Official Journal of
ARRL
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QST

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AMATEUR RADIO

July 2001

QST reviews

- **Kenwood** TS-2000 multiband transceiver
- **Videolynx** 434 miniature video transmitter

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July Antenna Issue

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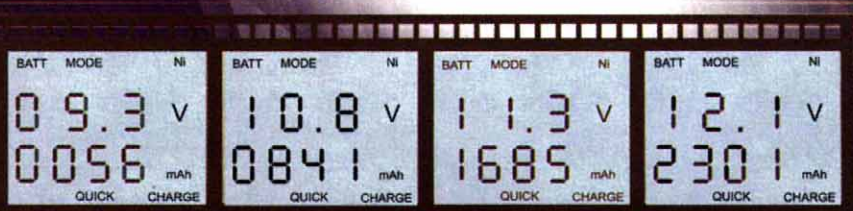

MH-FNB-72 Ultra high capacity 1700mAh 9.6V NiMH battery pack for Yaesu FT-817. Also includes a "rapid charging cable" that will enable you to charge the battery pack in around 3 hours using MH-C777, MH-C777PLUS, or MH-C888.

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Frequencies courtesy of Scanning USA, Feb. 2001 -Something new to monitor, by Tom Filecco

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Telephone: 860-594-0200
Fax: 860-594-0259

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QST Workbench

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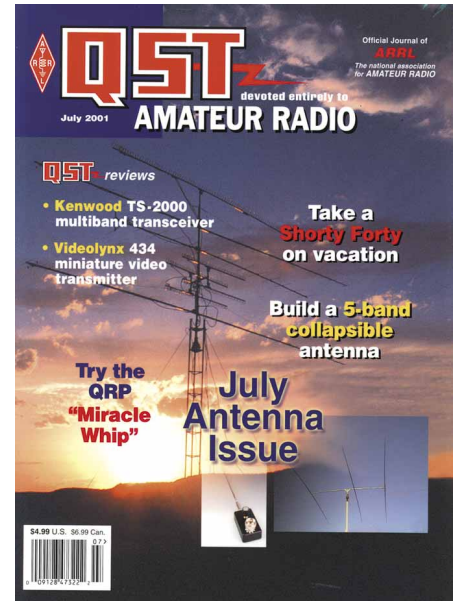

Our Cover:
Bruce Herrick, WW1M, captured this impressive shot of the W1XE/0 antennas at sunset during the 2000 June VHF QSO Party. Accompanied by images of the projects you'll find in this issue, it sets the mood for a month of antenna-building fun!

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The new RCI-2950DX (25W PEP) and RCI-2970DX (150W PEP) offer a unique opportunity for operators to own a two band/multi-mode transceiver at a price anyone can afford. Tech Plus waiting to upgrade? This rig can get you started on HF!

Whether your interests are in contests, DX, 10-meter FM repeaters or digital modes, this radio will give you many hours of enjoyment while leaving extra money for that special antenna you've been wanting. The affordable 2950DX is less than $300, while the value-priced 2970DX is under $430.

The redesigned receiver front-end, extensive shielding and improved stability, combine to offer a 2-band rig that excels where many of the multi-band radios begin to lose performance.

As a stand-alone or companion to your existing rig, the RCI-2950DX or RCI-2970DX can easily go from your shack to your car in minutes. Field day or supplemental club station, these rigs will help you get the most of our recent band openings on 12 and 10 meters.

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Stereo SSB and CW? Yes! (and more!)

A "Must Have" Station Accessory!

AOR's new Multi-Media Terminal (MMT) is a powerful new tool to add to your station. More than just DSP, transmit and receive PSK31 and RTTY, listen to amazingly clear audio, equalize your mic, apply potent filtering and hear "weak ones" others may miss.

AOR MMT TDF-370

- **Derived Stereo SSB and CW signals are incredibly clear.**
- **Use powerful DSP noise reduction and filtering technology, including Fast Fourier Transform.**
- **Decode and display PSK31 or RTTY, on the LCD panel, no external PC required!**
- **Enhance your transmitted audio with 8 channels of mic equalization.**
- **Digitally record up to 102 seconds of audio in up to 8 memories.**
- **Receive SSTV 56.7 kHz (external PC and software needed for viewing).**

AMAZING AUDIO

With a new Fast Fourier Transform audio filter, the MMT applies DSP filtering and creates a more "natural" sound, pleasing to the listener. Line enhanced noise reduction uses new algorithms to dramatically reduce background noise. An auto-notch function can be used to reduce or eliminate annoying interference. You won't believe your ears!

"HIGH FIDELITY" SSB

This is not a conflict of terms! AOR's unique technology derives unbelievable audio from a 2.4 kHz source in simulated stereo, through the provided headphones. The results are amazing and have been compared to "FM quality" reception. You didn't know your radio could sound this good. Just about everyone who hears it says, "Wow!"

BETTER TRANSMITTED AUDIO

Use the built-in microphone equalizer to enhance your transmitted audio. Contour a profile for your vocal characteristics or overcome some of the limitations that may exist in your microphone.

IMPROVED CW OPERATION

Built-in 100, 200 and 300 Hz audio band pass filters. Center frequency is adjustable from 800 Hz with 450 Hz pitch. There is also a special noise reduction circuit just for CW operation.

"STEREO" CW RECEPTION

The built-in band pass filter has independent outputs for the left and right channels, allowing independent bandwidth settings heard through the included stereo headphones.

DIGITAL MODES WITHOUT A PC

Receive and display PSK31 and RTTY (Baudot) modes without the need for a PC. AOR's MMT displays text on its easy-to-read LCD display. PSK31 formats include BPSK and QPSK. RTTY operations include 170, 425 and 850 Hz shifts.

PC INTERFACE

The MMT has a rear panel DSUB9 connector and a serial cable is provided. You can set internal parameters of the MMT and operate PSK31 and RTTY using a simple terminal program. You can also transmit and receive SSTV (56.7 kHz) through your computer (optional software needed for SSTV).

DIGITAL VOICE RECORDER (DVR)

Capture up to 102 seconds of audio, in as many as 8 memories, in the MMT's DVR. DPCM compression saves space and delivers good fidelity.

POWER MISER

The AOR MMT operates with just 4 internal AA batteries or from a regulated external supply of 9 ~ 15 VDC.

ACCESSORIES INCLUDED

With the AOR MMT, you get: input cable, stereo connectors, 8-pin mic connectors, power cable, stereo earphones and serial cable for connection to a computer. Note: some soldering of wires and connectors may be required to adapt your transceiver's mic and mic input with the MMT. No alteration to your existing equipment is necessary.

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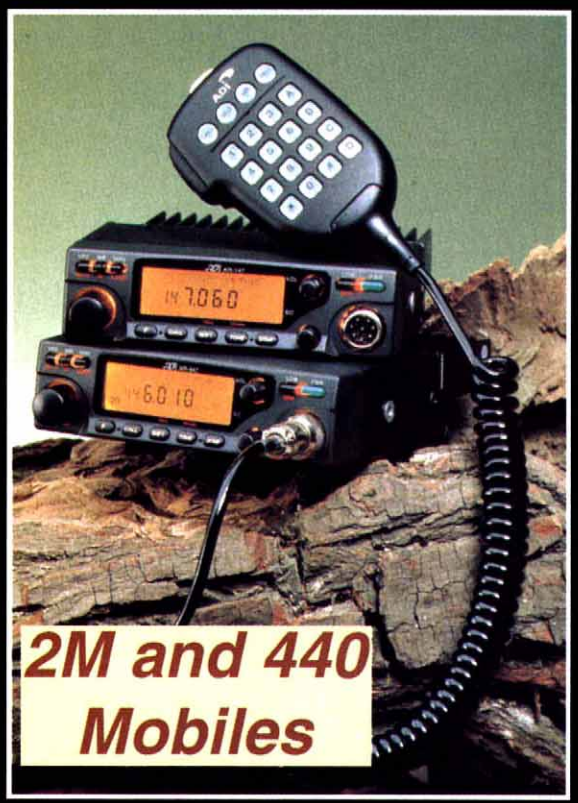

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"IT SEEMS TO US..."

Why Not 222?

Here's a pop quiz: What frequency bands are available to any licensed amateur in the United States, regardless of license class?

The answer: 222-225 and 1270-1295 MHz. These bands are available to Novice operators as well as to anyone with a Technician or higher class license. This arrangement dates back to 1987, when limited voice privileges were restored to Novices (decades ago Novices had voice privileges on 2 meters). There was a brief spurt of interest in the 220-MHz band when Novices were allowed to operate there, but Novice voice privileges on 10 meters proved to be more popular.

When 220-222 MHz was withdrawn from the Amateur Radio Service in 1991 the rate of growth in the use of the remaining portion of the band began to slow. Not to minimize the magnitude of the loss, this was somewhat ironic in that the FCC proceeding that resulted in the withdrawal of 220-222 MHz actually strengthened our hold on the rest of the band by making the allocation primary and exclusive. Repeaters were already limited to the frequencies above 222 MHz and so only the few that had to vacate what became the weak-signal portion of the band at 222.0-222.15 MHz were directly affected. Weak-signal operators were forced to relocate, requiring in some cases significant equipment modifications, but this was accomplished and life went on. Perhaps the greatest impact of the reallocation was to auxiliary operation and fixed packet links; some of this activity shifted to FM simplex frequencies and a little went to 219-220 MHz when that band became available on a very limited basis.

Activity patterns on 222 MHz (also called 1.25 meters) today vary greatly from place to place. We know of 1,718 repeaters in the band. In some areas they are just as active and nearly as numerous as on 2 meters. (We've long harbored the suspicion that we'd have enjoyed greater success defending 220 at the FCC if the activity in the Washington, DC, area had been as high as in such cities as Los Angeles, Chicago, Philadelphia or even Hartford.) Proponents of the band are quick to point out that it generally suffers less interference from commercial land-mobile transmitters in adjacent bands than either 2 meters or 70 cm, which translates to better receiver sensitivity and improved coverage. In short, it's a great band with a loyal following, some of whom occasionally chide us for not giving it more attention—and some of whom will be unhappy that we're now doing so and giving away their secret!

Why doesn't 222 MHz get more attention? Mostly it's because the band exists only here in the Americas. There is no amateur band between 2 meters and 70 cm in either Japan or Europe, the two other major markets for ham gear. This means that a manufacturer's product development, manufacturing, and marketing costs must be offset entirely by sales in the American market. Cautious Japanese manufacturers understandably have tended to focus on their domestic market first. Even American manufacturers have been reluctant to take the risk. Pricing policies also have had an impact. Anticipating sales in smaller quantities, manufacturers have tended to price 222-MHz products at a premium over 2-meter gear even when they were functionally the same.

There are signs that the tide is now turning. One reason may be that the American market for ham gear is somewhat healthier than either the Japanese or the European market, leading to greater interest in meeting our needs. Prices on 222-MHz hand-helds and mobiles have dropped, although they are not yet on a par with the incredible 2-meter bargains to be had. It may be significant that much of the new-product "buzz" at the Dayton Hamvention had to do with Kenwood's new TH-F6A triband hand-held, which will cover the three bands between 144 and 450 MHz.

The remaining glaring gap is in the frequency coverage of multiband, multimode rigs. Rigs such as ICOM's IC-706MKIIG, Yaesu's FT-847, FT-100D and FT-817, and Kenwood's TS-2000 are engineering marvels that set new standards in terms of features per cubic centimeter. Their designers owe us no apologies for having designed them for the world market and for not yet offering coverage of our uniquely American 222-225 MHz band. Still, we hope that as they consider the future evolution of these successful product lines they will put 222-MHz coverage high on the list of features to be added at the first opportunity. Why not? After all, it's the only feature that can be used by each and every one of the more than 684,000 licensed amateurs in the United States. In today's global Amateur Radio environment, that's not a market that's likely to be ignored.—*David Sumner, K1ZZ*

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(814-763-1529);
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Vice Director: William C. Edgar, N3LLR, 22 Jackson Ave., Bradford, PA 16701 (814-362-1250); n3llr@arrl.org

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GEORGE R. ISELY, W9GIG
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w9gig@arrl.org
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k9km@arrl.org

Dakota Division
JAY BELLOWS, K0QB
997 Portland Ave, St Paul, MN 55104
(651-983-2420); k0qb@arrl.org
Vice Director: Twila Greenheck, N0JPH, 3333 Owasso Heights Rd, Shoreview, MN 55126 (651-483-1214);
n0jph@arrl.org

Delta Division
RICK RODERICK, K5UR
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(901-757-0444); wd4q@arrl.org

Great Lakes Division
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wb8bgy@arrl.org
Vice Director: Gary L. Johnston, KI4LA, 3056 Hergott Dr, Edgewood, KY 41017-3377
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n2ff@arrl.org
Vice Director: Stephen A. Mendelsohn, W2ML, 318 New Milford Ave, Dumont, NJ 07628 (201-384-0570);
w2ml@arrl.org

Midwest Division
WADE WALSTROM, W0EJ
7431 Macon Dr, Cedar Rapids, IA 52411 (319-393-8982); w0ej@arrl.org
Vice Director: Bruce Frahm, K0BJ, PO Box DX, Colby, KS 67701
(785-462-7388); k0bj@arrl.org

New England Division
TOM FRENAYE, K1KI*
PO Box 386, West Suffield, CT 06093
(860-668-5444); k1ki@arrl.org
Vice Director: Mike Raisbeck, K1TWF, 85 High St, Chelmsford, MA 01824
(978-250-1235); k1twf@arrl.org

Northwestern Division
GREG MILNES, W7OZ
740 SE 24th Ave, Hillsboro, OR 97123-7286 (503-648-6990);
w7oz@arrl.org
Vice Director: Jim Fenstermaker, K9JF, 10312 NE 161st Ave, Vancouver, WA 98682 (360-256-1716); k9jf@arrl.org

Pacific Division
JIM MAXWELL, W6CF,
PO Box 473, Redwood Estates, CA 95044 (408-353-3911);
w6cf@arrl.org
Vice Director: Bob Vallio, W6RGG, 18655 Sheffield Rd, Castro Valley, CA 94546 (510-537-6704);
w6rgg@arrl.org

Roanoke Division
DENNIS BODSON, W4PWF
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w4pwf@arrl.org
Vice Director: Leslie Shattuck Sr, K4NK, 127 Henderson St, Greenville, SC 29611 (864-421-0732);
k4nk@arrl.org

Rocky Mountain Division
WALT STINSON, W0CP,
999 S Logan St, Denver, CO 80209
(303-770-3926); w0cp@arrl.org
Vice Director: Warren G. "Rev" Morton, WS7W, 1341 Trojan Dr, Casper, WY 82609 (307-235-2799);
ws7w@arrl.org

Southeastern Division
FRANK M. BUTLER JR, W4RH*
323 Elliott Rd SE, Ft Walton Beach, FL 32548 (850-244-5425);
w4rh@arrl.org
Vice Director: Evelyn Gauzens, W4WYR, 2780 NW 3rd St, Miami, FL 33125 (305-642-4139);
w4wyr@arrl.org

Southwestern Division
FRIED HEYN, WA6WZO*
962 Cheyenne St, Costa Mesa, CA 92626 (714-549-8516);
wa6wzo@arrl.org
Vice Director: Art Goddard, W6XD, 2901 Palau Pl, Costa Mesa, CA 92626 (714-556-4396);
w6xd@arrl.org

West Gulf Division
COY C. DAY, N5OK
RR1, Box 254, Union City, OK 73090-9726 (405-483-5632);
n5ok@arrl.org
Vice Director: David Woolweaver, K5RAV, 2210 S. 77 Sunshine Strip, Harlingen, TX 78550 (956-425-3128);
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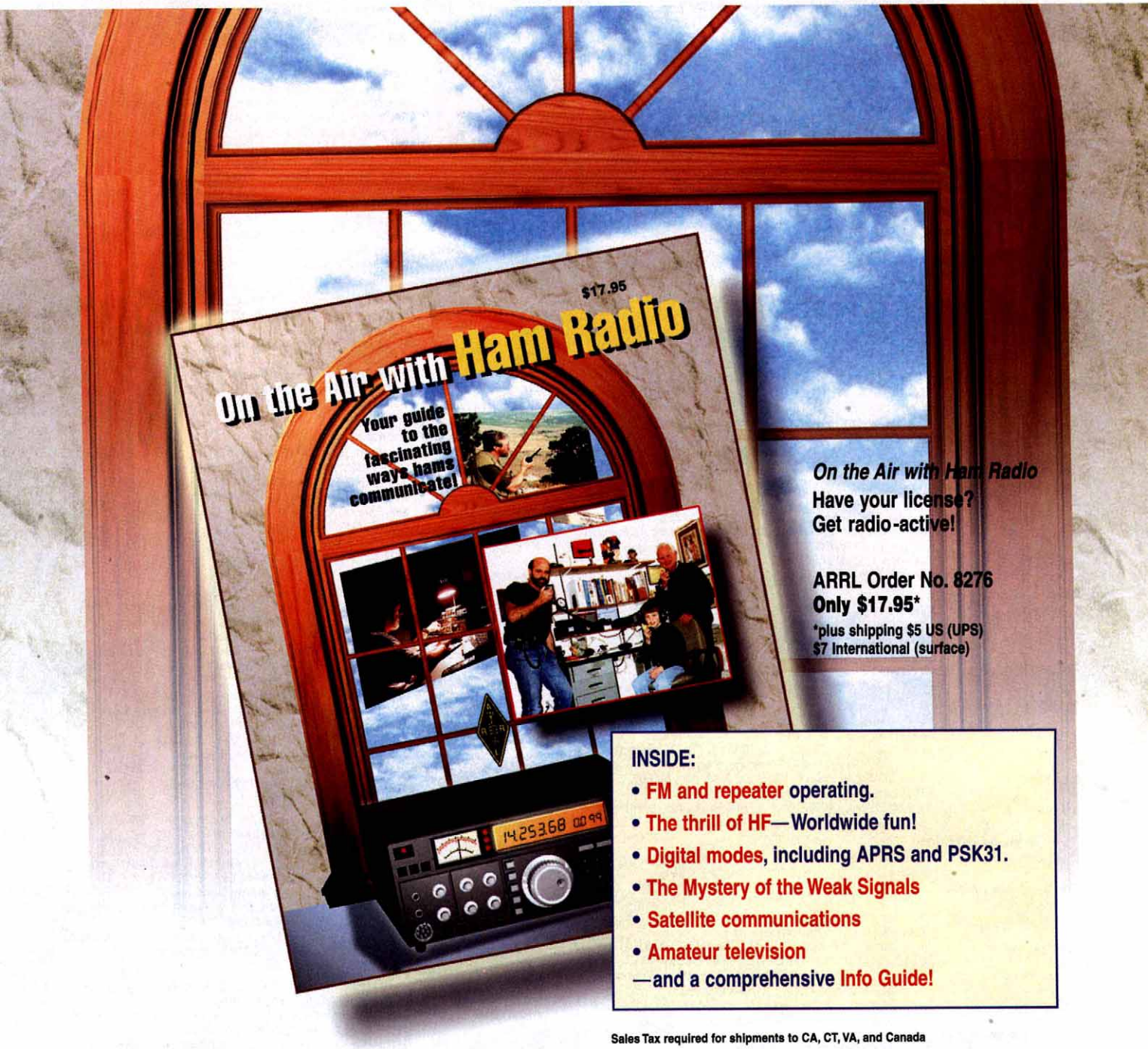

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Eastern Pennsylvania	Eric Olena, WB3FPL, RR5 Box 5687, Mohnton, PA 19540 (610-775-0526); **wb3fpl@arrl.org**
Maryland-DC	Tom Abernethy, W3TOM, 1133 Apple Valley Rd, Accokeek, MD 20607 (301-292-6263); **w3tom@arrl.org**
Northern New York	Thomas Dick, KF2GC, 4 Jenkins St, Saranac Lake, NY 12983 (518-891-0508); **kf2gc@arrl.org**
Southern New Jersey	Jean Priestley, KA2YKN, 7158 Chandler Ave, Pennsauken, NJ 08105 (856-662-3587); **ka2ykn@arrl.org**
Western New York	Scott Bauer, W2LC, 1964 Connors Rd, Baldwinsville, NY 13027 (315-638-7551); **w2lc@arrl.org**
Western Pennsylvania	John V. Rodgers, N3MSE, 803 S Main St, Butler, PA 16001-6326 (724-287-0424); **n3mse@arrl.org**

Central Division

Illinois	Bruce Boston, KD9UL, 815 E 3rd St, Beardstown, IL 62618 (217-323-9809); **kd9ul@arrl.org**
Indiana	Peggy Coulter, W9JUJ, 12330 SCR 200 E, Muncie, IN 47302 (765-288-0481); **w9juj@arrl.org**
Wisconsin	Donald Michalski, W9IXG, 4214 Mohawk Dr, Madison, WI 53711 (608-274-1886); **w9ixg@arrl.org**

Dakota Division

Minnesota	Randy "Max" Wendel, KM0D, 8539 Bryant Ave S, Bloomington, MN 55420-2147 (952-888-5953); **km0d@arrl.org**
North Dakota	Kent Olson, KA0LDG, 7702 Forest River Road, Fargo, ND 58104-8004 (701-298-0956); **ka0ldg@arrl.org**
South Dakota	Roland Cory, W0YMB, 815 2nd Ave W, Mobridge, SD 57601 (605-845-2400); **w0ymb@arrl.org**

Delta Division

Arkansas	Bob Ideker, WB5VUH, 103 Duquesne Ct, Little Rock, AR 72223 (501-868-8847); **wb5vuh@arrl.org**
Louisiana	Mickey Cox, K5MC, 754 Cheniere-Drew Rd, West Monroe, LA 71291 (318-397-1980); **k5mc@arrl.org**
Mississippi	Malcolm Keown, W5XX, 14 Lake Circle Dr, Vicksburg, MS 39180 (601-636-0827); **w5xx@arrl.org**
Tennessee	O. D. Keaton, WA4GLS, 141 Medearis Dr, Old Hickory, TN 37138 (615-758-2329); **wa4gls@arrl.org**

Great Lakes Division

Kentucky	John D. Meyers, N4GNL, 110 Cory Ln, Butler, KY 41006-9740 (859-472-6690); **n4gnl@arrl.org**
Michigan	Richard Mondro, W8FQT, 800 Dover St, Dearborn Heights, MI 48127 (313-730-2111); **w8fqt@arrl.org**
Ohio	Joseph J. Phillips, K8QOE, 2800 Jupiter Dr, Fairfield, OH 45014-5022 (513-874-0006); **k8qoe@arrl.org**

Hudson Division

Eastern New York	Pete Cecere, N2YJZ, 378 Ohayo Mtn Rd, Woodstock, NY 12498 (845-679-9846); **n2yjz@arrl.org**
NYC-Long Island	George Tranos, N2GA, PO Box 296, Bellport, NY 11713, (631-286-7562); **n2ga@arrl.org**
Northern New Jersey	William Hudzik, W3UDT, 111 Preston Dr, Gillette, NJ 07933 (908-580-0493); **w2udt@arrl.org**

Midwest Division

Iowa	Jim Lasley, N0JL, PO Box 5, Chillicothe, IA 52548 (641-935-4337); **n0jl@arrl.org**
Kansas	Orlan Q. Cook, W0OYH, 12110 We st 71st St, Shawnee, KS 66216 (913-631-0423); **w0oyh@arrl.org**
Missouri	Dale C. Bagley, K0KY, PO Box 13, Macon, MO 63552-1822 (660-385-3629); **k0ky@arrl.org**
Nebraska	Bill McCollum, KE0XQ, 1314 Deer Park Blvd, Omaha, NE 68108 (402-734-3316); **ke0xq@arrl.org**

New England Division

Connecticut	Betsey Doane, K1EIC, 92 Mohegan Rd, Shelton, CT 06484-2448 (203-929-7759); **k1eic@arrl.org**
Eastern Massachusetts	Phil Temples, K9HI, Apt 808, 125 Coolidge Ave, Watertown, MA 02472-2875 (617-926-5986); **k9hi@arrl.org**
Maine	William Woodhead, N1KAT, 63 1st Ave, Auburn, ME 04210 (207-782-4862); **n1kat@arrl.org**
New Hampshire	Al Shuman, N1FIK, PO Box 119, Goffstown, NH 03045-0119 (603-487-3333); **n1fik@arrl.org**
Rhode Island	Armand E. Lambert, K1FLD, 144 Summer St, Woonsocket, RI 02895 (401-762-0536); **k1fld@arrl.org**
Vermont	Bob DeVarney, WE1U, 43 W Milton Rd, Milton, VT 05468 (802-893-7336); **we1u@arrl.org**
Western Massachusetts	William Voedisch, W1UD, 240 Main St, Leominster, MA 01453 (978-537-2502); **w1ud@arrl.org**

Northwestern Division

Alaska	L. Kent Petty, KL5T, 21440 Falling Water Cir, Eagle River, AK 99517 (907-243-5856); **kl5t@arrl.org**
Eastern Washington	Kyle Pugh, KA7CSP, W 5006 Houston Ave, Spokane, WA 99208 (509-327-5039); **ka7csp@arrl.org**
Idaho	Michael Elliott, K7BOI, 11286 West Hickory Dale Dr, Boise, ID 83713-1028 (208-376-3458); **k7boi@arrl.org**
Montana	Darrell Thomas, N7KOR, 743 33rd Ave NE, Great Falls, MT 59404 (406-453-8574); **n7kor@arrl.org**
Oregon	William Sawders, K7ZM, 19821 Ponderosa St, Bend, OR 97702 (541-389-6258); **k7zm@arrl.org**
Western Washington	Harry Lewis, W7JWJ, 10352 Sand Point Way NE, Seattle, WA 98125 (206-523-9117); **w7jwj@arrl.org**

Pacific Division

East Bay	Andy Oppel, KF6RCO, 1308 Burbank St, Alameda, CA 94501-3946 (510-523-3953); **kf6rco@arrl.org**
Nevada	Jan Welsh, NK7N, 59 Constitution Ave, Henderson, NV 89015-5702 (702-565-0242); **nk7n@arrl.org**
Pacific	Ronald Phillips, AH6HN, HCR 2 Box 6637, Keaau, HI 96749 (808-982-6513); **ah6hn@arrl.org**
Sacramento Valley	Jerry Boyd, K6BZ, PO Box 252, Igo, CA 96047 (530-396-2256); **k6bz@arrl.org**
San Francisco	Leonard Gwinn, WA6KLK, 2960 Blackhawk Dr, Willits, CA 95490-9704; **wa6klk@arrl.org**
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Roanoke Division

North Carolina	John Covington, W4CC, PO Box 217122, Charlotte, NC 28221(704-577-9405); **w4cc@arrl.org**
South Carolina	Patricia Hensley, N4ROS, 164 N Main St PO Box 70, Richburg, SC 29729-0070 (803-789-5810); **n4ros@arrl.org**
Virginia	Carl Clements, W4CAC, 4405 Wake Forest Rd, Portsmouth, VA 23703 (757-484-0546); **w4cac@arrl.org**
West Virginia	O. N. "Olie" Rinehart, WD8V, 1256 Ridge Dr, South Charleston, WV 25309-2434 (304-768-9534); **wd8v@arrl.org**

Rocky Mountain Division

Colorado	Tim Armagost, WB0TUB, 6337 S Lafayette Pl, Littleton, CO 80121 (303-795-9683); **wb0tub@arrl.org**
New Mexico	Joe Knight, W5PDY, 10408 Snow Heights Blvd NE, Albuquerque, NM 87112 (505-299-4581); **w5pdy@arrl.org**
Utah	Mel Parkes, AC7CP, 2166 E 2100 North, Layton, UT 84040 (801-547-1753); **ac7cp@arrl.org**
Wyoming	Robert Williams, N7LKH, PO Box 130, Wapiti, WY 82450 (307-527-7758); **n7lkh@arrl.org**

Southeastern Division

Alabama	Bill Cleveland, KR4TZ, 2113 Wildwood Place, Mobile, AL 36609-2583 (334-661-3892); **kr4tz@arrl.org**
Georgia	Sandy Donahue, W4RU, 15010 Briarhill Ln, Atlanta, GA 30324 (404-315-1443); **w4ru@arrl.org**
Northern Florida	Rudy Hubbard, WA4PUP, PO Box 843, Milton, FL 32572-0843 (850-626-0620); **wa4pup@arrl.org**
Southern Florida	Phyllisan West, KA4FZI, 1410 Shelby Parkway, Cape Coral, FL 33904 (941-574-3467); **ka4fzi@arrl.org**
Puerto Rico	Victor Madera, KP4PQ, PO Box 191917, San Juan, PR 00919-1917 (787-789-4998); **kp4pq@arrl.org**
Virgin Islands	John Ellis, NP2B, PO Box 24492, Christiansted, St Croix, VI 00824 (340-773-9643); **np2b@arrl.org**
West Central Florida	Dave Armbrust, AE4MR, 3024 Salem Ave, Sarasota, FL 34232 (941-378-1701); **ae4mr@arrl.org**

Southwestern Division

Arizona	Clifford Hauser, KD6XH, 8741 N Hollybrook Ave, Tucson, AZ 85742 (520-744-9095); **kd6xh@arrl.org**
Los Angeles	Phineas J. Icenbice Jr, W6BF, 19323 Halsted St, Northridge, CA 91324 (818-349-3186); **w6bf@arrl.org**
Orange	Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (909-687-8394); **w6ubq@arrl.org**
San Diego	Tuck Miller, NZ6T, 3122 E 2nd St, National City, CA 91950 (619-434-4211); **nz6t@arrl.org**
Santa Barbara	Robert Griffin, K6YR, 1436 Johnson Ave, San Luis Obispo, CA 93401-3734 (805-543-3346); **k6yr@arrl.org**

West Gulf Division

North Texas	Donald L. Mathis, KB5YAM, 1190 Emerald Sound Blvd, Oak Point, TX 75068-2236 (972-292-1203); **kb5yam@arrl.org**
Oklahoma	Charlie Calhoun, K5TTT, 16101 E 98th St N, Owasso, OK 74055 (918-272-9872); **k5ttt@arrl.org**
South Texas	E. Ray Taylor, N5NAV, 688 Comal Ave, New Braunfels, TX 78130 (830-625-1683); **n5nav@arrl.org**
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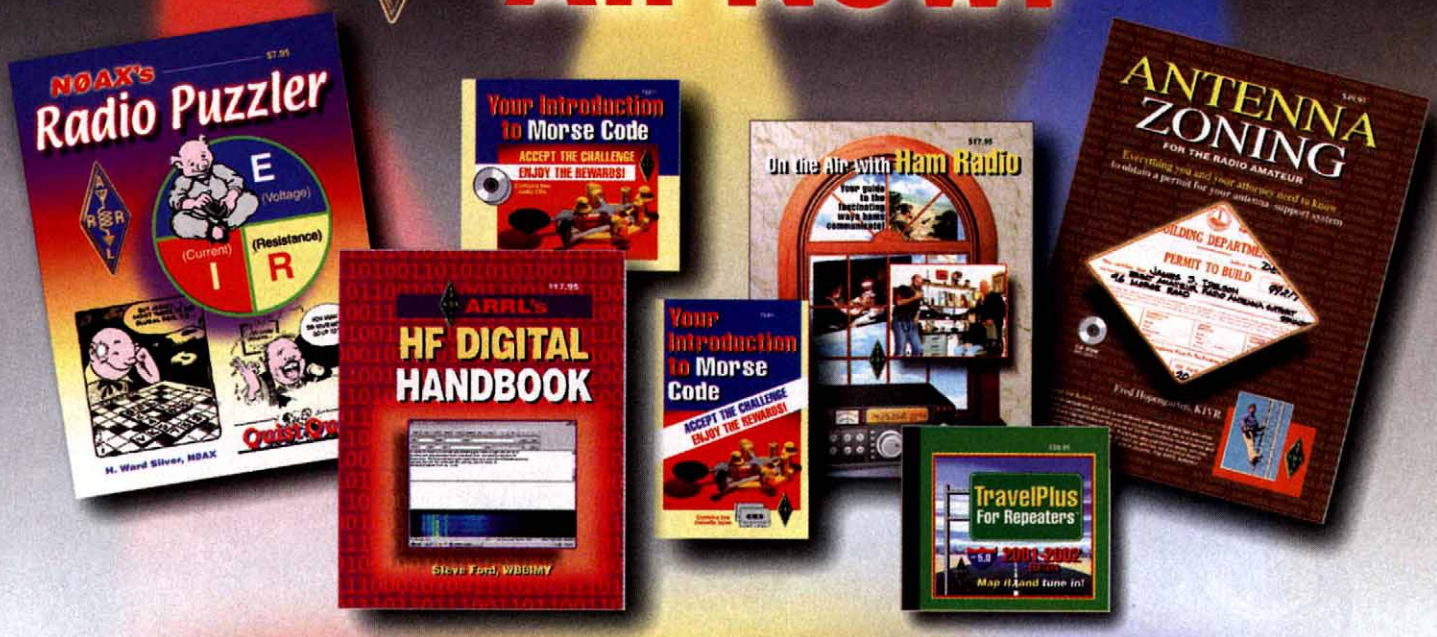

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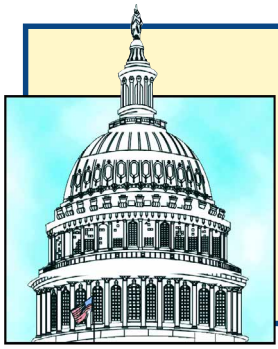


DC Currents

By Steve Mansfield, N1MZA
Manager, Legislative and Public Affairs

Just as radio waves aren't constrained by artificial boundaries, neither is ARRL's government relations effort. "DC Currents" covers behind-the-scenes activity you need to know about in Congress, at the FCC and other regulatory agencies, as well as at worldwide bodies such as the International Telecommunication Union.

ARRL "Washington Team" Pursues Amateur Radio Agenda on Hill

ARRL's activities on Capitol Hill on behalf of our members recently focused on a clearly defined set of issues affecting the interests of the Amateur Radio community. Most visible, of course, has been our effort to solicit cosponsors for the Amateur Radio Spectrum Protection Act. We also spent considerable time during the last session of Congress with our original sponsors, and they have proven to be particularly loyal by reintroducing the legislation this session (see the sidebar). In addition to spectrum legislation, we have begun telling the story of Amateur Radio problems with private land use regulation (CC&Rs) to congressional offices. Our objective is to obtain congressional leverage to get the FCC to revisit ARRL's petition for rulemaking. The hope is that the FCC will clarify that hams living in planned residential developments fall under the same "reasonable accommodation" limited preemption policy as that spelled out for other Amateur operators under the 1985 PRB-1 ruling.

One of the most important benefits of pursuing such legislation on Capitol Hill is the ability to "make connections" with various offices, and to establish ARRL as a source of current information on telecommunications issues. That's why we frequently help confused young Congressional staff members by giving them an update on radio theory and spectrum issues that we call "Spectrum 101."

In spite of our friendships on The Hill, one of the biggest impediments to legislative progress on our priority issues so far has been the focus of the House and Senate Commerce Committees. These bodies, which have jurisdiction over telecommunications, also work on a plethora of non-wireless issues such as confirmation of appointments, electrical deregulation, airline regulation, health and human services, "broadband deployment" and other issues. Sometimes "Hill Watchers" forget that the two Commerce Committees have vast jurisdiction, among which are the largest and most complex topics of any of the Congressional committees. This spring has seen a focus on non-telecommunications issues, although that can quickly change, and ARRL will be ready if it does.

COSPONSOR LIST FOR AMATEUR RADIO BILL GROWING

● The Amateur Radio Spectrum Protection Act, federal legislation that would preserve the total amount of radio spectrum available to Amateur Radio operators, has slowly gained momentum as the 107th Congress shifts gears. The bill, labeled HR.817 in the House of Representatives and S.549 in the Senate, would require the Federal Communications Commission to provide equivalent replacement spectrum should the commission ever reallocate existing amateur spectrum allocations. Congressman Michael Bilirakis (R-FL-9th) introduced the House bill in the US House of Representatives. Senator Michael Crapo (R-SD) introduced the Senate bill. Both the House bill and the Senate bill are the same as bills that were introduced but not passed in the last session of Congress. Even though the House bill had 167 cosponsors and the Senate bill had 11, neither seemed to be able to make it through the committee process.

In this session, HR.817, once again introduced by Rep Bilirakis, already has 20 cosponsors, including Washington Congressman Doc Hastings (R-WA-4th) who is Assistant Majority Whip, part of the House Leadership. Other cosponsors include Representatives John Baldacci (D-ME-2nd); Tammy Baldwin (D-WI-2nd); David Bonior, (D-MI-10th); Dan Burton (R-IN-6th); John Conyers (D-MI-14th); John Doolittle (R-CA-4th); Virgil Goode (I-VA-5th); Johnny Isakson (R-GA-6th); William Jenkins (R-TN-1st); Paul Gillmor (R-OH-5th); Walter Jones (R-NC-3rd), Mike McIntyre (D-NC-7th); Gary Miller (R-CA-41st); George Nethercutt (R-WA-5th); Ted Strickland (D-OH-6th); Charles Stenholm (D-TX-17th); Lee Terry (R-NE-2nd); Patrick Tiberi (R-OH-12th) and Karen Thurman (D-FL-5th).

The Senate companion bill, S.549, re-introduced by Senator Crapo, currently has 7 cosponsors, including Senators Daniel Akaka (D-HI); Thad Cochran (R-MS); Susan Collins (R-ME); Larry Craig (R-ID); Jesse Helms (R-NC); Bob Smith (R-NH) and Olympia J. Snowe (R-ME).

State Antenna Bills

♦ The general assembly of Alaska has passed, and Governor Tony Knowles has signed S.B.78, which will extend the limited federal preemption asserted by FCC's 1985 PRB-1 ruling into Alaska's state laws. Unlike PRB-1, the new Alaska statute specifies a schedule of antenna structure heights, below which municipalities could not further regulate, and "grandfathers" existing structures located where municipalities might enact a restrictive ordinance.

A Nevada antenna bill, A.B.61, has been reported favorably out of a Senate committee with a "do-pass" recommendation. Introduced by Assemblyman Bob Beers, WB7EHN, the bill passed in the Assembly by an almost unanimous vote (40-0-2).

Similar legislation in Wisconsin, A.B.368, has been referred to the Committee on Urban and Local Affairs. Under the Wisconsin bill, towns cannot enact or enforce laws that affect the placement, screening, or height of Amateur Radio antenna-support structures. The exception would be regulation that has a reasonable and clearly defined aesthetic, public health, or safety objective, and that represents the minimum practical regulation that is necessary to accomplish the objectives. The regulation must also reasonably accommodate Amateur Radio communication.

A PRB-1 style bill in Idaho, H.B.232, has passed the Idaho legislature and is now state law. That bill, while directly addressing antenna issues, couched them in emergency communication terms, asserting that it would "preserve the capability of Amateur Radio operators within the state of Idaho to provide radio communications in times of emergency and disaster."

New York Assembly Bill 1565 has been

referred to the Ways and Means Committee, and its Senate companion, S.2893, remains in the Local Government Committee. The New York bills contain prohibition against restricting antenna support structure height to less than 95 feet.

A page detailing those states that have laws or pending preemption legislation appears on ARRLWeb at **www.arrl.org/FandES/field/regulations/statutes.html**. States on the page include Florida, Idaho, Louisiana, Massachusetts, Maine, New Hampshire, Oregon, Texas, Virginia, Wyoming and Washington.

Randy Carlson, WB0JJX, Delaware Section Manager, brings to our attention a non-antenna related piece of legislation recently introduced in his home state that has interesting implications. The bill, S.B.129, would make "malicious interference with emergency communication" a Class-B misdemeanor. The bill extends the definition of interference beyond party line telephones to include wireless communication. The bill says: "'emergency communication' means any telephone call or any form of communication made, transmitted or facilitated by radio, computer or any other electronic device which is intended by its maker to provide warning or information pertaining to any crime, fire, accident, disaster or risk of injury or damage to any person or property."

ARRL Joins Coalition to Rein-in Ultrawideband Plan

♦ Working with a broad coalition of telecommunications interests, the ARRL has also recently spent time on The Hill looking for letters to the FCC from members on Congress on FCC plans to deploy ultrawideband (UWB) devices on an unlicensed basis under its Part 15 rules (ET Docket 98-153). While the ARRL believes this new technology may offer significant benefits, we believe it has not received adequate testing for potential interference with other services, and we are not alone in our concerns. The ARRL has been working on Capitol Hill with a coalition of other organizations whose members might be affected. Members of the coalition have been visiting Congressional offices to educate them on this highly complex technical issue, and to counter what is rumored to be pressure on the FCC from a few members of Congress to push the UWB proceeding through more quickly than we believe may be prudent.

Due to some of the characteristics of UWB, and the fact that some early testing has shown potential for harmful interference to certain systems, the coalition suggests that the technology should be rigorously tested prior to implementation. The coalition is also asking the FCC to identify and define the kinds of UWB devices likely to appear on the market. The biggest potential problems are believed to be possible interference with GPS systems, as well as possible interference to PCS systems. The ARRL is also trying to get UWB operations restricted to bands above 6 GHz, and has arranged with the University of Southern California's UWB lab to test the interference potential to the 1240-MHz amateur band.

ARRL's partners in the coalition are nearly a "who's who" in today's telecommunications world. They include:

Air Transport Association of America, Inc.
ARINC
Astrolink International
AT&T Wireless Services, Inc.
Ellipson, Inc.
Garmin International, Inc.
LocatorNet
Lockheed Martin Corporation
Magellan Corporation
Metricom, Inc.
Motient Services, Inc
NAVSYS Corporation
Nortel Networks, Inc.
Omnistar, Inc.
Outreach
QUALCOMM Incorporated
Rockwell Collins
Satellite Industry Association
SiRF Technology
Sirius Satellite Radio
Spatial Technologies Industry Association
Trimble Navigation, Ltd
US GPS Industry Council
WorldCom
XM Radio, Inc.

Media Hits

• Dennis Tito, KG6FZX, brought Amateur Radio into the limelight when he made a number of ham contacts from aboard the International Space Station. His contacts with his family were featured on NBC's *Today Show* and on CNN. In addition to the family contact, Tito made QSOs with Farrell Winder, W8ZCF, of Cincinnati. See "Happenings" in this issue for more information.

• Columnist John Boyle, writing in the Asheville (North Carolina) *Citizen-Times*, observes the positive benefit Amateur Radio has played in the life of nursing home resident Jay Leonard, WB4DCP. Leonard, who took up Amateur Radio after being disabled by a serious injury more than 30 years ago, has not only used his radios to keep in touch with friends in the outside world, but also used them to contact his daughter for help after his wife had a stroke. How does someone confined to a nursing home set up an antenna? With the help of buddies he met on the radio! Radio friends Don Perkins, KE4YS and Frank Kirby, KT4SH, drove all the way from their home state of Kentucky to install WB4DCP's antenna with the blessing of the nursing home. Robert Dockery, WD4CNZ, an ARRL Public Information Officer, made sure to send copies of this excellent article both to his Section Manager and Public Information Coordinator.

• Ray Brown, KB0STN of Joplin, Missouri gave us a heads-up about an article that appeared recently in the *Joplin Globe* that covers ham radio activity in Garden City, a Kansas community located 200 miles west of Wichita. The story mentions Dale and Nancy Urban, N0KQX and N0OXQ, Floyd Cook, W0YQX, Marion Miller, KA0RID and Jim Douglass, AC0E. Among the topics covered by the article were repeater operation, severe-weather spotting and ARES activities.

• An article promoting Amateur Radio's public service capacity appeared in the *Arlington Heights* (Illinois) *Daily Herald*. The article, which appeared in a column called "Good News" by Eileen O. Daday, discussed what local hams did to help the local 9-mile MS Walk. Mentioned in the article were William Zapel, N9WPD, of Schaumburg and Andrew Sharkey, K9AND, of Elk Grove. Shown in an accompanying photo were Jim Campbell, KB9RGU and Allan Rosewarne, N9SQT.

• *Retired Officer* magazine, targeted to retired military officers and members of the Retired Officers Association, featured a fine story about the vital backup communication still being provided by the Military Affiliate Radio System (MARS) to men and women in uniform, often through the help of ham volunteers. The article goes back to the early days of the formation of MARS, all the way up to the present time. Those mentioned in the article include Charles Stanley, W5FWE, of Sierra Vista, Arizona; James and Cindy Rogers, WA4AQU and KR4LS respectively, of Fayetteville, North Carolina; Robert Sutton, N7UZY, of Fort Huachuca, Arizona and David Reynolds, KB7MWA, of Parma, Idaho. Many of those listed are retired military officers.

• ARES County Emergency Coordinator Fred Stone, W8LLY, and Mary Jo Parker, KB8G, of the National Weather Service, were among those mentioned in an article in the *Dayton Daily News* covering volunteer efforts at storm spotting. Naturally ham radio plays a key role in Dayton (and elsewhere in the Midwest). Among the topics discussed were SKYWARN and other weather related emergency communications activities that are so vital to the communities in this tornado-prone area. The article notes that there are about 100 weather spotters in the Green County area!

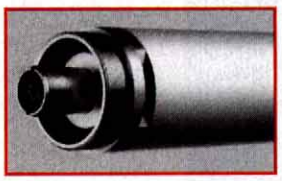
DIAMOND ANTENNAS

The Standard By Which All Others Are Judged.

Acclaimed as the technological leader in single & multiband antennas

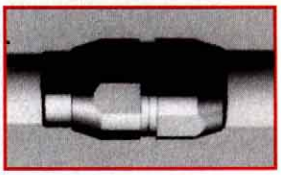
• Wide-band Performance • Factory Adjusted–No Tuning Required • Highest Gain
• UPS Shippable • High Wind Rating • Fiberglass Radome • DC Grounded • Stainless Hardware

X500HA (UHF-Conn.)
X500HNA (Type-N Conn.)
Ruggedized Base/Repeater Antenna



COAX CONNECTION AT BASE END

HEAVY DUTY BASE/ RADIAL ASSEMBLY



STRONG JOINT COUPLINGS

X50NA

The X50NA is an excellent choice where ruggedness is required in a medium–gain, dual-band, base/repeater application.

Features

- Wide frequency bandwidth
- Heavy duty fiberglass radome
- Stainless steel mounting hardware and radials
- Type–N Cable connection
- Compact size for easy mounting/ installation

Specifications:

Freq.: 2m: 144–148MHz
70cm: 440-450MHz
Power: 200 watts
Wind Rating: 135 MPH (no ice)
Height: 5.6 feet

X500HNA

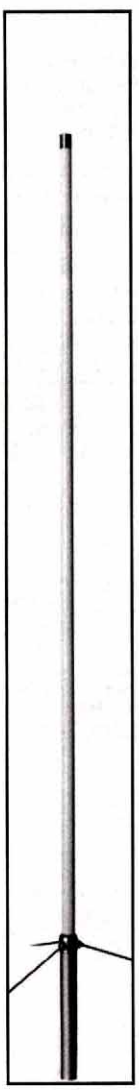
Diamond Antenna's best base station repeater antenna. Designed for strength and performance, the X500HNA is pretuned to achieve maximum gain in both the 2m and 70cm amateur bands.

Features

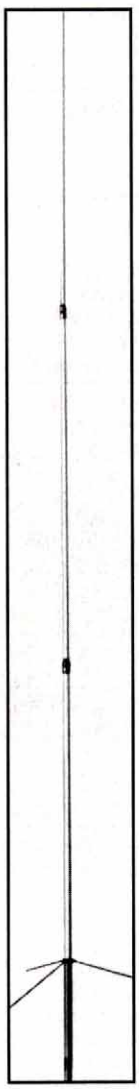
- Heavy duty fiberglass radome
- Overlapping outer shells for added strength
- Stainless steel mounting hardware and radials
- Strong–waterproof joint couplings
- Type–N Cable connection
- Wide band performance

Specifications:

Freq.: 2m: 144–148MHz
70cm: 440-450MHz
Power: 200 watts
Wind Rating: 90 MPH (no ice)
Height: 17.8 feet



X50NA



X500HNA

DIAMOND Mono-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
CP22E [1]	144	200	UHF	9.0	90
DPGH62 [1,6]	50	200	UHF	21.0	78
F22A	144	200	UHF	10.5	112
F23A	144	200	UHF	15.0	90
F718A [2]	440	250	N	15.0	90

DIAMOND Dual-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
X50A	144/440	200	UHF	5.6	135
X50NA	144/440	200	N	5.6	135
X200A	144/440	200	UHF	8.3	112
X510NA [3]	144/440	200	N	17.2	90
X510MA	144/440	200	UHF	17.2	90
X500HNA	144/440	200	N	17.8	90+
X700HNA	144/440	200	N	24.0	90
X2200A	144/222	150	UHF	11.5	112
U200	440/1240	100	N	5.9	135

DIAMOND Tri-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
U5000A	144/440/1240	100	N	5.9	135
V2000A [4,6]	52/144/440	150	UHF	8.3	110
X3200A [5]	146/222/440	100/200	UHF	10.5	112
X6000A	144/440/1240	100/60	N	10.5	112

1 Heavy duty aluminum construction.
2 F-718A: 440-450MHz., F718L: 420-430MHz.
3 X510NJ: 144-147/430-440MHz.
4 1/4λ. rated in dBi. Most requirement: 1.4"-2.4".
5 2m: 146-148; 100 watts
6 52-54MHz. only; DPGH62 adjustable from 50-54MHz.

BAND: 144=144-148MHz., 222=222-225MHz., 420=420-430MHz.,430=430-440MHz., 440=440 450MHz., 1240=1240-1300MHz.

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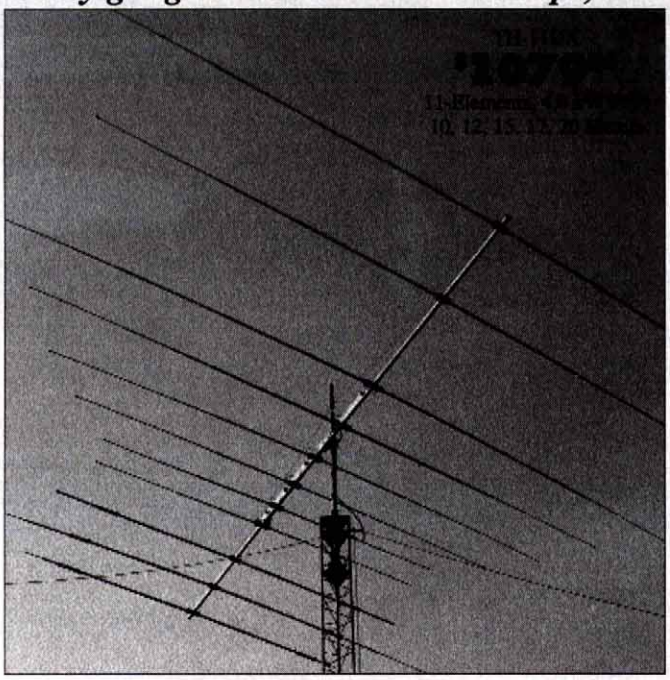
. . . are stronger, lighter, have less wind surface and last years longer. Why? Hy-Gain uses durable tooled components -- massive boom-to-mast bracket, heavy gauge element-to-boom clamps, thick-wall swaged tubing -- virtually no failures!



TH-11DX, $1079.95. 11-element, 4.0 kW PEP, 10,12,15,17,20M

The choice of top DXers.

With 11-elements, excellent gain and 5-bands, the super rugged TH-11DX is *the "Big Daddy" of all HF beams!*

Handles 2000 Watts continuous, 4000 Watts PEP.

Every part is selected for durability and ruggedness for years of trouble-free service.

Features a low loss log-periodic driven array on all bands with monoband reflectors, BN-4000 high power balun, corrosion resistant wire boom support, hot dipped galvanized and stainless steel parts.

Stainless steel hardware and clamps are used on all electrical connections.

TH-7DX, $819.95. 7-element, 1.5 kW PEP, 10,15,20 Meters

7-Elements gives you the *highest average gain* of any Hy-Gain tri-bander!

Dual driven for broadband operation without compromising gain. SWR less than 2:1 on *all* bands.

Uniquely combining monoband and trapped parasitic elements give you an excellent F/B ratio.

Includes *Hy-Gain's* diecast aluminum, rugged boom-to-mast clamp, heavy gauge element-to-boom brackets, BN-86 balun. For high power, upgrade to BN-4000.

TH-5MK2, $699.95. 5-element, 1.5 kW PEP, 10,15,20 Meters

The broadband *five element* TH5-MK2 gives you outstanding gain.

Separate air dielectric *Hy-Q* traps let you adjust for maximum F/B ratio on each band.

Also standard is *Hy-Gain's* exclusive *BetaMATCH*™, stainless steel hardware and compression clamps and BN-86 balun.

TH-3MK4, $439.95. 3-element, 1.5 kW PEP, 10,15,20 Meters

The super popular TH-3MK4 gives you the *most gain for your money* in a full-power, full-size durable Hy-Gain tri-bander!

You get an impressive average gain and a whopping average front-to-back ratio. Handles a full 1500 Watts PEP. 95 MPH wind survival.

Fits on average size lot with room to spare -- turning radius is just 15.3 feet. Four piece boom is ideal for DXpeditions. Rotates with CD-45II or HAM-IV rotator.

Features *Hy-Gain BetaMatch*™ for DC ground, full power *Hy-Q*™ traps, rugged boom-to-mast bracket and mounts on standard 2"O.D. mast. Stainless steel hardware. BN-86 balun recommended.

TH-2MK3, $339.95. 2-element, 1.5 kW PEP, 10,15,20 Meters

The 2-element TH-2MK3 is Hy-Gain's *most economical* full power (1.5kW PEP) full size tri-bander.

For just $339.95 you can greatly increase your effective radiated power and hear far better!

Ruggedly constructed, top-performing, compact 6 foot boom, tight 14.3 foot turning radius. Installs almost anywhere. Rotate with CD-45II or HAM-IV. BN-86 balun recommened.

EXP-14, $549.95. 4-element, 1.5 kW PEP, 10,15,20 Meters

Revolutionary 4-element compact tri-bander *lets you add 40 or 30 Meters!* Has 14 foot boom and tight 17.25 feet turning radius. Fits on roof tri-pod, mast or medium duty tower.

Hy-Gain's *patented* broadbanding *Para Sleeve* gives you less than 2:1 VSWR. 1.5kW PEP.

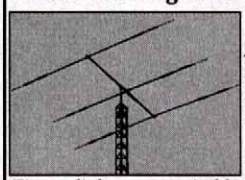
BetaMATCH™ provides DC ground to eliminate static. Includes BN-86 balun. Easily assembled.

***Truly** competitive against giant tri-banders at half the cost!*

QK-710, $169.95. 30/40 Meter option kit for EXP-14.

Compact 3-element 10, 15, 20 Meter Tri-Bander

For limited space . . . Installs anywhere . . . 14.75 ft turning radius . . . weighs 21 lbs . . . Rotate with CD-45II, HAM-IV



Fits on light tower, suitable guyed TV pole, roof tri-pod

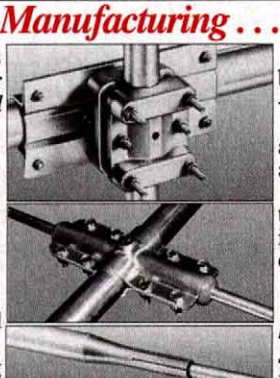
TH-3JRS, $329.95. Hy-Gain's *most popular* 3-element 10, 15, 20 Meter tri-bander fits on most lots! Same top performance as the full power TH3MK4 in a compact 600 watt PEP design.

Excellent gain and F/B ratio let *you* compete with the "big guns".

Tooled manufacturing gives you *Hy-Gain* durability with 80 MPH wind survival.

