November and KC4FRA replaces WD4RWU as the Net Manager of KTN effective in October. My sincere thanks to Russ and Tom for a fine job...they just needed a rest for a while.

AES® / KENWOOD • Closeouts & Specials of the Month . .

KENWOOD TM-321A • 25/5W 220MHz mobile FM transceiver. Digital VFO, 14 memories with shift, scan and lockout. Prog. band scan, 38-tone encoder, 16-key up/down DTMF mic. 12V DC @ 6.5A, 1½"h×5½"w×7"d.

Regular $469.95 • ***Closeout* $299.95**



KENWOOD TM-3530A • 25/5W, 220MHz base/mobile FM transceiver. Keyboard entry, 16-key DTMF, DCL capability, 23 multi-function memories; linked to 15 telephone number memories. Frequency up/down control from microphone. 12V DC @ 6.5A, 2 ½"h×7"w×9⅝"d.

Regular $519.95 • ***Closeout* $389.95**

KENWOOD TM-621A • 2m/220MHz, **dual band** FM mobile transceiver. Extended 2m receive 138 to 173.9MHz, transmits user modifiable for MARS/CAP. 45W (2m), 25W (220MHz). Dual Watch simultaneous 2m/220 receive, selectable full duplex operation. 30 memories, programmable memory and band scan, lockout, priority watch. CTCSS encoder, With modification can be used as a cross band repeater. 16-key DTMF mic. included. 12V DC @ 9.5A, 2"h×6"w×8"d.

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KENWOOD TH-31BT
220MHz FM Pocket Handheld

1.5/0.15W, 3-digit thumb-wheel and 5kHz upshift switch. DTMF keypad, programmable CTCSS encoder built-in, std. repeater offsets. Flexible antenna, 1.5W Ni-Cd battery (PB-2), wall charger, 4¼"h×2¼"w×1⅛"d, 0.6 lbs.

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plus • with **TH-31BT** purchase:
Extra PB-21 std. battery - **$5.00**
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With TH-25AT, TH-215A or TH-315A purchase, one extra standard battery pack* • **$5.00
TM-231A 50W 2m FM transceiver w/TTP mic

Call for HF Special Prices

TS-440S 9-band HF transceiver
TS-440S/AT HF transceiver w/auto. tuner
TS-680S 9 band transceiver w/6 meters
TS-140S 9-band HF transceiver

Call for Duo-Band Special Prices

TM-631A 45/25W 2m/220MHz FM trans.
TM-701A 25W, 2m/440MHz FM transceiver
TM-731A 45/35W 2m/440MHz transciever
TH-75A 1.5W, 2m/440MHz FM handheld

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NET	QNI	QTC	SESS	MGR
MKPN	1365	102	30	WD4RWU
KTN	920	66	30	WD4RWU
KYN(BOTH)	319	144	60	K4AVX/KZ8Q
TSTMN	425	44	30	KZ8Q
KNTN	237	94	39	WA4EBN

SAR (SEPT): K4VHF 84, WD4RWU 77, KI4QH 75, WB4ZDU 64, KB4UJA 59, N4LAF 56, WA4EBN 42, K4AVX 39, KA4MTX 33, WB4AUN 16, WA4HLW 13, WA4NOG 7, WD4CQF 4. PSHR: KI4QH 114, KA4MTX 63.

MICHIGAN: SM, George E. Race—WB8BGY (*@N8FTY*)—ASM: WA1LRL (@WA1LRL). STM: WD8KQC (@NT8R). SGL: N8CNY. TC: W8YZ. OOC: WA2AJQ. ACC: N8JVA. PIO: N8KBA. Silent Keys, with deep regret; KA8UNB, K8KEC, WD8REC. Battle Creek Amateurs supplied communications for the Cereal City Corporate Cup. Involved were, WD8BZV, N8GOM, N8BDM, WD8JOM, WO8X, and WI8J. Ray, WB8VWK, reports that the Edmore repeater now has 911 autopatch. Allegan Co. has a new repeater on the air, 147.24 +600. Congratulations to new Botsford ARC President Chet Syjud, N8JCJ. Planning is under way for the 1990 MI ARRL Convention to be held in Gaylord on September 22. Don Roberts, N4IHL has been elected the convention Chairman. The 1990 QMN Officers are; Larry, WB8R-Manager, Matt, NY8W-Training Mgr, Will, W8EOI-Early Mgr, Stan, W8YIQ-Late Mgr, Mike, W8TW-Secr/Treas. As we approach the end of 1989, my thoughts reflect back to all of the many accomplishments made by MI Amateurs during this past year. Your involvement and commitment to Traffic Nets, Emergency Communications, and Training, make our Section a real winner. My thanks to our Section Staff and the 153 who are in MI ARRL Leadership positions. The Leadership you give, in your individual areas, provides the MI Amateur community with a wide variety of opportunity to become involved in all aspects of Public Service, the backbone of Amateur Radio. Our NTS Nets are second to none. The Michigan Novice net continues to attract and train new traffic handlers. The new Northern Michigan Traffic Net provides many new outlets for traffic. The DEC and EC programs continue to provide training all across the State. Novice classes are in full swing, bringing many new people into our hobby. We end the year with a lot of future planning in place. The 1990 MI ARRL Convention in Gaylord, the 1991 ARRL National Convention in Saginaw, the Michigan Monument project to honor those, nation wide, who gave their lives in Public Service through Amateur Radio. Our commitment to a yearly SET, our strength in Public Service through the ARPSC, our continued relationship with the State EMD. As I come to the end of my first term as your SM, I wish to thank each and everyone of you for making the past 2 years so enjoyable for me. Barb and I wish each of you a very merry Christmas and a prosperous 1990. Please support the following MI area Nets:

NET	FREQ	TIME/DAY	QNI	QSP	SESS	MGR
MiTN	3953	7:00PM Dy	628	216	30	WD8EIB
MNN*	3722	5:30PM Dy	293	104	60	KF8AU
QMN*	3663	6:00PM Dy	516	102	60	WB8R
SEMTN	145.33	10:15PM Dy	343	97	30	N8HSC
UPN*	3921	5:00PM Dy	967	55	34	WA8DHB
GLETN	3932	9:00PM Dy	1183	82	30	NW8M
MACS*	3953	11:00AM M-Sa	326	45	30	K8OCP
WSSBN	3935	7:00PM Dy	502	37	30	W8NDI
NMTN	147.12	7:30PM Dy	117	22	15	N8JCL
VHF Net Activity NO REPORT NO8Q						

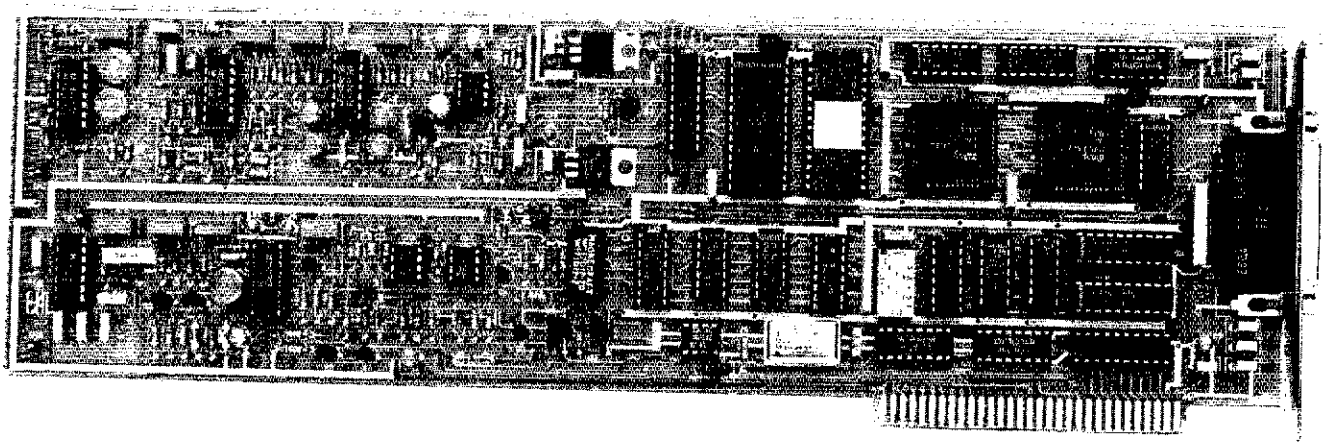
*QMN Fast-6:30PM Dy; QMN Late-10PM Dy.;MNN Late-8:00PM Dy.; MACS-1PM Sun.; UPN-12PM Sun. Traffic for September: KF8AU 408, KA8CPS 308, WD8KQC 140, N8FTY/BBS 126, NJ8S 114, WB8YDZ 99, N8FPN 89, WB8SYA 83, N8CRV 79, K8GXV 76, N8JAT/BBS 71, NY8W 65, WA8DHB 56, K8CQF 50, WD8MJB 50, WB8BGY 46, K8HAP 42, K3UWO 41, N8HSC 41, W8EOI 40, KA8BYK 35, N8CNY 31, WD8EIB 30, K8UPE 27, N8IIC 27, W8YIQ 25, K8ZJU 25, W8IHX 24, K8OCP 23, WB8YPG 18, KI8Q 16, W8VIZ 13, WB8R 12, W8RNQ 10, WT8J 10, WA8MVH 9, K4IHU 8, N21YA 7, WT8J 5, N8GGO 5, N8JCL 5, KA8NCL 5, W8GPP 4, WB8WJV 4, KN8JDN 4, W8URM 3, WI8J 2, August: WB8R 17

OHIO: SM, John Haungs, WA8STX Ph: (513)563-7373—ASM: David Kersten, N8AUH, Ph: (216) 221-8740. SEC: WD8MPV. STM: KF8J. ACC: KJ3O. ACT.BM: W8PH. TC: KB8MU. OOC: WB8ZCE. SGL: N8CVK. PIO: K8QOE.

NET	QNI	QTC	SESS	TIME(LOCAL)	FREQ	MGR
BN(E)	187	82	30	1845/DY	3.577	WD8C
BN(L)	197	88	30	2300/DY	3.577	K8TVG
BNR	207	74	30	1800/DY	3.605	W8EK
OSSBN	1794	803	90	1030,1615,18453	3.9725	N8IBS
OSSN	210	92	30	0645 M-F	3.577	KD8HB
OSSN	—	—	—	0600 S-SU	3.577	KD8HB
OSN	268	60	30	1810 DY	3.708	WD8KBW
OHIO SECTION ARES NET				1700 SUN	3.875	WD8MPV
OHIO SECTION WX NET				A/R	3.875	WD8MPV

During September, Section activities still revolved around a number of Hamfests and then came Hurricane Hugo to the Virgin Islands and to the Carolinas. Health and Welfare Traffic handling became an important Public Service part of our Amateur Radio Hobby. Several of the Section Amateurs were deployed to the Virgin Islands by the American Red Cross. Vern Barhorst, WD4EEB from Covington, member of QCEN in Cincinnati, Dave Morris, N8EEK and Bob Reckner, W8ICJ of Dayton A.R.A. They packed up portable HF rigs, antennas and coax and flew to Phila. PA to board a military transport for San Juan, PR. Congratulations to Hams who have recently upgraded Dale Osborne, N8LAY; Judy McCune, N8AIM; Jim Wilson, KB8GHZ; Chuck Henley Jr., KB8HVB; Gary Jarrell, KB8HSW; of Canton ARC. Also Jerry Wright, KA3CMK of Columbus; Georgia Buckwalter, KB8DUW of Alliance. The first recipients of the newly established Greater Cincinnati ARA Elmer Schubert, W8ALW Memorial Scholarship Fund were named as William L. Metzger, KE8ZL and Daniel H. Grosoehme, N8AFL. The high point of the Cleveland Hamfest Assn. BBQ Banquet Saturday evening was the awarding of the "Ham of the Year" awards. North Coast A.R.C. was Steve Wolf, NO8M, Roy Maskow, WD8MHL, and Hank Hausman, WB8RNI; Indian Hills R.C. was Al Benedetti, W8NPH; QCWA Chapter 1 was Paul Cornell, W8EFW; Parma R.C. was Frank Pettari, KA8HVH; Heights East Repeater Organization was Dave Hubbert, WD8KIS; Cuyahoga A.R. Society was Jack Andrisin, N8HVQ, and NASA Lewis Research A.R.C. was Heinz Wimmer, KC8F. Congratulations to these Cleveland Area Amateurs. Bill Beach, WA8SSI was presented the special Air

PC-COMPATIBLE AMTOR, RTTY, & CW . . .
THE NEW HAL PC-AMTOR



Our new PC-AMTOR plugs right into your IBM-compatible PC and gives you super AMTOR, RTTY, and CW performance. We've combined the best features of many of our other products to give you an easy to use, low cost, and very high performance PC terminal card.

• **AMTOR:** We have an entirely new algorithm that is really great! No more long waits to synchronize, no more strange link failures. This AMTOR *works*! Want to try CCIR 625 AMTOR? It's now legal and HAL has it!

• **RTTY:** Baudot or ASCII with an optimized 170-shift two-tone modem; from 45 to 110 baud.

• **CW:** A new algorithm for CW—the best yet!

• **AUTO-MODE:** Yes, that's right—PC-AMTOR is intelligent. It knows the difference between AMTOR, RTTY, and CW. Tune the receiver and sit back—we do the work. PC-AMTOR automatically finds the correct speed, code, and polarity—no more guessing!

• **FRIENDLY SOFTWARE:** Split screen with status indicators and pull-down menu selections. No more confusing key combinations.

• **TWO CONTROL PORTS:** PC-AMTOR is unique. It has two control ports—one using the PC bus and the other for serial I/O control. Run HAL software for normal AMTOR/RTTY/CW operation; use the serial control port and run your APLink or mailbox software. Now you can have both worlds!

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Icom IC-725	799.00
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Alpha Delta Transitrap HV	33.00
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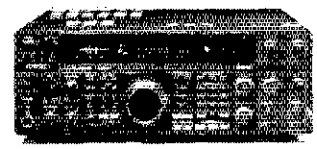

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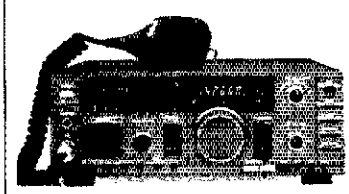
Ameco PT 3 Pre Amp	99.00
Larsen 2-meter on glass	49.95
Anteco 2M, 5/8, Mag. Mount, Comp	25.00



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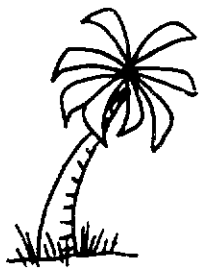

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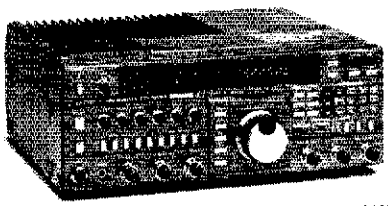
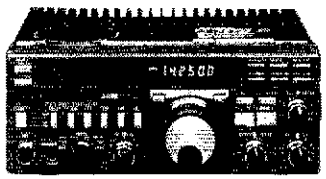
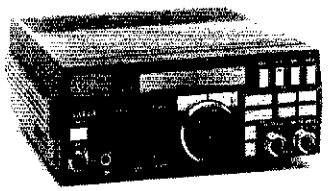


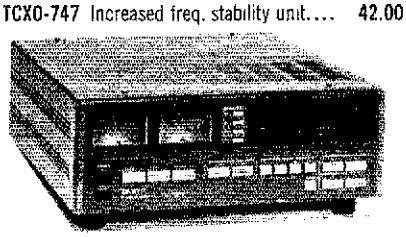
HF Transceivers	LIST
FT-767GX 160-10m xcvr/.1-29.99 MHz Rcvr	$2299.00
2M/767 2m module	239.00
6M/767 6m module	196.00
430/767 430-440 module	296.00
440/767 440-450 module	296.00
SP-767 Speaker w/audio filters	99.00
SP-767P Speaker/phone patch	136.00
FAS-1-4R Remote antenna selector	120.00
FIF-232C Interface	95.00
FTS-8 Encoder/decoder	55.00



FT-757GX MkII 9-band xcvr/SW rcvr/mic	$1280.00
FP-757HD Heavy duty supply with fan	309.00
FP-700 Power supply	244.00
FC-757AT Automatic ant. tuner w/memory	429.00
FAS-1-4R Remote antenna selector	120.00
SP-767 Speaker w/audio filters	99.00
SP-767P Speaker/patch	136.00
FRB-757 External relay box	14.00
MMB-20 Mobile mount	26.00

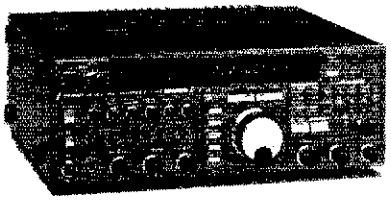


FT-747GX HF transceiver	$ 889.00
FP-757HD Heavy duty supply with fan	309.00
FP-700 Power supply	244.00
SP-767 Speaker w/audio filters	99.00
MD-1B8 Desk microphone	115.00
MH-1B8 Hand microphone	29.00
FM-747 FM unit	47.00
MMB-38 Mobile bracket	14.00
TCXO-747 Increased freq. stability unit	42.00



FL-7000 Auto. tune HF linear amplifier $2279.00

Misc. accessories	LIST
MD-1B8 Desk microphone	$ 115.00
MH-1B8 Mobile microphone	29.00
YS-60 1.8-60 MHz 2kw PEP wattmeter	127.00
YS-500 140-520 MHz 200w wattmeter	99.00
YH-55 Lo-Z headphones	28.00
YH-77 Lightweight headphones	26.00



VHF/UHF Base	LIST
FT-736R 25W 2m/430 full duplex xcvr	$2025.00
FEX-736-50 6-meter module	294.00
FEX-736-220 220MHz module	322.00
FEX-736-1.2 1.2GHz module	589.00
TV-736 1.2GHz ATV converter	163.00
Keyer-B Electronic keyer unit	19.00
FTS-8 Encoder/decoder	55.00
FVS-1 Voice systhesizer	37.00

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FT-712RHT/D8 35w 440 FM w/autodial mic	536.00
FT-290R MKII 25w 2m FM/SSB xcvr	610.00
FT-690R MKII 10w 6m FM/SSB xcvr	752.00
FT-790R MKII 25w 430-450 FM/SSB xcvr	681.00
FBA-8 Holder for C-cell Nicads	32.00
NC-26B Wall Charger for FBA-8	10.00
CSC-19 Soft case	16.00
MH-10F8 Speaker/Microphone	30.00
MH-10E8 Hand Microphone	24.00
FTS-7 Encoder/decoder	40.00
FT-4700RHT/C8 50/40W 2m/440 FM/TTP	799.00
AD-2 50w 2m/440 duplexer	48.00

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VHF/UHF Handhelds	LIST
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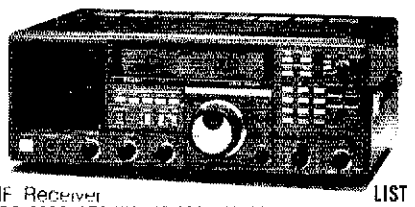
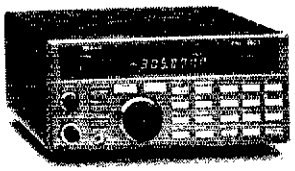
FT-811 440MHz FM HT	410.00
FT-470 2m/440 FM HT/batt/cgr/TTP	576.00
FT-23R 2.5w 2m HT	306.00
FT-23R/TTP 2.5w 2m HT w/TTP	351.00
FT-33R 5w 220MHz HT	328.00
FT-33R/TTP 5w 220MHz HT w/TTP	373.00
FT-73R 2w 440MHz compact HT	315.00
FT-73R/TTP 2w 440MHz compact HT w/TTP	355.00



HF Receiver	LIST
FRG-8800 150 KHz-29.999 MHz Shortwave	$ 784.00
FRA-7700 Indoor active receive antenna	58.00
FRT-7700 Antenna tuner	77.00
FRV-8800 118-174 MHz VHF converter	107.00
FIF-232C Interface	95.00
FF-5 500 kHz low-pass filter for VLF	40.00
DC-8800 DC kit	4.00
FM-W/8800 FM-wide kit	21.00



VHF/UHF Receiver	LIST
FRG-9600 60 to 905 MHz receiver	$ 609.00
VU-9600 NTSC video unit	25.00

Antenna Rotors	List
G-500A Heavy duty elevation rotor	$249.00
G-5400B Azimuth/Elevation rotor combo	473.00

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Force MARS award at the Cincinnati Hamfest, which was made at the recent Region 1 MARS Conference in Cleveland. Bill is a Liaison for MARS to Ohio Traffic Nets. Congratulations to Bill for his dedicated service to AF MARS. The Section Emergency Coordinator has named Robert I. Boughton, N1RB as the Emergency Coordinator for Wood County in the first ARES District and Larry Rain, WD8IHP for Richland County. William Reese, WB8ZRN has stepped down. Welcome to these two new Ohio ECs. Traffic: K8TVG 309, KD8HB 273, W8PMJ 206, KD8KU 192, W8BO 191, WD8KFN 165, N8IIP 163, WA8STX 154, KE8CV 152, *K8JDI 143, WD8IKC* 137, KC8JV 136, N8FWA 134, W8QZK 131, W8EK 122, KC8TN 118, N8CDN 112, WA8SSI 105, KA1S 98, W8SKP 98, W8JLW 82, K8DHD 78, W8BDC 75, WB8JGW 73, WA8HED 67, W8RG 66, KA8SON 64, KC8NM 62, WD8KBW 59, W8ZOL 57, KA8HBN 57, W8LOU 56, K8ALV 53, WB8FSV 53, WB8KWC 52, K8IOW 52, WD8RIB 47, WA8EYQ 46, W8BI 41, WB8DPZ 38, N8EFB 38, KA8BNQ 36, KA8GJV 36, N8GEC 33, KA8YIT 30, KA8CGF 29, NS8C 26, WD8QXT 26, W9SWM 26, N8HJB 26, NC8Q 25, WA8HGH 24, W8UND 23, WD8JYE 22, K8DXZ 22, WB8HHZ 21, NE8X 21, KA8OQF 20, W8PBX 20, N2NS 17, N8JRV 17, K8CKY 16, N8JYC 16, K8LQM 16, KB8ESU 15, W8LDQ 15, N8GOB 15, KA8ODX 15, N8AJU 15, KB8AKW 15, N8CEI 14, W8GDQ 14, KD8XL 14, KB8HBQ 12, NF8B 12, K8BAX 11, K8ES 11, K8WOQ 10, K8WZX 10, N8CW 9, K8JA 8, N8KXD 8, N8JOC 7, N8KTU 7, W8XT 6, KG8H 5, WB8MZZ 5, N8FPH 5, WB8GDM 5, K8EF 5, WD8PWG 5, WA8RLB 4, WB8NHV 4, W8FPA 3, KD8IC 3, N8XX 3, N8GIO 2, KB8DUX 2, KA8AUG 2, W8KN 1.

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EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM: K2ZM. STM: WB2EAG. SEC: WA2ZYM. BM: WB2IXR. SGL: KB2HQ. PIO: KB2TM. OOC: N2DVQ. ATC: WA2VGM. ACC: KV2A. ASM/PACKET: N2FTR. ASM/NWSLTR: WB2NHC. NET REPORTS FOR SEP(QNI/QSP): AESN 43/2 CDN 565/87 NYP 104/53 NYPON 427/285 NYSE 306/176 NYSL 310/199 NYSM 260/169 SDN 318/99. CLUB NEWS: W2CJO described his visit to Beijing to the Albany ARA in October. CCNR has a new treasurer-KB2DIS. Congratulations Ralph. Poughkeepsie ARC learned about AMSAT and the PACSAT from NJ2E at the Sept. meeting. Rip Van Winkle ARS reports election results President- N2JVE Vice President-KA2TLZ Treasurer-WE2G Secretary- KB2CCC. W2SZ discussed further plans for their 10 meter link at the October meeting. WECA learned how to get more out of their ham equipment at their October meeting thanks to W2RP. Yonkers ARC had a successful flea market on Oct 1st. It is with deep regret that I announce the passing of Bob Akin Jr., K2LCU, a long time active amateur. He was chairman of the board of the Hudson Wire Co, founded by his father in 1901. I was privileged to have known Bob personally. He will be missed. Just a reminder-I can always use additional items for the column. Please get them to me before the 7th of the month. An additional reminder-the holidays are upon us. Please lend a helping hand to the many traffic nets and to the clubs in your area who do various public service activities during the holiday season. It is a very rewarding experience to participate in playing Santa to the kids in a children's hospital. Not only is it fulfilling to you but greatly appreciated by the kids. SEP. PSHR: WE2G WB2VUK WB2EAG N5MEA KB2EPU K2ZVI WB1BTJ. SEP. TFC: WB1BTJ 211, WB2VUK 174, WB2EAG 142, KB2EPU 117, K2LYE 107, K2ZVI 83, N5MEA 51, WE2G 37, WD2K 36, WB2IIV 27, WF2M 27, N2FTR 26, W2CJO 15.

NEW YORK CITY-LONG ISLAND: SM, Walter M. Wenzel, KA2RGI—ASM: N2GQR. ACC/PIO: KA2LCC. SEC: WA2UJI. STM: K2MT. OOC: NB2T. TC: W2QUV. BM: W2JUP. The following are traffic nets in and around the section that handle NLI:

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SCVHF	145.370/R	2000	S-F	KA2JMA
NYPON	3913 kHz	1700	DLY	KA2UBD
NYS/M	3677 kHz	1000	DLY	N2EIA
NYS/E	3677 kHz	1900	DLY	KU2N
NYS/L	3677 kHz	2200	DLY	KU2N
NLT	28450 kHz	2100	WED	N2IMP
ESS*	3590 kHz	1800	DLY	W2WSS

*Independent Net, recognized by NTS, local times.

*** PACKET NODE STATIONS ***

N2MH/4 Queens Village/145.010/New York City Al2Q/4 Freeport/145.010 Nassau, W. Suffolk/W2HPM -4 Farmingville/144.970 Central Suffolk NR2L/4 Water Mill 145.090 Eastern Suffolk WB2IBO-4 Massapequa 145.030 Backup for Al2Q-4 VE LISTINGS: LIMARC - second Saturday of each month at 9:30 AM at Salten Hall, NY Institute of Technology, Old Westbury - contact Al Jones, W2ZDB 516-676-5790 SUFFOLK COUNTY VE TEAM - second Saturday of each month at 9:30 AM at the Suffolk County Community College, Islip Arts Bldg., Selden, NY - contact George Sintchek, WA2VNV 516-751-0894; GRUMMAN ARC - second Tues. of each month, at 5:00 PM at the Grumman Rec. Center, Bldg. 800, South Oyster Bay Road, Hicksville, NY - contact Howard Liebman, W2QUV 516-354-6861; GREAT SOUTH BAY ARC - fourth Sunday each month at 12 Noon at the Babylon Town Hall Office Annex, 281 Phelps Lane, North Babylon, NY - contact Walter Wenzel, KA2RGI 516-957-5726; If your group holds regularly scheduled license exam sessions and/or classes let me know so they can be added to this listing. I want to take a moment to thank all of the many operators that participated within the section and provided emergency communications for the areas struck by Hurricane Hugo. Everyone should be commended on the professionalism displayed by all when dealing with the public and the press. Space within this column does not allow me to mention everyone that assisted but I must say, "A job well done" to all those that assisted. Please remember that whenever there is a need for emergency communications please inform either Jim Heacock, KA2LCC or myself that you are participating in a certain operation. The reason for this is so we can coordinate the information and assist with relief operators where needed. Congratulations and welcome to the following for their recent appointments to the Local Field Organization: Joe Schimmel, W2HPM DEC of NYC/LI Packet Radio Operations; Mario Maltese, WF2T EC for North Hempstead; Paul Rendeiro, KD2ZM EC for Shelter Island; Mark Kaufman, WB2DWC EC for Queens; Jim Everett, WB2ZIE EC for Southampton; Bill Saverese, N2HII EC for Smithtown; Vincent Bacchus ATC; and Marty Goldstein,

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TS 440S/AT • Popular • HF Transceiver
TM 631A/731A • Dual Band • Mobiles
TM-231A • 50 Watt • 2 Meter Transceiver
TH 75A • New • 2 Meter/70 cm • Dual Band HT
YAESU
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N2FDK as PIA. At this time on behalf of all of the NYC/LI Field Organization I want to extend best wishes through the holiday season. One last wish: please take a moment this holiday season and give thanks for the blessings big and small we have in our lives and please remember that not everyone is as fortunate as we are. Traffic: N2MH-4 410, WI2G 360, KA2RGI 347, N2AKZ 312, KA2VZX 218, N2IMP 197, N2HLZ 120, WA2UKM 70, K2MT 55, NB2D 44, K2TWZ 34, KA2JMA 15, WB2KID 8, WB2ZIE 4.

NORTHERN NEW JERSEY: SM, Rich Moseson, NW2L—(@KD6TH) - ASMs: KA2F/Recruitment, W2VY/Youth, NW2S/NW, KY2S/SE, KC2ZA/SW ACC:WA2QYX. BM:K2ULR. OO/AAC: KA2BZS. PIO:NW2L. SEC:WB2HBZ. SGL:W2KB. STM:K2VX. TC:KA9Q. HAM RADIO INFO LINE: 201- 680-1585. // BLAME RACHEL - If you've had trouble finding me over the past few months, it's because I've been just slightly occupied with my new daughter, Rachel. She was born October 5, joining big brother Dan, who's 2 1/2. MARK YOUR CALENDARS - The 1990 ARRL Hudson Division Convention will be held Sunday, July 8, at the NY Institute of Technology in Old Westbury, NY. More details to follow. GET "SET" FOR A DISASTER! - From all indications after our near-miss with Hurricane Hugo in Sept., we would have been almost totally unprepared if the storm had struck here. So, sometime next fall, all @*$% will break loose in NNJ, to give us a full-scale test of our emergency skills. But this will be a test, not a training session. Between now and then, we need as many of you as possible to sign up for ARES (the Amateur Radio Emergency Service), take part in a few training sessions, then be on hand for the big event in the fall. To register in ARES, contact your local Emergency Coordinator (EC) or county District Emergency Coordinator (DEC). To find out who they are, contact Section Emergency Coordinator (SEC) Jim Dockery, WB2HBZ (638-1835), or me (680-1585). NNJ SECTION CABINET met Sept 23. Emergency Preparedness was major topic and "planned disaster" is the major result. NEW NTS APPTS. (eff. 10/1): KA2INE, NM/NJN-Early; WR2E, NM/NJ Slow Net; WB2FTX, NTS Packet Liaison. Tnx to Lee, W2QNL, for many years of service. Welcome new ORS W2DMM. NEW LICENSEES/UPGRADES: Nov.- Cesar Castro; Tech.- KB2DMA, KB2HVO, KB2GXZ, KA2ILQ, Ed Gaynor, Jeremiah Nezlick, Donald Pennino, KA2TYJ; Gen'l.- KA2HEX, N2IKJ, KB2IFA; Adv.- N2IW8, N2IYH, N2JSP, N2BSN, KB2GBS, N2JVH, KA2BMI, KB2AIG, Frank Ready; Ext.- N2IYY, K2BJB. // SEPT. NET ACTIVITY (Sess = Sessions QNI = Check-ins QSP = Traffic passed).

Net	Freq.	Time	Sess	QNI	QSP
NJM	3695	1000	30	237	121
NJN/E	3695	1900	30	284	74
NJN/L	3695	2200	30	120	90
NJPN	3950	1800	34	314	75
NJSN	3735	1830	30	137	25
NJVN/E	146.895	1930	30	495	75
NJVN/L	146.490	2230	28	184	60
OBTTN	147.120	2000	30	228	101
NJTTTN	223.880	2100	29	162	28

Packet NTS 24 hr/day via WA2SNA-1 & other PBBSs. Sept. Traffic (Call/Messages Handled/PSHR total): W2RRX/179/100 N2XJ/168/101 N2DXP/87/61 WB2FTX/82/60 KE2JX/72/-K2VX/59/66 KA2NEE/58/73 KA2KJF/46/70 WA2PAC/43/68 WB2OMP/20/- W2CC/14/- W2XD/13/- WA2CLP/8/-(AUG/14/-). Best wishes to all for a vy happy holiday season from Susan, Dan, Rachel and Rich, NW2L.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WØEJ—SEC: KDØBG. STM: WBØAVW. ACC: NUØP. OOC: WAØQMU. BM: KØIR. TC: KØDAS. SGL: WRØG; November 5-12 was declared "Amateur Radio Recognition Week" in Iowa by written proclamation of Governor Terry Branstad. The timing coincided with AMSAT's 20th Anniversary Space Symposium and Annual Meeting held in Des Moines and sponsored by the Central Iowa Technical Society. Thanks to WRØG for his efforts. WØSS celebrated 35 years at Rockwell International, Collins Divisions. A new call in the section is WVØD. Two harmonics of KCØDN passed their Novice exams recently. KAØYSQ and XYL are the proud parents of a new baby girl and NØBBM and XYL are the proud parents of a new baby boy! Congratulations to all! Newly elected officers of the Fort Madison ARC are: president, KUØP; vice president, KBØERL; and secretary/treasurer, KAØYAO. The Fort Madison group also had 43 sign in at their annual Radio Rodeo. The Cyclone Radio Club will sponsor a VE session in Ames on December 2. Call KCØRX at 515-292-4504 if interested. The Fort Dodge ARC will sponsor a VE session on January 4. Contact KØTDO. The Collins ARC hosted another successful pizza bash/membership drive in September and are planning second club station at a second site. Regretfully, KAØNMP, KØGIE, and KAØMJG are Silent Keys. Traffic: WØSS 243, WØYLS 101, KAØADF 88, NØJL 72, WBØMCX 48, KØCNM 44, WBØAVW 39, KØGP 37, KAØVBA 16.

KANSAS: SM, Robert M. Summers, KØBXF. SEC: NØBLD. STM: WØOYH. Net Manager KSBN/KPN, WØFRC. Net Mgr QKS, WBØZNY. KS RTTY Mgr, open. District Emergency Coordinators are WØOAG, WBØYJT, WØEB, WØFRC, NKØV, WAØCVR, WBØMDF. STATE Govt Liaison, NØBLD; Tech Coord. KAØHEP. Bulletin Mgr, KØJDD. ACC, KØBXF. PIO, WBØWSG. Manager of QKS-SS is WØMYM. WX Net Manager, WBØYWZ. Packet Coordinator WAØZBL. Another SILENT KEY for Kansas, Russ, KØPFM, Newton. Still in the hospital at last check was KØAOQ, Veleda. About 75 people enjoyed the picnic/meeting at Concordia Sept 16. Congratulations to KØNL on his recent 80th birthday. Welcome back to NCS duties on QKS-SS to WDØFIT and also to new NCS WCØE. WAØTJU about to be heard on the packet networks. The 12-year-old daughter of WAØKDC has passed her Novice test and is awaiting her call. Have noticed a few new calls appearing on the roll call for KSBN and KWN. Welcome and do offer to assist as alternate NCS as soon as your feet are good and wet. The new FCC Rule Book should be out by the time you read this. Better get a copy and be familiar with all the changes. Have you looked at the requirements for making the Public Service Honor Roll lately?? Will look for you next month! Traffic: KAØRCH 411, WØFE 278, KØBXF 256, WØFIR 198, NZØM 186, WØFRC 115, WØOYH 87, WØFDJ 64, WØQMT 54, WBØZNY 47, NBØZ 36, WAØTJU 29, WT6E 19, WØPB 14, WØMYM 12, KXØI 11, WAØYXK 10.

MISSOURI: SM, Bill McGrannahan, KØCRB—September was hectic. Hundreds of hams helped make the MS-150 Bike Ride a success. Chet Hallberg was the KC leader. Dave White,

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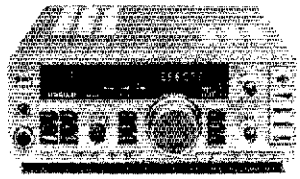


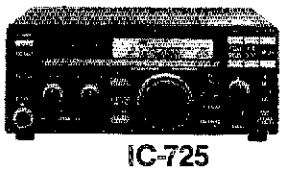
YAESU

TH-75A
2M/70CM DUAL BAND HT

TEN-TEC

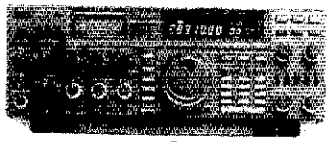
OMNI V

IC-32AT

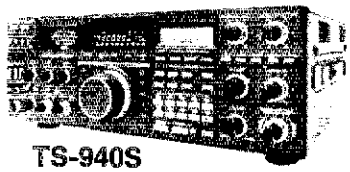


IC-725

IC-2GAT
IC-4GAT



IC-765



TS-940S

RANGER Communications, Inc.

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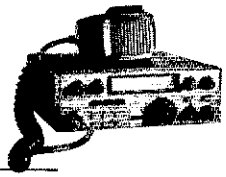

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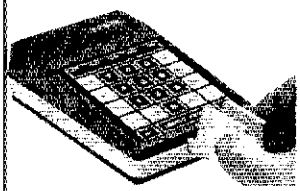

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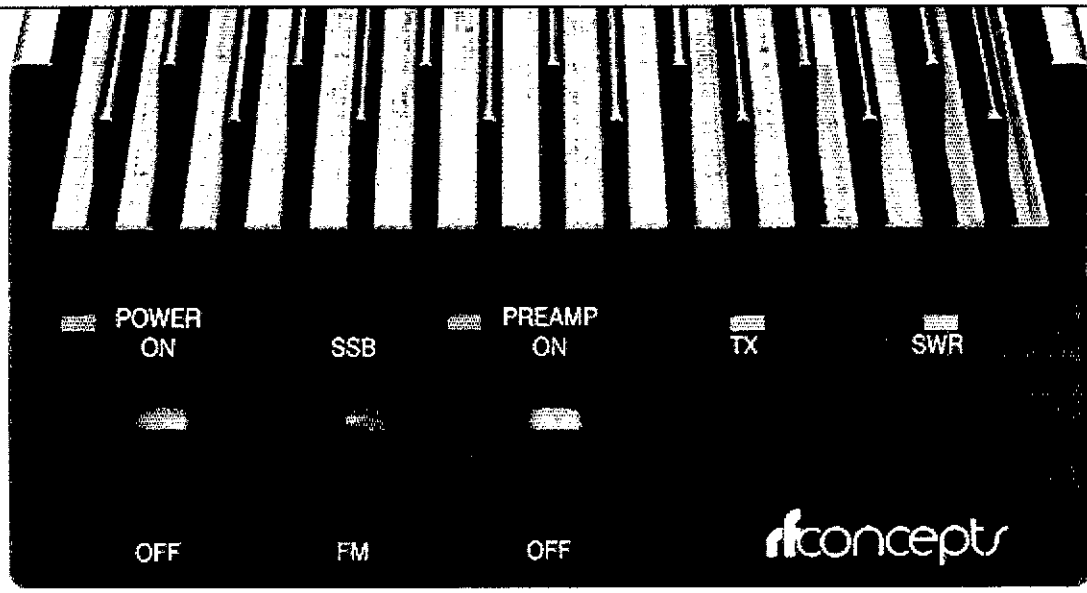

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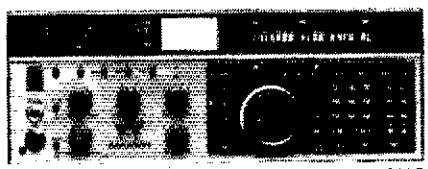

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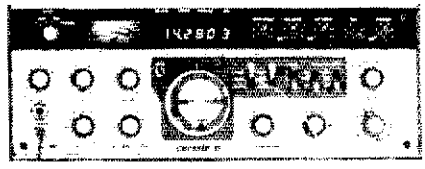
258 RS-232 interface	65.00	
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	
562 OMNI V 9-band xcvr/xtal mixed osc	2245.00	1899



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561 9-band digital transceiver	1495.00	1289
961 Deluxe 22A ps w/speaker	239.00	219.95
263G Remote VFO	269.00	249.95
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
603 KR-1B Dual keyer paddle	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	
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3175 75m mobile antenna	37.00	
3140 40m mobile antenna	37.00	
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Model	**ARX-2B**	**ARX-220B**	**ARX-450B**
Frequency, MHz	135-160	220-225	435-450
SWR 1.2:1 Typical 2:1 Bandwidth, MHz	>3	>5	>10
Gain, dB	excellent	excellent	excellent
Power Rating, Watts FM	1000	500	500
Radiation Angle, Deg.	7	7	7
Horizontal Radiation Pattern, Deg.	360	360	360
Height, ft. (m)	14 (4.3)	9.3 (2.8)	4.9 (1.5)
Weight, lbs. (kg)	6 (2.7)	5 (2.3)	1 (.45)

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WBØZCZ, reports enthusiastically about the Springfield section of the ride. WBØOIZ organized packet links between KC and Springfield and handled 182 pieces of traffic. On the 16th, we had fun at the MO SSB picnic and on the following day, the Marshall Hamfest drew a crowd! Also the South Side ARC (Grandview) set up a station in a shopping center for Amateur Radio Awareness Day. OOC Coordinator Carl Hohenberger, WBØBZP, is the new editor of the "Barracks Bugle." Tom Harshbarger, WAØX is now president of Southwest MO ARC. In KC the Heart of America ARC sponsors the Marlborough Elementary School Radio Club. KBØCUS is director/teacher. In turn the school's Desk Top Publishing Class turns out the HARC Newsletter. How's that for synergism? Cent. MO ARC received a "Sister City Proclamation" from the Matsuto Japan ARC. Ten hams led by KØBIX helped make the two-day Amer. Lung Assn. Ozark Bike Trek an outstanding event. The month ended with the Hurricane Hugo disaster. (More about this next month.) We end on a sad note with the loss of our friend, Alan Messing, W4OIF—a fine gentleman and a super traffic handler. My PBBS KØORB-1 or BBS of WØKX or WBØOIZ. Nets: MON AIØO Sess. 60 QNI 191 QTC 118; MEOW WDØELL 30/577/70; MOSSB WBØWLU 30/670/77; HBN KØDSO 21/354/26; KCARC WAØITU 3/106/12; HARC KAØSXY 4/123/7; SLARES KØWEX 4/251/2; CMEN KØPCK 4/58/1; ZAEN WDØELL Paul R. WBØEJJ 4/261/0; JCRE WØORI 4/75/0; QCWA 35 WØWHK 4/60/0; KCARES 5/62/0; QUBEC KØPHI 4/36/4. Traffic: WBØOIZ 466, NCØG 460, NØFBW 365, AIØO 165, WAØYJX 141, NDØN 109, KØORB 57, WØBMA 48, WØOUD 32, WBØWLU 30, KFØBM 21, WRØR 21, KØPCK 10, WBØUCI 10, WØRL 8.