Model No.	No. of elements	avg Gain dBd	avg F/B dB	MaxPwr watts PEP	Bands Covered	Wind sq.ft. area	Wind (mph) Survival	Boom (feet)	Longest Elem. (ft)	Turning radius(ft)	Weight (lbs.)	Mast dia O.D.(in.)	Recom. Rotator	Retail Price
TH-11DX	11	*For Gain and F/B ratio--See...*		4000	10,12,15,17,20	12.5	100	24	37	22	88	1.9-2.5	T2X	$1079.95
TH-7DX	**7**			**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$819.95**
TH-5MK2	5	• www.hy-gain.com		1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$699.95
TH-3MK4	**3**	• Hy-Gain catalog		**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$439.95**
TH-3JRS	3	• Call toll-free		600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$329.95
TH-2MK3	**2**			**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$339.95**
EXP-14	4	800-973-6572		1500	10,15,20 opt. 30/40	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$549.95

Tooled Manufacturing . . . Highest Quality Materials



1. Hy-Gain's famous super strong *tooled* die cast *Boom-to-Mast Clamp*

2. *Tooled* *Boom-to-Element Clamp*

3. Thick-wall *swaged* aluminum tubing

***Tooled** manufacturing* is the difference between Hy-Gain antennas and the others -- they just don't have it (it's expensive!).

Die-cast aluminum boom-to-mast bracket and element-to-boom compression clamps are made with specially *tooled* machinery.

Hy-Gain antennas feature *tooled* swaged tubing that is easily and securedly clamped in place. All tubing is deburred and cleaned for smooth and easy assembly.

Durable precision injection molded parts.

***Hy-Gain** antennas are stronger, lighter, have less wind surface area, better wind survival, need no adjustments, look professional and last years longer.*

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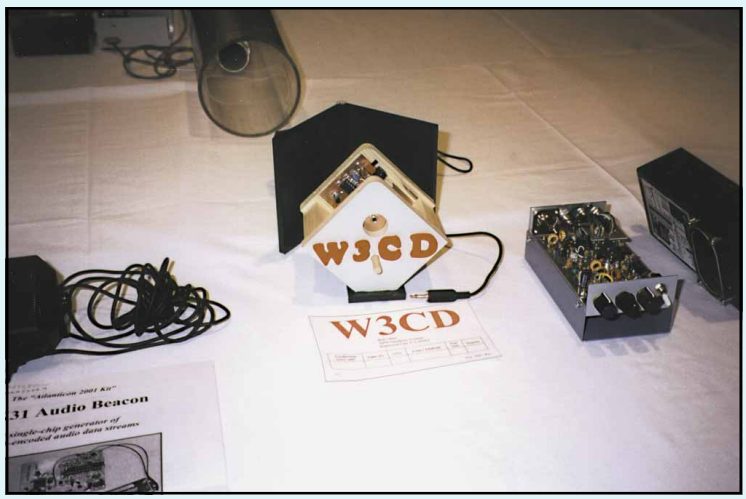
http://www.hy-gain.com

There has to be a vertical antenna around here *somewhere.* Bill Glenn, AA4BQ, lives in an antenna-restricted neighborhood, so he has to resort to camouflage to get on the air. His ingeniously disguised Hustler 4BTV vertical antenna looks like nothing more than a support for a birdhouse. Believe it or not, the house has attracted Purple Martin residents who don't seem to mind the RF!

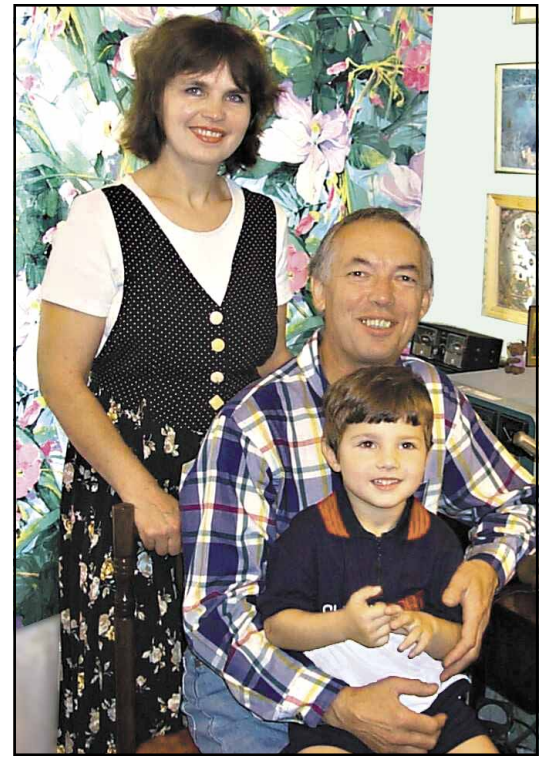
Hamming in Haifa. Ilan Sadeh, 4Z4UN/G0UUT, is familiar to amateurs looking for contacts with Israel. Ilan has his choice of several different transceivers that he uses with his Titanex log-periodic beam antenna.

More than 1000 visitors toured the National Weather Service facility in Peachtree, Georgia last February to get a glimpse of the SKYWARN program in general and Amateur Radio in particular. Brian Haren, KC5YNP (bottom), introduces his group to the newly refurbished NWS station WX4PTC. Amateur Radio's next generation gets a taste of 40 meters from Wade Massengill, KU4OJ (top).

Amateurs showed up by the thousands last spring for the Baltimore Hamboree/ARRL Maryland State Convention. (Right): The ARRL booth crew attracted a celebrity lineup including (left to right) ARRL Vice President Kay Craigie, WT3P, ARRL Delaware Section Manager Randall Carlson, WB0JJX, ARRL Honorary Vice President Hugh Turnbull, W3ABC, ARRL Vice President John Kanode, N4MM, and Atlantic Division Vice Director Bill Edgar, N3LLR.

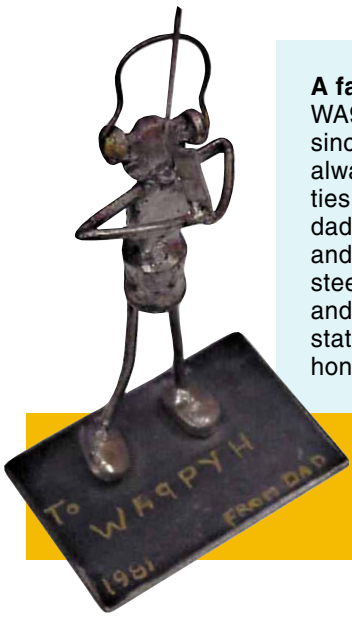


Atlanticon 2001! Low-power (QRP) enthusiasts gathered in Timonium, Maryland March 30 and 31 to share experiences and show off their latest creations. There was a PSK31 "Warbler" beacon competition (middle photo) that included entries such as W3CD's Warbler "birdhouse" (bottom). For more information, see "QRP Power" in last month's *QST*.



Were you one of the lucky hams who worked Chuck, 3Y0C, on Bouvet Island this year? If so, you may recognize the call sign UA3DEA. It belongs to Valery Karklit, who lives with his family in Sergiev-Posad, Russia. Valery was one of several amateurs who helped stations navigate the 3Y0C pileups.

In your face! Dan Calzaretta, NX9C, is a Tae Kwon Do black belt in Walla Walla, Washington. "I would like to see more amateurs taking an active interest in exercise and the martial arts. Discipline and respect are part of the philosophy of Tae Kwon Do, something we can all use in Amateur Radio!"



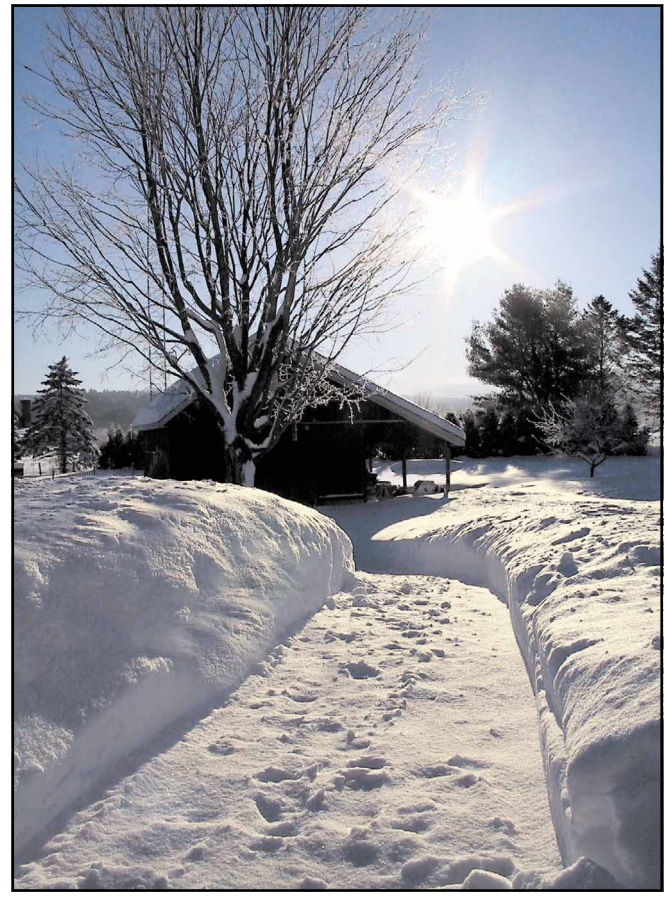
A father's gift. Jim Kocsis, WA9PYH, has been a ham since 1964, and his father has always supported Jim's activities. Twenty years ago Jim's dad picked up a welding torch and crafted this "award" from steel punchouts, small plates and thin brass rods. The little statue has occupied a place of honor at WA9PYH ever since.

Surprise! Participants at the Pikes Peak (Colorado) District Amateur Radio Emergency Service annual SKYWARN training were caught off guard when Donna Fair, director of the City of Colorado Springs Office of Emergency Management, presented an award to the group. The inscription on the award reads: "For outstanding dedication and service to the citizens of Colorado Springs." Accepting the award from Ms Fair are Pikes Peak ARES AEC Mike Proctor, KB0IAP (left) and Emergency Coordinator Wes Wilson, K0HBZ.

An eatery to call our own! If you find yourself with an appetite near Fraser, Michigan, do what Dick Arnold, K8RJA, did and swing into the "Ham Café!"

Calling All Messy Shacks!

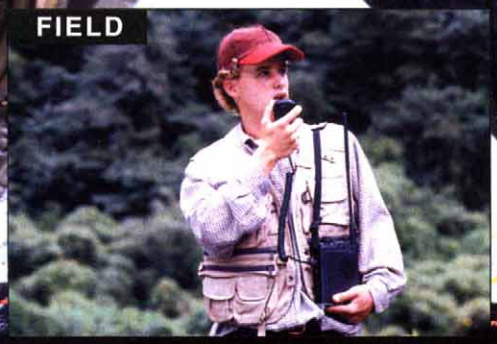
We want to see the worst of the worst—the stations that would make any self-respecting amateur shriek in horror. If your spouse has declared your shack off limits to family and neighbors, if the Environmental Protection Agency has qualified your station for Superfund clean-up status, if even the cockroaches are fleeing the room, we want to hear from you. Send a color photo or electronic image (high resolution—300 dpi at 4 × 5 inches, minimum) by **July 15** and we may use it in a future issue. Mail photos to: Joel Kleinman, ARRL, 225 Main St, Newington, CT 06111 or e-mail **jkleinman@arrl.org**.

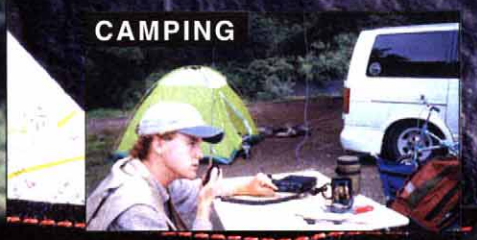


If you're already complaining about the heat, here is a reminder of last winter. The sun provides only meager warmth for this scene at the home of Craig, W1ZN and Susan, N1NZN, Kolk in Williston, Vermont. (Look closely and you can see their tower behind the barren, ice-covered tree.)

The Ultimate Backpacker!

Ham Radio in the Great Outdoors: It's the Best with Yaesu's FT-817!





Actual Size

Bring Ham Radio along on your next hiking, camping, or business trip with Yaesu's amazing new FT-817 Multimode HF/VHF/UHF Portable Transceiver!

- **ULTRA COMPACT:** Measuring just 5.3"x 1.5"x 6.5" WHD (135 x 38 x 165 mm) and weighing about 2 1/2 pounds (1.17 kg, including the supplied antenna and alkaline cells), the FT-817 is small and light enough to take along wherever you're going.
- **WIDE FREQUENCY COVERAGE:** 160-10 meters on HF, plus the 50, 144, and 430 MHz Amateur bands. Plus FM Broadcast, AM Aircraft, and Public Safety receiver coverage.
- **MULTIMODE DESIGN:** Ready for action on SSB, CW, AM, FM, FM-Wide (Rx), 1200/9600 bps Packet, and Digital, including dedicated USB and LSB PSK-31 configurations.
- **5 WATTS POWER OUTPUT:** Using a new-technology all-band MOS FET power amplifier, the FT-817 provides 5 Watts of power output when using a 13.8 Volt DC source. When using Alkaline batteries or the optional FNB-72 Ni-Cd Battery Pack, power is automatically set to 2.5 Watts;via Menu, this can be changed to 0.5 Watt, 1 Watt, or up to 5 Watts.
- **WIDE CHOICE OF POWER SOURCES:** The FT-817 is equipped with an alkaline "AA" cell battery case, and a 13.8 volt DC cable is also supplied. Available as an option is the FNB-72 Ni-Cd Battery Pack (9.6 V, 1000 mAh), which can be recharged using a 13.8 Volt power supply while the radio is being operated.
- **TWO ANTENNA PORTS:** A "BNC" connector is provided on the front panel, and a type "M" connector on the rear panel, with Menu selection of which connector will be assigned for operation on HF, 50 MHz, 144 MHz, and 430 MHz.
- **OPTIONAL COLLINS® MECHANICAL FILTERS:** An optional filter slot is provided, accommodating either the YF-122S (2.3 kHz) 10-pole SSB filter or the YF-122C(500 Hz) 7-pole CW filter. You get "base station" performance even from a mountain top.
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I. Interlocked Digital Bandwidth Tracking System (IDBT)

The IDBT feature greatly simplifies SSB operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system accounts for the settings of the IF WIDTH and SHIFT controls, and automatically sets a DSP bandwidth which matches the analog IF bandwidth.

IDBT: A Breakthrough in Selectivity!

II. Variable RF Front-End Filter (VRF)

Protecting the MARK-V's receiver components from strong out-of-band signals, the VRF system acts as a high-Q "Preselector," located between the antenna and the main bandpass filter networks, providing additional RF selectivity on the 160-20 meter Amateur bands for multi-operator contest teams, DX-peditions, or for operation near MW/SW broadcast stations.

VRF Features Large, High-Q Coils and High-Quality Relays

VRF Typical Bandpass Response (3.5 MHz)

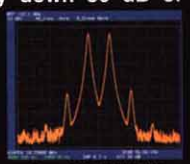
III. 200 Watts of Transmitter Power Output

Utilizing two Philips® BLF147 Power MOSFETs in a 30-Volt, push-pull configuration, the MARK-V's transmitter puts out up to 200 Watts of clean output power, thanks to the conservative design of the PA section.

T-Configuration Heat Sink

IV. Class-A SSB Operation

Exclusively available on the MARK-V FT-1000MP, a press of a front-panel button engages Class-A SSB operation of the transmitter, at a power output level of 75 Watts. Class-A operation produces incredibly clean signal quality, with 3rd-order IMD typically suppressed 50 dB or more, and 5th- and higher-order products typically down 80 dB or more!



Class A 75 W PEP IMD

V. Multi-Function Shuttle Jog Tuning/ Control Ring

The immensely-popular Shuttle Jog tuning ring, which is concentric with the Main Tuning Knob, has a new look in the MARK-V: it now includes the activation switches for the VRF (left side) and IDBT (right side) features, so you don't have to move your hand position to activate these important circuits during contest or pile-up situations!

Access VRF and IDBT Features via Shuttle Jog Dial

Features

■Frequency Coverage: (RX) 100 kHz–30 MHz; (TX)160–10 m Amateur Bands ■Dual In-band Receive w/Separate "S" Meters ■Ten Pole Collins® Mechanical Filter Built-in ■RX DSP Noise Reduction and CW Peaking Filter ■High-speed Automatic Antenna Tuner ■Two TX/RX Antenna Jacks plus RX-only Jack ■TX Microphone Equalizer ■RF Speech Processor ■Direct Digital Synthesis ■CW Spot and Two Key Jacks ■Two Headphone Jacks (1/4" and 3.5 mm) ■Low-Level Transverter RF Drive Jack ■Separate FP-29 Power Supply (30 V/13.8 V DC Output)

Photo shows optional MD-100A8X Deluxe Desk Microphone

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MARK-V FT-1000MP

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Specifications

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Power Output:	200 Watts PEP
Spurious Emissions:	At least 60 dB down
Power Source:	DC 30 V and 13.8 V (supplied by FP-29 Power Supply of MARK-V)
Dimensions:	9.6" x 5.4" x 13" WHD (243.5 x 136.5 x 331 mm)

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RETURNING TO AMATEUR RADIO

♦ I was born in 1952, into a family of hams. My dad, Julien Meyer, who passed away a couple of years ago, was W0DYC and my brother, Gary, still living in the Minneapolis area, is W0DYD. They were both licensed the year I was born. I got my Novice license at the age of nine (WN0DMQ) and was very active for quite a while with my homebrew 30-W transmitter on 80 and 40 and my Hallicrafters S-38E receiver. Some dads teach their kids how to fish; mine taught me how to build transmitters! When the Novice license lapsed, so did my interest for a couple of years, but I did return to the air as a General operator (WA0KNP) and got fired up again during my teen years.

The WRL Globe Chief, a VF-1 VFO and an NC-188 saw a lot of action working all states and a little DX. My dad bought an NC-300 and an Apache, which I used more than he did. I didn't do much with ham radio during my college years. I got married, graduated, started working full-time and raising a family. Ham radio took a backseat. There was a slight revival in my interest in the early 80s. In fact, my son got a Novice license at age 10 with my encouragement, but never really developed a desire to do much with it. I went into total ham radio retirement soon thereafter.

In 2001 I made a full-blown comeback...and, boy, what a whole new world I have entered!

I sold my old Globe Chief and a few other pieces of vintage equipment on eBay and made enough to buy a new ICOM IC-718 transceiver. After the radio arrived, I discovered that these newfangled rigs won't load into an antenna system unless the impedance is close to 50 Ω (the Globe Chief did!). I had whipped up a 12-foot vertical with a piece of PVC pipe and 33 feet of wire helically wound onto it. I figured that should at least tune up on 40 meters, but there was no way the ICOM would have anything to do with it. I made another purchase …an MFJ 949E antenna tuner that finally bridged the impedance gap between the transceiver and the antenna. My old Heathkit keyer was a bit unwieldy and, since the '718 has a built in keyer, I went back to eBay and purchased a nearly new Bencher paddle. I was ready to go.

The first thing I was very happy to learn was that CW was not dead. In fact, I think there are more guys and gals on CW today than there were when I dropped out 15 years ago. I've made a few contacts on SSB, but my new logbook is filling up fast with CW QSOs.

I was also pleased to discover that radio design has come a long way from the old days. I can't believe the selectivity and sensitivity of the receiver in my new rig. I worked a guy in Arizona who was running QRP at $^1/_2$ W and, not long after that, worked a fellow in New Zealand who was pumping out 5 W. I am amazed at how easy it is to work the DX stations at the moment! Along with Russia, Poland, Germany, Hungary, Sweden and a bunch of other countries, I have racked up 31 states since my return to airwaves and I am having a ball.

My QSL cards arrived a few days ago and I've joined the ARRL again. It just goes to show that you really *can* teach an old dog new tricks. I look forward to making many new friends in the coming years.—*Maynard "Ray" Meyer, WA0KNP, Madison, Minnesota*

AN INTERFERENCE COMPLAINT RECORD?

♦ I believe my late father, W2CCK, may hold the record for gathering the most interference complaints in the shortest time.

The incident occurred in 1961 when we lived across the street from a Catholic church that was about to dedicate a new auditorium in their adjacent grade school. A large crowd was in attendance, including the local bishop was well as monsignors from all over the archdiocese.

My dad would go to breakfast every Sunday morning with two or three other amateurs. On that fateful morning, however, about 15 cars were illegally parked in our yard and driveway. Dad decided to reach his friends on 10 meters with his 100-W AM transceiver.

Unbeknownst to my father, the electrician who wired the church and the school used 18-gauge zip cord to connect the public address systems. One wire was more than 100 feet in length and crossed from one building to the other at a height of about 25 feet. As you'd expect, the wire acted as an antenna, picking up dad's transmissions and relaying them throughout the church and school at earsplitting volume. Within one hour the FCC office in our area received a total of 290 telephone calls from angry parishioners, priests, teachers, neighbors—and one bishop.

An FCC engineer visited a few days later and, after a few tests, declared my father's station to be perfectly clean. After some further investigation, the engineer discovered the real cause of the problem. With a bit of shielding and bypassing, the interference was cured. The church rescheduled the dedication and my father continued to enjoy Amateur Radio.—*Bill Fisher, K2GVC, Bloomfield, New Jersey*

WHOSE BIG ANTENNA?

♦ I was standing in my front yard talking with my neighbor, Brian, N8RPA. We were discussing the upcoming Scouting Jamboree On The Air event when a young man of about elementary school age approached us on his bicycle. He stopped and asked, "What are all those antennas?" I looked up at the small antenna collection on my roof and answered, "Those are Amateur Radio antennas." Then the boy pointed three doors down at Brian's house and shouted, "No, what are those really big antennas down there?" Brian stood up straight, puffed up his chest and answered proudly, "Those are *my* Amateur Radio antennas!" The kid replied, "Well, they are messing up our TV." He got back on his bike and left before Brian could say another word.—*Roy W. Hadden, Jr, KB8VJF, Macedonia, Ohio*

ACCESS TO 10 METERS FOR CODELESS TECHNICIANS

♦ I am a licensed amateur operator and an ARRL member. I became a ham one year ago, at age 57. It was with great interest that I read the results of the "How's DX?" survey in the April 2001 *QST*.

On review of the survey I find that I, like others over the age of 50, am in the majority of licensed operators. I also notice the 51-80 year old operators are in the greater percentage while those ages 30 and younger are in declining numbers. These statistics demonstrate that changes are needed to keep the hobby alive.

I hold a Technician license. Since I have become licensed, it has become obvious to me that the world above 50 MHz is primarily a wasteland. Even 6 meters is a virtually dead band, despite the fact that its "magic" qualities have been promoted to codeless Technicians *ad*

nauseum. In contrast, 10 meters has much more activity, and is certainly more attractive from an operational standpoint.

The Technician ticket is supposed to be entry level. If that is the case, why not make it possible for Technicians to more fully experience Amateur Radio by giving them complete access to 10 meters without having to take the code test?

Limited access to even the top end of the HF spectrum limits the purpose of the Technician license. Unless they pass a Morse code test, Technicians are confined mostly to bands that are all but inactive. With total access to 10 meters, Technicians would have an even greater incentive to learn Morse code because they would receive a taste of what HF can offer if they upgrade to their General or Amateur Extra tickets.

I know that someday the code barrier will vanish completely. When that day comes, the road to General and beyond will be clearer for all of us. But until then, at least open 10 meters to the codeless Technicians so that they can appreciate the goal they are working toward. *—Richard N. Daring, KB3EUR, Orangeville, Pennsylvania*

[Editor's note: ITU regulations require that administrations limit access to bands below 30 MHz to amateurs who have demonstrated Morse ability.]

APRIL FOOL!

♦ These are truly wondrous times in which we live. Imagine, a laser generated antenna! This article was fascinating reading in the April *QST* ("Laser Generated Antennas" by Frank Musso, WA5QHV).

What is even more amazing is that this research has run parallel to other equally exciting new antenna technologies. One of the most promising fledgling design concepts is the stacked compost array. Taking advantage of the unique molecular structure of this natural bovine byproduct, hams worldwide will soon replace their huge towers and arrays with large piles of this sought-after material. The neighbors will be thrilled.

I can't wait to see what new advances to our state-of-the art are in store for us next April.—*Gene Davies, AA6NP, Los Angeles, California*

♦ I was very excited to read about the new laser generated antennas in the April *QST*. This is just what I need to add to my ham station—right alongside my isotropic antenna (20-dB gain, mounted at 200 feet), and my completely lossless feed lines. Happy April Fools Day!—*Dave Webb, KB8PNC, Huber Heights, Ohio*

ENCOURAGE CW TECHNICIANS

♦ I think focussing on the Technician ticket as the entry-license-of-choice is a mistake for younger folks interested in the hobby. It's fine for adults who have developed an interest in satellite and space communications, microwave propagation, and all the other various and wonderful opportunities that await on VHF and up. Adults are far more likely to have the technical expertise and financial resources to devote to those pursuits.

Using the Technician license as the point of entry for youth, however, is a mistake. As an ARRL VE, I've seen far too many excited adolescents turn their backs on Amateur Radio within a few months of earning their licenses.

Why? First, the younger folks have a (seemingly) natural inhibition about chatting with adults they don't know. Second, even in a large metropolitan area, the supply of exciting new contacts is severely limited if their only access to the airwaves is via the local repeaters.

For less than the cost of a 2-meter handheld transceiver, young hams who have earned the Technician "with Morse code" license have the whole world literally at their fingertips, as well as the opportunity to perfect valuable new skills. A QRP kit or an older commercial HF transceiver and a dipole puts them on the world stage!

Also, I must disagree with a lot of what I've seen and heard about CW not holding interest for younger folks. Try this test. Set up a booth in a campground, shopping mall, or other public place with lots of pedestrian traffic. Have one SSB station, one digital mode-of-your-choice station and one CW station. Dollars to donuts the younger folks will gravitate to the CW station. After all, the guy on SSB is doing what they already do on the phone and the Internet. The fellow on digital is doing something similar to what they already do on the Internet, only slower. The guy on CW? Well, now, *that's* cool! Our young people (at least, the ones we should be trying to attract) love to learn. They thrive on developing—and showing off—new skills.

For those and many other reasons, I strongly encourage individual Elmers, clubs, teachers, parents who are hams, the ARRL, and anyone else who'll listen to shift the focus to the Technician *with Morse code* license as the point of entry for younger recruits.

I have a suggestion for the experienced CW ops, too. If we want a new generation of CW enthusiasts to keep pounding the brass, we must seek out and answer those slow-speed CQs. I've resolved to answer every slow CQ I can find, and to make at least one careful sweep through the Technician HF segments during each operating session. Will you join me?—*Bob Rightsell, AE4FA, Columbia, South Carolina* QST

Name: ham radio, born January, 1968.

Why **ham radio** (magazine)? *The electronics and communications industry is moving forward at a tremendous clip, and so is amateur radio. Single sideband has largely replaced a-m, transistors are taking the place of vacuum tubes, and integrated circuits are finding their way into the ham workshop. The problem today, as it has always been, is to keep the amateur well informed.*—Editor Jim Fisk, W1DTY (SK), from the preview issue of *ham radio* magazine, February, 1968 (last issue published in June, 1990).

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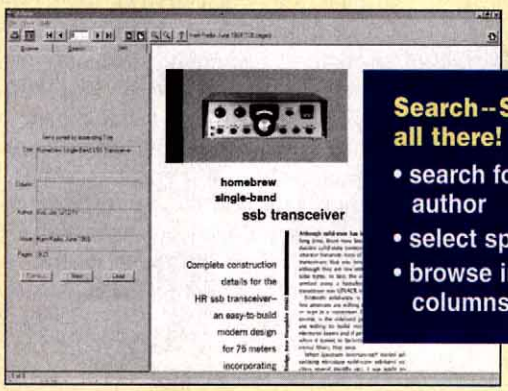

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By David Reid, PA3HBB

A Three Element Lightweight Monobander for 14 MHz

Not only is this portable antenna easy to build, it's light as a feather!

In preparation for the 2000 CQWW-CW contest for the PB6X Contest Group (www.qsl.net/pb6x), I started looking at my homemade 2-element 20-meter beam (see my Web site at www.qsl.net/pa3hbb for the article on this antenna). I decided that I needed more gain on 20 meters, along with a bit more front-to-back (F/B) ratio. But the beam had to be light and it should have the following qualities:

- easy to handle with one or possibly two people
- lightweight—but sturdy enough to handle the winter weather (always bad during a contest) and be built/taken down many times during a year
- reliable construction
- full size—to meet the F/B ratio and the forward gain required
- the ability to dismantle it easily for storage. I am not in a position to keep my antennas permanently erected because I live in a rented property.
- the ability to take the antenna into the field and on vacation.

Finding the Right Materials

With these goals in mind, I started looking into possible designs and materials to make the beam. Having designed and built a lot of beams in the past, I knew from experience that 3-element all-metal construction was possible. But to keep the elements from drooping too much and, mainly, to keep the weight down (and thus, the diameter/thickness/weight of the main boom), I ruled this option out at an early stage. I did explore the possibility of using metal elements, and performed some experiments; all of these proved that I was not going to meet all of my design criteria.

I had recently been experimenting with fiberglass fishing poles for making verticals, single-element delta loops and dipoles. So, I had a few left lying around the shack. Each of these was 6 meters long and extremely lightweight. "Perfect!" I said. "I have my elements. Now I just have to work out a way to mount them on a boom."

Again, experience held the solution. I opted for a piece of angle material made from aluminum, which is bolted to the main boom with two zinc-plated bolts at right angles to the boom. The zinc-plated bolts are important because if you use stainless steel, it will corrode the aluminum if you live in an environment where the air often carries a substantial salt content (near the ocean, for example).

I had done experiments with gain, SWR and front-to-back ratio on the 2-meter band a few years ago, so I dug out my notes and then scaled the dimensions to 20 meters.

But because I was planning to use wire for the elements (instead of 1/4-inch tubing), I knew the diameter-to-wavelength ratio of the elements was going to be higher than the 2-meter equivalent. This meant that my wire elements had to be longer than the scaled design. The question was, how much longer?

To solve this problem, I first constructed an exact model of just the driven element from the same material I had used in my original research on the 2-meter model. I then scaled this to 20 meters, but replaced the tubing with the #14 copper wire. I knew it would be too short — but I also knew that if I measured the resonant frequency of the 20-meter wire version I could calculate how much longer I needed to make the final driven element.

As the whole antenna design is scaled, I could calculate the percentage of the difference and apply this percentage to the other elements. The spacing between the elements was going to change so minimally that I decided not to alter these dimensions.

Now I had the dimensions for the three elements: reflector, driven element and director. The spacing was a direct scaling from the 2-meter model.

I calculated the weight and wind loading for the antenna and, to see if my calculations were in the ballpark, I compared them to some commercial monoband antennas. My results were very favorable. I am by no means a mathematician, so I always make sure that my calculations are in the same region as other antennas. Now to build the prototype…

Designing the Prototype

With the lightweight fishing rods as the elements, I decided the boom could be much lighter than a beam with all metal elements. The boom was calculated to be 16 feet, 3 inches long. I made it from three 6-foot, 6-inch lengths of 1-inch × 2-inch extruded aluminum channel stock. The three boom sections were overlapped by 20 inches and two zinc-plated bolts were used in each section to bolt (2-inch) sides together in an overlapping fashion. See Figure 1.

This made a strong boom that could

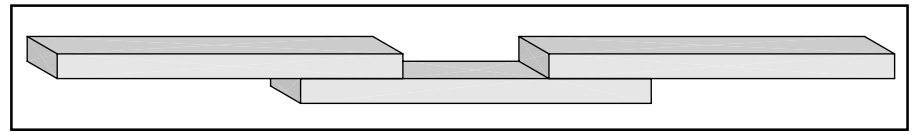
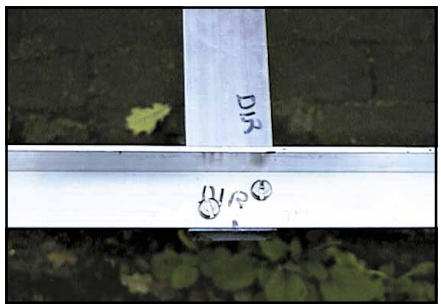


Figure 1—The boom sections.



An angle section bolted to the boom.

Bill of Materials

6—20-foot fishing rods. If you have difficulty locating suitable fishing rods, substitute six SD-20 antenna supports from WorldRadio, 2120 28th St, Sacramento, CA 95818; tel 916-457-3655. $19 each plus $5 shipping and handling.
3—aluminum rectangular box sections, 1 × 2 inches for the boom.
3—1.2 × 1.2-inch sections of angle material for the element brackets.
6—2-inch bolts for attaching the angle material to the boom.
4—3-inch bolts to hold the boom sections together.
4—4-inch bolts to attach the boom to the mast plates.
1—14 × 1/4-inch square printed circuit board for the boom-to-stub mast mounting plate.

be dismantled into its original three pieces whenever necessary. The correct position of the elements was measured and marked on the boom and the three 3-foot, 3-inch pieces of angle aluminum were bolted to the boom sections at the appropriate places. These element bracket angles are held in place with two zinc-plated bolts each. See Figure 2.

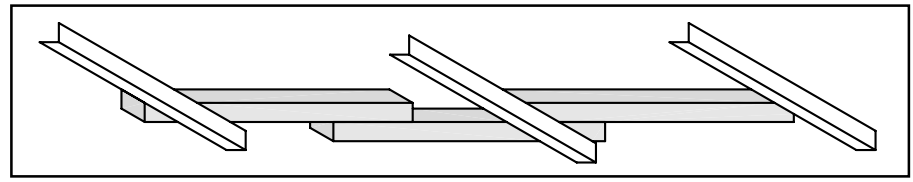


Figure 2—The boom and element brackets.

The fishing rods were strapped to the angle material using three removable/adjustable zip-wraps per fishing rod. Once the elements were strapped to the angles, it was possible to determine the center of gravity of the beam in the middle of the garden and mark this on the boom (more about this later).

A short piece of 2×2 lumber was used as a temporary stub mast mounting. This was bolted to the boom using four metal plates with bolts going all the way through the boom and stub. (This was eventually replaced by two triangles of thick printed circuit board material.)

I raised my homemade mast and rested it on the fence surrounding my tennis court and then climbed a ladder with the antenna in one hand —it really *is* light and easy to handle—because the elements can stay telescoped while I am attaching the beam to the rotator.

Having put the boom (with the telescoped elements) onto the rotator, I extended all of the fishing rods and friction-locked them in place. I extended the reflector first, then rotated the antenna through 180° and extended the director. Finally, I extended the driven-element rods.

The last step was to raise the mast to the vertical position. It all seemed too easy. No problems were encountered and there was no time when I felt unsafe or unsteady on the ladder.

These experiments proved that it was possible to build the prototype mechanically, and it even looked like a real antenna. I left the antenna up for a week to see if it would suffer in the weather. We had some high winds and a lot of rain, but the antenna still stayed up and I was pleased when I took it down and found that all the parts were in perfect condition. It looked like I had a mechanical structure that would stand up for a lot more than just one weekend of heavy contesting.

The next step was to cut the wire elements, attach them to the fishing rods and put the whole antenna back up in the sky to see how it performs. Using the lengths I calculated earlier, I cut the #14 solid copper wire, marked the center point with tape and threaded it through the hoops on the fishing rods. I then taped the ends of the wire to the fishing rod so that tape at the center was sitting between the two rods at the centerline of the boom. Additionally, I secured the wire ends to each fishing rod with an extra zip-wrap fastener just to be sure they would stay in place.

The antenna elements secured to the angle sections.

In the prototype, the driven element was connected to the 50-Ω coaxial feed line through a 1:1 homemade balun, which allowed me to test the resonance of the beam and determine the type of matching unit I required for the final antenna. A balun is generally necessary if you want your beam to have a directional pattern that is not distorted by the unbalanced feed line. However, it will also work without a balun. My preference is to use a balun on balanced antennas, but not on simple dipoles (or low beams such as my 2-element 80-meter wire beam, which is only 10 meters (33 feet) above the ground).

I assembled the beam again and put it back up on the mast. I connected my MFJ-259B antenna analyzer to the coaxial cable and the resonance was measured at 14.030 MHz and the impedance was 34 Ω. This was satisfactory. I could just use a 1:1 balun and still have an SWR of only 1.47:1. The 250-Hz 2:1 SWR bandwidth was about what I expected and it would certainly be sufficient for my needs as a CW-only antenna.

My first balun would not handle 400 W output, so a new one had to be built and tested. A 1:1.33 unun followed by a 1:1 balun would provide better match and Jerry Sevick, W2FMI, has some interesting designs in his book *Building and Using Baluns and Ununs*. But, because I am looking for a simple, lightweight design, I opted for the higher SWR and a simple 1:1 balun; my amplifier will easily load into 1.47:1.

With my first balun still on the antenna, I decided to check out the properties of the beam by listening on 20 meters to stations in different parts of the world

Temporary plates for the boom-to-sub mast.

The author holds the finished antenna.

using my Elecraft K2 QRP rig and rotating the beam to record the pattern, directivity and front-to-back ratio. Well, it acted like a beam; the front-to-back ratio was consistently over 20 dB. I compared the results against my 2-element 20-meter antenna, which has a front-to-back of approximately 12 dB and the 3 element was always superior.

While the K2 was connected to the antenna, I could not resist calling CQ with the beam pointing Stateside. After a couple of calls I raised a few stations on the East Coast (while only running 3 W into the beam) and was getting 559 to 579 reports.

As far as forward gain goes, the antenna seemed to be quite a bit better than my 2-element antenna. Certainly I received better reports on the 3 element in every case.

Building the Antenna Yourself

If you'd like to duplicate my design, you'll be pleased to know that it is a simple matter of drilling the holes in the correct places and bolting the boom sections together, the angle sections to the boom and the mast mounting plates in place. The last step is to clamp the fishing poles onto the angle sections and secure the antenna element wires to the poles. If you have never built a Yagi antenna before, you should know that the driven element is essentially a dipole, so the wire must be cut into two equal halves and attached at the center to the feed line (in this case, to the two wires from the balun). See Figure 3.

The only tools required are a drill (with the right size of drill bits for the bolts), and an adjustable wrench to tighten the bolts. No cutting or bending or folding is required, making building the antenna easy even for less experienced amateurs. It also has another advantage when on vacation or in the field—only one tool is required for assembly (an adjustable wrench). The element dimensions are shown in Table 1. See the "Bill of Materials" sidebar for a list of the necessary parts. A drawing of the boom and element dimensions is available in Figure 4.

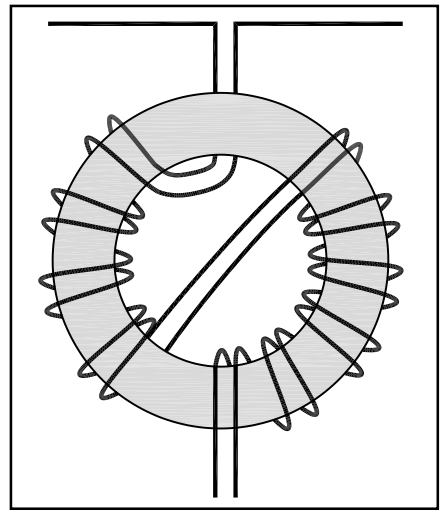


Figure 3—A diagram of the antenna balun.

Table 1
Element Dimensions

Note: All wire elements are composed of #14 solid copper wire.

Director	*Driven Element*	*Reflector*
31′, 6″	32′, 4″	35′, 10″

The fishing-pole supports for this antenna are a dielectric, so they actually lower the resonant frequency of the elements taped to them. There may be some variation in the exact dielectric properties of different brands of poles, so the antenna elements may need to be changed a bit. The director and reflector should not be very critical, so you can cut those to the lengths shown in Table 1. The driven element will be a bit more critical, so it may be necessary to add about 6 inches to the lengths shown and prune the length of the driven element until the antenna is resonant in your favorite part of the band. As designed, the SWR may be 2:1 at the point of best resonance.

The Balun

The 1-kW balun is made from a 2½-inch diameter ferrite toroid with a permeability of 40, wound with 10 bifilar turns of #12 copper wire (Figure 3). The wires are taped together first, then wound onto the core. The windings are crossed through the core at the 50% point (5 turns) to allow easy connection of the coax to one end and the driven element wires to the other. The whole balun is mounted in a suitable plastic box to keep it out of the weather.

The Spacing Between the Elements

The spacing for the elements is a direct scaling from my 2-meter model and it provides a reasonable front-to-back gain and forward gain as well as an acceptable SWR (2:1 or less) for the transmitter.

The angle section for the reflector is bolted to one end of the boom at 90° to the boom. The driven element is placed at the end of this section of boom, 6 feet, 6 inches from the reflector (on the second section of the boom). The director is placed at the far end of the boom on the third section.

Finding the Center of Gravity

The next step was to find the center of gravity of the completed antenna. The boom and angle mounting brackets were ready for the elements (fishing poles) to be temporarily

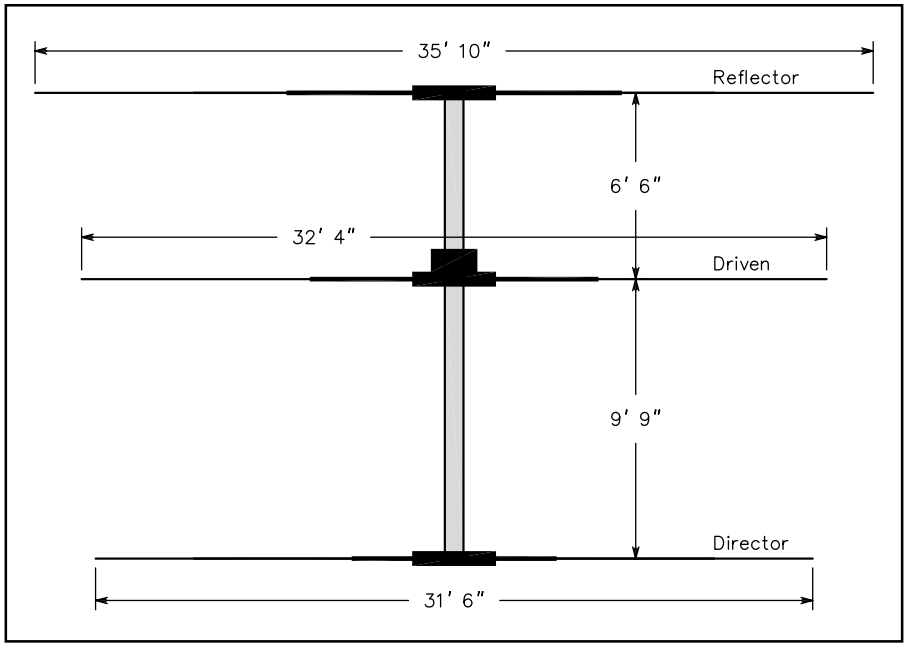


Figure 4—A drawing of the boom and element dimensions.

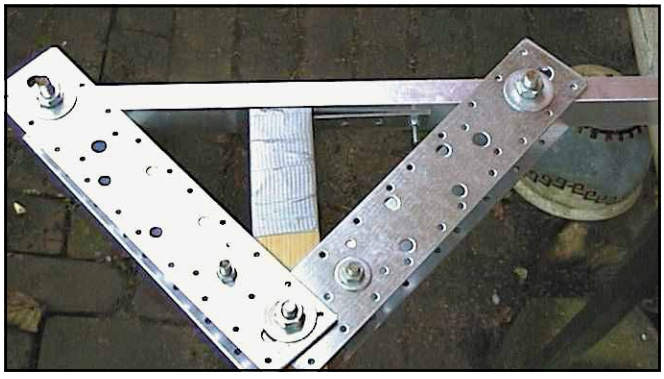


Figure 5—One approach to securing the boom to the mast.

strapped in place. The antenna was assembled in the garden and I just picked up the beam and, using one hand, just kept moving my hand back and forth until the beam was stable and horizontal. When I found this point, I marked it as the beam center of gravity—the point where I wanted to fit the boom-to-mast clamps.

Here you can see the wires on the elements themselves.

The Boom-to-Mast Clamp

There are several approaches you can use to secure the boom to the mast. One is shown in Figure 5. After several experiments with various materials, I wound up using plates made from printed circuit board material cut into triangles and bolted securely to the mast stub and the boom.

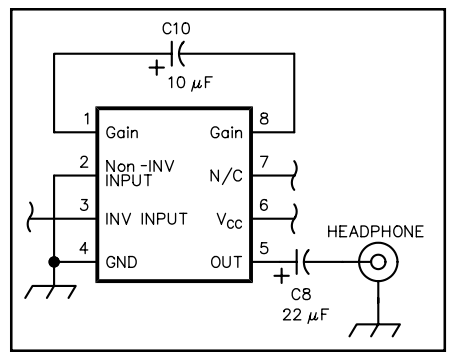
What Does it Weigh?

Traditionally, I weigh my antennas by putting the bathroom scales in the garden and, while holding the antenna, standing on the scales and recording the weight. Then I stand on the scales without the antenna and see the difference. With some quick subtraction I can determine the actual weight of the antenna. However, this method didn't work for this design—it was too light to measure the difference! So, I had to build a quick balance using a sawhorse and a long board, putting the beam on one end and weights on the other until it was stable and horizontal. According to my jury-rigged scale, the antenna only weighs 10 pounds!

Our thanks to Ed Hare, W1RFI, ARRL Laboratory Supervisor for his assistance in the preparation of this article. *You can contact the author at Leenderweg 46, 5591 JE Heeze, The Netherlands;* **pa3hbb@qsl.net**; **www.qsl.net/pa3hbb**.

FEEDBACK

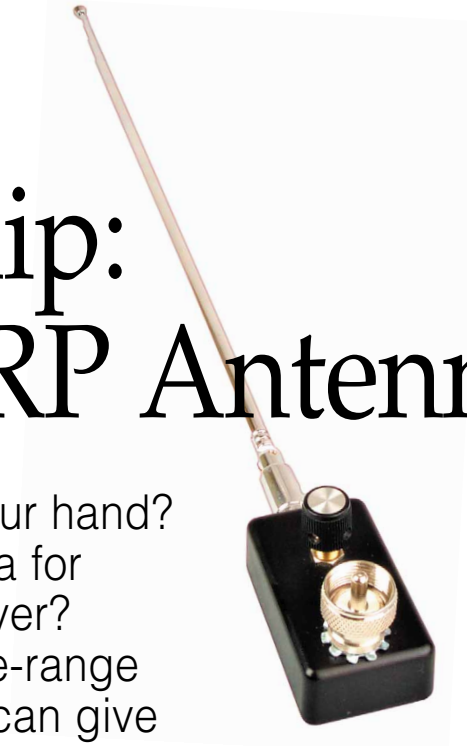
◊ In the June 2001 *QST* "Doctor is IN" column, the Doctor recommended a speaker switching arrangement for mobile operating (page 65). While this technique will work with most installations, some modern automobile radios use a bridge-amp audio output where neither speaker lead is at ground potential. In these radios there is 7 V dc on both speaker leads and grounding any speaker lead will shut down or destroy the audio output IC. If switching of the type illustrated in the column is used, *both* speaker leads must be switched and no path to ground should be allowed on the leads from the car audio system.



◊ In the May 2001 *QST* "QRP Power" column ("Rescaling the MRX-40 Receiver for 80 Meters"), the pinouts for U2, the LM380 IC, were not shown correctly. The correct pinouts/connections are shown here. In addition, the values for L1 and L2 should be in µH, not mH.

By Robert Victor, VA2ERY

The Miracle Whip: A Multiband QRP Antenna



Want to hold the world in the palm of your hand? Tired of packing a suitcase-size antenna for your hand-held, dc-to-daylight transceiver? The Miracle Whip, a self-contained wide-range antenna made from inexpensive parts, can give you the flexibility you need to be truly free—no ground required!

One of my favorite radio fantasies started with Napoleon Solo—the man from U.N.C.L.E. He'd be in a tight spot, say, under fire from a crack team of THRUSH nannies in miniskirts, and he'd reach into his pocket and pull out the world's niftiest radio. It was about the size of a pack of cigarettes and had a two-inch whip antenna. He'd call up Control—who could be anywhere in the world at that particular moment—and try to muster some help. Control, of course, would dish out a number of droll comments about Solo's regrettable tendency to get into any number of tight spots, whereupon Napoleon would dial up partner Illya Kuryakin, on the other side of the room, and ask him to shoot back. The nannies, twittering like squirrels in a dog pound at having their pillbox hats punctured, would retreat in disarray. End of episode.

The mini rig was a prop, of course, and I realized even then that such a radio could never work. Short of satellite support (which would come soon enough) or a new understanding of the universe (which may or may not come), a two-inch whip on a hand-held HF transceiver might get a signal across a room, but not around the world.

Since then, often during evenings spent at a campground picnic table, I continued to think about what it would be like to have such a handy radio. I often visualized a book-size, multi-band rig powered by internal batteries; something that would be practical for cycling, hiking or working skip from any nearby picnic table. It was easy to imagine the rig rendered in such a portable package, but I could never get the two-inch whip to work—even in my mind. I guess I couldn't set aside *all* the laws of physics. Agent Solo (or his heirs and assigns) would be forever doomed to throwing wires into trees.

Although nobody seemed to consult me, the radio of my daydreams appeared on its own. When I saw the first magazine ads for Yaesu's FT-817 low power (QRP) transceiver earlier this year, I was delirious—it was *exactly* the rig I'd been fantasizing about. I dug out my credit card, told my wife I was ordering an Ab-Rocker and called my buddy Angelo at Radioworld in Toronto ("…but Honey, we can't send it back, we'll lose money on the restocking charge…").

Rig in hand, the man from U.N.C.L.E. was *still* in my thoughts. He wanted *his* radio, or at least something like it. He wanted an antenna that plugged into the back of his (my) new '817 so he could easily brandish it when in desperate need, without having to find a tree, when there were *nannies*. I tried to explain about antennas, but he merely gave me that pained, condescending look usually reserved for conversations with Control.

What might actually work here? A telescoping whip perhaps, around 50 inches long, with some kind of loading system so the antenna could cover all the HF bands. I'd have to stay away from "interchangeable" coils (Solo wouldn't want the hassle), and I'd have to produce some kind of workable results. Efficiency might be measured in the single digits on some bands, yet DX *had* to be a possibility.

What I came up with is definitely fit for an U.N.C.L.E. operative. It's a 48-inch telescoping whip with a homebrew loading and mounting device. Physically, it's portable and practical, and looks *secret agent cool* on the Yaesu. I finished construction just as a contest weekend was starting, so I got to try it out under ideal conditions.

Although my QRP signal didn't burn out anyone's receiver, I'm pretty satisfied with the results. I spent about fours hours on HF during this particular contest and had scads of contacts on 10, many on 15 and 20, and a couple on 17—almost all overseas! I also worked four stations on 40 (within about 400 miles) and managed one contact with a local operator on 80 meters. The rig was sitting on my desk—indoors—and the whip was plugged into the back of the radio, which was ungrounded. That's definitely a worst-case scenario! Because I figured it would take a miracle for a rig-mounted antenna to work DX, I christened my creation the "Miracle Whip"!

In Theory

The heart of this design is in the loading system, which is made from readily available parts and costs about $30 for the whole works (less if you have the proverbial well-stocked junkbox). Here's the theory…

There are three ways (that I can think of) to load a length of wire on a particular frequency. The first is to make the wire a quarter of a wavelength long, which makes it resonant at the desired frequency. This works because the feed

point impedance of a quarter-wave wire (assuming you have a counterpoise) is about 50 Ω, which matches the coaxial output found on most rigs. Unfortunately, the shortest wavelength I'd be using was 10 meters, and a quarter of that is about eight feet, so this method wasn't an option.

The second way is to place a loading coil somewhere along the length of a wire that's shorter than a quarter wavelength at the desired frequency. You can place the coil at the base (base-loaded), somewhere in the middle (center-loaded) or at the top (end-loaded). Very simply, the loading coil makes up for the "missing" wire and forms a resonant circuit at the desired frequency.

How does it work? If you graphed the impedance of a quarter-wave antenna along its length, you'd see a continuous curve, with a low impedance at the feed end and high impedance at the far end. If you can imagine removing a section anywhere along the length of the antenna, you'd create a gap in that curve. The loading coil performs the impedance transformation required to bridge the impedance "gap" created by the missing section, allowing the use of a physically smaller (shorter) antenna.

A third method of achieving an impedance transformation is by using a transformer instead of a coil. A transformer is, after all, a device for matching different impedances! The hitch with this technique is that a transformer, unlike a loading coil, isn't a series device; it needs to be fed in parallel and usually "against" the antenna ground. Because of this factor, transformers must be used at the feed point.

Because Napoleon wouldn't like to swap loading coils to change bands, method three would have to be used. I figured an adjustable loading device would have to be placed at the base of the antenna, anyway, so a transformer seemed like a good possibility.

The Autotransformer

Most of us are familiar with the broadband transmission-line transformers often used as baluns. They can be made somewhat adjustable with clever switching arrangements, but they're always limited to whole-numbers-squared ratios such as 1:1, 4:1, 9:1, 16:1 and so on. I worried that this limitation wouldn't allow for enough adjustment flexibility.

Thankfully, there's another kind of broadband RF transformer that *can* perform a match like this—the autotransformer—and it isn't limited to natural-square ratios. Although it's theoretically not as efficient as a transmission-line transformer, in practice it works quite well. The efficiency usually suffers as you apply more power (because of core losses), but at QRP power levels (5 W or less), those losses are minimal. With a little seat-of-the-pants engineering I came up with a way to make an autotransformer more-or-less continuously variable, which was exactly what I needed to use the same whip and matching unit over such a wide range of frequencies.

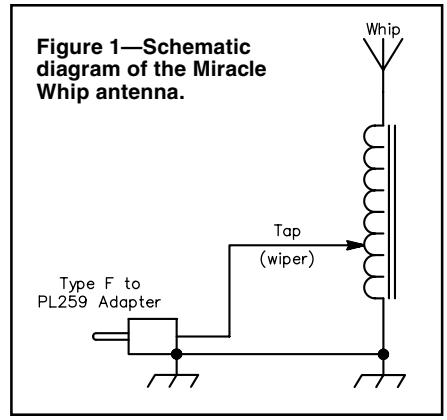
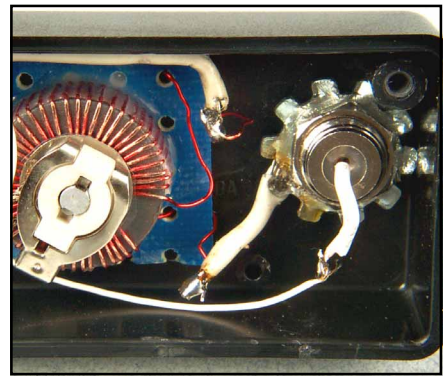


Figure 1—Schematic diagram of the Miracle Whip antenna.



Close-up view of the inside of the Miracle Whip clearly showing the core and wiper.

An autotransformer works like a conventional double-wound transformer as shown in Figure 1. The bottom part, where the input connects, represents the primary, and the entire coil, with the whip on the end, acts as the secondary. The impedance transformation is the square of the ratio between these two virtual sets of windings (turns). As the slider moves it taps the transformer, varying the ratio between the primary and secondary, providing (hopefully) the right match on each band.

This arrangement looks a bit like a series loading coil with a sliding tap, but if you look closer you'll see that we're applying the signal *across* the coil, which is connected to the signal source and to ground. The antenna winding—in effect the whole winding—is also across the output (the whip) and ground. Thus, we really do have a transformer as opposed to a loading coil, and the device does indeed transform our feed impedance into our whip impedance in a variable manner.

If you'd like to do a thought experiment, imagine exchanging the signal source and the ground, putting the ground on the tap and the source at the bottom. You'll see that the ratio is now different for any given tap position because the ground is now farther up the coil, which changes the number of windings on the antenna side. You'll also see that you've reversed the phase of the output. If you build and test this, you'll confirm this result.

Construction

I'm no machinist, so it was challenging for me to figure out how to homebrew the mechanics of the Miracle Whip. When I have no idea how to create what I need, a wander through the local surplus shop will occasionally provide inspiration.