NEBRASKA: SM, Vern Wirka, WBØGQM—Holiday Greetings to everyone! By proclamation of Nebraska Governor, Kay Orr, October 14, 1989 was "Amateur Radio Sell Nebraska Day." The proclamation was obtained through the efforts of the Elkhorn Valley Radio Club of Norfolk. To commemorate the proclamation the Elkhorn Valley Radio Club operated a special events station from Norfolk, Nebraska October 14. Several Nebraska amateurs participated in a Nuclear Regulatory Commission exercise designed to test plans to deal with emergency conditions at the Nebraska Public Power District Cooper Nuclear Power Station, near Brownville. The October exercise utilized amateur voice and packet communications as a back-up to regular communication circuits for civil defense, law enforcement, medical, and other emergency response agencies. The Blue Valley Radio Club reports they have regular gatherings every Saturday morning for coffee at the "Chances R Restaurant" in Seward. Blue Valley members also get together on Tuesday evenings at the Seward Civic Center to discuss computers and computer programs. Traffic: KØDKM 319, WBØGQM 17, WAØBOK 9, WDØEWH 7, KEØXQ 4, WCØO 2.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Caesar Rondina, N1DCS—ASM: KB1H. STM: K1EIC. SEC: N4GAA. OOC: KY1F. ACC: NK1J. BM: N1API. PIO: WA1CMF. TC: W1HAD. SGL: K1AH. Thanks to all the Section Leaders for attending our first section cabinet meeting. It was fun and a pleasure to see everyone. Thanks to ARRL for allowing us to use the facility. We are in the stages of forming a section seminar on a variety of subjects. The purpose will be for the further education of amateurs on such topics as Traffic handling, emergency communications and more. I will keep you informed. A special thanks to all at HQ who are the unheard backbone of what we do. For example, the guy who takes all this stuff I send in and make it look like an article. Thanks to Steve Ewald, and many others. Congrats to the new officers of Waterbury ARC, good luck in your endeavors. A special thanks to Al Jarvis, NA1I for his years of service as OOC. Due to other commitments, Al has had to resign his position. Thanks Al for the years and a job well done. KY1F Dan, has agreed to do this job temporarily until I can find a replacement. Any parties can send me a resume at my address on page 8 of QST. Congrats to SCARA for another Flea Market. Well done. FARA has a good idea of a special advanced VE team to do Novice and Tech, gets them all involved. Great!! Ct. had 93.3 and 95% rep to 1RN 3/4 in Sept. Nice job by Natchaug ARC at the town fair, and also SCARA, KA1RDX and others that participated in the Durham fair. In closing, please everyone say a special prayer for the speedy recovery and of close friend and fellow ham who has dedicated years to this hobby. Get well soon, Jerry, WA1IUF. Till next time, 73.

Net	Sess	Station	Traffic	NM	Liaison
WESCONN	33	482	281	KA1GWE	CPN
CPN	31	388	151	KY1F	1RN
NVTN	33	549	349	NM1K	CSTN
CN	60	292	207	W1WCG	1RN
RTN	29	212	76	WA1FCA	CN
CSN	21	70	23	N1FNN	1RN
TMRCN	4	09	1	NM1K	

PBBS reports: CT Section Traffic Node: N1DCS-4 BBS, KY1T NM Received 823, Forwarded 741, Total 1564. Traffic: W1WP 2746, NM1K 1082, K1EIC 1050, KY1T 818, KA1GWE 381, KA1JAN 229, W1EFW 195, N1GBP 151, KY1F 126, W1WCG 125, N1FNN 113, KC1OL 76, KA1UCU 69, N1API 61, KA1ROL 54, W1KYD 52, WB1ESJ 40, N1GKJ 38, KA1RVI 35, W1YOL 30, W1QV 19, KA1REQ 15, N1BOW 14, NX1Q 10, KA1TBM 6.

MAINE: SM, Ted Bonesteel, WA2ERT—New appointees: BM-Woody Woodward, KA1REB, Box 726 RR 1, Harrison, ME 04040. PIO: Danny Morris, KA1RFB, PO Box 84, E. Vassalboro, ME 04953. STM: Walt, KA1ODT. SEC: Rod, KA1RFD. ASM: Packet- Ron, N1AHH. SGL: K1NIT. OOC- Dick, K1WWT. TC- Dave, KQ1L. The following provided comms for the United Way Road Race in Augusta Sep 27: KA1FKS, N1CSW, W1OGT, KC1AC, KC1OC, KA1MLF, KA1LPW, KA1MWG, W2NYM, KA1RFD. W1VEH and K1ROG represented us at a Hancock County EMA hazardous material table top exercise. N1CBA published the first edition of the "The Emergency Communicator." Future editions will be distributed to clubs for inclusion in newsletters. Let's try for Statewide dissemination. Upcoming examinations: Dec 2, Sat, 9 AM, S. Portland, KD2EU; Dec 7, Thurs, 7 PM, Ellsworth, NU1L; Dec 20, Wed, 6:30 PM, Augusta, N1BCF. Nets (sess/QNI/QTC/Mgr): PTN/30/364/149/W1KX; SGN/26/945/128/K1GUP; CMEN/9/238/9/N1DZI; Hancock/3/10/0/WA2ERT; Aroostock/4/85/2/KA1LPW. Station activity: W1KX 262, WA2ERT 89, K1UNQ 62, KA1REB 61, NR1F 54, W1JTH 52, KA1ODT 45, W1VEH 44, ND1A 41, N1GND 36, WA1YNZ 35, KA1RFD 29, W1BMX 17 and KA2KZM 4.

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Net	Mgr	Freq	Time(EDT)	Day	Sess	QTC	QNI
EMRI	KA1GEP	3658	1900/2200	DY	60	189	297
EMRIPN	W1TC	3915	1730	DY	30	36	77
EMRISS	N1CVE	3715	2100	DY	23	41	83
EM2MN	N1DUB	63/23	2000	DY	30	111	445
HHTN	N1FLO	04/64	2230	DY	30	147	395
CITN	KB1AF	745/045	1930	DY	30	75	481
NEEPN	WA1FNM	3945	0830	SUN	4	6	29

Note the change in frequency for the EMRI Phone Net!! They meet at 5:30 PM daily. I encourage you to participate on 3915 with the regular members. Kudos to those who helped with the Hurricane Hugo Traffic and the Bay Area Earthquake stuff. Those that helped deserve a big pat on their back and some good publicity. Those that maliciously interfered with the life and death communication also know who you are..and you know what...WE know who you are and the Amateur Auxiliary knows who you are, the FCC knows who you are, and soon they will be taking action. I need to state here in the STRONGEST possible terms...Malicious interference in ANY form WILL NOT be tollerated and will be prosecuted to the full extent of the law. Thanks to the incredible effort by the Amateur Auxilliary to the FCC during these disasters, our bands will soon be a lot cleaner. Did your club do anything on Amateur Radio Awareness Day?? The Red Cross Club had 2 ATV stations set up in Boston that generated a lot of interest. I need to mention another incredible club...The Wellesley ARS, led by Tom Kinahan, N1CPE. With very little notice they helped with a message center for the Hurricane Hugo disaster. Thank you!! Have you done anything to enhance ham radio's reputation this month?? Please express your opinion on amateur radio issues to your section or division staff. We appreciate your input. Traffic Totals: K1UGM 776, WA1TBY 366, KW1U 355, KA1GEP 189, W1CE 170, KB1AF 150, N1FLO 138, N1CVE 124, W1TC 90, KA1PEP 48, K1UXB 44, K1GGS 40, N1AJJ 31, WA1CRE 31, K1ABO 29, KA1RSY 28, NV1H 25, WA1FNM 25, K1BZD 24, N1FWV 21, KA1MDM 19, K1SEC 13, KA1DJV 11, N1EGN 11, KA1AMR 8, KB1EB 6.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE— Hurricane Hugo would be one of the big events that generated a lot of Amateur Radio activity in the NH section this month. There were numerous Health and Welfare messages originated in NH on behalf of anxious friends and relatives. It was good to see that the public is aware of our message service and many people took advantage of our capabilities. Many of you experienced the satisfaction of being able to help relieve someone's anxiety and fears by the simple process of sending a packet or voice message to the distressed area. It's one of the things we do well in Amateur Radio and I encourage new (and veteran) Hams to actively participate in NTS nets and ARES drills. Hugo is a good example of why we need that training and discipline! Congrats to Ralph KB1XM on being honored as Ham of the Month by the GBRA. Each month the club highlights a club member with an article and salute to that person's contributions to the club and the hobby. SVARC has a new meeting place at the cafeteria in the Mascenic Valley Regional School in New Ipswitch. Data from the FCC data base indicates that we have had 41 new Hams join our NH ranks during the summer months with more on the way. Please make them feel welcome! And what are new Hams doing lately? Well, although she is shy about the publicity, Louise, KA1TYU of CNHARC got her license only last winter and found herself a key MARS relay station during Hugo! While working the 10M Novice band she handled traffic for the U.S. Armed Forces as well as the Red Cross between St. Croix and Washington, D.C. Thank you, Louise! Looks like these new folks get up to speed pretty quickly, doesn't it!! Butch WB1GXM has a Novice class going as an authorized class in the Goshen-Lempster Coop School with 10 students in the 5th grade. Butch is using a new study guide geared specifically to young people- contact him for more information. A big public service/promotional activity took place this month with 29 Hams supporting the Governor's Walk through Pawtuckaway State Park. Warren WB1HSB reports that about 1000 people walked the various trails and our safety and communications support was noted by many public figures and politicos during the walk. N1FDJ did a great job in setting up and coordinating the Amateur Radio tent with demos and handouts. In addition, Warren and Rich took this opportunity to test their new "porta-peater" on the site and ran the net through it. Public service events are a good place to try new technologies and equipment before you need them in a real emergency. The Field organization and the NHARA sponsor and encourage Amateur Radio participation in the Governor's walk — put it on your calendar for next year. More good press for Ham radio comes from Mack W1PNR. Hams in the North country handled safety and comm for the 17th annual Bicycle Race up Mt Washington. The roster includes AG1Z, VE2GUC, N1DQA, N1DQM, N1CMD, N1DCT, W1LQQ, W1PNR and the following members of the UNH ARC- KA1IXA, KA1PQE, N1DAS, WA1THQ, and KA1PQK. I spoke to Karen WA1THQ recently and she revealed that she had gone mobile marine/satellite! She worked the RS10/11 Amateur satellite while at sea in the North Atlantic using two mag- mounts for antennas- way to go!! If you have some activity or project you have done that might be of interest to others, drop a note to your newsletter editor or drop me a note so we can share it. The Contoocook club held their second fleamarket in Sept on a rainy Saturday. A small dedicated band turned out and Jack WA1ALM said he had a ball running a station demo on site and talking with lots of people about Ham radio! Contoocook has started a fall Novice class, so look for more new calls soon. The new VTNH net is rolling along with 198 checkins in 30 sessions this month—and— (FANFARE)— the NH NTS group had 100% participation on 1RN/3 and 1RN/4 this month! We were the only New England section to earn that distinction this month! Congratulations to the NTS volunteers! Name Sessions Traffic NM's call GSFM 30 101 N1ALM GSPN 34 104 W1FYR W1PEX 1935, KB4N 1352.

RHODE ISLAND: SM, William M Foss, KA1JXH. After Hugo slammed through the Virgin Islands, WA1KKP was in contact with NP2CM from 7 AM to 8:30 PM everyday. The first week after Hugo, providing communications for outgoing traffic and requests for equipment, supplies, assistance and out-going health and welfare traffic. This was all done on 15 meters without any interference. NCRC provided communications for the bank of Newport Bicycle Race on Sep 24th. Traffic: W1EOF, KA1KML 215 PSHR 63; KA1JXH 70 PSHR 60. I wish everybody a Merry Christmas and Happy New Year. Traffic: W1EOF 215, KA1KML 215, KA1JXH 70.

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- **Built-in VOX circuit.**
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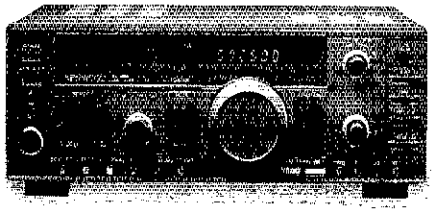

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VERMONT: SM, Frank Suitor, W1CTM— ASM: (Packet) K1AUE. ASM (Education) WB2MIC. SEC: K1LOO. STM: KT1Q. TC: W1AIM. SGL: WB1AJG. *"ARRL regrets, and apologizes for the inappropiate remarks made by the Vermont Section Manager concerning Mitch Stern WB2JSJ, contained in the November column."* Gov. Kunin has issued a proclamation designating the 2nd week in November as Amateur Radio Week—see ur club news for details. GMWS (Rutland) 10/89 meeting was highlighted by an ATV demo given by KA2OPG (Rick). N1FHY (Russ) reports *excellent net participation* by greater Rutland ARES members. CVRC reports their 10/89 meeting included a microwave communications presentation by K1LPS (Larry) & Section Technical Coordinator W1ATM (Chip). The newest TV star in Central VT. is CVARC President & Section Gov't Liaison WB1AJG (Bob). His interview on WCAX-TV was a great promotion for Amateur Radio and resulted in 28 inquiries on how to send health & welfare traffic to the Virgin Islands which had been hit by Hurricane Hugo. All traffic was sent to KV4- Land. Bob also reports that the special vehicle plates will have the Anti Coil-Gnd logo on the right hand side of the plate & will be bright blue on a white background. Contact him for further details at 433-6172. The K1HKI VE Team reports the following upgrades: Extra-N1EQO, KA1MTO/TLX, Adv- KA1SIX; Gen'l - KA1TNC; Tech-KA1QEA/TPI, Look for a potent HF signals from K1JTM (Don) with his new tower/beams. Burlington ARC reports the 34/94 MT. Mansfield repeater has been restored to prime condition by NW1N (Howard), KA1LEX (Randy) & N1ENH (Tom). Twin State ARC operated a Special Event Station at the new Montshire Museum in Norwich on 11/18. Their first club meeting in the museum will be 12/11 @ 7:30 PM - contact KA1CRP (Dave) for details. It's not too early for making plans to support the VT QSO Party on February 3/4 - contact WA1PDN (Dan) for details. Annual club reports have been received from GMWS & ARA. Border ARC & Amateur Radio Associates (ARA) are joining forces to sponsor a hamfest in Barton next July. The fall meeting of BARC held 11/5 was well attended and hamfest plans were generated - contact K1WML (Bob) or K1LOO (Tom) for further details. ARA Club officers include K1LOO (Tom) President, K1OXG (Les) VP, KC1BT (Ray) Sec'y and KA1TIF (Chet) Treasurer. Special tnx to all of u who called our Senators (Leahy 800-642-3193 & Jeffords 800-835-5500) in support of no fee for Amateur licenses. Our section traffic team is again congratulated for another outstanding month of presentation on 1RN-Cycle 2 98%, Cycle 3/4 100%. Section Traffic Manager (STM) KT1Q invites all to participate- contact him for a net schedule. Section traffic report: WA2SPL 1747, N1GMU 606, KT1Q 452, WA1JVV 290, NB1A 116, W1KRV 16. Section Net report: VTNH 30/198/243, VTPHN 4/55/5, GMN 26/498/35, CAR 26/577/50, TSFMEN (ASCUTNEY) 4/60/0, TSFMEN (KEENE) 7/74/5. Seasons Greetings to all!

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD— OOC: KA1SNA. PIO/ACC: K1BE. SEC/SGL: WB1HIH. TC: KA1JJM. STM: W1KK. It is with deep condolences that I have to announce the passing of a dear friend. Percy Noble, W1BVR. I met Percy over 40 years ago while checking into the WMN. Like many in the section, he took me under his wing and guided me through the process of handling traffic. Guess it took because after trying just about every facet of ham radio, I seem to drift back to the traffic nets. During my tenure as net manager of WMN, I received a box in the mail from Percy. In it was a foam plastic granite rock and a card with "Percy" on it. I often wondered if he sent it to indicate my steadfastness or stubbornness. I was always hopeful it was for steadfastness, but maybe a bit of each. Anyway, the "OLD MAN" of ham radio will never be forgotten by me. Congratulations to Norm, W1BYH, for coming in first in this section in the DX contest. A special "tip of the hat" goes to Brian, N1FIY. Brian is the radio officer for Post 73 Explorers Scouts sponsored by CMARA. He's been acting as "Elmer" for that troop for many years. It's great to have people like Brian take an interest in our youth in their formative years. Thanks from myself, the CMARA and all in the section. Take a look at the traffic totals. This reflects the activity this section had during the recent hurricane "Hugo." I want to thank those that participated. A job well done. Traffic: KA1IFC 916, KA1EXJ 188, WB1HIH 186, W1SJV 101, W1KK 78, KA1RVN NX1K 48, WA1OUZ 32, K1JHC 25, W1UD 756, KA1TDL 24, W1ZPB 17, KC1DI 15, KI2L 3, WA1OPN 2.

NORTHWESTERN DIVISION

IDAHO: SM, Don Clower, KA7T—ASM: K7REX. SEC: N7MAL. OOC: WB7CYO. STM: W7GHT. ACC: N7BI. PIO: WG7E. The Eagle Rock ARC has decided to host the 1990 WIMU Hamfest. They have already formed committees to work on the program. If you can help call WS7U or the Eagle Rock ARC. Also the Eagle Rock is planning a swapfest in Jan. I would like to wish everyone of you a Merry Xmas and a Happy New Year. 73s Don. Traffic: W7GHT 294, WS7U 47, N7MAL 44, KA7WZM 30.

Net	Sess	QNI	QTC	MNGR
Farm	30	1727	52	WA7GSM
NWTN	30	820	29	WA7VAO
CD	21	588	18	K7UBC
IMN	30	235	158	KA7EEE

PSHR: W7GHT 94, WS7V 60, N7MAL 72.

MONTANA: SM, Peter Peters, KF7R—SK: 9/22/89, John Bielenberg, W7BIS, from Polson: new repeater 5 miles south of Glasgow 147.37/97: WB7AHL of WY. Thanks Mont. Hams for emergency message from his daughter via 2 meters: Glendive Area news letter "LYARS" celebrating 10 years missing only one month, first issue was edited by WA7GVT: TEC: KB7IEL, KB7IKG, KB7FUP, KB7EAP, KB7GUQ, KB7GUR, KB7GUS, KB7GUG, KB7GYV & Bill Brady, Bill learned code in 8 days while riding a ferris wheel for a marathon fund raiser: GEN: KB7IBF, KB7HYL, KL7JGS, WB7WRL, KA7VLC: ADV: N7MCU, KB7AON: EXTRA: KF7VP, KF7WI: NOVICE: Sharon Gegelman: KE7LH was the moderator and organizer of one of his popular ham geology field trips held Aug. 26-27 to the Seeley Lake area and back to Bozeman: Traffic: KA7YYR 135.

NET	QNI	QTC	NET MGR.
MSN	85	1	KF7R
MTN	1703	88	N7AIK
IMN	235	158	KA7EEE

OREGON: SM, Randy Stimson, KZ7T—ASM: KM7R. ASM: W7FBP. STM: W7VSE. SEC: KV7F. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. OO: WN7W. STC: N7ENI. Klamath County held a disaster drill which involved the Red Cross and

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  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
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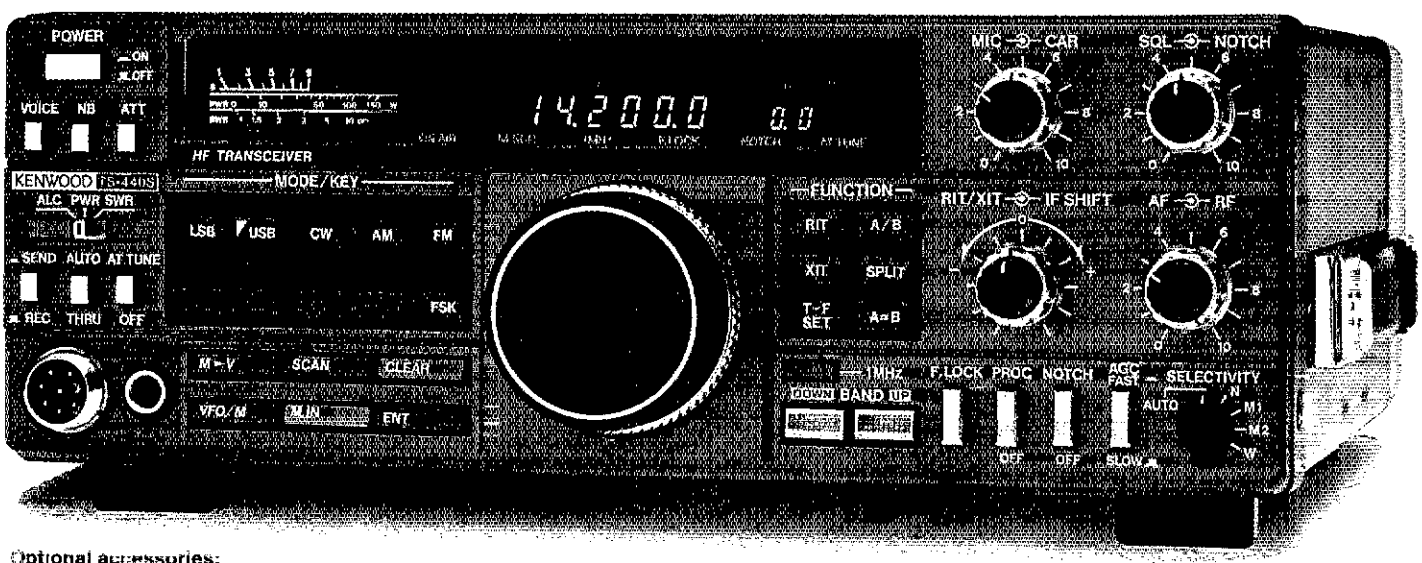

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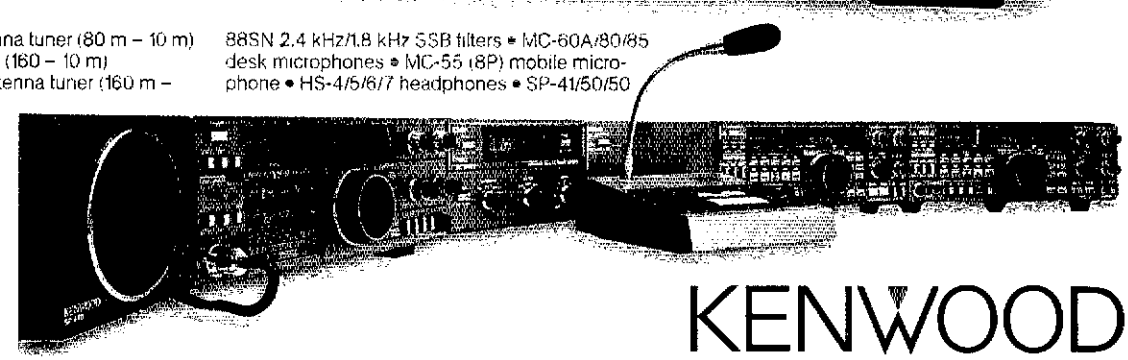
- AT-250 external auto. tuner (160 – 10 m)
- AT-130 compact mobile antenna tuner (160 m – 10 m)
- IF-232C/IC-10 level translator and modem IC kit
- PS-50 heavy duty power supply
- PS-430/PS-3D DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S-88SN 2.4 kHz/1.8 kHz SSB filters
- MC-60A/80/85 desk microphones
- MC-55 (8P) mobile microphone
- HS-4/5/6/7 headphones
- SP-41/50/50 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 (no pan display)
- VS-1 voice synthesizer
- TU-8 CTCSS tone unit
- PG-2C extra DC cable.



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the City Hospital. There was a communication center set up next to the emergency room in the Hospital and the Red Cross HQ was activated. The Hospital and Red Cross officials were amazed with the Packet station which handled masses of data in moments and with hard copy. The participants were NV7N, K7JIX, KA7WEZ, AL7IN, K7DDI, K7JIY, K7ADW, W7OXS KB7EKB and W7VW. Curly, WA7TIC, Clackamas County EC, has succeeded in getting ham gear in the County EOC. They now have complete two meter station and packet system with used HF gear on the way. It has taken a long time to convince them to spend the money. Great job. While we are talking about the Clackamas ARES group they have furnished communication for the Cascade Run Off for the past eleven years. That has to be some kind of a record. I am sorry to report that Gene White, K7YQM, DEC 5th District, has resigned because of health. He has done an excellent job and will be missed. Mike Dunlap, K7MYU, had been appointed Emergency Coordinator for the City of Salem in Marion County. Mike is the main reason we have all of the communication equipment in the State EOC and will be responsible for the training personnel to run that equipment. He will also work in harmony with the Marion County EC, Tim Russell, WA7TOF. Traffic (P) = Packet W7VSE 352, N7BGW 256, KA7EEE 228, WG7H 156, WB7EMO 130, N7DRP 57, W7LNE 51, W7VMS 48P, KA7AID 26, W7ODG 20, KA7WFW 16, KA7DEF 4, Late Aug. WB7EMO 18.

EASTERN WASHINGTON: SM, Tom Plaisance, KC7PH—STM: W7GB. SEC: WA7CBX. OOC: W7LKR. ASM: KC7MM. ACC: NQ7M. SGL: KD7AC. TC: W7DBV. ASM & WEN NM: KE7WG. PIO: WA7GQO. In case you missed it, KC7PH was elected (unopposed) to a two-year term as Section Manager, which began Oct 89. Bob Church, WA7GQO, has been selected as Eastern Washington's first Public Information Officer. Bob lives in Selah and has previous experience as PIO in Montana. His duties will included the coordination of public relations within the section. Hats off to the Walla Walla ARC, W7DP for a super hamfest, which include a great Section meeting. Jack Babbit, WA5ZAY, was not only busy as chairman of that event, but also found time to upgrade to Advance. Dick Umberger, N7HHU has put on a fine presentation on Packet. SEC WA7CBX reports 121 public service hrs. (Sept.) 73 and Happy Holidays to all, KC7PH @ N7HHU BBS. Traffic: W7GB 188, WA7YEN 176, W7LBK 36, N7HXT 15. (Aug.) W7LBK 67.

WESTERN WASHINGTON: SM, Mary E. Lewis, W7QGP—STM: KD7ME (@K7KNZ). SEC: NM7N (@N7HFZ). SGL: KD7AC. PIO: N7FKV. ACC: W7QGP. TC: W7JWJ. Tnx to KA7INX for easy SM transfer. Longview (Lower Columbia ARC) teaching a Novice class & putting up additional tower at club house. For VE team info contact Stu Farmer K7WF, 2724 Florida St., Longview, 98632; Chehalis Valley ARS holding Novice class & new meeting, place Backdoor Restaurant in Lewis Cty. Mall, 1930 1st Wed. VE exam for Lewis Cty. Contact Roy W7GYB 736-7028; Clark County ARC (Vancouver, signed as Special Service Club; Issaquah ARC also Special Service Club; Jefferson Cty ARC has very active ARES, working with Chimacum High School ARC, also a Special Service Club; West Seattle, Special Service Club, new meeting time 9:00 AM 2nd Saturday, Our Lady of Guadalupe School. For info call Roy 932-1095; VE testing Seattle 1st Sat NSCC 10 AM all walk-ins; 2nd Sat Tukwila Riverside Inn 10 AM after 147.08 Sea-Tac breakfast & meeting, All walk-ins 10 AM; 3rd Sat Renton United Good Neighbors Bldg at 1300. Mike WA7UVJ 854-4031 for info; Everett 2nd Sat 9 AM. Info Loren Hole KK7M 355-2141; Bremerton 4th Sat. 10 AM Info Dave Brooks N7HTK 876-3120; Tacoma exams contact W7BUN 845-7652. Call or write with other listing of exams and ham classes to W7QGP 523-9117. Net Reports - Sept. NTN, QNI 1373, QTC 128, QNS 30; NWSSB, QNI 502, QTC 46, QNS 30; WARTS QNI 2904, QTC 175, QNS 30; WSN QNI 510, QTC 135, QNS 60; PSTS QNI 122, QTC 74, QNS 58.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, WB3FCV. SEC: W6LKE. STM: K6APW. OOC: K6TI. TC: N6AMG. WB6DOB reports the annual NCN Picnic, held this year at the Knox Miller Regional Shoreline, was a great success. Joe also reports that the WA6EUZ repeaters on 145.41 and 145.49, long used for the NCN-VHF sessions will not be available due to a change of management. Paul Mason, WA6EUZ, is owed a debt of thanks for his years of tireless effort on behalf of NCN-VHF, and the many others who used them, for providing well-maintained and superbly designed systems with unmatched coverage. I had the pleasure this month of being invited to speak on the ARRL Section management and appointee structure at NBARA's first meeting to be held at the Norman C. King Recreational Center in Vallejo, a first-class facility for a first-class club. LARK's meeting was held in the City Council chambers, and featured presentations by two of the companies involved in the windfarm projects in their area. The CCCC mourns the loss of member KA4UJI. EBARC's meeting featured a presentation of the slide show on the 1988 Clipperton DXpedition, FO0XX, by one of the operators, W6RGG. MDARC welcomed new members N6VHH, N6VHI, N6PWX & N6VYF. I received a copy of the NALCO ARES Newsletter. If you have an interest in this group, check 147.48 or call WB6HPA, 843-9299, or WA2UNP, 540-8916. HRC's next Novice class will be starting soon. Contact NA6Q, 582-8790, or KB6RKR, 886-8434. Sep tfc: WB6DOB/222, W6VOM/175, N6VMK/78, WB6UZX/43.

NEVADA: SM, Joe Lambert, W8IXD—ASM: Curly Silva, K7HRW. LVRAC is planning a X-mas Party for 12/1. Also mark your calendars for NARA Swapfest on June 2 of next year. SIERA Hamfest at the Carson Valley Inn on 9/16 was real success. SIERA Newsletter also notes that K4CTZ has been named a Fellow of the Radio Club of America. It also has several interesting biographies of SIERA members other clubs might try this. SNARS newsletter had a summary of earthquake dangers in Calif. which are a major threat . The Section Mgr. visited with members of ENARS, EARC and NNARA on an overdue get-acquainted tour of Northeast Nevada. Thank you all for your hospitality and enjoyed meeting several new faces on this trip. Traffic counts for Sept: KF7GB 20, NØIA 42, KK4M 61, NK7N 16, WB7PNS 3. Stations qualifying for Public Service Honor Roll: KF7GB 61 pts. NØIA 126, KK4M 99, NK7N 60, WB7PNS 41. Please send us your traffic reports to KK4M for inclusion in the column.

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PACIFIC: SM, Wayne Jones, NH6GJ—I had the privilege of attending the combined meeting of the Big Island Amateur Radio Club and the Hawaii West Amateur Radio Society that was in Hilo on September 9. The occasion was the annual auction of the BIARC. I met quite a few new friends, and had quite a time! The auction started at about 1 PM, and was going strong when I had to leave at 5 PM to catch my flight back to Honolulu! I understand that they kept going for quite a while longer! Unfortunately, when I returned to Honolulu, I seemed to have caught a bit of the flu bug or something, because I really was ill for a few days following. During this time, I missed the deadline for last month's column, for which I sincerely apologize! The BIARC auction was not the only big event during the month of September, though. As always, the Aloha Week Parade and Hoolaulea activities also occurred. The event was supported by amateurs from all clubs on Oahu, and about 50 hams participated in the events during the week, which ended with the parade activities that were filmed for television, to be shown during the telecast of the Macy's Thanksgiving Day Parade. The events were coordinated by KH6NJ. Thanks Dennis! Traffic: KH6H 20, KH6S 19, NETS 25.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—Here is the rest of the Section Staff listing which was started last month. The District ECs are Cass, KX6Z for Metro Sacramento and Ken, WO6H for the Mother Lode District. Our ECs and their counties are Bob W6ITR, Alpine; Bill, WG6N, Amador; Phil, N6MSZ, Butte; Benny, KJ6MD, Lassen; John, KI6UF, Placer; Art, KA6HVY, Plumas; Bob, KI6FT, Sacramento; Wayne, W7KEH, Siskiyou; Les, KX6Q, Shasta; Brad, N6CVF, Tehama; Bill, N6GLL, Trinity; Mark, KA6YSC, Yolo; Barry, KE6LW, Yuba- Sutter. Public Information Assistants are: KA6OZQ, W6KZN; and KB6RHL. Official Relay Stations are: WB6CLD, WB6SRQ, N6LVY, N6LAM, WA6ZUD. OO Coordinator WY6O has built an excellent OO group consisting of KF6EN, WD6EHF, KI6UQ, WA6ZWE, WA6Q, WA6KYA, NT6E, AA6GN, K6FO, WB6RVR, KI6OF, and KE6EP. The only Asst. TC is Keith, K6QIF, a specialist in packet. On other matters, K6ELR's XYL Laura, who was licensed in the 50s has just gotten her new call, N6WAM and now the family is moving to 7-land. Carol, the CARS Radio Officer, is now N6WCV instead of the KB6BKX that many had trouble keeping straight. As this is my last report to you and, as I am out of space here, I'll say a final 73 and TNX to all who have helped me so much in my four years as SM. I have enjoyed those years very much! Traffic: WA6WJZ 120, W6CFQ 53, WA6ZUD 46, W6RFF 25, K6SRF 11, KB6WIJ 4.

SAN FRANCISCO: SM, Dick Wilson, K6LRN—Silent Keys: KA6MYV, Al Teacher and NY6A, Fred Walker presumed drowned on a sailing trip. Redwood Empire DX Assn. officers for 1989; W6OSP-Pres., AE6H-VP, WA8LLY-Secty-Treas., WW6D & WG6H-BoD. KB6SLY won a 2 meter mobile rig at the joint picnic at Scotia. KA7JAN-EC mailed RACES/ARES info to SF hams, pls read and return ASAP! Thanks to 28 respondents so far. WB6GWP is an asst EC-SF. WA6BXV has applied for DXCC-290 endorsement. Thanks to WB6TKD, K6BMW, WA6CBQ, WA6MSE, N6MON, WA6MHO & N6AQY for communications assistance on Oct. 1 Triathlon. Upgrades: KB6SZS to Tech; WD6HAE, KB6UYY, KB6ZOP, & KB6VYR to General; KC6CHF, N6NRK, N6VRN & N6NKS to Adv; N6VAW & W6TWQ to Extra. Congrats! WB2CHO and his able committee put on a super Flea-market/Swapmeet. Unfortunately, Mother Nature put on a display of thunder, lightning and rain not normally seen in Sept. turning the event into a swamp-meet. Pls remember; deadline is the 6th.

SAN JOAQUIN VALLEY: SM, Byron Smith, WA6YLB—Asst. SMs:K6YK and W6TRP.SEC:WC6U.STM:N6AWH. Get your pen ready and mark your calendar for the DX Convention in Visalia April 6,7 and 8th at the Holiday Inn. Congratulations to these new hams and upgrades: Paul KC6FFF, Bob KC6CSN. Techs: KC6DJT,WA6LAY WB6TVS. Generals: N6VGI,KA6RUF. Advanced: WA6FRO KC6EVJ,N6UVN,N6NIV and K6HMT. KB6BOK is now AA6QA. Sorry to report W6BYH as a Silent Key. KC6CEX has a new tower and beam. New officers of the Central Valley chapter of QCWA are: Pres. N6HB, 1st VP W6KAS 2nd VP K6EDO, Sect/Tres WA6KZV. W6QON has an IC-765. WA6KZV has a IC-32at. The Kern County Central Valley A.R.C had a great picnic in Sept with 50 hams in attendance. W6TRP and N6TFQ on ATV in Bakersfield. Visit this Club: Stanislaus Amateur Radio Assoc. on the third Tuesday of each month at the Stanislaus County Admin. Building (corner of 12th and H streets in downtown Modesto at 7:30 pm). Traffic: W6DPD 1, N6MXG 4.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: N6JQJ. TC: WA6PWW. STM: N6JLJ. PIO: N6HMO. ACC: W6MKM. BM:(vacant) OOC: KA6S. SEPTEMBER - I saw many of you at Pacificon, the ARRL Pacific Division Convention. The 'con was bigger and better than any in recent years. Thanks to SCCARA for sponsoring it and the many people who worked very hard to make it a reality. Special thanks to Shorty AE6Z for being the chairperson and head organizer for this and the last four Pacificons... The section RTTY ragchew frequency is 3680KHz. Recent denizens of it include WA6UBE, WB6W, N6PFK, WB6MLC and KB6BA...KA6S and WB6W met with FCC San Francisco FCC office to discuss closer cooperation between the FCC and the amateur auxiliary. Good things are expected to come from this... The Foothills ARS heard from section TC WA6PWW on the effects of a real load, such as an antenna, on a low pass filter designed to operate into a purely resistive load. The filter can do some very strange things! FARS also had their yearly camp outing, this time to Fremont Peak... The Gabilan ARC saw a video tape of member Howard KB6MTT erecting his 55 foot tower and HF beam....The Santa Clara County ARES/RACES supported both Red Cross and CDF/VIP at what has been called the "Lexington II" fire. Well done to all who participated... Our SEC, Dave N6JQJ, wants to reorganize the Official Bulletin Station (OBS) system so as to make it more useful to ARES. This effort is just beginning. The plan calls for a somewhat different approach to what an OBS is. This should not be a problem because the Westnet Packet Radio BBS system seems to be handling the job of distributing ARRL bulletins very well (TNX to WB5FIX among others), and because all old OBS appointments have long since expired (no reports at all in the last four years!). Hopefully, I'll be announcing a new Bulletin Manager in the near future... There is a telephone number that has information on Amateur Radio License classes, (408) 971-1424. Well...it only has the info that I put on it, and I can only put on it what I know about. PLEASE, let me know about any classes your group or club is sponsoring so that I may include them on the recording. My phone number is on page 8 of this issue of QST...TFFC: (no reports this month either, what's with you guys?) Phone numbers: Amateur Radio Classes (408) 971-1424 License Exams (408) 984-8353 (ARRL VEC) or (408) 255-9000 (Sunnyvale VEC)

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W— ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: KI4YV. ACC: WC4T. TC: KM4OX. SGL: KE4ML. PIO: WA9NEW. Want to hear how your signal sounds in Europe? N4TN reports someone retransmitting 40 M CW (around 7015 kHz) on a non-amateur frequency (around 8881 kHz); 3-4 kHz being translated. Interesting DX stations which are barely readable here on 40 M are strong into this mystery repeater. [BT] Its time to finalize your group's plans for "Free Christmas Radiogram" tables or booths at local shopping malls. Be sure to prepare signs and include an equipment display. A CW receiver, with the signal just audible over the crowd noise, is a very good way to attract attention. Most malls welcome this activity since we provide a free service. The goal of this type operation is to make the public aware of Amateur Radio; publicizing both the hobby and the public service aspects. This is a most effective way to contact the public. You may meet potential Novices looking for someone to give them exams, Amateurs who are inactive or new to your area, or get a chance to tell someone about our public service activities. Help out with an existing mall operation or set one up yourself. [BT] Although increasing the load on the NTS is not the main goal of the "Free Christmas Radiogram" tables, the traffic generated certainly contributes to the annual Christmas traffic rush. This is a good exercise of the traffic system and creates a special need for outlets in all cities & towns throughout NC. Please check into an HF or VHF NTS net, help with the traffic load and get some good experience handling traffic. [BT] Hurricane Hugo, which was headed toward the southern coast of North Carolina, caused lots of amateur activity prior to landfall as preparations were made for evacuation. ARES groups manned many county EOCs and shelters in the costal counties. The HF station at the Wilmington National Weather Service office provided liaison to the Hurricane Net, SERT had been activated Sep 20 and the State EOC station was manned on Sep 21. Thursday night the Governor and Lt. Governor of NC received their first information about power outages in Wilmington and Brunswick Co. when handed a radiogram at State EOC. The storm had strengthened to Class 4 and had a diameter of 200 miles when it veered westward toward Charleston. After sweeping across SC, Hugo's eye came northward through Charlotte causing extensive damage in NC. Numerous counties had over 75% of their roads blocked by downed trees. Damage to homes and businesses was extensive, and power, communications and water supplies were disrupted for days. The W4BFB station at the Charlotte Red Cross was on the air for 11 days and handled an impressive amount of disaster traffic (see report below). SEC N4MYB reports that ARES was a critical factor in communications for many NC counties, both in the central portion of the State and at the coast. [BT] N4MYB asks that all EC's send in their SET reports. It's not too late to hold an SET if your county hasn't had theirs yet. Tom suggests that county EM officials be involved in the planning of the exercise. [BT] Congratulations to N4UOQ and N4SSU on their recent marriage. [BT] Note increase in this year's traffic totals for quarter! Quite impressive. [BT] Quarterly traffic report, Jul-Sep 89:

Net	QNI	QTC	TFC	QND	SES	Net Mgr
CEN	1603	440	383	1674	94	WB4WII
NCMN	1193	557	392	1608	93	WD4MRD
CN	1749	1035	770	3901	184	K4IWW
CSN	686	130	114	2351	92	AA4MP
CNCTN	2677	267	201	1553	90	WA4MNR
PCTN	1768	508	432	1818	92	N4SVZ
RARS	1151	82	79	1784	92	K4ABJ
M2MEN	1759	98	75	1127	90	KF4MZ
CFARS	1100	82	82	1336	90	W4EHF
PETN	995	126	111	939	85	WB4HRR
THEN	951	138	126	1229	90	KA4LHW
ACAN	164	6	6	102	14	K4ULA
Totals	15,896	3,465	2,771	19,422	1,106	1989
(1988	14,316	2,600	2,270	16,847	1,090)	[BT]

September traffic: W4BFB 446, K4NLK 406, N9CGD 226, KB7LX 183, KI4YV 174, K4IWW 159, KA4EYF 143, WD4HTE 135, KB4FWL 92, AA4ZV 86, WA9NEW 82, N4UE 69/(45 AUG), N4SVZ 57, WD4MRD 53, W4EHF 48, WD4LOO 44, WB4WII 40, N4LST 40, KC4GCK 36, N4JTG 36, W4EAT 35, N4SMS 34, N4UMI 33, N4VHU 29, WA2EDN 25, KF4NJ 25, WA4MNR 24, N4SHE 17, WD4LSS 17, KA4KGZ 16, AB4W 15, N4UOE 14, W8KLF 11, N4VVX 6, KM4BN 4 [AR]

SOUTH CAROLINA: SM, Ned Moeller, N4FVU—Hurricane Hugo produced its share of heroes when it struck in Sept. S.C. Hams responded admirably when the weather emergency hit Sept. 20th. Amateur ops worked closely with the Am Red Cross, National Weather Svc & SC Emergency Preparedness officials in setting up communication links throughout the state. ARES volunteers manned the SC RACES HF Net which handled traffic between county EOCs & state EPD Hqs in Columbia. Amateur Radio provided invaluable communications to the affected areas—many times when other systems had failed. The SC NTS SSB Emergency Net operated continuously for 8 days. Area radio clubs provided essential links with Red Cross chapters around the state & emergency shelters housing evacuees from the storm. Additionally, National Weather Service offices were linked via 2-meter repeater nets. Outlying areas without normal communications relied on amateur mobile stations —one mobile station was manned for over 10 days. Hugo proved that S.C. Hams were prepared with emergency power and back-up antennas. Many Hams said the only thing that failed to work was their voices after hours and days on duty. A job well done for SC by section Hams. See you at the Greenwood GARS Hamfest Jan. 20. Traffic: WA2GYM 1320, KI4FL 1265, W4ANK 235, KA4LRM 117, N4MEJ 87, W4DRF 20.

VIRGINIA: SM, Claude Feigley, W3ATQ—STM: N4GHI. SEC: WB4ZTR. ACC: NT4S. OOC: W8IRT. PIO: AA4VP. TC: WX4C. SGL: W4UMC. See last months QST for a listing of section nets. There have been no changes. The threat of hurricane Hugo hitting Virginia resulted in a review of the section's "VIRGINIA EMERGENCY NET STANDARD OPERATING PROCEDURE" (SOP). This SOP outlines the procedures that will be

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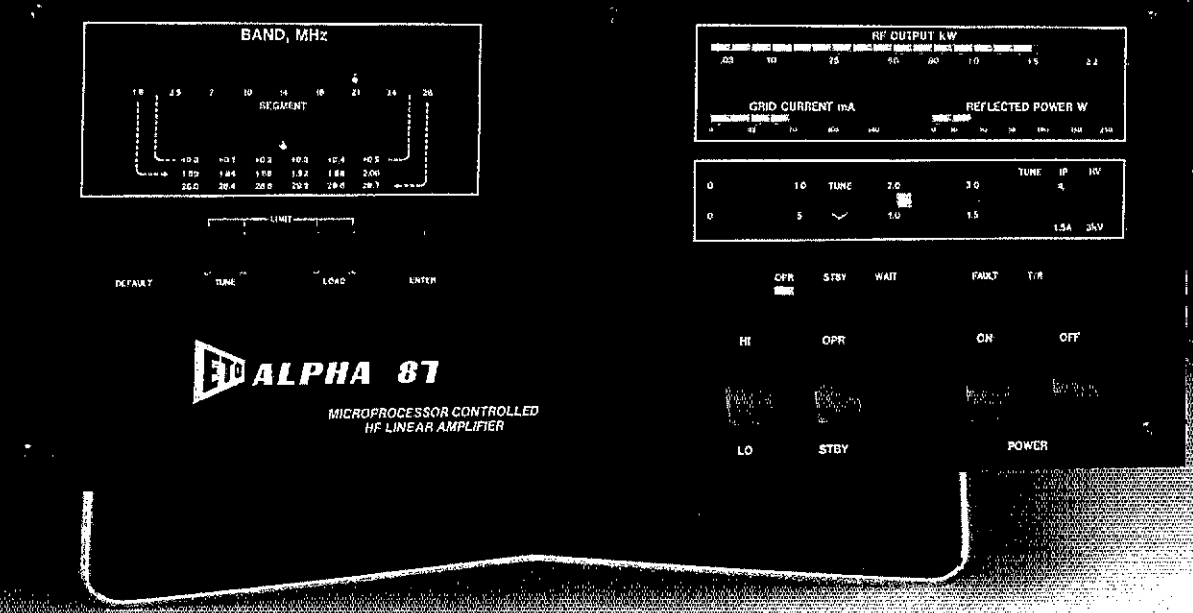

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placed in operation whenever there is need for us to provide communications for state and local governments during an emergency. Copies of the SOP are available from the SEC, WB4ZTR and the SM, W3ATQ. During Hugo's swath thru the islands, South and North Carolina, many of the hams in the section were very active. WB4ZTR was in close contact with Disaster Emergency Service officials in Richmond in case the Virginia emergency net procedures were to be activated. The southwestern part of the state did suffer damage so DEC, KB4PW setup operation at the Roanoke Red Cross. EC, WA5FAC assisted by getting equipment and ARES members to man the shelters setup by the local Red Cross. All communications were via VHF. The operation lasted from Friday afternoon until Saturday afternoon, Sept. 23rd. REMEMBER the section DEC/EC Net meets the 3rd Wednesday of the month at 9:30 PM on 3947 kHz. All ARES members should monitor this net to keep abreast of emergency activities. New appointments: W4AXH, EC for Mecklenburg county. WA4NEL, EC for Charlotte county. Welcome to the Middle Peninsula ARC, in the Gloucester area, as an Affiliated Club. We sure miss John, WD4FTK, from the various traffic nets due to his health problems. To those who may be interested in assuming the post of Section Manager or nominating a qualified candidate, all petitions must be in ARRL Headquarters by December 8, 1989. Nominating petitions are available from the SM, W3ATQ or Headquarters. Another year of successful VE examinations is coming to a close, thanks to all those who worked so diligently to provide this service. KF4OW saz 14 examiners tested 83 people, giving 112 exams at the Va. Beach hamfest. Seventy passed, 42 failed, four made Novice, 14 upgraded to Tech, four to General, five Advanced and five made Extra. Congrats to all. Upcoming exams; Dec. 2, Va. Beach contact Tom Weikel, KA4UNC - Richmond, John Tyler Community College contact Albert Bailey, N4RPI. All traffic handlers should be getting ready for the Christmas traffic crunch. We will need volunteer liaison station to move the traffic from the various nets. Come join the fun. To all, I wish much happiness for the Yuletide season and health and prosperity for the NEW YEAR. Traffic: WBØTAX 1454, N4GHI 1069, K4DOR 574, W3ATO 514, N4HOG 514, K4MTX 489, KD4NH 405, WB4D 358, W4JLS 356, N4EXQ 184, WB4ZTR 171, WD4MIZ 130, KJ4VT 112, N4KSO 91, WB4FLT 83, KB4PW 76, WB4VMX 76, KB4CAU 75, NW3K 66, WB4EDB 62, KC4ESG 53,WB4ZNR 60, N4GMQ 50, AA4GL 47, WB4KIT 47, WS8A 39, K4BGZ 39, N4RHV 37, K4GR 36, K4JM 34, N8ANQ 33, KI4W 29, WB4DQZ 23, N4FZA 23, N6GVG 17, KK8L 16, K4MLC 15, KB4OOPR 13, KOGYK 12, W4TZC 11, N4FNT 4, N4JEO 4, N3RC 3, NW4O 2, W4YE 2.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: N8FXH. SGL: K8BS. TC: K8LG. ACC: WA8FLF. Repeater Coord. WB8GDY. regret to report that John Davies, W8HZA has become a Silent Key. Logan Co. EC Roy, NU8K reports that Logan and Mingo ARES were ready during Hugo flash flood warnings. WD8V and KA8ZGY gave us good publicity during TV interview. Huntington HF on 10/8 was very successful. Congrats to KB8CJB and entire HF committee. New time for Novice Net is 7:15 PM daily.

NET	FREQ	TIME	QNI	QTC	SESS	NM
WVFN	3865	6:00	961	107	30	WD8DHC
WVN	3567	7:00	221	85	30	KZ8Q
WVMD	7235	11:45	753	66	29	WD8V
WVRN	3640	6:30	240	30	30	K8LG
WVNN	3730	7:30	68	30	27	KA8ZGY
Hillbilly	14290	Noonsu	166	14	4	W8YP
WVN-L	3567	10:00	178	54	30	KZ8Q

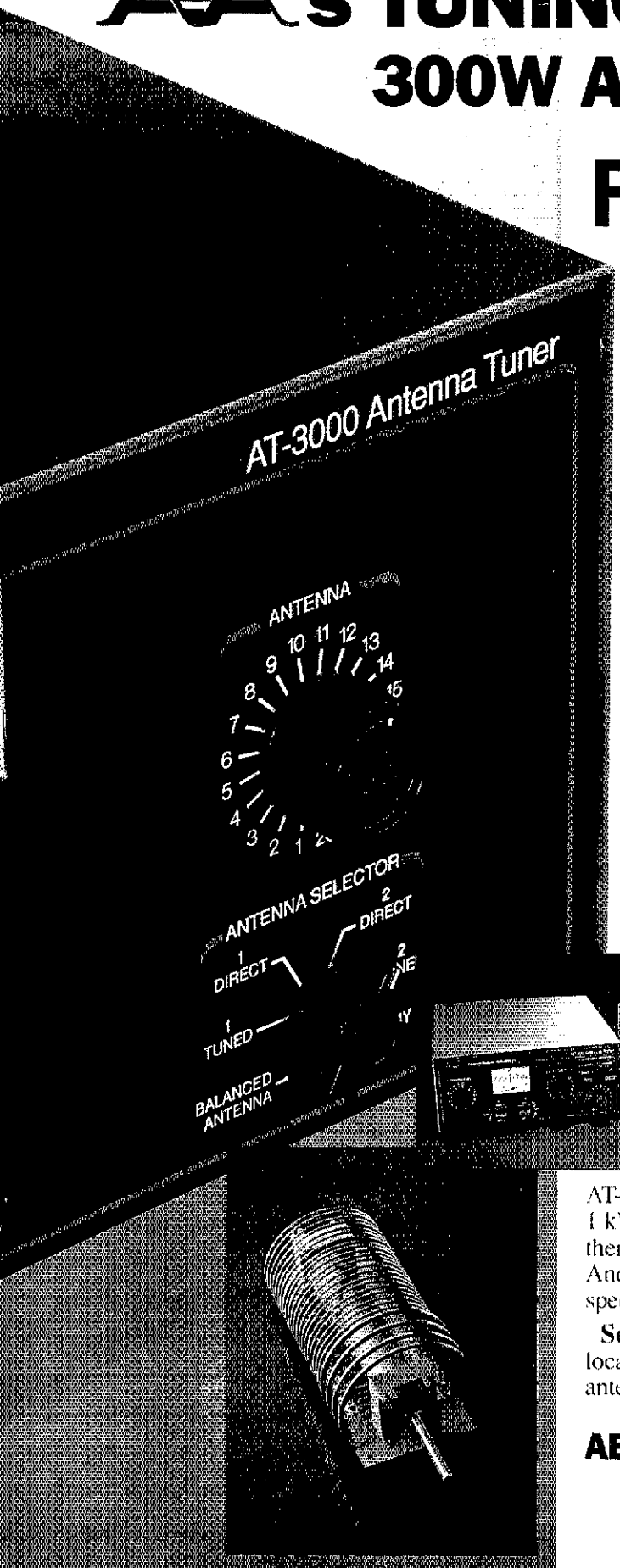
Traffic: WD8V 862, WT8L 358, KA8WNO 314, W8YP 133, KA8ZGY 100, K8TPF 94, WD8DHC 85, N8FXH 42, K8KT 20, W8JWX 15, NU8K 10.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Edie Sheffield, KAØMQA—SEC: K4UBU. STM: KBØZ. ACC: WBØDUV. PIO: WBØFQB. OOC: KAØCDN/WØIJR. TC: WØLFJ. SGL: WDØHNQ/WDØHNP. BM: KAØVKM. Many amateurs in the Section were involved with H & W traffic from Colorado into the affected areas which were devastated by Hurricane Hugo. My thanks to WØBWJ & KQØJ for their help with the media calls. The station of KQØJ & KAØMQA passed much of the traffic into Puerto Rico & the islands. The DRC station at Mile Hi Red Cross was activated by the EC of Denver Dist. 13, KBØCHT. Many DRC and ARES members worked many hours and several days passing and delivering H & W messages. This was a first time big effort of using packet radio in Colorado for these messages and the BBSs of WØLJF, KØHOA and W1HAB were busy and most helpful in getting this traffic out to the different areas. My thanks to all of the amateurs involved for your time and efforts. Congrats to the Western Colorado ARC in Grand Junction for their 50th year as an affiliated club in the Colorado Section. This is definitely the oldest ARRL affiliated club in Colorado. From all of the Section Leaders, we wish you a Happy Holiday season. NETS: COL: QNI 1000 QNF 926, QTC 63-120, 20 sess; CWN: QNI 56, QNF 325, QTC 37, 30 sess; CWXN: QNI 2136, QNF 2700, QTC 1893, 30 Sess. HNN: QNI 1628, QNF 951, QTC 145-674, 30 sess. NCTN: QNI 267, QNF 338, QTC 88, 29 sess. SCTN: QNI 343, QNF 340, QTC 52, 30 sess. Traffic: NØBQP 1803, KØHOA 1076, WØLVI 789, KØYFK 656, WØLJF 612, KCØVL 570, WØTX 514, NØHFZ 400, KAØWIE 360, WTØG 238, KAØMQA 216, NØGVC 224, NØFCR 168, KØSN 88, KBØZ 30.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMs: WA5UNO, KA5NNG, W5QNR. TC: W8GY. ACC: KA5BEM. NM Roadrunner Net meets daily, 3939 @ 0100 UTC, handled 82 msgs with 1120 checkins. NM Breakfast Club meets daily, 3939 @ 6:30AM, handled 173 msgs with 866 checkins. Yucca 2-mtr Net, 78/18 handled 22 msgs with 333 checkins. SCAT Net, 66/06 handled 8 msgs with 578 checkins. Info Net 12/72, with 91 checkins. Sunday Noon Packet Net on ZIA with 48 checkins. Southwest Net meets daily, 3538@0230VTC, handeled 59 msgs. With 93 checkins. Good newsletters from the following: Totah ARC, ENM ARC, Nazarene ARF, ABQ DX Assc, NM Scanner, Mesilla Valley ARC, El Paso ARC, Pikes Peak ARC, and Denver ARC. FB job by a lot of hard working individuals!! Also congrats to all ARES and others who contributed to the success of OPCOM 1-89 and the Red Cross Exercise. Tnx also to those who helped in the success of the Albuquerque Marathon. Sorry to report the passing of W9SSR, Tony of Rio Rancho. Traffic: KF5VF 107.

AEA's TUNING PERFECTION
300W AND 3kW TUNERS

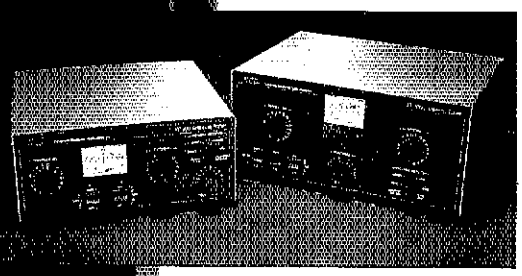


For tuning perfection, choose AEA's AT-300 300 watt or AT-3000 3 kW antenna tuners. Quality and exceptional engineering are built-in for maximum performance.

Easy Operation. The built-in front panel antenna switch allows you to easily select two unbalanced (coax-fed) antennas, a dummy load or a balanced antenna. Both the AT-300 and AT-3000 are easy to use.

Peak Reading Meter. The AT-3000 features a peak and average reading cross-needle meter which shows forward power, reflected power and SWR. High and low power is selected from the front panel to select the proper range for the SWR meter. Minimal SWR is achieved by inductors with 18 (AT-300) and 20 (AT-3000) taps created by AEA's exclusive patent pending CAM switch design for accurate tuning. AEA's tuners also tune a wider range of antenna impedances. There are limitless possibilities to create the best match.

Larger Size. Why are the AT-300 and AT-3000 so large? Because it improves the inductors' Q (quality) factor for high efficiency. High Q means low insertion loss which guarantees that maximum power is delivered to the antenna. Tests with some roller coil antenna tuners show insertion loss as high as 20dB on some amateur frequencies. Don't be fooled into believing that a low SWR is the key reason for using an antenna tuner! The primary reason is for maximum power transfer from the transmitter to the antenna. An SWR of 1.5 to 1 or better is usually all that is necessary to "make the transmitter happy." Remember that you can get 1 to 1 SWR with just a dummy load. AEA's two coil design also provides harmonic reduction, maximum power transfer and a wider range of impedance matches.



300 or 3,000 Watts. The AT-300 watt continuous duty cycle tuner has been tested at 1 kW with a 50 ohm load, so you can rest assured that there's no problem operating the AT-300 at 300 watts. And the AT-3000 is rated at 3 kW. AEA stands behind its specifications.

See the AT-300 and AT-3000 antenna tuners at your local AEA dealer. Get the most from your transceiver and antenna, and tune into top performance and reliability.

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UTAH: SM, Rich Fisher, NS7K—SEC/STM: Jim Brown. PIO: Lon Stuart. U.P.R.A. Utah Packet Radio Assoc. SNOW is dead; should be back up as soon as a trip can be organized. SLC and SLC3 has new ant. with a better location and this will give better coverage soon. There are plans for extending the backbone so watch for that. Also UPRA needs your support. QTC N7JLC 99, WA7MEL 68, NS7K 23, KO7H 4. 73, Rich, NS7K.

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, WO4W—ASM: W4XI. SEC: KB4GDN. STM: W4PIM. PIO: KB4KCH. ACC: AA4BL. OOC: KF4VS. SGL: N4FRQ. BM: KA4ZXL. Alabama amateurs have done a superb job in handling health and welfare messages into the Caribbean and South Carolina after the landfall of Hurricane Hugo. A number of clubs and individuals across the state spent long hours getting messages through from concerned loved ones. Packet radio was used very effectively for this purpose. We have been fortunate that no major tropical weather systems have affected Alabama this season—but we still need to be prepared as Hurricane Hugo has reminded us! It is good to see some new calls on the Alabama Section Net (ASN). Come join the fun nightly on 3575 kHz! Participation in NTS is fun and very rewarding. Our STM, W4PIM, has done an excellent job in promoting all our section nets. The Birmingham ARC has expanded their National Weather Service data capability on the W4CUE PBBS, and now NWS products are being forwarded to other packet BBS systems in the state. A personal note- I have accepted an offer to become the primary weather anchor for WBRC-TV, Channel 6, in Birmingham. I have enjoyed a wonderful three years in Demopolis, and look forward to joining the gang in Birmingham again. BPL: WA4JDH. PSHR: WA4JDH, W4PIM, W4QAT, W4CKS, WA4RNP. Traffic: WA4JDH 684, W4PIM 182, WA4RNP 109. W4QAT 100, W4CKS 131, WO4W 9.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM: KC4MJ. SEC: NC4E. STM: WB4WQL. PACKET: W4QO. ACC: KM4IH. BM: AA4UA. OOC: W8BLA. PIO: WA4LLE. SGL: WB4UVW. TC: W4ZTL. I hate to start this column with a sad note, but the following great Hams became SILENT KEYS during the last four weeks: Aubrey, K4YID; Toby, K4PIK & Cliff, N4QHL. Our deepest sympathies go to their families & friends. Harvey, W4TG, due to ill health, had to resign his OOC position. From all of the section, THANK YOU for a job well done. W8BLA, Verne, has accepted this vy important job & is looking for qualified hams in the section who desire to become members of the FCC Amateur Auxiliary. If u think u can qualify, contact Verne at the following address. Verne Fowler, W8BLA - 11315 Stroup Road- Roswell, GA 30075- Phone 404-993-2909. HUGO came and is gone, but to the hams in the section, it will take time to forget him. All of u who took part during the preparations & then expecting him to hit the GA coast need to be commended for the efforts that u made in setting up a fabulous communications system. It wud take all of this column & maybe a couple of more to list all the calls of all who were involved. Our coast was real lucky not to have any more damage than it did, but we were prepared for the worst. All I can say in once agn, TNX fer a job well done. PSHR honorees for Sept are: KA4HHE, WB4DVZ, KJ4NK, KC4BHX, WB4WQL, WA4LLE, K4ZUY & N4MWR. Remember the people who are on my staff are experts in the field they represent. If ur club or group needs their help, please contact them; they are willing and able. Once again this is December & the month that families get together. So from Leila and all of my family, a VERY MERRY CHRISTMAS from our house to yours & I hope that SANTA CLAUS does bring u that new piece of equipment this year. HO! HO! HO! God bless. Eddy. Traffic: KA4HHE 228, WB4DVZ 103, KC4BHX, WB4WQL 82, KJ4NK 50, WA4YYQ 35, K4ZUY 35, WA4LLE 32, N4MWR 22, K4BAI 6.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—SGL: John, KC4N. PIO: Petey, WA4PUO. BM: Dave: N4GMU. TC: Ed, WØRAO. ACC: Dick, WA4BIH. OOC: John, AB6I. SEC: Rudy, WA4PUP. STM: Cotton, KB9LT. ASM: Bill, KB4LB. ASM Digitala: Al, K4CY. A list of newly licensed hams for Aug and Sept shows 134 were added in the NFL Section. There is 1 Extra, 1 Adv, 3 Gen, 11 Tech and 118 Novices. This looks great to me and we hope all of them will join our clubs and become active with the section. My mail also had lots of newsletters from some of our clubs. They are: KEYED-UP from LMARS; SHARC TALES by SKY HIGH ARC; GULF COAST NEWS; THE PRINTED CIRCUIT from TARS; RANDOM WIRE of BARS; BALANCED MODULATOR from NOFARS; FLORIDA SKIP; BLURB from HCARA; THE GROUNDWAVE from DBARA; SHARC NET from SPRING HILL ARC; WESTSIDE STORY of WESTVARS; HAMM-RAMM NEWS and RELAY CHATTER by SUN COUNTRY ARS. It is great to receive all these fine publications and to realize how many active people we have in this Section. I will be presenting programs to OARC and the St. Augustine ARS in October and that will be an opportunity to meet more of our active amateurs. If you would like to be considered for an appointment to one of the volunteer positions in the Section, drop me a line and let me know of your interest. 73, Roy, N4ADI. Traffic: N4SS 379, KB9LT 323, N4JAQ 289, N4GMU 146, KI4PB 130, N4QYS 128, WA4EYU 111, AA4FG 97, N4DY 94, WC4D 75, W4UEA 72, N4UF 66, KI4CQ 63, N2AOX 62, W4AT 54, WA4PUP 48, NF4O 35, N4JHI 32, WB4DNT 31, W4KIX 29, WB4GHU 27, W8IM 21, KF4SP 21, KC4FL 18, N4OZD 17, WA4STZ 10, KI4VI 9, K4UTY 8.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—STM: K4ZK. SEC: W4SS. TC: KI4T. BM: WD4KBW. PIO: N4PBF. AAC: W4TAH. ACC: K4EUK. SGL: KC4N. PKT MGR: K4CY. Many thanks to K4CY for all the work he did in establishing packet links between Florida and the hurricane-affected areas. It was a job well done. All The Melbourne Hamfest was excellent as usual - The hamfest honored guest was Miss Phil KA4FZI, The ARRL Professional Teacher of the year. She was presented a plaque during the ARRL Forum as well as a presentation bouquet of mixed flowers. KC4EGO, K4KKP and the Fort Myers ARC were also recognized with plaques for their able assistance with the program she developed. KA4FZI also sent a copy of an article from one of the local newspapers which gave a very nice and informative account of her activities in the Novice Amateur Radio reading class she conducts. Congrats to KC4KSX who made his first DX contact with England. Todd is a Novice graduate of KA4FZI's Novice class last year. The Motorola ARC was presented The ARRL Na-

AEA's NEW PK-232MBX With PakMail™

Now AEA's popular PK-232 multi-mode data controller has new features you've been asking for...PakMail™ Mailbox with selectable third-party traffic, seven-character AMTOR (CCIR R.625) call identity, TDM (Time Division Multiplex) receiving for SWL's, and Prioritized Acknowledgement (ACK) protocol for improved packet performance. Compatible with almost every computer or asynchronous data terminal, you can enjoy the full spectrum of amateur digital communications with AEA's new PK-232MBX.

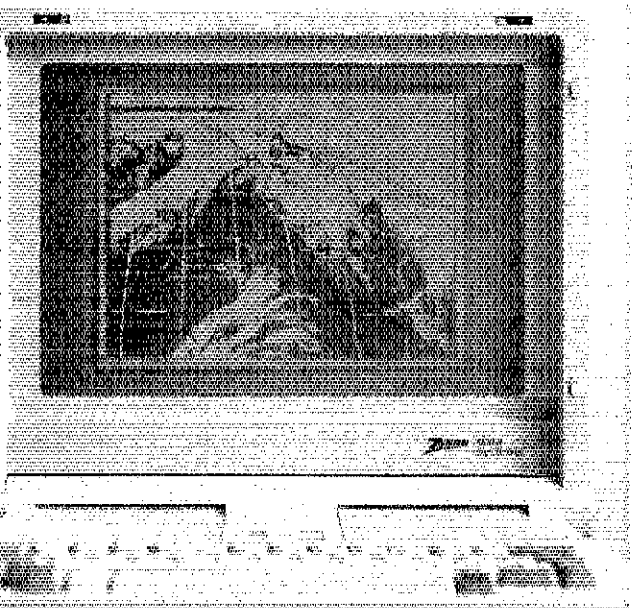
All Operating Modes. The PK-232MBX includes all authorized amateur digital modes available today...Morse, Baudot, ASCII, AMTOR/SITOR 476 and 625, Packet, WEFAX receive and transmit, as well as commercial standard NAVTEX automated marine information services.

Superior Modem. An eight-pole Chebyshev bandpass filter limiter- discriminator modem improves the signal-to-noise ratio at the detector and virtually eliminates interference from adjacent signals. System performance has been proven superior to that of PLL modems designed for telephone line services.

PakMail.™ PakMail™ mailbox with selective control of third-party traffic is now a standard feature. Your friends can now leave you messages around the clock. Your local full-service BBS can automatically forward your messages directly to your PK-232MBX.

WEFAX Transmission and Reception. AEA brought you the first multi-mode controller to send and receive WEFAX (weather facsimile) charts. The PK-232MBX directly supports the widest range of printers on the market using the optional RS-232/printer cable.

Host Mode. Only AEA provides the type of full-featured Host Mode preferred by many professional programmers for efficient control of the PK-232MBX. AEA's Host Mode programs include PC-Pakratt with FAX for the IBM PC's and compatible MS-DOS computers, COM- Pakratt with FAX for the Commodore C-64 and C-128, and now MacRATT with FAX for the Apple Mac-Intosh.

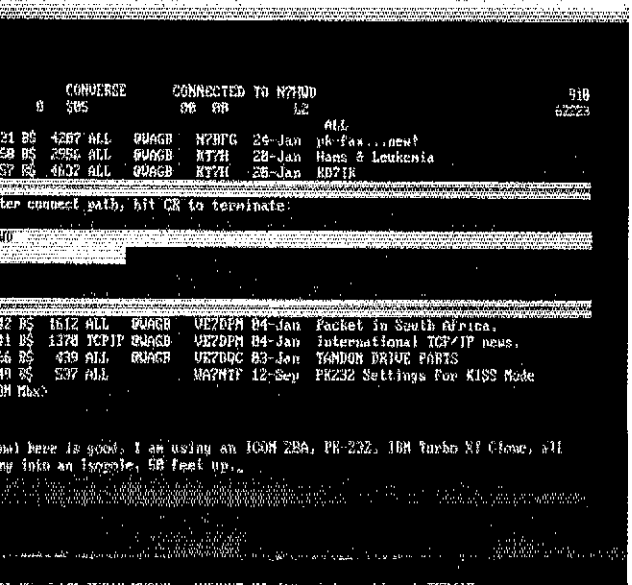


Two Radio Ports. Independent radio connection ports allow convenient, interchangeable all-mode operation regardless of port selection. You can connect two VHF/UHF radios, an HF and a VHF/UHF radio, or two HF radios, selectable by a front-panel switch.

Signal Analysis. The PK-232MBX's internal software features AEA's exclusive SIAM (Signal Identification and Acquisition Mode). The PK-232MBX automatically identifies Baudot, ASCII, AMTOR/SITOR and TDM signals, then measures signal speed and polarity. A simple "OK" command automatically switches the PK-232MBX to the recognized mode and starts the data display.

PakMail™ Upgrade Kit. The easily-installed PakMail™ upgrade kit includes a plug-in board and new software EPROMs, and is fully compatible with all existing PK-232's. Please contact factory for details.

You Deserve The Original. AEA produced the first multi-mode data controller. The PK-232 continues to be the standard against which all other multi-mode controllers are judged; the choice of critical amateurs, commercial services and government agencies. Don't settle for less than the best.



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tional Traffic System Service Award for their support of NTS and the Southeast Florida Traffic Net both in leadership as well as the WA4LZR repeater. The Fort Myers ARC, Modulator said it all in their headline - Phil West is the Best! They also reported that Cash, W4MPV, editor of the Modulator is recovering from a triple bypass at the Southwest Florida Regional Medical Center. The Englewood ARS continues its work with public service events - the "Adopt a Highway" was a terrific exercise for them. The Manasota Repeater Association and W4SS report that N8EHZ is the new Emergency Coordinator for Manatee County. Those hams *in the county* interested in becoming a member of ARES contact him at 795 0720. N4PBF reports that the American Radio Club has activated Southern Florida's first ATV repeater on 426.25 MHz and reactivated its 2M repeater on 145.50. He also reports that W4EHW, the amateur station at the National Hurricane Center was activated three times in recent weeks (this was received prior to Hurricane Hugo - RDH) W4IYT reports an amateur station aboard a Hurricane Hunter aircraft which will enable direct communication between ground points including NHC, W4EHW and the aircraft. KI4T reports a relay point for weather information is being established in Jamaica which help in passing weather data for the Carribbean Basin. Other club newsletters included the South Brevard ARC, Spark, Palmetto ARC, Bug Juice, Martin County ARS, Common Emitter, the Southwest Florida Traffic Net and the Everglades ARC, Beam. AA4CH reports that he was manning W4EHW at the National Hurricane Center as the eye of Hurricane Hugo struck Charleston. He also said that the researchers there were elated with amateur data collection. KD4GR reports that the Southeast Florida Traffic Net has now had 24 consecutive months of 1000 plus checkins per month. WD4KBW's bulletin report shows 97 received and 170 send by W4DL 28, WA4EIC 127, WT4F 35, K4IEK 24, WD4KBW 18 and WA9VND 37. Congrats to W7LUS who has been honored by being selected as a packet gateway station and handles out of state traffic on 20 meters - this is in addition to his BBS here in Sunrise. He relayed 450 messages for a total of 900 during September as a result of this new responsibility. Remember the ARRL Information Net which meets each Saturday morning at 8 AM on 3940 kHz. 73 de WA4PFK. Traffic: W3CUL 2933, W3VR 1126, WA9VND 531, WA4EIC 365, K4SCL 352, WA4PFK 293, K4ZK 237, K4EUK 225, WB4WYG 158, W4NFK 158, K4IA 151, K4FQU 151, KB6ECH 145, KD4GR 140, WA4RUE 138, KA4FZI 133, N4KFU 124, AA4CH 123, AA4BN 120, N4ORZ 115, KB4KXV 115, N4ET 109, W4DWN 105, W2JTT 102, N4MML 93, WT4F 82, WA4NBE 74, WD4KBW 63, KF4RL 55, KC4VK 52, KM4LP 44, KA4NXF 37, KB4MON 36, W3TLV 35, KA4YHS 28, KB4WBY 27, KB4UIA 26, KI4ZW 26, WB4GCK 25, KA9AKY 22, KA4SIH 22, KA0GYF 16, N4TVV 18, AB4BC 14, N4OIA 13, N7MCC 11, N0ABC 10, KA4GDU 6, AA4WJ 6, KA0RUL 6, W3IJR 5, KB4BLN 5, WA4PIL 5, W4VQE 4, N4PSV 3, K3KT 3, W4NSY 3, N4RHJ 2, W4MFD 2. (AUGUST) N4HAP 210, W1KAM 7.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—ASM: K7OMR. STM: W7EP. NM's: K7POF, K6LL, KI6ZH. I am sorry to report the passing of Glen O. Thomas, WA7HEH who became a Silent Key this month. Glen was a very active traffic handler and will be missed on the nets. K7KYW reports the Pima Co. ARES/RACES S.E.T. event will be Oct. 21-22. Please send in reports. Barry, KC8KV sent nice report on Yuma Co. He is DEC now and is organizing ARES/RACES activities out there. FB. Keep up the good work and do send reports to SEC. Pappy, KX7P our SEC reported FB ARES activity going on out at Lake Havasu City. Also AZ Sect. hams have been active in Hurricane Hugo operations. John, NJ7E was on Phx TV newscast showing him tracking the storm in The Caribbean from his hamshack. Also, understand Tucson operators were featured in a local TV news program. Details later, as operations are still going on at this writing. Gail, N7BXX is looking for anyone who may have personal experience relative to RFI to heart pacemakers. Contact him at Old Pueblo Radio Club, P.O. Box 42601, Tucson 85733. West Valley ARC and AZ. Rptr. Assn. received thank you from Glendale Police Chief for mobilizing 100 hams to aid in search for lost child in the desert. Fortunately the little girl was found just prior to hams reporting for the dragnet operation. NN7A, NN7D, and W7YS have returned from visit to USSR in August. While there they got permission to operate as R6ZF and R6YA and together made over 1200 QSOs on RTTY and SSB, and CW. K6FM and WX7E are leaving Flagstaff for new locations in Oregon. GL OMs. Jean, KA7PZL reports successful project R.A.F.T. where members of Coconino Co. ARC and Verde Valley ARC provided VHF communications between the Russian students rafting the Colo. river and the Grand Canyon rim areas. Craig, N7GLT rode the raft for six days and they were met at Phantom Ranch by four members of club, N7JWN, AA7AC, KA7PZL and N7FVK who all hiked down from the rim. Well done! Val, RA9YD participated in the support effort. I am pleased to report that after forty years of marriage, my XYL, Maria broke down and got herself a ham ticket. Her new Novice call is KB7INH. Best seasons greetings. 73 Jim

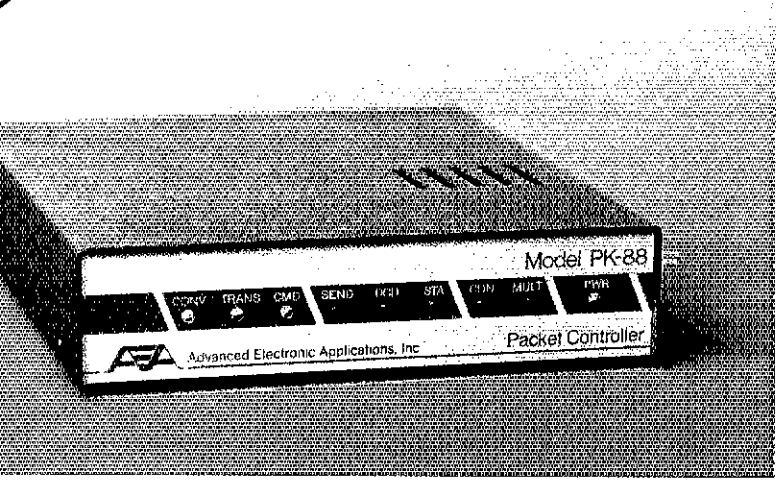
NET	Abbrev	QNI	Traffic	SES	Liaison
SouthWest Net	SWN	93	58	30	TWN
Arizona Cactus Net (HF)	ACN	No Report		TWN	
Arizona Cactus Net (VHF)	ACN	No Report			ACN (HF)
Tic & ATEN	885	106	29	TWN	

Traffic: W7EP 209, W7OIF 64, WE7G 31, N7ETP 16, W7KXE 14, K7POF 10.

LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF—The good news and the bad news. FCC Docket 87-14 (216-225 MHz band) Memorandum Opinion and Order released Aug. 17, 1989, reports that 525 Amateurs from California were able to write to the FCC. The total number of petitions for reconsideration filed by AMATEURS was only 700. 26 States sent in a number of petitions for reconsideration according to the FCC document.— This is just the TIP OF THE ICEBERG. The Military and other commercial interests are taking over our exclusive 14 MHz- 14.250 MHz band with the blessing of many. (If you don't care, no action is necessary.) The CBers are taking over the lower end of ten meters. The legacy for our children will be total CB with 50 kW military and commer-

New Low Price!
Amateur Net $119.95*
Retail $134.95

AEA's PK-88™ Packet Controller



Unique operating features with a proven hardware and software design make AEA's PK-88 your best choice in packet radio - now with MailDrop, an 8KBytes efficient personal Mailbox with selectable third-party traffic. The MailDrop uses a subset of the well-known WØRLI/WA7MBL packet BBS commands. When your PK-88 MailDrop is active, other stations can connect to your PK-88, leave messages for you or read messages from you. You can also store a single message or up to 15 separately numbered messages. Your MailDrop also accepts inbound mail forwarding from your local WØRLI/WA7MBL auto-forwarding packet BBSs.

The PK-88's internal KISS Mode is your direct interface to KA9Q's "NET" TCP/IP protocol suite - a single KISS command presets all packet parameters for TCP/IP operation. AEA's unique Host Mode provides the type of complete interface protocol preferred by many professional programmers for efficient control of the PK-88 by external programs and special applications. Your PK-88 also accepts special "NET/ROM" EPROMs provided by Software 2000, Inc., for Level Three node operation and networking.

In addition to all the features of a "standard" TNC, the PK-88 offers features not found in any other TNC:

- WHYNOT command - Shows reasons why some received packets are not displayed.
- AUDELAY command - Reduces spurious emissions in slow-switching radios.
- "Packet Dump Suppression" - Prevents dumping unsent packets on the radio channel when the link fails.
- Prioritized Acknowledgement (ACK) protocol improves performance on busy packet channels.
- CUSTOM command - Allows limited PK-88 customization for non-standard applications.
- Enhanced MBX command - Permits display of the data in I- and UI-frames, without packet headers and without retries and repeats.
- Enhanced MPROTO command - Suppresses display of non-ASCII packets from Level Three switches and network nodes.
- Unique MFILTER value $80 - Suppresses all graphics and control characters except TAB, CR and LF.
- Unique DFROM command - Permits selective digipeating ("Accept" or "Reject" digipeater operation by call signs).

Specifications:

- Processor: Zilog Z80. RAM: Battery backed, 32K Bytes. ROM: 32K Bytes
- Hardware HDLC: Zilog 8530 SCC

Modem:

- Modulator/Demodulator: AMD 7910 "World Chip"(tm), with differential AM detection and phase-continuous sinewave AFSK generator
- Modulator Output Level: Adjustable, 5 to 300 millivolts RMS
- Input Sensitivity: 5 millivolts RMS
- Input Range: 5 to 770 millivolts RMS
- External Modem Connector for use with external modem
- Hardware Watchdog Timer: One-minute time-out

Rear Panel Input/Output Connections:

- Radio Interface: Locking eight-pin; Receive Audio, Transmit Audio, PTT, Auxiliary Squelch, Ground
- Audio Input/Output: 3.5mm mini-plug
- External Modem: Five pins on DB-25; Transmit Data, Receive Data, Data Carrier Detect, Clock, Ground
- Terminal Interface: Standard RS-232 25-pin DB-25 connector
- Terminal Data Rates: Autobaud settings at 300, 1200, 2400, 4800, 9600. TBAUD adds 45, 50, 57, 75, 100, 110, 150, 200, 400, 600 and 19,200 BPS terminal rates
- HDLC Link Data Rates: 45, 50, 57, 75, 100, 110, 150, 200, 300, 400, 600, 1200, 2400, 4800, 9600, 19200 BPS

Front Panel LED Indicators:

- Converse, Transparent, Command, Send, Data Carrier Detect, Status, Connect, Multiple Connect, Power

Power:

- +12 to +16 VDC @ 550mA, coaxial power connector, (center pin positive), Model AC-1 120 VAC wall adapter available

Physical:

- 7.5"W x 6"D x 1.5"H; Weight 2lbs.,6oz.

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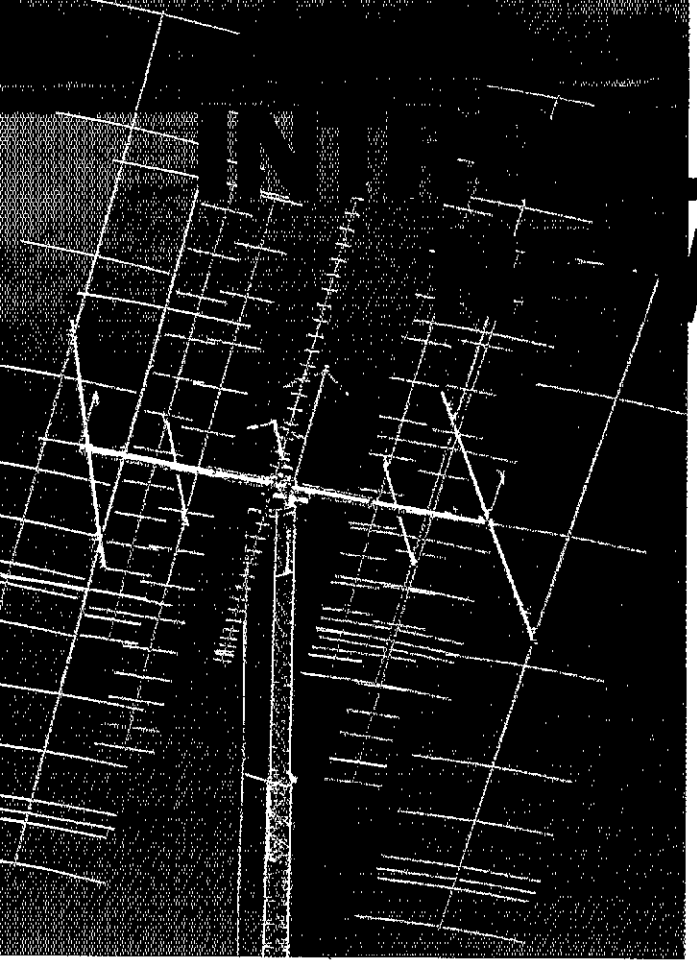
cial data stations. If you believe in AMATEUR RADIO FOR THE FUTURE learn to write to your elected officials and elect some who will work for you. If you don't help, who will??? — The furry of Hurricane HUGO has resided, but the messages are still flowing to and from the devastated Caribbean Islands. Our local heroes working with Frank Collins, N6TAF, at our ARRL Official Emergency Station located at the US Veterans Hospital in Los Angeles have done a great public service in handling more than 2,000 messages. The Veteran Hospital Station is also the Official AIRN West Coast Emergency Station and was in operation around the clock seven days per week during the disaster. Thanks to: N6KWS, Mike; WG5N, Warren, N6DE, Chuck; N6SUO, Eric; N6UNX, John and KA6RSY, John and KA6GSE, Dennis an active ARES member from the news media. Wm K. Anderson is the Director of the VA Medical Center and Benny Nicklebarry is Chief of Recreation; Hank Maar is Chief of Disaster Planning and Betty McKrosky is Chief of Vol. Services. Other VOLUNTEERS who signed in and handled traffic during the emergency were: AA6KM, Jim: N6VQQ, Ron: AA9TN, Barry: N6TUB, John: N6TAM, Dick: WA6MYB, Dr. Kent: WB6RNA, Leonard: KF6VC, Earl: N6PQU, Mike: KB6TVI, Steve: N6TFM, Ed & Jane Porter: KT6TO, George: KJ6VT, Roger: WA6QAG, Max: N6RBR, Lon: KB6WOR, Jeff: KC6EHN, Jerome: K6QVZ, Joe: NF6Y, John: N6MGI, Al: N6UNI, Steve: WA6VIQ, Jordan: K6JJJ, Gerald: KA6JZX, Nick: NX6T, Henry: KD6LT, Ed: KA6DXR, Chuck: KB6OWB, Harris: NV6H, Hugh: AA6NB, Phil: N6UGD, John: KJ6US, Tarik: N6FNK, Curt: WQ6R, Andy and KB6ZLG, Faruk. — THANKS FROM EVERYONE! OUR NEW AWARDS MANAGER IN THE LONG BEACH AREA IS: N6ATU, Frank Myers call him on (213) 869-5200 for an appointment if you need cards verified for an ARRL award.— N6NYK, Ralph is doing a great job of Disaster Communications according to the San Gabriel Valley Radio Club bulletin and is also the top operator for local EMERGENCY TRAFFIC this month with 110 vehicular emergencies reported. Congratulations Ralph! — Twenty four operators handled a total of 349 incidents during September 1989. — 73 Phineas. Traffic: K6UYK 261.