I did just that, and happened to find a wire-wound rheostat that looked like it was designed for just this project. It had the perfect wiper-and-brush mechanism that I'd need to make the sliding tap, and the resistance winding and the coil form it was wound on looked a lot like a toroidal transformer, which gave me some confidence that the unit could be adapted for my needs. It worked well, so here's how to build your own transformer out of a similar rheostat.

I've located some common commercial rheostats made by Ohmite that you can order from any of several suppliers. Go to the Ohmite web site at **www.ohmite.com**, click on "distributors" and choose one near you (or order from the Allied site in the parts list). These rheostats are supplied in many resistance values, but because you won't be using the resistance winding you can take anything that's in stock that's the correct physical type. These are identified as Ohmite part number RES*xxx*, with the "*xxx*" being the resistance. Typical values are shown in the parts list.

I'm going to go into quite a bit of detail on the construction of this device, but don't be intimidated—the whole process is straightforward and shouldn't take more than a couple of hours.

Start building by stripping the rheostat. You'll use the central shaft, which has a spring-loaded wiper and brush, its associated hardware and the collar/tube in which the shaft rotates. You can toss the resistance winding into your junk box. To get these parts free you'll need to unscrew the collar-retaining nut and remove the C-clip that holds the shaft in the collar. Don't lose the C-clip and be careful not to stress the wiper spring and its contact. The brush is held in its seat on the wiper by pressure alone, so when you take it apart, expect the brush to dangle on its pigtail.

Winding the Transformer

The transformer (Figure 2) is created by winding about 60 turns of #26 enameled wire onto the ferrite core specified in the parts list. I say "about" 60 turns because the number of turns isn't critical. A loading coil would need exactly the right number of turns on exactly the right core for consistent performance, but because our device is a broadband transformer, we're only concerned with the appropriate ratios between the primary and the secondary. Because the windings ratio of the finished unit will be adjustable anyway (that's why we're building it, right?), the number of windings isn't overly critical.

That said, you should shoot for about 60 turns; one or two less or more shouldn't be a problem. What you *do* want are uniform windings that are tight on the core, regularly spaced, with a bit of room between the windings (so the brush will contact only one at a time) and a gap of 30 degrees or so where there are no windings at all.

Why the gap? The rheostat, as originally manufactured, has stops to prevent rotation beyond the ends of the windings, but we lose those stops when we discard the original mounting. The gap will give you a good "feel" for when you've reached the beginning or end of your windings as you tune, so you'll know where you are. (If you think of a better solution, let me know.)

Spread some non-corrosive glue (Elmer's wood glue works fine) on the bottom and rim of the core to hold the windings in place and let the assembly dry completely before proceeding. Use a piece of fine sandpaper or emery cloth to carefully remove the enamel from the wire in the area where the wiper will make contact. You can eyeball this area by temporarily placing the wiper on the core with the shaft centered through the hole in the core.

Mounting

Here's the only tricky part of the project—mounting the core, the wiper and the shaft so the wiper contacts the coil windings with a suitable pressure. If the wiper is too high above the windings, you won't get good contact; if it's too low, adjustment will be difficult and you might tear the brush and perhaps even the windings. That said, it's not *that* difficult to get this right. Look at Figure 3 to understand the mechanics.

Cut a square of perfboard about 1 1/2 inches to a side and drill a hole dead center to accept the shaft collar. Center your newly wound core over the hole. Slide the wiper and shaft into the collar and install the C-clip. Insert the wiper/shaft/collar assembly through the core and the hole in the perfboard with the wiper positioned to contact the windings. Pull on the shaft and collar from the opposite side of the perfboard to see how things fit. If the shaft collar flange bottoms out on the perfboard *and* the wiper is contacting the windings with a reasonable-but-not-excessive force (there's still some spring travel in the wiper), you're home free.

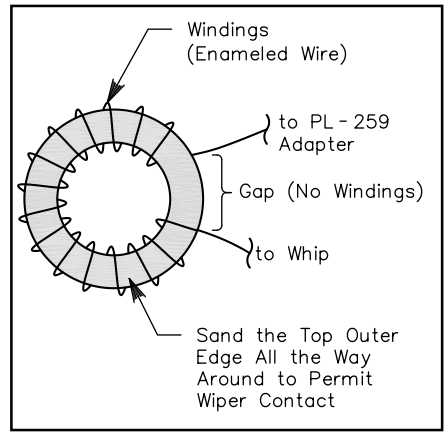


Figure 2—Winding the ferrite core with approximately 60 turns of #26 enamel wire. Note that you must sand the windings along the top outer edge to remove the enamel coating so that the brush can make contact.

Parts List

- Wire-wound rheostat—Ohmite # res100, res250, res500, res1000 or similar (available from Allied Electronics, www.alliedelec.com, about $20 each).
- Core—Palomar F82-61 or similar (available from Palomar Engineers at www.palomar-engineers.com; about $1.60 each).
- Whip, wire, PL-259, etc
- Enclosure—Hammond #1551HBK or similar.
- F-female to PL-259 adapter—RadioShack 278-258.

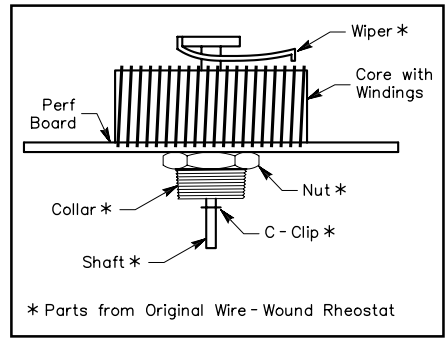


Figure 3—Side view of the modified rheostat assembly. The wiper and brush make contact with the core windings, jumping from one winding to another as you turn the wiper shaft.

If the wiper spring is bottoming out before the shaft collar flange is firmly seated on the perfboard, you'll need to insert one or more washers between the flange and the perfboard until the fit is right. This happened to me, and I wound up cutting a washer from a piece of transparent Mylar to get a good fit.

On the other hand, if the shaft collar flange bottoms out on the perfboard but the wiper contacts the windings only lightly (or not at all), you'll need to elevate the core above the perfboard by shimming underneath the core. You can do this by cutting a core-shaped ring of glueable, non-metallic material that's the right thickness, and gluing it under the core to raise it enough to get good contact between the wiper and the windings.

Fortunately, the wiper spring has a good deal of travel, so this adjustment isn't too difficult. Don't rush it, however, and spend enough time to set this up properly.

Once the adjustment's right, glue the core permanently to the perfboard, centering it over the hole and set it aside to dry. You can then insert and fasten the mounting collar with its nut. Finally, remove the C-clip from the shaft and extract the shaft and wiper for the next step.

The Brush

The original brush is quite wide for our purposes, so we need to file it down so it forms a flattened point that will contact only one winding at a time. You're going to file the sides and top to shape the contact area like a wedge with a flattened point. Check out Figure 4 to see what I mean.

Use a fine-tooth file and go slowly. The brush material is quite soft and you don't want to go too far. After shaping, use the file to cut a shallow groove across the middle of the point. This helps the point seat solidly when it settles over a winding. Make sure to round the edges as shown so the brush doesn't hang up when stepping over the windings.

After this you're ready to insert the shaft and wiper into the collar and replace the C-clip on the shaft to hold it in place.

Assembly

All that remains is to install your completed transformer assembly, a PL-259 coaxial connector and whip in a suitable enclosure. The transformer unit and the coaxial connector should be mounted so they don't interfere with each other, and the whip mounts on the top of the box. Eyeball the positions before you drill any holes. That done, drill all three required holes in the appropriate locations.

Panel-mount PL-259s are few and far between, but I managed to find something

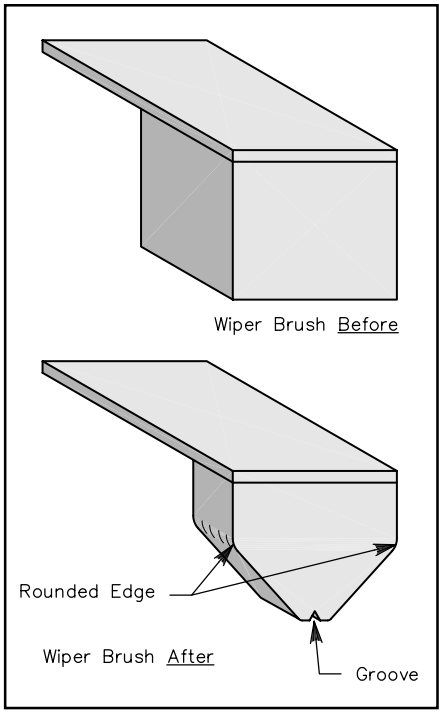


Figure 4—The normally flat-edged wiper brush must be gently filed to a rounded point (with a narrow groove) and rounded corners.

suitable. It's an "F-female to PL-259" adapter sold by RadioShack, part number 278-258. There's no way to solder to the inside (the F-type end of this adapter), but it's designed to make good contact with a piece of solid wire inserted straight into the end (like a cable-TV connector), so cut a short length of solid copper hookup wire, remove the insulation and stick it in the hole. You'll solder a lead from this to the transformer wiper lead. Your ground connection can be provided by using an appropriately sized lug washer (if you can find one) or by slipping another stripped lead under the connector nut as you tighten it down.

Mount the transformer in the box by inserting the shaft collar through the mounting hole and install the retaining nut.

My whip is 48 inches long and came from a surplus store. It looks like it might once have been part of a "rabbit ear" assembly. I chose it because it's beefy and because it had a swivel mount that would allow swinging the antenna to a horizontal or vertical orientation. Mount yours to the top edge of the box, making a connection in whatever fashion required; a stripped lead or lug under the mounting screw should do just fine.

Wire things up as per the diagram and remember to use a thin, flexible lead to make the connection between the wiper the Type-F end of your PL-259 adapter. Make sure there's plenty of slack. You'll want this to move freely, without strain. Screw on the cover and plug it in!

Operating

Select a band and tune the antenna by rotating the wiper while listening to band noise or a signal. The antenna peaks nicely on receive, so if you don't hear something right off the bat, something needs to be checked. You may find that the whip works better horizontally or vertically. Listen and experiment to determine how the antenna performs with the station you're working.

Once peaked for maximum receive signal, transmit at low power while watching the FT-817's SWR meter. If you have significant reflected power, rotate the slider a little to one side or the other and try again. You can feel each "detent" as you step from winding to winding. You might not get a perfect match on the lower bands because the impedance transformation ratios jump rather quickly at the bottom end of the transformer, but you should get something that's workable. I get 1:1 on 20, 15 and 10, and about 2:1 on 40 and 80 meters. Remember that your transmission line is about two inches long, so SWR-induced line losses aren't a consideration—you're mainly looking for reasonable loading.

A few words to the wise: *always tune at the lowest power setting and never attempt to transmit at higher power unless you see a decent match*. And, as mentioned before, the antenna peaks nicely on receive, so if you don't hear a peak, investigate and fix things before you transmit!

Once peaked, you're ready to switch to higher power and talk to someone. Remember that you're working QRP *with a compromise antenna*. A little patience will go a long way and, like a glider pilot or a fisherman, waiting for the right conditions is half the battle.

Performance

I'm not sure this setup would have saved Napoleon Solo's bacon every time, but considering the challenges of operating a QRP rig with an attached whip, I'm very pleased with the results. I've made the contacts I described with the whole kit and caboodle sitting on my desktop, without any sort of ground or counterpoise. In fact, adding a ground might make impedance matching considerably more difficult.

Obviously, the antenna performs better at higher frequencies. On 10 meters it's about an eighth of a wavelength—which isn't bad. As you go down in frequency the antenna is electrically shorter and less efficient. But it loads and radiates all the way down to 80 meters, which is the design goal, and it *will* make contacts there, given the right conditions.

Exterior view of the Miracle Whip housing.

Six, Two and More and More

Although I didn't design it to do so, the antenna works great on 6, 2 and even 440. The trick is to set the wiper to the very last turn—in effect providing a direct connection to the whip—with the transformer simply acting as a choke to ground. You can then slide the whip in or out to approximate a quarter wavelength for whatever band you're on. In this case the antenna is full size, so there's no compromise at all!

The autotransformer principle should also be applicable to a general-purpose, random-wire tuner. I think I'll play around with this. If you're an intrepid experimenter, I invite you to do the same and let me know what you find.

This antenna should work with just about any QRP rig, homebrew or store-bought. The only proviso is that, although the TX outputs of almost all rigs are designed to work into 50 Ω, the receiver inputs may prefer other impedances. Receiver input impedance is far less critical for most applications, however, so this may not be much of a handicap.

I'm completely satisfied with my first Miracle Whip—so much so that I plan to offer a commercial version to the amateur community (on the Web see **www.miracleantenna.com**).

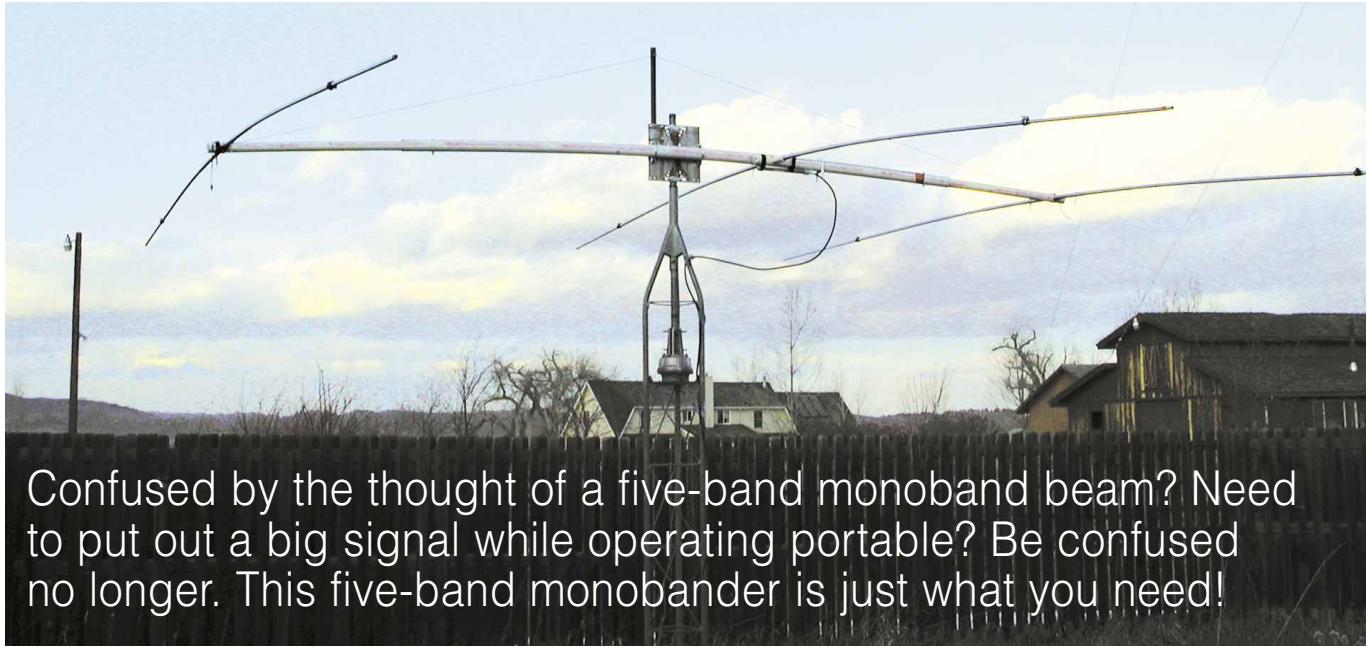
With the Miracle Whip I've realized a radio dream I've had for many years: working the world with a self-contained, hand-held station. I haven't yet tested it on a picnic table, but my desk is a pretty fair substitute. I'm expecting Napoleon to knock off the condescension once we get out to the campground.

The Miracle Whip trades efficiency for size and portability, so don't expect, well, miracles. But if you want a system that can work DX from a picnic table, an ocean view or a mountaintop, this one does the trick. Now, Mr. Solo, about those nannies…

You can contact the author at 1220 Bernard St, No. 21, Outremont, QC, H2V 1V2, Canada; **Lebloke@attcanada.ca**. QST

By Brian Wood, W0DZ

A Three-Element "Monobander" for 17-10 Meters—with Two Elements on 20!



Confused by the thought of a five-band monoband beam? Need to put out a big signal while operating portable? Be confused no longer. This five-band monobander is just what you need!

In 1966 I was a newly licensed Novice and was on the air using a friend's Globe Chief transmitter, a National NC-270 receiver and a homemade inverted V attached to my house with a bamboo pole. The Globe soon gave way to a home-brew 6146B transmitter built from schematics in the 1966 *Radio Amateur's Handbook*. But QSOs were hard to come by because I was running all of 50 W during the lull between solar cycles 19 and 20. Then came the September 1966 issue of *QST* and an article by Lew McCoy, W1ICP, entitled, "A Two-Element Beam For 15." In that article, Lew said, "An amateur's first venture on 15 and 10 under open band conditions is a revelation…If this is your first experience with a beam antenna you'll be in for plenty of surprises…This fall and winter should be a real humdinger on 15, so don't miss it!"

Lew wrote that article shortly after the beginning of solar cycle 20, which peaked in 1969-70 and was one of the lowest-peaking cycles in recent history, comparable (unfortunately) to cycle 23, which we're presently trudging through. I built that antenna, and it gave me some serious fun earning WAS and WAC and working lots of DX on 15 meters. Now I'd like to offer you that same thrill—building your own antenna and working DX with a gain antenna—20, 17, 12 and 10-meter bands included!

If you've followed me this far you're now asking, "Yeah, but a multi-band monobander—isn't that an oxymoron?" Nope! After a less-than-great performance in last year's Field Day—mostly because of antennas—I vowed to figure out how to build a no-compromise, three-element beam that could be easily *reconfigured* for any band from 20 through 10 meters.

My ideal antenna had to (1) be relatively inexpensive, (2) be lightweight, (3) have a telescoping boom so it could be collapsed for compactness, (4) have foldable, telescoping elements, (5) be easily re-configurable for different bands *without using any tools*, (6) have good gain and front-to-back values, (7) use parts that are easy to find and (8) be easy to build.

Part of my dream antenna was hiding in *The ARRL Antenna Book*. The PV4 monobander (by the late antenna guru Dr James Lawson, W2PV) described a four-element beam using a spacing of 0.1235 wavelength for driven element-to-reflector spacing and 0.2005 wavelength for driven-element-to-first-director spacing, with element lengths of slightly less than a half wavelength.[1] *The Antenna Book* also contains a *Basic* program that takes tapering into account when calculating element lengths.[2] I took that basic design and extended it so the resulting antenna

[1]Notes appear on page 41.

can be easily and quickly changed from one band to another without using tools. I also wrote a *Visual Basic* program that automatically calculates element lengths and spacing for any given frequency and also incorporates the *Taper* program.[3]

During the design process I quickly discovered that I had to give up on a four-element antenna—it was just too long and unwieldy. But a three-element beam is nothing to sneeze at! Making it work on 10 through 17 meters wasn't too difficult, but a three-element beam for 20 meters was pushing the limit, so I found a novel way to use the antenna as a two-element beam on that band. With due respect to W2PV, I call this antenna the DZ3.

Construction Details

The DZ3 consists of three main pieces: (1) the reflector (adjustable aluminum tubing mounted to a 1.5 × 52 7/8-inch PVC boom), (2) the driven element (adjustable aluminum tubing mounted to a 2-inch × 10-foot PVC boom), with its "hairpin" matching network and balun, and (3) the director (adjustable aluminum tubing mounted to a 1.5-inch × 67 1/8-inch PVC boom).

The boom pieces are made out of thick-wall (Schedule 40) PVC, which is inexpensive, strong and readily available. The reflector and director slide in and out of the bigger driven element boom. Lengths have been carefully chosen to make sure that the smaller booms can slide all the way into the large boom without hitting the driven element. Clevis pins are used to hold the sections together, so they're easy to take apart without tools. The "hairpin" matching network is used to adjust the antenna's impedance to 50 ohms. Because the driven element is "balanced" (floating from ground), a W2DU 1:1 current balun made out of RG-303 and ferrite beads is used to provide an interface to the unbalanced coax.[4]

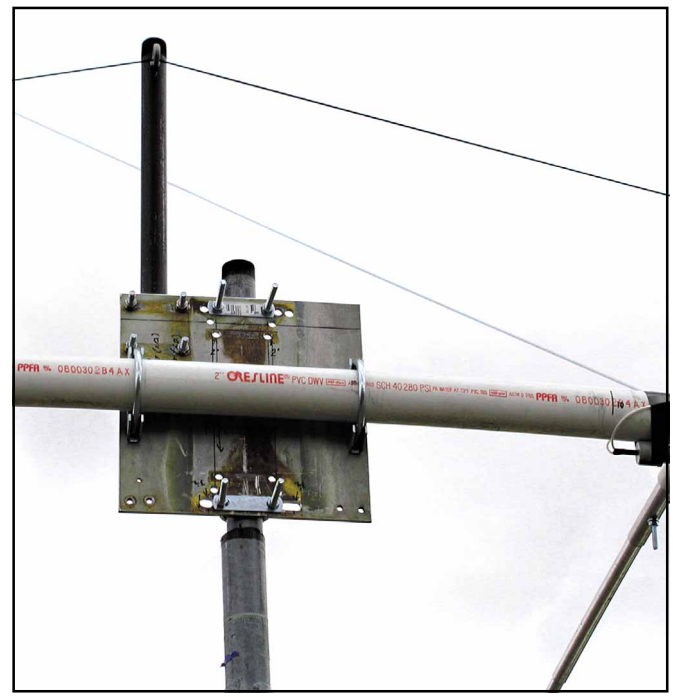
The elements are made out of telescoping aluminum tubing (0.058-inch wall so it telescopes smoothly) in 1, 7/8, 3/4, 5/8 and 1/2-inch diameters. The driven element is fixed so that as the antenna is adjusted for various bands, the hairpin matching network and balun don't have to be moved. The position of the shorting bar in the matching network *does* have to be adjusted as you change bands (by sliding a **U**-bolt along its length), but this is much easier than moving the whole network. Because aluminum diameters are measured in outside diameter (OD) and PVC is measured in inside diameter (ID), a 1-inch PVC pipe will hold a piece of 1-inch aluminum tubing quite nicely. This is done to hold the driven element to the boom, as the element halves must be separated.

I've often looked at TV antennas and asked myself why amateur antennas can't be made that way! A typical TV antenna has elements that fold in toward the boom. All you have to do is snap them into place. Although it's too hard to make a big antenna that way using readily available parts, we can come pretty close. With the DZ3, the elements can be slid out of the base section of tubing, rotated 90 degrees and re-bolted. The elements can then be rested against the base sections of the other elements. Figure 1 shows how the antenna looks when all elements are folded in and the boom pieces are fully retracted. Taping the elements together in six places makes for a compact, easy-to-carry, all-in-one-piece antenna that can be unfolded, extended and configured for any of five bands in only a few minutes!

Parts

I was hoping to find one hardware store that stocked all necessary parts, including aluminum tubing in the usual telescoping sizes. But alas, antenna tubing seems to be as hard to find today as it was for me 35 years ago when I built that two-element beam. In fact, Lew McCoy mentioned the problem in the 1966 *QST* article referenced above. Some things never change! Fortunately, I discovered that Texas Towers[5] carries a full line of tubing in 12 and 6-foot lengths. The 6-foot lengths are best for low-cost UPS shipping and were selected for this project to minimize cutting. The PVC tubing, **U**-bolts, screws and clevis pins are available at most any hardware store. Ace Hardware has the 1/4-inch aluminum tubing used for the hairpin matching network, and The Wireman[6] carries the W2DU 1:1 choke balun (Item #827, with SO-239 on one end and 6-inch pigtails on the other). Total parts cost is about $150. But compare that to the more than

Figure 1—That object next to the minivan is the antenna—completely folded and ready for transport.



A close-up view of the boom and mast assembly.

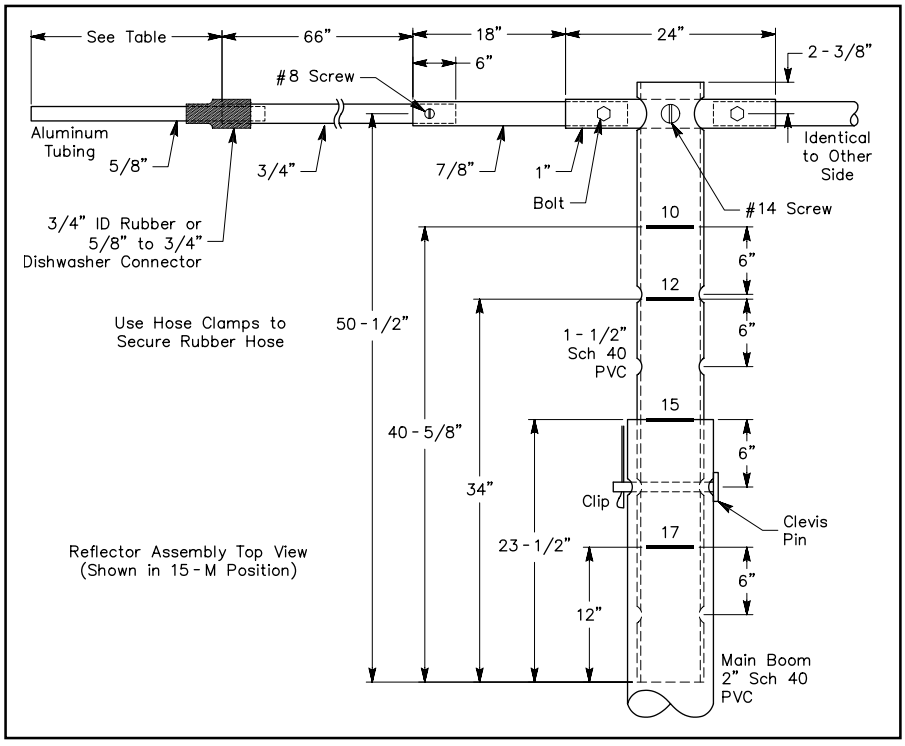


Figure 2—Reflector assembly details.

$400 you'd pay for a commercial monobander that isn't reconfigurable!

Detailed Assembly Instructions

When cutting the aluminum tubing you may find that the overall length leaves you slightly short by as much as 1/8 inch. Don't worry about this. Get as close as you can. The adjustable elements will compensate for any slight length discrepancies.

Reflector Construction (Figure 2)

Step 1: Cut the 1 1/2-inch PVC pieces to 52 7/8 inches. Drill a 1-inch hole all the way through the tubing exactly 2 3/8 inches from one end. Be very careful to center the hole in the tube. Use a drill press if one is available.

Step 2: Now cut and debur (file the edges of) a 2-foot piece of 1-inch aluminum tubing. Slide it through the hole, center it, and tape it to the PVC so it can't move. Drill a pilot hole for a large #14 × 1-inch self-tapping screw. Screw it in to secure the tubing in the PVC and remove the tape.

Step 3: Cut and debur two 2-foot lengths of 7/8-inch tubing. Mark that tubing with pencil 6 inches from the end and slide each piece into each side of the 1-inch tube until the pencil mark lines up with the end of the 1-inch tubing. Tape the elements so they can't move. Drill a 1/4-inch hole 3 inches from the end of the 1-inch tubing. Go all the way through both tubes. Be very careful to center the hole in the tubing. Use a drill press if possible so the bolts that hold the elements together won't be crooked. Put a 1/4-20 × 2 1/2-inch hex bolt, washer and nut through the holes to hold the elements together. The bolts will stick out quite a ways. This is okay—when collapsing the antenna, you'll need the extra length.

Step 4: Now mark each of two 6-foot pieces of 3/4-inch tubing with a pencil 6 inches from one end and slide them into the 7/8-inch tubing until the pencil marks line up with the end of the 7/8-inch tubing. Tape the tubing so it can't move. Drill a small pilot hole 3 inches from the end of the 7/8-inch tubing *on one side only*. Secure the tubes with a #8 × 1/2-inch self-tapping screw. Remove the tape.

Step 5: Using a *pencil*, mark a 6-foot length of 5/8-inch tubing with lines and

Table 1
Aluminum Tubing Lengths
(All dimensions in inches)

Band (Meters)	Reflector 5/8 dia	Driven Element 5/8 dia	Driven Element 1/2 dia	Director 5/8 dia	Director 1/2 dia.
10	12	11	—	2.5	—
12	26	14.25	—	15.5	—
15	48	36	—	34.5	—
17	69	57.75	—	57.5	—
20	*	66	36	66	55

*Since the director becomes a reflector on 20 meters, the reflector is not used and must be set for 10 meters.

6063-T832 Aluminum Tubing

Regarding the practice of using 6063-T832 tubing instead of the traditional 6061-T6 material: 6063-T832 material was developed for the furniture manufacturing industry, which needed a strong alloy with a very smooth and shiny finish to make their products hold up well and look good with a minimum of added processing. The product starts as a normal 6063 alloy ingot, which has a typical yield strength of about 28,000 PSI. The process involves drawing and redrawing the tubing to achieve the desired finish. This drawing process work hardens the material to a yield strength of about 40,000 PSI.

6061-T6 is made via a totally different process that uses a higher yield strength base material and fewer work-hardening steps in production. The finish is often quite ugly especially when "oil quenching" is used in the production process. The cost of 6061-T6 drawn tubing is significantly higher than that of 6063-T832.

Extruded tubing is another story. Most outlets can get 6061-T6 extrusions for only pennies per pound more than 6063 extrusions. There is no 6063-T832 process for extruded products (that I am aware of)—only 6063, which has a typical yield of 28,000 PSI as mentioned above. This isn't what we want to use for antenna construction and, incidentally, is what you are getting at Home Depot, Lowe's and other places that sell tubing in 8-foot lengths.

Today, almost every commercial amateur antenna manufacturer now uses 6063-T832 because it's less expensive, looks good and has excellent strength.—*Gerald Williamson, K5GW, Texas Towers*

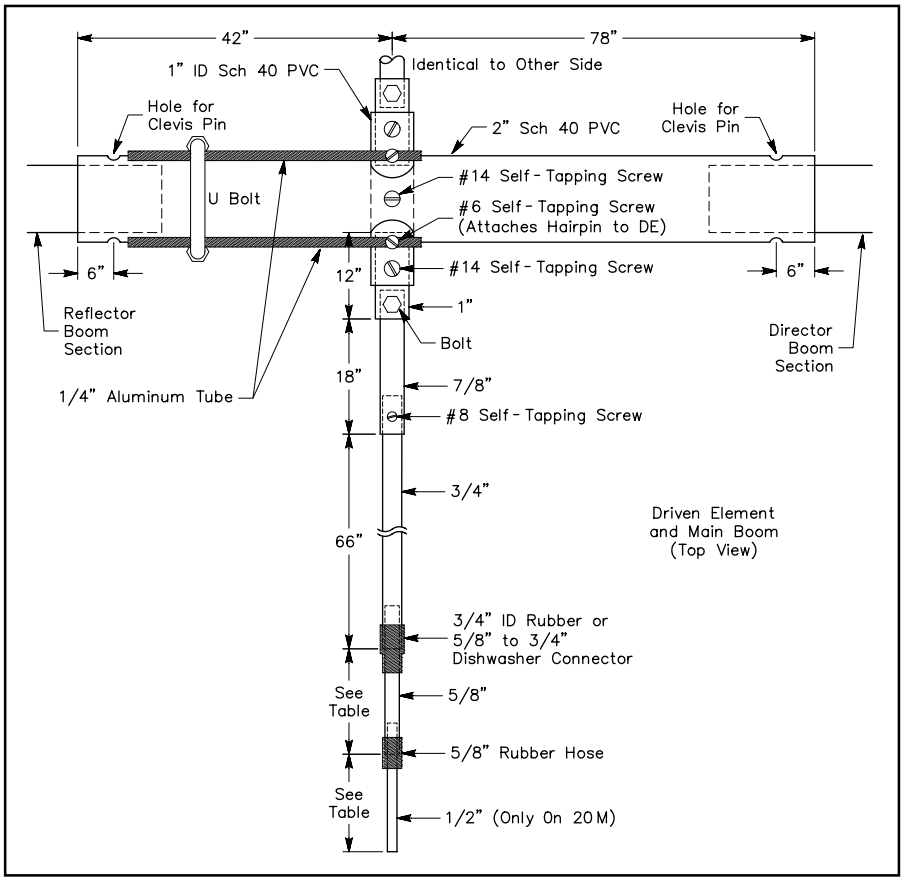
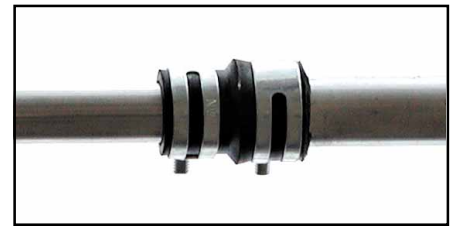


Figure 3—Driven element and main boom.



A tight shot of the dishwasher connector.

Bill of Materials

Quantity	*Description*
1	6-foot length of 1-inch aluminum tubing (cut into two 2-foot and two 1-foot lengths)
2	6-foot length of 0.875-inch (7/8-inch) aluminum tubing (cut into six 2-foot lengths)
6	6-foot length of 0.75-inch (3/4-inch) aluminum tubing
6	6-foot length of 0.625-inch (5/8-inch) aluminum tubing
4	6-foot length of 0.5-inch (1/2-inch) aluminum tubing (only needed for 20 meters)
2	3-foot length of 0.25-inch (1/4-inch) aluminum tubing (for hairpin)
6	Rubber "dishwasher connector" rubber tubes, 5/8-inch to 1-inch graduations, with clamps
1	10-foot length of 2-inch-ID Schedule 40 (thick-wall) PVC
1	10-foot length of 1 1/2-inch-ID Schedule 40 (thick-wall) PVC
1	1-foot length of 1-inch-ID Schedule 40 (thick-wall) PVC
1	W2DU 1:1 choke balun
2	#10-12 Spade lugs
1	12 × 12 × 1/4-inch aluminum plate for mounting bracket
1	Aluminum or steel eyebolt, long enough to fasten to top of mast
2	1-inch U-bolts (to attach the antenna to the mast)
3	2.5-inch U-bolts (one for hairpin, two to hold boom to mounting plate)
5	#14 × 1-inch self-tapping screws
6	1/4-20 × 2 1/2-inch hex bolts, washers and nuts
2	#6 × 1-inch self-tapping screws (fastens hairpin into driven element)
6	#8 × 1/2-inch self-tapping screws
2	7/16-inch × 3-inch clevis pins and clips
1	30-foot length of tightly woven nylon rope
1	Roll of duct or electrical tape
1	3 foot mast

band labels at the lengths shown in Table 1. Slide the other end of the tubing (opposite to where you measured) into the 3/4-inch tubing. Cut the 7/8-inch and 1-inch sections of rubber off a "dishwasher connector" (available at Ace Hardware), leaving the 5/8-inch and 3/4-inch sections. Slide the 3/4-inch section onto the 3/4-inch tubing and tighten it with the screw clamp provided. Holding the 5/8-inch tubing securely so it doesn't move, tighten the 5/8-inch section of the rubber connector lightly so as to allow the tubing to move, but with some effort. The friction fit will keep it in place while allowing you to easily adjust it for other bands. You'll want to re-mark the tube at the edge of this rubber connector so you can see the band marking! Mark a line on the tubing using a felt-tipped pen, and label the band. Repeat for all bands. (Note: If you can't find a dishwasher connector, an adequate and less expensive substitute can be made using 3/4-inch ID rubber hose cut into 2-inch lengths. Put a hose clamp on the 3/4-inch side and another one on the 5/8-inch side.)

Driven Element Construction (Figure 3)

Step 1: Drill a 1 5/16-inch hole all the way through and exactly 3 1/2 feet from one end of the 2-inch PVC. Insert a 1-foot length of 1-inch PVC (remember, this is ID; the OD of 1-inch Schedule 40 PVC pipe is about 1 5/16 inches and will fit perfectly in that hole), center it and tape it so it can't move. Drill a pilot hole in the center of the 2-inch PVC tube and secure this tube to the 1-inch tube with a #14 self-tapping screw. Remove the tape.

Step 2: Cut two 12-inch sections of 1-inch aluminum tubing and debur them. Slide each one into the 1-inch PVC tubing until 5 inches of aluminum tubing is visible on each side. Tape the aluminum tubing so it can't move. Drill a pilot hole into the top of each of the 1-inch PVC and 1-inch aluminum tubes approximately 1/2-inch from the point where the 1-inch PVC tubing intersects the 2-inch boom and secure each piece with a #14 self-tapping screw. These will become the attachment points for the wire ends of the W2DU balun.

Step 3: Lay the two pieces of 1/4-inch aluminum tubing along the boom toward the end that will have the reflector in it—the 3 1/2-foot length of boom. One end should line up just past the center of the driven element tubing. Tape the other end to the boom with duct tape (wrapped all around the boom). This tape is permanent, so wrap it neatly. Drill a small pilot hole into the other ends and into the

driven element aluminum tubing. Secure with #6 × 1-inch self-tapping screws. Attach a 2.5-inch **U**-bolt around the boom so it touches both tubes. This **U**-bolt will act as an adjustable shorting stub for the hairpin matching network.

Step 4: Follow the rest of the directions for reflector assembly from step 3 on. In step 5, first cut 3 inches off each of the 5/8-inch tubes to allow them to completely slide into the 3/4-inch tubes.

Step 5: If you're going to use 20 meters, mark the 20-meter position on a 6-foot length of 1/2-inch aluminum tubing at the length shown in Table 1 and slide the tube into the 5/8-inch tube to the marked point. Secure it with electrical tape. If 20 meters isn't on your agenda, simply remove the 1/2-inch tubing and set it aside. If the antenna will be used for extended periods on 20 meters, drill a pilot hole and secure the tubing with a #8 × 1/2-inch self-tapping sheet metal screw.

Director Construction (Figure 4)

Follow the assembly directions for the reflector using the dimensions in Table 1. Mark the 10, 12, 15, 17 and 20-meter points as noted, just as you did for the reflector. Instead of 52 7/8 inches, make the PVC tubing 67 1/8 inches. This should be the length of the remaining piece after the first cut. Cut 3 inches off the 5/8-inch section of aluminum tubing before inserting it into the 3/4-inch section. Note that the 20-meter position looks out of place—but isn't—because the director is used as a reflector on 20. If using for 20 meters, be sure to also perform Step 5 of the driven element assembly.

Element Leveling

Step 1: Because this design doesn't use **U**-bolts to hold the elements to the boom (to avoid crushing the boom and because it looks better), it's essential that the elements be lined up before holes are drilled to secure the three pieces of boom. Place the reflector tube and the director tube into the large boom so that the 17-meter marks line up with the ends of the 2-inch boom. Set the whole antenna on a level surface and eyeball the elements from a distance. When they're all even, tape the 1 1/2-inch tubing to the 2-inch tubing so nothing can move.

Step 2: Carefully drill a 7/16-inch hole all the way through the 2-inch and 1 1/2-inch tubing at a point exactly 6 inches from each end of the 2-inch tubing. Remove the tape.

Step 3: Repeat steps 1 and 2 for the other three bands (four for the director, as it includes 20 meters).

Step 4: Place the tubes so that the selected band holes line up and secure the tubes with a clevis pin and clip. Note: If the elements still appear uneven after all this, just enlarge the two holes in the 2-inch PVC tube by making them slotted (perpendicular to the boom) so that the other tubes can move slightly. Slide the elements until they are level. Then secure the tubes with shims or drill a small screw hole and insert a self-tapping screw or clevis pin to lock the element in place.

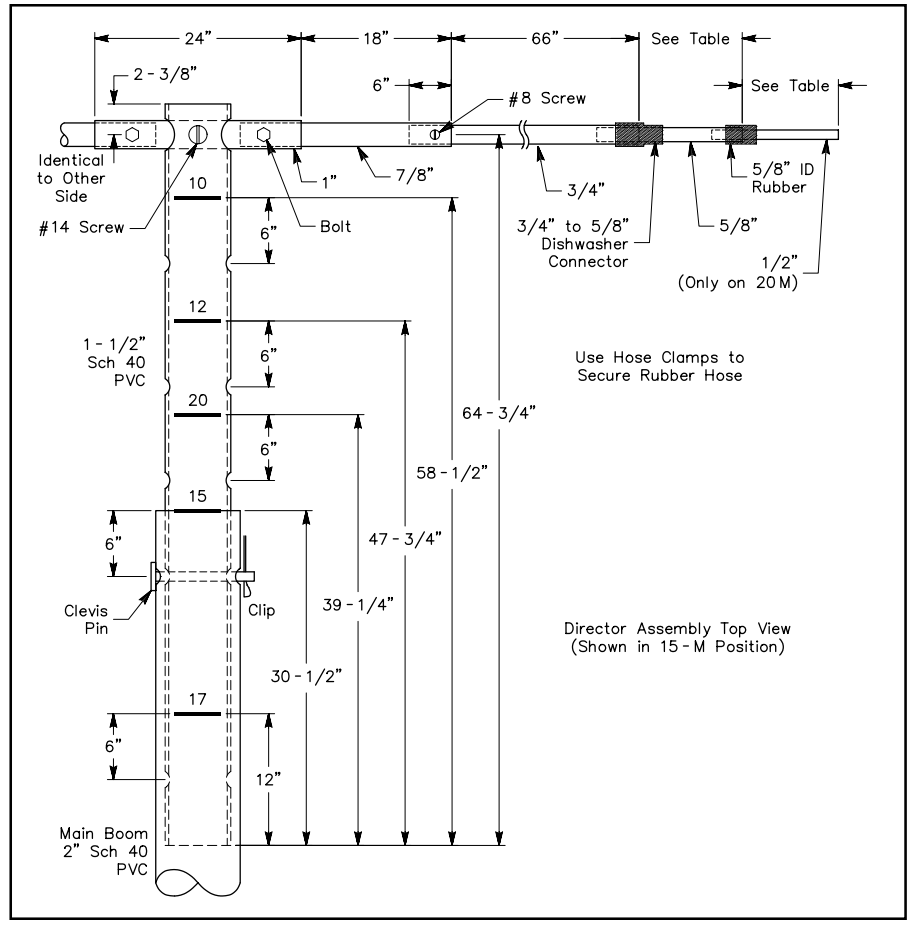


Figure 4—The director assembly diagram.

This view illustrates how the director attaches to the telescoping boom.

Final Steps

Build a mounting plate using **U**-bolts as shown in the photo on page 37. Attach the plate to the antenna between the driven element and the director. Because the boom sags when used at the lower frequencies, extend another 3-foot section of mast above the mounting plate and attach an eyebolt to it. Tie some nylon cord to the director where it attaches to the boom. Run the cord through the eyelet and tie it to the reflector. This cord will have to be adjusted every time you change bands, so make sure to use a knot that's easy to undo! Also, as you change bands, the antenna's center of gravity will change slightly. Some experimentation will quickly show you where to

place the mounting bracket that will work for all bands. The location shown in the photograph seems to work well.

Connect the balun to the driven element as shown in Figure 5 and tape it to the boom directly underneath the hairpin, with the SO-239 connector facing the reflector (hairpin on top of boom, balun on bottom). Adjust the hairpin **U**-bolt and the $^5/_8$-inch tubing for each band in turn. Be sure to label the band for the noted position of the hairpin and the last element tube.

Connect the antenna to your transmitter with 50-Ω coax. To prevent static charge from building up and damaging your equipment, be sure there is a good dc path to ground on the shield of the coax. This is most easily done by using good grounding techniques in your station, which is worth doing no matter what antenna system you use! *The ARRL Handbook* has a chapter that explains this in more detail.

To change bands, simply pop the clevis pins out, slide the reflector and director booms to the marked positions, reinsert the clevis pins, adjust the hairpin, and set the element lengths to the marked positions. The whole process should only take a few minutes.

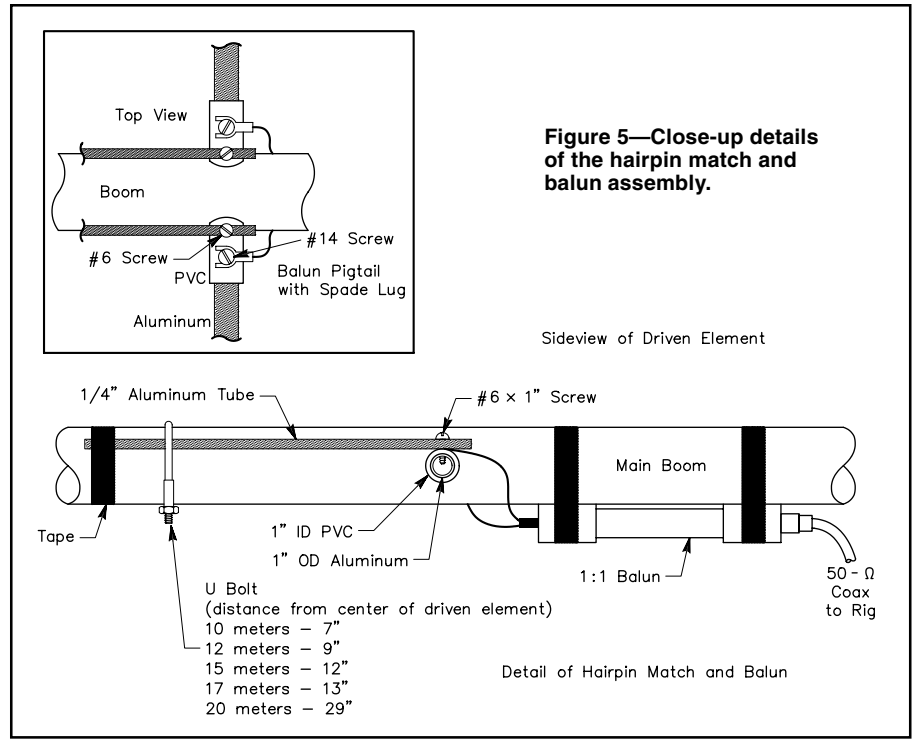


Figure 5—Close-up details of the hairpin match and balun assembly.

A detailed view of the hairpin match and balun assembly.

Using the DZ3 on 20 Meters

To use the DZ3 as a 2-element 20-meter beam, set the element that is normally used as the reflector at the marked length and spacing for 10 meters. This gets it out of the way as a resonant element and provides a counterweight for the rest of the beam. Adjust the position and length of the director and driven element to handle 20 meters. In this configuration, the director becomes a reflector and there is no director. Note that when used in this way, your beam headings will be off 180 degrees. This is because the beam now points in the opposite direction as all other bands. The elements also sag quite a bit on 20 because they are so long. Rest assured, this won't hurt the antenna. But if you leave it configured this way for an extended time, it might be worth adding some reinforcement.

Performance

The DZ3 has been tested and found to work well on all bands. In fact, most signals were only about one S-unit weaker with this antenna (at 10 feet off the ground) when compared to my TH7DX at 70 feet. If you have access to an SWR analyzer you can tweak the driven-element lengths and hairpin to get the best SWR for your setup. Be sure to get the antenna as high as possible before making changes. Nearby objects and the ground can have a noticeable impact on performance. It should be possible to get a gain of about 6 dBd, with a front-back ratio of 12-15 dB (4-5 S units). Front-to-back ratios can vary depending on the radiation angle of the antenna, which will vary based on band and height of the antenna, so don't be too alarmed if you don't see much difference.

A word of caution: PVC, even Schedule 40, isn't as strong as aluminum! Although it has been unintentionally tested under windy and snowy conditions, this antenna was intended for light-duty field operations, so I don't suggest leaving it at the top of a tall, fixed-height tower! Besides, you have to change bands manually. A small tilt-over tower or mast is suggested.

Also, PVC can discolor in sunlight. I suggest you paint the PVC with a water-based paint. Don't use spraypaint.

Dimensions in this article have been selected for the CW subbands. With an antenna tuner, however, you should be able to get it to load up pretty well in the phone subbands. You can also run the *Visual Basic* program mentioned earlier to get precise dimensions for whatever band segments you favor.

My thanks to John Wright, W7JN, for his help during the development of this article.

You can contact the author at 710 Grove Ct, Loveland, CO 80537-9325; **w0dz@arrl.net**.

Photos by the author.

Notes

[1]*ARRL Antenna Book*, 1988, Chapter 11, p 17-22.

[2]*ARRL Antenna Book*, 1988, Chapter 2, p 29-31.

[3]A copy of the program is available by sending a blank floppy disk with return envelope to the author (free via e-mail). The program runs on *Windows* 98, NT and 2000.

[4]M.W. Maxwell, "Some Aspects of the Balun Problem," *QST*, Mar 1983, pp 38-40.

[5]Texas Towers (**www.texastowers.com**, 1108 Summit Ave, Suite 4, Plano, TX 75074; tel 800-272-3467) provides 6063-T832 drawn aluminum, which is used by many antenna manufacturers and is reported to be a good alternative to 6061-T6 aluminum.

[6]The Wireman, Inc, **www.thewireman.com**, 261 Pittman Rd, Landrum, SC 29356; tel 800-727-WIRE. QST

By Ed Krome, K9EK

Getting Started with AMSAT-OSCAR 40

After months of anxiety about the health of Amateur Radio's most advanced satellite, hams worldwide may soon be rewarded with access to AO-40. Here's how to get started.

The long-awaited AMSAT Phase 3D satellite roared spectacularly into space on November 16, 2000. The launch into a geosynchronous transfer orbit by the Arianespace AR-507 launch vehicle from Kourou, French Guiana, was completely "nominal"; in other words, perfect. Initially, the 70-centimeter beacon was supposed to turn on within a few hours of launch, but did not do so. However, the 2-meter beacon turned on and worked well. The new satellite, christened AO-40, was heard worldwide.

On December 11, after the first 400-Newton bi-fuel engine burn, P3D/AO-40 became silent. The command stations, Karl Meinzer, DJ4ZC, Peter Guelzow, DB2OS, James Miller, G3RUH, Stacey Mills, W4SM, Graham Ratcliff, VK5AGR and others began recovery attempts immediately. The satellite was completely unresponsive. Amazingly, NORAD, which tracks thousands of space objects, was able to radar image AO-40 well enough to determine that it appeared to be in one piece.

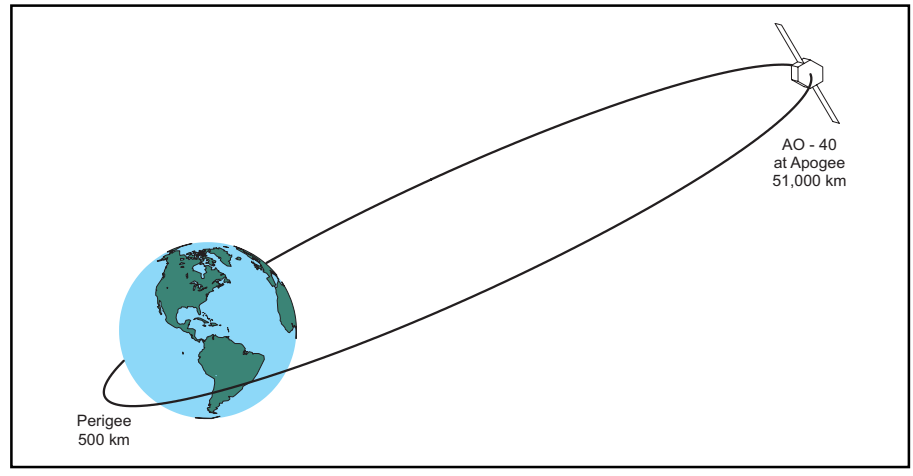
At least two automatic resets passed without hearing from the spacecraft. Then, on Christmas Day 2000, the second attempt to activate the S-band (2.4 GHz) transmitter was successful. AO-40 was still alive!

The good news—and there is really quite a bit of good news—is that the remaining satellite systems appear to be functioning normally. And although OSCAR 40 did not reach the inclination the team desired, its current orbit is stable and very useful. At the highest altitude of its orbit (the *apogee*), AO-40 seems to "hover" in the sky for hours at a time. We may have indeed lost our *downlinks* (satellite-to-ground transmissions) on 2 meters and 70 cm, but OSCAR 40 still has two fully-functional downlinks on 13 centimeters, as well as 2-meter and 70-cm *uplinks* (ground-to-satellite). This means OSCAR 40 still has the potential to be a fantastic DX satellite. The only difference is that you will need to set up equipment to receive on the microwave bands, which isn't nearly as difficult as you might think.

Before we start talking about hardware, however, one of the first purchases for your OSCAR 40 station should be satellite tracking software. You can't talk through the satellite until you know where it is! AMSAT's inexpensive PC- and Mac-based tracking software is highly recommended. In fact, these programs are tremendously interesting and instructive to "play" with—even if you never use them to track a satellite. Software sales provide a significant portion of AMSAT's operating and satellite-building funds, so when you purchase tracking software you'll know that you're doing your part in making AO-40 (and follow-on satellites) a reality. Just cruise on over to the AMSAT-NA Web site at **www.amsat.org**.

Communications Possibilities

Despite the damage, AO-40 still has a wide variety of operating frequencies and modes. Each individual transmitter and receiver has a common intermediate frequency of 10.7 MHz. All are connected to a central distribution network called the IF matrix. The IF matrix can be commanded to pair any uplink(s) with any downlink(s), providing the crossband, full-duplex modes that make satellite operation so different from terrestrial



AO-40's orbit is elliptical, which will give the satellite an outstanding "view" of much of the Earth. For hams on the ground, this means that we will have access to AO-40 for hours as it approaches every apogee.

AO-40 Ground Station Requirements

By Frank Sperber, DL6DBN

Uplink

Band	*EIRPc* [5]	*TX-power*	*Antenna*
435 MHz	21 dBWi	10 W 40 W	10-element X-Yagi$_2$ Crossed Dipoles over Reflector Plane[1]
1270 MHz	23 dBWi	10 W	12-turn Helix
2400 MHz	27 dBWi	5 W	60-cm Parabolic Dish[3]
5670 MHz	34 dBWi	10 W	60-cm Parabolic Dish

Downlink

Band	*GND-PEP/QSO* [4]	*Antenna*	*S/N*
2400 MHz	–167 dBWi	60-cm Parabolic Dish 14-turn Helix	26 dB 18 dB
24 GHz	–197 dBWi	60-cm Parabolic Dish	13 dB

Note: These are estimated values taken from the AMSAT-DL (AMSAT-Germany) Web site. The following are notes on the various types of antennas and terms:

(1) "Crossed dipoles over a reflector plane" is a pair of center-fed dipoles, mounted at 90° to one another, fed 90° out of phase, to produce right-hand circular polarization, suspended over a reflective sheet. This is a simple circularly polarized antenna with a predominantly vertical radiation pattern. Tracking is not required.

(2) "X-Yagi" ("crossed Yagi") is a right-hand circularly polarized Yagi antenna made with 2 sets of elements at right angles to each other. These elements are fed in a phase relationship that produces circular polarization. A "10-element X-Yagi" has two 10-element Yagis on a common boom. It is a relatively small directional antenna that requires tracking.

(3) "60-cm parabolic dish" is a 24-inch-diameter parabolic dish antenna with an appropriate feed for the band in use. Satellite tracking is required.

(4) "GND-PEP/QSO" is the signal strength of the satellite's signal on the ground.

(5) "EIRPc" is Effective Isotropic Radiated Power, circularly polarized, in decibels (dB) relative to 1 W. This is effective transmitted power from a combination of actual transmitter watts and antenna gain, referenced to an "isotropic" (point source) radiator.

communications. Theoretically, any uplink(s) can be paired with any downlink(s), though there are technical reasons why some pairings will never be used. Also, there can never be uplinks and downlinks in the same band at the same time. AO-40 isn't a repeater; it is a cross-band transponder. Because this allows so many combinations, a new mode naming convention has been adopted. Each band has an alpha designator. Both band designators, in the order of uplink/downlink, refer to a complete up/down schema. For example, the popular "Mode B," with its 70-cm uplink and 2-meter downlink, will now be referred to as "Mode U/V."