SAN DIEGO: SM, Arthur R. Smith, W6INI—PIO: N6PKY. TC: N6JZE. SEC: W6INI. STM: N6GW. The Southwestern Div Conv for 1990 will be held in San Diego Aug 24-26. If you are not a member of your local radio club you are missing out on a vital aspect of Amateur Radio. Here are the San Diego Section clubs, meeting date/time, name, location, contact info. 1st Tue/1930: North Shores ARC, So. Clairemont RecCen, 3605 Clairemont Dr, S D, W6SAX 272-1409. 1st Wed/1930: Palomar ARC, Lincoln Mid Sch, E Vista Wy at Escondido Av, Vista, W9FQN 749-0276. 1st Thur/1930: Convair ARC, Convair RecCen, Missile Rd/Clairemont Mesa Blvd, S D, K6DBJ 292-9169. 1st Thur/1930: South Bay ARS (SOBARS), Norman Park Cen, 270 F St, Chula Vista, KB6TPQ 583-7035. 2nd Mon/1930: 220 Club of SD, Serra Mesa RecCen, 9020 Village Glen Dr, SD, N6PC 582-6109. 2nd Tue/1900: SD Packet Assn, MA-COM Linkabit, 3033 Science Park Rd, SD, KB5MU 458-1238. 2nd Thur/1930: ARC of El Cajon, Buck Knives, 1900 Weld Blvd, El Cajon, KG6VP 444-0694. Balance next month. NCTN 29 sessions, 66 msgs, 250 ck-ins. ARES CW 4 sessions, 8 ckekins. Traffic: KI6ZH 259, KI6ZM 96, KC4IRP 38, N6GW 18, WA6IIK 4.

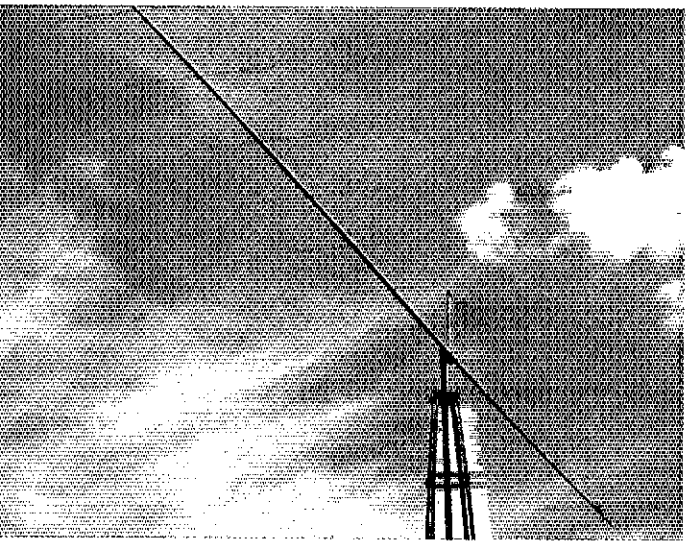
SANTA BARBARA: SM. Thomas I. Geiger, W2KVA— ACC: KB5AH, ASMs: N. Vntra, N6MA. S. Vntra W8AKF. Sbar WB6BYU. PIO: N4SEQ. BM: N6TNG. STM: N6WP. OOC: W8AKF. TC: W6KFV. SEC WB6IIY. DECs: Vntra WB6RVA, S.6bar-KA6KGF, N.Sbar-KI6XG, SLO-WB6IIY We are very please to welcome aboard the newest member of our Field Organization team, Public Information Officer George Magenta, N4SEQ. George is a professional photographer and videographer with many exciting credits to his name. In addition to making videos for some of Hollywood's best recognized names, he teaches photography at the local community college, is active in ARES and the SMARTT Club, where he is applying his expertise to innovative techniques for the Novice class, and is busily working on setting up an HF station in his new home in Santa Maria. George brings with him a wealth of experience and ideas, and a boundless enthusiasm that most of us would like to recapture. THANKS for helping, George, we're looking forward to working closely with you to give ham radio a great public image throughout the section. The highlight of the month was the opportunity to present the Santa Barbara ARC with a plaque commemorating fifty years of ARRL affiliation. This must truly be SBARC's year, as they also became the only Special Service Club in the section last August, and were then honored at the SW Division convention by our Director, WA6WZO, as Outstanding Club in the Division. Highlighting the SBARC "Old Timer's Night" festivities was a special "surprise guest" who is definitely NOT an OT, Kelly Howard, N6PNY, of "The New World of Amateur Radio" fame, captivated and delighted the audience with her talk about youth and the future of ham radio. The magic must have worked both ways as Kelly has since joined SBARC and is planning on attending regular meetings all the way from Saugus. Congratulations to SBARC and thanks to Kelly for making the evening especially enjoyable. August testing successes not reported last month: PRARC (ARRL)- To Advanced: N6SRQ. To General: WA6DHD. To Technician: KC6DEZ, KC6DFK (100% on test), Alex Miller & Todd Miller (Novice calls not yet rcvd). Examiners: W6MUS, W7CB, K6QH, NQ6W, NI0N. September testing successes-SBARC (ARRL)-To Advanced: KB6NAT. To General: KC6DEA. To Technician: KC6CXL, Roger Loiler (No Call). To Novice: Paul Shaad (No Call). Examiners: KB5AH, KI8XG, WA6VNO, WR6V, KB6ILQ, AA6OT. SARC (GLAARG)-General: N6TLU. To Advanced: W6FCR. To Technician: KC6EGE. Examiners: N6IR, N6UE, NM6W, W6PIM, KA7MGM, AA6FX. Congratulations to those who upgraded, and thanks to all those dedicated VEs. 73 for now. Traffic: W8AKF 414, W6NOR 144, N6NLW 73, VE3AWE/6 28.

WEST GULF DIVISION

NORTH TEXAS: SM, Dan Dansby, W5URI—ASM: W5GPO, K5MXO, W5IWE, KG5SC. ACC: KA1CWM. STM: W5VMP. SEC: NØAJP. OOC: WA5YKO. TC: K5SXK. PIO: K5HGL. BM: W5QXK. Frances', N5CEJ, RACES Coord for Tarrant Co has resigned her position so she may spend more time with her OM, Wayne, KI5D, recently retired. Lamar, KA5NGO, will be taking Frances job. Good luck to both. Wichita Falls Hamfest was well attended. I enjoyed seeing old faces and meeting new ones each year I attend. WA5MWD is the new Packet Net Manager for the Section. Welcome to W5TOO as the newest Packet Gateway Station. He is replacing WY5J who



eter and 2-meter moonbounce installation. Four 6M-2WL, four
-5WL and one 432-13WL antennas in array on self-supporting
89-foot US tower at N7ML.



2M-18XXX installation at N7KQK.

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The superior engineering designs, quality and high performance that AEA built its reputation on are now available in its dynamic new line of antennas. Developed and manufactured by Mike Staal K6MYC, president of M² Enterprises and co-founder of KLM antennas, the product line includes an assortment of 2-meter, 6-meter and 440 MHz antennas and accessories for fixed or portable applications. AEA/M² antennas are already recognized for their superior performance by many moonbouncers.

Features. AEA's new antenna line features computer-optimized antennas with the highest gain for boom-length attainable.

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Accessories. To complement the antenna line, AEA also offers various "H" frame support packages. The MT-3000 heavy-duty elevation mechanism and controller for tilting up multiple yagi arrays. Also welded aluminum power dividers for coupling multiple antennas.

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ements	5	9	11	17	18	20	14	22	N/A	16	39	N/A
oom	15'9"	39'6"	50'4"	33'	36'	41'4"	9'10"	18'	N/A	10'	30'3"	N/A
eight	11/14	31/40	38/47	13/15	14/16	30/37	6/8	12.5/15	1.5/3	4/5	12/13	1.3/3
indload	2.0	5.0	6.9	2.7	2.9	6.1	1.1	2.5	N/A	0.82	2.5	N/A

n - Length, feet and inches.
ht - Weight in pounds, antenna weight/shipping weight.
load - Windload area in square feet.
Six meters. 2M - Two meters. WL - Wavelength.
Heavy-duty. CP - Circularly polarized. EB - Eggbeater.

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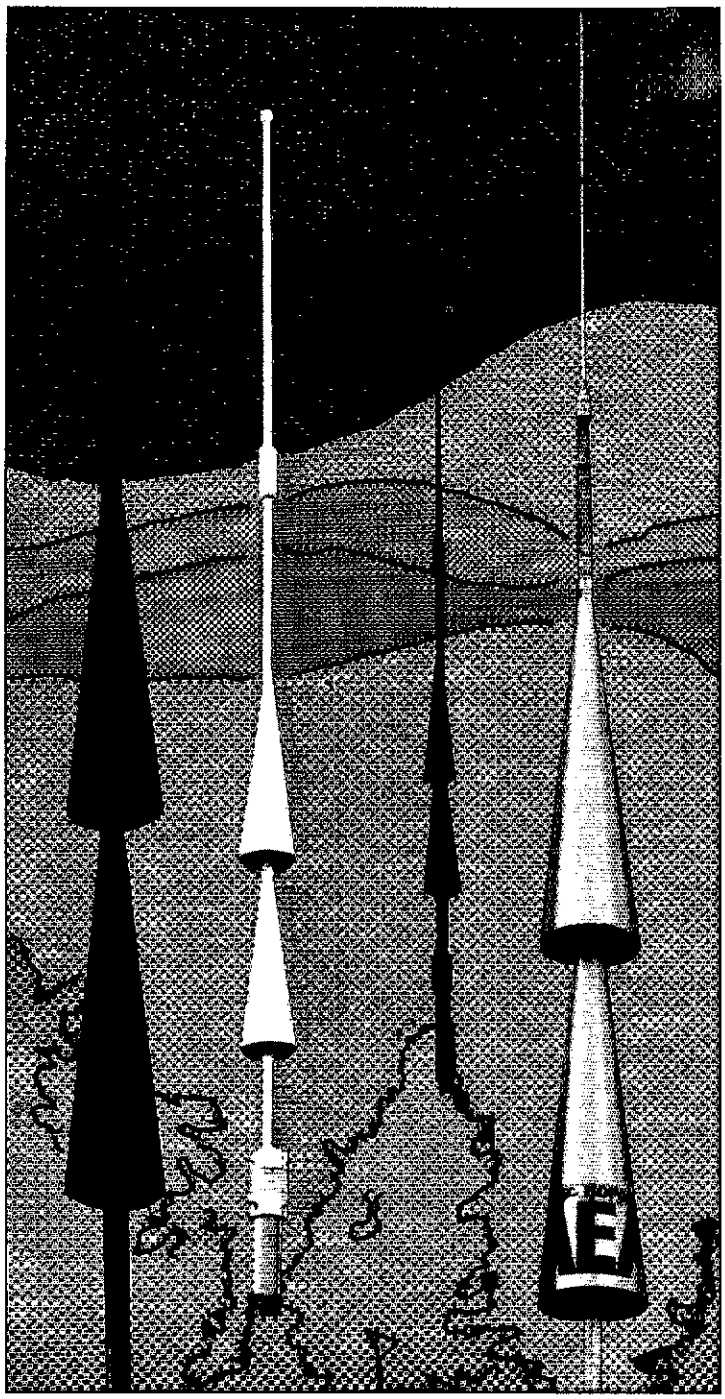
has elected to step down from his obligation. To Ed & Gene Good Luck and Thanks. I am still needing an SGL for the Section. If interested, contact me. Congratulations to Doug, KO5I, upon his appointment as full time General Manager, AMSAT-NA. Good Luck, Doug. JOTA is now history for this year and it was a huge success. See December Section newsletter for details. Tarrant Co RACES members have designated Christmas Week as "Be Kind to Lamar Week". Traffic: K5UPN, 891, W5TNT 496, KF5BL 275, K5MXQ 178, W9OYL 129, N5KCL 89, KD5RC 89, N5PGZ 64, N5NZH 61, KC5NG 47, KB5ADE 37, WB5CPY 35, WA5EZT 24, KB5BNU 14, AC5Z 14, W5VMP 12.

OKLAHOMA: SM, Joe Lynch, N6CL—This month I am saddened to report the passing of Rosemary Kays, N5FUM. She died suddenly while on a trip overseas. She leaves her OM, Charles, N5FEB, other family members and many friends in the Tulsa area. The Bartlesville ARC received a plaque for 50 years of affiliation with ARRL. In attendance was the first president of BARC and several past members who related many tales of the history of the fine club. Your SM attended both the Wichita Falls and the Wichita Hamfests and saw an excellent Oklahoma representation in attendance at both. At the Wichita Falls Hamfest, I met with the SM of NTX, W5URI and discussed with him many mutual concerns. At the Wichita Hamfest, I met with the SM of Kansas, KØBXF. We also had a meeting discussing mutual concerns. Winter wx is almost here. Be extra alert and prepared for WX emergencies, especially when driving to those Holiday celebrations. 73. Traffic: WA5EQW 551, N5IKN 99, K5CXP 60, WA5OUV 55, WA5ZOO 32, WA5OGC 32, K5GBN 24.

SOUTH TEXAS: SM, Arthur R. Ross, W5KR— STM: WD5GKH. SEC: K5DG. OOC: K5SBU. ACC: WB5YDD. PIO: WA5UZB. BM: WA5WCY. TC: NZ5U. SGL: K5KJN. ASM, all of above plus N5TC. OOC K5SBU has nominated the following candidates for membership in the Amateur Auxiliary to FCC Field Operations Bureau: NR5W, W5JL, K9MBB, KB5UE, KB5AQV, KE5DQ, WD5BRN, WB5KXK, K5HKX, W3KO, KC5TK. Clear Lake "CHRONICLES" rprts excellent program given by WA2YMQ on subject of "Amateur Radio and How it Applies to Sailing." PIA KA5EEQ rprts Brenham ARC operated a Special Events Station for Amateur Radio Public Awareness Day; results were good; he also sent copy of a well written Ham Radio article which appeared in October 1989 issue of "MOTORHOME" magazine; has many nice words and good suggestions for Ham Radio aspirants. 7290 Traffic Net Secretary NF5T rprts 357 messages passed in 47 Sept sessions; 3223 check-ins; NTS liaison 2 per session; NM W5YQZ. Univ of Texas ARC News rprts KB5JPB upgraded to Technician with new call N5OWG; AA5BT received CW WAZ and Catch 22 Awards; congratulations to both. PIA NZ5J, Seguin, rprts upgrades: N5OEO to Advanced and KB5KMB to Technician; Great Going, fellers. OBS W5KLV, San Antonio, rprts 19 bulletins, 3 propagation forecasts given 30 readings on 8 nets. TTN NM K5UPN rprts 137 msgs passed in 30 September sessions. RN5 NM WB5YDD rprts 494 msgs passed in 60 Sept sessions; STX represented 100% by W5KLV, W5CTZ, WB5HZQ, KE5ZV, N5NAV, WV5X, KF5KQ, N5ILI, WB5YDD. San Benito ARC President WA2VJL rprts special Hurricane Preparedness Program presented at Public Library for school-age children well received by about 50 youngsters. "The Bexar Wire," San Antonio ARC, rprts Editor-in-Chief N5CNH wed N5NVL in August; San Antonio ARC renewed as SSC; much activity in STX summer. CAND NM K5UPN rprts 614 msgs passed in 62 Sept sessions; NTS liaison 2 per session. N5MJB of Northwest ARS (NARS), Houston, has been appointed HF and VHF Awards Manager; he will be responsible for validating WAS, 5-band WAS and VUCC applications for that area.

WEST TEXAS SM, A. Milly WISE W5OVH, at lubbock Hamfest heard that 21 local amateurs provided communications for the annual golden cross Bike-A-Thon. 597 contacts were made by 12 amateurs during the 36 hours which the special event station was on the air commemorating Buddy Holly—Otis Brassfied N5LEV has taken over as editor of the West Texas ARC relay bulletin. There is a change of officers in WTARC, due to illness in the family, Pres Woody KF5FY had to step down as pres, and now vice-pres. Bob Payne N5KUC has taken over the reins. Otis N5LEU who has been chairman of the CDESSA hamfest for five years, has resigned so now the whole club put on the hamfest Congratulations to grant N5GOM of Dalhart who has completed the requirements for WAS—the W5AW repeater of the Big Spring ARC is back on the air on 146.82 Thanks to Alex W5TOC who co-ordinated the repair—The big bend ARC is putting a rebuilt engine in their emergency VAN. Classes for Novice currently being held at Sul Ross State University with 11 prospective students enrolled—Attended San Angelo hamfest and their VE exams were quite successful; Robert N5OIU made general and passed the 20 WPM. Willie KB5IKB upgraded to advanced. Donald N5NCF and Tom WB5MTR both passed Extra; Cyrus KB5KDJ and R.K. Miller KB5FFM upgraded to Tech. CONGRAT TO ALL . . . Study Gentry AA5NA the young lady who was the first woman extra class licensed in the lubbuck area is now a activequalified VE examiner—Big Spring ARC W5AW Set up a set test set in the collisium. During Sept the W5AW clubhouse was refurnished, a new door, repaintng new rungs on the new pole for the 40 & 80 Meter ant. Thanks to N5BCM and KB5GXX. WD5EFJ and WD5NCQ have gotten very active on packet.—Glad to have another club in the West Texas Sect.— Congrats to WTRA INC for Becoming reaffiliated with ARRL-The lubbock VE results David WA4NXI upgraded to Extra and so did ED N5FGU. Arthur N5MHK went to ADV. Troy KB5KPQ and John KB5UPO. Both upgraded to Tech. NEWTON BECAME A NOVICE.
Traffic: Cand 614 Messages 3 sessions RNS representing 100% WEST TEXAS AE5I and W5GMK Report QNI 911-QTC 137 N3O Sessions Total Time 801 minutes. NE5I 133 K5KKO (packet) 19

Improve Your Performance



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IsoPoles.™ Available in 144, 220 or 440 MHz, all IsoPole™ antennas yield the maximum gain attainable for their respective lengths, and a zero degree angle of radiation. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Cones offer greater efficiency over obsolete radials which radiate in the horizontal plane. Plus the IsoPoles™ have a broad frequency coverage. This means no loss of power output from one end of the band to the other, when used with SWR-protected solid-state transceivers. Experience a typical SWR of 1.4 to 1 or better across the entire band!

VHF versions include a 50 ohm SO-239 connecter recessed within the base sleeve for full weather protection. With the IsoPole™ you won't experience the aggravating deviation in SWR when the weather changes. Also, the impedance matching network is designed for maximum legal power and compensates for the impedance lump introduced by the SO-239 connector used in the VHF models.

AEA's IsoPoles™ are built to withstand the environment. The insulating material offers superb strength and dielectric properties plus excellent long-term ultra-violet resistance. Mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion resistant aluminum alloys. The aerodynamic cones are the only appreciable windload and are attached directly to your TV mast.

Hot Rods.™ Improve your signal with AEA's popular Hot Rod™ antennas for handheld transceivers...2-meters (HR-1), 220 MHz (HR-2) and 440 MHz (HR-4). Hot Rods™ provide more gain than a 5/8 wave handheld antenna!

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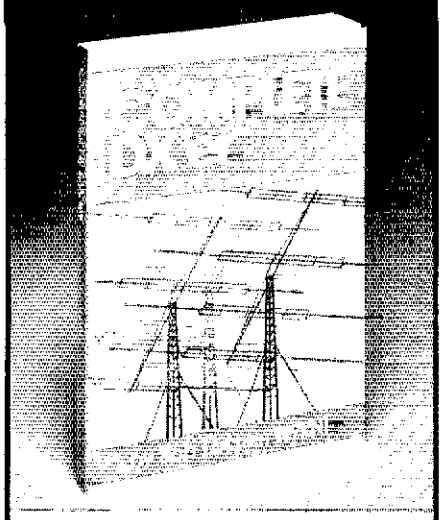
DX!



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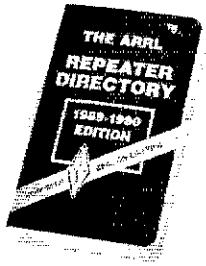
Hit the Road



The 1989-90 Repeater Directory has over 13,000 listings including over 1,400 digipeaters, band plans, beacon listings, CTCSS (PL) tone chart and more. Still pocket-size and only $5*.

*See the ARRL Bookshelf page elsewhere in this issue for ordering information.

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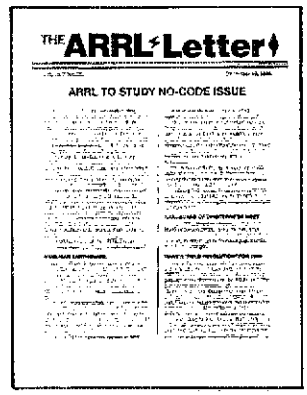
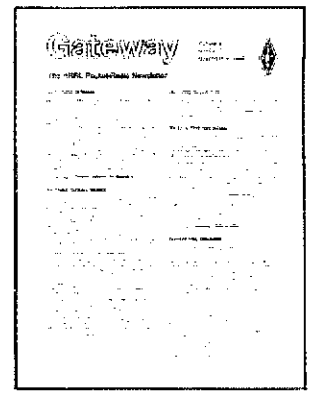
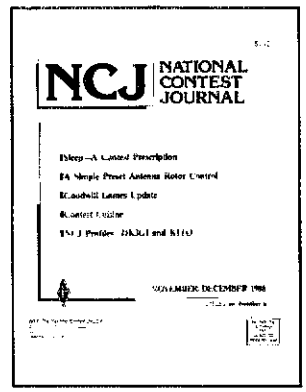
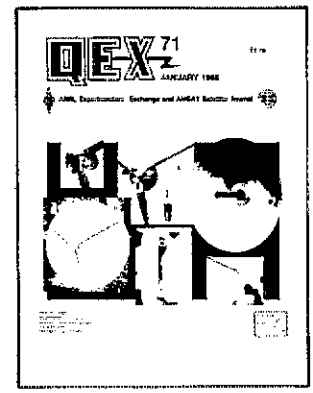








INFORMED SOURCES

The ARRL Letter provides news of interest to active, organizationally minded radio amateurs faster than it can be disseminated by **QST.** We strive to be fast, accurate and readable in our reporting. Available to ARRL members *only*. Biweekly. 26 issues by first class mail to the US, Canada and Mexico: $19.50 Elsewhere by airmail: $31.00.

Gateway, the ARRL Packet-Radio Newsletter, has the latest in what is happening in modern Amateur Radio digital communication: hardware, software, LANs, PBBS, and HF gateways. Biweekly for 25 issues by first class mail to ARRL members: US, $6; Canada and Mexico, $11; elsewhere by airmail, $14. Non-members add $3 to these rates.

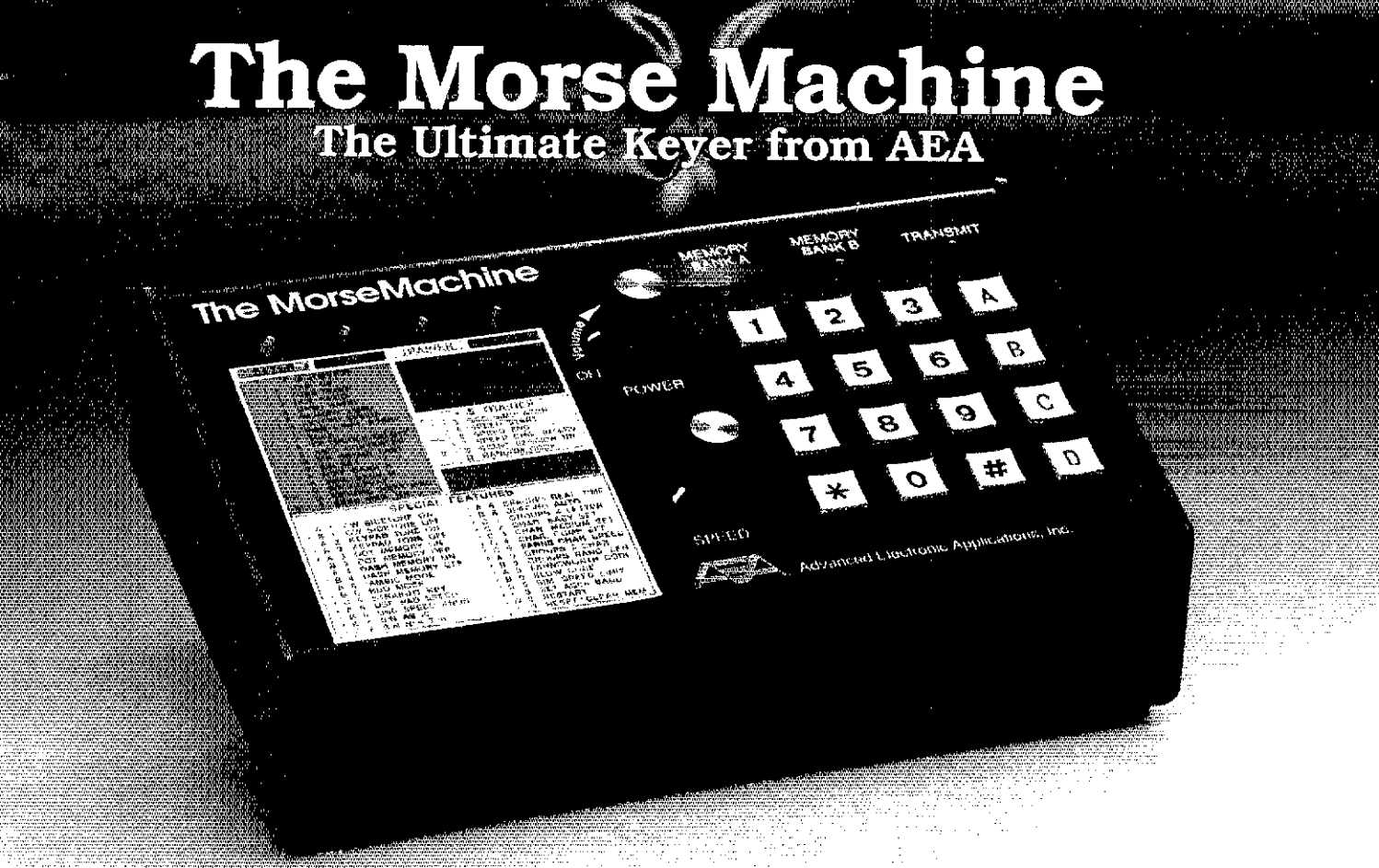
QEX, the ARRL Experimenters Exchange, provides a medium for the exchange of ideas and information between Amateur Radio experimenters in order to document advanced technical work and support efforts to advance the state of the Amateur Radio art. Monthly. For 12 issues to ARRL members: US, $10; Canada and Mexico by first class mail $18; Elsewhere by airmail $38. Non-members add $10 to these rates.

NCJ, the National Contest Journal, features articles by top contesters, letters, hints, statistics, scores, NA Sprint and QSO Parties. Big gun or small, the **NCJ** provides a valuable source of information on the active world of competitive radio. Bimonthly for 6 issues (one year): US, $10; Canada and Mexico by first class mail, $11; elsewhere by airmail, $12.

Payment must be in US funds and checks must be drawn on a bank in the US. Because of the uncertainty of postal rates the maximum term for any of the above subscriptions is 12 months, and rates are subject to change without notice.

The Morse Machine

The Ultimate Keyer from AEA



The Morse Machine has all the features you've been asking for in a high performance keyer like 2-99 WPM speed selection and over 8,000 characters of memory that can be stored in 20 memories. The 20 memories are soft partitioned so that your stored messages may be as short or long as you like. Memory can be expanded to hold up to 36,000 characters. Of course, all memory is backed up by an internal lithium battery so that once a message is loaded, it will stay there until you write over it.

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- A proficiency trainer, the same as the one used in the MorseMatic, allows random code group practice with steadily increasing speed.
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The Morse Machine is a full featured keyer for the serious contester, with automatic serial number insertion and incrementing in any memory message. You can use the front panel knob to adjust your sending speed or enter a precise speed with the keypad, toggling between the two at any time. Exchanges can be speeded up by having parts of your message sent at a higher speed. You can also add remote switches for 4 of the memories so that you can instantly send your responses or call CQ.

A computer can be interfaced to The Morse Machine through its RS- 232 compatible I/O. Any front panel function may be programmed by the computer. This makes loading memories as simple as typing them in from your keyboard. The Morse Machine can display your random code, or Dr. QSO practice sessions on the computer screen.

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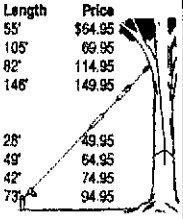
D-56	10/15/20/40/80	6	82'	114.95
D-68	10/15/20/40/80/160	8	146'	149.95



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VS-41	10/15/20/40	1	28'	49.95
VS-52	10/15/20/40/80	2	49'	64.95
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*Can be used without radials
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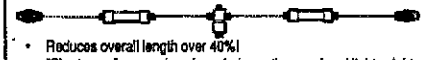
D-40	40	66'	22.95
D-80	80/75	130'	25.95
D-160	160	260'	34.95

Includes assembly instructions, Deluxe center connector, 14ga Stranded CopperWeld Antenna wire and End insulators.

LIMITED SPACE DIPOLES



- Reduces overall length over 40%!
- "Shorteners" are enclosed, sealed, weatherproof and lightweight.
- Complete with Deluxe Center Connector, 14 ga. CopperClad antenna wire, end insulators, and assembly instructions.
- Use as inverted "V", or flat-top.
- Excellent for all class amateurs.

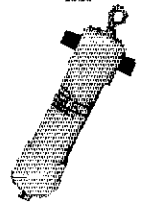
Model	Band	Length	Price
LS-40K	40	38'	$44.95
LS-80K	80/75	69'	$49.95
LS-160K	160	100'	$49.95

●Any single band, or Trap antenna with "Pro-Balun" instead of Deluxe Center Connector; Add $8.00 to antenna price.

COAX CABLE: (includes PL-259 connector on each end)

Type	Length	With antenna purchase	Separately
RG-58	50'	$8.00	$11.95
RG-58	90'	13.00	16.95
RG-8	50'	21.50	25.95
RG-8	100'	36.00	39.95
RG-8X	50'	11.95	14.95
RG-8X	100'	18.95	20.95

"PRO-BALUN" PB-1 $17.95



- 1:1 For Dipoles, Beams & Slopers
- Handles Full legal power
- Broadband 3 to 35 Mhz.
- Lightweight, Sealed & Weatherproof
- Deluxe connectors require NO soldering
- NO jumper wires
- Minimizes coax & harmonic radiation

Pro-Balun PB-4, 4:1 ratio, $19.95

ALL BAND — LIMITED SPACE ANTENNA

- Sealed, weatherproof lightweight shorteners utilize NO rust terminals
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- Works ALL Bands 160 thru 10 Meters
- Perfect for ALL classes of Amateurs
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- Shorteners provide full 135 feet electrical length; with only 70 feet physical length
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Model AS-2 $49.95 (U.S. Postpaid)

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MF4.0 for VGA, 640x480 pixels. Records, views, and PRINTS in 2, 4, 8, or 16 colors or shades from a group of 262, 144. Provides gray-scale viewing.

All Programs see all recorded data. With MF2.3 this is done with 3 selectable picture areas: full area, 1/4 area (magnified to full screen), and 1/16 area (magnified to full screen). MF3.4 and MF4.0 use full area and 1/4 area (magnified to full screen). Each magnification increases details, doesn't just duplicate pixels.
Price $49 for either program ($20 for previous MF buyers), post paid in US, Canada, & Mexico. Add $3 for airmail elsewhere. No credit cards.

Request free detailed information.

Demo Disk showing sample views, $2, post paid in US, Canada, and Mexico. Add $1 for airmail elsewhere. Specify CGA, EGA, or VGA.

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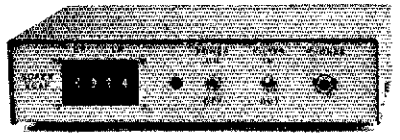
• SUPERSCAF •

(A Switched-Capacitor Audio Filter)



SuperSCAF is a versatile switched-capacitor filter for eliminating interference and noise on CW, SSB, RTTY, AMTOR, PACKET and other narrow band modes. Extremely steep filter skirts remove adjacent clutter and noise to enhance weak signal reception and greatly increase intelligibility and listening comfort.

SuperSCAF incorporates a switched-capacitor band-pass filter, an economical implementation of digital filter technology. Extreme sharpness, stability, accuracy and complete freedom from ringing characterize this design approach. Bandwidth is adjustable from a minimum of 30 Hz to a maximum of 3700 Hz, allowing optimum passband tailoring under widely varying conditions. Skirt slope is 150 dB per octave (about twice as steep as a good crystal filter), and stopband attenuation is at least 51 dB. SuperSCAF is connected via the receiver's speaker or headphone output and provides 1.5 Watts to drive a 3.2 to 8 Ohm speaker. SuperSCAF operates from 105 to 130 VAC.

SuperSCAF is available in kit form for $139.95 or assembled for $179.95. Please include $7.00 for shipping and handling. Order from AFtronics, Inc., PO Box 785, Longwood, FL 32752-0785. Florida resident should include state sales tax.

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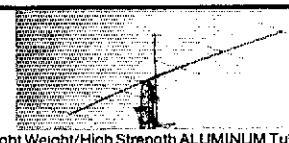

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How many antennas have you seen ruined by the failure of the mast? If you are stacking antennas, or have a beam antenna, our 6061-T6 Aluminum masts will increase the survivability of your antenna system. These masts are 67% lighter and 50% stronger than galvanized steel tubing. An example of the weight difference is 2" OD x ⅛" Wall x 24' Long. **AL-39#, Steel-112#.**

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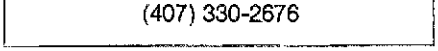
HI-PERFORMANCE DIPOLES



Antennas that work! Custom assembled to your center freq. ea. band; advise ft. of center and each end; hang as inverted "V" - horizontal vert. dipole, sloping dipole ; all commercial quality - stainless hardware - legal power - no-trap, high efficiency design. Personal check, MO or C.O.D. ($3)

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MPD 2	80-40M max-performance dipole, 85' long $82	$95-$96 ppd
HPD-3*	160-80-40M Hi-performance dipole 113' long	$79 ppd
SSD-4*	160-80-40-20-15-10M space saver dipole 71' long	$125 ppd
SSD-5*	80-40-20-15-10M space-saver dipole-specify L. 42'-$105	52'-$108 ppd
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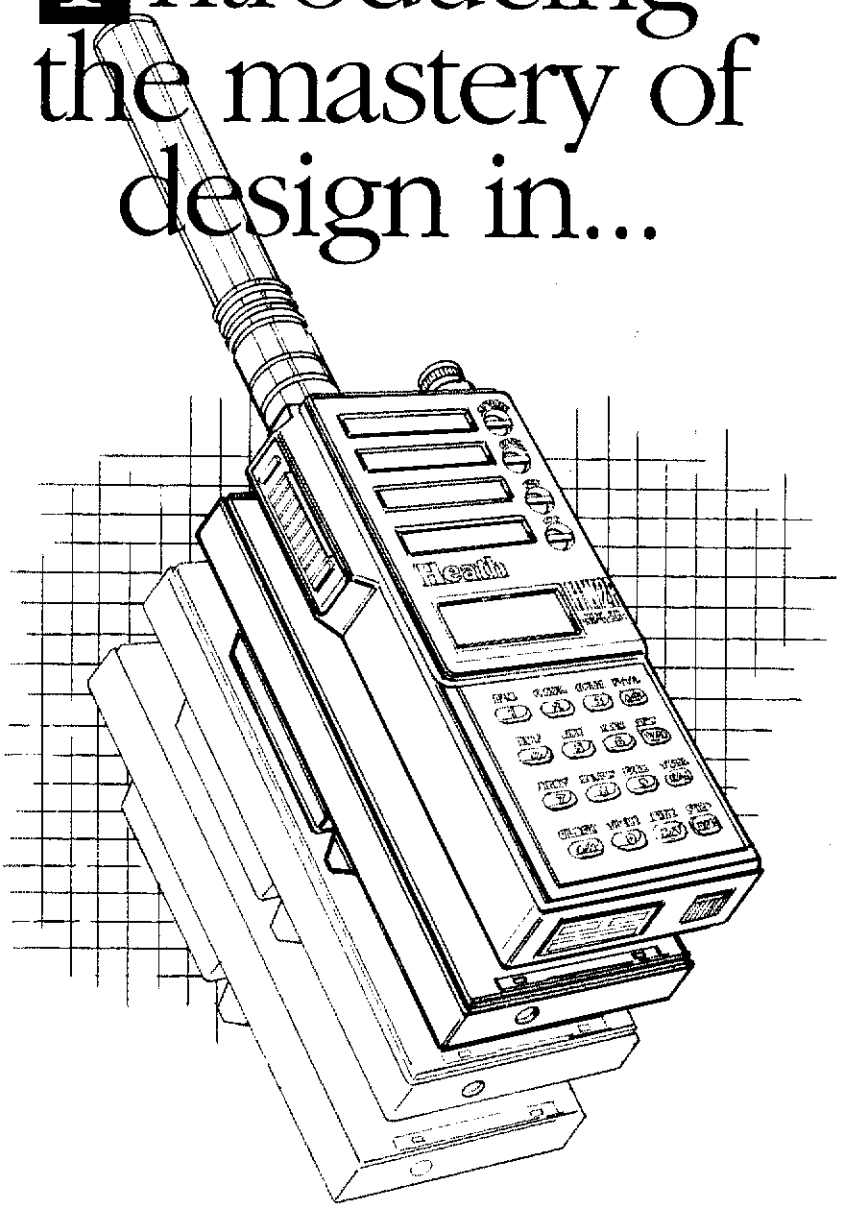

The art of small talk

Introducing the only compact HT designed for you—Heath's new 2-meter and 450 MHz Micro-Deluxe handheld transceivers.

Built with a receiver sensitivity of 0.158 µV for 12 dB SINAD, the micro-sized HW2P or HW4P measures an unbelievable 4-3/8"H x 2-1/16"W x 1-1/4"D. Battery-packs hinge onto the back of the unit so the HT retains the same basic form, even with the largest capacity batteries. Slip it into your pocket or hook it on your belt - no more hassles with bent clips or tangles with car seatbelts. Heath's new micro-HTs will go anywhere you do.

The art of Easy Operation. Enter frequencies directly from the full-function keyboard or QSY from the displayed frequency via the rotary frequency selector. Scan between two frequencies, Scan 1 Mhz or scan all except between two frequencies. Scan favorite memory channels (useful for temporarily locking out a busy channel), scan first ten memory channels, last ten or all twenty. All scanning modes support either Pause Scan (stop on active channel then resume) or Busy Scan (stop on active channel and hold). One button Call channel is a quick way to get to your favorite repeater or simplex frequency.

HW2P shown actual size.

The art of Low Power Consumption. With only 46 mA required for RX squelched, and 1200 mA for full 5 watts TX output, these new handhelds are the most efficient designs available. A nine-step battery saver defaults to 22 mA in receive, but life can be further extended, approaching only 10 mA average RX current squelched.

The art of 5 Watts Power. With the optional 12V, 600 mA/h battery-pack, the HW2P and HW4P offer full 5 watts out in High, 3.5 watts in Medium and 300 mW in Low. The 7.2 V battery-packs (400 mA/h, 700 mA/h, 1200 mA/h) offer 2 watts in High, 1 watt in Medium, and 300 mW in Low. The 7.2 V, 700 mA/h battery is included standard with the HTs.

Full Line of HT's. Also new are the Heath 2-meter and 450 MHz Mini-Deluxe handheld transceivers. Only slightly larger than the Micro-Deluxe HTs, with all the same exciting features.

Discover the art of small talk, call your authorized Heath dealer about the complete line of Heath HT's and Heathkit station accessories today.

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TECH TALK from ICOM

ICOM's New IC-R9000: The SWL's Winning Edge – Part I

One of the oldest and most popular areas of special interest among radio amateurs and communications enthusiasts alike is shortwave listening. It is a pursuit with endless attractions for everyone. It was also the original inspiration that ushered many of today's best-known operators into our exciting world of amateur radio. That same SWL route to hamming continues strong today, and SWL'ing now covers more diverse areas than ever before. It is fantastic!

Describing the full SWL'ing picture in this Tech Talk is obviously impossible, however a sampling of activities illustrates its vast appeal to folks of all ages. The international shortwave broadcast band of 2300-2500kHz/120 meters, 5950-6200kHz/49 meters and 9500 - 9900kHz/31 meters are ideal for receiving direct-from-the-source news and native-land music that is quite informative and entertaining. The 5.0 - 7.0MHz and 8.5 - 9.0MHz range is frequented by mysterious spy code transmissions, smugglers and unknown radio activities appearing during evening hours on an eclectic basis. The range of 14.5 - 14.8MHz is also known for its guerrilla communications, and the 7.4 - 7.5MHz band is peppered by modern-day pirate radio stations during weekend nights. The 120MHz band is used by aircraft and airports daily, public services like police, fire, ambulance, etc. operate in the 150MHz/VHF and 460MHz/UHF bands. The amateur bands of 900MHz and 1200MHz are also rapidly increasing in popularity. Literally hundreds of specific frequencies are used for the previously described activities, and they change frequently without notice. Spotting and following them is a challenge all SWL'ers take quite seriously.