As of this writing, mid-May 2001, the following items have been found to be working: the 2-meter (V), 70-cm (U) and 23-cm (L) receivers (uplinks), both 2.4 GHz (S) transmitters, the magnetorquing (satellite orientation) system, the YACE (Yet Another Camera Experiment) camera, IHU-2 (Internal Housekeeping Unit – 2), both RUDAK (digital communications experiments), LEILA (the alligator-killer) and the high-gain antennas. The following items are believed not to be working: the 2-meter and 70-cm transmitters (downlinks), the 10-GHz (X) transmitter and the omnidirectional antennas. Status of the 5.7 GHz (C) receiver, the 360-THz IR laser transmitters and the 24 GHz (K) transmitter appear favorable. The power and battery systems appear to be working well.

Where Do I Start?

My suggestion is that you start by assembling the components you'll need for a Mode U/S station—transmitting on 430 MHz and receiving on 2.4 GHz. Unless the command team manages to recover the 2-meter and 70-cm transmitters, this is likely to become the most popular configuration. OSCAR 40 is transmitting telemetry on 2.4 GHz now and some limited 2-way operation is already taking place.

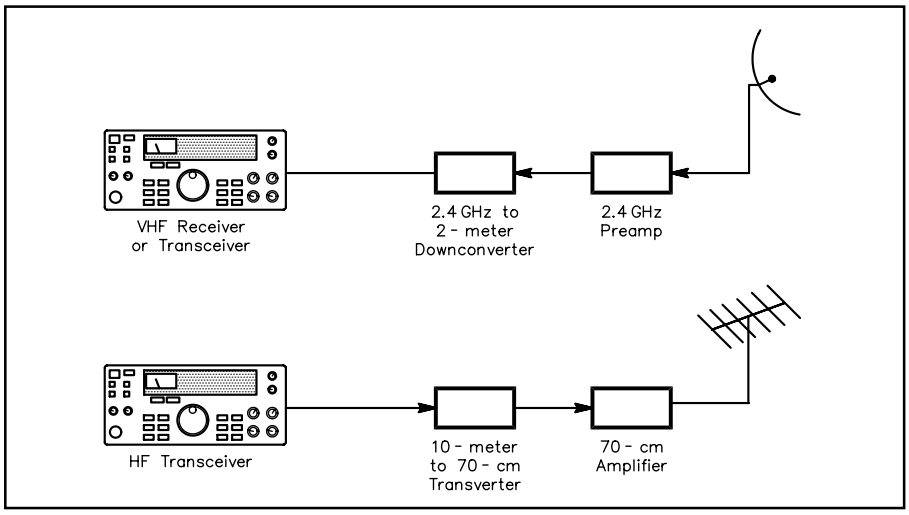
Antennas

There are a number of 2.4 GHz receive antennas available to you. Check out the Down East Microwave Web site (**www.downeastmicrowave.com**) and take a look at some of their 2.4 GHz loop Yagis and helixes. Other excellent choices include the Andrew 26T-2400 grid-style dish antenna and AirLink parabolic dishes. Both assemble in about 15 minutes—no tuning or other adjustments required. PC Electronics sells the Andrew dish. You'll find them online at **www.hamtv.com**. The AirLink antennas are available from SSB Electronic (see the "Resources" sidebar).

Also, Phillips-Tech offers grid-style MMDS dishes, complete with feeds, that are reasonably priced and work well. Find them on-line at **www.phillips-tech.com**.

For transmitting on 430 MHz, you don't need a monstrous antenna; it depends on how much transmitter output you can generate. The less transmitter output you have available, the bigger the antenna you'll need. For example, if you run 100 W output on 430 MHz, you will probably be able to get away with a small 6- or 8-element Yagi for your uplink antenna. Don't worry too much about antenna polarization at this point. Yes, it would be nice to have a circularly polarized antenna for your uplink, but AO-40 is so sensitive, you aren't likely to notice the 3-dB loss you'll incur by using just horizontal or vertical polarization.

What about an antenna rotator? Satellite tracking requires the ability to adjust the antenna in both the azimuth (measured in degrees clockwise from North) and elevation (measured in degrees up from the horizon). A new, off-the-shelf Az/El rotor can be expensive. If all you have is an azimuth rotor, you can use the characteristics of both the satellite itself and of your antenna to operate over a significant part of the satellite's orbit. First, use your tracking software to follow AO-40 through typical passes. Notice that the satellite is never directly overhead and spends most of its time in mid-elevation. Also, notice that, except around perigee (the point of closest approach to Earth), the orbit changes relatively slowly. Then, remember that an antenna's receiving pattern capability is not needle-sharp. It has a beamwidth over which it will provide satisfactory reception. If you set your antenna to 10-20 degrees elevation and lock it there, then follow the satellite in azimuth only, you will enjoy quite



A Mode U/S station could look something like this. A 24-inch parabolic dish antenna receives the 2.4 GHz downlink, which is amplified and then converted to 2 meters. Almost any receiver capable of listening to 2-meter CW or SSB could be used to monitor the converted signals. To transmit at the 70-cm uplink frequency, an ordinary HF transceiver could drive a 10-meter-to-70-cm transverter. A 70-cm RF power amplifier gives the necessary boost and the small 70-cm Yagi antenna sends the signal on its way.

a bit of "talk time" before the satellite disappears from your window.

Receiving and Transmitting

To operate Mode U/S remember that you need to transmit to the satellite on 70 cm and receive on 2.4 GHz.

The uplink is straightforward. You can use a 70-cm multimode rig as your uplink transmitter (possibly paired with a "brick" amplifier to generate a little more "oomph").

To receive on 2.4 GHz you will need to convert the signals from microwave to something lower in frequency—such as 2 meters. For this you'll need a *receive converter* (sometimes referred to as a *downconverter*) such as the Down East Microwave 2400RX or the SSB Electronic UEK-3000. You install the unit at your antenna so that the signal is converted right away before making the trip through the coaxial cable to your station (more about this in a moment). Most 2.4-GHz receive converters convert to 2 meters. So, you'll need a 2-meter all-mode receiver at your station. A number of HF transceivers now include 2 meters and these will work just fine in this application. Another alternative is an all-mode-scanning receiver. If you have only HF receive capability, you can obtain a 2-meter to 10-meter converter. The 2-meter output of the 2.4 GHz converter routed to the shack, where it is fed into the 10M-2M converter, then to the HF receiver, where it is received in the 10-meter band.

The same approach is used for reception on the higher bands.

As long as we're talking about hardware, another popular approach to setting up the foundation of a microwave satellite station is to simply buy a multiband (2 meters/70 cm or even HF through 70 cm) transceiver that includes satellite features. These rigs take a lot of the guesswork out of the whole operation. The ICOM IC-910H transceiver generates all the output you'll need to uplink on 70 cm and includes the 2-meter receiver for use with a downconverter. The same is true of the Kenwood TS-2000 and the Yaesu FT-847. If you prefer to buy used gear, check out the ICOM IC-821H, Yaesu FT-736 or Kenwood TS-790. Note that none of these radios cover the 2.4-GHz downlink, so you will still need to use a converter to receive.

More About Converters

As frequencies increase, frequency converters become the method of choice for a variety of reasons, both economic and technical. The complexity of a receiver or transmitter is in the interface between the RF world and the audio/digital world. By adding a receiving converter to a good quality receiver, the receiver's usage may be easily extended for a fraction of the cost of a complete radio. Older Drake and Collins radios, with their crushproof vacuum tube front ends and high selectivity, can be attached to converters to provide exceptional microwave performance. You can also generally plug one receive converter into another. For example, a 2.4 GHz to 10-meter converter is difficult to find, but you can plug a 2.4-GHz to 2-meter converter into a 2-meter to 10-meter converter. In my own weak-signal station, I have never owned a radio that would tune above 30 MHz. I simply plug one converter into another and eventually wind up somewhere in the 10-meter band. The frequency readouts aren't always exact, but it all works just fine.

The technical reason, which becomes more important as frequencies increase, has to do with noise. Overall receiving system performance is determined by the signal to noise ratio. For a given signal level, we can make a big difference in the quality of our received signal by lowering the noise part of the equation. And the most significant contributor to overall system noise is front-end noise. On UHF, natural noise from space (caused by electron motion) is very low. Man-made noise is also low. The noise comes from our amplifying devices and from the degradation of the signal between where it is received (the antenna) and where it is first amplified. Coaxial cable is the most common connection medium, and it is far from ideal. As frequencies increase, coaxial cable becomes progressively (and amazingly) lossy. If this loss occurs between the antenna and the first stage of RF amplification, it looks like noise and degrades the performance of the overall system. How do you prevent cable loss? The best way is to eliminate the cable. This is why mounting a low-noise preamplifier in the shack is nowhere near as effective as mounting the same preamp at the antenna.

By using converters, the highest-frequency amplifiers and conversion gear can be mounted remotely, right up at the antenna. Then the lower frequency output can be routed to the shack through inexpensive cable. High-quality commercial converters incorporate weatherproof construction and low-noise front ends and are designed for antenna mounting.

Digital Operation

AO-40 has a variety of digital experiments in dedicated subbands. There are two hard-wired 9600-baud modems (these require the same ground modems used for the 9600 baud LEOs) and 16 "agile" (programmable) modems attached to the RUDAK computers. Operation of both RUDAK CPU's with the 9600-baud modems and both 153.6 kBit/s high speed PSK downlinks has also been verified on the 13-cm downlink. Beacon telemetry, currently being transmitted on the 13-cm Middle Beacon, is 400 baud BPSK, the same as that on AO-10 and AO-13. W4SM's *P3T* (**www.cstone.net/~w4sm2/software2/P3t_AP.zip**) is the telemetry demodulator and analysis program. There is also a

Transponder Frequency Band Plan for AMSAT-OSCAR 40

Note: Frequencies shown are for transponders that were known to be functional when this article went to press. See the ARRLWeb at www.arrl.org for updates. All signals are digital, SSB or CW. FM is not permitted on AO-40.

Uplink Frequencies

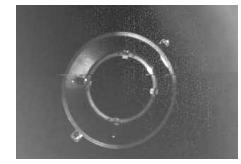
Band	Digital	Analog Passband
70 cm	435.300 - 435.550 MHz	435.550 - 435.800 MHz
23 cm(1)	1269.000 - 1269.250 MHz	1269.250 - 1269.500 MHz
23 cm(2)	1268.075 - 1268.325 MHz	1268.325 - 1268.575 MHz
13 cm(1)	2400.100 - 2400.350 MHz	2400.350 - 2400.600 MHz
13 cm(2)	2446.200 - 2446.450 MHz	2446.450 - 2446.700 MHz
6 cm	5668.300 - 5668.550 MHz	5668.550 - 5668.800 MHz

Downlink Frequencies

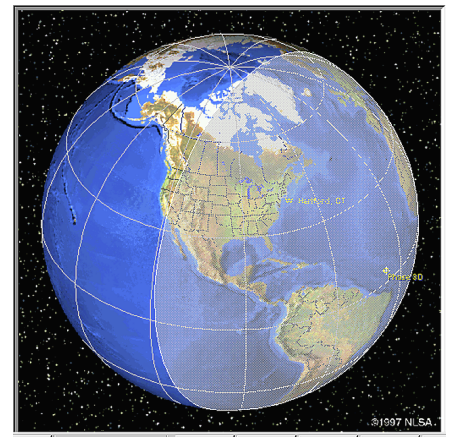
Band	Digital	Analog Passband
13 cm(1)	2400.650 - 2400.950 MHz	2400.225 - 2400.475 MHz
13 cm(2)	2401.650 - 2401.950 MHz	2401.225 - 2401.475 MHz
1.5 cm	24048.450 - 24048.750 MHz	24048.025 - 24048.275 MHz

Telemetry Beacons

Band	General Beacon (GB)	Middle Beacon (MB)	Engineering Beacon (EB)
13 cm(1)	2400.200 MHz	2400.350 MHz	2400.600 MHz
13 cm(2)	2401.200 MHz	2401.350 MHz	2401.600 MHz
1.5 cm	24048.000 MHz	24048.150 MHz	24048.400 MHz



The YACE camera aboard AO-40 captured this dramatic photo as the satellite moved away from the Ariane V rocket.



In this view, courtesy of *Nova* tracking software, you can see a typical example of AO-40's huge footprint. With this kind of coverage, the DX possibilities are fantastic!

popular sound-card demodulator program called *AO40RCV* (**www.qsl.net/ae4jy/ao40rcv.htm**) by AE4JY.

The satellite also has several cameras for the SCOPE and YACE (Yet Another Camera Experiment) experiments. The YACE camera has already taken pictures of the second stage AR-507 (launch rocket) separation. YACE is still functional although degraded since the December incident.

Let's Summarize

There isn't a "best" way to get into the satellite scene, but if you have no prior satellite experience, I recommend the following:

- Read the satellite chapter of *The ARRL Handbook*. You can buy it from your favorite dealer or order direct from the ARRL on-line at **www.arrl.org/shop/**
- Study the tables in this article. One lists frequencies. Another is a projection of uplink and downlink requirements. This gives you a pretty good idea of antenna size and transmitter power required for satisfactory communications.
- Get a good sat tracking program from AMSAT and learn how to use it. Play with it and get a feel for satellite motion.
- Subscribe to the AMSAT e-mail reflector. Read everything on the **amsat.org** and **amsat-dl.org** Web sites. These are the best sources of current AO-40 information.
- Visit the Web sites listed elsewhere in this article. Look at commercial offerings. Compare and contrast. Study. Think.
- Learn more about AO-40 and its capabilities. Decide what turns you on and what you want to do.
- Start at the beginning. Don't get too adventurous on your first foray into satellite operating. The better you understand the basics, the more sense the advanced stuff makes. This is fun, but can appear rather complex. After all, this *is* rocket science….

Resources

AMSAT-NA
850 Sligo Ave, Suite 600
Silver Spring, MD 20910-4703
301-589-6062
www.amsat.org
Tracking software: **www.amsat.org/amsat/catalog/software.html**

AMSAT-DL (Germany)
Lots of AO-40 information. English is available for many sections.
www.amsat-dl.org

Down East Microwave Inc
954 Rt 519
Frenchtown, NJ 08825
908-996-3584
www.downeastmicrowave.com

SSB Electronic USA
124 Cherrywood Dr
Mountaintop, PA 18707
570-868-5643
www.ssbusa.com

Phillips-Tech
PO Box 737
607 Parker St
Trinidad, CA 95570
707-677-0159
www.phillips-tech.com

Hamtronics
65 Moul Rd
Hilton, NY 14468-9535
716-392-9430
www.hamtronics.com

Postscript

AO-40 was first opened for general 2-way communications on May 5, 2001. The S2 (2401 MHz) downlink was paired with the U (435 MHz) and L1 (1269 MHz) uplinks. Although signal strength was highly dependent on squint angle, transponder performance was excellent. Many QSOs were completed with almost 80 different call signs noted during that first period of operation. At least a dozen stations were using L band uplinks, some with less than 10 W to a single Yagi or helix. Small "barbecue grill" truncated-parabola dishes seemed to be the most popular type of receiving antenna. Several stations reported good results with 16-turn helix antennas. That's a tiny antenna! Receiving converters ran the gamut from commercial (SSB, DEMI, Parabolic) to homebrew. Stock and slightly modified MMDS TV receiving converters were in wide usage. Overall performance, operation and satisfaction level was excellent. This is going to be a great satellite!

You can contact the author at 1023 Goldfinch Rd, Columbus, IN 47203; **k9ek@amsat.org**.

By Julio Volpe, EA5XX

Honduras 2000 "Radiosolidarity"

A group of Spanish amateurs volunteer to set up a packet radio network in Central America.

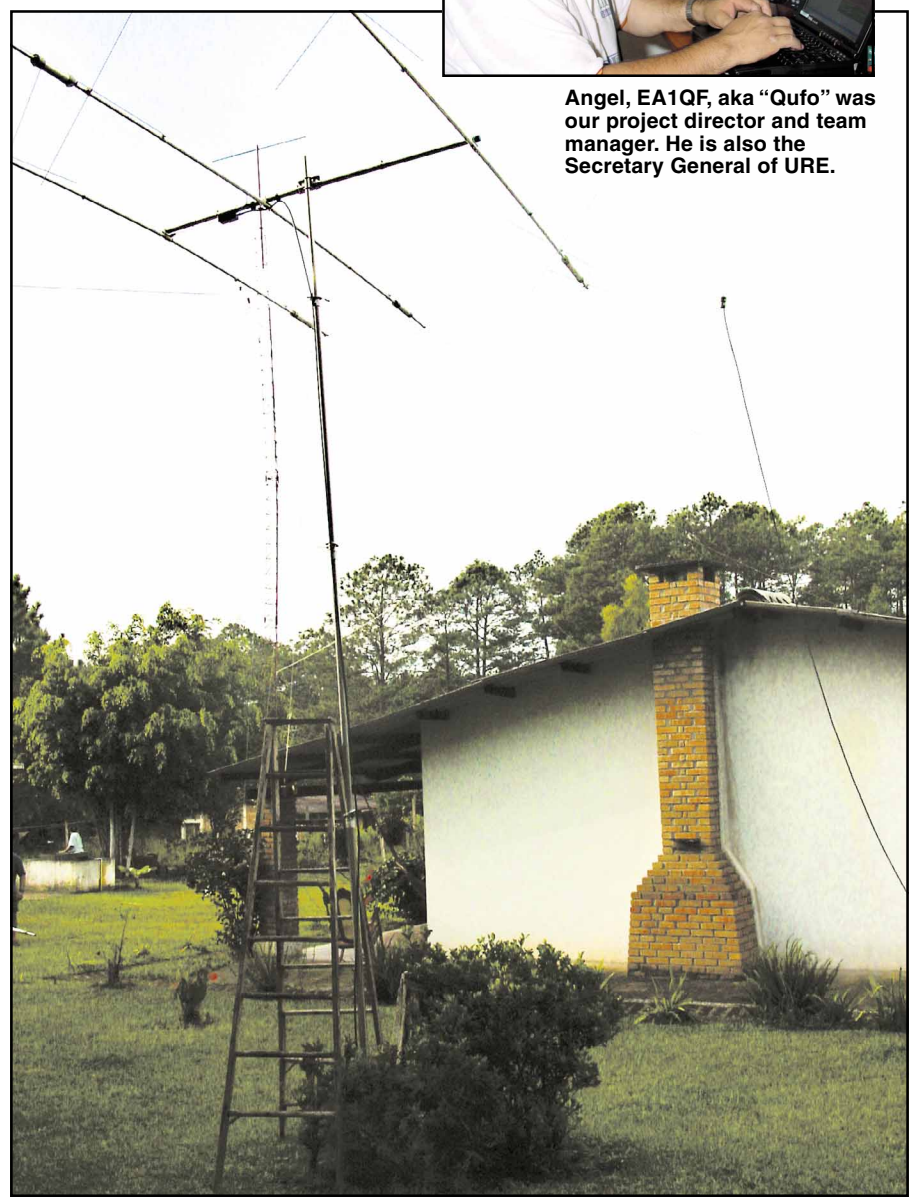
Angel, EA1QF, aka "Qufo" was our project director and team manager. He is also the Secretary General of URE.

Honduras was a big unknown for all of us. This Central American country, as big as the State of Ohio, entered our thoughts when it appeared on our TV screens in Spain for the first time a couple of years ago. That was when the terrible hurricane "Mitch" hit them. Our association, URE (Union de Radioaficionados Españoles) the national organization for radio amateurs in Spain and a member of IARU, believes in a new kind of DXpedition—one where we go to countries where radio amateurs can be helpful to the people.

As I reported earlier in *QST*, in 1998 we went to Cameroon, operated as TJ2RSF and installed a VHF net for the missionaries to use for communication between their hospitals in the deep tropical jungle (see "TJ2RSF, the Mission," October 1999 *QST*, page 32). In 1999 we traveled to El Salvador, where we operated as HU4U and took the first step in URE's ambitious project of providing a new packet radio network for Central America. In the year 2000, it was on to Honduras.

You may ask why a packet radio network? The answer is that we think that this is an ideal mode in a disaster zone. When the phones go out and electrical power is limited to a few hours each day, packet radio's store-and-forward technology handles the routing and delivery of messages better than other alternatives. It works well for tracing missing persons, requesting medicine and medical assistance, and sending and receiving weather reports. Many other types of messages can be sent and received by this useful mode.

Perhaps the most important fact is that we radio amateurs know how to install packet networks. Unfortunately, last year



On-air operations took place from this base camp.

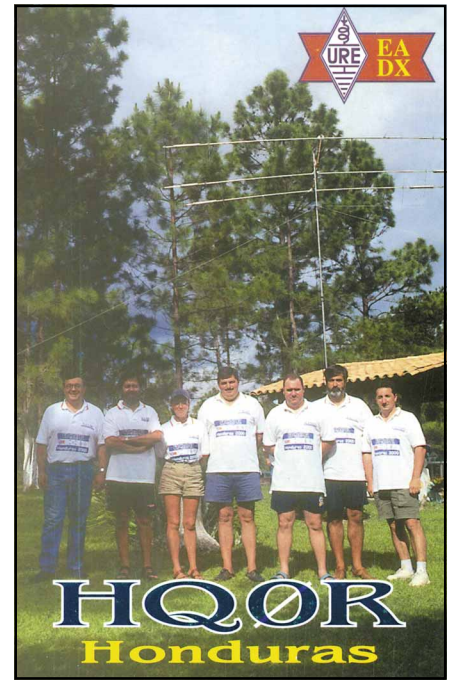
RadioSolidaridad

The following was taken from URE's Web page at **www.ure.es/honduras/honduras.htm**.

This is another of URE's "RadioSolidaridad" projects. It is part of a new concept in DXing, adding an important component: to help other countries with their Amateur Radio development.

URE (Union de Radioaficionados Españoles), with URR (Union de Radioaficionados de la Rioja), have been working on these activities for a while. TJ2RSF (1998), HU4U (1999) and now HQ0R (2000) are all part of these "RadioSolidaridad" expeditions.

The goal this year will be to install a new packet-radio net, and to teach our friends in HR-land how to keep it in good shape. We'll be working with Radio Club Tegucigalpa's amateurs and in the future they will be the operators of this new digital network.



If you worked HQ0R last year, you may already have received your QSL from EA4URE. Seven Spanish hams traveled to Honduras to install a packet-radio network to provide disaster communications for that Central American country. They also made nearly 15,000 QSOs from HQ0R.

a terrible earthquake hit El Salvador and put our network to the test. A few days after the earthquake from Spain we called Chisco, YS1FAF, CRAS president and he told us that the packet net was working nonstop providing vital communications in the area.

Departure and Arrival

We departed from Madrid's Barajas airport with all the necessary equipment to install the network. We also carried with us three amplifiers and a Yagi tribander that we would use in the HQ0R operation. From Madrid, we flew to Paris, Miami, Guatemala, El Salvador and finally Tegucigalpa. Our journey involved flying in five different planes. The trip took two days because of delays caused by problems with overbooking and "lost" baggage.

A lot of our friends from the Radio Club de Tegucigalpa (RCT) led by RCT President Oscar Suazo, HR1ORS, were waiting to meet us. They also gave us a lot of help in those first moments. It is very nice to have local friends when you arrive in another country with a lot of strange packages that will be inspected by very surprised customs officials. You DXpeditioners know what I'm talking about.

We made our base at the country house of Ramon, HR1RAP, in the Valle de los Angeles (Valley of the Angels), which is about 25 miles from Tegucigalpa, the capital city of Honduras. This house was exactly the place we needed to set up our mini antenna farm and perform the last test of all the equipment before installing the network nodes. As soon as we arrived at the house in the green Central American forest where we were to stay, we divided our group into two teams. One team was in charge of the activation of the HQ0R from the base camp and the second group made ready to install the central BBS and the nine digipeaters we had brought from Spain.

Establishing the Network

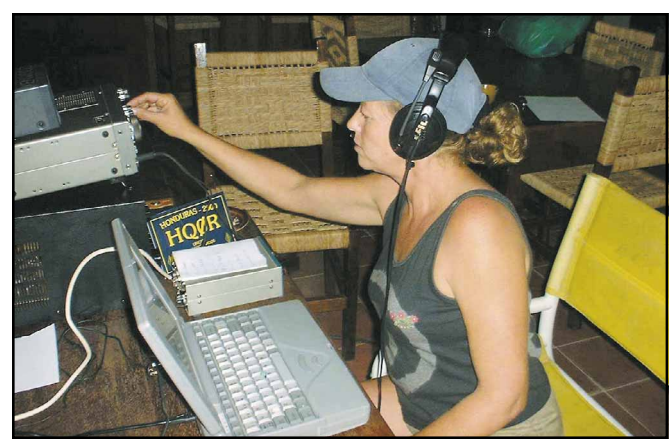
Our first step was to install the BBS at the Tegucigalpa headquarters of RCT, and for this job we had the help of many RCT members. (In fact, RCT members were there to help us with just about everything we did—even with our trips to the supermarket to buy food.)

Fortunately, there was a high tower at the RCT headquarters building on which we could install the VHF antenna. Tegucigalpa has a lot of hills and it is very difficult to cover the whole city. With a lot of help from Honduran hams we finished our work in a couple of hours, and before the hard morning rain began to fall, HR1BBS was on the air.

When any DXpeditioner installs something new in another country it is not enough to leave it working. It is very important to show the local folks how to use and maintain the equipment. This was our concern, and for that reason we spent a lot of hours teaching the new sysops how to run the software and to keep TNCs, transceivers and PCs working correctly. Our friends from RCT made us feel like great teachers because they learned very quickly.

The Pan American volcanic mountain chain runs from Mexico through Panama, dividing Guatemala, El Salvador, Hondu-

Pere, EA3CUU, pauses for a photo while working the HQ0R pileup.



Belinda, EA8NN, showed her great skill while making QSOs on CW.

The author (left) and Toni, EA5RM, waiting at the Guatemala airport.

Standing, from left to right: Paco Crespo, EA4BT; Luis Alonso Suazo, HR1LAS (one of the many Honduran hams that worked shoulder-to-shoulder with the Spanish hams on this project); Belinda de Leon Cabrera, EA8NN and Pere Crespo, EA3CUU. Kneeling, left to right: Toni Gonzalez, EA5RM; Jose Aguado, EB1ADG and Angel de Pazos, EA1QF.

ras and Nicaragua. A site in that chain was our selection to install node number 1.

The Hula mountain is 1685 meters above sea level and its evergreen volcanic crater was the location that we chose. We drove through heavy rain and wind caused by Hurricane Norman. We drove along very rough and narrow country roads, climbing and climbing until we arrived at our destination. Our global positioning receiver read 13° North, 87° West and grid locator EK63JW.

Later, I was watching my friend Chema, EB1ADG, on the 25-meter tall tower, as he installed the antenna more than 1600 meters above sea level. We were wet with the tropical rain that was driven by a strong wind blowing from the Fonseca Gulf in the Pacific. The experience made me realize that this was exactly what we try to accomplish in our new style of DXpedition—radio solidarity. A unity between peoples facilitated by Amateur Radio.

The thought that we Spanish hams were working atop a green Central American volcano to create a VHF net more than 6000 miles from our homes caused tears to trickle down my face. To me, it was living proof that radio amateurs are trying (and succeeding) to go beyond the traditional 59(9) operation, and URE is supporting it.

When the antenna was in place, we installed the TNC, the power supply and the transceiver in the cabinet that they had there. At that time, my emotions were very high. When we turned on the equipment, we could talk to a friend in Tegucigalpa, and he told us that the node was hearing a number of other nodes. One node from Guatemala, another from El Salvador and one from Nicaragua were listed as heard.

We installed the rest of the network without any problems. We left some equipment behind with our Honduran friends for later installation. That meant our mission was a complete success.

HF Activity

On-the-air activities provided a break, as well as a lot of fun, for us. We made nearly 15,000 QSOs in an all-band effort on SSB, CW and other digital modes. Our principal effort was on CW where Pere, EA3CUU, and Belinda, EA8NN, operated in a 24-hour-per-day effort. They made a special effort on 30 meters, where they quickly found themselves on the list of the "most wanted."

Paco, EA4BT, and Toni, EA5RM, manned the 1-kW SSB station in an around-the-clock operation. They made a lot of Europeans happy on 18 and 24 MHz. Paco, EA4BT, made dipoles for 40 and 80 meters that helped us make a lot of QSOs despite a high noise level.

Angel, EA1QF, worked a lot of surprised RTTY operators. Angel also delighted many hams by giving them a QSO on the 6-meter band.

Chema, EB1ADG, and I came back to the base every night very tired from the installation job. We would only appear on the bands when other members of the team took a break to "recharge forces" or plan the day to come and the strategies on the bands.

The pictures tell the rest of the story. I hope our team had the pleasure of working you during this operation. If not, we hope to see you from our next Radiosolidarity expedition.

Julio Volpe, EA5XX, is the DX Editor for Radioaficionados*, which is the monthly journal of URE. Julio is also URE's National RadioSolidaridad Manager, which puts him in the leadership for projects like the one described in this article. He was first licensed in 1993 as EA5ADC. Julio calls Alicante on Spain's Mediterranean coast home, but he's also lived in Uruguay and Michigan. You can contact Julio at PO Box 4062, 03080 Alicante, Spain;* **ea5xx@arrl.net**.

By Vic Curtis, WA3YUV

Fessenden Lost and Found

When you think of the pioneers of radiotelephony, what names come to mind? The first on your list should be a person whose name you probably won't recognize—Reginald Fessenden.

I became aware of Reginald Aubrey Fessenden thanks to a special event operation sponsored by the Southern Maryland Amateur Radio Club (see the sidebar, "Radio's First Voice—the 100th Anniversary"). The club was invited to set up their station at the Vickers House on Cobb Island, Maryland (now the home of the Chapman family) where Fessenden made radio history with the first voice transmissions.

The year 2000 marked the 100th anniversary of Fessenden's remarkable achievement, and to commemorate the occasion I decided to research the history of the first wireless voice communication. I thought it would be a 10-minute read through an encyclopedia, but I quickly found myself immersed in a fascinating (and often entertaining!) story. Fessenden's tale is one of secrecy, presidents and sea captains. It also includes an anecdote about how his progress was almost scuttled by the power of Limburger cheese. More on that later.

"Reg"

Reginald Fessenden, or Reg as his friends called him, was born October 6, 1866 in Knowlton, Quebec, Canada. By the age of 21 he was working with the likes of Thomas Edison and other visionaries. He later experimented extensively with radiotelegraphy at Western University (now the University of Pittsburgh). Although he never did graduate from a university, his work at Purdue and Pittsburgh earned him the title of "professor."

From his earliest years as an inventor, Fessenden was obsessed with the idea that voices could be transmitted and received by radio. Conceiving such an idea was one thing; making it a reality was quite another.

A Radio Pioneer

It was a different world for the radio

experimenters in 1899. RadioShack was still decades in the future and tiny, solid-state transceivers with digital signal processing could not even be imagined. At the turn of the 20th century, you made your own radio components by hand.

Even in those early days, Fessenden was already ahead of his time. He had decided that the spark-gap transmitters were inadequate for the transmission of voice. He reasoned that he needed a *continuous wave* of radio energy to carry his voice, like the ripples in a pond after a rock is thrown in. In fact, Fessenden gave us the term "continuous wave," later abbreviated "CW."

The spark transmitters of the time were damped-wave types. The short bursts of energy provided by these transmitters were good enough for the buzzes and clicks of Morse code, but not terribly useful if your goal was to sing a Christmas carol or play the violin over the air.

Reg felt that it might be possible to generate something close to a continuous wave if the transmitters could produce about 10,000 bursts per second. (This was like asking a car to do 150 miles per gallon today.) A fellow by the name of Kintner, an assistant who was working with Reg at the time, was given the task of designing such a transmitter. Another gentleman named Brashear, an optician by trade, became an RF technician and was assigned to build the interrupter. The working prototype was in Reg's hands by early 1900. It needed only to be tested in a practical application.

Cobb Island

The US Weather Bureau was interested in using radio to relay observations, but the range was not yet great enough to be practical. They contacted Fessenden and asked if he could perfect long-range radiotelegraphy equipment for them. Willis Moore, the Chief of the US Weather Bureau, asked Fessenden to write a proposal. Reg drafted the proposal and it was accepted.

Fessenden was given the job of extending the reach of radiotelegraphy for the princely sum of $1.50 an hour or $3000 a year. That was an excellent wage in 1900. His assistants would receive 60 cents an hour or $1200 per year.

Reg asked another assistant, Frank Very, to join his team. Frank accepted and suggested that they might use the Vickers house at Cobb Island on the Potomac River as their headquarters. (Frank Very's sister lived on the island.) They thought it would be a good site far from prying eyes.

Perfecting Telegraphy or Telephony?

The Weather Bureau wanted to send Morse messages back and forth to ships at sea and other remote locations. That was fine, but Reg was more interested in continuing his voice transmission work—especially since he already had what he

believed to be a working transmitter.

The Bureau assigned Alfred Thiessen to help with the radiotelegraphy experiments. When Thiessen learned of Fessenden's ambition to send audio over the airwaves, he was captivated. Fortunately, Theissen was discreet in his reports to the Bureau, and for good reason. If word had reached the Bureau that Fessenden was working on telephony, he would have been fired immediately. Willis Moore was quoted as saying, "We want nothing to do with that sort of quackery. My superiors would laugh me right out of the Bureau, right out of the country if they found me wasting the taxpayers' money on such tomfoolery."

Fessenden did indeed improve on the radiotelegraphy system as promised, even though his evening hours were spent pursuing telephony. The progress in radiotelegraphy wasn't wasted. In fact, Reg and his assistants worked diligently at extending the distances covered for radio transmissions of all types. For example, Fessenden developed a detector that greatly improved the sensitivity of receivers. He called his detector a *barretter*, which means "exchanger" in French. He named it so because the barretter "exchanged" the RF energy to audio that he could hear in his headphones.

The letters that Very sent home describe some of the Cobb Island work. In May 1900 he wrote, "I am studying the entire subject of wireless telegraphy. A good deal of the writing of the record will perhaps fall to me, and I must do it intelligently. The ideas are novel, and the whole thing is very interesting." In August of 1900 he writes, "My part of the work has been largely the construction of apparatus. I have been winding a great many coils of wire of different lengths and diameters; some of these are found to work better than others. The results can be partly explained by theory, but there are some things whose meaning we do not yet know, and shall be able to explain in time if we keep on experimenting."

December 1900

The date is December the 23, 1900. Reginald Fessenden is on Cobb Island. Alfred Thiessen is one mile away. Reg fires up the steam engine to run the generator and checks the connections to his

Radio's First Voice—the 100th Anniversary

On December 23, 1900, from Cobb Island, the small isolated island in the Potomac River at the southern tip of Maryland, Professor Reginald Fessenden made history when he used a modified spark gap radio to transmit the first words over the air.

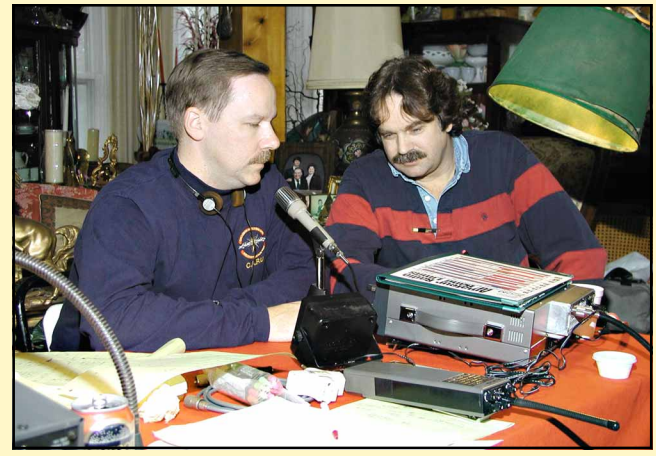
Many know the achievements of Marconi, but very few heard of Reginald Fessenden. Nevertheless, efforts by Southern Maryland Amateurs to recognize and preserve Fessenden's contributions to the origins of voice communications have been ongoing for more than a decade.

On December 1, 1990, members of the Southern Maryland Amateur Radio Club (SMARC) operated a 90th anniversary commemorative station in the historic Vickers House, Fessenden's Cobb Island laboratory and the site of the first voice transmission. Ten years later, while the world was preparing for global meltdown from the Y2K bug, SMARC and the Charles County Amateur Radio Club (CCARC) planned a unique collaborative commemorative effort. To recreate the event, each club operated unique special event stations located as close as possible to the original sites where Fessenden and Thiessen conducted their experimental telephony transmissions. With the flip of a coin, SMARC would set up at the Vickers House using W3F and CCARC would set up at the Cobb Island Community Center using W3T (setting up at Neale Sound, the actual location of Alfred Thiessen's receiving station, was rather impractical).

Over the next few months CCARC and SMARC planned different aspects of the "Radio's First Voice" operation. Historical research was conducted at the Library of Congress, with local and county historical societies, on the Internet, and the most important source, information gathered over many years by Joanne Chapman, the current owner and resident of the Vickers House. We soon nailed down the technical requirements for establishing dual HF stations one mile apart from each other as well as the operating frequencies, times, modes, special postal cancellation stamps and participation certificates. Distinctive QSL cards were designed to tell the history of the event while uniquely identifying each station. The activity managers and public information officers sent press releases to *QST*, local radio stations, television stations, and newspapers.

After a hardy breakfast on Saturday, December 16, a caravan of antennaed vehicles worked its way to the southern tip of Maryland. We were grateful to find a well-maintained bridge onto the island, something that didn't exist in 1900. The weather cooperated by being rainy, damp, windy and cold. (Amateurs can't put up towers or antennas in nice weather. I believe that is a subset of Murphy's Law.) Slingshots in hand,

Here's most of the gang in the Cobb Island Community Center. From left to right: Lee Flick, N3YWZ; Ben Flick; Frank Carson, N3OCW; Jim Gormley, N3SFY; Vic Curtis, WA3YUV; Art Audley, AA3RT; Allen Stevenson, KA3ZPA; John Foote, KB3EHK, Greg Jones, K3GJ and Bob Martin, W3LZX (seated).



Frank, N3OCW, is making his first ever HF QSO from the house where Fessenden made *his* first voice QSO. Vic, WA3YUV, is struggling to stay awake (4 AM came awfully early!).

new telephony transmitter and interrupter.

He taps out a message in Morse to Thiessen, warning that he is about to attempt voice communication. Reg shouts into his microphone. Thiessen telegraphs back, "Professor, your voice sounds like the flapping wings of a flock of birds; I can make no sense from it!"

Reg is frustrated to say the least. He shuts down the steam engine and ponders the situation. He decides to try one more time. Reg fires up the steam engine and notices that it runs faster and smoother than it did before. Could this have been the problem? He telegraphs Thiessen that he would try again.

Fessenden shouts into the microphone, "One, two, three, four. Is it snowing where you are, Mr. Thiessen? If it is, telegraph back and let me know."

"Yes, it is!" is Thiessen's excited response.

Reg noted the event in his log excitedly: "This afternoon, here at Cobb Island, intelligible speech by electromagnetic waves has for the first time in the world's history been transmitted."

Wireless voice was born that instant on Cobb Island, Maryland.

The Limburger Incident

In 1901 Fessenden was directed by the Weather Bureau to relocate his operations to Manteo, North Carolina. This was a serious undertak-ing, especially when you consider that he wanted to transport several huge wood antenna masts along with the rest of the heavy cargo.

Winter is not the best time of the year to take an overloaded ship out on Chesapeake Bay. As luck would have it, there was a storm waiting for them. With the masts in tow, the captain headed into the storm while Fessenden used the opportunity to enjoy a snack of one of his favorite foods: pungent Limburger cheese.

The captain was already upset, fearing he might lose his ship, and the "fragrance" of Limburger sent him over the edge. He raged at Fessenden, demanding that the masts be cut loose and that the offending cheese be thrown overboard. Fessenden resisted and the two nearly came to blows.

They finally compromised. The precious masts stayed, but the Limburger was cast overboard in a sack and towed

we began to raise antennas, feed lines appeared and soon radios began to crackle.

Concurrently, the great folks of Cobb Island set up historical displays and got the coffee and cookies flowing. At 10 AM all four stations (two at each location) roared to life. The next six hours were indescribable as pileup after pileup was worked as fast as we could operate and log. We later found out that one of our members, JD, W3SMD, was posting special event information on every DX cluster he could find. Like a decade before, a link with the actual historic event was made when Gwynne Very-Griswold, granddaughter of Fessenden's assistant, Frank Very, again stepped up to the microphone to make a contact, this time with a station in New Mexico. Despite the rain, many of the Cobb Island residents visited, as did members of the press and people who had heard about the event. Even after making 523 contacts, everyone wished we could have continued to give more folks the opportunity to participate in this special event.

A joint special-event memory book will be developed and presented to the Cobb Island Historical Society. The book will contain the background, pictures, articles, and other related materials about our activities.

What will the future bring? Maybe there will be a 105th anniversary of "Radio's First Voice"; only time will tell. But we are satisfied that we have done our part in telling the world about the event that occurred on Cobb Island on December 23, 1900. Fessenden changed the way the world communicated.—*Gregory W. Jones, Sr, K3GJ*

The Charles county crew fights the cold and rain to get the antenna up at the community center.

Bill, KE3RE, and Bob, W3LZX, keep W3T on the air in a big way.

Frank, N3OCW, is learning how to hold a wire the proper way.

behind the ship with the masts. Somehow they made it to Manteo with the equipment intact and the masts were used again. The fate of the waterlogged Limburger is unknown.

North Carolina

It wasn't long after their arrival that Moore finally discovered that Fessenden had been working on the forbidden voice transmitter. Since "tomfoolery" had become reality, Moore recognized the vast potential. He responded by demanding that Fessenden sign over nearly half of the new telephony patents to him. If Fessenden refused, he would be out of a job and the Bureau's funding would cease.

On His Own

Reg continued his work with the Bureau and saw great progress, although he complained bitterly about the quality of the men sent by the Bureau to assist him. At one point he wrote directly to "His Excellency the President of the United States of America Mr Theodore Roosevelt" to complain about the condition and the contract he had with the Weather Bureau.

In August 1902, Fessenden left the Bureau. The work continued for a few months without him with disastrous results. The stations were shut down and the equipment that had made history was sold at auction.

Soon after leaving the Weather Bureau, Fessenden, with the help of some wealthy partners, formed the National Electric Signaling Co (NESCO).

On Christmas Eve 1906 from Boston he made a special broadcast, playing "O Holy Night" on his violin, speaking and singing. It was the first radiotelephony broadcast to the general public.

The next 10 years were fraught with conflict. In 1912 he was ousted from NESCO after he had some disagreements with his partners. In 1914 the American Marconi Company purchased a license to Fessenden's patents from NESCO. The Marconi Company capitalized on Fessenden's discoveries, and soon began developing products that infringed on his patents. Other companies did the same. Fessenden protested, then sued Marconi, General Electric, Westinghouse and finally RCA, accusing them all of patent infringement. Years after he started the fight they reached an out-of-court settlement for $500,000, with $200,000 going to his lawyers.

Reginald Fessenden died at his seaside home on the island of Bermuda in 1932. Among the inscriptions on his burial vault is a curious line of Egyptian hieroglyphics. They translate to: "I am yesterday and I know tomorrow."

The author wishes to thank Dr John S. Belrose, VE2CV, for his assistance. Jack's article on Reginald Fessenden can be found at: **www.ieee.ca/millennium/radio/radio_about.html**.

Event photos by Ken, KA3POX.

You can contact the author at PO Box 316, Cheltenham, MD 20623-0316; **wa3yuv@erols.com**.

QST

NEW PRODUCTS

2.4-GHZ BASE STATION ANTENNA FROM ANTENEX

◊ Antenex Inc has released a new family of omnidirectional base station antennas that are suitable for use on the upper end of the amateur 13-cm band: 2.4 to 2.45 MHz.

The FG24003 features a white, high gloss, heavy wall, fiberglass radome and a gold anodized aluminum mounting sleeve and top cap. A trace on PC board material within the radome serves as a collinear element.

The FG24006 is a very similar—but taller—antenna that delivers a higher level of performance. Both use nickel-plated brass female N connectors for feed line connection. A mast mounting kit for these antennas—the FM2—is sold separately.

For more information on the FG24003 and FG24006 and the entire line of Antenex antennas, antenna mounts and antenna related products, visit your favorite Amateur Radio equipment dealer or contact Antenex, 2000-205 Bloomingdale Rd, Glendale Heights, IL 60139; tel 800-323-3757 or 630-351-9007, fax 630-351-9009; **www.antenex.com**.

VERNIER DIALS WITH INTEGRATED SCALES FROM NATIONAL RF

◊ National RF has released a new series of vernier driven analog dial assemblies that can be used in a variety of tuning applications.

Three models are available. The NPD-1 has a scale that measures $2^{3}/_{4} \times 3^{3}/_{4}$ inches and utilizes a $1^{1}/_{2}$-inch diameter 6:1 vernier drive, the NPD-2 has a $5^{1}/_{8} \times 3^{5}/_{8}$ scale and a 2-inch diameter 6:1 drive, and the NPD-3 features a $5^{1}/_{8} \times 3^{5}/_{8}$ scale and a 2-inch diameter 8:1 drive. The couplings on all three models are set up for $^{1}/_{4}$-inch shaft diameters. Each comes complete with two uncalibrated paper scales and a clear plastic scale protector.

Price: NPD-1, $34.95; NPD-2, $44.95; NPD-3, $49.95. For more information contact National RF Inc, Radio Engineers Division, 7969 Engineer Rd, Suite 102, San Diego, CA 92111; tel 858-565-1319, fax 858-571-5909.

AUTOMATIC LOGGING ADDED TO CSS MULTIMODE TNC SOFTWARE

◊ Creative Software Services has announced the addition of "AutoLogging" to their *PacTerm '98*, *PKTerm '99* and *MultiComm* host/multimode software packages.

This new feature allows users of CSS's *Log Windows* and Scientific Solutions' *DXBase 2002* logging programs to input contact information directly from within the TNC software, eliminating the need to toggle between two separate applications.

PacTerm '98, *PKTerm '99* and *MultiComm* run under *Windows 95/98/Me*, *NT*, *2000* and the forthcoming *Windows XP*.

The host/multimode software packages sell for $79 each. Demo versions are available for download from the company's Web site. For additional information visit your favorite Amateur Radio products dealer or contact Creative Services Software, 503 W State St, Ste 4, Muscle Shoals, AL 35661; tel 256-767-3739, fax 256-381-6121; **info@cssincorp.com**; **www.cssincorp.com**.

QST

Next New Products

By Steve Ewald, WV1X

2000 Simulated Emergency Test Results

THE REASON FOR SET

By Paul Beeman, W2PB,
EC for the Town of Islip, New York

It was a quiet Sunday afternoon. The sky was clear and sunny with soft, puffy white clouds. Then without notice, over the amateur airwaves of Islip came the announcement of a severe thunderstorm watch. This thunderstorm watch quickly escalated to a tornado warning. How could this happen with such speed?

A natural event? A freak chance? No, this scenario was used by the Town of Islip (New York) Amateur Radio Emergency Service (ARES) radio operators on Sunday, October 15, 2000, for their annual emergency preparedness drill.

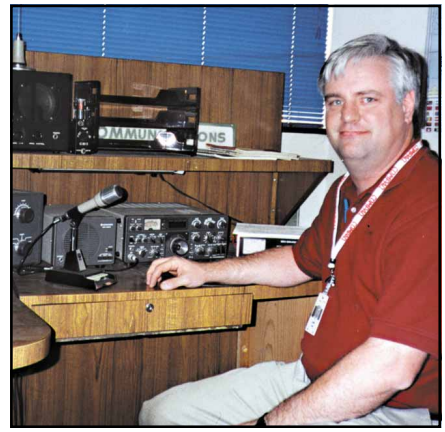
Using a local Amateur Radio repeater (K2IRG), 10 of Islip's ARES operators conducted their annual "disaster and emergency training drill." Over the next three hours, communications were established to support two evacuation shelters and communications to the town government.

In times of emergencies, such as hurricanes, wildfires, and airplane crashes, it is this group of trained, licensed radio operators that establish the much-needed communications within the disaster area, and often times, the outside world. The key to emergency communications is training, portable communications, speed of dispatch to the site, and the ability to stay on the air without support from the already stressed resources and agencies for long periods of time.

Thanks for Participating!

Thank you, Paul, W2PB, for summarizing the reasons so well for the annual ARRL Simulated Emergency Test (SET). The previous segment was excerpted from his press release to the *Suffolk Life* newspaper.

The 2000 SET results represent a great dedication by many radio amateurs across the country who are active in public service through their radio clubs, ARES, RACES (Radio Amateur Civil Emergency Service), SKYWARN and the ARRL National Traffic System (NTS). The annual exercise serves as an important training function, and is a showcase event to demonstrate the communication abilities that Amateur Radio operators can provide to their communities—especially during emergencies.



Jim Cordill, KI0BK, operates from the radio room at the Salvation Army Emergency Disaster Services Headquarters in Kansas City, Missouri. The Metro Communications Exercise on November 4 involved ARES and SKYWARN along with several area agencies, cities and counties.

2001 Set on the Horizon

The weekend of October 6-7, 2001, is the primary date for the next ARRL Simulated Emergency Test. Please contact your ARRL Section Manager and/or Field Organization leaders to learn about the plans for SET in your area.

THE TARHEEL EMERGENCY NET

By J. C. Chaffin, K4CWZ, Net Manager

The Tarheel Emergency Net (THEN) began in the late 1950s, and is the North Carolina HF ARES Net. Its purpose is "to provide communications during emergencies, to provide training in all aspects

2000 SET Top Ten

Section	*Points*
ARES Activity	
North Carolina	9688
Michigan	4730
Virginia	2224
New Hampshire	2147
Ohio	1976
North Texas	1655
Oregon	1532

Section	*Points*
Western Pennsylvania	1511
Eastern Washington	1357
Mississippi	1272
Section/Local Nets	
North Carolina	5933
Ohio	2023
Michigan	1178

Section	*Points*
Western Pennsylvania	1177
Western New York	980
Mississippi	822
Maryland-DC	559
New Hampshire	425
Kansas	403
Indiana	338

SET Scorecard

The points for ARES activity were awarded in the following manner:

Category	*Points*
A) Number of amateurs participating	2 (each)
B) Number of new amateurs (licensed since 1997)	3 (each)
C) Number of formal third party messages originated	1 (each)
D) Tactical communication was conducted on behalf of served agencies: (<0.5 hour, 5 points; 0.5-1 hour, 10 points, >1 hour, 20 points)	
E) Number of stations on emergency power during test	2 (each)
F) Number of emergency-powered repeaters used in test	10 (each)
G) Dual membership in ARES and RACES is encouraged	10
H) Liaison was maintained with an NTS section/local net	10
I) Digital modes were used during test	10
J) Number of different agencies for which communication was provided.	5 (each)
K) Number of communities in which agencies were contacted	10 (each)
L) Press release was submitted	10

The points for net activity were awarded in the following manner:

A) Total number of messages handled.	1 (each)
B) Number of different stations participating	2 (each)
C) Number of different stations checking in on emergency power	2 (each)
D) Number of new amateurs (licensed since 1997) in test	3 (each)
E) Number of net control stations	5 (each)
F) Number of different stations performing NTS liaison	5 (each)

JUNE JEFFERS, KB0WEQ

Simulated "victims" are treated for hazardous material exposure in Operation Joint Response 2000. This full-scale exercise on September 19 was held at Richards-Gebaur Air Force Base in Cass County, Missouri. ARES provided communications for the drill.

of net operations, to serve as a forum for discussions, and to provide fellowship among radio amateurs."

THEN is particularly concerned that new licensed radio amateurs are welcomed and become participants of all its activities. North Carolina Section Manager John Covington, W4CC, stated that he wanted as many stations as possible to have some experience as net control station (NCS), and THEN works hard to provide this opportunity. During the SET, many stations, old and new operators alike, took turns as NCS and as liaisons to HF and VHF nets and to the day and evening sessions of the NTS Fourth Region Net.

The appreciation that North Carolina Emergency Management has for ARES was a major factor in our successful exercise in 2000. NC4EO is the Amateur Radio station at the State Emergency Operations Center. This station's equipment and antennas have been upgraded, and the State EOC used the SET to give it a whirl. The eastern branch office of the State EOC also tested equipment during the SET. Many radio amateurs gained first-hand experience by operating these stations. The participation of a faithful group of experienced operators, an interested and enthusiastic group of new participants and the State Emergency Management's interest in Amateur Radio made the good score achieved by the Tarheel Emergency Net in the SET possible.

SET STORM IN BILLINGS, MONTANA

By Bob Rightmire, WA7YNU

The details of this emergency scenario were set up at two meetings of the Safety Outreach Committee and two meetings of the Yellowstone ARES. Members of the Safety Outreach Committee include weather forecasters from two TV stations, the Montana Highway Patrol, the National Weather Service (NWS), Yellowstone County Disaster and Emergency Services (DES), and a Yellowstone grant project under the Federal Emergency Management Agency (FEMA).

The simulation on October 18, 2000, started at 5:30 PM when the NWS announced a simulated winter storm watch using NOAA radio. Amateur Radio operators from throughout the county moved into positions at assigned siren locations. At 6 PM, the NWS issued a simulated blizzard warning over NOAA and all local radio and TV stations including cable. The emergency sirens were tested. Darren Evig, KC7TLO, Yellowstone ARES chairman, opened the Amateur Radio net and received reports from all the siren locations around the county. Two critical bits of information were gathered on behalf of the emergency service authorities: Did the siren sound, and did it rotate?

At 6:30 PM, the Montana Traffic Net on 3.880 MHz, joined the Yellowstone County SET when a message about the siren test was handled on behalf of the Yellowstone County DES administrator to the Montana State DES administrator in Helena. Because of 75-meter band conditions, a relay was used to get the message to its destination.

ARES Activity

Area	*Reporter*	*Points*	*Section Points*
Atlantic Division			
Eastern Pennsylvania			**763**
Lancaster Co	WB3FQY	528	
Monroe Co	N3ZUJ	235	
Maryland-DC			**466**
Charles Co	W3TOM	180	
Prince Georges Co	WI3N	143	
Anne Arundel Co	N3QXW	92	
Frederick	N8AAY	51	
Western New York			**1078**
Tompkins Co	N2WRC	296	
Chenango Co	K2DAR	239	
Onondaga Co	WA2PUU	166	
Herkimer Co	N2ZWO	164	
Broome Co	KB2YEN	140	
Delaware Co	WB2JOW	73	
Western Pennsylvania			**1511**
Beaver Co	K3NPX	414	
Erie Co	N3HPR	256	
Westmoreland Co	N3WAV	249	
Blair Co	KA3EJV	229	
Butler Co	N3XCD	180	
Fayette Co	K3FQI	118	
Jefferson Co	KA3YCB	65	
Central Division			
Illinois			**626**
Lake Co	K9DRW	333	
DeKalb Co	W9ICU	172	
LaSalle Co	KF9NZ	121	
Indiana			**713**
Whitley Co	WB9UNL	205	
Vigo Co	N9YNF	161	
Pike Co	WB9NCE	158	
Monroe Co	K9DIY	105	
Howard Co	N9LRO	84	
Wisconsin			**167**
Calumet Co	KN9P	167	
Delta Division			
Arkansas			**281**
Cross Co	W5WPN	235	
Hemp Co	W4LZQ	46	
Mississippi			**1272**
NW MS	KD5CKP	302	
E Central MS	WB5OCD	234	
Loundes Co	KD5FUO	204	
Central MS	AB5WF	171	
SW MS	N5ZNT	144	
Hancock Co	K5DMC	96	
Stone Co	KB5DZJ	88	
Lamar Co	KC5TYL	33	
Tennessee			**446**
Blount Co	KF4QVI	187	
Loudon Co	KM4H	126	
Carter Co	KD4INB	74	
Madison Co	AB4EG	59	
Great Lakes Division			
Kentucky			**656**
Fayette Co	KF4MOM	170	
Magoffin Co	KE4NLL	82	
Madison Co	KF4EBC	80	
Area 5	KA4MAP	77	
Johnson Co	N4KJU	77	
Michigan			**4740**
Kent Co	N8XOF	2142	
Alcona Co	W8SZ	438	
Monroe Co	KB8AIZ	363	
Iosco Co	KB8ZYY	353	
Ionia Co	N8ZMT	317	
Ottawa Co	N8GGO	279	
Jackson Co	N8RDP	191	
Ontonagon Co	W8UXG	190	
Bay Co	KC8BGK	149	
Midland	KB8QWQ	120	
Benzie Co	K8BTE	93	
Mason Co	KC8MWF	67	
Mecosta Co	W8PET	38	
Ohio			**1976**
Shelby Co	N8KZL	417	
Clermont Co	K8EC	329	
Portage Co	N8IIQ	237	
N Central Coast	K8HLH	230	
Jefferson Co	WA8DRL	151	
Adams Co	N8HIA	148	
Montgomery Co	KI8O	132	
Hancock Co	N8SNG	116	
Allen Co	W8TY	96	
Preble Co	N8XP	85	
Wood Co	N1RB	35	
Hudson Division			
Eastern New York			**361**
Hudson Valley Net	N2JBA	190	
Westchester Co	N2YGK	171	
New York City/Long Island			**133**
Islip	W2PB	133	
Northern New Jersey			**262**
Bergen Co	KC2AHS	166	
Chatham Borough	W2UH	96	
Midwest Division			
Iowa			**284**
Polk Co	WB0UCY	164	
DeMoines Co	N0EJD	120	
Kansas			**1250**
Metro Exercise	KB0WEQ	345	
Op Joint Response	KB0WEQ	266	
Dist 4, Zone 2	KC0CIG	165	
Wyandotte Co	K0BXF	151	
Dist 4, Zone 3	KB0WEQ	140	
Dist 3, Zone 29	K0FJ	135	
Zones 29, 30	KC0AUH	48	
Missouri			**254**
Jackson Co	K0UAA	141	
Macon Co	K0VNL	113	
Nebraska			**382**
SE Nebraska	W0ERT	221	
Omaha	AJ0A	161	
New England Division			
Eastern Massachusetts			**98**
Cape Code	WQ1O	98	
Maine			**108**
Piscataquis Co	WA1JMM	108	

New Hampshire 2147

RACES Liaison	WA1WOK	468
Belknap Co	N1FQP	323
E & W Coos Co	KH6GR	234
Merrimack Co	N1SKZ	194
West Hillsboro Co	W1DAY	182
Cheshire	WA1YZN	176
S Grafton Co	N1HAC	147
Manchester	W1ZIZ	127
Strafford Co	K1BD	123
W Rockingham Co	N1SNB	114
American Red Cross	N1HKO	59

Western Massachusetts 32

Franklin Co	N1SCC	32

Northwestern Division
Eastern Washington 1357

Whitman Co	KD7EWV	723
Spokane Co	KI7QT	634

Oregon 1532

Clackamas Co	KA7IJK	345
Okanogan Co	K7UK	235
Salem	WC7M	173
Deschutes Co	KC7CKC	171
Columbia Co	KC7ILK	170
Washington Co	N7OGM	147
Linn Co	WB9HZT	102
Umatilla/Morrow Co	N7ZHG	102
Benton Co	KB7WSY	87

Western Washington 364

Lewis Co	KC7QHJ	148
District 4	K7BL	127
Grays Harbor Co	N7UJK	89

Pacific Division
Nevada 176

Central W District	KA7AJQ	176

Pacific 170

North Hawaii	KH7T	89
Maui Co	KH6H	81

Sacramento Valley 168

Alturas	N6SSQ	107
Siskiyou Co	KE6MZT	61

San Francisco 196

Humboldt Co	KF6RZN	196

Santa Clara Valley 383

Cupertino	KN6PE	233
Monterey Co	KQ6FM	150

Roanoke Division
North Carolina 9688

Central Branch	K4NSM	2071
Guilford Co	KE4IAM	1932
Pitt Co	K4ROK	1524
Piedmont	KB1G	472
Mecklenburg Co	W4OH	422
Johnston Co	KD4BJD	421
Nash Co	KE4LXW	357
Alamance Co	N4MIO	330
Jackson Co	AD4XV	294
Currituck Co	KD4ATK	276
Gastonia Co	KD4YTG	275
Iredell Co	W4SDT	232
Lincoln Co	W4GY	210
Eastern Branch	WA4MOK	210
Wilson Co	KF4OFP	184
Cumberland Co	KL7NL	174
Union Co	WA3RTC	151
Stanly Co	W4KMA	123
Lenoir Co	KB4OHX	30

Virginia 2224

VOPEX	W4IN	380
Franklin Co	W4TLM	283
Loudon/Fairfax	KE4SKY	282
Chesterfield Co	KA4CBB	181
Gloucester Co	KE4NBX	177
Giles Co	W4PAJ	170
Frederick Co	WA4VE	130
York, Poquoson Co	W1CLS	116
Fairfax Co	KE4SKY	101
Winchester	KE4PMS	98
Williamsburg	KC4CMR	96
Newport News	N4ZBV	72
Falls Church City	KC1AD	70
Clarke Co	KF4TNX	68

West Virginia 250

Marshall Co	N8FQN	104
Summers Co	W8KBM	80
Fayette Co	N8BJY	66

Rocky Mountain Division
Colorado 259

Dist 24	W6AUN	155
Dist 3	N6EUP	104

Southeastern Division
Georgia 674

Marshall Co	AC4B	345
Gwinnett Co	N4VHA	201
Long Co	KF4ZUR	128

Northern Florida 556

Orlando	W1WLH	406
Seminole Co	KK2Y	150

Southwestern Division
Orange 459

Hemet, San Jacinto	N6PLV	285
San Bernardino Co	N6RPG	97
Inyo Co	KE6MGO	77

Santa Barbara 411

San Luis Obispo Co	KE6FKS	264
Santa Barbara Co	W9EC	147

San Diego 153

Southern District	K6FQ	153

West Gulf Division
North Texas 1655

Wichita Co	W5GPO	929
Coppell/Carrollton	KA1CWM	349
Nacogdoches Co	KK5BE	215
Irving	KA5OZC	162

South Texas 523

Travis Co #1	KB5VYT	390
Travis Co #2	KB5VYT	133

West Texas 168

Brewster Co	N5DO	168

Section/Local Nets

Atlantic Division
Eastern Pennsylvania 188

Allentown	N3SIG	188

Maryland-DC 559

MEPN	N3WKE	140
Charles Co	W3TOM	123
Prince Georges Co	N3IOU	94
Ann Arundle	N3QXW	78
MDD	WJ3K	76
Maryland Slow Net	KC3Y	48

Western New York 980

OCTEN	KA2ZNA	458
NYS/Early	WB2QIX	143
NY Phone Net	N2LTC	112
CNYTN	WA2PUU	109
CARES	K2DAR	69
Southern Tier	N2NCB	49
TIGARDS	W2MTA	29
NYSCN	W2MTA	11

Western Pennsylvania 1177

Beaver Co	K3NPX	414
Blair ARES	KA3EJV	203
WPA Phone & Traffic	N3KB	161
Erie Co ARES	N3HPR	156
Coreen	AA3KC	125
Westmoreland Co	N3WAV	118

Central Division
Illinois 249

Lake Co	W9FUL	147
DeKalb Co	W9ICU	102

Indiana 338

Whitley Co	WB9UNL	100
Wabash Valley	N9YNF	121
Pike Co	WB9NCE	73
Monroe Co	KB9UVW	44

Wisconsin 77

CARES	KN9P	77

Delta Division
Arkansas 151

Cross Co ARC	W5WPN	133
Hemp Co	W5LZQ	18

Mississippi 822

MS Phone Net	N5JCG	419
Meridian Area	WB5OCD	129
Magnolia ARC	AC5MR	86
Capital Area	K5XU	53
West Central MS	WD5HXB	53
JARC	AB5WF	51
Stone Co	KB5DZJ	31

Tennessee 262

Blount Co	KF4QVI	184
Carter Co ARES	KD4INB	45
Madison Co	AB4EG	33

Great Lakes Division
Kentucky 67

Madison Co	KF4EBC	42
Johnson Co	N4KJU	25

Michigan 1178

Alcona Co	W8SZ	243
Jackson Co	N8RDP	168
Bay Co	KB5TOJ	134
Monroe Co	KB8AIZ	122
Ottawa Co	N8GGO	119
SEMTN	WI8K	109
ICARES	WB8VAV	95
Ontonagon Co	W8UXG	90
Benzie Co	K8BTE	62
Crop Walk	KB8TYJ	36

Ohio 2023

OSSBN	N8IO	547
C OH Tfc Net	N8RRB	477
Shelby Co	NO8C	330
Portage	N8IIQ	195
NW OH ARES	N8TNV	164
DeForest ARC		132
Burning River	KF8FE	92
Hancock Co	N8SNG	56
Wood Co	N1RB	30

Hudson Division
Northern New Jersey 96

Bergen Co	KC2AHS	96

Midwest Division
Iowa 138

Polk Co	WB0UCY	118
Des Moines Co	N0EJD	20

Kansas 403

KSN, KPN	N0KFS	278
Trojan ARC	K0FHJ	65
QKS	WB0ZNY	60

Missouri 157

Jackson Co	K0UAA	94
Macon Co	N0DR	63

New England Division
Connecticut 105

Conn. Phone Net	N1DIO	105

New Hampshire 425

Merrimack Co ARES	N1SKZ	99
North Country ARES	KH6GR	99
Tri-State FM Emerg Net	N1VFM	95
S Grafton Co	N1HAC	77
W Hillsboro Co	W1DAY	55

Western Massachusetts 44

FCARC ARES	KC5KKS	44

Northwestern Division
Montana 78

Billings	WA7YNU	78

Oregon 326

District 1	AB7ZQ	191
Washington Co	N7OGM	65
HEART Net	K7ESM	41
BCARES	KA8ZGM	29

Western Washington 139

Pacific Co	KB7L	78
Grays Harbor	KB7EQW	61

Pacific Division
Nevada 119

Douglas Co	KK7AA	119

San Francisco 184

Humboldt Co	KF6RZN	184

Santa Clara Valley 81

ARES SET Net	KQ6FM	81

Roanoke Division
North Carolina 5933

Four Co ARES	KC4WXA	1630
Guilford Co	KE4IAM	1557
Tarheel Emerg Net	K4CWZ	682
Johnston Co	KC4CIZ	474
Triad SKYWARN	KB1G	387
Metrolina Net	N4YYN	297
Nash Co	KE4LXW	222
Jackson Co	AD4XV	135
Alamance Co	N4MIO	130
UCARS	WA3RTC	96
Stanly Co	W4KMA	92
Wilson Co	KF4OFP	84
CFARS	KL7NL	74
Currituck Co	KD4ATK	73

Virginia 156

Middle Peninsula	KE4NBX	64
Williamsburg	KC4CMR	55
Newport News	N4ZBV	37

West Virginia 67

WVN	W8WWF	40
Summers Co	KB8WSK	27

Rocky Mountain Division
Colorado 141

Montrose, Delta Co	KI0KY	107
TMAR	N0FCK	34

Southwestern Division
Orange 102

OVSARC	KB6TPT	102

Santa Barbara 21

Ventura	KD6HHG	21

West Gulf Division
North Texas 291

Mesquite	KA5SNM	165
Nacogdoches	KK5BE	126

South Texas 308

Travis Co #1	K5FNI	240
Travis Co #2	K5FNI	68

West Texas 87

Bend Emerg Net	WA5ROE	87

NEW PRODUCTS

ECHOSTATION

◊ *EchoStation* is a new software package for *Windows* that works with the computer's sound card to create a full-featured repeater or "announcement machine."

The program operates in any of several modes. In one mode, it can be set up to air special voice announcements automatically, according to a pre-set schedule. Announcements could include club meeting notices, ARRL Audio News or SKYWARN bulletins.

The program waits for the frequency to clear before transmitting, and provides automatic CW and/or voice ID. Announcements can also be triggered with DTMF commands. A special feature allows long announcements to be paused briefly at natural breaks to allow a repeater's time-out timer to reset. Announcements can be created as .WAV or .MP3 files, or as text files using the optional voice synthesizer.

In other modes, *EchoStation* runs as a repeater controller, supporting both duplex and simplex operation. Audio mixing, VOX, station ID, courtesy tone, timers and DTMF decoding are all performed in software, allowing a repeater or simplex repeater to be built with a minimum of external equipment. The program also supports forward and reverse autopatch on computers equipped with a voice modem, and includes a built-in Web server for remote control over the Internet.

EchoStation is offered with a 30-day free trial; the registered version is $19.95. The program includes Setup Wizards, more than 40 pages of context-sensitive help, and free e-mail support for registered users. Minimum computer system requirements are a Pentium-133 PC running *Windows 95* or above, 16 Mbytes RAM, 10 Mbytes hard disk space, and a *Windows*-compatible sound card.

Full details on *EchoStation*, and a free-trial download, are available at **www.synergenics.com**.

Previous • Next New Products

By Brian Mileshosky, N5ZGT

Defying Gravity with Amateur Radio

Amateur Radio at its best in front of—and above—a million eyes and ears at the world's largest and most popular hot air balloon event.

Imagine waking up to the sight of more than 1000 hot air balloons in the sky over your town at the same time. Imagine over a million people converging at the balloons' launch grounds over the course of nine days. Imagine an event so large that it is considered the single most photographed event in the world. Anywhere else, you'd have to use your imagination, but in Albuquerque, New Mexico, this event is reality! On October 7-15, 2000, over a million visitors from around the world visited the annual Kodak Albuquerque International Balloon Fiesta, where colorful hot air balloons of all sizes, shapes and designs decorated the skies above.

This event attracted 1019 hot air balloons from 40 states and 22 countries. Many Amateur Radio operators from Albuquerque and other places around the country made sure that ham radio had a presence at this world-famous event in two ways: (1) Promotion of our hobby to the general public, and (2) showing the ballooning community what can be done with APRS—the Automatic Position Reporting System!

Promoting our Hobby

Special event station N5B was placed on the air in the Balloon Explorium, an on-site interactive museum for kids of all ages (literally) at the Balloon Fiesta field where the general public could learn about the many aspects of ballooning. This year over 100,000 people visited the Explorium, and we took advantage of the opportunity to promote Amateur Radio to such a large crowd from many places around the globe.

Amateurs across New Mexico and the country were able to work N5B on the HF General sub-bands. It was interesting to answer all the questions the general public had about ham radio! The operators at N5B were happy to explain how one can obtain an Amateur Radio license, what Amateur Radio is used for, and the benefits of Amateur Radio in times of need. It was even more exciting to meet many of the visitors who also had their ham licenses.

In addition to experiencing HF voice

ALBUQUERQUE INTERNATIONAL BALLOON FIESTA

operations, the public was also introduced to APRS.[1] Any APRS fanatic would agree that operating an APRS tracker from a balloon, whether it uses hot air or gas, is very interesting! But what if there were multiple trackers in the skies above the world's most popular ballooning event? The ballooning community and general public certainly found out—and were very impressed.

Tracking Balloons in Real Time

APRS, the latest in packet radio, is widely used in the United States and many parts of the world. The innovative technology allows amateurs to track moving objects on their computer displays.

The moving objects—balloons in our case—need to carry "APRS trackers" consisting of 2-meter FM transceivers set to 144.390 MHz (the national coordinated APRS frequency), Global Positioning System (GPS) receivers and packet terminal node controllers (TNCs) with APRS firmware. The TNCs function like sophisticated radio modems. The GPS receiver sends the position information to the TNC, which then assembles the data into APRS packets, converts the packet data to audio signals, feeds the audio signals to the radio and then keys the radio to transmit.

Watching APRS in action doesn't require as much equipment. All you need are a 2-meter FM receiver, a packet TNC (it does *not* have to include APRS firmware) and a computer running APRS software. You can download the software at TAPR's Web site for almost every computer operating system that exists.

APRS trackers were carried by at least 10 hot air balloons and seven chase crews during the whole event, sending positioning reports according to where they actually were located. Back at N5B, an APRS station running *APRS Plus* software and Delorme's *Street Atlas USA* program displayed the balloons' positions on a big-screen television in front of the curious public. APRSers from all over New Mexico enjoyed the activity, as did many others around the world who received the position reports via N5B's onsite APRS Internet gateway. The gateway passed position reports received from the balloons to the Internet so others could view the tracks and maps via the Web.

APRS trackers were carried by at least 10 hot air balloons and seven chase crews during the whole event, sending positioning reports according to where they actually were located.

The APRS tracker units sent aloft with the Challenge balloons.

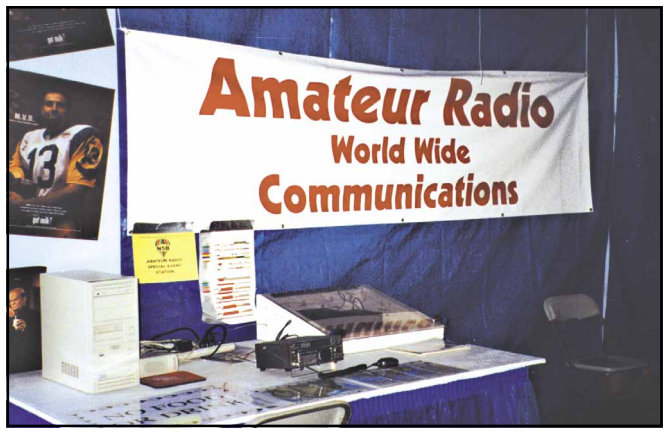
Many balloon pilots and crews showed a particular interest in what they saw on the screen in front of them as well. Balloon pilots must verbally describe the lay of the land below them via radio for their chase crews to follow and recover them. This can be confusing with hundreds of other balloons in the sky. In addition, quite a few pilots were unfamiliar with the terrain. Pilots often noted that instead of having to verbally describe where they were in relation to the chase crews, the chase crews could instead *see* where the balloon was heading using the capabilities offered by APRS! The detailed APRS maps allowed users to zoom in to street level, which is obviously important to the chase crews.

APRS was particularly useful to the Balloon Fiesta's *Dawn Patrol*, a group of balloonists who ascend into the black predawn skies to test the winds before the Fiesta's mass ascension, when all the balloons launch in waves. One of the Dawn Patrollers and N5B coordinator Peter Naumburg, K5HAB, used a Kenwood TH-D7A transceiver and Garmin III+ GPS receiver to monitor the progress of his chase crew below. He also kept an eye on his illuminated GPS screen as another APRS-equipped Dawn Patrol pilot maneuvered his balloon in the dark to "splash and dash" into the mighty Rio Grande river. This popular maneuver occurs when balloon pilots dip their gondolas into the river while in flight.

APRS at its Best

Among the many ballooning activities at the Fiesta was the fifth America's Challenge gas balloon distance competition. Twenty-six teams from around the world were set to compete in this event, but almost half of them decided not to fly for a variety of reasons, including

[1]Notes appear on page 58.



The N5B special event station.

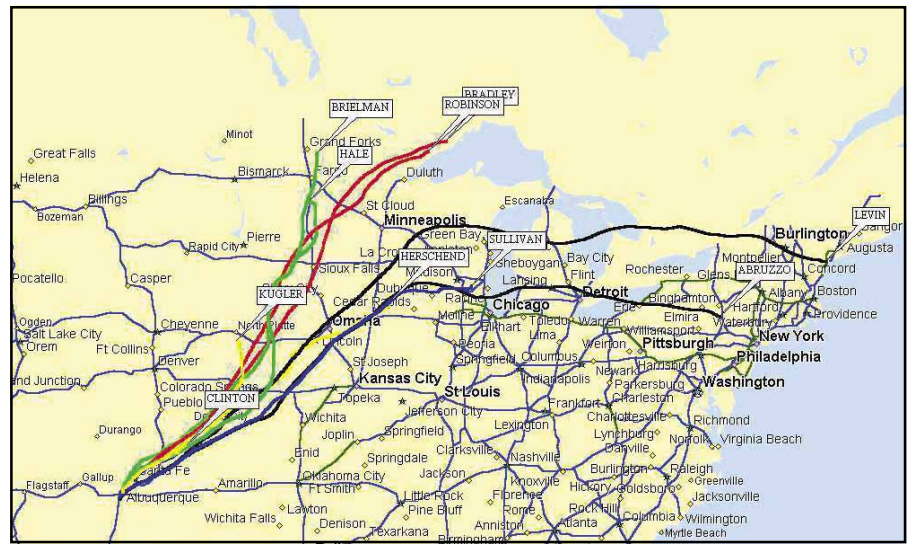
APRS tracking was displayed on this large-screen TV.

being uncomfortable with a string of storms that passed through New Mexico the night before. On October 10, ten teams launched from the Balloon Fiesta park and piloted their gas-filled balloons (either helium or hydrogen was used) on a journey across the United States seeking to win this competition—and APRS was with all of them for every mile of the flight!

Each balloon competing in the competition had an APRS tracker aboard, which consisted of a Kantronics Tracker (a KPC-3 Plus TNC with a built-in 12 channel GPS module), an Alinco DJ-190T 2-meter hand-held transceiver, two Energizer 6-V lantern batteries wired in series, an active GPS antenna and a heavy-duty twin-lead **J**-pole antenna. All of this hardware was enclosed in a modified waterproof Pelican 1200 case, with the **J**-pole and its feed line protruding so the pilot could hang it over the outside of the gondola. APRS reports were sent once every 6 minutes at 5 W. Each transmission gave the balloons' longitude, latitude, speed and direction. Altitude information was not transmitted because that would give the balloon teams an unfair advantage in the competition.

What's in store for this year? Because of the overwhelming positive response, we are planning to set up more HF, VHF and UHF operations and, of course, more balloon-borne APRS trackers!

Each of the balloons was tracked with the help of New Mexico's 30+ mountaintop APRS digipeaters[2] until they finally drifted out of radio range. From there, we depended on the various APRS Internet gateways to help relay the position reports back to the ballooning community at N5B. This proved to be very successful, as we tracked each balloon in real time from the instant it launched until the moment it touched down! Of the 10 balloons that had competed, the Levin team was tracked all the way to Gorham, Maine! This team won by achieving the greatest flying distance of all the other balloons: 1998.09 statute miles in 64.07 hours. The second and third place winners, the Abruzzo team and the Bradley team, landed in Springville, Pennsylvania and Nolaw, Ontario, Canada respectively. Many of the gas balloon teams were greeted where they landed by fellow hams who watched them travel across the country via APRS!



This APRS screen capture shows the tracks of the various Challenge balloons.

- America's Challenge gas balloon competition officials used the position reports from each of the balloon trackers to tally the official results of the race.
- At least one balloon pilot in each of the 25 America's Challenge balloons became a licensed Amateur Radio operator before the event so that he or she could take an APRS tracker along during the competition.
- Real-time maps and tracking were found on the Balloon Explorium's Web site, **www.explorium.org**, as well as **findu.com**, a real-time APRS map source.

Success!

Several onlookers expressed interest in becoming a part of our awesome hobby, including many pilots who intend to explore what APRS and other ham communication can offer to the ballooning community. Amateur Radio and ballooning are a great combination, similar to champagne and ballooning—a marriage that has lasted some 216 years!

Many people put great effort into making this event a success. Jim Baremore, K5QQ; Peter Naumburg, K5HAB; Mike Pollmann, N0YLS, and Keith Soesbe, KG6CGT, assisted in setting up and maintaining the APRS trackers and the displays. Tom Ellis, K5TEE, organized the HF special-event station communications. Steve Dimse, K4HG, made it possible for people to track the balloons with **findu.com**. There were over 100,000 hits on this Web site from people watching just the balloon activity over three days! Brent Hildebrand, KH2Z, helped with programming issues. Many thanks to them, as well as the other helpful amateurs who volunteered their time to operate N5B.

What's in store for this year? Because of the overwhelming positive response, we are planning to set up more HF, VHF and UHF operations and, of course, more balloon-borne APRS trackers! Organizers of the International Hot Air Balloon Fiesta are looking forward to having us back. Listen and look for us October 6-14, 2001!

Notes

[1]Join packet radio's latest popular development, APRS. *APRS: Tracks, Maps and Mobiles*, by Stan Horzepa, WA1LOU, is available from your favorite dealer or ARRL Publication Sales at 1-888-277-5289 (toll-free), or on *ARRLWeb*, **www.arrl.org**. You can also find information at **www.tapr.org**.

[2]For more information about New Mexico's extensive APRS system, please visit the Upper Rio FM Society, Inc homepage at **www.urfmsi.org**.

Brian Mileshosky, N5ZGT, hails from Albuquerque, New Mexico. A 21-year-old senior in electrical engineering at the University of New Mexico, Brian was the 1999 ARRL Hiram Percy Maxim Award winner as well as the 1997 winner of the Newsline Young Ham of the Year Award. He was first licensed in 1992 at age 12, holds a General license and now is studying for his Amateur Extra ticket. Brian authored the "Youth Forum" column for Worldradio magazine for three years, and currently authors the Youth@HamRadio.Fun column for the ARRL WebExtra. He's a brother of the Kappa Sigma fraternity, as well as very active in the Boy Scouts of America as an assistant scoutmaster and a Vigil Honor member of the Order of the Arrow. You can contact the author at 1021 Dakota SE, Albuquerque, NM 87108-4921; **n5zgt@arrl.net**.

Photos by the author.

By Paul Rinaldo, W4RI

Protecting Our Bands: More than Meets the Eye

The ARRL's defense of frequencies mission can be expressed in three words: "Don't lose spectrum!" Why? Simply this: Without spectrum there is no Amateur Radio!

There's good news and bad news, so the saying goes. The good news is that the Amateur Radio Service has a number of frequency allocations (albeit relatively narrow ones) throughout the radio spectrum. The bad news is that those looking for new uses of radio like first to look in other people's spectrum rather than their own. They seem to think the amateur allocations are easy prey.

It's the job of the ARRL Technical Relations Office (TRO) in Fairfax, Virginia to protect our bands at the federal level in Washington and internationally. The ARRL through its TRO is well known to the government agency spectrum managers and their counterparts in industry. It's time we gave our members a more complete look at what the ARRL does through its Fairfax office.

ARRL General Counsel Chris Imlay, W3KD (left), with Technical Relations Manager Paul Rinaldo, W4RI.

Some Background

Everyone seems to know about the so-called "WARC bands" and possibly that we got them at the 1979 World Administrative Radio Conference (WARC-79). Until 1993, there were a lot of single-issue WARCs every few years but the big ones involving wholesale reshuffling of the spectrum occurred much less frequently. ARRL and the IARU geared up for the major WARCs, fought the campaign and then returned to hamming as usual. In between WARCs, there were meetings of ITU Study Groups that required attendance by ARRL and IARU about once a year, and volunteers were enlisted to cover them. Sleepier times for telecommunications ended in the 1980s and the ITU knew it had to pick up the pace. The 1993 World Radiocommunication Conference (new name and abbreviation—WRC) met only to set the agenda for WRC-95. The plan was to hold WRCs every two years. WRC-97 took place, but WRC-99 slipped to WRC-2000 and the pattern now is a WRC every three years. The Study Groups were charged with doing the detailed investigations of each item on the agenda of the next WRC and possibly the subsequent one. Also, a permanent Conference Preparatory Meeting was established to bring all the studies together about six months before a conference and produce a thick report to serve as the technical basis for the WRC.

This three- or four-fold quickening of the ITU calendar was needed to fast-track new radio applications such as third-generation cellular systems and new satellite systems. Advocates of these emerging technologies gathered technical experts who championed their technical papers through the Study Groups, drafted position papers and prepared proposals for upcoming WRCs. But the incumbent services, such as the amateur and amateur-satellite services, had to marshal their forces as well and avoid being blindsided at each step along the path toward a possible allocation action. In the early 1990s, it became clear to the ARRL leadership that effective spectrum protection required a change from a now-and-then volunteer response to a full-time staff.

There was also the question of how to pay for it. The "Defense of Frequencies" fund was given new life by annual appeals to ARRL members. The Board of Directors saw it not as a question of

Who's Who: Team TRO

The TRO has a staff of four: Technical Relations Manager Paul Rinaldo, W4RI; Technical Relations Specialists Walter Ireland, WB7CSL, and Jonathan Siverling, WB3ERA; and Administrative Assistant Claudia Campa. Domestically, the TRO is part of the ARRL Washington team consisting of President Jim Haynie, W5JBP; Executive Vice President David Sumner, K1ZZ; General Counsel Christopher Imlay, W3KD; and Legislative and Public Affairs Manager Steve Mansfield, N1MZA. Internationally, it becomes more complicated because the TRO receives guidance not only from Sumner but also from International Affairs Vice President Rod Stafford, W6ROD, and International Amateur Radio Union (IARU) President Larry Price, W4RA.

ITU Alphabet Soup

BDT—Telecommunication Development Bureau
BR—Radiocommunication Bureau
CPM —Conference Preparatory Meeting
ITU—International Telecommunication Union
ITU-D —Telecommunication Development Sector of ITU
ITU-R—Radiocommunication Sector of ITU
ITU-T—Telecommunication Standardization Sector of ITU
JRG 8A-9B—Wireless Access, including Radio Local Area Networks (RLAN)
JTG 1-6-8-9 —Multimedia applications
JTG 4-7-8-9 —5 GHz band allocations
PP—Plenipotentiary Conference
SC—Special Committee on Regulatory/Procedural Matters
SG1—Spectrum Management
SG3—Radiowave Propagation
SG4—Fixed-Satellite Service
SG6—Broadcasting Services
SG7—Science Services
SG8—Mobile, Radiodetermination, Amateur and related Satellite Services
SG9—Fixed Service
TG 1/7 —Protection of passive service bands from unwanted emissions
TG 6/7 —Planning parameters for digital broadcasting at frequencies below 30 MHz
TSB—Telecommunication Standardization Bureau
WP 1A—Engineering principles and techniques, including computer-aided analysis for effective spectrum management
WP 1B —Principles and techniques for spectrum planning and sharing
WP 1C —Techniques for spectrum monitoring
WP 6E —Terrestrial emission
WP 7C—Earth exploration satellite systems and meteorological systems
WP 7D—Radioastronomy
WP 7E—Inter-service sharing and compatibility
WP 8A—Land mobile service excluding IMT-2000; amateur and amateur satellite services
WP 8B—Maritime mobile service including global maritime distress and safety system (GMDSS); aeronautical mobile service; and radiodetermination service
WP 8D—All mobile-satellite services and the radiodetermination-satellite service
WP 8F—IMT-2000 and systems beyond IMT-2000
WP 9C—HF Systems
WRC—World Radiocommunication Conference

whether we could afford it, but as something we could not afford not to do.

The WRC Calendar Drives the Process

The agenda for each WRC is known about three years in advance. It is established by the previous WRC and is blessed by the ITU Council, which meets yearly. WRCs also project six years ahead to the subsequent WRC and agree on a preliminary agenda for that as well. These agendas for the next two WRCs form a "to do" list for nearly everyone in the ITU WRC and Study Group process. Even before the ink is dry on an agenda, there is a group that meets at the WRC site to parcel out the work to Study Groups responsible for studies relating to the item. If an item concerns a broadcasting allocation, the Study Group responsible for broadcasting gets the action but Study Groups for other radio services are inevitably involved. This is often a "zero-sum" game, meaning that one service's gain could be another service's loss. More often these days, it is more a matter of increased sharing. The object is to stuff as many compatible services in one band as possible. Whether it's zero-sum or more sharing, no one is making any new radio spectrum.

Take for example our 40-meter realignment, which is agenda item 1.23 for WRC-2003. Study Group 8 (mobile, radiodetermination and amateur services) is responsible for the studies. More specifically, the action is handled by Working Party 8A (land mobile and amateur services). However, finding 300 kHz worldwide for the amateur service requires some adjustment in allocations for the broadcasting service around 7 MHz, so Study Group 6 (broadcasting services) is an interested party. The actual studies from the broadcasting viewpoint are performed by Working Party 6E (terrestrial emissions). Probably, there would be an inevitable impact on Study Group 9 (fixed service) and its Working Party 9C (HF fixed), not only because of a possible amateur band shift but also because the broadcasters want more spectrum. Broadcasters have another agenda item to study the adequacy of BC spectrum from about 4 to 10 MHz. They're also planning conversion from double-sideband AM to digital broadcasting, which will undoubtedly involve dual transmissions during a long transition period. Suffice it to say that a modification of an allocation in one band can cause a ripple effect throughout the spectrum.

The task of the TRO is to cover the Study Group and Working Party meetings, submit papers advocating our cause, respond to documents that give us concern and generally participate in the studies. Each issue is projected over years of domestic preparatory meetings and international meetings. In just the technical studies, there are typically three or four ITU meetings to consider an issue. For every ITU Study Group, Working Party and Task Group (to handle certain specific issues) there is a shadow US preparatory group that typically meets monthly to consider US input papers and to review documents from foreign sources.

ITU Study Group Meetings

Our "home" within the ITU Radiocommunication Sector is Study Group 8, more specifically Working Party 8A, as discussed above. They both meet yearly, usually in Geneva, Switzerland. Depending on the amount of business, WP 8A meetings last anywhere from 5 to 10 working days and SG 8 meets for about two days. Internationally, WP 8A is divided into even smaller Working Groups. Paul Rinaldo, W4RI chairs WG 1 (amateur services). IARU President Price and Ken Pulfer, VE3PU, are regular participants. Back in Washington, WP 8A preparations are split in two: Eric Schimmel of the Telecommunications Industry Association (TIA) chairs Ad Hoc 8A (land mobile) and Rinaldo chairs Ad Hoc 8E (amateur services). Walt Ireland, WB7CSL, serves as recording secretary for Ad Hoc 8E.

TRO staff also attends the meetings not only of Ad Hoc 8A but also the rest of the SG 8 family: 8B (radiodetermination, ie, radiolocation and radionavigation), 8D (mobile satellites) and 8F (IMT-2000 and beyond—third and fourth-generation cellular). This is done to see who might be interested in our frequencies as well as to keep abreast of rapidly changing technologies. For six years during the '90s, Rinaldo chaired Task Group 8/2 charged with developing standards and finding spectrum for wind

profiler radars. While we knew beforehand that wind profilers would operate in radiolocation bands shared with amateurs, we succeeded in keeping the impact as small as possible.

TRO covers Study Group 1 (spectrum management), its Working Parties and Task Groups. Working Party 1A deals with spectrum engineering, WP 1B with spectrum management concepts, WP 1C with monitoring and TG 1/7 with unwanted emissions from satellites to passive radio services such as radio astronomy. TRO attends all the international and US preparatory meetings of SG 1 except, for the moment, those of TG 1/7. This Task Group is currently studying commercial satellite unwanted emissions against a WRC-2003 agenda item. They're not after amateur satellites—at least yet—because the interference potential is not as great as from commercial satellites. However, ARRL was heavily involved in SG 1's past two Task Groups. Laboratory Supervisor Ed Hare, W1RFI, attended meetings of TG 1/3 on unwanted emissions. Unwanted emissions consist of out-of-band (OOB) emissions close in frequency to a signal and resulting from modulation, and spurious emissions that lie further out. The studies were reconstituted in TG 1/5 in which Rinaldo participated as chairman of the drafting group that completed an 80-odd page ITU-R Recommendation on OOB. Other Amateur Radio participants who played important roles in these Task Groups were Peter Chadwick, G3RZP, Ken Pulfer, VE3PU, Hans-Joachim Brandt, DJ1ZB, and Jay Oka, JA1TRC. Had ARRL and the other societies not been involved, the amateur services could have been subject to new rules on unwanted emissions that could have increased the cost of amateur equipment and restricted home-brewed transmitters.

Study Group 6, mentioned earlier, has a large number of Working Parties dealing with the various aspects of sound and television broadcasting. The TRO participates in SG 6 and WP 6E to protect our HF allocations and to contribute to studies leading to gaining an allocation of 300 kHz at around 7 MHz. Ireland came to the ARRL from the International Broadcasting Bureau/Voice of America, and has been our principal particpant in SG 6 and WP 6E. He serves as Deputy Head of Delegation to WP 6E meetings. Ireland also serves as Special Rapporteur for WP 6E Special Rapporteur Group 2 (SRG 2) on CPM-related issues for broadcasting agenda items. He is also covering Task Group 6/7 dealing with the introduction of digital sound broadcasting, which will place new demands on HF spectrum.

C. RIVERA, NOAA

WB3ERA and fellow TRO staff member Walt Ireland, WB7CSL (right), at the recent WRC-2003 Advisory Committee meeting at the FCC.

Sumner is also attending the WP 6E and SG 6 meetings leading up to WRC-2003. He participates in his capacity as Secretary, IARU. He is joined by IARU technical representative Wojciech Nietyksza, SP5FM, who is well known to ITU and CEPT.

Study Group 7 is responsible for science services: WP 7A (time and frequency standards), 7B (space operations), 7C (earth exploration), 7D (radio astronomy) and 7E (sharing studies). The TRO staffers regularly participate in WPs 7C, 7D and 7E. WP 7C is studying a possible allocation of 6 MHz bandwidth in the 420-470 MHz band. They would like to center it at 435 MHz, possibly because the proponents thought the amateur services were a "soft target." The name of the game is to find compatible sharing partners. The proponents have yet to show how they can point a radar signal from a satellite toward the Earth without causing harmful interference to radiolocation and amateur stations. Amateur satellites, as well as the International Space Station, could also be affected. These studies are in preparation for WRC-2003. Ireland has been the principal WP 7C participant for ARRL. The TRO follows 7D (radio astronomy) and participated in the studies leading to the reshuffling of allocations above 71 GHz that was settled at WRC-2000. The next issue is studying which bands are suitable for the amateur services in 275-1000 GHz, which may be subject to allocation at WRC-2006.

ARRL does not routinely participate in the other ITU-R Study Groups: 3 (propagation), 4 (fixed satellite service) or 9 (fixed service). Nevertheless, we benefit from ITU-R propagation studies and at least temporarily are interested in fixed service frequencies around 7 MHz to the extent that they may be involved in our achieving 300 kHz worldwide.

The US WRC Proposal Process

While the work of the ITU Study Groups is captured in a Conference Preparatory Meeting report, which forms the technical basis for a WRC, no action can be taken at a conference without specific proposals from ITU Member States. The United States usually develops numerous proposals on a wide variety of agenda items over a period of about two years prior to a WRC. Proposal development is a bottom-up process initiated by the entity that wants something or in some cases to insist that things not be changed.

The United States has two agencies regulating the radio spectrum: NTIA for federal government agencies and FCC for everyone else. Not surprisingly, there are two proposal development processes: NTIA has a Radio Conference Subcommittee (RCS) of the Interdepartment Ra-

NTIA Alphabet Soup

IRAC—Interdepartment Radio Advisory Committee

ITS—Institute for Telecommunication Studies (Boulder, CO)

OIA—Office of International Affairs

OSM—Office of Spectrum Management

RCS—Radio Conference Subcommittee (IRAC)

dio Advisory Committee (IRAC)—that's closed to everyone except government agencies. The FCC has the WRC Advisory Committee (WAC) created to provide the FCC advice, technical support and recommendations relating to WRC-2003. WAC considers proposals from everyone except federal government agencies. (FCC's WRC-2003 home Web page is **www.fcc.gov/wrc-03/**.)

FCC Alphabet Soup

EB—Enforcement Bureau

IB—International Bureau

NOI—Notice of Inquiry

NPRM—Notice of Proposed Rule Making

OET—Office of Engineering & Technology

R&O—Report and Order

PS&PWD—Public Safety & Private Wireless Division (WTB)

S&RD—Satellite and Radiocommunications Division

WTB—Wireless Telecommunications Bureau

The work of the WAC is divided into Informal Working Groups (IWGs) to gather information and develop recommendations on specific issues. In the case of WRC-2003 preparation the IWGs are, namely:

1 IMT-2000 and Terrestrial Wireless Interactive Multimedia
2 Mobile-Satellite Service including GPS
3 Fixed-Satellite Service / Broadcasting-Satellite Service
4 Fixed Service / Fixed-Satellite Service Sharing
5 5 GHz, 13.75-14 GHz and Maritime Issues
6 Public Protection and Other Issues
7 Regulatory Issues and Future Agendas

Nearly all agenda items of interest to the amateur services are assigned to IWG-6 and fall under the not-so-glorious category of "Other Issues." Amateur agenda items include Articles S1, S19 and S25, 7 MHz, digital broadcasting, and adequacy of broadcasting bands between 4 and 10 MHz. Ireland was appointed as Vice Chairman of this group in recognition of his broadcasting and amateur service experience. ARRL is also concerned with some of the other IWGs, particularly if they are looking for spectrum anywhere near amateur bands.

Once a particular proposal is agreed at the IWG level, it is sent to the WAC for its approval. Rinaldo and Ireland have been designated members of the WAC. The FCC itself can accept, modify or reject an industry proposal. If approved, an industry proposal then goes to NTIA and the Department of State. If it survives that review, it becomes a draft US proposal and can be given final approval by State and sent to Geneva.

At some time in the WRC preparatory process, a US delegation is formed and a head of delegation with ambassadorial rank is named. While the FCC's WAC preparations are open to the public, the delegation is a closed group. Rinaldo has been a member of US delegations to WARC-92, WRC-93, WRC-95, WRC-97 and WRC-2000. At least one of the ARRL TRO staff will be a member of the US delegation to WRC-2003. There will also be amateurs in other country delegations, and the IARU will be well represented.

CITEL

Over the past two decades, there has been renewed emphasis on regional telecommunications organizations. Many have heard of CEPT (European Conference of Postal and Telecommunications Administrations). In our region, the organization is the Inter-American Telecommunication Commission (known by its Spanish acronym CITEL), an agency of the Organization of American States (OAS). Nowadays, practically everything that occurs at the ITU-R CPM and WRC is pre-digested in all the regional organizations, and CITEL is no exception. CITEL has an assembly every four years, a permanent executive committee (called COM/CITEL) meeting annually and a variable number of meetings of its Permanent Consultative Committees (PCCs) I (Public Telecommunications Services), II (Broadcasting) and III (Radiocommunications).

COM/CITEL currently consists of representatives from the following countries: Argentina, Brazil, Canada, Colombia, Ecuador, Grenada, Honduras, Mexico, Paraguay, United States and Uruguay. PCC.I acts as a technical advisory body within CITEL with respect to standards coordination, planning, financing, construction, operations, maintenance, technical assistance, equipment certification processes, rate principles, and other matters related to the use, implementation and operation of public telecommunications services in the Member States. PCC.II is the technical advisory body for standards coordination, planning, operation, and technical assistance regarding the broadcasting service in its different forms. PCC.III is the CITEL technical advisory body for standards coordination, planning and full and efficient use of the radio spectrum and satellite orbits, as well as matters pertaining to the operation of radiocommunication services in the Member States. Amateur issues typically reside within PCC.III. The CITEL Secretariat is located at the OAS headquarters in Washington, DC.

CITEL Alphabet Soup

CITEL—Inter-American Telecommunication Commission

COM/CITEL—Permanent Executive Committee

IARP—International Amateur Radio Permit

PCC.I—Permanent Consultative Committee (Public Network)

PCC.II—Permanent Consultative Committee (Broadcasting)

PCC.III—Permanent Consultative Committee (Radiocommunication)

CITEL Executive Secretary Clovis Baptista (left) met in Washington, DC, recently with Jon Siverling, WB3ERA, of the Technical Relations Office, to discuss amateur issues. ***(Photo by P. Huguet, CITEL secretariat)***

CITEL is the beat of Jon Siverling, WB3ERA. He is bilingual, maintains liaison with the CITEL secretariat, and regularly participates in PCC.III and COM/CITEL. This year he also attended a meeting of PCC.II to explain Amateur Radio's role in disaster communications and to further promote our 7-MHz issue to Region 2 broadcasters. Siverling also attends many other US preparatory meetings for ITU meetings and will participate in a meeting of WP 8D this year.

The CITEL Working Group to prepare for WRC-2003 is chaired by Marc Girouard (Industry Canada) and Paula Córdoba (National Communications

Commission, Argentina) serves as vice-chairperson. Siverling is the Chapter 5 coordinator of this Working Group, which covers maritime mobile, amateur, amateur-satellite and broadcasting services in the MF and HF bands. WRC-2003 amateur issues found in Chapter 5 include Agenda Item 1.7 (Articles S1, S19 and S25) and Agenda Item 1.23 (7 MHz harmonization). This preparatory group met for the first time during the XVII Meeting of PCC.III, in Panama, March 5-9, 2001. This group will prepare Inter-American Proposals, or IAPs, that will be the regional input to WRC-2003.

Recently, IARU Region 2 President Tom Atkins, VE3CDM, Rinaldo and Siverling met with CITEL Executive Secretary Clovis Baptista at the OAS Headquarters, Washington, DC. Baptista is supportive of Amateur Radio throughout the Region. He continues to urge more administrations within the Americas to ratify the International Amateur Radio Permit (IARP).

IARU

The ARRL serves as the International Secretariat of the IARU. By direction of President Price and Secretary Sumner, much of the day-to-day support is handled by the Technical Relations Office, known also as the IARU Technical Office. Functions performed routinely include:

- Daily distribution of documents to IARU officials from international sources such as ITU, CITEL and other regional telecommunications organizations.
- Drafting of input papers to international meetings for approval of IARU officers.
- Participating in studies and drafting of documents related to IARU Administrative Council meetings.
- Development and maintenance of instructional material for the Amateur Radio Administration Course offered periodically by IARU overseas and yearly by ARRL in Newington. Providing instructors for these courses.
- Assisting the IARU in publications projects such as contributing to the drafting and editing of the ITU-D *Disaster Communications Handbook for Developing Countries,* to be published in 2001.
- Providing support to IARU displays at ITU TELECOMs and other international expositions.

Domestic FCC Matters

General Counsel Imlay normally takes

Rinaldo with Legislative and Public Affairs Manager Steve Mansfield, N1MZA.

the lead in ARRL representation before the FCC. After all, the FCC deals with regulatory decisions, and operates according to an adversarial process. Nevertheless, many of the Commission's dockets include technical aspects and are studied by the TRO. General Counsel and the TRO draft pleadings for review by ARRL officials. This review includes the Executive Committee, including close scrutiny by the President and Executive Vice President.

That's the formal relationship with the FCC but the informal dealings are many. These involve frequent telephone calls and visits to several Bureaus and Offices. TRO staffers are at the FCC several times each week on international or domestic issues. The result is that ARRL has good access to various components of the FCC and enjoys a professional working relationship.

Nearly everything that goes on internationally either starts or ends with consideration at the FCC. The ITU tends to deal only at the radio service level, for example simply allocating bands of frequencies to (say) land mobile. It's up to each country to decide how to use the land mobile allocations. The FCC usually divides the ITU services into narrower domestic services. In the case of land mobile, it treats public safety and other dispatch radio separately and assigns different frequencies.

At present, Ultra-Wideband (UWB) (ET Docket No. 98-153) is a hot issue. The ARRL is involved in both legal and technical studies to minimize the amount of interference from UWB to amateur systems operating in UHF and SHF bands, ie, 300-3000 MHz and 3-30 GHz, respectively.

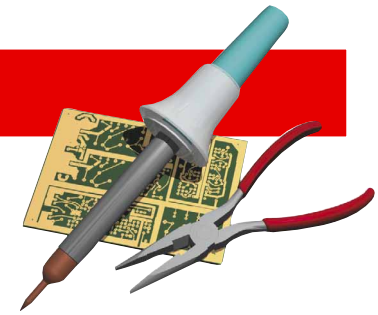
The TRO is also participating in the work of the ARRL Board committee on Spectrum Strategy. Progress has been made on characterizing the problem of the influx of low-power (Part 15) devices in our bands above 420 MHz. Study is underway to develop a test plan, to be conducted by radio amateurs, to augment the noise studies recommended by the FCC Technological Advisory Council.

Routinely, the FCC circulates notices of proposed experimental licenses, many of which intend to use amateur bands. Normally, this is not a problem because of low power or infrequent use in a specific geographical area but the ARRL needs to watch them. Occasionally, as in the case of the use of the 2400-2450 MHz band by police in the Los Angeles area, harmful interference is observed, analyzed and reported to the FCC.

Conclusion

The ARRL's TRO may not be too visible within the amateur community, but is an important part of the action in Washington and internationally. QST

From May 1941 QST



The Doctor is IN

Q Is it true that an antenna must be resonant to radiate RF?

A Some hams steadfastly cling to the confusing notion that somehow "resonance" is necessary in an antenna system in order for radiation to occur. (In this sense I am using the term "antenna system" to include the antenna, the transmission line, the antenna tuner—and the environment in which all these are placed, including the ground, nearby conductors, etc.)

Resonance is by no means necessary for radiation to occur! If the impedance at the shack for an antenna, its feed line and its environment happens to end up at, say, 120 $-j$ 400 Ω, and if the transmitter is designed to work into exactly this impedance directly—or even more interestingly, if the transmitter consisted of a voltage source and a lossy resistive attenuator pad—no antenna tuner at all would be required. In this case, the transmitter wouldn't be very efficient, admittedly, but it also wouldn't care what the load impedance is at all. Where would resonance come into the act in such a situation? It wouldn't.

However, most transmitters are indeed designed to work into a 50-Ω nonreactive load, so the function of an antenna tuner in this case would be to transform 120 $-j$ 400 Ω into 50 + j 0 Ω. Is there "resonance" in this system with such an antenna tuner as an impedance transformer? Let me submit that the answer most antenna engineers would give is "Why are you asking this question?"

They'd simply state that the antenna tuner provides a 50-Ω load to the transmitter. The SWR on the line between the antenna and the tuner isn't changed by the presence of an antenna tuner at the input of the transmission line. The "additional SWR" due to the mismatch between the characteristic impedance of the line and the antenna load adds extra loss beyond the matched-line loss for that length of line at that frequency. But where does "antenna resonance" come into play?

It doesn't.

It is quite possible to look mathematically at the way the impedance changes along the physical length of the line, using the hyperbolic transmission line equation—and the impedance as it varies along the length of the line has absolutely nothing to do with the source impedance of whatever appears at the input of the line. The impedance at any point along a transmission line depends solely on:

1. The complex characteristic impedance of the line itself
2. The physical length of the line
3. The velocity factor of the line
4. The matched-line loss of the line
5. The impedance at the load end of the line (the antenna in this case)

Q Bill Wilson, W5IKB, asks, "Recently I have been bothered with HF interference that appears to be coming from a new satellite dish that my neighbor has just installed on his chimney. It was on a small slab on the ground originally and gave no trouble. The dish is now about 20 feet in the air and about 30 feet from the end of my 40-meter dipole and 60 feet from my beam. The resulting interference is especially intense between 1 and 11 MHz. Any ideas?"

A My guess is that the dish's downconverter is using a switch-mode power supply and that it is generating some switch-mode interference. This is often somewhat tunable, perhaps with broadband noise that varies regularly across the band, every 25 kHz or so, to a very uniform broadband noise that tapers off slowly in frequency.

The diagnostic, if your neighbor would allow it, would be to unplug the downconverter and see if the noise goes away.

If it is the downconverter, you may be able to filter it. First, try a common-mode choke on the power connection and on the coax going in and out of the unit. You usually need to use an F-240-43 core. To suppress HF, you usually need about 10 turns of wire, so those little clamp-on beads won't work. In some cases, you may need to use a "brute-force" type ac-line filter. The RadioShack catalog #15-1111 filter will work. Do keep in mind that surge suppressors are not filters, so make sure you use a suitable filter.

FCC Part 15 rules put the burden of cleaning up the problem on the operator of the device. This would either be your neighbor, if he owns the equipment, or the satellite company, if it is rented. Unfortunately, it is sometimes very difficult to persuade a neighbor, or even the satellite provider, that a satellite receiving system is being operated in violation of federal law.

Q Glenn Becklund, N0HBK, asks, "I am putting up a tower this spring and it will be approximately 100 feet from my shack. I don't know if I should bury the coax, bury PVC or string a wire from the house to the tower and hang the cable from it."

A Most hams run coax above ground to dipoles and towers. Although this makes the coax more visible, it is also the easiest installation and it lends itself to quick repair if necessary. For relatively short spans, the coax can be run without any additional support. Longer runs should be supported with rope or wire, as you suggest. Always be sure to include a "drip loop" at the shack end to keep water from entering the connectors. Also, the connectors at the antenna end should also be sealed to be watertight.

Practically speaking, coax can be buried by itself only if it is specifically rated as "direct bury." Ordinary coax can be buried for short-term installations, but I wouldn't expect it to last for an extended period of time.

Although coax can be buried in PVC, proper drainage has to be provided so that the PVC does not fill up with water. This can be accomplished by installing the PVC on a slope and providing a place for the water to drain out. You should also seal the upper end of the pipe and screen the lower end of the pipe to keep out dirt and burrowing critters.

Q I think I have just enough room in my backyard to put up a wire dipole antenna for 17 meters, my favorite band. Can you give me some installation and tuning tips? And what if I can't string the dipole in a straight line? Is that a problem?

Let's start with the basics. A classic dipole antenna is $^1/_2$ wavelength long and fed at the center. The feed-point impedance is low at the resonant frequency, f_0, and odd harmonics thereof. The impedance is high near even harmonics. When fed with coax, a classic dipole provides a reasonably low SWR at f_0 and its odd harmonics.

When fed with ladder line (see Figure 1) and an antenna tuner with a balanced output, the classic dipole should be usable with a wide-range tuner on many frequencies. If there are problems (such as extremely high SWR or evidence of RF on objects at the operating position), change the feed line length by adding or subtracting $^1/_8$-wavelength at the problem frequency. A few such adjustments should yield a workable solution. Such a system is sometimes called a "center-fed Zepp."

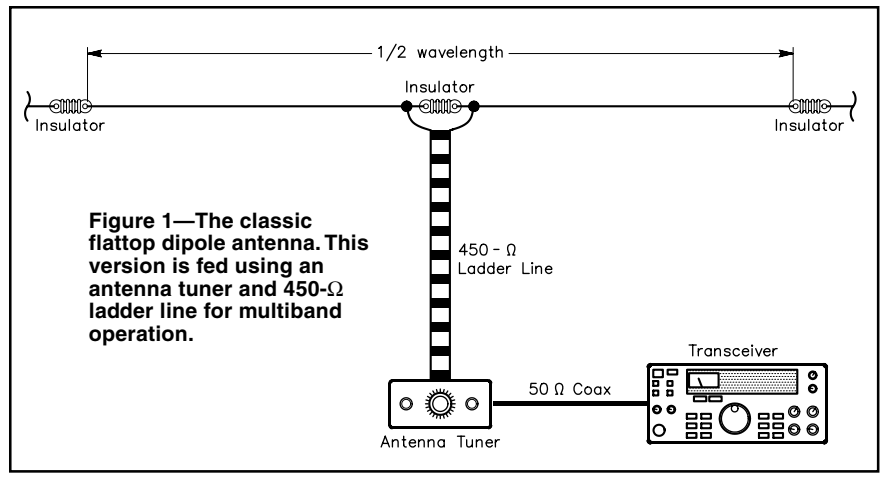


Figure 1—The classic flattop dipole antenna. This version is fed using an antenna tuner and 450-Ω ladder line for multiband operation.

Most coax-fed dipoles require a little pruning to reach the desired resonant frequency. Here's a technique to speed the adjustment. When assembling the antenna, cut the wire 2 to 3% longer than the calculated length and record the length. When the antenna is complete, raise it to the working height and check the SWR at several frequencies. Multiply the frequency of the SWR minimum by the antenna length and divide the result by the desired f_0. The result is the finished length; trim both ends equally to reach that length and you're done.

Here's another trick, if you use nonconductive end support lines. When assembling the antenna, mount the end insulators in about 5% from the ends. Raise the antenna and let the ends hang free. Figure how much to prune and cut it from the hanging ends. If the pruned ends are very long, wrap them around the insulated line for support.

Dipole antennas need not be installed in a horizontal straight line. They are generally tolerant of bending, sloping or drooping as required by the antenna site. Remember, however, that dipole antennas are RF conductors. For safety's sake, mount all antennas away from conductors (especially power lines), combustibles and well beyond the reach of passersby.