The benefits of using a supreme quality receiver like ICOM's new IC-R9000 are especially significant for modern-day SWL'ing. Since you cannot tune all bands and frequencies simultaneously, the IC-R9000's multiple scan modes and 1000 tunable memories are tremendous assets for maximizing your available time. Its pacesetting circuit designs and extensive IF filtering also assure clear copy of even the weakest signals while minimizing interference from strong stations, and its frequency coverage of 100kHz to 1999.8MHz is comparable to a complete monitoring station in one deluxe cabinet.

ICOM's new IC-R9000 also adds a few new dimensions of its own to modern shortwave reception. The first and most obvious difference between the IC-R9000 and other receivers is its large multi-function CRT. The screen's upper section displays your selected frequency, mode, filter width, tuning speed, memory channel and GMT or local time. The screen's lower area can be switched to display memory contents and notes, scanning parameters and computer interfacing selections, plus it serves as an RTTY/AMTOR/PACKET display for an externally-connected interface. The bottom area also includes a unique switch-selected band spectrum display. This spectrum scope is great for locating briefly-appearing signals that are near but not on your tuned frequency. It is like using hundreds of eyes to watch a full band's action!

Another unique and clever feature of the IC-R9000 is its automatic loading of memories 900-999 with scan-detected activity. You set upper and lower scan limits, let the IC-R9000 "perform its magic" for a few minutes, and it informs you of all busy frequencies. The IC-R9000 will also scan a band of frequencies 2.5, 5, 10, 20 or 50kHz around any selected frequency, scan for only voice/modulated signals, scan according to your selected mode, or scan any preprogrammed number of memories. The previous functions are also only five of the IC-R9000's eight modes of scanning. This receiver does not compare with other units; it totally supercedes them!

Although the IC-R9000 is quite sophisticated in design and futuristic in performance, it is surprisingly easy to operate. You simply switch on its power, dial a desired frequency, and increase the volume to a comfortable level. The front panel's "MHz UP/DN" buttons are convenient for large frequency excursions. Tuning steps from 10Hz to 100kHz are selectable via buttons above the main tuning knob. Direct frequency and/or memory selection can also be performed via the front keypad. If you know a particular memory's contents, simply enter its number and press the "M-CH" key for reception. You can review the contents of all the memories using the lower half of the CRT screen while continuing to monitor the last selected frequency. You can enter a memory's number on the keypad to change frequency to that memory. Alternately, the front panel's "MEMORY UP/DOWN" knob is useful for direct selection and reception of each memory channel. Now that's user friendly!

Shortwave listening is a fascinating pursuit every family member can enjoy, and ICOM's IC-R9000 truly puts the world at your fingertips. This top-of-the-line receiver is confidently backed by the industry's finest one year warranty and supported by four North American service centers ready to assist you on a moment's notice. Stay tuned for the second part of the amazing IC-R9000 story next month!

ICOM America, Inc., 2380 - 116th Ave. N.E., Bellevue, WA 98004 **Customer Service Hotline (206) 454-7619**
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THE BEST OF BOTH WORLDS.

The pacesetting IC-R9000 truly reflects ICOM's long-term commitment to excellence. This single-cabinet receiver covers both local area VHF/UHF and worldwide MF/HF bands. It's a natural first choice for elaborate communications centers, professional service facilities and serious home setups alike. Test-tune ICOM's IC-R9000 and experience a totally new dimension in top-of-the-line receiver performance!

Complete Communications Receiver. Covers 100KHz to 1999.8MHz, all modes, all frequencies! The general coverage IC-R9000 receiver uses 11 separate bandpass filters in the 100KHz to 30MHz range and precise-tuned bandpass filters with low noise GaAsFETs in VHF and upper frequency bands. Exceptionally high sensitivity, intermod immunity and frequency stability in all ranges.

Multi-Function Five Inch CRT. Displays frequencies, modes, memory contents, operator-entered notes and function menus. Features a subdisplay area for printed modes such as RTTY, SITOR and PACKET (external T.U. required).

Spectrum Scope. Indicates all signal activities within a +/-25, 50 or 100KHz range of your tuned frequency. It's ideal for spotting random signals that pass unnoticed with ordinary monitoring receivers.

1000 Multi-Function Memories. Store frequencies, modes, and tuning steps. Includes an editor for moving contents between memories, plus an on-screen notepad for all memory locations.

Eight Scanning Modes. Includes programmable limits, automatic frequency and time-mark storage of scanned signals, full, restricted or mode-selected memory scanning, priority channel watch, voice-sense scanning and scanning a selectable width around your tuned frequency. Absolutely the last word in full spectrum monitoring.

Professional Quality Throughout. The revolutionary IC-R9000 features IF Shift, IF Notch, a fully adjustable noise blanker, and more. The Direct Digital Synthesizer assures the widest dynamic range, lowest noise and rapid scanning. Designed for dependable long-term performance. Backed by a full one-year warranty at any one of ICOM's four North American Service Centers!

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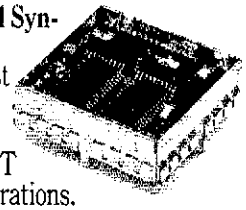
MAKE YOUR DREAMS A REALITY!

ICOM incorporated your most requested features with modern technology's best designs to produce the remarkable IC-765 dream rig. Its combination of excellent performance and superb reliability truly open a new dimension in HF operating enjoyment.

THE HF FOR TODAY'S ACTIVE AMATEUR.

Includes: ***Band Stacking Registers.** Each band's VFO's retain the last selected frequency, mode and filter choice when changing bands. Produces the equivalent of 20 VFO's; two per band. Great for multiband DX'ing! ***99 Fully Tunable Memories.** Store frequency, mode and filter selections. Each one can be returned and/or reprogrammed independent of VFO operations. Memories 90-99 also store split Tx/Rx frequencies. ***10Hz Readout.** Perfect on-the-dot frequency selection for nets, DX skeds and data communication modes. ***Full QSK Break-in.** For super CW operations!



***Direct Digital Synthesizer (DDS).** Assures ultra-fast PLL switching and lock-in for excellent PACKET and AMTOR operations.

***Maximum Operation Flexibility!** The three step attenuator cuts multi-station overloads. ***Built-in AC Supply.** The IC-765 is 100 percent duty cycle rated for cool operation and superb performance on all modes! ***Fully Automatic Antenna Tuner.** With built-in CPU and memory for extremely fast tuning and one-touch operation. Wide tuning range. ***CW Pitch Control.** Total operating comfort and convenience for successful contesting and DX'ing. An iambic keyer with adjustable speed and weight is also built into the IC-765! ICOM also included ***Narrow 500Hz CW Filters.** The FL-32A and FL-52A deliver razor sharp selectivity. A serious DX'ers delight! 250Hz FL-53A and FL-101 optional.

The IC-765 **General Coverage Receiver** covers all bands, all modes and is backed by ICOM's full one-year warranty at any one of our four North American Service Centers. The IC-765 turns your dreams into reality!

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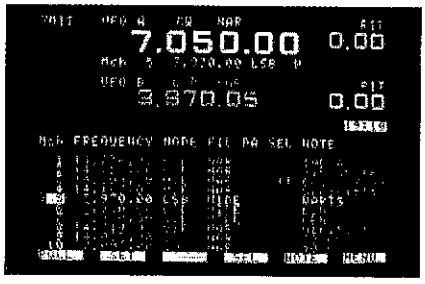
IC-781 HF Transceiver

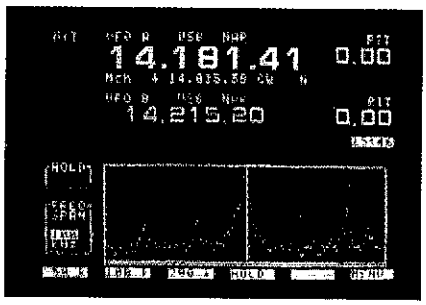
THE FUTURE OF AMATEUR COMMUNICATIONS

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

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



Unique Spectrum Scope. Continuously indicates all signal activities and DX pileups with your operating frequency in the center. Selectable horizontal frequency spans of 50, 100, and 200KHz for each side of the frequency you're listening to. Vertical range indicates relative signal strengths. A contester's dream!



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

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

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

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

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

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

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

See the IC-781 at your local ICOM dealer.

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- For dipoles, yagis, inverted vees and doublets
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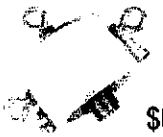

- Small, rugged, lightweight, weatherproof
- Replaces center insulator
- Handles full legal power and more
- With SO 239 connector

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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'	$41.95
D-40	40/15	66'	28.95
D-20	20	33'	27.95
D-15	15	22'	26.95
D-10	10	16'	26.95
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
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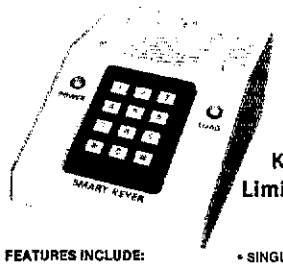

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Detects 4 digit sequence
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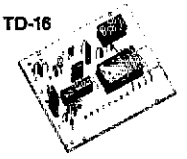

KIT: **$44.95***
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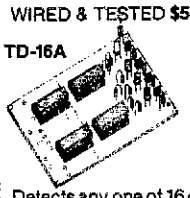
TD-16A



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Directly drives 4 relays
Separate on & off codes

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5 to 12V. DC. @ 10ma
Generates alert signal or switches external device when tone is detected

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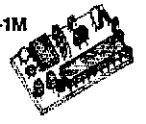

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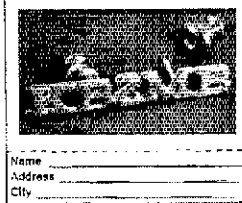

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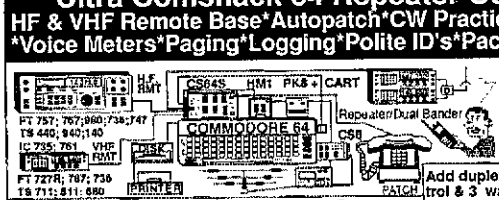

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Includes: Interface, disk, cables, Manual

Ultra Options

Controller Features
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*18 Rotating Polite ID's
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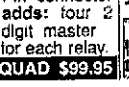

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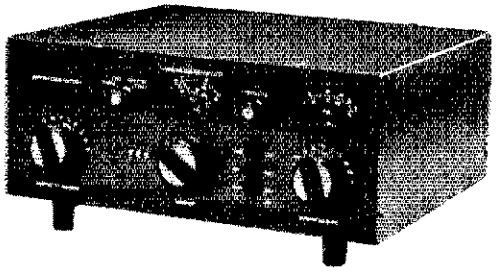
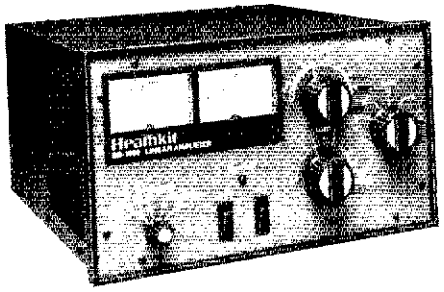


SA-2060 Delux Antenna Tuner Kit

Heath's tuner matches balanced, unbalanced, and single wire lines from 1.8 to 30 MHz. It switches between antennas and has dual wattmeters for forward and reverse power. It handles inputs of up to 2000 watts PEP on SSB and 1000 watts on CW. The variable inductor and turns counter allow you to accurately set the tuner to predetermined values for frequencies you use. A great kit to build!



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Remember the famous Heath SB-220? The SB-1000 is its successor, and it develops even more power output.

Heath puts building back into amateur radio! Remember your first QSO? It felt good didn't it? You'll experience the same feeling when you switch on a piece of equipment you've built yourself. Order a Heathkit from rfe, build it, and see!

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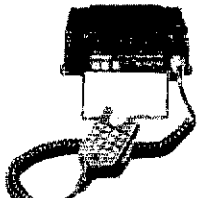
A great 2 meter and 440 MHz handheld with 20 memory channels plus 2 programmable "call" channels. It may be modified for MARS, CAP, or embassy use. Auto power off, dual VFO, semi- or crossband full duplex, and more!



HW-24/HW-24H Twin Band Mobile Transceiver / Repeater

20 memory channels with VHF/UHF operation. Two internal VFO's. Repeater function. The HW-24 runs 10 watts; the HW-24H runs 50 watts.

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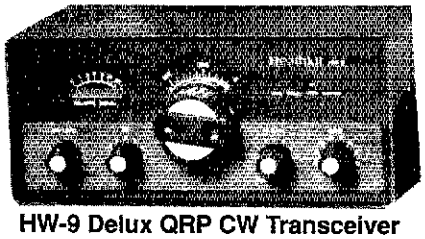
The smallest Packet TNC available. A built-in mini bulletin board; TNC-2 compatability; and quick, easy hook-up to your HT or VHF/UHF transceiver

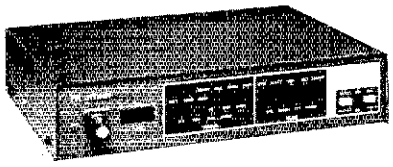


HW-9 Delux QRP CW Transceiver

Covers the bottom 250 KHz of 80-15 meters plus 250 KHz of 10 meters. 4 watts out except 3 on 10 meters.

On-line technical assistance: Should you as a Heath owner ever have questions about your equipment, you can get answers from the tech consultants on their direct line: 616-982-3296.

Order with confidence from ***rfe.***



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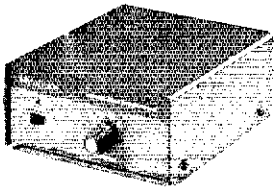
Seven modes, two port configuration for interchangeable HF or VHF operation, supports all common baud rates and CW from 5 to 99 wpm.



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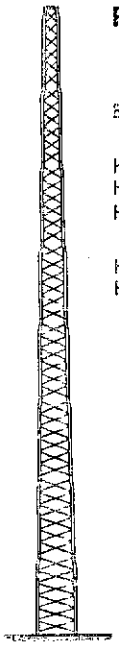

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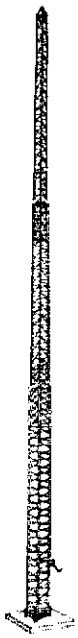

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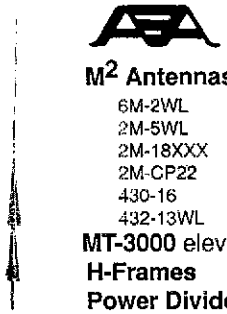

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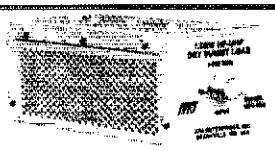
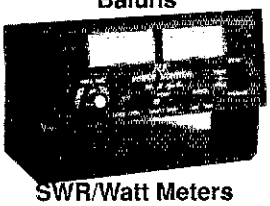
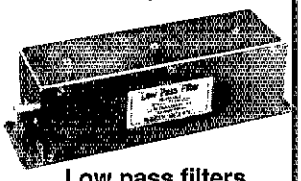


Dummy loads



SWR/Watt Meters



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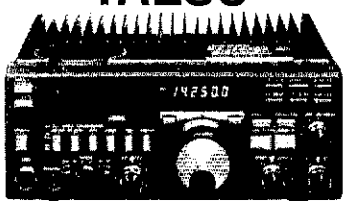

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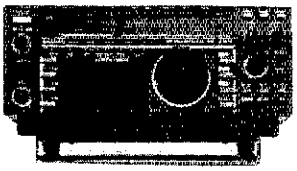
FT-709R	4W, 440 fm HT
FT-4700RH	2M/440 Dual band mobile
FGR-8800	150KHZ - 30MHZ Receiver
FGR-9600	60-902MHZ Receiver

ICOM

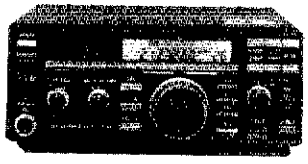
IC-765

160-10M with General Coverage Receiver; 99 Tunable Memories, Band Stacking Registers, Full QSK, 10 Hz Readout, DDS, & More.



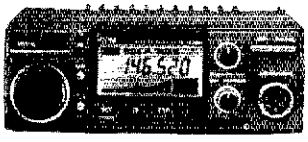
IC-735

160-10M, General Coverage Receive, Dual VFO & 12 Memory Channels, QSK, Compact.



IC-725

Ultra Compact, 100 W Output, 160-10M, General Coverage Receiver, 26 Memories.



IC-228A/H

Compact Mobile 2-Meter Transceiver.

AEA

PK-232

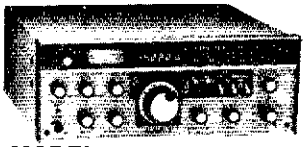
Morse, Baudot, ASCII, AMTOR, Packet, Facsimile, & Navtex

AT-300 Tuner

BENCHER

Keyer Paddles, Baluns, and Filters

TEN-TEC



MODEL 561 CORSAIR II

OTHER TEN-TEC PRODUCTS:

Omni V HF Transceiver
Model 585 Paragon
Model 425 Titan Linear Amplifier
Model 420 Hercules Solid State HF Amplifier
Model 238 Antenna Tuner

KANTRONICS

KAM All mode terminal unit

MFJ

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ACCESSORIES SWITCHES

989C TUNER

TNC UNITS DUMMY LOADS
ANTENNA BRIDGES CLOCKS

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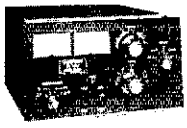
RS-20A..... 88.95	RS-35A.....139.95	RS-50A.....199.95
RS-20M....109.95	RS-35M.....159.95	RS-50M.....219.95
VS-20M....124.95	VS-35M.....174.95	VS-50M.....232.95

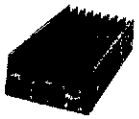
AMPS, TUNERS & ACCESSORIES



AMERITRON AL-80A

AL-84: 600W PEP
AL-80A: 1000W PEP
AL-1200: 1500W out
AL-1500: 1500W out
RCS-4 & RCS-8V
Remote coax switches

NYE VIKING MBV-A



rf concepts amps

Alpha-Delta, B&W, & MFJ Coaxial Switches

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Hustler 6BTV.....$139*
MFJ 949DTuner.....$135*
Icom 28A/H .....$Call

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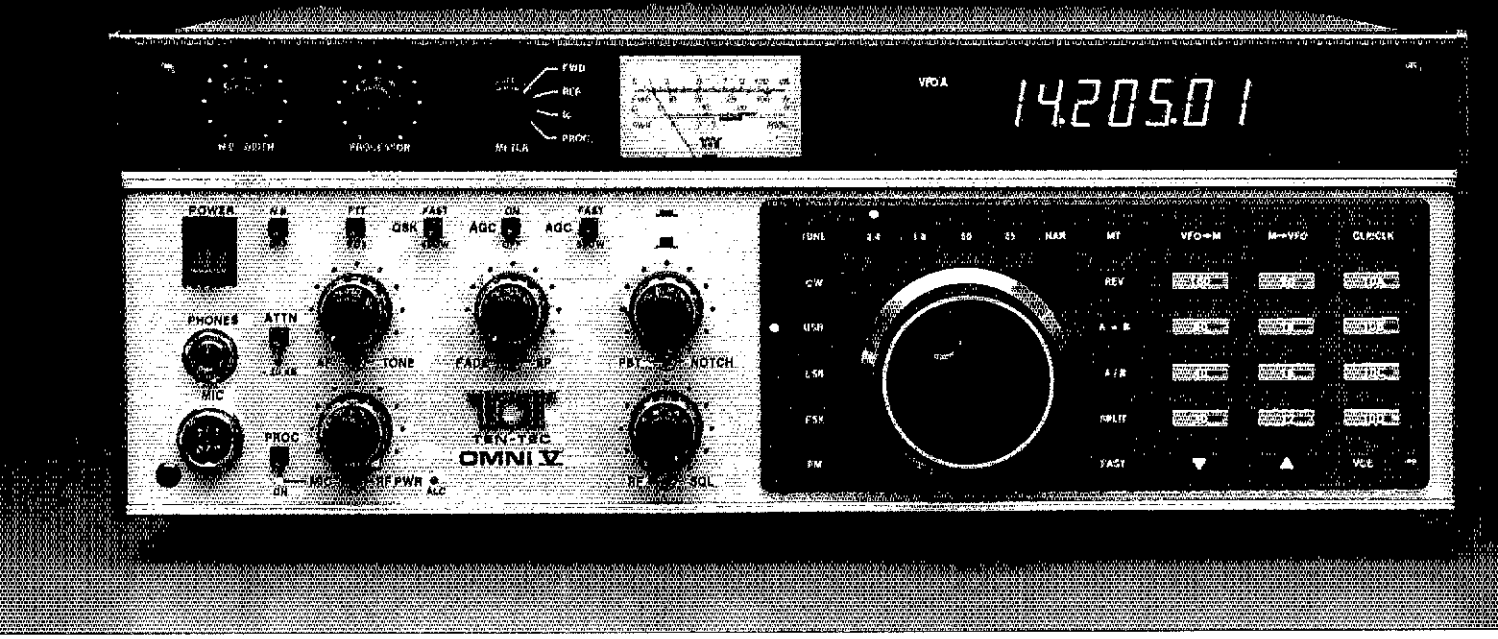


The NEW OMNI V:

The OMNI V is a Paragon with a 12 band crystal mixed local oscillator in place of the general coverage synthesized oscillator. The result is receiver cleanliness like the legendary Corsair and Omni series. The OMNI V local oscillator is a new ultra low noise 5.0 to 5.5 MHz PLL design. Phase noise is simply eliminated as a significant variable. Dynamic range is maintained right up to the edges of the crystal filters, even under the most adverse conditions.

Many of the nifty features made possible by digital technology are included. Dual VFO's with A-B-split select, the frequency stability of a PLL, 25 tuneable memories, VFO to MEM, MEM to VFO and the SCRATCHPAD feature. RS-232 interface is standard and includes remote band switching for the HERCULES II amplifier. The memories are nonvolatile RAM and are retained until you change them. The status registers and clock are backed with a lithium battery (2 year life) so that when the rig is powered up, the status is the same as when you turned it off.

The OMNI V operates USB, LSB, fast or slow QSK CW and real FSK. FM is optional. All bands from 160 through 10 meters are push button selectable. Each band position covers 500 kHz plus 30 kHz over-shoot at the band edges. The four 500 kHz segments of the 10 meter band are switched automatically as you tune through the segment limits. Tuning is in your choice of 10 Hz or 50 Hz increments on SSB, CW and FSK. With the FM option, tuning is in 100 Hz or 500 Hz increments. Up/Down buttons tune in 10 kHz or 50 kHz increments.

An auxiliary frequency tuning system is available and plugs into the rear panel. This allows you to remotely tune the frequency from the most convenient and comfortable position. It takes about 10 ms to fall in love with this option.

A noise blanker and audio speech processor are standard equipment as is the cw sidetone and speech monitor. The rear panel has a full complement of inputs, outputs and controls for the convenience of the all-mode operator, including an auxiliary RX antenna input. High speed key lines are provided for QSK control of a fast switching amplifier, such as the TITAN or HERCULES II. Changeover in fast QSK is less than 30 ms, great for CW and the digital modes.

The front panel is spacious and friendly. The vacuum fluorescent display uses large, bright, easy to read elements. The frequency display doubles as the 24 hour clock display when the CLOCK button is pressed. Other elements indicate VFO status and warn when the memories are full.

All four of the 6.3 MHz I-F crystal filter positions are push-button selectable, independent of mode. A second filter socket is also provided, in series, behind the standard 2.4 kHz filter in the 9 MHz I-F. This may be used for an optional 2.4 kHz, 1.8 kHz, 500 Hz or 250 Hz filter which is selected with the "NARROW" button. This adds six or eight poles into the crystal filter network and even further reduces the impact of adjacent strong signals. Most impressive!

If you do not need a general coverage receiver in your HF rig, the elegant OMNI V is a great choice. If you are also a serious DX-er and/or contester, the OMNI V is the best choice.

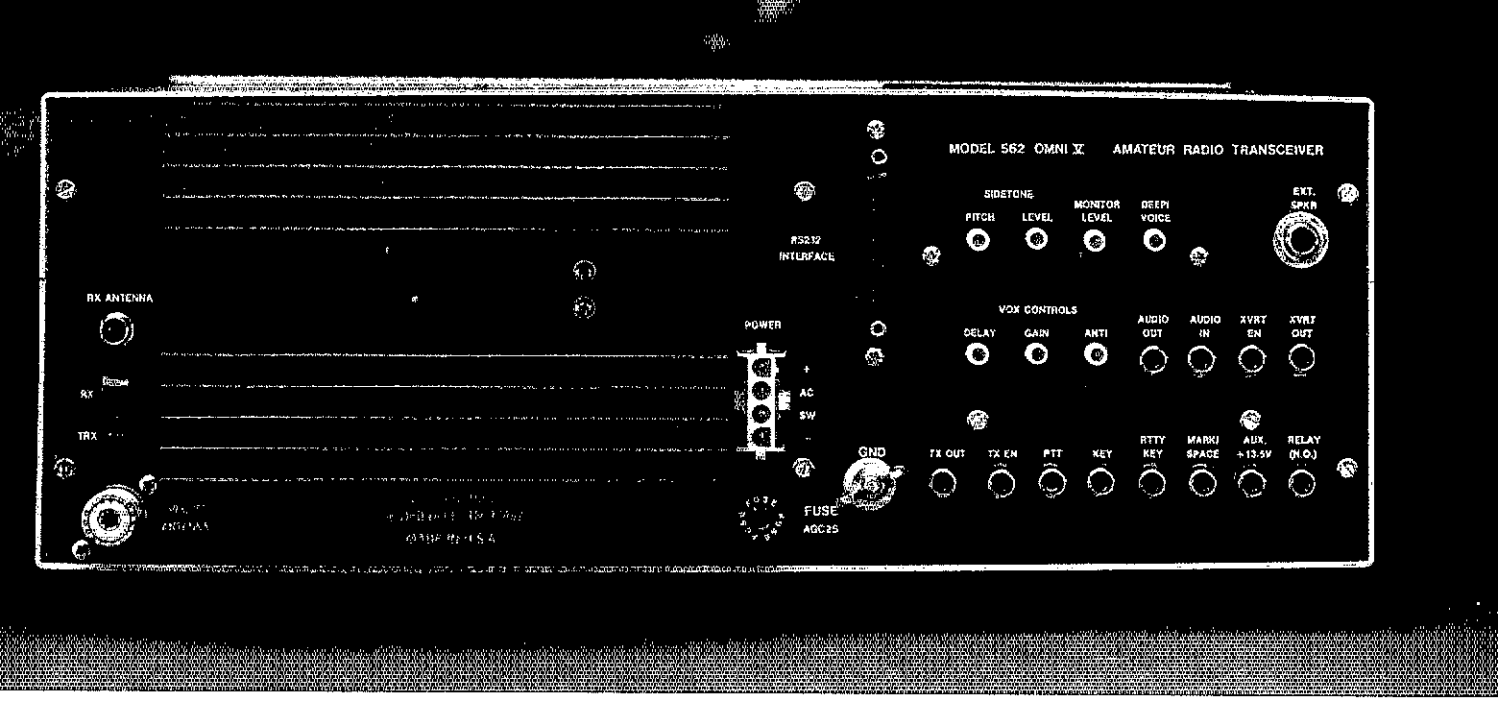
The OMNI V Station with Model 961 Matching Power Supply, and the Mighty Titan Amplifier.

GENERAL SPECIFICATIONS

Frequency Range: Transmit and receive on all ham bands from 160 through 10 meters in their entirety. Twelve 500 kHz segments plus 30 kHz over-shoot at the upper and lower edges of the segments.
Frequency Control: LO generated from a crystal oscillator mixed with a low noise 5.0 - 5.5 MHz phase locked loop.
Frequency Stability: Worst case, 1 PPM per degree C at 29.999 MHz.
Frequency Accuracy: +-100 Hz @ 25 degrees C.
Antenna Impedance: 50 Ohms, unbalanced.
Printed Circuit Boards: G-10 epoxy glass.
Power Required: Receive = 1.5 A. Transmit = 20 A. 12-14 Vdc.
Dimensions: HWD 5¾" x 14¾" x 17". 14.6 x 27.3 x 43.2 cm.
Net Weight: 16 lbs. 7.25 kg.

TRANSMITTER

Modes: USB and LSB (J3E), CW (A1A), FSK (F1A). Optional FM (F3E).
DC Power Input: 200 watts maximum.
RF Power Output: ALC stabilized, adjustable from 20 watts to 100 watts (50 Ohm load) with front panel RF OUT control.
Microphone Impedance: 200 Ohms to 50k Ohms. Bias voltage for electret mic is provided in front panel connector.
CW Sidetone: Internally generated with rear panel level and tone adjustments, independent of front panel audio level control.
SSB Generation: 9 MHz, 8 pole crystal ladder filter, balanced modulator.
Carrier Suppression: Greater than 60 dB.



Impressive from either end... but it's how we make ends meet that really delivers the difference.

Unwanted Sideband Suppression: Greater than 60 dB at 1.5 kHz AF input.
Harmonic Emissions: Greater than 45 dB below peak power output.
Third Order Intermod Products: –30 dB from two tone at 100 watts PEP.
Metering: Switchable forward power, SWR, collector current or audio processing level on SSB.
CW Offset: 600 Hz.
FSK Shift: 170 Hz.

RECEIVER

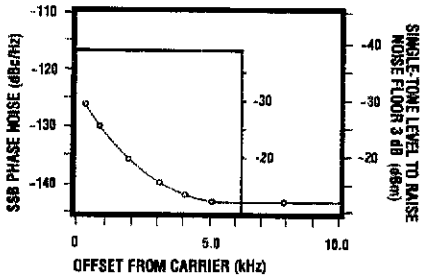
Modes: LSB, USB, CW and FSK. FM with optional board.
Sensitivity: .15 uV for 10 dB signal to noise ratio at 1.8 kHz bandwidth. With FM option, .3 uV for 12 dB SINAD at 15 kHz bandwidth.
Selectivity:

	–6 dB BW	–60 dB	Shape Factor
Standard 2.4 kHz	2.4 kHz	3.36 kHz	1.87:1
Opt. 1.8 kHz	1.8 kHz	2.90 kHz	1.60:1
Opt. 500 Hz	500 Hz	1.40 kHz	2.80:1
Opt. 250 Hz	250 Hz	.85 kHz	3.40:1
Opt. FM	15 kHz	30.00 kHz	2.00:1

Attenuator: –20 dB.
I-F Frequencies: 1st I-F 9 MHz, passband tuning I-F 6.3 MHz.
Image Rejection: ►100 dB.
I-F Rejection: ►60 dB average.
Noise Blanker: Switchable on/off with width adjustment.
Dynamic Range: 97 dB, measured with standard 2.4 kHz filter at 20 kHz spacing. 100 dB + with cw filters.
Third Order Intercept: + 10 dBm.
Noise Floor: –133 dBm @ 2.4 kHz bandwidth.
Squelch Sensitivity: Less than .6 uV.
Receiver Recovery Time: Less than 30 ms.
Pass Band Tuning I-F Shift: + –2.3 kHz.
Audio Output: Speaker, 1.5 watts @ 8 Ohms. Fixed level 1 mw @ 600 Ohms.
Notch Filter: 250 Hz to 2.2 kHz, greater than 50 dB notch depth.

Audio Bandpass Filter: 4 pole, variable center frequency 220 Hz to 1.7 kHz, 35% band width @ –6 dB.
Tone Control: Variable 15 dB roll-off @ 5 kHz.

PHASE NOISE PERFORMANCE OF THE OMNI V
–127 dBc/Hz @ 250 Hz offset from carrier.
–146 dBc/Hz @ 5 kHz offset from carrier.



Here is a graph of the phase noise performance of the OMNI V receiver. These measurements can only be made under laboratory conditions and, even then, our test equipment is at the limit of its ability to measure the noise at the narrow offsets. The significant measurements are those close-in. Note that this graph does not even go out to 25 kHz offset where many of the published measurements are made. Certainly, we invite comparison.

A WORD ABOUT COST

The OMNI V and the Paragon are the same price. Our 12 band crystal mixed oscillator is the same cost to manufacture as our general coverage synthesized oscillator. The choice between these two transceivers is based on general coverage vs. the best possible receiver performance in the ham bands.

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MADE IN USA

X SERIES

BASE/REPEATER ANTENNA

X-600MA Dual-Band: 2m 3-5/8 elements, 70cm 6-5/8 elements ●Power rating: 200W ●Weight: 5lbs ●Length: 205in ●Wind rating: 90MPH ●Connector: N

X-600A Dual-Band: 2m 3-5/8 elements, 70cm 5-5/8 elements ●Power rating: 200W ●Weight: 5lbs ●Length: 205in ●Wind rating: 90MPH ●Connector: UHF

X-500A Dual-Band: 2m 3-5/8 elements, 70cm 5-5/8 elements ●Power rating: 200W ●Weight: 5lbs ●Length: 114in ●Wind rating: 112.5MPH ●Connector: UHF

X-300A Dual-Band: 2m 2-5/8 elements, 70cm 3-5/8 elements ●Power rating: 200W ●Weight: 3.3lbs ●Length: 88in ●Wind rating: 90MPH ●Connector: UHF

X-200A Dual-Band: 2m 2-5/8 elements, 70cm 3-5/8 elements ●Power rating: 200W ●Weight: 4lbs ●Length: 67in ●Wind rating: 135MPH ●Connector: UHF

X-50A Dual-Band: 2m 3/4λ, 70cm 3-5/8 elements ●Power rating: 200W ●Weight: 3lbs ●Length: 126in ●Wind rating: 90MPH ●Connector: UHF

DIAMOND ANTENNA

F SERIES

F-22A 2m 2-7/8 elements ●Power rating: 200W ●Weight: 3lbs ●Length: 178in ●Wind rating: 90MPH ●Connector: UHF

F-23A 2m 3-5/8 elements ●Power rating: 200W ●Weight: 8lbs ●Length: 178in ●Wind rating: 90MPH ●Connector: UHF

NR SERIES

DUAL-BAND MOBILE ANTENNAS

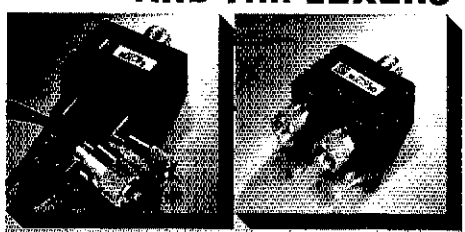
NR-770HA 2m 1/2λ, 70cm 2-5/8 elements ●Power rating: 200W ●Length: 39in.

NR-770RA 2m 1/2λ, 70cm 2-5/8 elements ●Power rating: 200W ●Length: 39in.

NR-790A 2m 3/4λ, 70cm 3-5/8 elements ●Power rating: 200W ●Length: 51in.

NR-770SA 2m 1/4λ, 70cm 1/2λ elements ●Power rating: 200W ●Length: 19.5in.

MX SERIES DUPLEXERS AND TRIPLEXERS



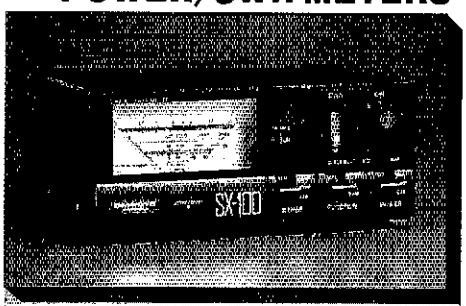
MX-72
Duplexer with UHF connectors for HF, 2m and 70cm bands
●Coaxial cable: RG58AU 35cm

MX-72H
Duplexer with UHF connectors for HF, 2m and 70cm bands
●Coaxial cable: 5D2VS 35cm

MX-72N
Duplexer with UHF connectors and N connector for HF, 2m and 70cm bands
●Coaxial cable: 5D2VS 35cm

MX-72D
Direct connection type Duplexer with UHF connectors for HF, 2m and 70cm bands
●Coaxial cable: None

SX SERIES WIDEBAND POWER/SWR METERS

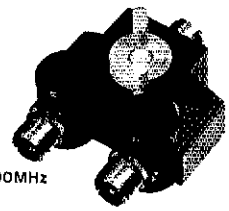


●Forward & Reflected power & SWR
●Selectable RMS or PEP switch
●3Power ranges:
5W, 20W, 200W
30W, 300W, 3KW (SX-100only)
●Power meas. accuracy: 5% typ.)
●Insertion loss: 0.2dB Max.
●Wideband performance

FIVE MODELS TO CHOOSE FROM

Model	Frequency
SX-100	1.8-60MHz
SX-200	1.8-200MHz
SX-400	140-525MHz
SX-600	Dual-Band 1.8-160 & 140-525MHz
SX-1000	4-Band 1.8-160, 430-450, 800-930, 1240-1300MHz

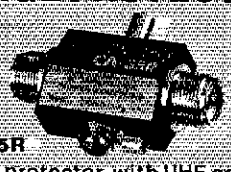
CX SERIES COAXIAL SWITCHES



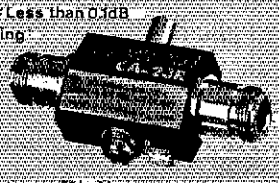
CX-210A
Wideband coaxial switch with UHF connectors
●Frequency range: DC-1000MHz
●Impedance: 50ohms
●Max. power rating: 1.5KW

CX-210N
Wideband coaxial switch with N connectors
●Frequency range: DC-3000MHz
●Impedance: 50ohms
●Max. power rating: 1.5KW

SURGE PROTECTORS



CA-35R
Surge protector with UHF connectors
●Frequency range: DC-500MHz
●Impedance: 50ohms
●Insertion loss: Less than 0.1dB
●Max. power rating: 400W (PEP)



CA-23R
Surge protector with N connectors
●Frequency range: DC-1500MHz
●Impedance: 50ohms
●Insertion loss: Less than 0.1dB
●Max. power rating: 200W (PEP)

DUMMY LOADS

DL-30A
●Frequency range: DC-500MHz
●Power rating: 15W (average), 100W (peak)
●Impedance: 50ohms
●Input connector: UHF male

DL-30N
●Frequency range: DC-500MHz
●Power rating: 15W (average), 100W (peak)
●Impedance: 50ohms
●Input connector: N male

For further information, see your local authorized DIAMOND Dealer or call us at.
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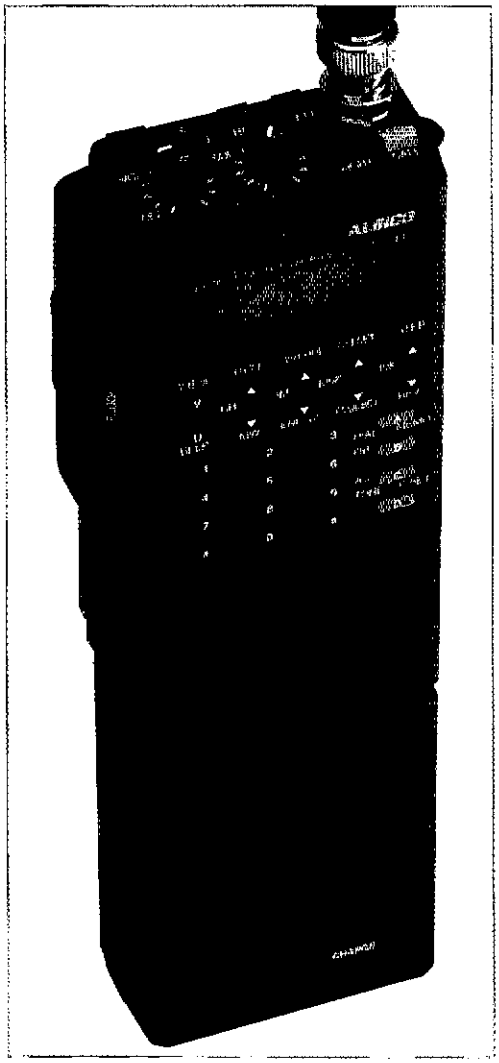
GET TWO BIRDS WITH ONE STONE
DJ-500T DUAL BAND HAND-HELD



Engineered with the most advanced electronic technology, the Tiny, Tough and Terrific DJ-500T features two methods of Frequency Selection, Encode/Decode Subaudible Tones and a Single memory - 16 Digit Auto Dialer and the following plus:

- **144.00Mhz - 147.995 Mhz / 440 - 450 Mhz** (Frequency Coverage is Modifiable*)
- **Ultra Compact: 2 5/16" (W) x 7 1/2" (H) x 1 1/2" (D)**
- **Cross Band Full Duplex**
- **High Power Output: 2.5W** (VHF) **/ 2.0W** (UHF) **with Standard Ni-Cd battery**
  6Watts (VHF) **/ 5Watts** (UHF) **with Optional Battery***
- **Two methods of Frequency Selection**
  Direct keyboard entry and small, quick up and down adjustments.
- **Automatic Battery Save Function**
- **All Ni-Cd batteries have unique DC/DC converter for 13.8VDC input**
- **Programmable Odd Offsets**

- 20 Memory Channels (10 each band)
- Illuminated LCD
- Multiple Battery Options
- Function Lock
- 10 db RF Attenuator
- Unique Priority Function
- CAP and MARS modifiable (Permit required)

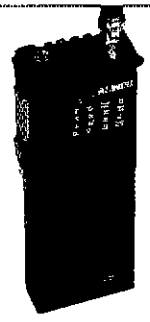
2-Year Limited Factory Warranty

6 WATTS VHF
*** 5 WATTS UHF**
(* With Optional EBP-8NAZ or 13.8VDC input)

DJ-100T
2m FM Transceiver
- 3 Watts/Standard
- 6.5 Watts/Optional

DJ-200T
220Mhz FM Transceiver
- 2.5 Watts/Standard
- 5 Watts/Optional

- LCD read out
- 10 Memories
- Dipswitch Programmable Subaudible Tone built-in
- MARS and CAP modifiable (DJ - 100T) (Certificate required)



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Amateur Electronic Supply — Las Vegas, NV
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The Ham Hut — Amarillo, TX
Henry Radio — Los Angeles, CA
Hirsch Sales Co. — Williamsville, NY
HR Electronics — Muskegan, MI
Ham Radio Outlet — Anaheim, CA
Ham Radio Outlet — Atlanta, GA
Ham Radio Outlet — Burlingame, CA
Ham Radio Outlet — Oakland, CA
Ham Radio Outlet — Phoenix, AZ
Ham Radio Outlet — Salem, NH
Ham Radio Outlet — San Diego, CA
Ham Radio Outlet — Van Nuys, CA
Ham Radio Outlet — Woodbridge, VA
HSC — Santa Clara, CA
HSC — Sacramento, CA
HSC — Sunnyvale, CA
International Radio Systems — Miama, FL
Jun's Electronics — Culver City, CA
KComm — San Antonio, TX
KJI Electronics — Houston, TX
Madison Electronics — Houston, TX
Maryland Radio Center — Laurel, MD
Memphis Amateur Electronics — Memphis, TN
Michigan Radio — Mt. Clemens, MI
Missouri Radio Center — Kansas City, MO
N & G Electronics — Miami, FL
Omar Electronics — Loganville, GA
Omni Electronics — Laredo, TX
Quement Electronics — San Jose, CA
RF Enterprises — Mernfield, MN
R & L Electronics — Hamilton, OH
Radio World — Boulder City, NV
Reno Radio — Reno, NV
Rivendell Associates — Derry, NH
Rogus Electronics — Southington, CT
Rosen's Electronics — Williamson, WV
Rose Distributing Co. — Preston, ID
Satellite City — Minneapolis, MN
Soundnorth — S. Int'l Falls, MN
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Texas Towers — Plano, TX
Universal Amateur Radio — Columbus, OH
VHF Communications — Jamestown, NY
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THE TWIN BANDER

DR-57OT

The **ALINCO Model DR-57OT** is a dual band transceiver offering big value in a small package. The independent main band and sub-band operation permits full duplex operation. The front panel is easy to read and understand. The LCD display lets the operator know at a glance which functions are in operation. The built-in duplexer has a single antenna output for a dual band antenna. **ALINCO** has listened to the consumer and in response has created the versatile **DR-57OT** which is truly user-friendly with minimal effort.