A *sloping dipole* is often used to favor one direction (the "forward direction" in the figure). With a nonconducting support and poor earth, signals off the back are somewhat weaker than those off the front. With a nonconducting mast and good earth, the response is omnidirectional. There is no actual gain in any direction with a nonconducting mast compared to a flat-top dipole.

A conductive support such as a tower can act as a parasitic element. (So does the coax shield, unless it is routed at 90° from the antenna.) The parasitic effects vary with earth quality, support height and other conductors on the support (such as a beam at the top). With such variables, performance is very difficult to predict.

Losses increase as the antenna ends approach the support or the ground. To prevent feed-line radiation, route the coax away from the feed point at 90° from the antenna, and continue on that line as far as possible.

An *Inverted V* antenna appears in Figure 2. While "**V**" accurately describes the shape of this antenna, this antenna should not be confused with long-wire **V** antennas, which are highly directive. The radiation pattern and dipole impedance depend on the apex angle, and it is very important that the ends do not come too close to lossy ground.

Bent dipoles may be used where antenna space is at a premium. Figure 3 shows several possibilities; there are many more. Bending distorts the radiation pattern somewhat and may affect the impedance as well, but compromises are acceptable when the situation demands them. When an antenna bends back on itself, some of the signal is canceled; avoid this if possible.

Remember that current produces the radiated signal, and current is maximum at the center of a half-wave dipole. Therefore, performance is best when the central area of the antenna is straight, high and clear of nearby objects.

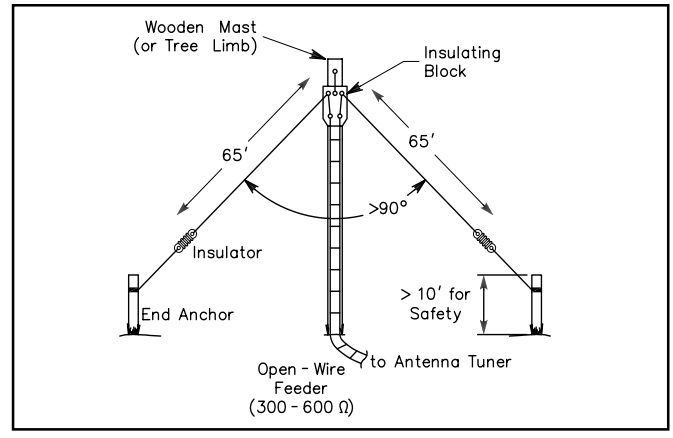


Figure 2—The Inverted V takes its name from its shape.

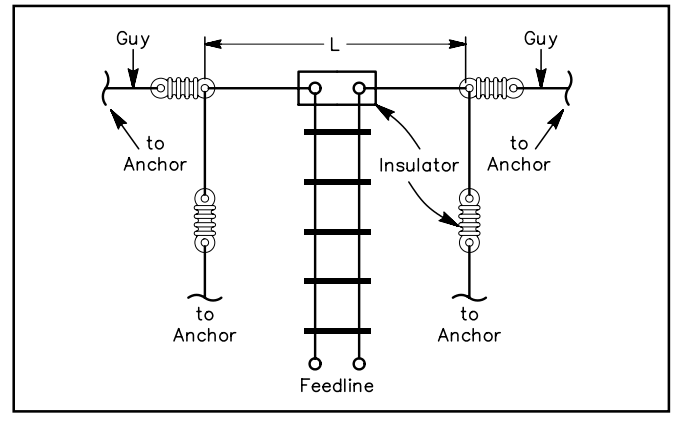


Figure 3—Dipole antennas can be bent a number of ways to fit in the available space.

Do you have a question or a problem? Ask the doctor! Send your questions (no telephone calls, please) to: "The Doctor," ARRL, 225 Main St, Newington, CT 06111; doctor@arrl.org; www.arrl.org/tis/. Also see, "The Doctor is On-line" at www.arrl.org/members-only/qst/doctor/.

Philip T. Sage, KF8JW

QRP-France with a "Junk Box Shorty Forty" Antenna

Just when you think you've seen them all, along comes a small, portable, resonant antenna. Whether for portable use or simple experimentation, the Shorty is sure to please!

As an on-and-off ham for many years with the good fortune to travel France on business, I was especially happy to note our country's participation in the CEPT reciprocal licensing program. CEPT makes it possible for US hams to take their gear to more exotic locations without a lot of planning and paperwork. (Hams who live in exotic locations are also free to operate in more mundane regions—a distinct disadvantage of living in paradise.) When a recent *ARRLWeb* story described how easy it now is to operate in many European countries, I was a little nervous—but excited enough to think about giving it a try. Could I pull enough stuff together to make a go of it? Most importantly, could I make an effective antenna that would fit into my suitcase?

With a weeklong business trip to France less than a week away, I committed to operating as F/KF8JW/P during the evening hours from the balcony of my hotel room. The challenge was to take enough gear to succeed without overwhelming the purpose of the trip (business).

To travel light, 40-meter QRP with my tiny Norcal 40A transceiver seemed like the best bet. Two watts of CW should be plenty if I could come up with a reasonable antenna.

To coexist peacefully with the other items in my suitcase, my entire station had to fit into a space of about 12 × 6 × 4 inches. The antenna would have to be dropped (spooled) from an open window or hung from a tree. It would have to tune effortlessly and be relatively easy to handle. And, because I am familiar with one of the hotels on my itinerary, I knew a full-size dipole would be way too big for the space available.

A quick look in *The ARRL Antenna Book* turned up a curious antenna dubbed the "Shorty Forty," a "short" antenna originally conceived by Jack Sobel, W0SVM.[1] There weren't many construction details, especially concerning the feed line attachment, and being pressed for a quick solution, I chose to build a modified version of the "Shorty Forty" that I call the "Junk Box Shorty Forty" to honor the original.

Starting at the last minute, I was forced to use only junk box components. I later replaced the feed line with a section of RadioShack TV twin lead (#15-1153), which set me back less than $4.

The design is essentially a loaded, shortened dipole with a pair of loading coils positioned on either side of the feed point. Actually, the coils form a single center-fed coil, and the dipole elements trail out on either side. The coil is continuous and is actually three coils wound together on the same form. I added a few turns between the feed points to make a lumped hairpin-type match, which allowed me to make the overall length even shorter. This has been described as a *helical hairpin match*.[2]

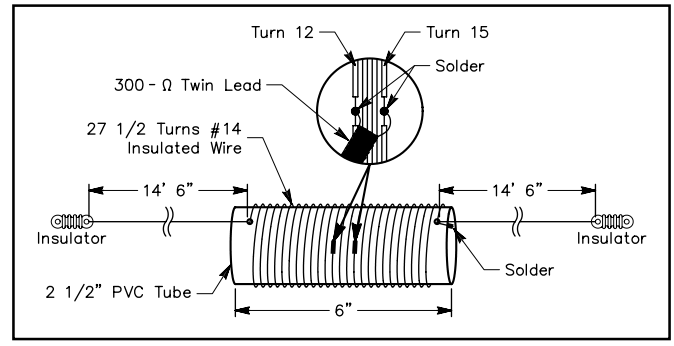
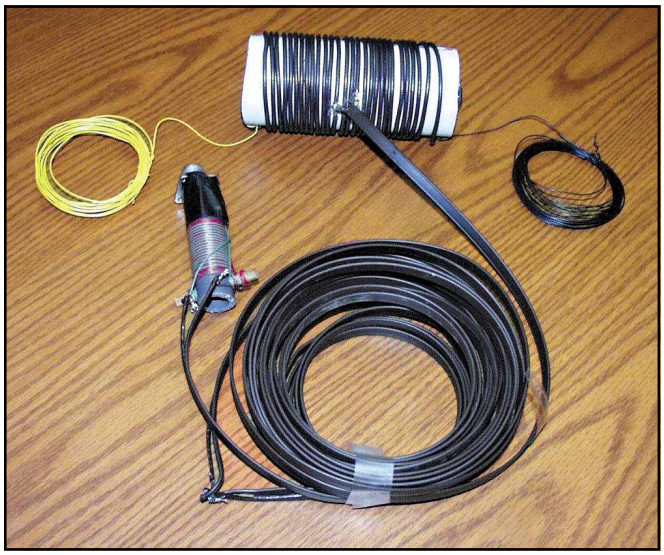


Figure 1—Construction diagram of the Junk Box Shorty Forty. At the center of the dipole is a 6-inch long, 2½-inch wide PVC tube. Wind 27½ turns of #14 insulated wire on the tube, beginning at either of the two anchor holes (the legs of the dipole solder to the coil through these holes). Connect 32 feet 300-Ω twinlead feed line to the center of the coil at the turns 12 and 15 as shown. Connect the other end of the feed line to a 4:1 balun. You may also need to use an antenna tuner depending on where you set up the antenna.

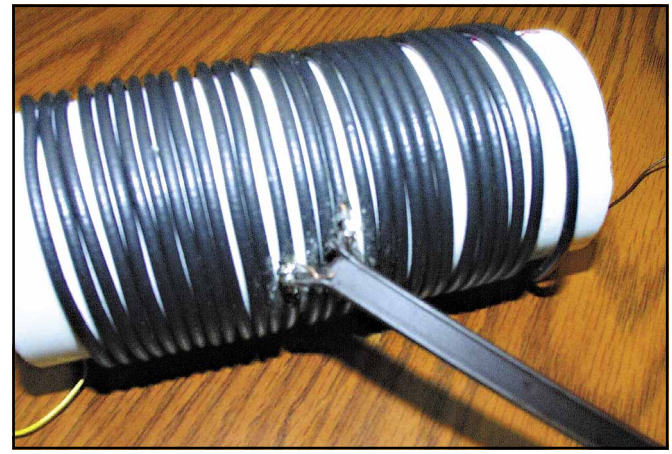
I used a 2½-inch piece of schedule 40 PVC pipe (5 inches long), drilled holes for string attachments and wound 27½ turns of #14 solid copper wire harvested from a piece of Romex house wire (see Figure 1). Romex is a trade name for standard house wiring. Any solid #12 or #14 wire will do. 12¼ turns are used in each loading coil, and three turns make up the matching section. The pipe cuts easily with a hacksaw, and drilling two holes near the ends is relatively easy. Mine are ¼-inch thru holes about ⅜-inch in from the ends of the pipe. The precise diameter of these holes isn't important.

I wound the coil by attaching one end of the insulated black wire (pulled apart from the house wire, insulation intact) to a nail

[1]Notes appear on page 68.



The Junk Box Shorty Forty—with the yellow and black dipole elements wound onto the loading coil—packed for transport. Note the twin lead connection to the middle, with two full turns between feed points. The 4:1 balun is visible as well.



A close-up view of the feed line/coil connection.

at the far end of the basement. I walked toward the fixed end and applied fairly high tension. Once wound, each end was threaded through the holes in the ends of the pipe to hold everything together. (By the way, the coil's hollow center later proved to be a good storage place for string and other station accessories.)

The Theory

The coil has an inductance of about 31 µH. A reference coil listed in the *Antenna Book* (34 turns of #12 wire on $2^1/_2$-inch form $4^1/_4$ inches long) has an inductance of 40 µH. About 3 µH are used in the balun/helical hairpin stub portion.

The antenna's input impedance is a good match for 300-Ω TV twin lead or 450-Ω ladder line. I used twin lead because of the power levels involved and its compact size. Besides—I had some on hand!

I used some scrap #24 solid wire for the dipole elements. I cut two pieces (yellow and the black), each about $14^1/_2$ feet long, leaving the insulation on. This stuff is just about invisible when it's 15 feet up in the air. I was confident that I wouldn't attract a lot of attention with my antenna. Loops for attaching the support strings were made by simply folding the dipole wires back on themselves for $1^1/_2$ inches or so, winding the ends with at least four twists.

Transmission Lines and Matching

Despite plenty of planning, the feed line "just happened."

The *Antenna Book* called for 50-Ω coax *without* a helical hairpin match. My available suitcase space wouldn't allow for standard coax (RG-58), and I wasn't comfortable using higher-loss RG-174 mini coax. Zip cord, featured in another section of the book, was interesting, but I didn't have any on hand and the twin lead was lightweight and potentially less bulky.

I even thought about making custom ladder line from two-inch-wide packing tape and another pair of #24 insulated wires. A check of the *ARRL Handbook* for equations and another trip to the basement and I was set. All I needed was to build a quick assembly fixture and somehow tape it all together.

Before I had assembled all necessary supplies, however, I found a hunk of old TV twin lead and, being late, I substituted it with a solemn promise to make the real stuff in the morning.

The coil wasn't fully wound, so I calculated the lumped inductance needed to match the antenna to 300 Ω. I initially used 39 feet of 300-Ω RadioShack heavy-duty TV twin lead, but now I have about 32 feet of the light-duty stuff attached.

I calculated the required hairpin match based on an equation in *The ARRL Antenna Book* and attached the twin lead to two parts of the loading coil, near the center, separated by three turns. The total turns are $27^1/_2$, with $12^1/_4$ turns for each dipole loading coil, with three full turns in the middle of the coil for the two feed point attachments (straddling two full turns).

According to *The Antenna Book*, when using a helical hairpin, the radiation resistance must be lower than the line (Z_0) so a match can be produced by trimming the antenna to make it capacitive. Then, by using a shunt inductor across the antenna terminals, the antenna can be resonated while simultaneously increasing the impedance to a value equal to the line Z_0. The match is then sized to exhibit the desired inductive reactance.[3]

Rather than building a more traditional stub match, I inserted a lumped sum inductance in the form of a few extra turns across the antenna terminals—a helical hairpin stub. This avoids the bulk of traditional hairpin stubs and keeps the circuit wound on the coil form (PVC pipe). This method works because the radiation resistance of the antenna is much lower than that of the 300-Ω twin lead.

Typically, an electrically short dipole has an input impedance of approximately $Z_{in} = 20\pi \times 2(L/\lambda) \times 2$ (assuming a triangular current distribution). For the Junk Box Shorty Forty (without loading coils and matching unit), that works out to about $Z_{in} = 11.4\ \Omega$ at 7.05 MHz.[4]

With a Z_{in} well below that of the 300-Ω Z_0 of the transmission line, the dipole loading coils and the helical hairpin work together to match the antenna to the feed line.

Each loading coil in the dipole legs add about $X_L = j618\ \Omega$ based on equations originally described by Jerry Hall, K1TD, in September 1974 *QST*.[5] Loading coil losses are kept to a minimum by reducing the total inductance required. This can be accomplished by positioning the inductors at the center, using #24 (small diameter) wire for the dipole elements and by using a matching section.

Rearranging the equation, $L = (X_L/2 \times \pi \times f)$, with f = 7.050 MHz, yields an inductance of 14 µH which, at 1.14 µH per turn, requires 12.25 turns. Two 12.25-turn inductors plus a three-turn matching section (about 3 µH) equals $27^1/_2$ turns

and about 31 µH of total inductance (as a single inductor).

To balance, the antenna must be made even shorter to provide more capacitive reactance (which helped achieve my goal of a *shorter* short antenna). The capacitive reactance can be estimated from available graphs at around –450 Ω for the final dipole element length.[6]

The twin lead (300 Ω), assuming a good impedance match at the antenna, transfers power effectively. When compared to RG-174 mini coax, which has a loss of about 3.2 dB per 100 feet, the TV twin lead wastes much less power.

Building the antenna actually took only about an hour. I first hung the antenna inside the house (it was a bitterly cold winter evening in northeast Ohio), much to the dismay of my formerly sleeping wife. I listened to several QSOs on 40 meters before I abandoned my disruptive testing in favor of future daylight work.

Putting Theories into Practice

The next morning was cold and snowy—perfect antenna weather! With the limitations of the weather, all reasonable chances of elevating the antenna (simulating a hotel balcony) disappeared. I had to run the dipole between the house and the children's swing set. After several pruning sessions I actually had a resonant antenna—even though it was only 5 feet off the ground. I obtained a 2:1 SWR bandwidth of 7.030 to 7.140 MHz, covering enough of the CW subband to be useful.

Starting with longer dipole elements, several feet were removed, resulting in final leg lengths of 14 feet 6 inches. The hairpin and twin lead provided a reasonable match and my portable balun/antenna tuner brought the SWR down to 1:1 at the transmitter.

A similar setup was used by Joe Everhart to match his NJQRP Squirt antenna, featured in April 2001 *QST*. I have experimented with several other feed arrangements, but I prefer the 300-Ω twin lead because it's easy to use and store.

After putting the children to bed, I set out into the cold, ran the twin lead under the kitchen door and set up a practice station on the kitchen table. Friday evening contests and QSO parties were in full swing.

I worked my way up the band making contest contacts. Finally I found Titus, KD4WQT, in Durham, North Carolina, and we embarked on a wonderful QSO. He gave my Norcal 40A an RST of 579. Considering that the antenna was only five feet above the ground, I was pleased and confident that I had an antenna I could successfully use in Europe.

Packing for the trip was simple. I wrapped everything around itself and wrapped it again in a layer of bubble wrap. The balun/tuner fit inside the PVC pipe. I'm sure I could have made everything more compact, but with less than a week to prepare, I was pleased.

Viva La Dipole!

The trip to France was uneventful, but lengthy. We left the US Sunday afternoon, arriving in southwestern France Monday afternoon. After checking into our hotel, I sank into my pillow for some much-needed rest. I woke up late in the evening and couldn't sleep, so I set up the station. From my window I could reach the terrace garden lamppost to anchor my antenna.

W1AW was a welcome sound from the United States! I copied part of the 20-WPM code-practice transmission while I was getting started. Most of the stations were on earlier in the evening, so working ops in Europe on 40 meters was going to take some improvisation.

After considering alternatives and the time I'd have available for fooling with antennas, I actually rigged the antenna *indoors* and set up my station in another room. It received well, but I really wondered how it would transmit.

Success! Everything fits on a 1-square-foot tile on the kitchen floor. The key is mounted to the pine board, which protects the hardware against travel damage. A small tuner is (at the upper left) hidden under the rest of the station.

Running 2 W to an indoor antenna is a worst-case scenario, to be sure. It meant my chances of success were near zero, but I set up my tiny station and forged ahead.

After a few minutes, F6ICW returned, finding my response to his CQ. I was elated and surprised that we held a 10-minute QSO from his QTH near Paris. I'm sure Bernard struggled to copy, sending a generous 359 report, but I was nonetheless thrilled.

A few more hours working the key were difficult, but fruitful. Friday evening I started the QSO parade with Denis, F/SO0DWK, in Paris, who was also traveling. Denis struggled to copy the weak signal from an "Indoor Shorty," but with the hotel empty at the start of the weekend, it was only a few hours before I could move the antenna outdoors again and really cut loose.

Outdoors, the antenna performed as expected (that is, much better!).

In Closing

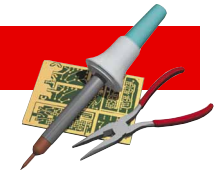
If your travel budget is a little bruised, you certainly don't have to schedule an overseas trip to take advantage of the "Shorty." The antenna works well in a variety of unusual antenna locations, it's easy to build and packs away conveniently. It even works indoors in a pinch.

I had a great time building it. If you can plan your own CEPT adventure, consider taking along your own Junk Box Shorty Forty.

Notes

[1] *1988 ARRL Antenna Book*, Equation 1, p 6-7.
[2] *1988 ARRL Antenna Book*, Section 26-20.
[3] *1988 ARRL Antenna Book*, Section 26-9, "Combined Balun and Matching Stub."
[4] Warren L. Stutzman and Gary A. Thiele, *Antenna Theory and Design*. Published by John Wiley and Sons, 1981, pp 198-200.
[5] *1988 ARRL Antenna Book*, Section 6-6.
[6] Warren L. Stutzman and Gary A. Thiele, *Antenna Theory and Design*. Published by John Wiley and Sons, 1981, pp 198-200.

4618 W Prospect St
Mantua, OH 44255
Ptsmantua@aol.com



West Mountain Radio *Nomic* Sound Card/ Transceiver Interface

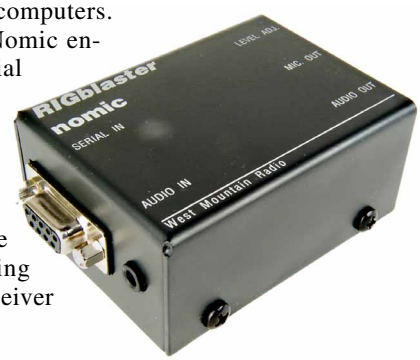
Amateurs have been awakening to the power of computer sound cards. For years sound cards were regarded as entertainment gadgets at best, generating beeps, chimes and "You have mail" announcements in station computers. But thanks to software authors throughout the world, these ubiquitous devices have become essential tools for everything from contest "voice keyers" to computer-based modes such as PSK31, MFSK16, RTTY, SSTV and more.

In terms of connecting a sound card to your transceiver, a shielded audio cable is all you need for reception; no special interfacing is required. Transmitting is another matter. You need a way to match the audio level between your sound card output and your transceiver, *and* the means to place your radio into the transmit mode when it is time to send. In many cases, a couple of audio cables and a single-transistor switch on an available COM port will suffice. For quite a few amateurs, however, it isn't that easy. Isolation and RF problems can introduce hum and other objectionable noises. Keying circuits can refuse to operate, or will operate erratically.

A couple of years ago, West Mountain Radio introduced the RIGblaster interface, which solved most of these problems by consolidating all of the keying and interface connections in one box. Since then, the RIGblaster has become the *de facto* standard. Its transformer isolation, ample RF bypassing, handy audio level adjustments and optically isolated keying take the pain out of interfacing your sound card to your radio. The RIGblaster also offers a jack for your station microphone. With a single push of the button, you can disconnect your sound card audio lines and substitute your microphone (this is particularly convenient for SSTV where image transmissions are often mixed with SSB conversations).

The Nomic

The RIGblaster Nomic represents a natural step in the evolution of this popular interface. I suppose you could call it "Son of RIGblaster." Nomic is designed for amateurs who need an even more compact sound card interface, one without a microphone option. Smaller than a pack of cigarettes, the Nomic can fit just about anywhere. It doesn't even require a power supply. (If your station doesn't have room for a Nomic, you need help!) The Nomic is also ideal for the growing number of hams who enjoy portable operating with their laptop or notebook computers.



The left side of the Nomic enclosure sports a DB-9 serial connection. This is the port for the cable between the Nomic and your computer COM port and it is used solely for placing your radio in the transmit mode. The keying connections to your transceiver are made through a RJ45 modular telephone-style jack on the right side of the Nomic. This jack is labeled **MIC OUT**, but it doesn't necessarily need to be connected to your transceiver microphone jack. You can just as easily make the connection to the auxiliary jack.

When you want to transmit, your software creates logic pulses that appear on the COM port's RTS or DTR pins (the Nomic selects either active pin automatically). The pulses cause the Nomic's 4N33 optoisolator to conduct, and if you've wired the connection to your radio properly, the radio will switch to transmit.

Correct wiring is never a problem. The Nomic package includes a set of four tiny jumper wires and plugs. Remove the four screws that hold the Nomic box in place and you'll find a 13-pin jumper "header." By following the instructions in the Nomic manual, you can use these jumpers to assign the microphone audio, microphone ground, PTT (push to talk) ground and PTT "hot" lines to any of the **MIC OUT** jack pins. The benefit may not seem obvious at first, but think carefully. To connect the Nomic to the microphone input of any radio, all you need is a microphone plug to fit the radio, a multiwire shielded cable and a RJ45 plug. (West Mountain Radio sells preassembled cables for several transceiver brands.) *It doesn't matter how the Nomic-to-radio cable is wired.* You simply switch jumpers to make the correct connections and you are done. It doesn't get more foolproof than this.

Audio from the sound card is fed to the **AUDIO IN** port. If your sound card doesn't have a line-level output and you have to tap your transmit audio from the sound card speaker jack instead, don't worry about losing the use of your computer speakers. Just plug your speakers into the Nomic **AUDIO OUT** jack and they'll work just as well as before.

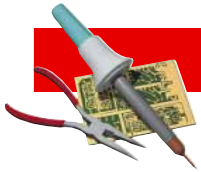
The Nomic design provides a transformer for transmit audio matching and isolation. A level-adjustment potentiometer on the right side of the Nomic case lets you tweak for just the right amount of transmit audio for your radio.

Software

Nomic comes with more than just hardware. The device is shipped with a CD-ROM filled with an astonishing amount of software for PCs (*DOS* and *Windows*). There are freeware and shareware applications to transmit and receive packet (including APRS), AMTOR, PACTOR, RTTY, PSK31, MFSK16, SSTV, CW and even high-speed CW (for meteor scatter)—all requiring nothing more than your computer sound card and the Nomic. The CD even offers a sophisticated color 3D-radio terrain-mapping program written by VE2DBE and a demo logging program known as *VQlog* written by EA6VQ.

With the Nomic interface and its CD-ROM library, you'll be busy exploring new worlds for a long time! *Manufacturer: West Mountain Radio, 18 Sheehan Ave, Norwalk, CT 06854; tel 203-853-8080;* **www.westmountainradio.com**. *$29.95.*

Steve Ford, WB8IMY ♦ *QST* Editor



By H. Ward Silver, N0AX

Test Your Knowledge!

Consider this to be a "reverse engineering" quiz. Ward gives you the answers and you supply the questions! The theme, in honor of AO-40's first QSOs, is satellite technology.

1. Perigee
a. Closest approach of a satellite to Earth
b. Farthest distance of a satellite from Earth
c. Average distance of a satellite from Earth
d. A failed launch

2. Mode
a. Orientation of orbit with respect to Earth's orbit
b. Angle between Earth-Moon-Sun
c. Uplink-Downlink frequencies
d. Relative angular difference between the ground station's and satellite's polarization

3. Bird
a. Rocket booster or launch vehicle
b. Refers to any airplane used to monitor weather
c. A satellite
d. Signals

4. Acquisition
a. Notification of "space-available" by launching agency
b. Completion of fund-raising
c. Phase-lock to satellite telemetry signals
d. Reception of signals from satellite

5. Keplerian
a. Refers to early orbital theory
b. Anything in the shape of an ellipse
c. Parameters describing a satellite's orbit
d. Type of rocket launch procedure

6. Alligator
a. Sensitive satellite receiver
b. Ground station with better transmit than receive capability
c. Operator who only listens
d. Nickname for the container in which a satellite is shipped

7. Mean Motion
a. A fast az-el rotator
b. Number of satellite revolutions in a solar day
c. Relative velocity of satellite to the Earth's surface
d. Relative velocity of satellite to a geosynchronous orbit

8. Sidereal Day
a. Time for Earth to rotate exactly 360°
b. Day on which a satellite is in-line between the Earth and sun
c. International holiday in honor of amateur satellites
d. Time between satellite visibility at equal longitudes

9. Pass
a. Decline the opportunity to transmit
b. Suppress a competing signal by raising power
c. Authorization to act as a control station
d. Period of satellite visibility

10. Decay
a. What an orbit does
b. The result of too much soda pop in the shack
c. Trailing edge of CW signal
d. Echoes from the lunar surface

11. ESA
a. Extra Shuttle Activity—a spacewalk
b. Europe Satellite Amateur—a Region 1 radio association
c. European Space Agency—the European equivalent of NASA
d. Elevated Solar Absorption

12. Quadrifilar
a. Omnidirectional antenna in the shape of a helix
b. Transmission line with four conductors
c. Magnet with two sets of poles
d. Stereo signal with front and back channels

13. LOS
a. Line of sight
b. Loss of signal
c. Left on second
d. Lead of satellite

14. Elliptical
a. Polarization of crossed-dipoles
b. Reflection coefficient of reactive loads
c. Orbit that alternates between close to and far from Earth
d. Shape of "kick" motor nozzle

15. $26
a. Cost per foot of silver-plated S-band waveguide
b. Total out-of-pocket expense for OSCAR-1
c. Equivalent expense over commercial satellite for average ham QSO
d. Dinner tab at AMSAT's inaugural board meeting

Bonus: Arthur C. Clarke

Total Your Score!

Give yourself one point for each correct answer.

11-15	Warp speed!
6-10	In need of a boost, but almost there.
1-5	Ground control to Major Tom?

Answers

1. a—Perigee is the closest distance and apogee the farthest.
2. c—The mode tells you which transponders are active.
3. c—Slang for any satellite.
4. d—When you first hear the satellite, you have acquisition.
5. c—The orbital parameters or "elements" allow you to find the satellite in the sky at any time.
6. b—This means the same for all amateur communications!
7. b—A low-orbit satellite will have a high mean-motion.
8. a—This time is measured with respect to the "fixed stars."
9. d—A pass is the entire time you can hear the satellite's signals.
10. a—An orbit decays as it gets closer to the Earth.
11. c—The European Space Agency has launched many ham satellites.
12. a—These compact antennas give good hemispherical coverage for satellite communications.
13. b—LOS occurs at the end of a pass (or when your preamp dies).
14. c—Elliptical orbits have a large difference between perigee and apogee.
15. b—True! The ejection spring was from Sears and cost $1.15.

Bonus—In 1945 Mr Clarke was the first to suggest that communication satellites could be placed in geosynchronous orbit.

HINTS & KINKS

VACUUM-TUBE FILAMENT VOLTAGE

◊ Tubes are very expensive these days. There is a way to extend their life without sacrificing efficiency. The initial and prolonged filament voltage has great effect on tube life. By adjusting for what is known as the *emission limited* filament voltage, it is possible to increase tube life by 50%. Here is the procedure:

1. Tune the transmitter to its peak output.
2. Slowly reduce the filament voltage until there is a slight decrease in output.
3. Increase the voltage very slowly (by 0.1 to 0.2 V) to achieve normal RF output.

Of course, all QRO amplifiers should have filament in-rush protection to protect the tube(s) when the power is switched on.—*Richard Mollentine, WA0KKC, 7139 Hardy St, Shawnee Mission, KS 66204-1710*

Some Comments

◊ Editor's Note: I was curious about the need for this technique, so I contacted the author of a few *QST* and *ARRL Handbook* amplifier projects, George Daughters, K6GT. Here are some of George's comments:

Filament-Voltage Setting: This is a good idea to maximize tube life. You can conveniently control the filament voltage with a "meaty" rheostat in the filament-transformer primary. An equivalent control in the secondary circuit typically requires an inconveniently small resistance. The guiding principle should be to operate at the manufacturer's suggested nominal conditions.

Filament-voltage adjustment *is* a problem in amplifiers that don't have a separate filament transformer. That is, when one transformer supplies other circuits (B+, bias, control) along with the filaments. In such cases, filament-voltage adjustment can only be accomplished via a series resistance in the filament line. Any resistance in the primary would affect *all* of the secondary voltages, which would probably be undesirable!

Filament In-Rush Protection: In-rush current protection is necessary for power supplies that have a capacitor-input filter in B+ line. Their start-up current can be gigantic. A step-start protects the rectifier diodes in the high-voltage supply. For a tube's filament/heater, the need is less clear.

For tubes with *directly* heated cathodes (3-500Z and such), in-rush protection is probably a good idea. For tubes with *indirectly* heated cathodes (4CX800A, 8877 and so on), this probably isn't necessary. The manufacturers of these tubes don't recommend it, but they don't recommend against it, either. It probably shouldn't hurt, but why bother?

This point has been tossed around a lot on the Internet "amps reflector" and this information above is a summary of what I've gleaned there.—*George T. Daughters, K6GT*

FOR A CLEAN FIST, TRY CLEAN EARS

◊ "For a clean fist, try clean ears," says Mark Hansbarger, AA9MU. Display your vintage keys and keep dust off the contacts for little cost by using simple plastic dust covers, as AA9MU did, using an oversize cotton-swab package (see Figure 1).

Measure the height, width and depth of your key, then be on the lookout for a plastic cover available from many differently packaged products.

Custom fit the cover by placing the plastic over the key. Then mark positions for the finger grips, other protrusions and parts of the container to be trimmed off, with a nonpermanent felt tip marker. Finally, cut the cover to fit.

Instead of cutting off the pieces completely, AA9MU recommends folding them out of the way in case of an oversize cut, as shown in Figure 2. Thus, the flap can be folded back into place and secured with clear adhesive tape.

To make an adjustable cover, cut the plastic container from side to side to allow the long ends to neatly slip inside each other, then tape them in place. Cutting precisely and drilling a tight fit for the top arm pivot screw allows using the key while it's covered.—*Mark B. Hansbarger, AA9MU, 1000 Lane 440 Lake James, Angola, IN 46703;* **mark@hansbarger.com**

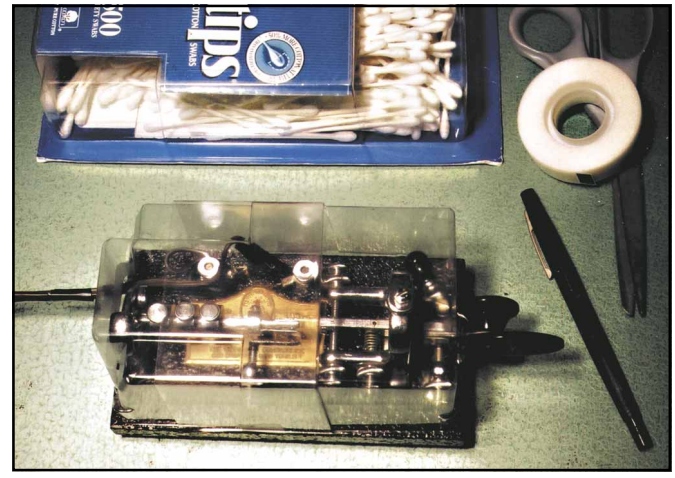


Figure 1—AA9MU makes key covers from clear-plastic packaging, such as those used for cotton swabs. Notice how the container was cut in half with the two ends telescoped together to match the key-base length.

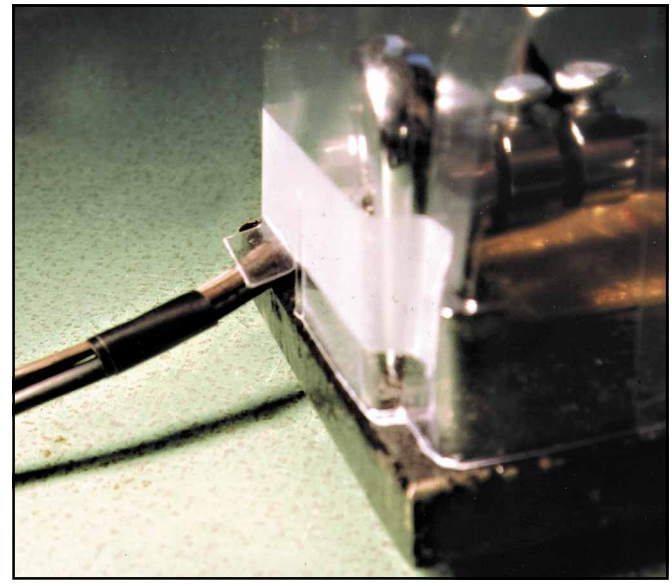


Figure 2—Cables exit the AA9MU key cover.

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor

EXTERNAL KEYING LINE FOR THE ICOM IC-706 MKII

◊ I was tired of the fast hang-time drop on my old RF-Concepts 2-315 brick amplifier when on 2-meter SSB; setting the hang time to the maximum available still isn't quite long enough for us Southern folk. Therefore, I decided to make a connector for the brick's external keying line to use with my IC-706 MkII.

At first, I thought of switching the amplifier from the default positive keying to negative keying, but this caused more problems than it solved. So I reverted to the negative keying position, and after a little trial and error came up with the circuit in Figure 3.

This circuit inverts the output of the IC-706 MkII **VSEND** line (Pin 7 on the Accessory socket). My trusty DMM says this will only draw 1 mA from the +8 V reference regulator in the radio, which is rated at a maximum of 10 mA.

All parts for this circuit can be obtained from RadioShack, and assuming that you still have the pigtail connector that came with the radio, you can build this for about $5.—*James D. Bryant II, KC5VDJ, 8409 Farley St, Overland Park, KS 66212;* **kc5vdj@swbell.net**

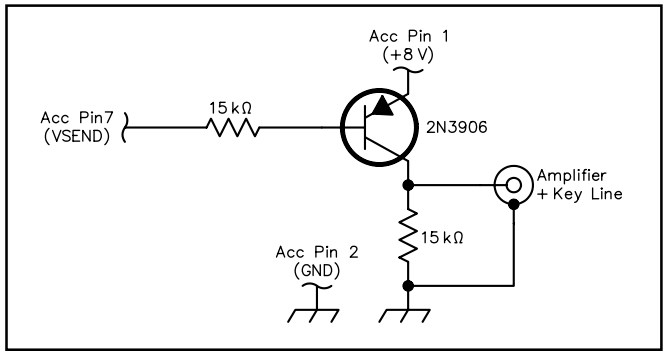


Figure 3—A keying-line inverter for the IC-706MkII transceiver for use with RF-Concepts style external keying circuits. ICOM rates the +8 V line at 10 mA, maximum. This circuit draws only 1 mA. Acc pin numbers refer to the pins on the accessory socket (13-pin DIN) on the radio rear panel.

DX ON A BABY MONITOR

◊ When out of the shack in another part of the house, I used to wonder what good DX I was missing. Now, I can hear the DX spots I need over DXTelnet and I'm still able to get other things done throughout the house or yard. After logging on to DXTelnet and activating the voice spell feature, I place the transmitter unit of a baby monitor close to my computer speakers. Next I clip the battery powered receiver unit to my belt or put it in my shirt pocket. Baby monitors are relatively inexpensive and are available at most toy stores. Now I don't have to miss that rare DX spot because I'm not in the shack.—*Dr. Charles C. Doggett, WA3EEE, 3723 Marriottsville Rd, Randallstown, MD 21133;* **CDoggett@prodigy.net**

A MULTI-DIODE CLIPPER

◊ Several years ago, I purchased a JPS NIR-12 DSP unit. I have extremely tender ears, and impulse noise is extremely painful to me, to the extent that the radio was of no use to me for HF reception. To remedy this, I came up with a clipper system that is quite effective, and makes a world of difference. I used two RadioShack #32-1031B line-to-voice-coil transformers. For the input and output terminals, I hooked the audio in and out between the C (common) terminal and the 4-Ω terminal. I wired the two transformer primaries together in parallel (using the 10-W and C terminals) and connected two strings of series connected silicon rectifier diodes across them. The two diode strings are oppositely polarized.

The circuit operation is simple: It transforms the low voltage audio from the receiver to a higher voltage (at 600 Ω). Two diode strings across the 600-Ω line clip both sides of the audio, and the clipped audio is transformed back to 4 Ω.

I used four series connected diodes for each string. Add more diodes if you want to increase the output volume. Check the clipping action by increasing the receiver volume until clipping starts, then back the volume down until it is clear. If it is not loud enough, add more diodes to the string. The NIR-12 is now extremely useful, thanks to this modification.—*William Bastian, N9BOE, 21226 Charcoal Ave, Warrens, WI 54666-8591;* **n9boe@mwt.net**

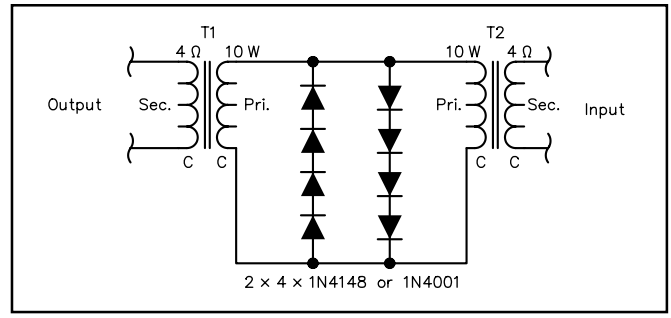


Figure 4—N9BOE uses several diodes and transformers to expand the usefulness of a common diode-clipper circuit. T1 and T2 are RS #32-1031 audio transformers.

MORE ON FINDING LOST PARTS

◊ Lloyd Hanson, W9YCB's "Recovery of Small Lost Parts" (*QST*, Aug 1999, p 65) is a very good article, and Mr. Hanson obviously has a lot of experience. Before sweeping with a squeegee, I sweep with a flashlight and my eyes. Lay a lit flashlight on the floor (or other flat surface where parts are lost) so that it shines across the area and look for shadows. A light source at the surface casts long, stark shadows even from very small parts. Sweep the light back and forth across the area and shadows will seem to jump at any object. I often find parts that I didn't know were lost!—*Roy Day, K4PXW, 3457 Glendale Ave, Louisville, KY 40215*

GREASING ANTENNA ROTATORS

New Synthetic Greases

◊ There are new low-temperature synthetic greases that will lubricate (flow) at lower ambient temperatures than older mineral-based greases, particularly below 0°F. If you have an older antenna rotator that needs service, remove the old grease from the rotator and bearing races and sparingly replace it with newer synthetic grease.—*Richard Mollentine, WA0KKC, 7139 Hardy St, Shawnee Mission, KS 66204-1710*

Grease Fittings

◊ Thrust bearings that lack zerk fittings can still be greased. Some kinds of grease are available in aerosol cans. Simply bend the applicator straw to reach into the bearing. For heavier greases, you may be able to get a grease needle from an auto-supply store or bicycle shop.—*Richard Mollentine, WA0KKC, 7139 Hardy St, Shawnee Mission, KS 66204-1710*

RESTORING PLASTIC WINDOWS ON RADIOS AND GEAR

◊ Most of us have purchased or owned gear that has devel-

Figure 5—Micro-Mesh products for removing scratches.

oped those annoying scratches or haze on the plastic display windows. I have discovered an excellent product designed to remove these artifacts and make those windows look like new. It is a complete abrasive/polishing system made by Micro-Surface Finishing Products of Wilton, Iowa.

The product is called Micro-Mesh; it is a series of special flexible abrasive sheets. These are supplemented by Micro-Gloss liquid polishes for that last bit of smooth flawless shine. Each abrasive sheet has a cloth backing for flexibility and a thin latex material coated with special abrasive crystals. The sheets are washable and reusable many times. The samples I have consist of nine sheets graduated from 1500 to 12000 grit.

By following the instructions carefully, I have restored several windows and displays on flea-market bargains to a perfectly brilliant transparency. Make no mistake about it, this is a professional product for restoring just about any unpainted plastic. The aerospace industry uses this product to remove scratches and haze from jet canopies, and as an avionics repairman I use it at work to fix displays on very expensive cockpit instruments. You could use it to restore irreplaceable plastic windows on antique radios, or increase the value of equipment before sale. Clean, scratch-free gear always sells first at the flea markets! To select the product kits that best fit your needs, go to **www.micro-surface.com** or call 1-800-225-3006. It's great for plastic watch crystals, too!—*Tom Sherwood, W8AAZ, 324 Linton Dr, Wilmington, OH 45177;* **tsherwood@in-touch.net**

Hints and Kinks items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given hint will work for your situation, we make every effort to screen out harmful information. Send technical questions directly to the hint's author.

QST invites you to share your hints with fellow hams. Send them to "Attn: Hints and Kinks" at ARRL Headquarters (see page 10), or via e-mail to **h&k@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. Whether praising or criticizing an item, please send the author(s) a copy of your comments. QST

NEW PRODUCTS

6-METER RIG FROM RANGER COMMUNICATIONS

◊ Ranger Communications Inc has announced the RCI-5054DX—an all-mode (SSB, CW, FM and AM) 6-meter transceiver.

The radio is identical in appearance and features to their 10/12-meter RCI-2950DX. Highlights include 10 memories, programmable repeater offset, 2.5 kHz RIT, a noise blanker/antenna noise limiter and a scan feature. An optional CTCSS tone board is also available. The power output is specified at 25 W for SSB and 10 W for the CW, FM and AM modes.

The RCI-5054DX is priced at $325. For more information visit your favorite Amateur Radio products dealer or contact Ranger Communications Inc, 401 W 35th St, National City, CA 91950; tel 877-536-0772, 702-262-0772, fax 702-262-0780; **www.rangerusa.com**.

CE DISTRIBUTION APPOINTED US DISTRIBUTOR FOR JJ ELECTRONIC TUBE LINES

◊ CE Distribution of Tempe, Arizona has been appointed US Distributor for JJ Electronic, a manufacturer of electron tubes and other components that is located in the Slovak Republic.

Available tube types presently include the EL34, 6L6GC, KT88, 6BQ5/EL84, 12AX7-S, 12AU7, 12AT7, 6922, 300B and the 7027A.

Noreen Cravener, President of CE Distribution, commented, "The JJ Electronic components are a perfect complement to the lines we presently distribute to the audio market. Great precision and care is taken in the production of the audio tubes, which are factory matched where applicable. The JJ Electronic components are well known and highly regarded in the industry. Now they're more accessible."

For more information contact CE Distribution LLC, 6221 S Maple Ave, Tempe, AZ 85050; tel 480-755-4712, fax 480-820-4643; **jbosaw@cedist.com**; **www.cedist.com/**.

HEIL SOUND HAND MIKE

◊ Heil Sound has added hand-held microphones to their product line. All models come pre-wired for a variety of popular radios that employ conventional (round) 8-pin microphone jacks.

The HMM-K is set up for Kenwood and Alinco transceivers; the HMM-Y is wired for Yaesu transceivers. These microphones should also work with other radios that are pin-compatible with these brands. Contact Heil Sound for details.

These two HMM-series microphones contain dual microphone elements: the HC-4 "DX Dream Machine" element and Heil's new full range "Rag Chew" element. A slide switch located on the back of the mike's case allows you to choose the best audio response for a particular communications application.

A third model, the HMM-iC, is specifically designed for use with ICOM transceivers. It contains a single element—Heil's new "articulate" electret condensor—and comes with a conventional 8-pin microphone plug installed. All models include a button-style microphone hanger system and the related fastening hardware.

The list prices for the HMM-K and the HMM-Y are $78, the HMM-iC lists for $58. For more information visit your favorite Amateur Radio products dealer or contact Heil Sound, 5800 N Illinois, Fairview Heights, IL 62208; tel 618-257-3000, fax 618-257-3001; **info@heilsound.com**; **www.heilsound.com/**. QST

Previous • Next New Products

The Kenwood TS-2000 All-Mode Multiband Transceiver

Reviewed by Robert Schetgen, KU7G
Senior Assistant Technical Editor

The TS-2000 is Kenwood's long-anticipated reentry into an "arms race" that's been raging among amateur equipment manufacturers for several years now. The rivalry was touched off when 6-meter coverage started appearing as "standard equipment" in a few of the mid-level HF tabletop and mobile transceivers. Kenwood was no innocent bystander here; their HF plus 6-meter TS-680S was one of the rigs that may have started this whole thing in the first place.

Kenwood then seemed content to stand back while the competition progressively upped the ante. HF/6-meter rigs were followed by HF/6-meter/2-meter rigs, and then HF/6-meter/2-meter/70-cm rigs. Yaesu—with their FT-847—escalated the stakes further by rolling in full-duplex satellite capabilities.

A little over a year ago, Kenwood unveiled a mockup of the Amateur Radio equivalent of the 2-lb version of the Swiss Army knife. At that time, they still hadn't come up with a title for their proposed creation (among the general ham population, it temporarily held the *nom de plume* "Kenwood's Radio with No Name"). The premiere edition of the glossy sales brochure that outlined its capabilities and band coverage—handed out at Dayton Hamvention 2000—read like an inventory of a spoiled ham's toy box. Coverage on all of the current HF bands with general coverage receive?—*check*; 2 meters, 6 meters and 70 cm?—*but of course*; 1.2 GHz (optional *or* standard)?—*why not?*; DSP filtering?—*you bet!*; satellite capabilities?—*yup* (welcome to the new millennium, Bunky!); a built-in TNC for VHF and UHF (with DX packet cluster display and "go to" features)?—*got that*. Toss in an automatic antenna tuner; a CW memory keyer; Kenwood's exclusive CW "Auto-tune" feature; a TCXO; an integrated RS-232 level converter; a separate receive antenna jack; and—well—*yada yada yada*.

This rig is heftier than the current crop of multiband subcompacts, though. What if you're in the market for a mobile transceiver?—*No problem!* An optional compact mobile control head (the RC-2000) will plug right in for back seat or trunk mounted chassis setups. You can even buy a less expensive "silver box" version of the rig (the TS-B2000) and operate it using the mobile head.

Kenwood recently released a TS-2000X version. The 'X includes the 1.2 GHz module as standard equipment. And any of the versions—with or without the front panel display, buttons and knobs—can be fully controlled using a personal computer and Kenwood's optional ARCP-2000 PC software.

We purchased the "standard" TS-2000 tested in this review several months ago, intending to add the 1.2 GHz option as soon as it became available. We had initially hoped to include data and comments on 1.2 GHz performance in this review. The module—the UT-20—just recently became available, and the installation requires a trip to Kenwood's service facility for installation. Consequently, we'll save the 1.2 GHz information for a future column.

The Radio

The base-model TS-2000 covers 12 ham bands from 1.8 through 450 MHz. Transmit capabilities on the 222-MHz band are not provided, but the radio is capable of receiving signals there—and a healthy chunk of the LF, HF, VHF and UHF spectrums as well (see Table 1).

Bottom Line

The TS-2000 is the closest thing yet to a complete ham station between a single set of covers. Highlights include multimode transceive on up to 13 ham bands, a full range of VHF/UHF FM repeater and satellite operating features, and a built-in packet TNC.

The main receiver covers MF/HF from 0.03 to 60 MHz with IFs at 69.085 or 75.925 MHz, 10.695 MHz, 455 kHz and 12 kHz. The DSP-based filtering is in the 12 kHz IF. For reception of 118 to 512 MHz, the first IF is at 41.895 MHz. UT-20-equipped models also tune 1240 to 1300 MHz with a first IF of 135.495 MHz. Transmitter output is adjustable from 5 to 100 W on the ham bands between 1.8 and 148 MHz and 5 to 50 W on 70 cm (1 to 10 W on 23 cm when the UT-20 is installed). The maximum AM-mode output is 25 W from 1.8 to 144 MHz and 12.5 W on 70 cm (2.5 W on 23 cm).

The transceiver has a sub-receiver that functions on the AM and FM modes only (including packet) from 118 to 174 MHz and 220 to 512 MHz, with IFs at 58.525 MHz and 455 kHz.

The Manual

As an old-time model builder and programmer, I always reach for the manual first. This one is large, 143 pages. I spent a considerable amount of time just reading the detailed table of contents. The manual is designed to please anxious-to-get-on-the-air new owners. In only seven pages, it describes radio installation and provides examples of two typical first QSOs: HF/6 meters and VHF/UHF. This lets you get your feet wet and confirms that your new baby is functioning properly. With these initial "instant gratifications" delivered, the manual then moves on to a complete tour. The documentation packed with the transceiver includes eight schematics that are large enough to read (23×33 inches). [A PDF file of the manual is available on Kenwood's Web site: **www.kenwood.net**.—*Ed*]

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

Looking at just the illustration in the manual, the front panel looks pretty intimidating. My old eyes had trouble making out the key labels that it shows. Thankfully, the actual panel is about 4 times larger than the depiction in the book. Nonetheless, I wouldn't want to try operating this rig in a dimly lit room—at least not until I became intimately familiar with the location of the controls. While I give Kenwood credit for backlighting the keys (like a car stereo), many of the additional key assignments are printed directly on the front panel, and the vast majority of these keys perform multiple operations.

Transceiver Controls

This radio has many capabilities, and therefore, many controls: 55 keys, five single and three double (concentric) knobs. There are control groups to suit many specialized pursuits: DXing, satellite work, VHF/UHF operation and more.

At the center of the panel is a tuning knob with a diameter of almost two inches. I didn't notice it at first, but there's a tension lever under the knob's lower edge. With minimum tension, a flip sends the knob more than a turn; at maximum tension, it's difficult to turn the knob with a finger in the indentation.

A pair of knobs at the lower left set the DSP filter high and low edges. At the upper right, an **RIT/SUB** knob adjusts the RIT or XIT when those functions are on, and the sub-receiver frequency when they're off. Two concentric sets control the main-receiver AF and RF gain, squelch and notch (for the DSP beat-cancel function when it's set for manual control). A third controls the sub-receiver AF gain and squelch; pushing this knob switches the sub receiver on or off.

Last, we come to the knob for all reasons: **MULTI/CH**. In the VFO mode, this knob steps the operating frequency up or down rapidly by one of several user selectable steps. In memory-channel mode, this knob is used to select the memory channel. It also selects menus in the menu mode and works as a control for many functions that are evoked by front panel buttons, such as **CAR**rier level or **MIC** gain.

A Battalion of Buttons

If these buttons were all positioned in one rectangular grid, it would be very difficult to learn their use; luckily they're not. Several plateaus and shapes on the front panel serve to group the keys. Some keys are rectangular, some triangular; there are even ellipses and other odd shapes. All of these characteristics help our minds cope with the staggering number of controls.

Nonetheless, the functions of many keys are context sensitive. The **CLR** key (lower left of main tuning knob) exits from, aborts or resets various functions, erases memory channels or locks memory channels out of the scan list. Some keys need to be pressed twice to perform a single function: Keypad frequency entry requires that you press **ENT** to initiate the action and again to end it (if you don't enter enough digits to fill the display). To recall a satellite memory, you must press **VFO/M VFO/CH** to enable the **MULTI/CH** selection of a channel, and again, to return to the frequency-adjustable mode.

The front panel of the TS-2000 includes a **PF** (programmable function) key that can be assigned one of a variety of functions by the user. The radio comes with Kenwood's MC-43S basic hand microphone, but an optional mike—the MC-47—offers four additional programmable keys (optional desk mikes are also available).

Many of the control keys can be switched between the main and sub receivers. The portion under control is indicated by a **CTRL** icon on the main display. If the icon is near the main frequency display, the operating controls act on the main receiver. If the icon is near the sub-receiver frequency display, the operating controls act on the sub receiver. The selected transmission band is similarly indicated by the location of a **PTT** icon.

A Multitude of Menus

Aside from all of those buttons, there are also many menus—and menus of menus! Actually, most of these menus function simply as software switches that enable, disable or set some feature of the radio. There are 62 of these, and 10 of them have submenus that further define individual functions.

With this many settings, we need help to remember what's what. You enter the menu system by pressing the **MENU** button to the upper right of the main knob. When you do so, the active menu's number, setting and text "explanation" (a scrolling description) appear in the bottom line of the display. At this point, we can use the **MULTI/CH** knob to maneuver through the main menu. If a menu contains a submenu, the explanation will show "Push Sub." Menu settings are changed via the **+** and **–** buttons, located just to the right of the main tuning knob.

The settings of all of these menus are then stored in one of two main menus (A and B). This allows you to set up two different arrays of settings to tailor the radio for a particular purpose. (It's like those vehicles that remember the seat, mirror and steering wheel locations for two different drivers.) As the manual suggests, you might set up "Menu A" for DXing and "Menu B" for rag chewing, for example. In addition, you can set up a "Quick Menu" that contains only those functions you choose. This might contain the settings you change most often.

A Long LCD Display

The **DISP** key switches the display among the normal display, DSP filter settings and "Visual Scan" modes.

On the left side of the LCD is the meter display. On receive it is an S-meter, but it also shows the filter bandwidth. While transmitting it can indicate RF output power, ALC, SWR (this functions only from 1.8 through 50 MHz) and speech-processor level. Icons below the meter show which HF antenna jacks are active and whether the automatic antenna tuning unit is enabled on transmit, receive or both.

The larger main-receiver portion of the display and the smaller sub-receiver portion (to the right) each show the selected memory channel, frequency and a constellation of icons that indicate the various functions applicable to that receiver. Look for the **PTT** and **CTRL** icons at the upper left of each receiver's frequency display. They indicate which receiver receives inputs from the panel controls and the current transmission band. When the RIT, XIT or split functions of the main receiver are active, the sub-receiver display shows an appropriate icon and frequency information. The rectangular area below the main-receiver display is a dot-matrix screen that normally shows the operating mode, but also shows menu numbers and settings or the DSP filter configuration. A similar dot matrix area is located under the sub-receiver display.

In the DSP display mode, the dot-matrix screens show information about the state of the DSP filters. The display enters this mode automatically whenever the operator adjusts the filter controls.

In the "View Scan" mode, the dot matrix below the sub-receiver frequency display shows a small band scope that plots the relative strength of signals near the main-receiver frequency. The main-receiver dot matrix shows the mode and the number of channels to be scanned. You may choose to scan 31, 61, 91 or 181 channels on each side of the main-receiver frequency. The sub-receiver frequency display shows the frequency of the channel currently being scanned. Scanning can be paused to hear the current scan station by pressing the **DISP** key. A second press resumes scanning. View-Scan mode can also be used to scan memory channels rather than VFO channels.

Connections

Kenwood has covered all the bases here. The front panel has the standard **MIC** (8-pin) and **PHONES** (1/4-inch, two or three conduc-

Table 1
Kenwood TS-2000, serial number 20800064

Manufacturer's Claimed Specifications

Frequency coverage: Receive, 0.03-60, 118-174, 220-512 MHz; transmit, 1.8-2, 3.5-4, 7-7.3, 10.1-10.15, 14-14.35, 18.068-18.168, 21-21.45, 24.89-24.99, 28-29.7, 50-54, 144-148, 430-450 MHz.[1]

Power requirement: Receive, 2.6 A; transmit, 20.5 A (maximum).

Modes of operation: SSB, CW, AM, FM, FSK.

Measured in the ARRL Lab

Receive and transmit, as specified.

Receive, 2.1 A; transmit, 18 A. Tested at 13.8 V.

As specified.

Receiver

SSB/CW sensitivity, bandwidth not specified, 10 dB S/N: 0.5-1.7 MHz, <4 µV; 1.7-24.5 MHz, <0.2 µV; 24.5-30, 50-54 MHz, <0.13 µV; 144-148 MHz, <0.16 µV; 430-450 MHz, <0.11 µV.

AM sensitivity, 10 dB S/N: 0.5-1.7 MHz, <32 µV; 1.7-24.5 MHz, <2.0 µV; 24.5-30 MHz, 50-54 MHz, <1.3 µV; 144-148 MHz, <1.4 µV; 430-450 MHz, <1.0 µV.

FM sensitivity, 12 dB SINAD: 28-30 MHz, 50-54 MHz, <0.22 µV; 144-148 MHz, 0.25 µV; 430-450 MHz, <0.18 µV.

Blocking dynamic range: Not specified.

Two-tone, third-order IMD dynamic range: Not specified.

Third-order intercept: Not specified.

Second-order intercept: Not specified.

FM adjacent channel rejection: Not specified.

FM two-tone, third-order IMD dynamic range: Not specified.

S-meter sensitivity: Not specified.

Squelch sensitivity: SSB, 0.5-1.7 MHz, <18 µV; 1.8-28.7 MHz, <1.8 µV; 50-54 MHz, 144-148, 420-450 MHz, <1.1 µV; FM, 28-30 MHz, <0.2 µV; 50-54 MHz, <0.2 µV; 144-148 MHz, 0.16 µV; 430-450 MHz, <0.1 µV.

Receiver Dynamic Testing

Noise floor (MDS), 500 Hz filter:

	Preamp off	*Preamp on*
1.0 MHz	–110 dBm	–118 dBm
3.5 MHz	–128 dBm	–138 dBm
14 MHz	–129 dBm	–137 dBm
50 MHz	–127 dBm	–142 dBm
144 MHz	–124 dBm	–140 dBm
432 MHz	–128 dBm	–143 dBm

10 dB (S+N)/N, 1-kHz tone, 30% modulation:

	Preamp off	*Preamp on*
1.0 MHz	16 µV	6.3 µV
3.8 MHz	1.8 µV	0.68 µV
50 MHz	2.8 µV	0.38 µV
120 MHz[2]	0.79 µV	N/A
144 MHz	3.1 µV	0.48 µV
432 MHz	2.3 µV	0.38 µV

For 12 dB SINAD:

	Preamp off	*Preamp on*
29 MHz	0.57 µV	0.14 µV
52 MHz	0.66 µV	0.14 µV
146 MHz	1.1 µV	0.18 µV
440 MHz	0.75 µV	0.13 µV

Blocking dynamic range, 500 Hz filter:

spacing:	20 kHz *Preamp off/on*	5 kHz *Preamp off/on*
3.5 MHz	127/124 dB	103/101 dB
14 MHz	126*/121 dB*	103/98 dB
50 MHz	123/118 dB	100/94 dB
144 MHz	115/108 dB	94/89 dB
432 MHz	123/115 dB	97/93 dB

Two-tone, third-order IMD dynamic range, 500 Hz filter,

spacing:	20 kHz *Preamp off/on*	5 kHz *Preamp off/on*
3.5 MHz	94/96 dB	68/68 dB
14 MHz	94/92 dB	69/67 dB
50 MHz	94/89 dB	69/66 dB
144 MHz	89/86 dB	65/63 dB
432 MHz	86/86 dB	69/67 dB

Intercept:

	Preamp off/on	*Preamp off/on*
3.5 MHz	+16/+14 dBm	–17/–28 dBm
14 MHz	+19/+4.2 dBm	–15/–29 dBm
50 MHz	+18/–4.0 dBm	–15/–35 dBm
144 MHz	+12/–8.1 dBm	–17/–38 dBm
432 MHz	+14/–9.5 dBm	–16/–39 dBm

Preamp off, +59 dBm; preamp on, +58.4 dBm.

20 kHz channel spacing, preamp on: 29 MHz, 79 dB; 52 MHz, 80 dB; 146 MHz, 75 dB; 440 MHz, 76 dB.

20 kHz channel spacing, preamp on: 29 MHz, 80 dB*; 52 MHz, 80 dB; 146 MHz, 76 dB; 440 MHz, 77 dB*; 10 MHz channel spacing, preamp on: 52 MHz, 113 dB; 146 MHz, 87 dB; 440 MHz, 81 dB.

S9 signal at 14.2 MHz: preamp off, 110 µV; preamp on, 24 µV; 52 MHz, preamp off, 170 µV; preamp on, 15 µV; 146 MHz, preamp off, 58 µV; preamp on, 5.4 µV; 432 MHz, preamp off, 63 µV; preamp on, 4.8 µV.

At threshold, preamp on: SSB, 14 MHz, 1.7 µV; FM, 29 MHz, 0.12 µV; 52 MHz, 0.09 µV; 146 MHz, 0.06 µV; 440 MHz, 0.06 µV.

Manufacturer's Claimed Specifications	Measured in the ARRL Lab
Receiver audio output: 1.5 W at 10% THD into 8 Ω.	2.3 W at 10% THD into 8 Ω.
IF/audio response: Not specified.	Range at –6 dB points, (bandwidth): CW-N (500 Hz filter): 551-1042 Hz (491 Hz); CW-W: 288-1717 Hz (1429 Hz); USB-W: 445-2356 Hz (1911 Hz); LSB-W: 471-2269 Hz (1798 Hz); AM: 146-2476 Hz (2330 Hz).
Spurious and image rejection: 70 dB.	First IF rejection, 14 MHz, 90 dB; 50 MHz, 86 dB; 144 MHz, 95 dB; 432 MHz, 118 dB; image rejection, 14 MHz, 89 dB; 50 MHz, 69 dB; 144 MHz, 86 dB; 432 MHz, 88 dB.

Transmitter	Transmitter Dynamic Testing
Power output: HF & VHF: SSB, CW, FM, 100 W high; 5 W low; AM, 25 W high, 5 W low; UHF: SSB, CW, FM, 50 W high, 5 W low; AM, 12.5 W high, 5 W low.	HF & 50 MHz: CW, SSB, FM, typically 104 W high, 3.7 W low; AM, typically 25 W high, 3.3 W low; 144 MHz: CW, SSB, FM, typically 98 W high, 4.0 W low; AM, typically 22 W high, 3.0 W low; 430 MHz: CW, SSB, FM, typically 51 W high, 6.8 W low; AM typically 12 W high, 3.0 W low.
Spurious-signal and harmonic suppression: HF, ≥50 dB; VHF & UHF, ≥60 dB.	HF, 55 dB; 50 MHz, 63 dB; 144 MHz, 69 dB; 430 MHz, 69 dB. Meets FCC requirements for spectral purity.
SSB carrier suppression: ≥50 dB.	As specified. >53 dB.
Undesired sideband suppression: ≥50 dB.	As specified. >62 dB.
Third-order intermodulation distortion (IMD) products: Not specified.	See Figures 1 and 2.
CW keyer speed range: Not specified.	10 to 63 WPM.
CW keying characteristics: Not specified.	See Figure 3.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 18 ms.
Receive-transmit turn-around time (tx delay): Not specified.	SSB, 10 ms; FM, 10 ms. Unit is suitable for use on AMTOR.
Composite transmitted noise: Not specified.	See Figures 4 and 5.
Bit-error rate (BER), 9600-baud: Not specified.	146 MHz—Receiver: BER at 12-dB SINAD, 7.9×10^{-5}; BER at 16 dB SINAD, $<1.0\times10^{-5}$; BER at –50 dBm, $<1.0\times10^{-5}$; transmitter: BER at 12-dB SINAD, 1.7×10^{-4}; BER at 12-dB SINAD + 30 dB, $<1.0\times10^{-5}$. 440 MHz—Receiver: BER at 12-dB SINAD, 2.9×10^{-4}; BER at 16 dB SINAD, $<1.0\times10^{-5}$; BER at –50 dBm, $<1.0\times10^{-5}$; transmitter: BER at 12-dB SINAD, 1.5×10^{-4}; BER at 12-dB SINAD + 30 dB, $<1.0\times10^{-5}$.

Size (HWD): 4.2×11.1×14.6 inches; weight, 17.2 lb.

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.

*Measurement was noise-limited at the value indicated.

Third-order intercept points were determined using S5 reference.

[1]1240-1300 MHz transmit and receive with UT-20 1.2 GHz module.

[2]AM aircraft on sub receiver only.

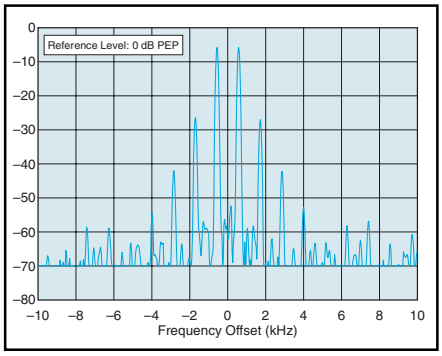


Figure 1—Worst-case HF spectral display of the TS-2000 transmitter during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 27 dB below PEP output, and the worst-case fifth-order product is down approximately 42 dB. The trans-ceiver was being operated at 100 W PEP output at 1.85 MHz.

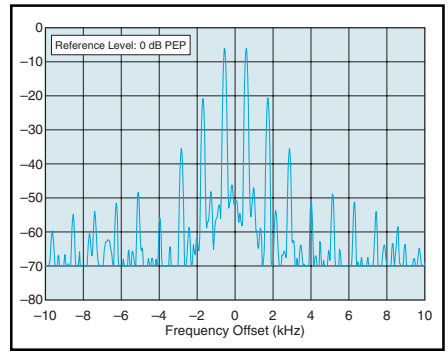


Figure 2—Worst-case VHF/UHF spectral display of the TS-2000 transmitter during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 22 dB below PEP output, and the worst-case fifth-order product is down approximately 36 dB. The transceiver was being operated at 100 W PEP output at 50.2 MHz.

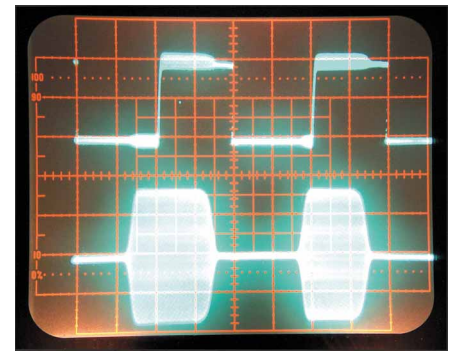


Figure 3—CW keying waveform for the TS-2000 showing the first two dits using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. The transceiver was being operated at 100 W output at 14.02 MHz.

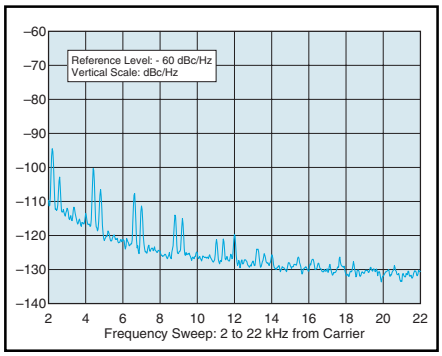


Figure 4—Worst-case HF spectral display of the TS-2000 transmitter output during composite-noise testing. Power output is 100 W at 3.52 MHz. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.

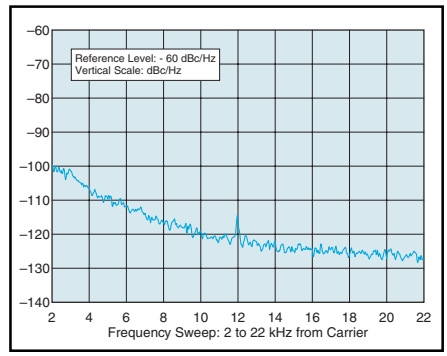


Figure 5—Worst-case VHF/UHF spectral display of the TS-2000 transmitter output during composite-noise testing. Power output is 50 W at 430.02 MHz. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.

tors) connections. On the back are several antenna connectors (**ANT1** and **ANT2** for HF and **50 MHz**, **HF RX ANT**, **ANT 144**, **ANT 430**). All are SO-239s except the **RX ANT** (it's a phono jack) and **ANT 430**, which is an N connector. When installed, the UT-20 has its own antenna connector on a pigtail. Although the TS-2000 has an internal automatic antenna tuning unit, it also has a back-panel 6-pin **AT** connector for Kenwood's now-discontinued AT-300 tuner.

There are two external speaker connectors (1/8-inch, two conductors) on the rear panel. One of these outputs mutes the internal speaker and the other does not. Menus numbers 16 and 17 control the mixing/separation of the main and sub receiver audio signals at these connectors and the **PHONES** jack. A "diversity" speaker setup helps you separate an ongoing QSO from secondary audio, and ignore the secondary audio when desirable.

The TS-2000 offers two CW keying jacks as well. One (1/4-inch, three conductors) takes paddle input to the internal keyer. The second (1/8-inch, two conductors) accepts keying from a manual key, external keyer or a PC keying line.

There is no shortage of accessory connectors. A **COM** connector accepts a standard DB9 cable for connection to a PC. (No interface is needed!) There's a **PANEL** connector for the optional RC-2000 remote-panel kit. The **REMOTE** (7-pin DIN) connector accommodates an HF amplifier. **EXT CONT** (8-pin DIN) provides amplifier control connections for 50, 144, 430 or 1200-MHz amplifiers. **ACC2** (13-pin DIN) offers a host of connection points for interfacing an external TNC, MCP or RTTY device, or a computer sound card.

DSP Functions

There are many. The filtering scheme is wonderfully flexible. There are no optional filters, and I didn't miss them.

CW bandwidth is adjustable from 2 kHz to 50 Hz (250 to 1500 Hz for FSK). While working CW, I was constantly using the **LO/WIDTH** control to adjust the bandwidth, from 1 to 2 kHz for tuning to 400-500 Hz for operating, and as narrow as 80 Hz for crowded conditions. (Band noise kept the 50-Hz width from being useful for me.) The **HI/SHIFT** control adjusts the IF shift.

In voice modes (AM, FM, SSB) both the passband low (0 to 1000 Hz) and high (1400 to 5000 Hz) cutoff points are adjustable.

The notch filter, auto and manual beat-cancel functions worked well. I tuned W1AW's bulletin signal from about 15 miles away and was able to almost eliminate it with each of these features. It was amazing to listen to the auto beat cancel function chase the signal as I changed frequency.

The noise-reduction modes—**NR1** (line enhancement), and **NR2** (correlation time)—were sometimes helpful. It takes some practice to get best advantage from these features.

Satellite Operations

I've dabbled a bit with satellite operation over the years, but I decided to hand the rig over to Steve Ford, WB8IMY—our resident satellite expert—and have him share his impressions. Here's what he had to say:

"The Kenwood TS-2000 performed admirably in the satellite mode. I had no difficulty making contacts through the OSCAR 29 satellite, as well as OSCAR 14. The full duplex function was flawless and the automatic uplink/downlink VFO tracking (referred to as "Trace" in the TS-2000) makes using even inverted-transponder birds such as OSCAR 29 a breeze. You can store all of your favorite satellite frequency combinations in one of the TS-2000's many satellite memories for quick access.

"With 50 W output on 70 cm, you may not need an external RF power amplifier with the TS-2000 to uplink to the new OSCAR 40 satellite in Mode U/S—assuming that you use a reasonable antenna (such as an eight-element Yagi). For the 2.4-GHz downlink, the TS-2000's ability to display the actual target receive frequency (rather than the IF signal frequency from the receive converter)—up to 19.999 GHz—is a blessing. I used the TS-2000 in combination with a small dish antenna and receive converter to monitor OSCAR 40's 2.4-GHz transponder. It performed well, although I occasionally found myself cranking up the audio to fairly high levels to copy faint signals.

"If you intend to couple the TS-2000 to an external amplifier to run serious power for other weak-signal modes, be aware that the TS-2000 only provides an open-collector NPN transistor switch (rated at 20 V and 20 mA) for amplifier control. This may be insufficient to switch some amplifiers, although adding an external relay would solve this problem. If you're in doubt about your amplifier's requirements, check with its manufacturer."

Memory Functions

There are 300 memory channels to store frequency, mode, bandwidth and many other aspects of operation. Each memory channel can be tagged with a seven-character alphanumeric identifier. The channels can be divided into up to 10 groups (0 through 9), and more than one group can be selected for recall or scanning. Memory channels can be selected for storage or recall by scrolling through the list via the **MULTI/CH** knob or the mike **UP/DWN** buttons. Channels may also be selected directly by entering the appropriate memory number with the numeric keypad.

Memories 0 through 289 are general memories. Memories 290 through 299 store start and end frequencies that might be used to control scanning or to restrict VFO tuning via the main dial. Neat feature! This might be used to ensure that you remain within the frequency allocation of your license class on a particular band.

Quick Memory

The TS-2000 has 10 scratch-pad locations that hold a snapshot of the current operating conditions. This includes the frequency and mode of both VFOs and the sub receiver. These also retain the on/off/selection status of RIT, XIT, filter bandwidth, noise blanker, DSP noise reduction, beat cancel, auto notch and other various transmit and receive functions. In order to store or recall quick-memory

locations, both the main and sub receivers must be in the VFO mode, even when the sub receiver is switched off. Quick Memory is a stack system. If all quick memories are full and **M.IN** is pressed, the new data storage will cause the oldest data set to be lost.

TNC Capabilities

The TS-2000 sports a built-in TNC (AX-25) that's primarily intended to support the PCT (Packet Cluster Tune) and Sky Command II+ features.

It's important to note that Sky Command II+ system—a feature that allows near complete control and operation of this transceiver remotely (over the air) using Kenwood's TH-D7A VHF/UHF handheld or TM-D700A VHF/UHF mobile—is not presently legal for use in the United States. Kenwood has recently filed a Petition for Rulemaking with the FCC, requesting that they consider adopting a change in Section 97.201(b). This rule limits "auxiliary station" operation to frequencies above 222.15 MHz. (Unfortunately, the current Sky Command system employs 2-meter frequencies to transmit the TS-2000's receive audio back to the handheld or mobile radio.)

Other Features

The **TF-Set** key momentarily swaps the transmit and receive frequencies so that you can be sure it is clear before transmitting. You can also then easily change the transmitting frequency if you wish. This is helpful for FM repeaters, satellite operation and working DX splits.

FM Repeaters

The TS-2000 is well equipped for FM repeater operation—it's very nearly as feature-packed as Kenwood's most deluxe dualband FM handhelds and mobiles. It is capable of dual in-band receive (VHF/VHF, VHF/UHF or UHF/UHF) and cross-band repeat, and has an automatic repeater-offset feature. Memories can store frequency offsets, alphanumeric tags and access tone information. Digital Code Squelch (DCS) operation is also supported, and CTCSS and DCS tone scan is provided. DTMF—for autopatch and repeater control—requires an optional DTMF microphone, the MC-52DM. The transceiver can store up to ten 16-digit DTMF sequences, and each can be alphanumerically labeled.

MULTI/CH = Tuning Convenience

Here's that knob again! It makes tuning changes very convenient. The user can select channel sizes that set the tuning rates for this control. Its rate is stored for each mode in each band range (HF/50 MHz, 144, 430 and 1200 MHz). The channel can be from 1 kHz to 100 kHz for various modes below 60 MHz. By pressing the **1 MHZ** key, you can change frequency by 1 MHz for each detent of **MULTI/CH**. (You can also reprogram these steps to be 100 kHz or 500 kHz.)

Transmit Signal Characteristics

The TS-2000 permits several adjustments to the transmit audio in addition to speech compression. There are six user-selectable audio bandwidths from 2.0 to 3.0 kHz. Menu #21 sets one of six audio-response curves: off, high boost, formant pass, bass boost, conventional and user defined. The user curve is custom designed using the optional ARCP software.

CW Characteristics

Several capabilities of the TS-2000 particularly cater to CW operators. We can select full break-in or semi break-in keying with delays from 50 to 1000 ms. Full break-in on this rig is a pleasure. It's quiet enough that the TR switching is not distracting. The CW offset and sidetone are adjustable in 50-Hz steps from 400 to 1000 Hz.

Pressing **FUNC** then **RIT/CW TUNE** causes the receiver to adjust its frequency (or the RIT if that function is active) so that the received signal's pitch equals (within 50 Hz) that selected for the sidetone (offset). This effectively zero beats the received CW signal automatically. To use this function, you must select a filter bandwidth less than 1 kHz.

Menu #37 selects whether the receiver automatically compensates for the mixing scheme change when you change the mode from SSB to CW. You can tune a CW signal in the SSB mode and not lose it when you switch to CW! Couple that with Menu #36: In full break-in mode, operating the keyer automatically changes the mode to CW and transmits: hunt and pounce! That's a nice feature!

There is a built-in three-memory (about 50 characters each) keyer with adjustable weighting. Message-memory playback is interruptible to insert contest serial numbers and such. Menu #30 sets whether the playback is ended or paused when interrupted by keying. When storing a message in memory, the display shows a gauge indicating how much memory remains. Messages may be automatically repeated at intervals from 0 to 60 seconds.

For those who prefer a "Lake Erie swing," the keyer has a "bug" mode in which dahs are keyed manually and the dits are made automatically. The message memories cannot be recorded while in the bug mode, however.

RIT and XIT

RIT and XIT each have a ±20 kHz range. They normally tune in 10-Hz steps, but can be fine tuned in 1-Hz steps. They work only on the main receiver. Pressing the **CLEAR** key (not **CLR**!) resets the offset to zero. They do not have independent settings, so changes to one affect the other. Thus, it makes no sense to use them simultaneously. Unfortunately, Packet Cluster Tune mode locks RIT and XIT out. If you want them, you must kill **PCT** first.

AGC

The digital AGC permits adjustment of the AGC delay in 20 steps, as well as switching it off completely. You can set separate AGC delays for each mode: SSB, CW, FSK and AM. For CW, I needed the AGC at its fastest setting for the S-meter to follow the incoming signals.

VOX

VOX can be switched on or off, VOX mike level and delay can be set separately for each mode, except FSK.

Speech Processor

The speech processor level can be independently set for each mode: USB, LSB, FM or AM. It does a good job, as shown by my experience with ZK1NFK (see "On the Air").

On the Air

I found the front panel surprisingly easy to learn and use. An initial pass through the menu system took about five minutes (without the manual in hand) and the prompts were adequate to set up most functions without research. Jumping around the bands with the **+** and **–** keys, tuning dial (both normal and fine mode) and the **MULTI/CH** knob was a breeze. There was a lot of QRN, so I became familiar with the noise blanker, DSP and filter controls. The noise blanker did a good job.

DSP **NR1** and **NR2** kill noise, but I often couldn't copy the station I was seeking with the noise removed. You can set their operating levels from the front panel. In the noisy conditions that I experienced, the CW filters sounded hollow, but they were useful down to 80 Hz wide. They offered great on-the-spot flexibility.

I was so interested in the CW auto-tune feature that I quickly programmed it into the **PF** key for easier access. When I used it on the air, however, I found that there was seldom a single signal in the passband. Even when there was a single signal, the auto-tune feature sometimes missed it. It may have been a product of the noisy on-air conditions I encountered, but CW auto-tune successfully tuned about one signal in four attempts. The

SSB-to-CW frequency correction feature worked flawlessly.

My favorite feature is the DX Packet Cluster Tune. I'm not an avid DXer and never before had access to the DX Packetcluster. I got the local frequency from Product Review Editor Joe Bottiglieri, AA1GW, and the feature is easy to set up. At first, I enabled its auto-tune function, but sometimes the DX spots came in so fast that the radio was continually jumping among DX stations. I soon switched auto-tune off (although transmitting switches it off automatically) and selected Morse callsign announcements. I never had any idea how much DX activity there is! There were even spots for 50 MHz activity and the International Space Station, NA1SS.

You can't argue with success! In the first few hours on a very noisy (QRN) night, I worked N0TU/M QRP CW, HK8RQS in Colombia and ZK1NFK, Manihiki Island. These last two were pileups. ZK1NFK was working folks all over North America, but I dialed in the speech processor and got through with my lowly (and low) 20-meter dipole on my seventh call. I'm impressed.

Our thanks to Steve Ford, WB8IMY; Ed Hare, W1RFI; and Mike Tracy, KC1SX of the ARRL Lab Staff for their assistance in preparing this review.

Manufacturer: Kenwood Communications Corp, 2201 Dominguez St, Long Beach, CA 90801; 310-639-5300, fax 310-537-8235; **www.kenwood.net**. Manufacturer's suggested list price: TS-2000, $2599.95; TS-B2000 ("silver box" version),

ARRL Lab Data Table Change

Beginning with this Product Review, the test data table includes something new—receive dynamic range and intercept points for a narrower than standard spacing: 5 kHz. We try to keep data tables in *QST* as consistent as possible for the logical reason that it makes comparing various radios easier. Therefore, when someone proposes a change in testing—or additional testing—a good reason must be supplied to justify the extra time and publication space. Needless to say, such changes are not approved very often.

One of the things that I have received feedback on from a number of hams is that other stations close in frequency to the one they are trying to listen to can present major difficulties. In contests, strong stations in your area may abound, and if someone located nearby is several kilohertz up or down the band, has his beam pointed in your direction and is running a kilowatt, you will certainly know it! If you are working a pileup for that rare DX and the operation is split, you will be listening just a few kilohertz from a large crowd of folks all trying to get through at the same time. Of course, these are examples of extreme cases, but there are certainly others.

The ARRL Lab standard spacing of 20 kHz is a good compromise between narrow and wide dynamic range performance, but it doesn't characterize crowded conditions very well. In our *Expanded Test Result Reports* (available on the members section of our Web site or via mail), we show (graphically) receive dynamic range over a range of frequencies, from about 200 kHz away to 1 kHz away from the desired signal frequency. This "swept" data gives a much more complete picture of a receiver's dynamic range than any single number can, but the graphs would take up too much page space to publish in each transceiver review that appears in *QST*. Examples of these graphs appear to the right. Note that these particular graphs differ from those in the Expanded Reports in that: (1) Data for two transceivers is shown and (2) Noise-limit markings have been omitted for clarity.

Why did we choose 5 kHz specifically? First, it is a spacing commonly used for "close-in" dynamic range testing by several independent sources, so it has become something of a standard. Second, as previously noted, 5 kHz is a common split in DX operations, so there is precedent there. Last, many multiple-conversion receivers start out with a relatively broad "roofing" filter in the first IF (for substantial cost savings, among other reasons) and this narrower spacing can give a better indication of the performance of later receiver stages. It is important to note that, for the majority of rigs, the "skirts" of the roofing filter are outside of the 5 kHz range so the rejection normally provided by this filter is not being shown.

For an example of 5 kHz dynamic range test results from several example transceivers, refer to Table 2.

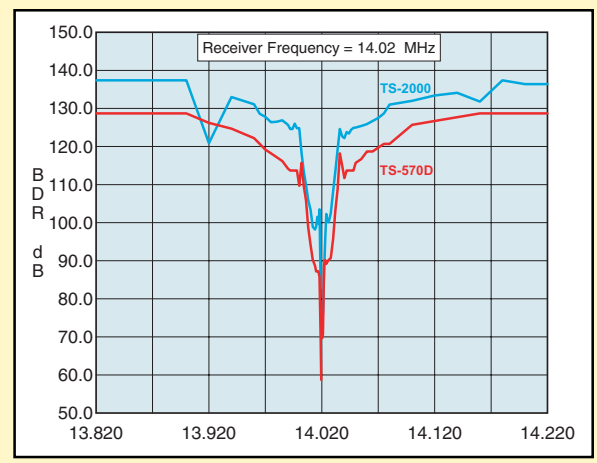
It is important to note that no single test result can stand alone as an indicator of overall receive performance. Always try to obtain as much information as possible to get the "big picture" when comparing different radios. Also note that the wide range of values that appear in this table are in part due to differences in receiver architecture, which is a whole other issue to consider in itself.

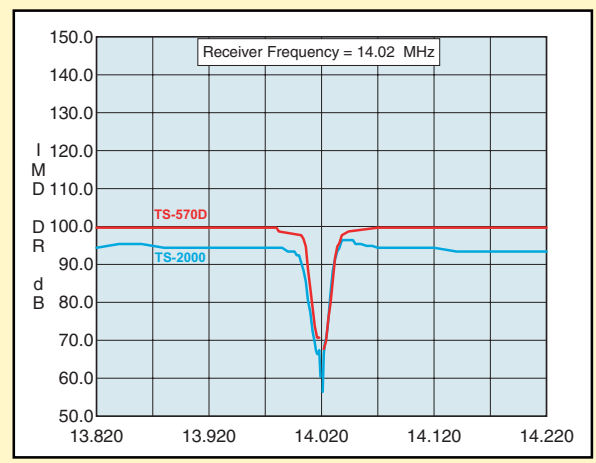
As always, the ARRL Lab welcomes feedback and discussion of test data and methods.

73, Michael Tracy, KC1SX
ARRL Lab Test Engineer

Table 2
Dynamic Range Measurements at 5 kHz Spacing for Several Current HF Transceivers

	5 kHz Dynamic Range (dB)	
Transceiver	*Blocking*	*IMD*
Elecraft K2	126	88
ICOM IC-706MKIIG	86	74
ICOM IC-746	88	78
ICOM IC-756PRO	104	80
ICOM IC-775DSP	104	77
Kenwood TS-570D	87	72
Kenwood TS-2000	99	67
Ten-Tec Omni 6+	119	86
Yaesu FT-847	82	73
Yaesu Mark-V FT-1000MP	106	78





$2199.95; TS-2000X (with 1.2 GHz module installed), $3299.95. Typical current street price: TS-2000, $2300; TS-B2000; $1850; TS-2000X, $2750. List prices of selected optional accessories: RC-2000 Mobile Controller head with cabling, $385.95, ARCP-2000 *Windows* PC control program on CD-ROM, $82.95; UT-20 1.2 GHz module (sold and installed by Kenwood Service), $549.95; DRU-3A Digital Recording Unit, $139.95; VS-3 Voice Synthesizer (announces operating frequency only), $39.95.

The Video-Lynx 434 Micro ATV Transmitter

Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor

If your objective is to rapidly deliver a large amount of information in an easy-to-digest format, full-motion video is tough to beat. Radio links carrying video can be extremely useful tools in amateur public service and emergency communications applications; terrific attention grabbers at ham radio demonstrations; a great way to swap shack views and homespun videos with other hams; and a high-tech payload for balloons, kites, rockets, robots or R/C models.

Getting your feet wet in this aspect of our hobby may not be as expensive as you think. Most hams *already own* a video receiver that's capable of displaying 70-cm amateur television signals: a "cable ready" TV! Just connect a suitable 70-cm receive antenna to the cable input jack of the television, dial up *cable* channels 57 through 61, and you're got a basic ATV receiving system. (ATV-optimized receivers and downconverters, however, will outperform the cable receiver in a TV set.)

How about transmitting? There's a wide selection of ATV transmitting equipment available, but if your intended applications involve short-range simplex operation, a Video-Lynx 434 might fit the bill.

The '434 is a low-power ATV transmitter in a tiny package; it's just slightly larger than the 9-V battery typically used to power it. It transmits an amplitude modulated video signal on 433.97 MHz (cable TV channel 59).

The transmitter's circuitry is entirely encapsulated in potting resin. A 9-V battery connector, a BNC antenna jack and a female phono "Video In" socket are mounted on pigtail cables. The only control on the device is a recessed video linearity adjustment screw. There are no provisions for sending an audio subcarrier along with the video.

Video Sources

The transmitter accepts SMPTE standard video (NTSC or PAL) at 1 V P-P. Most video sources—such as camcorders, VCRs and the small black and white and color "surveillance" cameras—have a "Video Out" jack that supplies this signal.

Bottom Line

The Video-Lynx 434 is a tiny, low power video transmitter that can serve in a variety of short-range ATV assignments.

I purchased a tiny color camera from an electronics surplus store for under $80. Black and white cameras are available for much less.

Power Considerations

A standard 9-V battery provides power for the Video-Lynx 434. I found that a fresh alkaline battery would power the transmitter for about 3½ hours. If longer operating periods are desired, the documentation suggests using nickel hydride or lithium batteries, or connecting an additional 9-V battery in parallel. A 9-V power supply can also be employed, but be careful—the '434 circuitry does not include reverse polarity protection.

I was pleased to discover that my camera will work at 9 V dc. (The wall transformer dc power supply that came with it outputs 12 V.) This allows me to run both the transmitter and the camera—albeit for a short time—from a single battery.

Station Identification

As always, you'll need to identify properly. For my tests, I simply positioned my QSL card in a corner of the camera's field of view.

Antennas and Signal Path Are the Key

As is the case with any radio communications system, the antennas and the propagation path are major factors in determining the effective range of the system. The documentation that comes with the transmitter includes plans for a simple ground plane antenna. With the ground plane connected to the '434 and the stock telescoping whip on an ICOM IC-R3 communications/video receiver (see "Product Review," *QST*, Feb 2001) I was able to view clear video over a line-of-sight path of up to about 300 yards.

If you need greater range, directional antennas—at one or both ends of the path—will help tremendously. A cross-reference chart in the manual provides "theoretical system performance" for various combinations of transmit/receive antennas. These include ground planes, 5-element Yagis and 25-element Yagis. Range figures shown in the chart were calculated using the typical specifications of a Video-Lynx 434 transmitter and a PC Electronics TVG-4G downconverter/receiver. With 25-element Yagis at each end of the path, the maximum theoretical "snow-free" line-of-sight range is 8 miles. Your actual results, of course, will vary.

Conclusion

The small size and simple, rugged construction of the Video-Lynx 434 video transmitter make it an attractive choice for short range video links.

Manufacturer: Videolynx, 19910 Bramble Bush Dr, Gaithersburg, MD 20879; **www.transmitvideo.com**; **videolynx@transmitvideo.com**. Manufacturer's suggested list price: $120. Typical current street price: $99. The Video-Lynx 434 is available from PC Electronics, 2522 Paxson Ln, Arcadia CA 91007; 626-447-4565, fax 626-447-0489; **tom@hamtv.com**; **www.hamtv.com**; and MFJ Enterprises Inc, PO Box 494, Mississippi State, MS 39762; 800-647-1800/662-323-5869, fax 662-323-6551; **www.mfjenterprises.com** (MFJ catalog number MFJ-8704).

Table 3—Video-Lynx 434

Manufacturer's Claimed Specifications	Measured in the ARRL Lab
Transmit frequency: 433.97 MHz (± 50 kHz).	433.98 (carrier frequency).
Power requirement: 9 V dc, 30-40 mA.	60 mA, tested at 9 V.
Modulation type: AM.	As specified.
Power output: 50-100 mW PEP.	63 mW.
Spurious signal and harmonic suppression: ≥40 dB.	As specified.
Size (HWD): 5/8×2 1/4×1/2 inches; weight, 1.4 oz.	

ARRL Executive Committee Reviews Preliminary 5 MHz Band Petition

The ARRL expects to file a petition soon seeking a new US amateur band in the vicinity of 5 MHz. The ARRL Executive Committee reviewed a preliminary draft *Petition for Rule Making* at its May 5 meeting in Dallas, Texas.

The EC agreed that the petition should seek a 150-kHz wide domestic secondary amateur allocation around 5 MHz. Executive Committee members will review the completed draft petition before it's filed with the FCC, possibly in advance of this month's ARRL Board meeting.

Participants in the ARRL's WA2XSY 5-MHz experimental operation have established that an allocation at 5 MHz could improve emergency communication capabilities by filling the gap between 80 and 40 meters.

An amateur allocation in the vicinity of 5 MHz long has been an objective of the International Amateur Radio Union. Winning an allocation at 5 MHz—even on a domestic basis—could take several years. Securing an international allocation is expected to be more difficult and take even longer. Consideration of an allocation at 5 MHz is not on the agenda for the World Radiocommunication Conference (WRC) in 2003 nor on the preliminary agenda for WRC-05/06.

On the LF front, ARRL General Counsel Chris Imlay, W3KD, informed the May Executive Committee session that an FCC *Notice of Proposed Rule Making* was expected soon in response to the ARRL's petition, RM-9404. Filed in late 1998, the petition asks the FCC to establish LF allocations in the vicinity of 136 kHz and between 160 and 190 kHz.

The Committee also was told that favorable FCC action is anticipated on a petition seeking to upgrade Amateur Radio's status from secondary to primary at 2400 to 2402 MHz.

The minutes of the ARRL Executive Committee meeting in Dallas are available on the ARRL Web site, **www.arrl.org/announce/ec_minutes_466.html** and elsewhere in this issue.

ARRL AGAIN ASKS FOR 2300-2305 MHz PRIMARY STATUS

The ARRL has again asked the FCC to create a primary domestic Amateur Radio allocation at 2300-2305 MHz. Amateurs now are secondary there. The ARRL first asked the FCC in 1996 to upgrade the allocation to primary, but the Commission never acted on the request.

"The segment 2300-2305 MHz is of extreme importance to the Amateur Service, especially for weak-signal communications and propagation research, including beacon operation, due to the low noise levels in that band," the ARRL said. The renewed petition was prompted by increasing demands on that portion of the spectrum due to development of new telecommunications technologies.

The Amateur Service has primary allocations at 2390-2400 MHz and 2402-2417 MHz. The ARRL last year sought to have the segment 2400-2402 MHz elevated from secondary to primary, but the FCC has not yet acted on that request either. The AO-40 satellite has been successfully using 2.4 GHz for downlink telemetry and transponder operation.

The ARRL also requested that the FCC not introduce any other users to the band. As of press time the FCC had not put the ARRL's petition on public notice.

THREE STATES ADOPT AMATEUR RADIO ANTENNA BILLS

Idaho, Alaska and Nevada have become the latest states to adopt Amateur Radio antenna bills. All three measures incorporate the language of the limited federal preemption known as PRB-1 into the respective state statutes. The new laws require that local rules or ordinances involving placement, screening or height of antennas or towers and based on health, safety or aesthetic considerations "reasonably accommodate" Amateur Radio communication. Such ordinances also must represent "the minimum practicable regulation to accomplish a legitimate purpose" of the municipal government. The Alaska measure also includes a schedule of antenna structure heights, below which municipalities may not further regulate.

Surrounded by antenna bill supporters, Idaho Gov Dirk Kempthorne (seated at desk) signs his state's Amateur Radio antenna legislation into law. The bill becomes effective July 1. Present at the signing ceremony (L-R) were Ralston Scott Sr, W5RWS; Ken Hastings, W7NPO; Vern Moore, KC7YUI; John Cline, K7BDS, Director Bureau of Disaster Services; Madge Rich, KD6ZVO; Doug Rich, KD6GCL, RACES Legislative Committee Chairman; Jeff Welker, KC7R; Frank Black, AC7BF; Gary Peek, K7TIH; State Rep Max Black; Mike Langrell, AA7VR, State Races Officer/ Idaho Section Emergency Coordinator; Bob Gomes, W7AFM; State Sen Grant Ipsen; and State Rep Margaret Henbest, KB7WWT.

Rick Lindquist, N1RL ♦ Senior News Editor

ARRL and REACT Sign Memorandum of Understanding

Representatives of the ARRL and REACT met in Dallas, Texas, May 16 to sign a memorandum of understanding between the two organizations. The agreement is intended to promote joint coordination of the resources between ARRL and REACT and to facilitate the flow of information to and from the public during emergencies.

ARRL President Jim Haynie, W5JBP, and REACT International President Chuck Thompson, N5IAG, signed on behalf of their respective organizations.

"This memorandum of understanding is part of our efforts to establish a common front in dealing with emergencies and disaster communication and with other issues facing the radio hobby, including such things as antenna ordinances," Haynie said. Thompson said the memorandum will strengthen the organizations' "common goal of providing assistance to the public."

While REACT has been associated primarily with Citizens Band in the past, the organization has widened its focus to embrace Amateur Radio and other radio services. ARRL and REACT share common goals in terms of emergency communication.

The memorandum of understanding calls on the two organizations to "cooperate and utilize their resources from time to time to optimum mutual benefit to both parties." Among specific principles, the agreement will involve cooperation during emergencies and disaster relief and the elimination of "duplicative or technically inferior service" during such responses.

Thompson and Haynie are long-time friends, and Haynie is a member of REACT in the Dallas area. Haynie was the instructor for Thompson's Novice Amateur Radio license class. He says Thompson recruited him to REACT membership.

The REACT-ARRL memorandum of understanding is available on the ARRL Web site at **www.arrl.org/FandES/field/mou/react.html**.

JAY MILLER, KK5IM

REACT President Chuck Thompson, N5IAG (left) and ARRL President Jim Haynie, W5JBP, sign the memorandum of understanding on behalf of their respective organizations.

On April 14, Idaho Gov Dirk Kempthorne signed into law "The Emergency Communications Preservation Act," which becomes effective July 1. Idaho Section Manager Mike Elliott, K7BOI, credited John Cline, K7BDS, and his staff at the Idaho Bureau of Disaster Services with leading the effort to get the bill passed. "This was John's idea, and he gathered the forces to make it happen," he said. The measure easily passed the Idaho House and Senate.

On April 27, Alaska Gov Tony Knowles signed that state's Amateur Radio antenna bill into law. The bill, which is effective July 26, got unanimous approval in the Alaska House and Senate.

The measure incorporates a three-tier minimum regulatory height schedule. Municipalities would not be permitted to further regulate antennas shorter than 75 feet in areas with a population density of more than 120 people per square mile. A minimum regulatory height of 140 feet would prevail in areas with a population density of more than 120 people per square mile for a lot size of an acre or larger. The top-tier 200 feet minimum regulatory limit would apply in areas where the population density is 120 people or less per square mile. The law also contains a "grandfather" provision to protect existing towers.

Alaska Section Manager Kent Petty, KL5T, said letters, e-mails and telephone calls, as well as legislative testimony from the state's amateur community, "really paid off."

On May 22, Nevada Gov Kenny Guinn signed that state's Amateur Radio antenna legislation. The law goes into effect October 1.

Nevada Assemblyman Bob Beers, WB7EHN, the bill's author and sponsor, said, "The grass roots support for this bill was key to its passage and enactment, and the subject of awed comments in both houses." The measure cleared the state House and Senate on unanimous votes. Language in the bill that would have made it apply to future deed covenants, conditions and restrictions imposed by homeowners' associations was stripped from the bill in committee.

At press time, Amateur Radio antenna bills were pending in New York and Wisconsin.

ARRL KEEPS UP PRESSURE ON ULTRA-WIDEBAND ISSUE

The ARRL once again has recommended that the FCC take a "reasonably conservative" approach in its plans to deploy ultra-wideband (UWB) devices on an unlicensed basis under Part 15 rules. The ARRL also has told the Commission that it's not reasonable to assume that Part 15 rules can be applied to UWB devices, due to their unique transmission characteristics.

The ARRL said the FCC should take no action in the UWB proceeding, ET Docket 98-153, until it establishes specific rules, definitions and classes of UWB devices in a further *Notice of Proposed Rule Making*. The League also called on the FCC to consider additional "more specific and targeted tests" before adopting appropriate UWB rules.

The ARRL's latest round of comments in the UWB issue came in response to a late-March FCC request for comments on five reports addressing UWB's interference potential. The reports were submitted by Qualcomm, Time Domain, the National Telecommunications and Information Administration (NTIA) and the Department of Transportation. The ARRL commented on the reports April 25 and submitted reply comments May 10.

Citing the Qualcomm report, the ARRL commented in April that "the broad nature of the interfering signal . . . indicates that any interference would extend to all VHF and UHF amateur bands." That particular report dealt with lab tests to assess the impact of UWB emissions on PCS phones using code division multiple access (CDMA).

Reports by UWB proponent Time Domain and from the NTIA dealt with interference potential from UWB devices operating below 2 GHz to GPS receivers. Reacting in May to comments filed by Time Domain, the ARRL said it would be reasonable to conclude that if UWB devices bother GPS receivers, "there is at least the same degree of interference potential to amateur receivers."

Responding to comments filed by XtremeSpectrum Inc, the ARRL said that specifying a spectrum mask for UWB—as XtremeSpectrum had suggested—was "an absolute necessity" and "a step in the right direction."

The League has arranged with the University of Southern California's UWB lab to test the interference potential of

UWB devices to "typical Amateur Radio station configurations." Those test results are expected in the next few months.

In its initial comments filed last September, the ARRL advised the FCC to put its UWB proceeding on hold until more evidence was available on the technology's interference impact. Earlier this year, the ARRL joined an industry coalition in calling on the FCC to issue a further *Notice of Proposed Rule Making* before it takes final action to authorize UWB equipment.

The League has said that its own review supports a conclusion that UWB has potentially beneficial applications that should be accommodated under the FCC's Part 15 rules "subject to appropriate interference avoidance regulations."

AO-40 TRANSPONDER TESTS A HIT!

AO-40's inaugural transponder tests this spring were a huge success. Reports from amateurs making their first contacts on AO-40 came from all over. The transponders remained in operation as this report went to press. Stations were logging both domestic and DX contacts via AO-40.

"It was just great!" enthused AMSAT-NA President Robin Haighton, VE3FRH, who worked a dozen or so stations via AO-40 right after the transponders went live. AO-40 ground controllers opened up the next-generation satellite's transponders May 5 for general amateur use on an experimental basis. Stations can uplink on either 435 MHz or 1.2 GHz. The transponder downlink is at 2.4 GHz.

Ed Krome, K9EK, in Indiana, reflected the enthusiasm of many users. "Wow, AO-40 was terrific on this first morning of transponder operation," he said. "After almost 10 years, what a thrill!"

AO-40 was available for use several hours a day, starting at orbital positions MA 136 and continuing through MA 240. The tests have shown that uplink frequencies (without taking Doppler into account) are 435.495-435.780 MHz and 1269.211-1269.496 MHz, and the downlink passband is 2401.210-2401.495 MHz. The transponders are inverting.

Haighton expressed appreciation for the "very hard work" of Project Leader Karl Meinzer, DJ4ZC, AMSAT-DL President Peter Guelzow, DB2OS, and the worldwide support group of command stations and technical advisors "for providing us with a great satellite."—*thanks to AMSAT News Service and AMSAT-DL*

DENNIS TITO PHONES HOME VIA HAM RADIO

Having the time of his life aboard the International Space Station, US businessman Dennis Tito, KG6FZX, in early May

made his first Amateur Radio contacts from his perch in space. The first so-called "space tourist," Tito reportedly paid Russia some $20 million for the privilege of visiting the ISS. He and two Russian cosmonauts launched April 28 from Kazakhstan on a 10-day *Soyuz* vehicle taxi mission. NASA initially opposed Tito's visit, but Russia insisted. NASA finally relented and agreed to the arrangement under certain conditions.

Tito spoke May 1 via Amateur Radio with his family as the ISS was passing over Hawaii. The audio was telebridged to the mainland. On May 2, Farrell Winder, W8ZCF, in Cincinnati, reported snagging two contacts with the ISS—the second time chatting with Tito for several minutes. Tito used the NA1SS call sign for the contact. He reportedly made a few other contacts as well. Winder said Tito told him he loved space and was having "the greatest experience of his lifetime."

In May, Tito told the Dayton Hamvention's AMSAT forum via a telephone link that Amateur Radio had pro-

ARISS International Team Meets

Members of the Amateur Radio on the International Space Station International Team met this spring in the Netherlands to firm up plans to expand ham radio operation from space. The gathering offered an opportunity to involve all ARISS partners in future activities.

Attending the sessions May 4-6 at the European Space Agency facilities in Noordvik were delegates from the US, Russia, Canada, Germany, Belgium, Italy, France, Japan, Great Britain, the Netherlands, Portugal and Poland. Those on hand included representatives from AMSAT and the International Amateur Radio Union. The partners reached accord—in some cases tentatively—on issues ranging from the scheduling of international ARISS school QSOs to future hardware plans and the final design of an ISS QSL card

Rosalie White, K1STO, who represented ARRL on the US delegation, said that up until now, the ARISS partners have been working on projects on a country-by-country basis. "Now, we've realized that we need to learn to adapt together and to get things accomplished as an international group." Other American attendees included ARISS Administrative Committee Chairman Frank Bauer, KA3HDO, and Space Amateur Radio Experiment (SAREX) Working Group Chairman Roy Neal, K6DUE, who moderated the sessions.

ARISS Operations Committee Chairman Will Marchant, KC6ROL, updated the group on the status of school contacts to date. He also reviewed how the crew has been using the ARISS equipment since the first crew came aboard last November.

The current "Phase 1" Amateur Radio facility aboard the ISS includes handheld transceivers for 2 meters and 70 cm, although in its current location aboard the Functional Cargo Block, the station only has 2-meter capability. A packet setup also is aboard. Still outstanding are plans to complete fabrication of and install the four ARISS antennas on the ISS Service Module, the ultimate ARISS station location.

With a series of successful ARISS US and Canadian school contacts behind them, the ARISS partners appointed an ARISS School Committee—with representatives from the US, Europe, Canada, Japan and Russia. White said a plan is in the works to integrate the European schools into the contact rotation.

The ARISS partners also reviewed applications for some Amateur Radio projects, including one for a slow-scan television setup. They okayed a prototype design for a QSL card that was expected to be ready by summer.

ARRL PHOTO

Russian ARISS delegate Sergei Samburov, RV3DR, and US delegate Rosalie White, K1STO, stand in front of an ISS mural at the Noordvik ESA facility in the Netherlands.

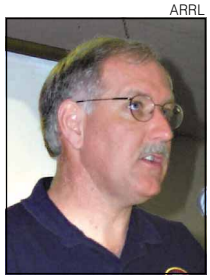
FCC News

FCC TO AMATEURS: DETAILED REGULATION "NOT IN THE PICTURE"

The FCC says the ball is in the court of the Amateur Service to determine the course of future Amateur Radio regulation. Speaking May 20 at the Dayton Hamvention FCC forum, Bill Cross, W3TN, of the FCC's Wireless Telecommunications Bureau, said that the days of Commission-imposed regulation are past.

"Detailed regulation of the nitty gritty of communication services, including the Amateur Service, is not in the picture," Cross said. "Rather, the FCC is shifting to strong and effective enforcement of truly necessary regulations."

ARRL



The FCC's Bill Cross, W3TN, speaking at Dayton Hamvention.

"I hope that those of you who are thinking about asking us to carve up a band by fiat will think again," he told the packed forum. "You really are asking us to tie your hands regarding your use of your spectrum."

Before the FCC initiates any rule-making proceedings in the Amateur Service to change privileges, Cross said it wants to see proposals involving the implementation of "new and more modern communications technologies," such as digital. In addition, he said, any future proposal "must include all licensees, and it must include all bands," and—most important—the amateur community must reach a consensus on the topic.

Cross said the FCC does not want and cannot handle "multiple proceedings that address piecemeal changes in operating privileges" that affect only certain classes of licensees or certain bands. "You, collectively, need to reach agreement on how you want to use your spectrum," he reiterated.

Amateur Radio Enforcement

♦ **Californian turns in ticket; FCC still wants explanation:** A California ham has turned in his Technician license in the wake of an FCC inquiry into his involvement in alleged rules violations on a Los Angeles-area repeater. But the FCC has told Gregory S. Cook, ex-KC6USO, of Chico that he must still address the allegations of broadcasting, playing music, and one-way phone patching before he'll be allowed to get another license.

FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth wrote Cook earlier this year, citing information that Cook had been party to the transmission of "a lengthy broadcast" in the late evening and early morning hours of February 1 and 2 over the W6NUT repeater in the Los Angeles area.

Hollingsworth also wrote Technician licensee Ted R. Sorensen III, KC6PQW, of Agoura Hills, citing information alleging that Sorensen had acted in concert with Cook, who was hooked in via phone patch while Sorensen facilitated the actual transmission. A similar transmission February 4-5 was said to have featured only Cook, again via phone patch to Sorensen's transmitter, Hollingsworth said.

Responding on March 10, Cook sent the FCC his ham ticket—due to expire May 7—and said he would agree to not renew and to stay off the air for a year if the FCC would consider the case closed.

Hollingsworth obliged him, but only to a point. He said the FCC had accepted Cook's license for cancellation and that he could reapply in a year. But before that, Hollingsworth said, Cook would have to "respond satisfactorily" to the present allegations.

In a separate reply, Sorensen told Hollingsworth that he intends to cooperate fully and adhere to FCC rules. He suggested that a "fair punishment" would be suspension from the W6NUT repeater for a year. Sorensen also offered to provide information on other rulebreakers on the W6NUT repeater.

Alleged Violations Investigated

On February 20, Hollingsworth initiated a separate inquiry with the repeater's trustee, Kathryn Tucker, AA6TK. Hollingsworth told Tucker that the FCC had received complaints that control operators and the repeater licensee "fail to address long periods of jamming by users, broadcasting, music playing as well as a plethora of other violations."

In a lengthy reply, Tucker, said the repeater's owners had not monitored the alleged February episodes involving Cook and Sorensen.

"The policy of the W6NUT repeater is not to attempt to remove unruly operators from its use," she told the FCC, adding that "an extensive educational campaign" has been conducted to inform users of proper operation.

Tucker said the W6NUT owners have received "numerous complaints" about the repeater's operation. "The policy is to let them 'go in one ear and out the other'," she told the FCC.

At press time, Hollingsworth said the situation remained under investigation.

vided a real boost during his ISS adventure. "The opportunity to do a phone patch five days in a row was a very important part of my flight, and I looked forward to it every day," he said.

TWO ARRL SECTIONS GET NEW SECTION MANAGERS

New section managers take office July 1 in the Maryland-DC and Northern New Jersey ARRL sections. There was one contested race, two candidates were elected without opposition, and incumbent section managers were re-elected in six other sections.

In Rhode Island, incumbent SM Armand E. Lambert, K1FLD, held off a challenge from Ellis H. Maris Jr, W3PDK, 180 to 123. Votes were counted May 22 at ARRL Headquarters. In Maryland-DC, Tom Abernethy, W3TOM, will succeed Bill Howard, WB3V, who decided not to run for another term. In Northern New Jersey, William Hudzik, W2UDT, of Gillette, will succeed Jeffrey Friedman, K3JF, who did not seek another term.

Incumbent section managers reelected without opposition were Jan Welsh, NK7N, Nevada; Al Shuman, N1FIK, New Hampshire; Donald W. Costello, W7WN, San Joaquin Valley; Mel Parkes, AC7CP, Utah; and Clay Emert, K5TRW, West Texas.

All terms are for two years.

VIRGINIA SM POSITION DECLARED VACANT; NEW SM NAMED

The ARRL Executive Committee declared the office of Virginia Section Manager vacant on May 16, and a new SM has been appointed.

"After lengthy deliberation and careful consideration, the ARRL Executive Committee has decided that it is in the best interests of the membership to declare the office of Virginia Section Manager vacant, effective immediately," a brief statement from the Executive Committee said. "A new Section Manager, Carl A. Clements, W4CAC, of Portsmouth, has been appointed to fill the vacancy for the remainder of the current term of office, through March 31, 2002. These actions have been taken in accordance with the rules and regulations of the ARRL Field Organization."