- *ULTRA-COMPACT BODY*
  5 7/8" (W) x 2" (H) x 8 1/2" (D)
- *HIGH POWER*
  45 watts on 2M and 35 watts on 70 cm. Approximately 5 watts low power.
- *EXTENDED RECEIVER RANGE*
  (130-169.995 MHz) on 2M, 144-147.995 MHz transmit. 440-449.995 MHz on 70 cm. (transmit and receive)
  (Specifications guaranteed on amateur bands only. Modifiable for MARS/CAP permits required)
- *SIMULTANEOUS*
  Receiving on both bands at the same time
  Scanning: intermix scan modes on both bands at the same time
- *INDEPENDENT*
  The volume, squelch and control dial are independently adjustable on both bands. You can store the following information on both bands at the same time. Priority function, choice of 37 encoding/decoding sub-tone frequencies,call channel, scan function (program, memory channel, VFO or unique open channel scan), memory skip, bell function, + or - repeater shift.

FULL FEATURES

- *FULL DUPLEX CROSS BAND OPERATION*
  Transmit on one band while receiving on the other band -- telephone style.
- *AUTOMATIC BAND EXCHANGE (A.B.X.)*
  When in the ABX function is active, an incoming signal on the sub-band will activate an automatic exchange between the main band and the sub-band.
- *PRIORITY*
  The VFO frequency is monitored for 5 seconds and then shifts for one second to the selected priority channel (In both bands at the same time).
- *DUAL SPLIT SHIFT OPERATION*
  Operates odd offset operation
- *BELL FUNCTION*
- *REPEATER REVERSE FUNCTION*
- *CALL CHANNEL FUNCTION*
- *BEEP FUNCTION*
- *20 MEMORIES (10 FOR EACH BAND)*
  Each memory channel can store frequency, repeater offset, encode/decode frequency.
- *4 SCANNING MODES*
  Program scan, memory scan, band scan and unique open channel scan (opposite to normal busy scan). Scan stops on a busy (or open channel) channel andthen resumes approximately 5 seconds after stopping even if the signal is still present.
- *REPEATER OPERATION*
  The DR-57OT can be used as a cross band repeater.

EASY TO OPERATE FUNCTION

- *LARGE AMBER MULTI-FUNCTION LCD DISPLAY*
  Visible in all conditions, it indicates main and sub-band frequencies, frequency step, "on air", "call", "CTCSS", "PRI", "REV", "-", "+", "*", "T" (tone), tone frequency, "MUTE", "LOCK", "ABX", "♪", "BUSY", "F", "S/RF meter", "REV"
- *MHz FUNCTION FOR BOTH BANDS*
  One MHz is increased or decreased per touch
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  One touch selection with pressing of twin key
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WHAT'S NEW ON THE ARRL BOOKSHELF?

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Antenna Compendium Vol 2

Antennas continue to be a topic of great interest among radio amateurs. ARRL continues to receive many more papers than can possibly published as articles in QST. Once the first ***Antenna Compendium*** was published in 1985, we started a new collection of material. Six of the papers in this 208-page volume contain listings of BASIC programs suitable for use with an IBM PC or compatible computer. ARRL offers separate from the book, a 5¼-inch (360k) computer diskette which contains eleven BASIC programs in ASCII text format, and one compiled Pascal program.

Here's a list of topics: New design and construction data for verticals, steerable arrays for the low bands, steerable array of verticals, inverted bobtail curtain, a simple phased array feed system that works, theory of unipole antennas, low-profile paired verticals for HF, multiband loaded counterpoise for vertical antennas, multiband groundplane for HF, tunable vertical, ⅝-wave VHF antenna, experiments with HF and MF ⅝-wave antennas, new techniques for rotary beam construction, attic tri-bander, yagi pattern design factors, half-loop antennas, coil shortened quads (½-size example for 40-M), 14-30 MHz LPDA for limited space, antenna trap design using a home computer, suburban multibander, fat dipoles, swallow tail antenna tuner, coaxial resonator match, simple broadband 80-meter dipole using multiple coaxial stubs, J-pole antenna for ARES/RACES operation, portable 2-meter antenna, half-wave handle antenna for your hand-held, controlled current distribution antenna, end-coupled resonator (ECR) loop, balloons as antenna supports, kite supported long wires, computer-aided antenna selection guide, guide to antenna modeling, window slot antenna for apartment dwellers, polar pattern plotter for the C64, VHF Sniffer (absorptive wavemeter), additional aspects of the balun problem, servo-controlled antenna tuner, remotely controlled antenna coupler, phase-shift design of Pi, T and L Networks, sunspots, flares and HF propagation, and visible phenomena of the Ionosphere. Separately the book (#2545) is $12 and the diskette (#2626) is $10. Book and Diskette (#2863) available together for $18

Novice Notes: The Book

Here's just what the newly license ham ordered: A collection of popular articles from the popular "Novice Notes" series in QST. You'll find basic information on operating (getting on) and equipment and antennas (getting on and getting out). Find out what you should do before your license arrives; how to buy used gear; all about antenna tuners and antennas; logging and QSLing; awards chasing; tips on phone, cw and digital operating; believing in yourself — the "Can Do" attitude. This book is packed with practical information. #2561 $6 plus postage and handling.

Night Signals

"Heavy morning ground fog. Increasing clouds and lower temperatures. Lows of 20 to 25 Fahrenheit in the Cascades with accumulations of 5 to 6 inches new snow possible tonight." But Marc Lawrence couldn't hear the weather forecast that night. He was lying with a broken leg, up 3500 feet in the rugged Cascade range. His only means of communications were his broken ham radio transceiver and a VHF hand-held radio that was useless because of the terrain. Find out the role that Amateur Radio played in this exciting adventure by Cynthia Wall, KA7ITT, written in tradition of the Tommy Rockford ham radio adventure series. #2588 $5.

Amount of order/shipping and handling; less than $20/$2.50, $20.01-30.00/$3.50, $30.01-40.00/$4.50, $40.01-50.00/$5.50, $50.01-75.00/$6.50, Over $75/$7.50. Add an additional $1 for UPS.

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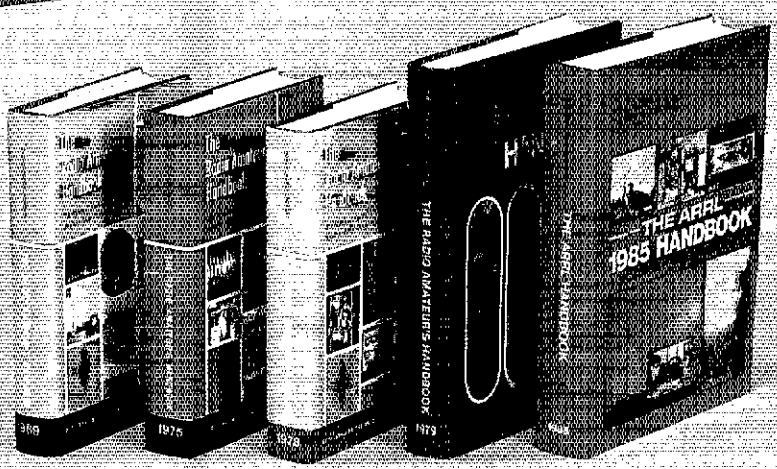

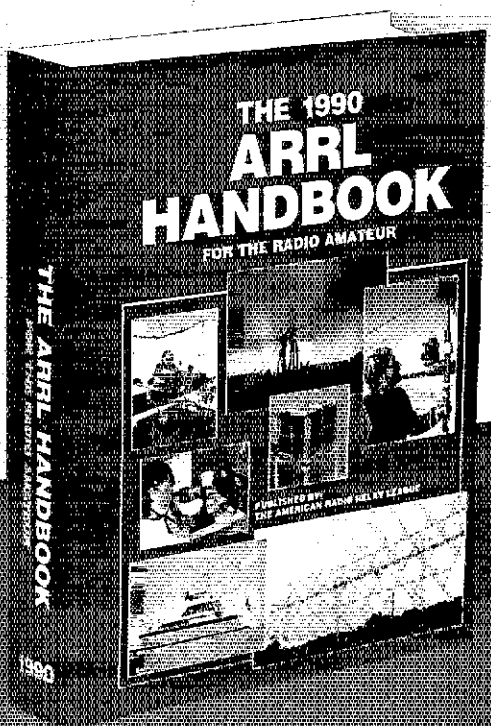

INTRODUCING THE GREAT...

If you bought one of the Handbooks pictured above, you're not alone. These represent over 486,000 of the 5.8 million copies of the **Handbook** purchased since 1926. ARRL's premier publication is successful because it is updated every year. The new sixty-seventh edition is no exception. With over 1200 pages and over 2100 tables, figures and charts, **the 1990 ARRL Handbook for the Radio Amateur is better than ever!**

Every ham is interested in antennas, and we've added a host of new antenna projects including three high-performance Yagis for 144, 220 and 432 MHz designed by Steve Powlishen, K1FO. Dick Jansson, WD4FAB, has completely revised the space communications chapter, which includes his innovative helical array for AO-13 Mode L.

But that's not all. You'll find many other popular construction projects that can be built in a weekend, such as power supplies, keyers, measuring devices, QRP transmitters and VHF/UHF preamps. For the more ambitious builder, there are projects like a high-performance communications receiver, high-power HF and VHF amplifiers, a 1296-MHz transverter or digital audio memory keyer.

The **Handbook** has always been famous as a reference for component data. You will find an entire chapter devoted to everything from tube and transistor specifications to aluminum tubing sizes. Also featured is the most up-to-date information on digital techniques and operating practices.

At $23, the **Handbook** remains an exceptional value for a hardcover technical publication. For shipping and handling in the US, please add $3.50 ($4.50 for UPS), elsewhere add $5 for shipping by surface mail. Save on shipping charges by visiting your favorite ARRL dealer!

Here is a description of what is covered in the **Handbook**:

The first five introductory chapters cover: basics of Amateur Radio, electrical fundamentals, radio design technique and language, solid state fundamentals and vacuum tube principles. Next are 12 chapters devoted primarily to these topics: power supplies, audio and video, digital basics, modulation and demodulation, RF transmitters, receivers, transceivers, repeaters, power amplifiers, transmission lines and antenna fundamentals. Another four chapters cover voice, digital, image and special modulation techniques. The RF spectrum, propagation and space communications are covered in two chapters. The construction and maintenance section offers 12 chapters of useful projects ranging from power supplies and antennas through digital equipment. You'll also find up-to-date component data that the **Handbook** is famous for. The final five chapters cover obtaining your license, station design and operation, interference, monitoring and direction finding. An abbreviations list and huge index make up balance of the book.

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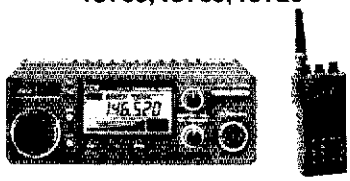

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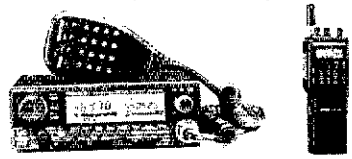

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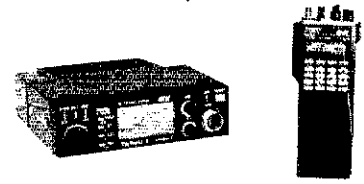

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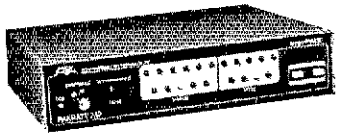

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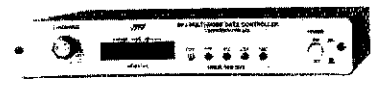

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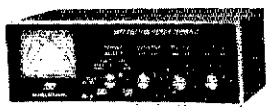

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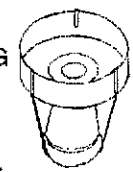

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PASS THAT EXAM . . .

with ARRL training material

There's no time like the present to begin studying for your next Amateur Radio exam. ARRL publications are written to make passing the exams as easy as possible, while learning the basic material for each exam.

Every ham needs a copy of the new **FCC Rule Book.** It has all of the new regulations with easy-to-understand interpretations. It also presents what you need to know as far as the regulatory material that appears on the exams.

If you are not licensed, our popular beginner's package, **Tune in the World with Ham Radio** is just the ticket for the prospective Novice. The 257-page text covers the basic regulations and theory you need for the written exam. At the beginning of each chapter is a list of key words, and these words are highlighted the first time they appear in the text. The book contains the question pool currently being used on the exams as well as several chapters on how to get on the air once your license arrives. The kit also has two 90-minute cassettes. One teaches the code with voice explanations, and a second provides practice in the format used on the exam. If you have a computer, you can purchase the *Tune in the World* book and a code-learning cartridge called **Morse University** for the Commodore 64 (TM) or with a diskette package for the IBM PC called **Morse Tutor.** Both provide practice at varying speeds and are often used for practice for the General and Extra class code exams as well as for the Novice.

The *ARRL License Manual Series* consists of the **Technician, General, Advanced** *and* **Extra Class License Manuals** which are based on the current question pools used in the exams. They also have the key words presented at the beginning of each chapter, with the word highlighted the first time it is used. You will also find the complete question pool used on each exam with answers.

Besides the computer programs mentioned above, we have four sets of tapes that give practice from 5 to 22 Words Per Minute. On sets 1, 2, and 3 (at speeds up to 18 WPM) the individual characters are recorded at a rate of 18 WPM, but the spacing between the letters is increased to slow the overall average code speed. This makes it easier to learn the code at higher speeds. At speeds greater than 18 WPM and in set 4, standard code timing is used.

Teaching a Novice, Technician, or General class licensing course? **The ARRL Instructor's Manual** tells how to go about teaching such a course. The **Novice, Technician,** and **General Class Instructor's Guides** are tailored to the specific needs for each class of license.

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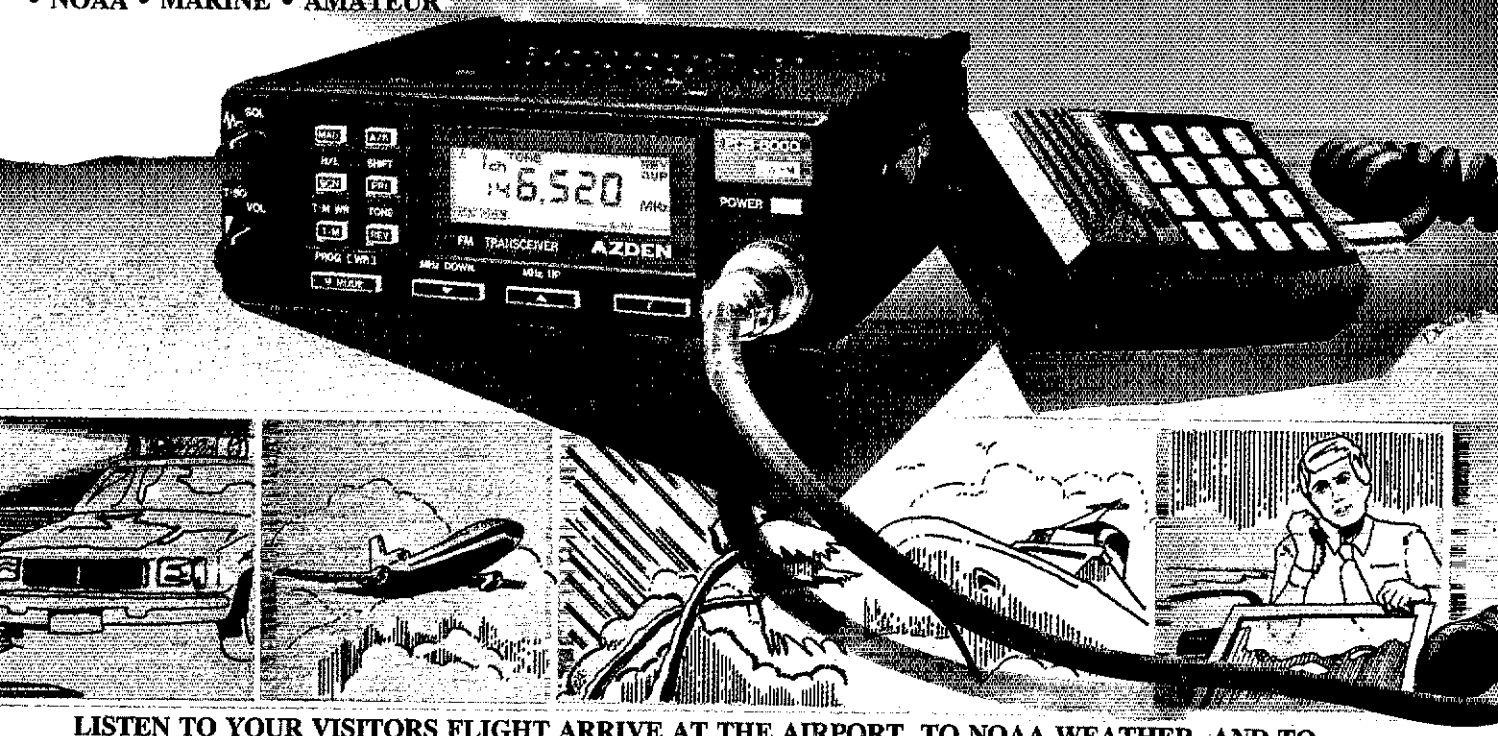

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New exams mean a new edition of **Tune in the World with Ham Radio!** Using ARRL's beginner's package, students will quickly pass their exam in no time and be on the air to enjoy the great band conditions we are experiencing today. Novices can now communicate not only using Morse code, but voice communications on 10-meters and VHF/UHF repeaters as well. They can also use digital communications to link home computers through packet radio networks. Imagine being able to personally communicate with an astronaut as the Space Shuttle circles the Earth or with someone on a remote island in the South Pacific!

Besides the bright new cover, we're also excited by the new text which we've made even more understandable and fun for the newcomer. There are hundreds of illustrations that describe important concepts. As with the last edition, two 90-minute cassettes are included. One teaches the code and the other provides practice to make passing the code portion of the exam a snap! Since the tapes are recorded in stereo, the voice portion can be switched off for self-testing and even more practice.

The 30-question part of the exam on regulations and basic radio theory is chosen from categories of topics that are contained in the total pool of 372 possible questions. The text presents all of these questions and distractors along with the answer key and a sample Novice test.

The **Tune in the World with Ham Radio** package including the text and both tapes is available for $19. The book alone is $14. Add $3.50 for shipping and handling.

The new edition covers questions that will be used on exams effective November 1, 1989.

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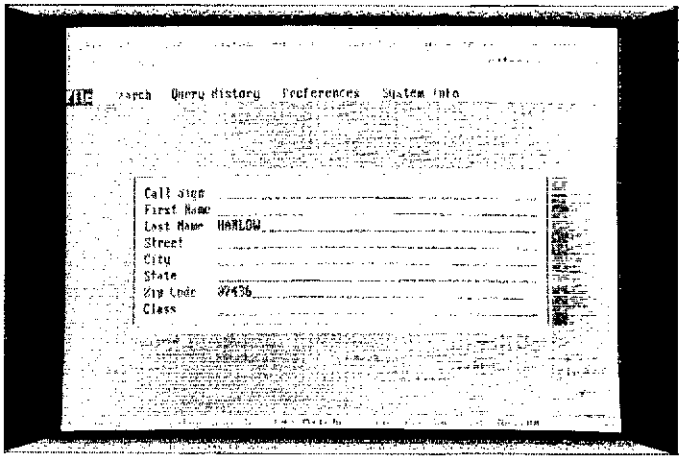

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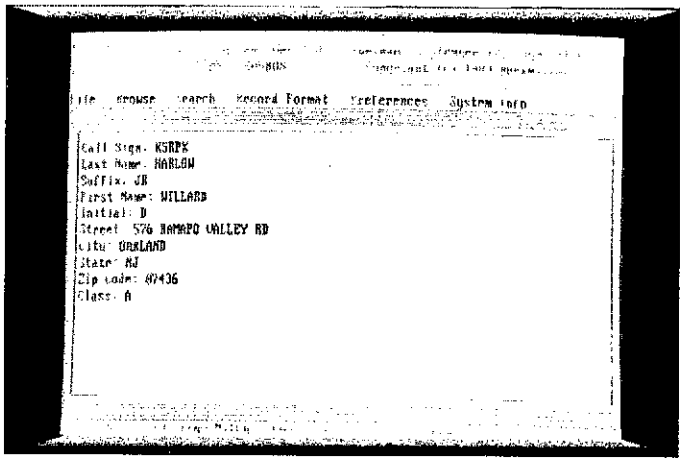

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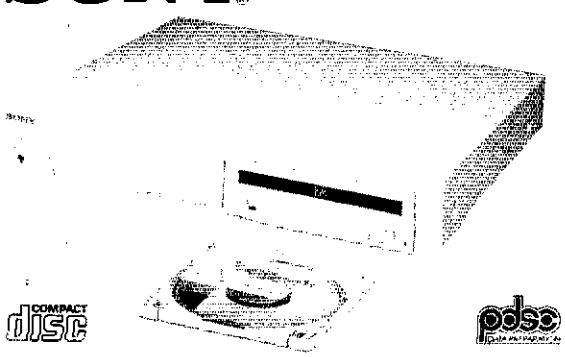

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*Requires 640k RAM, hard disk drive and MS-DOS 3.1 or later version.

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The **only** repeaters and controllers with REAL SPEECH!

No other repeaters or controllers match Mark 4 in capability and features. That's why Mark 4 is the performance leader at amateur and commercial repeater sites around the world. Only Mark 4 gives you Message Master™ real speech • voice readout of received signal strength, deviation, and frequency error • 4-channel receiver voting • clock time announcements and function control • 7-helical filter receiver • extensive phone patch functions. Unlike others, Mark 4 even includes power supply and a handsome cabinet.

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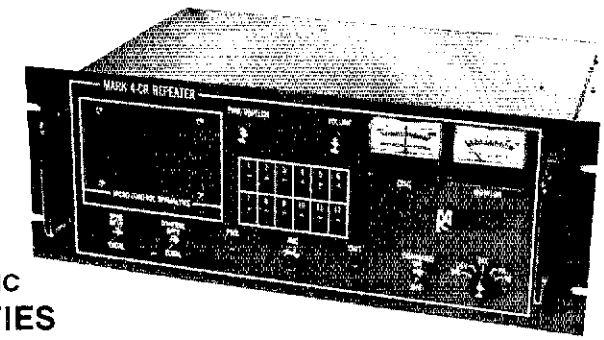
2 meters, 220, and 440!



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RS-232 Option For Repeater Control Using MODEM or PACKET TNC

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Cross Needle SWR/Power Meters for All Bands

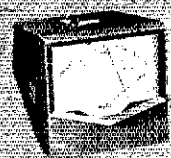
NS-660PA

Model	Freq. Range Int. Sensor	Forward Power	Connectors
NS-660A/PA*	1.8-150 MHz	30/300 W/3 kW	SO-239
NS-563BM/BN*	140-525 MHz	3/30/300 W	SO-239/N type
DP-810	1.8-150 MHz	0-1.5 kW	SO-239
DP-820/N	140-525 MHz	0-150 W	SO-239/N type
CN-101	1.8-150 MHz	15/150 W/1.5 kW	SO-239

*All models back lit
**Average Power Reading Only

CN-460M

CN-520



MOBILE/BASE CROSS NEEDLE SWR/POWER METERS

Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-410M*	3.5-150 MHz	15/150 W	SO-239
CN-460M*	140-450 MHz	15/150 W	SO-239
CN-466M*	140-460 MHz	15/75 W	SO-239
CN-620M**	1.8-60 MHz	200 W/2 Kw	SO-239

*Back lit with mobile bracket
**Optional mobile bracket available

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(213) 538-1043 ■ FAX (213) 538-1096

Specifications subject to change without notice. * All models And types not represented.

NEW Cross-Needle CN-101 SWR/Power Meter

- Frequency: 1.8 thru 150 MHz
- Power Range: 15/150 W/1.5 kW
- Input Connectors: SO-239

Simultaneous display of SWR and Power readings by quick reference cross needle display. . . P.E.P. monitoring. . . Normally displays average RF Power.

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AV5	5 band trap vert	128.95
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HF5B	HF mini beam

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TH7DXS	7 el triband
TH5MK2S	5 el triband
EX-14	4 el triband
TH3JRS	3 el 750W pep
18AVTS	5 band trap vert
14AVQS	4 band trap vert
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NMOMM	mag. mt	20.95
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		per/ft.
Belden 9913	Low Loss	63 cts
RG213/U 50 Ω (OHM)		37 cts
RG8/U	Foam	37 cts
RG8X	Mini	22 cts
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BNC(M)UHF(F) 2910		5.95
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CR2AM	2M mag mt	41.00
CR2AP	2M perm mt	41.00
CR274AM	dual band mag mt	55.00
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20AG	top sect. 9'	59.95
25G	10' sect	69.95
25AG2	top. sect. 9'	83.95
45G	10' sect	166.95
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RM30	30mt. std. resonator	17.95
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435-40CX	70 cm satellite	
432-30LBX	70cm satellite	
2M-13LBA	2 meter	
2M-16LBX	2 meter	

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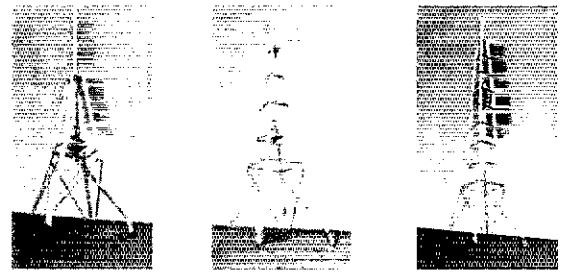

CR-18 CR-30 CR-45

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 (CK45) Is Recommended. Specifications Are Subject To Change Without Notice Or Obligation.

*Subject To Availability

Model	Height	Maximum Antenna Wind Load In FT 2	Base Width	Max. Vert. Load Lbs.	Tower Weight Lbs.	SALE
CR-18	5'10"	21@ 90 MPH	31½"	440	28	$139.95*
CR-30	9'10"	22 @ 90 MPH	39"	1,322	49	239.95*
CR-45	14'9"	23 @ 90 MPH	39"	881	55	319.95*
CK-45	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2½"					47.95*

*U.P.S. Not Included

For Safety's Sake All Towers Should Be Guyed.

CLP 5-130-2
- 50-1300 MHz
- 23 elements
- $239.95 + UPS.

CLP 5-130-1
- 105-1300 MHz
- 19 elements
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Automatic Notch/Peak, CW Filter In One. Use Between Radio and Speaker. Then Say Good-Bye to Annoying Tune-Ups, Whistles and Hetrodynes.

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FL2

FL3

Ultimate Audio Filter. 12 Poles of Tunable Filtering. Use 6 Ways to Dig Out Signals. SSB, CW, RTTY, Peak/Notch HI/Low Pass. Release the Full Potential of Your Receiver.

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ICOM, Kenwood, Yaesu
- HI quality audio
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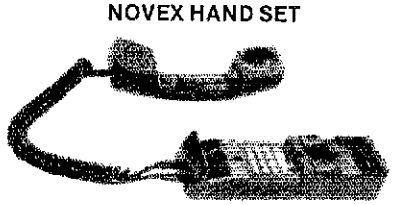
- Split plugs allows use as mic. or speaker
- Why pay more? **$22.95 + UPS**

NOVEX HAND SET



- DTMF dial pad
- Back lit dial
- Speaker vol. control
- Cellular look
- Wired for current 8-pin mic.

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- All HF Bands 1.8-21 MHz (10 MT user install)
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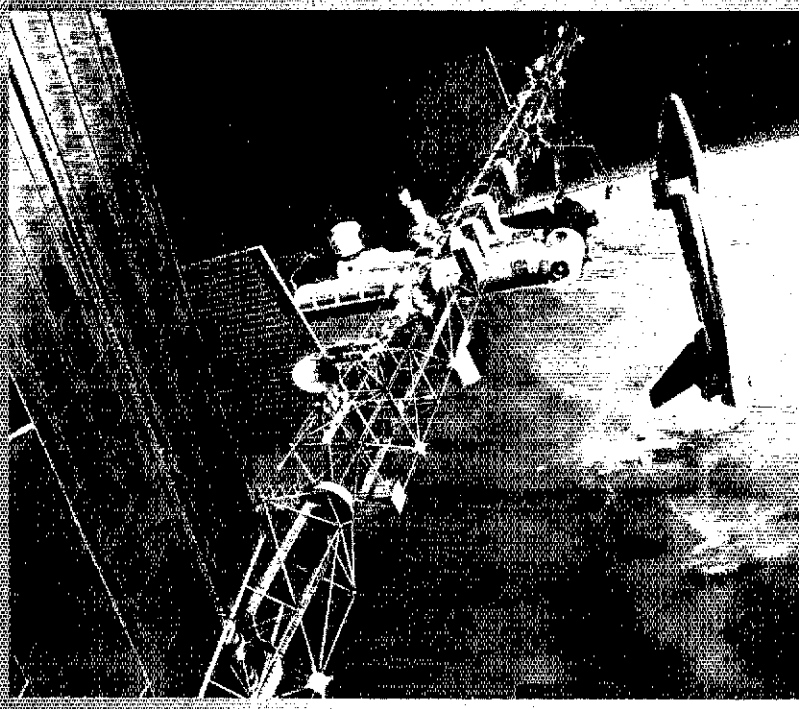

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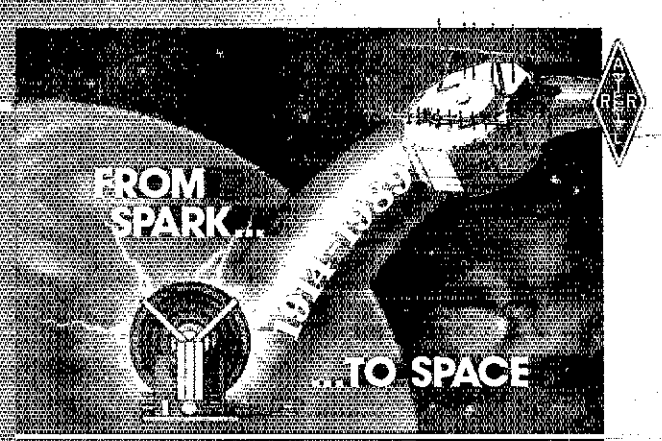

*See the ARRL Bookshelf page elsewhere in this issue for ordering information.

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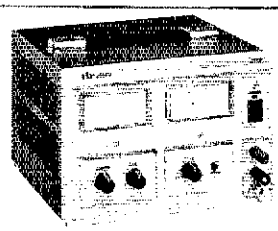
A POWER SUPPLY FOR EVERY WORKBENCH



Here's an excellent value in an all-around bench power supply. Dual meters let you continuously monitor voltage and current, and 0-30 volt 3-amp output fills most common power supply needs. Use the constant current mode to charge rechargeable batteries, limit power to circuits under test, and operate devices that are current dependent.

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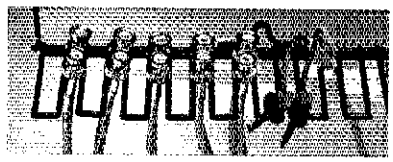
Specifications: Output voltage: 0-30 VDC continuously variable. Coarse and fine controls. Output load: 0-3 A continuous. Output impedance: Typically less than 0.2 Ω to 10 kHz. Ripple: To 10 kHz, less than 5 mV p-p (0.5 mV rms typical). Load regulation: ±0.25%±3 mV, 1-100% of rated current. Line regulation: ±0.25% ±2 mV for ±10% line variation. Current limiting: 0-3 A, variable. Power: 120 VAC/240 VAC, ±10%, 50-60 Hz, 180 watts.

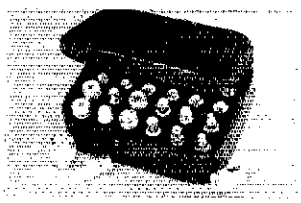
HANDY BNC CABLE SET



Our new BNC cable set provides you with 10 handy coax cables for connections to instruments and other equipment. Included are two 3 ft. BNC male/dual E-Z hook connectors, three 1-1/2 ft. BNC male/BNC male connectors, two 2 ft. BNC male/BNC male connectors, and a rack that you can mount on your workshop wall for convenient cable storage. An outstanding value at less than $3.00 a cable.

HCA-5002 ..... $29.95

PREMIUM QUALITY COAX CONNECTORS



Make different types of coaxial connector adapters with gold plated pins and Teflon insulation. Just screw the required connector onto one of the interfaces — no crimping or soldering is needed. In just seconds, you'll have that special coaxial connection you require. Kit contains male and female N, F, RCA, BNC, UHF, SMA, TNC, and mini UHF connectors. A handsome, padded, zippered case is included with your deluxe kit to protect your connectors and to keep them looking new after years of service.

HCA-3001 ..... $79.95

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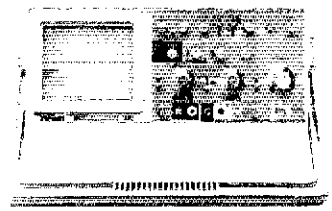

These oscilloscopes offer the measurement capability you need, plus luxury features that make them a joy to own. TV triggers, 1 mV/div sensitivity, differential and X-Y measurements, plus beam finder, component tester, graticule illumination, and other features many manufacturers omit. Enjoy a top-quality 25 or 40 MHz scope backed by a reliable name, full warranty, and complete specifications.

25 MHz: SO-4552 ..... $399.95
40 MHz: SO-4554 ..... $599.95

Specifications: Vertical: 1 mV/div-5 V/div. Bandwidth less at 1 mV/div. Accuracy ±3% at 1 kHz, ±5% at 1 mV/div. Overshoot: less than 5%. Max input: 400 V. Modes: CHA, CHB, dual, add. Horizontal: .2 s - .1 µs/div, plus X10 magnifier. Trigger: CHA, CHB, Line, Ext, Auto, Norm, TV-V, TV-H, +/-. Power: 90-132/198-264 VAC, 50/60 Hz, 45 W. Weight: 16.7 lbs.

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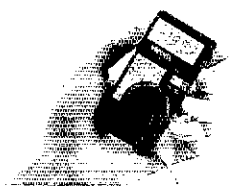

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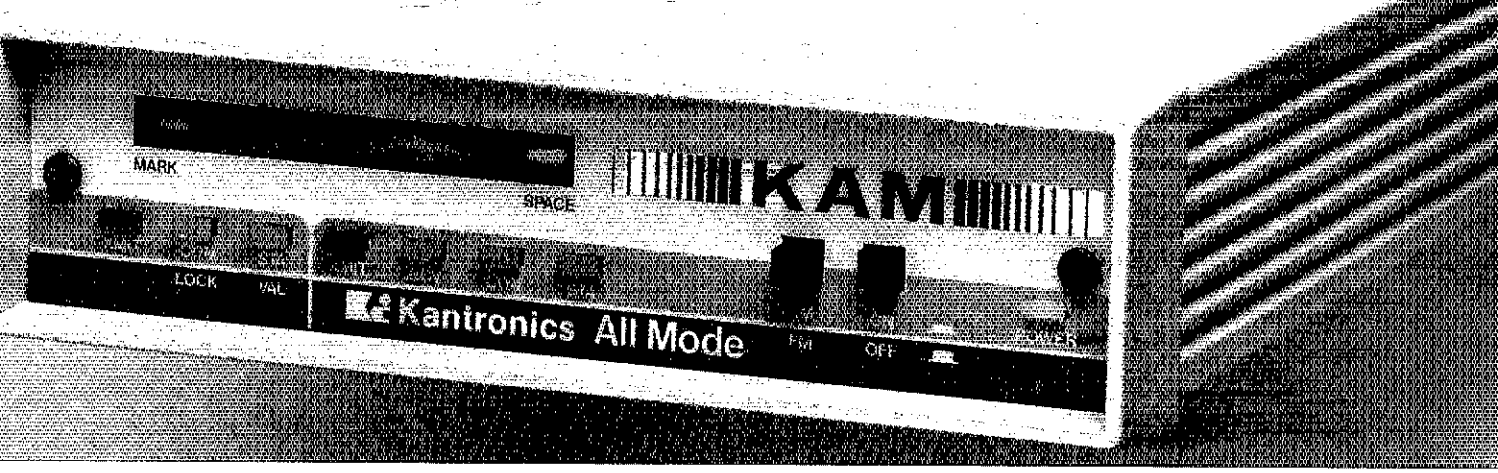

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In 26 countries around the world, tens of thousands of amateurs know that Kantronics is the leader in bringing tomorrow's technology to their stations today. They also know they will always be among the first to incorporate just-introduced features and modes with Kantronics software and firmware updates.

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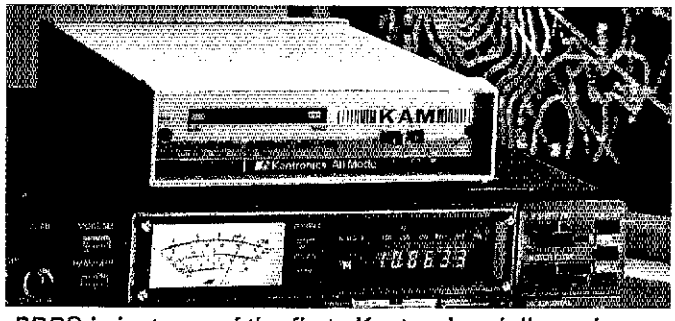
Meet Your Mailman

In this age of telco LANS, E-mail and FAX,



PBBS is just one of the firsts Kantronics delivered.

you will know you have mail in your **Personal Packet Mailbox™** when your KAM "STA" LED is blinking. New firmware level 2.85 has also added a handy automatic mailbox user-connect. So save your computer and monitor life by turning them off when you are away, and never miss a beat on the airwaves.

Version 2.85 KAMs have increased Packet Cluster™ compatibility, **KA-NODE™** path preservation, KA-NODE recognition of the "NET" nodes and HF baud rates from 50 through 300! And there are three new mailbox commands: *List Mine, Read Mine* and *Kill Mine.*

and Tomorrow...

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(2) The Ham-Ad rate is $1.00 per word. This includes firms or individuals offering products or services for sale. A special rate of 30 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 December 14 through January 13 will appear in March *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.

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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.

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.

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.

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., 1409 Cooper Drive, Irving, TX 75061.

LITTLE Big Horn Nets Sundays: 14.057-2200Z, 21.150-2230Z. Native American Indians and Others Welcome. Info WA2DAC.

INTERESTED In Public Service? Join your Local Radio Emergency Associated Communications Team. In Pennsylvania call 717-938-6943 or write REACT, 1160 Old Trail Road, Etters, PA 17319.

RECOMMENDED 50 MHz DX Window. A detailed paper recommending 4 calling frequencies 50.010-CW DX, 50.090-CW DX, 50.110-SSB DX & 50.125-SSB USA for peak solar cycles 22 & 23-25. Send SASE for free 4 page paper. Sam Goda, WA6JRA, 1815 N. Woodside Street, Orange, CA 92665 USA, 714-637-3989.

CITRUS COUNTY Florida Hamfest January 20, 1990. National Guard Armory, Seven Rivers Drive, off US 19 in Crystal River, FL. Set-up 3 PM Friday and 7 AM Saturday, Public at 9 AM. Admission $4 (SASE) until Dec. 20, 1989, $5 thereafter. Indoor tables $8, outdoor fleamarket $5. Vendors must purchase admission. Del Slocum, 904-726-0725 or SHARC Hamfest, 3101 E. Oakton, Hernando, FL 32642.

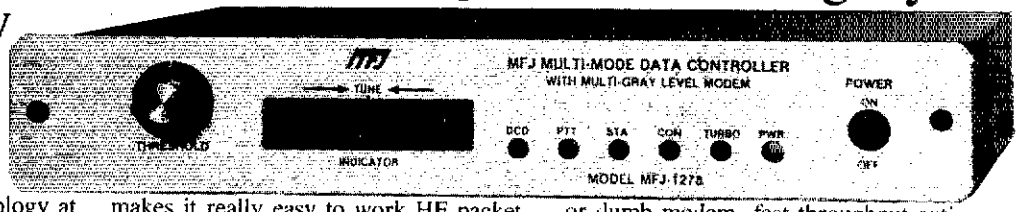
MFJ gives you *all 9* digital modes

and *keeps on* bringing you state-of-the-art advances

. . . while others offer you *some* digital modes using 3 year old technology

MFJ-1278

$279.95



No 3 year old **"NEW"** technology at MFJ!

Using the latest advances, MFJ brings you 9 exciting digital modes and *keeps on* bringing you state-of-the-art advances.

You get tons of features other multi-modes just don't have.

Only MFJ gives you *all 9* modes

Count 'em -- you get 9 fun modes -- Packet, AMTOR, RTTY, ASCII, CW, FAX, SSTV, Navtex and full featured Contest Memory Keyer.

You can't get all 9 modes in *any* other multi-mode at *any* price. Nobody gives you modes the MFJ-1278 doesn't have.

The best modem you can get

Extensive test in ***Packet Radio Magazine*** prove the modem used in the MFJ-1278 copies HF packet more accurately than all other modems tested.

The MFJ-1278 is the *only* multi-mode with a ***true*** DCD circuit for HF. This dramatically reduces sensitivity to noise and dramatically increases completed QSOs.

Exclusive Built in Printer Port

Only the MFJ-1278 has a dedicated printer port that lets you plug in your Epson or IBM compatible printer.

You don't need to buy an optional $40 cable just to plug your printer into your MFJ multi-mode.

New Easy Mail™ Personal Mailbox

You get MFJ's new Easy Mail™ Personal Mailbox with soft-partitioned memory so you and your ham buddies can leave messages 24 hours a day.

20 LED Precision Tuning Indicator

MFJ's unequaled tuning indicator makes it really easy to work HF packet.

And unlike others, you use it exactly the same for all modes -- not differently for each mode.

Just tune your radio to center a single LED and *you're precisely tuned in to within 10 Hz* -- and it shows you which way to tune!

Multi-Gray Level FAX/SSTV Modem

You'll see tomorrow's news today when you copy outstanding FAX news photos with crisp, clear details.

MFJ-1278 is the *only* multi-mode with a built-in multi-gray level modem. It lets you transmit *and* receive high resolution multi-gray level FAX/SSTV pictures with an appropriate terminal program.

Only MFJ can transmit FAX . . .

Most packet stations can *receive* FAX **But** only the MFJ-1278 lets you *transmit* FAX without internal modifications that disable other modes.

So now you can send your own pictures, maps and diagrams by FAX to stations throughout the world.

Too bad they can't send theirs to you . . . *unless* they disable other modes

One FREE Upgrade!

When you buy your MFJ-1278 *today*, you don't have to worry about missing new modes and features that come out *tommorow*.

Why? Because your MFJ-1278 comes with a coupon good for one ***free*** eprom upgrade exchange that'll add new features.

Plus More . . .

Plus you get . . . 32K RAM (not 16K), ***free*** AC power supply, Host mode that lets MFJ-1278 serve as a KISS interface or dumb modem, fast throughput anti-collision technology, independent transmit level for each radio port, random code generator, lithium battery backup, RS-232 *and* TTL serial ports, *standard* 850 Hz RTTY shift, socketed ICs, tune up command, peripheral I/O port, automatic serial numbering, programmable message memories, dual radio ports (*each* HF or VHF), CW key paddle jack, speaker jack that lets you monitor CW sidetone, transmit and receive audio and packet connect bell, ***new*** fully intergrated instruction manual with *Fast Start*™ instructions and more in a 9½ x 9½ x 1½ inch cabinet.

Get on the air instantly Just plug it all in

All you need is an MFJ-1278, your rig, any computer and a terminal program.

With an MFJ Starter Pack, $24.95, you just plug it all in, wire up your mic connector and you're on the air.

Order MFJ-1284 for IBM compatibles (includes Picture Passing); MFJ-1287 for Macintosh; MFJ-1282 (disk) for C-64/128; MFJ-1283 (tape) for VIC-20.

No Matter What™ Guarantee

You get MFJ's full one year No Matter What™ Guarantee.

That means we will repair or replace your MFJ multi-mode (at our option) *no matter what* happens to it for a full year.

Others give you a *limited* warranty. What do you do when *they* say, "Sorry, your *limited* warranty doesn't cover *that*?"

Get 9 new ways of having fun

Don't settle for 3 year old technology.

Choose the only multi-mode that gives you the latest advances and all 9 modes.

Get 9 new ways of having fun *today!*

What the ham magazines say about the MFJ-1278:

QST Magazine: ***"I was especially impressed** by the new '1278s DCD (data carrier detect) circuit performance. This function, vital to HF packet-radio operation, performs admirable . . . . Refinements such as this go a long way toward improving the viability of HF packet-radio operation with a multimode!"*

***"FAX reception is so good** that it is irresistible to tune around for interesting FAX transmissions. The current '1278 provides good copy on all seven supported FAX formats . . . . I most enjoyed copying news-photo transmissions. Some of these were outstanding, with crisp, clean reproduction and a surprising amount of detail."* **September, 1989.**

CQ Magazine: ***"I found the '1278 did an excellent** job (copying CW), even with bad operators. I've checked lot of CW 'copiers' in my time, and certainly this unit was as good or better than most."*

***"I switched the terminal mode to HF packet** . . . . I was very impressed, because with the tuning indicator I immediately received (good) packet copy . . . I (tried) a connect with an east coast station. Before I knew it I had a QSO going and even handled break-in stations anxious to log New Mexico."* **May, 1989.**

73 Magazine: ***"If you think I enjoyed using** (the MFJ-1278) you are right. It was easy and fun to use . . . Overall, I found the MFJ-1278 to be . . . a good multi-mode controller at a reasonable price. You won't be disappointed."* **April, 1989.**

Worldradio Magazine: ***"Bottom line: Excellent value** for the money. Solid performer. Easy to use. **Easiest** of the top three to get on line . . . . "* **September, 1989.**

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BEST OF MFJ

MFJ, Bencher and Curtis team up to bring you America's most popular keyer in a compact package for smooth easy CW

MFJ-422B $129.95

The best of all CW worlds - a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

This MFJ Keyer is small in size but big in features. You get iambic keying, adjustable weight and tone and front panel volume and speed controls (8-50 WPM), dot-dash memories, speaker, sidetone and push button selection of automatic or semi-automatic/tune modes. It's also totally RF proof and has ultra-reliable solid state outputs that key both tube and solid state rigs. Use 9 V battery or 110 VAC with MFJ-1305, $9.95.

The keyer mounts on a Bencher paddle to form a small (4 1/8 x 2 5/8 x 5½ inches) attractive combination that is a pleasure to look at and use.

America's favorite paddle, the Bench, has adjustable gold-plated silver contacts, lucite paddles, chrome plated brass, and a heavy steel base with non-skid feet.

You can buy just the keyer assembly, MFJ-422BX, for only $79.95 to mount on **your** Bencher paddle.

Artificial RF Ground

MFJ-931 $79.95

You can create an artificial RF ground and eliminate RF "bites", feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise. MFJ-931 also lets you electrically **place a far away RF ground directly at your rig** - no matter how far away it is - by tuning out the reactance of your ground connection wire. 7½x3½x7 in.

Antenna Bridge

MFJ-204B $79.95

Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge.

No other equipment needed - take it to your antenna site. Determine if your antenna is too long or too short, measure its resonant frequency and antenna resistance to 500 ohms. It's the easiest, most convenient way to determine antenna performance. Built-in resistance bridge, null meter, tunable oscillator-driver (1.8-30 MHz). Use 9 V battery or 110 VAC with AC adapter, $9.95.

Super Active Antenna

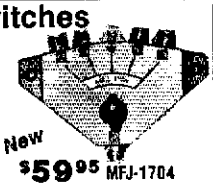
'World Radio TV Handbook' says MFJ-1024 is "a first rate easy-to-operate active antenna ... quiet ... excellent dynamic range ... good gain ... very low noise factor.... broad frequency coverage ... excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. MFJ-1024 covers 50 KHz to 30 MHz

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control. ON LED Switch two receivers and aux. or active antenna. 6x23x5 in. Remote unit has 54 inch whip, 50 ft. coax and connector. 3x2x4 in. 12 VDC or 110 VAC with MFJ-1312, $9.95.

MFJ-1024 $129.95

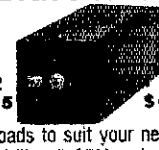
MFJ Coax Antenna Switches



$34.95 MFJ-1701 $21.95 MFJ-1702 New $59.95 MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. They come with MFJ's one year **unconditional** guarantee. **MFJ-1701, $34.95.** Six position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. Black aluminum 10x3x1½ inch cabinet. **MFJ-1702, $21.95.** 2 positions. Cavity construction. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. **MFJ-1704, $59.95.** 4 position Cavity Switch with Lightening/Surge protection device. Center Ground position. 2.5 KW PEP, 1 KW CW. Extremely low SWR. Isolation better than 50 dB 500 MHz. Negligible loss. 50 ohm, 6¼x4¼x1¼ in.

"Dry" Dummy Loads for HF/VHF/UHF



MFJ-260 $28.95 MFJ-262 $69.95 MFJ-264 New $109.95

MFJ has a full line of dummy loads to suit your needs. Use a dummy load for tuning to reduce needless (and illegal) QRM and save your finals. **MFJ-260, $28.95.** Air cooled, non-inductive 50 ohm resistor. SO-239 connector. Handles 300 watts. Run full load for 30 seconds, derating curve to 5 minutes. SWR less than 1.3:1 to 30 MHz, 1.5:1 30-60 MHz. 2½x2½x7 in. **MFJ-262,$69.95.** Handles 1 KW. SWR less than 1.5:1 to 30 MHz. 3x3x13 in. **MFJ-264, $109.95.** Versatile UHF/VHF/HF 1.5 KW Dry Dummy Load. An MFJ first. Gives you low SWR to 650 MHz, usable to 750 MHz. You can run 100 watts for 10 minutes, 1500 watts for 10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 inches. SO-239 connector

MFJ-1286 Gray Line DX Advantage

New $29.95 MFJ-1286

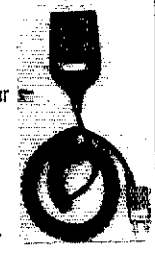
Snag rare DX for only $29.95! The MFJ-1286 is a computerized DXing tool that predicts DX propagation. Even the casual DXer can work rare DX by knowing when conditions are best for DX. The Gray Line is the day/night divider line where the most amazing DX happens every day. Now you'll know **exactly** when to take advantage of it.

Gives detailed world map. Shows Gray Line for any date/time. UTC in 24 user chosen QTHs, time zones and more. IBM compatible. Any graphics.

MFJ's Speaker/Mics

For Kenwood, Icom, Yaesu, Santec

MFJ-284 or MFJ-286 $24.95



MFJ's compact Speaker/Mics let you carry your HT on your belt and never have to remove it to monitor calls or talk.

You get a wide range speaker and first-rate electret mic element for superb audio on **both** transmit and receive.

Earphone jack, handy lapel/pocket clip, PTT, lightweight retractable cord. Gray. One year **unconditional** guarantee.

MFJ-284 fits Icom, Yaesu, Santec. **MFJ-286** fits Kenwood.

12/24 Hour LCD Clocks

$19.95 MFJ-108B $9.95 MFJ-107B

Huge 5/8 inch bold LCD digits let you see the correct time from anywhere in your shack. Choose from the dual clock that has separate UTC/local time display or the single 24 hour ham clock.

Mounted in a brushed aluminum frame. Easy to set. The world's most popular ham clocks for accurate logs. MFJ-108B 4½x1x2; MFJ-107B 2¼x1x2.

Lighted Cross/Needle SWR/Wattmeter

MFJ-815 $69.95

MFJ Cross-Needle SWR/Wattmeter shows you SWR, forward and reflected power in 3 ranges (20/200/2000 watts forward/5/50/500 reflected). Push button range selection. 1.8-30 MHz.

Mechanical zero adjust for movement. SO-239 connectors. Light requires 12 VDC or 110 VAC with MFJ-1312, $9.95.

Deluxe Code Practice Oscillator

New MFJ-557 $24.95

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Also portable because it runs on a 9 volt battery (not included) or an AC adapter ($9.95) that plugs into the side.

Earphone jack for private practice. Tone and volume controls for a wide range of sound. Speaker. The key has adjustable contacts and can be hooked to your transmitter. Sturdy. 8½x2¼x3¾ in. One year **unconditional** guarantee

MFJ AC Voltage Monitor

$19.95 MFJ-850 New

Prevent damage to rig, computer or other gear. Monitor AC line voltage for potentially damaging surge/brown out conditions on 2-color expanded 95-135 volt scale.

Plugs into any AC outlet. 2% accuracy. 2¼x2¼x1½ inches.

• One year **unconditional** guarantee • 30 day **money back** guarantee (less s/h) on orders from MFJ • Add $5.00 each s/h • **Free** catalog

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MFJ TUNERS

Here is the finest 3 KW Tuner money can buy with roller inductor, dummy load, *new* peak reading meter, antenna switch, balun plus more ... $349.95

The MFJ-989C is not for everyone.

However, if you do make the investment you get the finest 3 KW PEP tuner money can buy - one that will give you a lifetime of use, one that takes the fear out of high power operation and one that lets you get your SWR down to absolute minimum.

The MFJ-989C is a compact 3 KW PEP roller inductor tuner with a new **peak** reading Cross-Needle SWR/Wattmeter. The roller inductor lets you get your SWR down to absolute minimum.

With **three continuously** variable components - two massive 6 KV capacitors and a high inductance roller inductor - you get precise control over SWR **and** the widest matching range possible from 1.8-30 MHz.

MFJ-989C **$349.95**

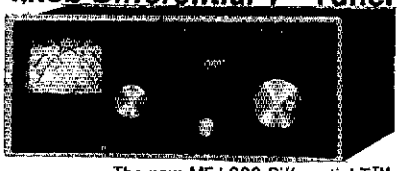
You get a **new** lighted **peak** and average reading Cross-Needle SWR/Wattmeter with a **new** more accurate directional coupler.

You get a giant two core balun wound with teflon wire for balanced lines and a 6-position antenna switch with extra heavy switch contacts.

Its compact 10¾x4½x15 inch cabinet fits right into your station.

You get a 50 ohm 300 watt dummy load for tuning your exciter, a tilt stand for easy viewing and a 3-digit turns counter plus a spinner knob for exact inductance control. Add $10 s/h.

2-knob *Differential-T*™ Tuner



MFJ-986 **$269.95** The **new** MFJ-986 Differential-T™ 2-knob Tuner uses a differential capacitor to make tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only **one** best setting. Covers 1.8-30 MHz.

The roller inductor lets you tune your SWR down to absolute minimum. 3-digits turns counter lets you quickly return to your favorite frequency.

You get MFJ's **new** peak and average reading Cross-Needle SWR/Wattmeter with a **new** directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

A **new** current balun for balanced lines reduces feedline radiation and forces equal currents into antenna halves that are not perfectly balanced for a more concentrated, stronger signal. Add $10 s/h.

MFJ's *Fastest Selling* Tuner

MFJ-941D **$109.95** **The MFJ-941D is MFJ's fastest selling 300 watt PEP antenna tuner. Why? Because it has more features than tuners costing much more and it matches everything continuously from 1.8-30 MHz.**

It matches dipoles, vees, verticals, mobile whips, random wires, banlanced and coax lines.

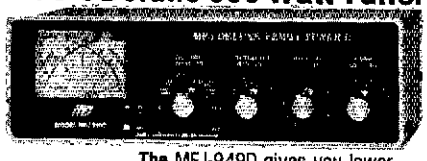
SWR/Wattmeter reads foward/reflected power in 30 and 300 watt ranges. Antenna switch selects 2 coax lines, direct or through tuner, random wire, balanced line or tuner bypass. Efficient airwound inductor gives lower losses and more watts out. Has 4:1 balun. 1000 V capacitors. 10x3x7 inches.

MFJ's *Random Wire* Tuner

MFJ-16010 **$39.95**

You can operate all bands anywhere with any transceiver when you let the MFJ-16010 turn any random wire into a transmitting antenna. Great for apartment, motel, camping operation. Install a wire anywhere! Tunes 1.8-30 MHz. 200 watts PEP. Ultra small 2x3x4 in.

MFJ's *Deluxe* 300 Watt Tuner



MFJ-949D **$149.95** **The** MFJ-949D gives you lower SWR than **any** tuner that uses two tapped inductors. Why? Because you get two **continuously** variable capacitors that give you infinitely more positions than the **limited** number on switched coils.

This gives you the precise control you need to get your SWR down to a minimum. After all, isn't that why you need a tuner? Covers 1.8-30 MHz.

You get MFJ's **new** lighted 2-color **peak** and average reading Cross-Needle SWR/Wattmeter, dummy load, antenna switch, and 4:1 balun - all in a compact 10x3x7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

With MFJ's **deluxe** 300 watt PEP tuner you get an MFJ tuner that has earned a reputation for being able to match just about anything - one that is highly perfected and has years of **proven** reliability.

MFJ's *Mobile* Tuner

MFJ-945C **$89.95**

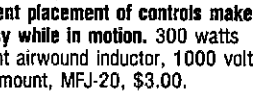
Don't leave home without this **mobile** tuner! Have an uninterrupted trip as the MFJ-945C **extends your antenna bandwidth** and eliminates the need to stop, go out and adjust your mobile whip.

You can **operate anywhere in a band and get low SWR.** You'll get maximum power out of your solid state or tube rig and it'll run cooler and last longer.

Small 8x2x6 inches uses little room. **SWR/ Wattmeter and convenient placement of controls make tuning fast and easy while in motion.** 300 watts PEP output, efficient airwound inductor, 1000 volt capacitors. Mobile mount, MFJ-20, $3.00.

144/220 MHz VHF Tuners

MFJ-921 **$69.95**



MFJ's new VHF tuners cover both 2 Meters and the 220 MHz bands. They handle 300 watts PEP and match a wide range of impedances for coax fed antennas. SWR/Wattmeter. 8x2½x3 in. **MFJ-920, $49.95.** No meter. 4½x2½x3 inches.

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MFJ's *Artificial* RF Ground

$79.95 MFJ-931

You can create an artificial RF ground and eliminate RF "bites", feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise. The MFJ-931 also lets you electrically **place a far away RF ground directly at your rig** -- no matter how far away it is -- by tuning out the reactance of your ground connection wire.

Barefoot/1.5 KW Linear Tuner

MFJ-962C **$229.95** For a **few** extra dollars, the MFJ-962C lets you use your barefoot rig now and have the capacity to add a 1.5 KW PEP linear amplifier later. Covers 1.8-30 MHz.

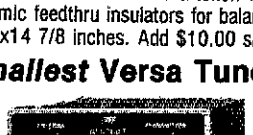
You get two husky **continuously** variable capacitors for maximum power and minimum SWR. And lots of inductance gives you a wide matching range.

You get MFJ's **new** peak and average reading Cross-Needle SWR/Wattmeter with a **new** directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

Has 6-position antenna switch and a teflon wound balun with ceramic feedthru insulators for balanced lines. 10¾x4½x14 7/8 inches. Add $10.00 s/h.

MFJ's *smallest* Versa Tuner

MFJ-901B **$59.95**



The MFJ-901B is our smallest -- 5x2x6 inches -- (and most affordable) 200 watt PEP tuner --when both space **and** your budget is limited. Good for matching solid state rigs to linears.

It matches whips, dipoles, vees, random wires, verticals, beams, balanced and coax lines from 1.8-30 MHz. Efficient airwound inductor. 4:1 balun.

FOR YOUR NEAREST DEALER OR TO ORDER

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• 1 year **unconditional** guarantee • 30 day **money back** guarantee (less s/h) on orders from MFJ • Free catalog • Add $5.00 s/h (except as noted)

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M200	10' mast, 2" o.d	$15.50
BX-40	40'self supporting (6 sq ft.)	$215.50
BX-48	48'self supporting (6 sq.ft.)	$274.50
BX-56	56'self supporting (6 sq.ft.)	$368.50
BX-64	64'self supporting (6 sq.ft.)	$474.50
HBX-40	40'self supporting (10 sq.ft.)	$249.50
HBX-48	48'self supporting (10 sq.ft.)	$338.90
HBX-56	56'self supporting (10 sq.ft.)	$432.00
HDBX-40	40'self supporting (18 sq.ft.)	$313.00
HDBX-48	48'self supporting (18 sq.ft.)	$423.50
	★ GUY WIRE SPECIAL ★	
3/16EHS	500' galvanized 7 strand	$45.00
1/4EHS	500' galvanized 7 strand	$55.00

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ADP-1	complete Oscar Link system	$171.00
AP8	8band ¼wave vertical	$161.00
A3	3 element triband beam	$272.00
A743	7 & 10 MHz add on kit for A3	$88.00
A744	7 & 10 MHz add on kit for A4	$88.00
D3W	10/12/17 mtr dipole	$140.90
4218XL	18 element 2 mtr, 28.8' boomer	$144.00
R4	10,12,15,20 meter vertical	$211.90
R45K	17 meter add kit for R4	$32.00
R5	10-12-15-17-20 mtrs	$232.00
A4S	4 element triband beam	$357.00
AV4	40-10 mtr. vertical	$81.00
AV5	80-10 mtr vertical	$124.00
ARX2B	2 mtr 'Ringo Ranger'	$41.50
ARX450B	450 MHz 'Ringo Ranger'	$41.50
A144-11	144 MHz, 11 ele. VHF	$52.00
A147-11	11 element 146-148 MHz. beam	$52.00
A147-22	22 element 'Power Packer'	$148.00
A144-10T	10 element 2 mtr 'Oscar'	$59.00
A144-20T	20 element 2 mtr 'Oscar'	$86.00
215WB	15 element 2 mtr 'Boomer'	$89.00
220B	17 element FM 'Boomer'	$109.00
230WB	144-148MHz, 30 element	$239.00
32-19	19 element 2 mtr. 'Boomer'	$124.00
424B	24 element 'Boomer'	$89.00
10-3CD	3 element 10 meter 'Skywalker'	$127.00
10-4CD	4 element 10 mtr. 'Skywalker'	$161.00
15-4CD	4 element 15 mtr. 'Skywalker'	$195.00
20-4CD	4 element 14 MHz 'Skywalker'	$340.00

HUSTLER ANTENNAS

4BTV	40-10 mtr. vertical	$83.00
5BTV	80-10 mtr vertical	$109.00
6BTV	6 band trap vertical	$129.00

ROTORS

Alliance	U110	$49.00

CABLE

(2-18 & 8-22)	4080 - per foot	$0.25
(2-16 & 8-20)	4090 - per foot	$0.35
1800	RG8U Mini 8 low loss foam per foot	$0.22
1198	RG8U Columbia superflex 100'	$31.00
1180	RG8U Low loss 100% bonded foil shield 88% tin copper braided sheild -per foot	$0.42
1176	RG213 Columbia - per foot	$0.36

TENNA PHASE III POWER SUPPLIES

PS4 ..... **$21.90**
Fully regulated, 13.8 VDC - 4 amps constant with surge protection, overload protection w/instant auto reset.

PS7 ..... **$27.90**
Fully regulated, 7 amp constant,10 amp surge capacity.

PS12 ..... **$37.90**
Fully regulated, 10 amp constant 13 amp surge, electronic overload protection w/instant auto reset.

PS20 ..... **$72.90**
Fully regulated, 25 amp surge capacity, 13.8 VDC. 17 amp constant, with meter.

PS25 ..... **$89.90**
Regulated 4.5-15VDC-25 Amp constant 27 amp surge, instant auto reset, dual meter for current & voltage.

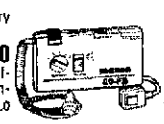
PS35 ..... **$109.90**
Same as above except. 35 amp constant, 37 amp surge, adjustable from 10 to 15 volts.

PS50 ..... **$179.90**
Fully regulated 50 amp, adjustable voltage 11-15VDC, dual metering, short circuit protection, multiple binding posts (4), carry handles.

MAXON . . $26.95

Model 495A - 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



model 49F5 ..... **$49.90**
5 Ch FM 2-way, with Earphone mic, offers hands free voice activated or push-to-talk TX, VOX activated by Hi-Med-Lo mic sensitivity switch, 5¼x2¼x1.

uniden

BC100XLT
$169.90
20 Ch 10 band, Ch lockout, priority, auto search, delay, track turning, programmable, built-in nicad rechargable battery pack, AC/DC charger.

BC800XLT $219.90
WHILE THEY LAST! The units that receive CELLULAR telephone, 40 Ch 12 band, 800MHz, instant weather, priority, track tuning, auto search, direct Ch access, lockout, memory backup, AC/DC.

BC560XLT . $94.90
16 Ch 10 band mobile, 2 digit LED, delay, priority, programmable, ch lockout, direct ch access, weather search, squelch, review, track tuning.

BC145XL . . $92.90
16 Ch 10 band programmable, built-in delay, review, priority, memory backup, Ch lockout, direct Ch access, weather search, track tuning, AC/DC.

BC70XLT	20 Ch 10 band hand held	$149.90
BC200XLT	200 Ch 11 band hand held	$234.90
BC175XL	16 Ch 11 band aircraft AC/DC	$138.90
BC210XLT	40 Ch 11 band aircraft & weather	$169.90
BC590XLT	100 Ch 11 band mobile weather	$199.90
BC760XLT	100 Ch 12 band aircraft & 800 MHz	$259.90

Regency

R1077 . . . . . $89.90
10 Ch 6 band digital display, search, lockout, scan delay, dual scan speeds, function verification, AC only.

R4010 . . . . $114.90
10 Ch 10 band hand held.

R4020 . . . . $179.90
100 Ch 11 band hand held.

R4030 . . . . $234.90
200 Ch 12 band 800MHz hand held

INF10 . . . $104.90
Preprogrammed for police & fire in all 50 states, Super Turbo Scan, weather channel, scan, hold/scan key, mobile mounting bracket.

RADAR DETECTORS

BEL 975 ..... **$164.90**
Tri band Vector 3, sequential LED's, volume control.

847 ..... **$134.90**
Express remote, X & K band superhet, audible & visual alarm.

MAXON RD25 ..... **$74.90**
Delexe mini, X & K band, dual conversion superhet

RD2A **$45.90**
Dual conversion superhet, X & K band, audible & visual alarm.

RD3 ..... **$49.90**
Dual conversion Superhet, X & K band, sequential LED alarm

RD30 ..... **119.90**
WIRELESS dual conversion Superhet, X & K band, city/hwy.

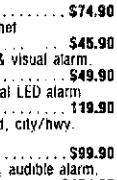
UNIDEN RD9 ..... **$99.90**
MINI, dual conversion superhet, sequential LED's, audible alarm.

RD9XL **$124.90**
Micro Superhet, X & K band w/carry case, city/hwy.

COBRA RD3120 ..... **$99.90**
Mini Superhet, dual filter, city/hwy, X & K band

RD3110 ..... **$79.90**
Superhet, dash/visor, X & K band, falsing control.

ASTATIC



D104 Silver Eagle **$69.90**
Chrome plated base station amateur microphone, factory wired to be easily converted to electronic or relay oeration. Adjustable gain for optimum modulation.

ETS D104 SE **$84.90**
Same as above with end of transmission Roger Beep.

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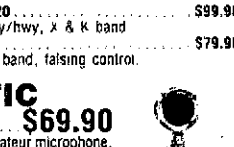

25 WATT 10 Meter Transceiver, all mode operation, backlit multi function LCD meter, frequency lock, auto squelch, NB, RF gain, PA, external speaker jack, 7¼Wx9¼Dx2½H.

HR2510 ..... **$239.90**

HR2600 ..... **$279.90**

RANGER

10 meter transceiver, 25 watt, can be programmed to split reansceive, SSB, CW, AM, FM, programmable scanning, fully automatic noise blanker, 2½Hx7¼Wx11D

AR3500 ..... **$349.90**

AR3500/100 ..... **$419.90**

DO YOU Know The True Father Of Radio? Nikola Tesla was vindicated, as the true father of the radio art, by the US Supreme Court in 1943. Find out more by attending the International Telsa Symposium, late July 1990. For more information contact: Steve Elswick, 719-392-6404 or the International Tesla Society Inc., 330A West Uintah Street, Suite 215, Colorado Springs, CO 80905-1095.

INDIANA: South Bend Swap & Shop, Sunday December 31, 1989, last day of 1989 before New Years Day at Century Center downtown, on US 33, oneway north between Trustcorp Bank Building and river. Four lane highways to door from all directions. Tables: $5/5 ft. Round: $15/8x2.5. Rectangular: $20/8 ft. Wall locations. Talk-in 52-52 & area repeaters. Sponsored by Repeater Valley Hamfest Committee. Contact: Wayne Werts, K9IXU, 1889 Riverside Drive, South Bend, IN 46616, phone 219-233-5307.

QSL CARDS/RUBBER STAMPS/ENGRAVING

CANADIAN QSL Cards, send $1 for samples refundable with your order. M. Smith, VE7FI, 18610-62nd Avenue, Surrey, BC CANADA V3S 7P1.

ENGRAVING: Callsign/Name Badges by W6LQV. 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.

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QSL's—Quality for less is back! See our display ad in this issue of QST. Harry A. Hamlen, P.O. Box 1, Stewartsville, NJ 08886.

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DON'T Buy QSL Cards until you see my free samples. Also I specialize in custom cards and QSL business cards. Write or call for Free Samples and custom card ordering information. Little Print Shop, Box 1160, Pflugerville, TX 78660, 512-990-1192.

FREE Logbook with first order. QSL samples cost 3 stamps. Gazebo Press, 4148 Mimosa Lane, La Plata, MD 20646.

RAISED Printed QSLs. Very unique. You can feel the type! Our new laser technology produces exotic callsign type effects. Super high quality. Standard designs or use your own artwork/computer graphics to create a really personal QSL. We now offer state outlines in 3-D. $1 for samples & information. Dennis, WA5QMM, Network QSLs, P.O.B. 13200, Alexandria, LA 71315-3200, 318-443-7261, FAX: 318-445-9940.

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GAILS QSLs, overnight, $6/100. Stamp for samples. 1150 Muenz, Wright City, MO 63390.

FULL COLOR QSL Cards made on Kodak paper from your negative, slide or print. $32.95 per 100. Request samples (enclose $1). Bizcard Co., Box 191-T, Stevensville, MI 49127.

PHOTOS, Postcards—Become QSLs. Clear stick on labels. New! "Kall Kards". Stamp brings details. K-K-L, Box 412, Troy, NY 12181-0412.

CUSTOM CALL SIGN . . . for your car . . . van . . . or truck. Adheres to metal or glass! Transfer instantly vehicle to vehicle! Display Amateur Radio & your call in white lettering on 2¼ inch x 8 inch flexible plastic. Order magnetic or suction mounted version on black . . . blue . . . or red background! $8.50 each . . . 2/$15 ppd. Sign On, 1923T Edward Lane, Merrick, NY 11566.

QSLs $28.50 500. SASE samples. ARRL membership cards available. Don Ellis, K3LQQ, 84 Chapel Drive, Zephyrhills, FL 33544, 813-973-1238.

FULL COLOR—3,000 $325; 6,500 $425; 12,500 $600; 25,000 $750. WA8CZS, 1-614-452-6375.

NEW DIMENSION QSL's, 6600 Lucia Lane, Minneapolis, MN 55432, 612-571-6881. A thousand dimensional QSL's for only $39.95 shipping included! Send stamp for samples or see our display ad in this issue of QST and order now!

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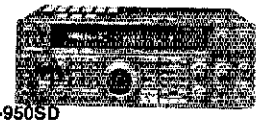

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The First Digital Processed Signal In Amateur Radio
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HF Transceiver
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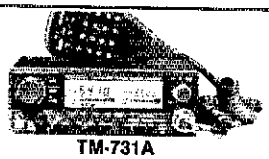

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All Mode 2m Mobile

COMPACT 2M FM Mobile

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TM 2550A (45W)	**TM231A (50W)**
TM 2530A (25W)	

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2m/70cm
Dual Band
HT

TH215A
2m HT XCVR
TH-25AT, TH-45AT, TH-205AT
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IC-781
HF "PERFORMANCE" RIG
- 160-10M/General Coverage Receiver
- Built-in Power Supply and Automatic Antenna Tuner
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IC-765 New HF XCVR
- Built-In Automatic Antenna Tuner & Power Supply
- 99 Memories • 100W Output
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- Band Stacking Registers

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With General Coverage Receiver
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- 26 Memories w/Band Stacking Registers
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2 meter HT
RX 138-174 MHz
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7 Watts

IC-32AT
Super Dualband FM HT
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Heavy Duty-High Quality-Rugged-Reliable

- **Input Voltage: 105-125 VAC Output:13.8 VDC ± .05V**
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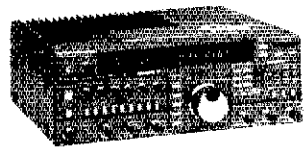
Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	$49
RS7A	5	7	59
RS12A	9	12	79
RS20A	16	20	99
RS20M	16	20	119
RS35A	25	35	159
RS35M	25	35	179
RS50A	37	50	229
RS50M	37	50	249

YAESU



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New All Mode Base Transceiver
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FT-411 NEW
2 meter HT
- 49 Memories
- 2.3 to 5 Watts
- Extended Rec.

FT-470
2m/70cm Dual Band
- 42 Memories
- DTMF Autodialer
- 2.3 - 5 Watts

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- **compact size**
- **10 memories**
- **up to 5W output W/FNB 11**

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	LIST		LIST
AL80A	$985.00	ATR15	380.00
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AL1200	1825.00	RCS8V	134.50
AL1500	2370.00		

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rfc 2-317 2M
30W in = 170W out
LIST $299.00

Model	Band	In-Out	List Price
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2-117	2M	10-170W	$299.00
2-417	2M	45-170W	$299.00
3-22	220	2-20W	$112.00
3-211	220	2-110W	$299.00
3-312	220	30-120W	$264.00

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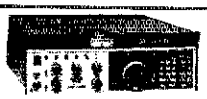

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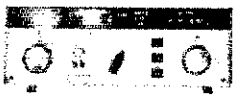

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HF Linear Amplifier
1500 Watts Output, 160-15M, Pair of EIMAC 3CX800A7
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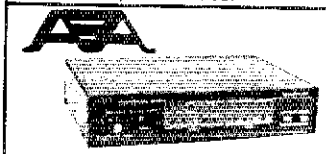
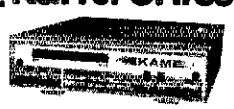
DJ-500T Dual Band HT
DR-110T 45W, 2M Moible
DR-510T Dual Band, 45W Moblie

AMPS
ELH 230G 2M, 2W in 30W out
ELH 230D 2M, 2W in 30W out, w/pre-amp
ELH 260D 2M, 2W in 60W out



PK-232 MBX
CALL FOR OTHER AEA PRODUCTS

Kantronics



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901/941D Tuners	$59.95/$99.95
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- Built-in Antenna Switch/Balun

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ANTIQUE-VINTAGE-CLASSIC

WANTED: Old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Avenue, Milw., WI 53204.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: Radio, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201, 818-242-8961.

WANTED: QST VOLUME 1. W6ISQ, 82 Belbrook Way, Atherton, CA 94025.

SCHEMATICS: Radio receivers 1920's/60's. Send Brandname, Model No., SASE Scaramella, Box 1, Woonsocket, RI, 02895-0001.

WE MAY HAVE the tubes you need. (Thousands in stock). Send SASE for our list. Fala Electronics, P.O. Box 1376-1, Milwaukee, WI 53201.

BUY, Sell, Collect and Restore early tube equipment? Early receivers, tubes and telegraph gear? Join the Antique Wireless Association which sponsors old-time "meets", flea markets, museum and journal with technical articles and free want ads. Membership and annual dues only $10. Write for information and Museum hours: Bruce Kelley, W2ICE, Route 3, Holcomb, NY 14469.

WANTED: Hallicrafter silver panel Skyriders and other very old or unusual Hallicrafter equipment, parts, etc. Chuck Dachis, "The Hallicrafter Collector", 4500 Russell Drive, Austin, TX 78745.

MICROPHONES and related memorabilia used in radio/TV broadcasting prior to 1960 wanted. Cash paid: trade terms available. Write: James Steele, WKBK, Box 2525, Kingsland, GA 31548-2525, 912-729-6106.

WANTED: WWII Military Radios and Accessories. Need ATD Tuning Units, DY43 Dynamotor, BC 222/223 Manuals, ART-13 Connectors, ARR/41/MT-1518 Mount, ATB, GRC 108 Receiver, Hallicrafters HT20. Charlie, 501 Mystic Valley Pkwy., Medford, MA 02155.

WANTED Books: Pre-1900 Electricity and Telegraphy, Pre-1925 Radio, Pre-1940 Television. Books, Magazines or any other related literature. Jim Kreuzer, N2GHD, 6270 Clinton Street, Elma, NY 14059, 716-681-3186.

WANTED: The entire 1934 "Z" and "H" line of Silver-Marshall Radios, any condition. Chuck Dachis, WD5EOG, The Hallicrafter Collector, 4500 Russell Drive, Austin, TX 78745.

CODE/CIPHER Machines Wanted! Historian buys code/cipher devices, manuals, books, etc! All periods! Melton, Box 5755, Bossier City, LA 71171, 318-798-7319.

E.F. JOHNSON Transmitters, Literature and Accessories wanted for my station. Wanted: Johnson kilowatt and/or Viking 500 for my station. Will pay cash and pick up. All inquiries are cheerfully answered. Phone 518-638-8199 or write Len Crispino, P.O. Box 702, Hudson Falls, NY 12839.

WANTED: Pre-1930 QSTs. Richard Titus, NV2C, 231-9 Lucas Lane, Voorhees, NJ 08043, 609-772-0316.

WANTED: Pre-WW2 Pan American Airways aircraft transmitters/receivers and schematics/manuals for same: Pre-WW2 Speed-X bugs. Conly, 819 Henrietta Avenue, Sunnyvale, CA 94086.

TELEGRAPH BUGS, early American keys, mid-century paddles wanted. Write John Hensley, WJ5J, 5054 Holloway Avenue, Baton Rouge, LA 70808.

WANTED: old proportional R/C systems manufactured between 1960 to 1975. Ron Gwara, WA2GBG, RD 1, Box 355, Waverly, NY 14892, 607-565-7486.

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TELEGRAPH Items Bought By Collector: old or unusual keys, bugs, sounders, call boxes, etc.-any condition. Pre-1920 telegraph or radio literature. Larry Nutting, WD6DTC, 4025 Slate Court, Santa Rosa, CA 95405, 707-539-1883.

WANTED: Hallicrafters SX-28. Larry Greisel, 318 17th Avenue, Seattle, WA 98122.

HAMMARLUND Equipment Wanted. I am looking for a HX50A, HX500, HXL-1, HQ-88, HQ-215, HQ-150, HQ-200. Pse drop me a note on your QSL card stating condition and price. KD4AJ, 1968 Huntington Hall Court, Atlanta, GA 30338. All responses will be answered.

COLLECTOR Looking For Pre-1942 Communications Receivers, Commercial, Amateur, Government, Kit, Homemade, etc. Anything considered. Wayne, NØTE, Rt. 1, Box 114, Burlington, KS 66839, 316-364-5353.

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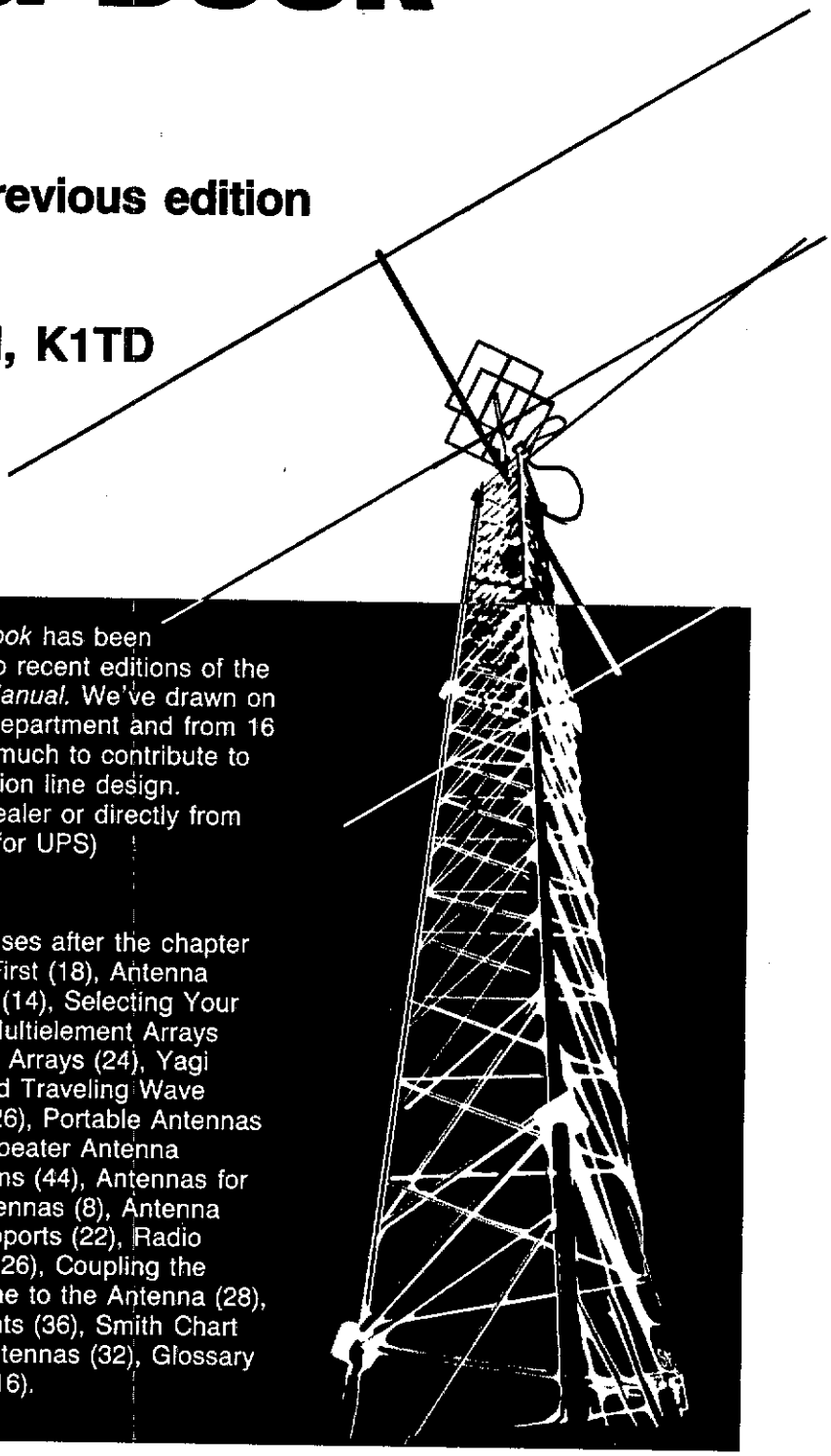

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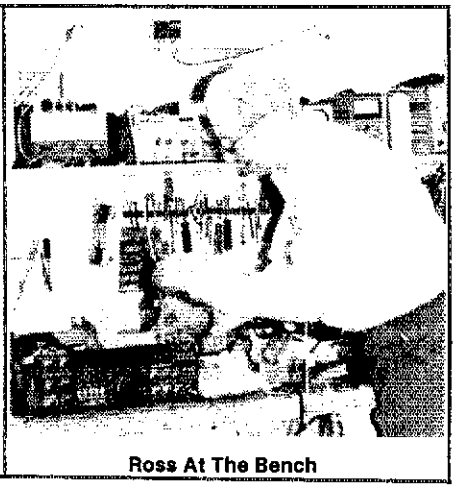

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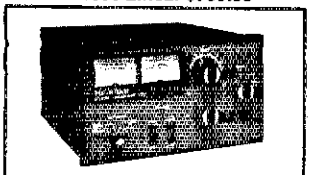

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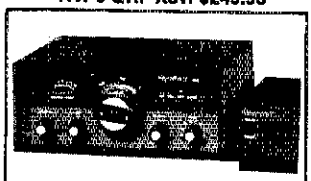

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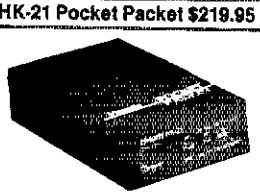

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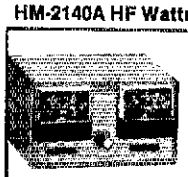

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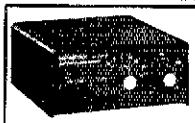

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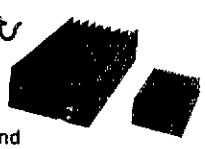

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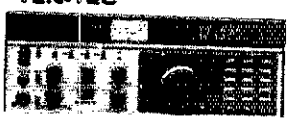

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15GP CRT Tube Wanted, Dead or Alive. Steve Antol, 4249-1/2 Orchard Street, Phila., PA 19124.

DRAKE C-4 Console, $350. K3KD, 215-754-6286.

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KENWOOD TS140S, $695. W6XM, 619-459-5527.

AYN RAND NET sked to discuss ideas presented in her novels 'The Fountainhead' and 'Atlas Shrugged'. Send address to K1UKQ, 222 Wm. Henry Road, Scituate, RI 02857.

WANTED: IC-735/725; Trade Complete IBM System/23, 100MB, Terminal, Printer, Manuals. K3LLH, 609-455-6838.

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1990 CALLBOOKS North American $28, International $30. Both $55. Personal check UPS paid. Shipments start Nov. 20. Avatar/W9JVF, 1408 W. Edgewood, Indianapolis, IN 46217.

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MORSE TERMINAL for Tandy Color Computers complete with interface cables allows sending and receiving Morse Code, $42.95. Dynamic Electronics, Box 896, Hartselle, AL 35640, 205-773-2758.

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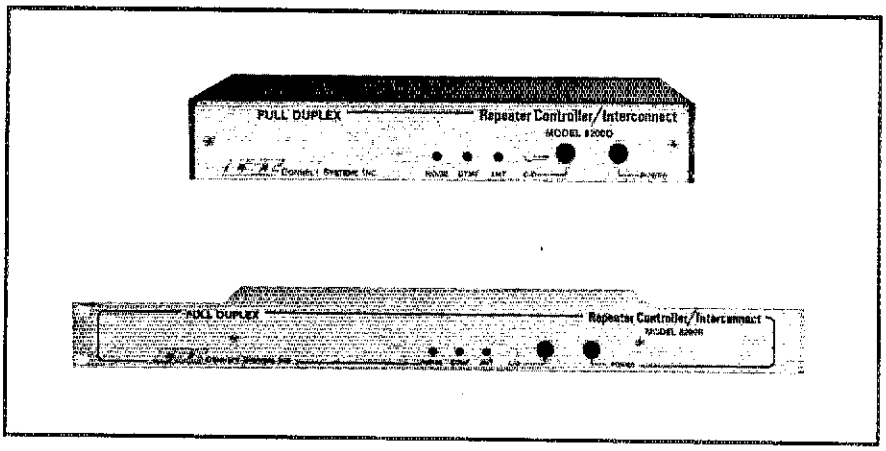

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WANTED: ICOM-02AT and Charger. K6DL, 2612 N. Valencia Avenue, Santa Ana, CA 92706.

R-390A RECEIVER Parts: Info SASE. CPRC-26 military manpack radio, 6 meter FM, with antenna, crystal, handset: $22.50, $42.50/pair. Military-spec TS-352 voltohm/mulitmeter, leads, manual: $12.50. $4.50/piece shipping, $9 maximum. Saytronics, P.O. Box 591, Sandusky, OH 44870.

MADISON Guaranteed: Kenwood, ICOM-stock. Penta 572B $79; 6146B $15.95; BW VS300A antenna tuner $99; Mullard 807 $3.95; 100mfd/450V axiallead cap $4; 120/450 $4; Amphenol PL259 silverplate $1.50; TNC solder Rg174 silverplate male $4; PLessy HN male crimp, rg58 $5; Doublemale BNC $4; UG262B/u chassis, 4 hole mt. bnc $3; PL259-SO239 elbow $1; UG201a/u adaptor n male-bnc female $4. Items new, prices FOB Houston, subject prior sale. Mastercard/Visa/COD. Madison Electronics, 3621 Fannin, Houston, TX 77004, 1-800-231-3057, 1-713-520-7300.

1990 CALLBOOKS: Prepublication orders until 12/25. North American, $25. International, $27. Both, $49. Any eight or more: North American, $22; International, $24. Postpaid USA. Century Print, 6059 Essex, Riverside, CA 92504-1555, 714-687-5910.

FOR SALE: Yaesu FT-727R, 2-Mtr and 440 MHz Handheld, x-tra btry pack and 30' ext ant, charger and case, operating manual. See QST Nov. 1988, page 139. Mint condition, $305. I ship. Bob Turner, KA3HBB, 412-274-9678.

SB-220 2 KW Amplifier, works OK. Low hours use. $400, you ship or pick up. Philip Trout, W3HMH, 1312 Ruppert Road, Silver Spring, MD 20903, 301-593-8151.

FOR SALE: Freq Meter BC-221-AH covers 125 to 20000 KHz, $50; HP200B audio source, 10 to 25000 Hz, $40; HP100-ER calibrating scope, 10 Hz to 1 MHz, $50; in-line coax RF power meter 100 or 1000 watt range, $45. Model 19, 28 teletype equip, call for details. T. Lukas, WA3MGF, 5025 Hillsboro Road, Apt. 24-B, Nashville, TN 37215, 615-385-9785.

NATIONAL NCL-2000 2 KW PEP tabletop final amplifier, 80-10 M. Manuals, spare matched pair RCA-8122 finals, $450. Excellent condition. Prefer Chicago area pick up. Norb, K9SS, 211 N. Dwyer Avenue, Arlington Heights, IL 60005, 708-392-3543.

WANTED: Johnson Valiant-II, National NC-300C&A. W1QD, 120 Derby Road, Revere, MA 02151, 617-284-4644.

SALE: (all together) ICOM 03AT, BC-35, H3-10, Microphone, free 10 Mtr and more! Info: Bassett, P.O. Box 6764, Buena Park, CA 90630.

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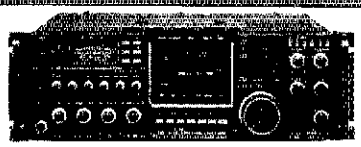

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IC-735 Gen. Cvg Xcvr	1099.00	Call $
IC-751A Gen. Cvg. Xcvr	1699.00	Call $
IC-725 New Ultra-Compact Xcvr	949.00	Call $
IC-575A 10m/6m Xcvr	1399.00	Call $
IC-726 HF/50 MHz All Mode	1299.00	Call $
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IC-R9000 100 kHz to 1999.8 MHz	5459.00	Call $
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call $
IC-R71A 100 kHz-30 MHz Rcvr	999.00	Call $
VHF		
IC-228A/H New 25/45w Mobiles	509./539.	Call $
IC-275A/H 50/100w All Mode Base	1299./1399.	Call $
IC-28A/H 25/45w, FM Mobiles	469./499.	Call $
IC-2GAT, New 7w HT	429.95	Call $
IC-2SAT Micro Sized HT	439.00	Call $
IC-901 New Remote Mount Mobile	1199.00	Call$
UHF		
IC-475A/H 25/75w All Modes	1399./1599.	Call $
IC-48A FM Mobile 25w	509.00	Call $
IC-4SAT Micro Sized HT	449.00	Call $
IC-4GAT, New 6w HT	449.95	Call $
IC-04AT FM HT	449.00	Call $
IC-32AT Dual Band Handheld	629.95	Call $
IC-3210 Dual Band Mobile	739.00	Call $
IC-2500A FM, 440/1.2 GHz Mobile	999.00	Call $
IC-2400 144/440 FM	899.00	Call $
220 MHZ		
IC-3SAT Micro Sized HT	449.99	Call $
IC-375A All-Mode, 25w, Base Sta.	1399.00	Call $
IC-38A 25w FM Xcvr	489.00	Call $
1.2 GHz		
IC-12GAT Super HT	529.95	Call $

TS-940S

HF Equipment	List	Jun's
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TS-940S/AT Gen. Cvg Xcvr	$2499.95	Call $
TS-440S/AT Gen. Cvg Xcvr	1449.95	Call $
TS-140S Compact, Gen. Cvg Xcvr	949.95	Call $
TS-680S HF Plus 6m Xcvr	1149.95	Call $
TL-922A HF Amp	1749.95	Call $
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R-5000 100 kHz-30 MHz	1049.95	Call $
R-2000 150 kHz-30 MHz	799.95	Call $
RZ-1 Compact Scanning Recv.	599.95	Call $
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TS-711A All Mode Base 25w	1059.95	Call $
TR-751A All Mode Mobile 25w	669.95	Call $
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TM-731A 2m/70cm, FM, Mobile	749.95	Call $
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TH-75A 2m/70cm HT	TBA	Call $
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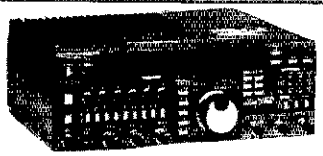

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FT-757 GX II Gen. Cvg Xcvr	1280.00	Call $
FT-767 4 Band New	2299.00	Call $
FL-7000 15m-160m Solid State Amp	2279.00	Call $
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FRG-9600 60-905 MHz	808.00	Call $
VHF		
FT-411 New 2m "Loaded" HT	406.00	Call $
FT-212RH New 2m, 45w Mobile	499.00	Call $
FT-290R All Mode Portable	610.00	Call $
FT-23 R/TT Mini HT	351.00	Call $
FT-33R/TT 220 MHz HT	373.00	Call$
FT-73R/TT 70cm HT	355.00	Call $
UHF		
FT-712RH, 70cm, 35w Mobile	536.00	Call $
FT-811 70cm built-in DTMF HT	410.00	Call $
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FEX-736-220 220 MHz, 25w Module	322.00	Call $
FEX-736-1.2 1.2 GHz, 10w Module	589.00	Call $
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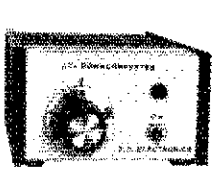

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Red White and Blue Decal per package of 5 ..... **#1115 $ 2.00**
Black and Gold Patch ..... **#1120 $ 3.00**
Red White and Blue Patch ..... **#1125 $ 3.00**
Member 5" Diamond Decal per package of 5 ..... **#1130 $ 1.00**
Life Member Decal 5/pkg ..... **#1135 $ 1.00**
Cloth Patches
4" ARRL Diamond ..... **#2170 $ 2.00**
Life Membership goes with 4" ARRL Diamond ..... **#1170 $ 1.25**

CONTINUED . . .

MORE SUPPLIES . . .

Membership Pins
Membership ..... #1180 $ 3.00
Replacement Pin for Life Membership ..... #1190 $ 3.00
Life Membership Plaque ..... #1240 $25.00
ARRL License Plate ..... #1095 $ 5.00
Spark To Space
*HAT ..... #1092 $ 7.00
PATCH ..... #1091 $ 3.00
Bumper Sticker ..... #1093 $ 2.00
Member Stationery
50 pieces of stationery and envs. .... #1460 $ 8.00
50 pieces of stationery ..... #1465 $ 4.00
50 envelopes ..... #1470 $ 5.00
Log Books
8½ x 11 Spiral ..... #1250 $ 2.50 U.S. $ 3.50 Elsewhere
Mini-Log 4" x 6" ..... #1260 $1.75 U.S.
3-hole Loose Leaf, 96 8½" x 11 sheets ..... #1265 $ 4.00
Maps and Atlases
U.S. Call Area ..... #1270 $ 3.00
*World Map — full color great circle map centered on the United States ..... #1280 $10.00
Grid Locator (US and Canadian Grid Squares) ..... #1290 $ 1.00
ARRL World Grid Locator Atlas .... #1475 # 4.00
Polar Map (for OSCAR) ..... #1300 $ 1.00

For Traffic Handlers:
Message Delivery Cards per package of 20 ..... #1310 $ 1.00
Message Pad with 70 sheets ..... #1320 $ 2.00
Message Pad with 70 sheets per package of 3 ..... #1330 $ 5.00

Antenna and Transmission Line Design Aids
Standard Smith Charts per package of 5 sheets ..... #1340 $ 2.00
Expanded Smith Charts per package of 5 sheets ..... #1350 $ 2.00
Smith Charts — 50 OHM Center per package of 5 sheets ..... #1341 $ 2.00
Antenna Pattern Worksheets 100 8½ x 11 sheets ..... #1360 $ 3.00

***QST Binders**
6½ x 9½ for *QST* 1975 and prior ..... #1370 $11.00
8½ x 11 for *QST* 1976 and after ..... #1380 $12.00

Video Tapes
SAREX W0ORE/Challenge VHS ..... #1420 $25.00
SAREX W0ORE/Challenge U-Matic ..... #1430 $35.00
Amateur Radio's Newest Frontier VHS ..... #1440 $25.00
Amateur Radio's Newest Frontier U-Matic ..... #1450 $35.00
New World of Amateur Radio VHS ..... #WAR1 $20.00
New World of Amateur Radio U-Matic ..... #WAR2 $36.00

— — — — — — — — — — USE THIS FORM OR PHOTOCOPY — — — — — — — — — —

ORDER FORM: Please allow 1 week for us to receive your order, 1 week for processing and 1 to 3 weeks shipping time in the US after your order leaves ARRL. In the US, add the following amounts to your order to cover shipping and handling. Add an additional $1.50 to the mail rate for shipment via surface mail outside the US, call or write for airmail rates. Include street address for UPS.

Amount of Order	Mail	UPS	Amount of Order	Mail	UPS
Less than $20.00	$2.50	$3.50	$40.01 — $50.00	$5.50	$6.50
$20.01 — $30.00	3.50	4.50	50.01 — $75.00	6.50	7.50
30.01 — 40.00	4.50	5.50	Over $75.00	7.50	8.50

Product #	Quantity	Title	
		Subtotal for books and non-exempt supplies	
		Enter shipping and handling based on above subtotal	
		Enter items exempt from shipping charges below	
		Donation to the Legal Defense Fund ($1 min.)	
		Donation to the W1AW Renovation Fund	
☐ YES! Sign me up for membership at the rates shown at right			
Payment must be made in U.S. Funds drawn on a U.S. bank		TOTAL	

$7.50 minimum on all credit card orders

Charge to ☐ VISA ☐ MasterCard ☐ AMEX ☐ Discover

Name _____

Call _____

Street _____

City _____

Card Number _____

Card good from _____

Card good to _____
Expiration Date

Signature _____

ARRL 225 MAIN STREET NEWINGTON, CT 06111 U.S.A.

INVITATION TO MEMBERSHIP

JOIN TODAY! Take advantage of these membership benefits: **QST** The interesting, lively way to keep on top of everything that is happening in Amateur Radio: Coverage of regulatory developments; Washington news: operating — DX, VHF-UHF, and repeaters, OSCAR, SSTV, RTTY; Novice Notes; lists of hamfests where you can meet local hams, hear interesting talks, and possibly find a bargain at a fleamarket; and you will find technical articles aimed specifically at the beginner's level. **W1AW** Is the voice of ARRL. This station transmits daily code practice sessions and regular bulletins. **LOW COST INSURANCE** for your ham gear. **OTHER SERVICES:** Outgoing QSL, Operating Awards, Amateur Radio Emergency Service, Field Organization and much, much more! The League is a **democratic organization,** of, by and for its members. The members determine policies of the League through the Board of Directors which is elected directly by the membership. The League is YOU! Fifty percent of dues is allocated to QST, and the balance for membership.

DUES

	U.S.	Elsewhere
1 Year	$25	$36
2 Years	47	69
3 Years	65	98
Amateurs who are age 65 or over with proof of age:		
1 Year	$20	$31
2 Years	37	59
3 Years	50	83

Life Membership: Please write for formal application.

ARE YOU AGE 17 OR YOUNGER?
ARE YOU THE OLDEST LICENSED AMATEUR IN YOUR HOUSEHOLD?

If you answered "YES" to both questions then these special rates apply: Age 13-17 $12.50. Age 12 and younger $6.25. Evidence of your date of birth is required. Attach a copy of your birth certificate or have your parent or guardian certify your date of birth. A list of all other amateurs in your household is required. Family memberships, club commissions and rebates and multiple year rates do not apply.

Family Membership An immediate relative of a full dues paying member living at the same address, may become a family member without **QST** for $2 per year.

KENWOOD R2000 General Coverage Digital Receiver, mint, $525. WA1IWD, 203-848-1376.

TS520, VFO520, SP520, MC-50, CW Filter For Sale. Good condx., $550. K1FN, 609-586-3209.

WANTED: Kenwood microphone, MC-50, dynamic dual impedance (50K ohm/500 ohm) desk model. Used but good condition OK. Tom Norrie, 1174 Yale Avenue, Wallingford, CT 06492.

COLLINS new tube sets 75S3 $60, 75A4 $80, KWM2 $90 and 32S3 $50 without 6146B's. 6DC8, 6EA8, 6BN8, 6BF5, 6AT6, 6AH6, 6AH5, $3 each, 20 for $50. KWM2 on-off switch new phone $15. $3 UPS. WE2T, 65 Aleta, Rochester, NY 14623.

FOR SALE: Heath SB303/401, spkr., desk mike, manuals and cables; Hy-Gain TH6-DXX. Jim Tourigny, WA1SER, RR 1, Box 297, Pascoag, RI 02859.

SSB ELECTRONIC—VHF/UHF/SHF Specialists-Preamplifiers for EME, OSCAR, and weak signal applications, high performance transverters 50 MHz-10 GHz, converters, mast-mounted preamplifiers, solid state amplifiers 144 MHz-2.3 GHz, high power tube amplifiers, test equipment. Call or write for our 40 page illustrated catalog. SSB Electronic USA, K3MKZ, 124 Cherrywood Drive, Mountaintop, PA 18707, 717-868-5643 evenings-weekends.

PANASONIC RF-4900 Receiver, $275; Bearcat 210 Scanner, $80; Standard SRC-146A Handheld, $85; Robot #70 SSTV Monitor, #80 Camera, $75; Hy-Gain #343 6 Meter Beam, never used, $100; Collins #51J-4 Receiver for parts, $90; TRS-80 Computer w/Monitor, $75; RS Color Computer II, $50; TI99/4A, $50. Wanted-Hallicrafter Receivers prior to 1960, especially SX-28 or SX-32. Ernie, WB2IMH, 215-649-2586 after 8 PM.

KENWOOD Transceiver TS-930S/AT. Auto Tuner installed Kenwood SP-930 Ext. Spkr. with Audio Filter and Kenwood MC-60A Amp, Desk Mike. Each in very fine condition. $1175 takes all. Call or write Wally Krause, K9IQT, 1483 Bayview Drive, Lake Zurich, IL 60047, phone 312-540-0561.

FOR SALE—Ten-Tec 509 Argonaut w/208 CW filter; 206A xtal cal; 210 pwr sply; KR-5A keyer; manual. Brand new condx $285 firm. Cashier check only. Will ship UPS. R. S. Crowell, 640 Stonehenge Drive, Mary Esther, FL 32569, 904-244-0307 anytime.

TWO METER Swap for your General Coverage Receiver, or Transceiver with General HF Coverage. Have Kenwood TH-215A and TH21AT, both with accessories. Let's swap some unwanted gear for something we can both use. WB8P, 419-726-0084.

WANTED: $20 reward for a copy of manual of Raytrack DX2000L linear amplifier. Charlie Crabtree, WB9FCI, 708-680-0178.

IBM-PC RTTY/CW. New CompRtty II is the complete RTTY/CW program for IBM-PC's and compatibles. Now with larger buffers, better support for packet units, pictures, much more. Virtually any speed ASCII, BAUDOT, CW. Text entry via built-in screen editor! Adjustable split screen display. Instant mode/speed change. Hardcopy, diskcopy, break-in buffer, select calling, 24 programmable 1000 character messages. Ideal for MARS and traffic handling. Requires 256k PC or AT compatible, serial port, RS-232C TU. $65. Send call letters (including MARS) with order. David A. Rice, KC2HO, 144 N. Putt Corners Road, New Paltz, NY 12561.

LIKE NEW Yaesu FT-747GX/FP-757HD, Tuner MFJ-901, MFJ Keyer Model-407B, Bencher (Iambic), Heath HN-31, $1500 value. First $1000 or best offer. You ship. W4PDT, 904-282-0749.

WANTED: used Hy-Gain tri-bander TH3MK3 or TH3Jr. Bob Powell, 4644 South 2030 West, Salt Lake City, UT 84119, 801-969-9250.

PIN-FEED continuous 90# white card stock for computer generated QSL's or MRC's. 3-1/2 x 5-1/2 finished size: 500/$10, 1000/$18, $3.50 shipping. Mobile Bureau Press, Box 6436-C, Florence, SC 29502.

1990 CALLBOOKS: North American, $24.75; International, $27.75. Both $48.75. Two or more sets $46.75 per set. Postpaid USA. California residents add sales tax. Duane Heise, AA6EE, 16832 Whirlwind, Ramona, CA 92065, 619-789-3674 evenings.

WANT TO Buy A Yaesu FT-23R Handheld. Write or phone Paul Durey, P.O. Box 565, Yakima, WA 98907, 509-248-4510 ask for Paul.

FOR SALE: ETO/Alpha 70V with spare tube and 160M coil in excellent condition, $1500. FOB Houston. Contact NR5M or KE5IV, 14101 North Freeway, Houston, TX 77090, or 713-872-7200.

HAM SHAREWARE for IBM/compatibles. SASE for catalog. JK&S, Dept. QST, P.O.B. 50521, Indianapolis, IN 46250-0521.

FL7000 YAESU Amplifier. 160 thru 10 meters solid state. 1200 watts input power. Mint condition. I'll ship in original carton, $1,550. WB2EBD, 609-886-0061.

WANTED: Hallicrafters SR-150 or SR-160 Transceiver, with or without Power Supply, must be in working or repairable condition, reasonable. Charles, N7MID, 206-869-2831.

HELP—need older Grundig "Satellit" M/Band Radio (need not work) to fix mine. KA3TVX, 657-14th Avenue, Prospect Park, PA 19076.

COLLINS S-Line equipment and parts several. SASE for list. WD5JFR, 4161 Oak Road, Tulsa, OK 74105, 918-742-1845.

GROUND RADIAL Wire, Coax, Lowest Costs: new #16 bare solid copper. 1000 foot spool, $38 includes shipping. Mil Spec RG213, 37 cents/ft. Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 508-369-1738.

TRI-EX MW-50 55 foot crank-up tower, excellent condition, $500. Wilson TTM-45, 45 foot tubular crank-up tower, $300. Call or write: Bob, W5SUR, 220 Stonewall Jackson Drive, Conroe, TX 77302, 409-273-1902.

COLLINS S/LINE MANUALS—a limited supply of reproductions of the latest published editions, complete with the original Rockwell International multi-colored covers and foldouts, are available for the following models: KWM-2/2A, 75S-3/3A, 32S-3, 32S-3A, 312B-4/5, and the 516F-2. For information and a price list, please send a SASE to Jenny Brouwer, AB8U, 3041 Rising Springs Court, Bellbrook, OH 45305.

JOBS FOR HAMS

$$WANTED$$ Sales Distributors Your QTH, High Potential DX Ham Publication. Part/full time commissions. J/C Enterprises, 4920 Mayflower Street, Cocoa, FL 32927.

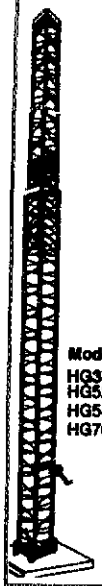
ADVERTISING DEPARTMENT STAFF

Angela M. Beebe, KA1SER, 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

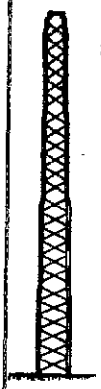
CRANKUP SALE!

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

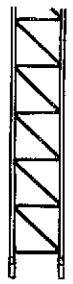
- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	$449
HBX48	48 ft	10 sq ft	303	$589
HBX56	56 ft	10 sq ft	385	$699
HDBX40	40 ft	18 sq ft	281	$569
HDBX48	48 ft	18 sq ft	363	$689

*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, concrete base, rotor plate and top section per manufacturers specs.

Packages shown below are rated for 70 mph wind zone. 90 mph wind zone packages 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'	$849	$1229	$1549
60'	939	1389	1939
70'	999	1719	2159
80'	1199	1869	2369
90'	1289	2039	2579
100'	1369	2199	2989
110'	1449	2459	3209
120'	1669	2619	3429

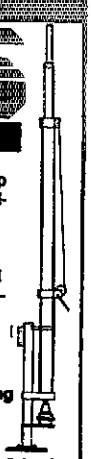
US TOWER CORPORATION

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
TX456	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDX556	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

Note-US Towers Shipped Freight Collect From Visalia, CA Factory

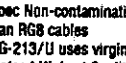
**Note-towers rated at 50 mph to EIA specifications*

RG-213U

$.39/ft $379/1000 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



$.22/ft $209/1000 ft.

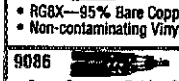
- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

9086

$.45/ft $439/1000 ft.

- Same Specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HANDLINE/HELIAX®



Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket.....$.79/ft.
½" LDF4-50 Andrew Heliax®.....$1.99/ft.
⅞" LDF5-50 Andrew Heliax®.....$4.99/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

HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Heliax®	$29	$29	$29	$29
⅞" Heliax®	$55	$55	$55	$55

Amphenol Silver PL259.....$1.50
UG21B N Male.....$3.50
9086/9913 N Male Connector.....$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga.....$.10/ft.
⅛ 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.....
A4S 4-el Tribander Beam w/S.S. Hdwre.....
A743 & A744, 30/40 mtr KIT for the A3 & A4.
R4 20-10 mtr Vertical.....
AP8 80-10 mtr Vertical.....
AV5 80-10 mtr Vertical.....
D40 40 mtr Dipole.....
40-2CD 2-el 40 mtr Beam.....
A50-5 5-el 6 mtr Beam.....
215 WB NEW 15-el 2 mtr Beam.....
230 WB NEW 30-el 2 mtr Beam.....
4218 XL 18-el 2 mtr Beam.....
3219 19-el 2 mtr Beam.....
424B 24-el 432 MHz Beam.....
ARX2B 2 mtr Vertical.....

CALL FOR SPECIAL PRICES!

Hy-Gain

Discoverer 2-el 40-mtr Beam.....
Discoverer 3-el Conversion Kit.....
EXPLORER-14 SUPER-SPECIAL.....
OK710 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.....
28DQ 80/40 mtr Trap Dipole.....
5BDQ 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

HF6VX 80-10m Vertical $159.95 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $149.95 Delivered
- Full Legal Power
- Automatic Band Switching

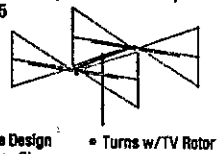
Accessories:

RMK II Roof Mtg. Kit.....$59.95
STR II Stub-Tuned Radials.....$39.95
TBR160 160m Coil Kit.....$59.95
30m Add-on Kit.....$39.95
17/12m Add-on Kit.....$39.95

HF6V HF2V

FREE UPS on ACCESSORIES when purchased with antenna

HF5B "Butterfly" 20-10m Compact Beam $259.95



- 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.....$419
KT34XA 6-el Broad Band Triband Beam.....$619

ROTORS

Alliance HD73 (10.7 sq. ft. rating).....$129.95
Alliance U110 (3 sq. ft. rating).....$49
Telex CD 4511 (8.5 sq. ft. rating).....$Call
Telex HAM 4 (15 sq. ft. rating).....$Call
Telex Tailtwister (20 sq. ft. rating).....$Call
Telex HDR300 Heavy Duty (25 sq. ft. rating).$Call

ROTOR CABLE

Standard 8 cord cables $.25/ft. (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.45/ft (vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G.....$54.50 45G.....$153.50
25G.....$65.50 55G.....$197.50

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	CALL FOR PRICES
FK2558	58 ft.	13.3 sq. ft.	
FK2568	68 ft.	11.7 sq. ft.	
FK4544	44 ft.	34.8 sq. ft.	
FK4554	54 ft.	29.1 sq. ft.	
FK4564	64 ft.	28.4 sq. ft.	

25G Double Guy Kit.....$299.
45G Double Guy Kit.....$319.

*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
3/16 CCM Cable Clamp (3/16" or 5/32").....$.45
1/4 CCM Cable Clamp (1/4" Cable).....$.55
1/4 TH Thimble (fits all sizes).....$.45
3/8EE (3/8" Eye & Eye Turnbuckle).....$6.95
3/8EJ (3/8" Eye & Jaw Turnbuckle).....$7.95
1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle).....$9.95
1/2 × 9EJ (1/2" × 9" Eye & Jaw Turnbuckle).....$10.95
1/2 × 12EE (1/2" × 12" Eye & Eye Turnbuckle).....$12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle).....$13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle).....$16.95
3/16" Preformed Guy Grip.....$2.49
1/4" Preformed Guy Grip.....$2.99
6" Diam - 4 ft Long Earth Screw Anchor.....$19.95
500 D Guy Insulator (5/32" or 3/16" Cable).....$1.99
502 Guy Insulator (1/4" Cable).....$3.49
5/8" Diam - 8 ft Copper Clad Ground Rod.....$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating).....$.32/ft
HPTG4000 Guy Cable (4000 lb rating).....$.52/ft
HPTG6700 Guy Cable (6700 lb rating).....$.72/ft
9901LD Cable End (for 2100/4000 cable).....$9.95
9902LD Cable End (for 6700 cable).....$11.95
Socketfast Potting Compound (does 6-8 ends).....$16.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	$29	$49	$69	$89
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(Antenna/tower product prices do not include shipping unless noted otherwise)

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TS-950SD

TRANSMIT THE ULTIMATE SIGNAL

- Digital Signal Processing
- Dual Frequency Receive
- Digital AF Filter • 100 Memories

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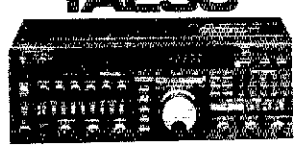


FT-767GX HF/VHF/UHF BASE STATION

- Add Optional 6m, 2m & 70cm Modules
- Dual VFO's
- Full CW Break-in
- Lots More Features

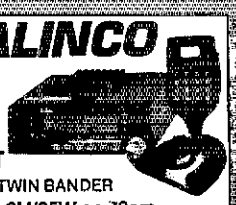
ICOM NEW!

IC-765 NEW HF TRANSCEIVER

- Built-In Automatic Antenna Tuner and Power Supply
- 99 Memories • 100 W Output
- 160–10M/General Coverage Receiver
- Band Stacking Registers

ALINCO

NEW!



DR-570T

VHF/UHF TWIN BANDER

- 45W on 2M/35W on 70cm
- Receive on both Bands at Same Time
- Extended Receiver Range
- More Features for the Money Than Anyone Else

CALL TODAY!

KENWOOD

TS-140S AFFORDABLE DX-ing!

- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
- Compact, Lots of Features

YAESU

FT-736R VHF-UHF BASE STATION

- SSB, CW, FM on 2 Meters and 70 cm
- Optional 50 MHz, 220 MHz or 1.2 GHz
- 25 Watts Output on 2 Meters, 220 and 70 cm
- 10 Watts Output on 6 Meters and 1.2 GHz • 100 Memories

ICOM

IC-725 NEW ULTRA-COMPACT HF TRANSCEIVER

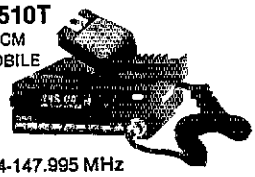
NEW!

- USB/LSB/CW, AM Receive Optional Module for AM Transmit and FM TX/RX
- 160–10M Operation • 100 W Output
- Receive 30 kHz to 33 MHz
- 26 Memories with Band Stacking Registers

ALINCO

DR-510T

2M/70CM FM MOBILE



- 144-147.995 MHz 440-450 MHz
- Cross Band Repeater Function
- 45W/35W Output
- 14 Memories

SPECIAL SALE-CALL!

KENWOOD

KENWOOD SPECIALS

TS-440, Compact HF
TS-140, Affordable HF
TS-680, HF Plus 6 Meter
TM-231, 2 Meter Mobile

CALL FOR BEST PRICE!

YAESU

NEW!

FT-470

COMPACT DUAL BAND FM HANDHELD (2M/70CM)

- 21 Memories for Each Band
- Dual VFO's for Each Band
- Up to 5 Watts Power
- Built-in CTCSS
- Built-in 10-Memory DTMF Autodialer

ICOM

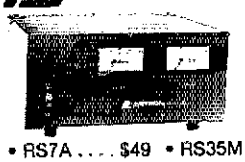
NEW!

IC-2 SAT

MINI 2 METERS FM HANDHELD

- Receive 138-174 MHz
- Transmit 140-150 MHz
- Up to 5 Watts Output
- 48 Memories
- Band and Memory Scanning
- Automatic Power Shut-Off

ASTRON



• RS7A $49	• RS35M . . $159
• RS12A . . . $70	• VS35M . . $174
• RS20A . . . $89	• RS50A . . $199
• RS20M . . $109	• RS 50M . $219
• VS20M . . $124	• RM50M . $259
• RS35A . . $139	• VS50M . . $232

dkconcepts

- 12 Models of V/UHF Amps
- Solid State GaAsFET Receiver Preamps
- Output of 30-170 Watts
- High SWR Shutdown
- Made in USA

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MULTI-MODE TNC

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Index to Volume LXXIII—1989

How to Use This Index

Items are listed according to the monthly column in which they appeared and/or under any category (or categories) that generally describes them. Examples: "Build the Versa Loop" is listed under Antennas and Transmission Lines and under Feature Articles—Technical. "Packet Radio: Worked All States and Beyond" is listed under Contests & Operating Activities, Computers, and Feature Articles—General Interest.

Technical

FEEDBACK

These items are not listed elsewhere in this index.

FM/RPT

HAPPENINGS

HINTS AND KINKS

HOW'S DX?

IARU NEWS

KEYING AND CONTROL CIRCUITS

MEASUREMENT AND TEST EQUIPMENT

NEW BOOKS

NEW PRODUCTS

SPECIALIZED COMMUNICATIONS TECHNIQUES

TECHNICAL CORRESPONDENCE

VHF AND MICROWAVES

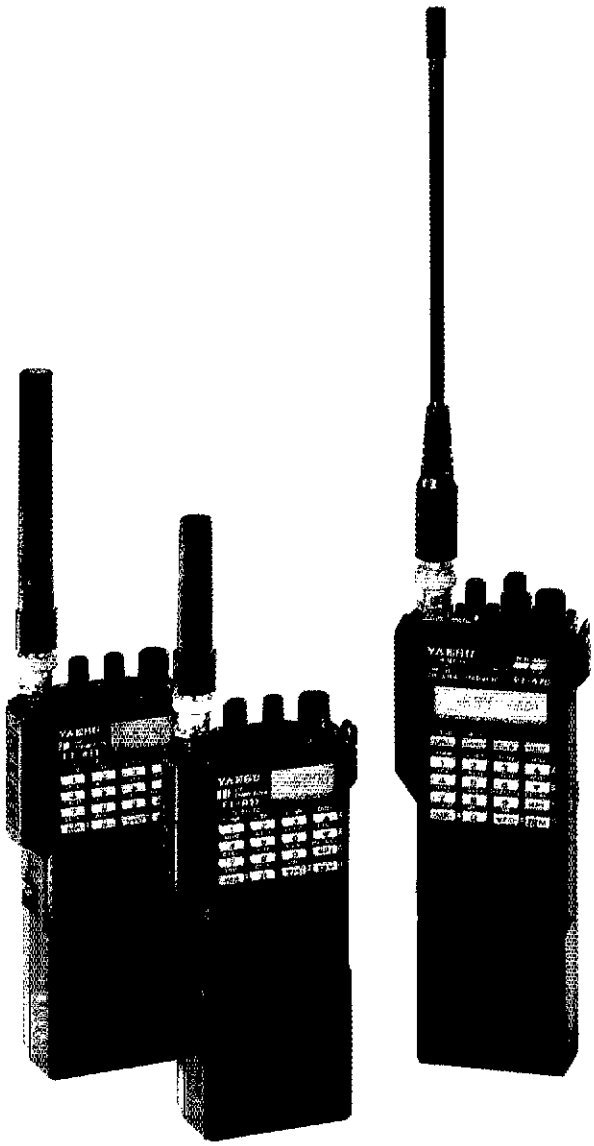
The New Frontier (column)

The World Above 50 MHz (column)

YL NEWS AND VIEWS

Compare...Ours & Theirs

Choosing the radio that's right for you can be pretty confusing. That's why we decided to make it as simple as possible for you to see how these Yaesu hand-helds stack up against the competition. No boasts, no sales pitches, just a factual side-by-side comparison of "ours" versus "theirs." Because Yaesu quality speaks for itself.



2 METER HANDHELD SPECIFICATIONS	YAESU FT-411/811	ICOM IC-2SAT/IC-4SAT	KENWOOD TH-215/TH-415
Memory Channels	**49**	48	10
VFOs	**2**	1	1
Memory Channels Store Any Offset	**49**	10	10
Wide Receiver Frequency Range (MHz)—VHF	**140-173**	138-174	141-163
Wide Receiver Frequency Range (MHz)—UHF	**430-450**	440-450	438-450
Built-in CTCSS Encode/Decode	**Included**	Option	Encode Only
Memory DTMF Autodialer	**10**	None	None
CTCSS Paging	✓	Option	—
Programmable Battery Saver	✓	✓	✓
Backlit LCD Display	✓	✓	✓
Backlit DTMF Keypad	✓	—	—
APO, Automatic Power Off	✓	✓	—
1 MHz Up/Down Stepping	✓	✓	✓
Vinyl Case	✓	Option	Option
Scan For CTCSS Tone	✓	—	—
Built In VOX	✓	—	—
Clock	—	✓	—
Odd Split, Any Tx Or Rx Frequency In Any Memory Channel	**49**	10	1
Suggested Retail Price	**$406.00***	$439.95*	$349.95*

DUAL-BAND HANDHELD SPECIFICATIONS	YAESU FT-470	ICOM IC-32AT	KENWOOD TH-75A
Memory Channels	**42**	20	20
VFOs Per Band	**2**	1	1
Wide Receiver Frequency Range (MHz)—VHF	**130-180**	138-174	140-164
Wide Receiver Frequency Range (MHz)—UHF	**430-450**	440-450	438-450
Built-in CTCSS Encode/Decode	**Included**	Option	Encode Only
Memory DTMF Autodialer	**10**	None	None
Dual Receive With Balance Control	✓	—	✓
CTCSS Paging	✓	—	✓
Cross Band Full Duplex	✓	✓	✓
Programmable Battery Saver	✓	✓	✓
Backlit LCD Display	✓	✓	✓
Backlit DTMF Keypad	✓	—	—
Alternating Band Scan	✓	✓	✓
Cross Band Repeater	✓	—	—
Power Output on 2 Meter and 440	**2.3W**	5.0W	1.5W
APO, Automatic Power Off	✓	—	✓
1 MHz Up/Down Stepping	✓	✓	✓
Memory Channels Store Any Offset	**42**	20	20
Vinyl Case	✓	Option	Option
Odd Split, Tx Or Rx, Any Frequency In Any Memory Channel	**42**	20	2
Suggested Retail Price	**$576.00**	$629.00	$549.00

YAESU

17210 Edwards Road Cerritos, CA 90701 (800) 999-2070

Data and prices obtained from latest available manufacturers' brochures & printed material. October, 1989.

*VHF Radios only.

KENWOOD

Stacked in your favor!

TM-231A/ 331A/431A/531A

FM Mobile Transceiver

Looking for a compact transceiver for your mobile VHF and UHF operations? KENWOOD has a compact rig for each of the most popular VHF/ UHF bands.

- **20 multi-function memory channels.**
- **High performance — high power! 50W (TM-231A), 35W (TM-431A) with a 3 position power switch.**
- **Optional full-function remote controller (RC-20).** A full-function remote controller can be mounted in any convenient location. Using the IF-20 interface the RC-20 may be connected to four mobile transceivers. (TM-231A/ 431A/531A or the TM-701A).
- **Multi-function microphone supplied.** Various controls are provided on the mic. for increased utility.
- **Auto repeater offset on 144 and 220 MHz.**
- **Built-in digital VFO allows selection of the frequency step.** (5, 10, 15, 20, 12.5, 25kHz; TM-531A: 10, 20, 12.5, 25kHz.)
- **Selectable CTCSS tone built-in.**
- **Tone alert system — for true "quiet monitoring"!** When enabled this function will activate a tone when squelch opens.
- **DRS (Digital recording system).** The optional DRU-1 can store received and transmitted messages for up to 32 seconds, allowing the operator to check or return any call using the tone alert system.
- **Automatic lock tuning function (TM-531A).**
- **Repeater reverse switch.**

TM-231A
136-174 MHz receive.
1X on Amateur bands only.
Modifiable for MARS/CAP.
Permit required.

Optional Accessories:
• **RC-20** Full-function remote controller • **RC-10** Handset • **IF-20** Interface unit handset • **DRU-1** Digital recording unit • **MC-44** Multi-function hand mic. • **MC-44DM** Multi-function hand mic. with auto-patch • **MC-48B** 16-key DTMF hand mic. • **MC-55** 8-pin mobile mic. • **MC-60A/80/85** Desktop mics. • **MA-700** Dual band (2m/ 70cm) mobile antenna (mount not supplied) • **SP-41** Compact mobile speaker • **SP-50B** Mobile speaker • **PS-430** Power supply • **MB-201** Mobile mount • **PG-2N** Power cable • **PG-3B** DC line noise filter • **PG-4H** Interface connecting cable • **PG-4J** Extension cable kit • **TSU-6** CTCSS unit

KENWOOD U.S.A. CORPORATION
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...pacesetter in Amateur Radio

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