Clements will fill out the term of Lynn Gahagan, AF4CD, of Chesapeake, who had been SM since April 1998. Gahagan was notified of the action in mid May by ARRL Executive Vice President David Sumner, K1ZZ, who thanked Gahagan for his service to ARRL. For more information, see the Minutes of the Executive Committee Meeting elsewhere in this issue.

Nominees Sought for ARRL Board of Directors

If you're a full ARRL member in one of the following five divisions and are interested in playing a part in the League's democratic organization, here's the opportunity. Nominations are open for the offices of director and vice director for the 2002-2004 term in the Pacific, Rocky Mountain, Southeastern, Southwestern and West Gulf divisions.

ARRL Divisions

The policies of the League are established by 15 directors who are elected to the Board on a geographical basis to represent their divisions and constituents (see page 10 of any recent *QST* for a list of the divisions, directors and vice directors). These 15 directors serve for three-year terms, with five standing for election in each.

Just as in national or state politics, ARRL voters/members have the privilege and responsibility to decide that they like the actions of their incumbent representatives and support them actively for reelection or to decide that other representatives could do a better job, and to work for the election of those persons. Vice directors, who succeed to director in the event of a midterm vacancy and serve as director at any Board meeting the director is unable to attend, are elected at the same time.

Call for Nominations

Nominations are open for director and vice director in the five divisions mentioned above for the three-year term beginning January 1, 2002.

How to Nominate

1. *Obtain official nominating petition forms.* This package consists of a cover letter; a reprint of this election announcement; blank Official Nominating Petition forms and Candidate's Questionnaires for the offices of director and vice director; a copy of the ARRL Articles of Association and Bylaws; and an informational pamphlet for candidates.

Any full member residing in a division where there is an election may request an official nominating petition package. You don't need to be a candidate to request the forms. Your request for forms must be received by the Secretary *no later than noon Eastern Time on Friday, August 10, 2001.* There are separate forms for director and vice director nominations.

2. *Submit petition with statement of eligibility and willingness to serve.* Official forms bearing the *signatures of 10 full members of the division* and naming a full member of the division as a candidate for director or vice director, must be submitted, with a statement *signed by the candidate* attesting to his or her eligibility, willingness to run and willingness to assume the office if elected. These documents must be filed with the secretary *no later than noon Eastern Time on Friday, August 17, 2001.* Only original documents can be accepted; *no facsimiles of any kind are acceptable.* On Monday, August 20, 2001, the secretary will notify each candidate of the names and call signs of each other candidate for the same office. Candidates will then have until Friday, August 31, 2001, to submit 300-word statements and photographs, if they desire these to accompany the ballot, in accordance with instructions that will be supplied.

3. *Election Committee to certify eligibility.* In accordance with the Bylaws, an Election Committee, composed of three directors not subject to election this year, is responsible for the conduct of the election. This year, the Election Committee consists of Jay Bellows, K0QB, (chair), Tom Frenaye, K1KI, and Frank Fallon, N2FF.

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

Balloting Will Follow

If there is only one eligible candidate for an office, he or she will be declared elected by the Election Committee. Otherwise, ballots will be sent to all full members of the League in that division who are in good standing as of September 10, 2001. (You must be a licensed radio amateur to be a full member.) The ballots will be mailed not later than October 1, 2001 and, to be valid, must be received at HQ by noon Eastern Time on Friday, November 16, 2001. A group of nominators can name a candidate for director or vice director, or both, but there are no "slates," as such. Each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he or she wishes. Because all the powers of the director are transferred to the vice director in the event of the director's death, resignation, recall, removal outside the division or inability to serve, careful selection of candidates for vice director is just as important as for director.

Absentee Ballots

All ARRL members licensed by the FCC, but temporarily residing outside the US, are eligible for full membership. Members overseas who arrange to be listed as full members in an appropriate division prior to September 10, 2001, will be able to vote this year where elections are being held. Members with overseas military addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal addresses. Even within the US, full members temporarily living outside the ARRL division they consider home may have voting privileges by notifying the Secretary prior to September 10, 2001, giving their current *QST* address and the reason that another division is considered home. If your home is in the Pacific, Rocky Mountain, Southeastern, Southwestern or West Gulf divisions division but your *QST* goes elsewhere, let the ARRL Secretary know as soon as possible, but no later than September 10, 2001, so you can receive a ballot from your home division.

The Incumbents

These people presently hold the offices of director and vice director, respectively, in the divisions conducting elections this year:

Pacific—Jim Maxwell, W6CF and Bob Vallio, W6RGG

Rocky Mountain—Walt Stinson, W0CP and Warren G. "Rev" Morton, WS7W

Southeastern—Frank Butler Jr, W4RH and Evelyn Gauzens, W4WYR

Southwestern—Fried Heyn, WA6WZO and Art Goddard, W6XD

West Gulf—Coy C. Day, N5OK and David Woolweaver, K5RAV

For the Board of Directors:

May 24, 2001

David Sumner, K1ZZ
Secretary

MOVED & SECONDED

MINUTES OF EXECUTIVE COMMITTEE
Number 466
Irving, Texas – May 5, 2001

Agenda

1. Approval of minutes of November 11, 2000, Executive Committee meeting
2. Report on management reorganization and Development Department
3. Virginia Section matters
4. FCC matters
5. General legal matters
6. Antenna matters
7. Legislative matters
8. International matters
9. Organizational matters not previously considered
10. Recognition of new Life Members
11. Affiliation of clubs
12. Approval of conventions
13. Date and place of next EC meeting

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 8:30 AM Saturday, May 5, 2001, at the Dallas/Fort Worth Airport Marriott Hotel, Irving, Texas. Present were the following committee members: President Jim Haynie, W5JBP, in the Chair; First Vice President Joel Harrison, W5ZN; Executive Vice President David Sumner, K1ZZ; and Directors Frank Butler, W4RH, Frank Fallon, N2FF, Tom Frenaye, K1KI, and Fried Heyn, WA6WZO. Also present were International Affairs Vice President Rodney J. Stafford, W6ROD, and General Counsel Christopher D. Imlay, W3KD.

1. On motion of Mr. Butler, the minutes of the November 11, 2000, Executive Committee meeting were approved in the form in which they had been distributed.

2. Mr. Sumner reported that the search for a Chief Development Officer is underway as authorized by the Board at Minute 57 of its January meeting. The executive recruiting firm AST/BRYANT has been retained to assist in the search. The management reorganization authorized at the same time has been implemented, with the key positions of Marketing and Sales Manager and Book Team Supervisor still to be filled.

3. Mr. Harrison reported on the status of affairs in the ARRL Virginia Section. Mr. Harrison met with Section Manager Lynn Gahagan, AF4CD, on February 1 to review concerns that had been brought to the attention of the Executive Committee. Mr. Sumner subsequently was instructed by the Executive Committee to write to Mr. Gahagan to set out five points that had to be addressed and resolved with regard to the administration of the ARRL emergency communications program in the Section. This letter was sent on February 20 and a response to a request for clarifications was sent on March 7. Mr. Gahagan replied on March 23, and his reply was shared with the members of the Executive Committee. After discussion, it was agreed that the Committee would meet by telephone conference on Monday, May 14, to determine the final disposition of the matter.

4. Mr. Imlay reviewed FCC matters as follows:

4.1. ET Docket 98-153, Ultra Wideband (UWB) Transmission Systems. Recent developments in this proceeding include a FCC Public Notice released March 26 that invited comments on several tests of UWB interference potential. ARRL comments were filed on April 25 and reply comments are planned by the deadline of May 10. Unfortunately, the UWB Lab at the University of Southern California has not completed a test of compatibility with 1.2-GHz amateur equipment supplied by the ARRL. The ARRL is participating in an informal coalition of spectrum users in an effort to make sure that the FCC gives appropriate weight to interference concerns in defining and developing rules for UWB.

4.2. ET Docket 00-47, Software Defined Radios. The ARRL participated in the Notice of Inquiry portion of this proceeding last year. On December 8, the FCC released a Notice of Proposed Rule Making (NPRM). The NPRM was reviewed and no need for additional ARRL comments was identified. Comments filed by others are being reviewed and a determination as to whether reply comments are required will be made prior to the deadline of May 18.

4.3. Noise Environment Assessments. The FCC Technological Advisory Council has not initiated its proposed study of aggregate RF spectrum noise levels. The ARRL Ad Hoc Spectrum Strategy Committee is preparing a plan for the ARRL to engage in such a study in accordance with Minute 43, 2001 Annual Meeting of the ARRL Board.

4.4. New Petition for Rule Making, 2300-2305 MHz Amateur Primary Allocation. In 1996 the ARRL petitioned the FCC to upgrade the status of the Amateur Service in the band 2300-2305 MHz from secondary to primary. Because of other proposals concerning this band that have been submitted to the FCC it is timely to renew this request. Mr. Imlay had prepared such a petition. On motion of Mr. Butler, the General Counsel was authorized to file the petition as drafted.

Among the other proposals for the use of the 2300-2305 MHz band are a petition by Microtrax for a new Personal Location System (RM-9797) and a petition by AeroAstro for a short data message service called SENS (no FCC File Number yet assigned). When the FCC issued a NPRM in ET Docket 00-221 to reallocate certain government bands to non-government services, it did not include 2300-2305 MHz. However, it did include 216-220 MHz. New non-government services in the 219-220 MHz band would impact the limited amateur allocation there. Accordingly, the ARRL filed comments seeking to preserve the utility of the band, possibly by expanding the amateur secondary allocation to 216-220 MHz to permit greater flexibility.

4.5. The FCC's Advisory Committee for the 2003 World Radiocommunication Conference has proposed preliminary views on a number of WRC-03 issues including the realignment of allocations at 7 MHz and has invited public comment by May 9. Because the preliminary views on the items of interest to us already have been influenced by ARRL participation, there appears to be no need to file further comments.

4.6. There is no known opposition to the ARRL petition, RM-9949, seeking an upgrade in amateur status at 2400-2402 MHz from secondary to primary. Favorable FCC action is still anticipated.

4.7. Experimental license applications for 2402-2450 MHz on behalf of the City of Los Angeles and Los Angeles County, California, have been disposed of, with the application of the County denied and a license grant to the City rescinded effective later this year. Southwestern Division Vice Director Art Goddard, W6XD, was recognized for contributing significantly to the favorable outcome.

4.8. A FCC NPRM is still expected soon in response to the ARRL petition, RM-9404, filed October 22, 1998, seeking amateur access to low-frequency (LF) spectrum.

4.9. At the 2000 Second Meeting of the Board, Minute 62, a motion was adopted directing the filing "at the appropriate time" of a petition to permit spread spectrum emissions in the bands 219-220 and 222-225 MHz. The Committee had received a communication from Roanoke Division Director Dennis Bodson, W4PWF, urging action with regard to the 222-225 MHz band. However, after discussion it was agreed that the petition is more likely to be considered favorably by the FCC if it is filed not as an isolated proposal, but in combination with others.

4.10. It appears to be unlikely that the FCC will propose a comprehensive "biennial review" of Part 97 this year. Informally, the ARRL has been urged by FCC staff to submit a single petition at one time containing any rules changes we may wish to seek from the Wireless Telecommunications Bureau.

4.11. An ARRL Application for Review of the FCC staff's denial of our petition, RM-8763, seeking clarification of the FCC PRB-1 limited preemption policy with respect to amateur antennas, is pending before the full Commission. The Committee discussed various approaches to the problem of how to extend the effect of PRB-1 to properties subject to restrictive covenants. It was agreed that a request will be made to the Chairman's office for an *en banc* presentation to the full Commission on the issue, preferably in the autumn after the new Commissioners have been seated. During the discussion the committee was in recess for luncheon from 11:55 AM to 1:17 PM.

4.12. A preliminary draft Petition for Rule Making seeking a domestic secondary allocation for the Amateur Service in the vicinity of 5 MHz was reviewed. On motion of Mr. Heyn, it was agreed that the petition should seek a bandwidth of 150 kHz. A completed draft will be circulated to the Executive Committee for review prior to filing.

4.13. PR Docket 92-257, Amendment of the Commission's Rules Concerning Maritime Communications. The ARRL filed comments in response to a NPRM in this proceeding. The NPRM proposes to change the service rules for the Automated Maritime Telecommunications System (AMTS) operating in the 216-220 MHz band. The ARRL's comments urged changes in the rules so that AMTS licensees could no longer refuse to accommodate nearby amateur operations at 219-220 MHz without presenting a technical justification.

4.14. RM-10051, Petition of SAVI Technology, Inc., to Amend Part 15 to Permit Longer-Duration Periodic Radiators at 433.9 MHz. The petition was filed November 22, 2000 and placed on public notice January 30, 2001. The ARRL filed opposing comments, citing our legitimate concerns about interference.

4.15. Application of Terion, Inc. (formerly Flashcomm) for expansion of its HF commercial messaging system, which is now authorized on a temporary, secondary, fixed-term basis on frequencies outside the amateur bands. The proposed expansion was placed on public notice by the FCC on November 17, 2000. The proposal would not directly affect the amateur bands, but it raised other concerns that led to the filing of ARRL comments.

4.16. WT Docket 98-143, amateur license restructuring reconsideration and Novice band refarming. In a Memorandum Opinion and Order released April 6, the FCC disposed of numerous

petitions for reconsideration and related petitions on amateur license privileges and qualifications. Particularly regrettable is the fact that the Commission decided not to keep track in its database of Technician licensees who in the future qualify for HF privileges by passing a Morse code examination. Mr. Stafford reported that the committee created at Minute 66 of the 2001 Annual Meeting of the Board has been named the Novice Spectrum Repurposing Committee and has begun its work by telephone conference and e-mail. Member input will be solicited via the ARRL Web site. A question had arisen in the committee as to whether consideration of the 7-MHz band should be postponed in view of the possibility that changes in the band allocation will be made at WRC-03. Mr. Sumner observed that changes, if any, that are agreed to at the conference are likely to involve a long transition period.

4.17. WT Docket 00-230, Efficient Uses of Spectrum Through Elimination of Barriers to the Development of Secondary Markets. The NPRM in this proceeding, released November 27, 2000, did not require ARRL comment and no comments that would affect amateur allocations were filed by others. The proceeding will continue to be monitored for possible impact.

4.18. FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth continues to be in regular contact with the ARRL regarding ongoing enforcement efforts. The incursion of unlicensed stations into the amateur bands, and particularly the 28-MHz band, is of primary concern.

5. Mr. Imlay reported that the ARRL is not a party to any legal actions at this time.

6. Antenna matters: Mr. Imlay reported on an action in Florida brought by Barry Gorodetzer, N4IFE, against his homeowners' association. The case went to trial on April 19 and a decision is expected shortly. The ARRL is not participating financially in the case at this time.

7. Legislative matters: Mr. Sumner reported that there are now 19 co-sponsors of HR.817 and 6 co-sponsors of S.549, the House and Senate versions, respectively, of the Amateur Radio Spectrum Protection Act.

8. International matters: Mr. Stafford reported on the ARRL's preparations for the IARU Region 2 Conference in Guatemala in early October. On motion of Mr. Butler, the Committee authorized the submission of two papers on WRC-03 agenda items 1.7 and 1.23 based on existing ARRL policy.

9. Organizational matters: There has been little recent progress in the ongoing review of the ARRL Articles of Association and Bylaws. Mr. Sumner was asked to distribute a document incorporating the comments and suggestions made by committee members to date, to serve as the basis for further review.

It was agreed that a review of Standing Orders of the Board would not be undertaken until next year, to permit attention to be given to more urgent matters. Mr. Heyn renewed a request for compliance with an existing Standing Order with regard to the reporting of IARU expenses.

10. On motion of Mr. Heyn, 122 newly elected life members were recognized and the Secretary was instructed to list their names in *QST*.

11. On motion of Mr. Fallon, the following clubs were declared affiliated or their earlier affiliation by mail vote was ratified:

Category 1

145.49 Repeater Club, Willard, MO
Bradenton Amateur Radio Club, Bradenton, FL
ENC Repeater, Inc., Kinston, NC
Kennebec Amateur Radio Society, Kents Hill, ME
Lake County Radio Amateur Civil Emergency Services, Inc., Libertyville, IL
Lake Erie Amateur Radio Association, Solon, OH
Mesa DX and Contest Club, Fresno, CA
Milton Amateur Radio Club, Danville, PA
Mount Ava Repeater Association, Inc., Marion, IL
Pottstown Area Amateur Radio Club, Spring City, PA
Smith Chart Amateur Radio Society, Raleigh, NC
South Jersey Mountain Toppers Amateur Radio Club, Pickens, SC
Palm Beach County Amateur Radio Emergency Service, Inc., Boca Raton, FL
Rockaway Emergency Coastal Weather Alert, Yonkers, NY
Welaurel Reading Works Amateur Radio Club, Reading, PA

Category 2

Beaver Bunch, Bemidji, MN
Mid South 2m SSB Group, Collierville, TN
Technology Journalists' Amateur Radio Club, San Bruno, CA
Two-Meter Area Spectrum Management Association, Orange, CA

Category 3

Arcadia High School Amateur Radio Club, Phoenix, AZ
BARC, Jr., Boulder, CO
Brinnon Amateur Radio School Club, Brinnon, WA

The ARRL now has the following numbers of active affiliated clubs: Category 1, 1958; Category 2, 31; Category 3, 147; Category 4, 16; Total, 2152.

12. On motion of Mr. Frenaye, the holding of the following ARRL conventions was approved or their earlier approval by mail vote was ratified:

2001

Oklahoma Section, Feb. 16-17, Tulsa
Vermont State, Feb. 24, Milton
Maine State, Mar. 30-31, Lewiston
Delta Division, Apr. 20-21, Little Rock, AR
Southeastern VHF Conference, Apr. 20-21, Nashville, TN
International DX, Apr. 20-22, Visalia, CA
Washington State, Apr. 21-22, Yakima
Delaware State, Apr. 29, New Castle
Eastern New York Section, Apr. 29, Poughkeepsie
Louisiana State, May 4-5, Baton Rouge
South Carolina State, May 5, Greenville
Alabama State, May 5-6, Birmingham
Wyoming State, May 26-27, Casper
Georgia Section, June 2, Marietta
West Gulf Division, June 8-10, Arlington, TX
Midwest/Dakota Division, June 15-16, South Sioux City, NE
10-10 International. July 12-14, Worcester, MA
Rocky Mountain Division, July 13-15, Bryce Canyon, UT
Montana State, July 20-22, East Glacier
Pacific Northwest DX, July 20-22, Everett, WA
Central States VHF Conference, July 26-29, Fort Worth, TX
Oklahoma State, July 27-28, Oklahoma City
South Texas Section, Aug. 3-4, Austin
Eastern Washington Section, Aug. 4-5, Spokane
Colorado Section, Aug. 19, Golden
Kansas State, Aug. 19, Salina
Missouri State, Aug. 25, Columbia
West Virginia State, Aug. 25, Weston
Eastern VHF/UHF Conference, Sept. 1-2, Enfield, CT
Kentucky State, Sept. 8, Louisville
Western Pennsylvania Section, Sept. 9, Butler
W9DXCC, Sept. 14-15, Rolling Meadows, IL
Illinois State, Sept. 14-16, Peoria
Arkansas State, Sept. 15, Little Rock
Virginia State, Sept. 22-23, Virginia Beach
Connecticut State, Oct. 7, Wallingford
Hawaii State, Oct. 13, Honolulu
Southeastern Division, Dec. 1-2, Palmetto (Tampa), FL

2002

Maryland State, April 6-7, Timonium
Western New York Section, August 4, Williamsville
Southwestern Division, Aug. 16-18, Escondido, CA

13. It was agreed that the next meeting of the Executive Committee would be held at the call of the President.

There being no further business, the meeting was adjourned at 4:18 PM.

Respectfully submitted,

David Sumner, K1ZZ
Secretary

MINUTES OF EXECUTIVE COMMITTEE Number 467 Telephone Conference – May 14, 2001

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met by telephone conference at 3:30 PM Monday, May 14, 2001, for the purpose of determining the final disposition of a pending matter with regard to the ARRL Virginia Section (Minute 3, Executive Committee Meeting Number 466, May 5, 2001). Present were the following committee members: President Jim Haynie, W5JBP, in the Chair; First Vice President Joel Harrison, W5ZN; Executive Vice President David Sumner, K1ZZ; and Directors Frank Butler, W4RH, Frank Fallon, N2FF, Tom Frenaye, K1KI, and Fried Heyn, WA6WZO.

On motion of Mr. Fallon, the following resolution was adopted:

Whereas, at the instruction of the Executive Committee, First Vice President Harrison met with ARRL Virginia Section Manager Lynn Gahagan, AF4CD, on February 1 to review concerns that had been brought to the attention of the Executive Committee with regard to the administration of the ARRL emergency communications program in the Section, and

Whereas, Secretary Sumner subsequently was instructed by the Executive Committee to write to Mr. Gahagan to set out five points that had to be addressed and resolved with regard to these concerns, and

Whereas, Mr. Gahagan's reply has been reviewed by the Executive Committee, and

Whereas, the rules and regulations of the ARRL Field Organization provide that the office of any Section Manager may be declared vacant by the Executive Committee whenever it appears to be in the best interests of the membership to do so, and

Whereas, the Executive Committee has concluded that the interests of the membership in the Virginia Section will be best served by doing so, be it

Resolved, that the office of Virginia Section Manager is hereby declared vacant, with immediate effect, and

Further resolved, that the Field and Educational Services Manager is instructed to appoint a new Section Manager to complete the current term of office in accordance with the rules and regulations of the ARRL Field Organization.

Mr. Sumner read the following public announcement that is to be made as soon as Mr. Gahagan has been notified:

After lengthy deliberation and careful consideration, the ARRL Executive Committee has decided that it is in the best interests of the membership to declare the office of Virginia Section Manager vacant, effective immediately. A new

Section Manager, Carl A. Clements, W4CAC, of Portsmouth, has been appointed to fill the vacancy for the remainder of the current term of office, through March 31, 2002. These actions have been taken in accordance with the rules and regulations of the ARRL Field Organization.

There being no further business, the meeting was adjourned at 3:40 PM.

Respectfully submitted,

David Sumner, K1ZZ
Secretary

LIFE MEMBERS ELECTED MAY 5, 2001

◊ Robert F. Acinapura, KC7CDC; Kenneth Alan, K6PSI; Cindy Arant, KC4TMR; Ronald C. Arant, N4PHP; Robert J. Bailey, WO2B; Dale Baldwin, WB0QGH; Leigh Bassett, W3NLB; Laura L. Bauer, W9EET; Thomas D. Belsan, KB7NRG; David B. Belsky, K1DBB; George L. Bisso, KD7LXB; Paul A. Bous, KB0N; Robert Brehm, AK6R; George M. Brown, KF6PBL; Jim Brown, KE4JUH; Scott R. Bullock, N1CX; James L. Burns, WD4DBJ; Tim D. Cailloux, W4EGT; Paul Cappa, K1PC; Elaine R. Chase, N1GTB; Jed W. Clawson, W7JED; Clayton L. Coleman, KB5TBB; Marion B. Crosby, KD5NBN; Robert "Tony" D. Day, KC4AUF; Erik S. Dean, NI6G; James P. Demos, K2DE; John C. Dewey, KA9CAR; James A. Dicso, K2SZ; Paul Dilley, WA4PXE; James A. Eden, ZF1EJ/KE; Jack Egbert, N5EOO; Melvin N. Eleazer, WB4TWB; Bernardo N. Fernandez, K6BF; David S. Fraasch, WB6RAB; James C. Frey, K8YD; Scott A. Ginsburg, K1OA; L. Deanne Glorioso, W1MGA; Robert A. Godfrey, N2LG; Edward J. Gosch, W2UV; Mary J. Grandstaff, KB8ZXH; Dan B. Gudz, WA6TT; Richard A. Hall, K5GZR; Leo A. Halog, KR6EG; Mark E. Hambrice, KD5LUN; Dinah L. Harper, N9ALI; Thomas R. Haughey, KN4ZU; William Hermes, KM5Y; J. E. Hershey, WB6GSO; Robert E. Hickman, AA5WE; Takashi Hioki, JF1GUQ; Robert Hobdell, KA3YQO; Paul W. Hoffman, NK3M; Sylvia K. Hutchinson, K8SYL; Robert J. Inderbitzen, NQ1R; Lawrence E. Irvin, KG4JHN; Seiichiro Iwase, JA1UBZ; Donald James, N2VU; Robert K. Kelly, KL7EN; Matthew F. Koval, KA8YEZ; Jennifer A. Lanham, KG4ERF; Richard Lichtel, KD4JP; William R. LoBianco, KA9LFU; Daryl A. Maclachlan, KF4NPA; Kathleen L. Malone, KC2HGO; Aubrey Manuel, KE6AWX; Douglas J. Mason, KC8KQW; Joseph D. Mastroianni, AE6I; William E. Mc Cleary, KG9QJ; Richard F. McAllister, K6RFM; David G. Moninger, AD6TW; Robert D. Montgomery, K3BM; Douglas L. Moore, KC5ZF; Daniel J. Myers, KG8TO; David R. Nardo, W2UQ; Christina K. Nelson, N2SJZ; Robert G. Nelson, KB1BD; Barry W. Norman, KD4KMK; Jessie P. Oberreuter, KB7PSG; James E. Olson, W4JO; Julio L. Ortiz, AD6DK; Jerome F. Palmer, N3KRX; Stanley L. Perkins, W7SLP; Edwin Petzolt, K1LNC; Joshua W. Phinney, N1XM; William C. Phlegar, N8VT; Eric Pierce, VA3EP; William A. Prize, KB9YEK; David A. Pyle, KW1DX; Donald L. Reed, WA0HSW; Philip R. Russ, K5LLS; Phillip L. Sauvey, KE8RO; Diane Scalzi, WI8K; Mark J. Scarloss, N0IGD; Gary Schultz, WD8LHR; Patrick L. Scolla, WB0EGR; Christopher W. Sells, AC4CS; Daniel J. Serafini, W9CP; Douglas A. Sharp, K2AD; Charles J. Shaw, KB3BTO; Dennis H. Shawl, W9PBB; James C. Sheaffer, N8RJF; Charles A. Shepherd, WA4JOC; Melody L. Siff, KE4ACK; David Singer, AA6DS; John R. Sokolowski, KB9SXF; Russell D. Stafford, W3CH; Valerie L. Stein, N9NMW; Steven J. Stroschein, W9XF; William D. Tatsch, KD5NBA; Lewis A. Thompson, W5IFQ; James W. Tittle, KC6SOE; Herbert J. Ungricht, WB7H; Robert M. Walp, W6YDN; James F. Walroth MD, N3AWS; Spencer L. Webb, KW2S; Benjamin G. Webster, N2ROQ; Charles L. Weyand, WC6CW; Dan White, WB5DNT; Scott Wilkerson, W9VHE; Alan K. Wilson, KA5WGL; Brian D. Wood, AA6FV; Neal R. Zipper, KR4IZ. QST

STRAYS

YOUNG AMATEURS SPEAK AT DAYTON

◊ The Youth Forum at the 2001 Dayton Hamvention, moderated by Carole Perry, WB2MGP, attracted an outstanding lineup of enthusiastic young amateurs. From left to right, Jonathan Troup, K0DE (age 13) "My Elmering Experience With Kids"; Kristin Wilson, KC0INX (age 12) "The 14er Event"; Benjamin Arthur, KC0ISG (age 10) "Kids Getting Ham Licenses"; Carole Perry, WB2MGP; Patrick Clark, KC8BFD (age 16) "APRS—Benefits in Emergencies"; Zane Wruble, W2YL (age 12) "Collecting Awards" and Crystal Melhorn, W9IOU (age 15) "Promoting Ham Radio Through Local Clubs."

Next Strays

NEW PRODUCTS

NEW SIGMA VERTICAL ANTENNAS BY FORCE 12

◊ The new SIGMA verticals can be supplied in survival ratings up to 200 MPH. Other models are lightweight and small for DXpeditions and portable operation.

The SIGMA-5 is a true vertical dipole. This means it does not need radials, so the real estate needed is minimal. It is fully balanced and fed at the center, with the provided balun. The relay control is complete with 50 feet of 5-conductor control cable and a remote control switch, needing only 95 mA at 12-V dc (such as the rig power supply) and "all-off" is 20 meters. There are no traps and the efficiency is said to be >90% on 20 meters, rising to 99% on 10 meters. VSWR on all bands is rated at less than 1.8:1, except on 20 meters, where it covers about 320 kHz with 2:1. The 20-meter response can be set to anywhere in the band.

SIGMA-5 efficiency is independent of the ground. To enhance the low-angle energy, one can add an extensive ground screen (dense for 20-30 feet) under the antenna (then more screen or wires out to perhaps 5 wavelengths).

Like the SIGMA-5, the SIGMA-40 is a vertical dipole, but for 40 meters only. It also does not need radials or substantial real estate. The antenna is 24-feet tall, plus a base mounting post. The SIGMA-40 is free standing with a tilt base, rated for 90-MPH wind survival and 5 kW RF output. The SIGMA-40 is bolted together and the loading technique is a combination of T-bars at the top and bottom of the antenna, plus 4-inch diameter, high-Q coils ($^3/_8$-inch diameter tubing) at the center. The coils are non-adjustable and tuning is very simple.

DXpeditions and portables might prefer the smaller, lighter SIGMA-40XP. This comes in 4-foot sections for easy transport and is only 16 feet tall for faster installation. It comes complete with guy wires welded to a collar for simple one-set of guying. Bandwidth is about 200 kHz and tunable to anywhere in the band. The RF power handling is the same.

SIGMA-5 $349; SIGMA-40 $489; SIGMA-40XP $449.

Contact your favorite dealer, or Force 12 at PO Box 1349, Paso Robles, CA 93446; 800-248-1985; **www.force12inc.com/**. QST

Previous • Next New Products

Washington Rocks in Nisqually Earthquake

By Ed Bruette, N7NVP, ARRL Section Emergency Coordinator, Western Washington

Wednesday, February 28, 2001, 18:54 UTC and all was well. Thirty-one seconds later, the 6.8 Nisqually Quake, centered about 11 miles northeast of Olympia, rocked Western Washington! Eight counties were declared disaster areas.

For years, geologists and emergency managers have been predicting this would happen. Because of the warnings, neighborhood programs have been established, business plans put into place and ARES/RACES/ACS teams have drilled and exercised both with and without those they serve. Now it was time to see if all that preparation would pay off.

What Happened?

In much of the affected area, cell and landline phones were overloaded. Power went out, and people found themselves in gridlock almost instantaneously. US West estimated that 60 million calls were initiated in Western Washington on the day of the quake. The overall number of calls for the 24-hour period was at least 6 times normal. Citizens calling 911 caused part of the phone problem either asking "Are we having an earthquake?" or telling the 911-call taker "We are having an earthquake!" Kitsap County's emergency manager, Phyllis Mann, observed that her message of "Drop, cover and hold" has been morphed into "Drop, cover, hold and dial."

It was soon apparent that there were "hot spots" of damage. Some communities never lost power or phone service. The area's major airport, Sea-Tac, temporarily lost the ability to control aircraft when the control tower's 3/4 inch windows shattered and the interior was reduced to shambles. One of the controllers stayed under a desk and continued to talk to incoming aircraft. Boeing Field took a hit that closed their main runway for a week. King County's 800-MHz radio system was overwhelmed. Roads and sidewalks buckled. The dome in the state capital building cracked. Thirty miles from the epicenter, a two million gallon capacity water tank broke its steel seismic tie-down straps!

The epicenter of the February 28, 2001 earthquake that struck Western Washington was between Olympia and Tacoma. (Copyright 2001, the State of Washington Military Department, Emergency Management Division. All rights reserved.)

We were Lucky!

The scientists say this was *not* the *"Big one"!* The monetary cost of this earthquake may exceed $2 billion but this was *not* a catastrophic event. The Nisqually Quake was 49 km (30 miles) deep. Had it been closer to the surface, the damage would have increased significantly. Many businesses that closed on the day of the quake reopened the next business day. Bridges were inspected and quickly placed back in service as structural engineers determined them to be safe. The transportation infrastructure remained largely intact. Fewer than a dozen bridges, ramps and overpasses are out of commission for an extended period. None collapsed! The state statistics show one death and 407 quake related injuries. A week after the quake, only four people were still hospitalized—three serious and one critical. The majority of the building damage occurred in commercial and government structures. Residential damage assessment conducted in the first four days by the American Red Cross listed 110 single-family homes and apartments destroyed and 126 other single-family homes and apartments with major damage. Many others suffered cosmetic damage. The Red Cross opened seven shelters on the day of the disaster. Four days later they were all closed.

Hams Respond

Hundreds of radio amateurs self-activated or got pages or phone calls to respond. Nets were activated per the local area plans and contact established with city, county and state emergency manage-

ment. Amazingly, very few repeaters failed (three or four). Many local nets remained on their repeaters.

The US Coast Guard's Seattle Vessel Traffic System (VTS) temporarily lost its ability to control vessel traffic in Puget Sound when the personnel in the Seattle Vessel Traffic Center evacuated their building following the February 28 earthquake. The system was inoperable for about one hour until it was partially restored by transferring the operation to the USCG Cutter *Midget* berthed at Pier 36 in Seattle. When the quake hit, there were approximately 73 vessels in the system. Without adequate radio communications capability to cover all of the Puget Sound Area or phone service, the Captain of the Port was not able to communicate adequately with vessels underway in the Straits of Juan de Fuca or Puget Sound and warn them of the potential hazards following the earthquake.

Fortunately, Lt Russ Read, N7HOV, established a working relationship with the King County Amateur Radio Emergency Service (ARES) two years ago. Within ten minutes of the earthquake Lt Read joined Rick Hodges, KB7TBF, the King County ARES Emergency Coordinator on the King County damage assessment net. Critical information was passed from the net to the Captain of the Port and factored into the Coast Guard's response to the earthquake.

Shortly thereafter, Lt Read came up on the K7LED repeater and passed two messages to Bob Knight, W7MZO, in Kirkland. W7MZO relayed the traffic to the state Emergency Operations Center (EOC) via the Washington State Emergency Net (WSEN) on 3987 kHz. The messages informed the Canadian VTS that Seattle VTS was inoperable due to the earthquake and would be off line until further notice. The Coast Guard also requested Canadian VTS to instruct all deep draft vessels bound for the US waters of Puget Sound to go to anchor until further notice. The Captain of the Port was quite pleased when Lt Read reported 15 minutes later that the information had been passed to their Canadian counterparts, who then passed it to vessels inbound to US waters.

Marina Zuetell, N7LSL, DEC for Medical, brought up her net and established contact with most of the Puget Sound hospitals. Reports were received from a total of 11 hospitals in King County, three in Kitsap County, one in Mason County, and a relay concerning one in Pierce County. In addition, reports from the Puget Sound Blood Center and Bergen Brunswig Pharmaceutical Company were received. Thirty Amateurs participated in the Medical Net during the four hours of activation. Many were team members who have practiced and trained for this kind of a response. Others were individuals who wanted to help—the emergent volunteers, who provided information concerning traffic, damage reports, offers of equipment, and assistance in surveying a hospital for damage. N7LSL said, "Those who responded did a fantastic job. I am very proud of them—they performed the job they were trained to do, and did it very well."

Red Cross shelters and chapter houses were manned and supported in several counties. Damage assessment teams were provided with Amateur Radio communicators for several days after the quake. The state EOC received several messages via APRS!

Eastern Washington, especially Spokane County emergency management, and hams activated and were available for support. Radio Depot (the local ham store) reported a newly licensed ham purchased his first radio just after the quake. Two other hams updated their equipment on the day of the quake. Many of those who operated mobile wished for more installed equipment.

Lessons Learned

- We need to reinforce, with verbal and written documentation, the protocols for activation and response. When the *ground shakes*, don't wait for someone to call you on the telephone or page you. Know your net control frequencies and how to program your radio, and check into the net to see if and where you are needed. If you work in a different community or county from where you live, be familiar with the ARES/RACES/ACS frequencies in both places.
- Post-earthquake vehicular traffic moves at a snail's pace—or slower.
- Cell phones are poor emergency management tools during the first several hours of an earthquake even if the system is intact (Surprise!). After the Northridge Earthquake, cell phones were the only commercial system that stayed up. Ours did not. There has been a lot of talk about how cell phones will replace Amateur Radio because everyone has a phone, and our use in an emergency will be reduced because of it. Obviously not true! Radio was the only communications out of some counties for a while. Hams were operating most of those radios!
- The radio end of transmission lines (coax) must be labeled. Otherwise valuable time will be wasted making the determination which radio will work on the associated antenna.
- Headsets can be both a blessing and a hindrance.
- Credentialing and facility orientation needs to be standardized at similar organizations such as hospitals. Facility security personnel, in some locations, are unfamiliar with the radio team and its purpose.
- When passing NCS (Net Control Station) responsibilities, it must be clear to the station receiving the responsibility that they are the NCS.
- If you have equipment installed in places like school districts and fire stations etc., the effort must be made to inspect and operate the equipment on a regular basis. This will avoid comments like, "that radio has not worked since shortly after it was installed," or "I had to reprogram all the channels back into memory." Additionally, operating instructions need to be available for each radio.
- Even if you have a plan to relieve your operators, they must be tracked and made to take a break. Volunteers need to have pre-assigned positions.
- Having the ARRL's *ARES Field Resources Manual* in your possession has limited value if the blanks haven't been filled in with the local net information, etc.
- Some areas could not have manned a second shift. Many volunteers are not available on the day after the event because they have employment commitments. We need more operators who are willing to be involved as emergency communicators. These folks need to be willing to train and participate in drills and exercises.

Observations

Our situation would have been considerably different if this were a catastrophic event. Bridges and roads would have been in much worse shape. Loss of public communication systems would have been much more widespread. Public safety communications would have been impacted more heavily. Repeaters would not have fared so well. Simplex frequencies would be at a premium. We would not have enough trained emergency communicators to answer the call and very little time to train emergent volunteers. Digital modes would be required for both short and long haul communications.

What to do Now?

Back to the preparation phase. Review your unit's response to the earthquake with an eye toward improving your readiness. Awareness is high in the post-disaster period. This is the time to promote

Amateur Radio. Offer classes to all who are interested. Recruit everyone who has an interest into your emergency communications unit. Provide meaningful training to your unit. Include served agencies in as many training opportunities as possible. Encourage all ARES/RACES/NTS members to enroll in the ARRL Certification and Continuing Education Course in emergency communications.

"Very Proud"

State RACES Officer Jim Sutton, WA7PHD, was very favorably impressed by the professionalism of the radio amateurs who supported the community. Jim Pace, K7CEX, District 4 DEC, summed it up this way: "I am very proud of my EC/ROs and their teams. I can sleep well, knowing that all of our training and drilling was for good reason. They were there when needed—and will be in the future."

I could not say it better myself. To all who made the Amateur Radio response a success—thank you very much! You earned the right to be very proud of our effort.

STAR 2001 Grant Awarded to St Clair County

The St Clair County (Illinois) ARES/RACES/SKYWARN group has, for a long time, supported the Freeburg Emergency Services and Disaster Agency (ESDA) with emergency and public service communications. Recently, the Freeburg ESDA obtained the STAR 2001 Grant Award. This award, Surviving Tornadoes through Awareness and Reaction, enabled the Freeburg ESDA to obtain and distribute 150 Specific Area Message Encoding (SAME) weather alert receivers to persons most at risk during tornado warnings. These special receivers that augment the outdoor warning siren system have been issued to residents of mobile homes, daycare and senior care centers, schools and the local library.

An award ceremony took place where representatives of the various agencies and public service groups met to receive the STAR Grant Award. Pictured (left to right) Freeburg Mayor Allen Watters; Freeburg Trustee Brad Towers; Freeburg Police Chief Melvin Woodruff, Jr; ARRL EC and Coordinator for Freeburg ESDA Eugene Kramer, WA9TZL; Trustee Tom Carpenter; National Weather Service Warning Meteorologist James Kramper; Illinois Emergency Management Police Advisor Thomas Zimmerman, IEMA Public Information Officer Chris Tamminga; Douglas Wallace, American Red Cross; Will Cousineau, representative for Illinois State Representative Dan Reitz; Nancy Bates, American Red Cross; and Stan Krushas, Region 8 IEMA Coordinator.

FREEBURG TRIBUNE

Thanks to Eugene Kramer, WA9TZL, EC, St Clair County, and Coordinator, Freeburg ESDA.

Field Organization Reports

Public Service Honor Roll
April 2001

This listing is to recognize amateurs whose public service performance during the month indicated qualifies for 70 or more total points in the following 8 categories (as reported to their Section Managers). Please note the maximum points for each category:
1) Checking into a public service net, using any mode, 1 point each; maximum 60.
2) Performing as Net Control Station (NCS) for a public service net, using any mode, 3 points each; maximum 24.
3) Performing assigned liaison between public service nets, 3 points each; maximum 24.
4) Delivering a formal message to a third party, 1 point each; no limit.
5) Originating a formal message from a third party, 1 point each; no limit.
6) Serving as an ARRL field appointee or Section Manager, 10 points each appointment; maximum 30.
7) Participating in a communications network for a public service event, 10 points each event; no limit.
8) Providing and maintaining an automated digital system that handles ARRL radiogram-formatted messages; 30 points. Stations that qualify for PSHR 12 consecutive months, or 18 out of a 24-month period, will be awarded a certificate from HQ on written notification of qualifying months to the Public Service Branch at HQ.

879 NM1K
792 WA9VND
505 WZ7V
420 WX4H
396 KV4AP
380 KJ4N
373 WA4GQS
294 KK3F
289 NR2F K4FQU
284 N9VE
269 K9JPS
266 N8IO
259 KK5GY
258 WA5OUV
248 N8OD
247 KA2ZNZ
240 W7TVA
232 K8PJ
223 KB2RTZ
222 W7BO
216 W3HK
213 K8GA
205 WB5ZED
204 K7VVC W4CAC
201 KA4FZI
200 K2UL
194 N1LTC
192 NN7H W4ZJY KB2VRO
187 KB2EV
186 W8YS W7GB
184 AD6LW
182 KC5QZZ AD4GL
179 W6DOB
178 K9FHI
176 W4EAT WO0A
173 KE4JFS N8FPN KC8CON AF4NS
172 KC2AHS
170 WN0Y
169 WB5NKC
168 N2JBA K6YR KA2GJV W6IVV
166 WB4BHH N5NHJ
163 W5ZX
161 N2RPI
160 KB1DSB N1AKZ KW1U
159 W3YVQ W1PEX W6QZ
158 AA3GV KD4GR
157 N2CCN
156 N2OPJ WA1FNM
154 AF4QZ W0WWR WA5I
153 W4IWW WB4GM K0PY N7YSS N8BV
152 W0OYH
151 WB2GTG KB2KLH N3YSI
150 KC2DAA KA1GWE
149 AC4CS W2MTA
148 K3JL N2KPR
147 KC5OZT
146 N5OUJ N3SW KD1LE
145 KC4ZHF N1LKJ
144 AD4XV KC2EOT W7ZIW
142 N0SU WB2UVB KG4FXG
141 N9KNJ K0IBS WA4DOX W0LAW
140 WB2ZCM K4YVX KT6A
139 W3BBQ W5GKH WA4QXT N2WDS N9BDL
138 N2YJZ N3ZKP
137 W1QU K2DN K2BCL
136 WA2YBM
135 KG4FQG WD4JJ WB5NKD
134 AA3SB W9YCV W1GMF
132 WD9FLJ
131 NZ1D
130 KA4UIV W1ALE
129 KI4YV WA0TFC KB5TCH W6JPH
128 KE4JHJ K5IQZ W2RJL NN2H K7GXZ W9CBE
127 N5NAV K9LGU KK1A
126 NC4ML W5CDX N3WK WD8DHC
125 W2AKT WA1QAA WB2QIX
124 W2JHO KA4HHE N3EFW
123 K5DPG KV4AN W7LG
122 AA2SV AG9G K7MQF
121 K4BEH W3IPX W7GHT W7QM KA4LRM N7DRP
120 KG2D WI2G N9TVT
119 AA8SN KB0RUU WD9HII K9GBR N3RB
118 KF6OIF W4CKS K4MTX WA1JVV KA2DBD WA2UKX K4WKT N9MN KA8WNO KA2DBD
117 N8EIZ KB2WII
116 WR8F N7CEU
115 N3WAV WD0GUF N7AIK W5MEN
114 AB4E KB0DTI KE3FL W1JX W4WXA K2PB K1JPG KG4CHW
113 KG4KCC K3CSX KB2ETO
112 KF4NJP KC6NBI KA2CQX WA4EIC
111 WB4TVY WD4MIS WB4ZNB K8KV K4DMH
109 N1JBD K1FP WB7VYH K6IUI N8DD
108 KB2KOJ KM5VA
106 K8VFZ AB2IZ WA2GUP
105 W4XI W3CB KA2BCE WA2CUW
104 KM5YL KR4MA KE0K W2LC WA8SSI
103 WB4BIK AA4YW
102 AA2ED KJ7SI
101 KC4VNO WB4UHC WA4GLS KD4HGU KC8HTP
100 KG4EZO
98 K5MC WA2YOW K0PIZ KF5A
97 W0FCL K8QIP
96 WA9JWL KC0HOX W3OKN
95 W4CC KE4GYR WB2IJH
94 KO4OL KA1VED AA4BN
93 KC6SKK W7VSE
92 W3NNL KC7SGM
91 KC3Y WB4PAM NC1X
90 K8AE
88 K8LEN W1JTH KC2ANN WA4EYU
87 WA3HJC N1IST
86 KG5GE WW8D W5AYX KG9B
85 WA2EDN KB2YUR N0OBM N1CPX N2GJ W2CC WA4CSQ
84 K3UWO KE4DNO
83 K2DBK
82 K8ZJU N2VQA K3TX WB9GIU KA8VWE
81 K4BG W4QAT KE4PAP N4CQR W2GUT
79 N3ZOC W2PII
77 WA8DHB
76 W7EP KE4WBI K8SH
75 N1ARN W4SEE W4MWC
74 KC8KYP
73 W5PY N8EXV W8IM
71 KD1SM WJ2F AC5Z

The following stations qualified for PSHR during the month indicated, but were not previously recognized in this column: (Mar) W1GMF 148, KA8VWE 103, KC2ANN 87, W2PII 79, N7CEU 73.

Section Traffic Manager Reports
April 2001

AK, AL, AR, AZ, CO, CT, DE, EMA, ENY, EPA, GA, IA, ID, IL, KS, KY, LA, MDC, ME, MI, MN, MO, NC, NFL, NH, NLI, NTX, OH, OR, ORG, SD, SDG, SBAR, SC, SFL, SNJ, STX, TN, VA, VT, WI, WMA, WNY, WPA, WV, WWA, WY.

Section Emergency Coordinator Reports
April 2001

The following ARRL Section Emergency Coordinators reported: AZ, CT, ENY, EWA, IA, IN, KS, KY, LA, MDC, MI, NLI, OH, SD, SFL, STX, SV (North), TN, VA, WCF, WMA, WNY, WPA, WY.

Brass Pounders League
April 2001

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
WX4H	420	1732	1801	5	3958
NM1K	777	281	893	10	1961
KK3F	106	830	714	40	1690
W5SEG	32	776	756	0	1564
WA9VND	516	287	597	38	1438
W1GMF	5	364	908	7	1284
KT6A	0	664	612	2	1278
KW1U	2	556	517	20	1095
NR2F	139	355	515	15	1094
W7BO	355	346	364	0	1065
N2LTC	0	444	479	28	951
W1PEX	2	21	785	45	853
WB2GTG	14	380	426	19	839
WZ7V	0	430	37	366	831
W4EAT	0	407	354	8	769
W6DOB	0	304	410	31	745
K7VVC	28	324	372	8	732
KB1AJ	5	364	297	43	709
KJ4N	180	224	333	0	671
W0WWR	1	115	529	25	670
N1LKJ	3	329	318	14	664
WB5ZED	19	328	296	18	661
N3YSI	1	294	282	22	599
W7TVA	51	247	237	61	596
KA1VED	6	278	278	8	570
KA2ZNZ	15	278	171	100	564
W9YPY	0	245	304	0	549
N8IO	110	189	202	8	509
K9GU	0	243	31	233	507

BPL for 100 or more originations plus deliveries: K9JPS 205, N9VE 202, W3HK 156, WA5OUV 154, KK5GY 139, N8OD133, K8PJ 107, WW8MM 106, K8LJG 104. The following stations qualified for BPL in the months indicated, but were not previously recognized in this column: (Mar) K8PJ 135, N8OD 135.

Tracking Down QSL Info for Chinese Stations

This month Asian DX expert Fred Laun, K3ZO, with some assistance from Jack Shirley, N8DX, gives us another helpful hint at obtaining QSL cards from Chinese stations using a Chinese Callbook *on the Internet. Many of you will remember Fred's advice three years ago in this column on QSLing Chinese Novices (December 1998 page 80). Thank you, Fred and Jack.*—Bernie, W3UR

By Fred Laun, K3ZO

Thanks to BA4EG and BD7NQ, a Chinese lookup service, ChinaQRZ, now exists on the Web. It is based on the *China Callbook* so expertly put together by BA4CH. The URL is **www.hellocq.net/qrz/index.php**.

You will find, however, that in almost all cases the address is provided only in Chinese characters. A few of the listings also carry the address in English, but I would estimate they are less than 10 percent of the total.

You don't read Chinese? Not to worry. Neither do I. But I have used the lookup successfully to get many cards from China. Here's how.

First of all, make sure that your browser is set up to display Chinese fonts. I use *Netscape* for most purposes, but in the case of different fonts I find that Microsoft's *Internet Explorer* is easier to configure. Once the lookup page is up on the screen, just do an **<ALT-V>** to bring up the "View" menu and scroll down to "Encoding." Select "Chinese Simplified" from the next menu if you see it listed. If not, select "More" and then select "Chinese Simplified" from the resulting menu.

Now type the call you want to look up in the appropriate space near the top of the page and click on the adjacent button. The address you want will appear in the upper right part of the page, just below the ChinaQRZ logo. Now you can do one of two things:

1. You can print it, and the next time you have dinner at your favorite Chinese restaurant, you can take the page along with you and ask them to write it out for you in Western script.

2. You can print it out, assemble it on an airmail envelope using clear tape, write "China" down below, and mail it off, with your QSL, IRC or green stamp and QSL card with SAE inside.

If you choose option (2), here is the order in which the information appears on the Web page:

- Call Sign (this will always appear in Western script)
- Full name of operator
- Province
- County (This space is often left blank)
- City and Street address
- Postal Code (in Western script)

There are entries on the following lines as well, such as the operator's e-mail address, if known, and the date and source of the information on that station. But all the info you need to successfully address your envelope is contained on the first six lines.

Please note that only the information to the right of the vertical line is what you want. For example, on the line where the call sign appears you will see some Chinese characters on the left side of the vertical line. Those characters simply mean "call sign" in Chinese. The same is true with the other lines as well. The characters to the left of the vertical line simply explain what that line is showing, and should not be included when you cut out the address and paste it on the envelope.

In China the preferred order in which address materials appear on the envelope is as follows:

Postal Code
Province
County
City and Street Address
Operator Name
CHINA

So you can cut and paste to put everything in the proper order. However, if you just paste the entire block on the envelope as it appears on the lookup page, it will probably work since the directions will likely be obvious to the postman.

You will find that almost all mainland Chinese personal stations (BA, BD and BG prefix) are listed. The lookup is admirably up to date. However, many of the BY calls (club stations) do not appear in this lookup, since that is a different licensing process handled by a different government office. This lookup page is also good for some Taiwan (BO, BV and BX) stations as well as some Macao

To get an address of a Chinese station, go to www.hellocq.net/qrz/index.php. Type the call sign in the first empty block. The results will be in the first six lines in the upper right corner (highlighted).

Bernie McClenny, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

(XX9) and Hong Kong (VR2) stations.

A fairly complete, but somewhat outdated list of club stations (BY calls) can be found on the BY2HIT web page at **www.qsl.net/by2hit/ebycall.htm**.

Other pages that contain Chinese QSL information include:

www.qsl.net/bd2alf/chinalist.html—a list of stations in Daqing Province

www.qsl.net/bg7rk/callbook.htm—a list of stations in Guang Xi Province

Where do you find Chinese stations on the air? The best place is 21400 kHz, which serves more or less as a Chinese calling frequency. The lowest class of home station license (BG prefix) can only operate SSB on 21400-21450, so they are in that part of the band. Generally speaking, Chinese operators choose frequencies in 5-kHz increments, so you will often find Chinese stations having in-country QSOs at 21405, 21410, 21415, etc. If the band is open to China and you don't hear activity on one of those channels, calling "CQ China" or "CQ DX Asia" on one of them may produce a run of Chinese stations for your log.

Another good place to find Chinese stations is 29600 kHz FM, but only if you're fairly close to China. I can work many China stations there easily from my HS0ZAR station in Thailand, but have never been able to do it from here on the US East Coast.

Other places where Chinese stations hang out frequently are 7050-7070 CW and SSB, 14025-14050 CW, 21025-21050 CW and 21100-21150 CW.

A number of club stations are located at Chinese high schools; you will frequently hear stations such as BY3AU or BY5QE calling CQ on SSB in almost any part of the 15 meter phone band. The students, frequently 15-18 year-old girls, use Amateur Radio to help them practice their English.

It just goes to show you there is always a way! For more information on Amateur Radio in China, check out the "How's DX?" columns in September 1999 and February 2000 QST.

AMATEUR RADIO FOUNDATION TO PUBLISH HISTORY

A husband-and-wife team who took ham radio to some 200 DXCC countries will be the main subjects of a book soon to be published. The Yasme Foundation has commissioned a full-length history of the foundation and a biography of its two principal luminaries, Lloyd Colvin, W6KG (who died in 1993) and Iris Colvin, W6QL (who died in 1998).

The assistance of radio amateurs and others around the world is requested for this effort. The foundation has retained freelance writer Jim Cain, K1TN, to write the book. Anyone with information to share (reminiscences, anecdotes, photos, etc.) may contact him at **yasmebook@mybizz.net**.

"The foundation is extremely pleased to have Jim Cain, a writer well-known and respected among Radio Amateurs and a licensed ham since 1961, to research and write this important Amateur Radio history of Lloyd and Iris Colvin, W6KG and W6QL. We believe that Jim is the most qualified person for the job," said Yasme Foundation President Wayne Mills, N7NG.

The Yasme Foundation is a not-for-profit corporation organized to conduct scientific and educational projects related to Amateur Radio, including DXing and the introduction and promotion of Amateur Radio in underdeveloped countries.

Lloyd and Iris Colvin visited and operated from more than 200 ARRL DXCC entities, including nearly every member-country of the United Nations. Danny Weil, VP2VB; Martti Laine, OH2BH; and the late Dick McKercher, W0MLY, among others conducted Amateur Radio operations under the Yasme banner. A list of Yasme operations can be found at **www.yasme.org**.

The Yasme Foundation's officers and directors are Wayne Mills, N7NG (president); Rusty Epps, W6OAT; Bob Vallio, W6RGG; Charles "Mac" McHenry, W6BSY; G. Kip Edwards, W6SZN; Martti Laine, OH2BH and Fred Laun, K3ZO.

When these two legendary amateurs went on a DXpedition, they did it right. Usually they would stay for 3-4 weeks and everyone received a polite QSO from either Lloyd, W6KG, or Iris Colvin, W6QL.

July is IOTA Month

DXers who are participating in the IOTA (Islands On The Air) Program, sponsored by the Radio Society of Great Britain (RSGB), know that July is IOTA Month. This is probably the best month to work a new one because so many people in the Northern Hemisphere go on IOTA DXpeditions, especially during the RSGB IOTA Contest on the last full weekend of the month. This year's event is sure to be even better than all the rest as participation continues to grow. If you are just starting out in this DX award program you can easily work your first 100 IOTA counters and some of the more serious operators can work well over 200. This year's contest will be held on July 28 and 29. For complete rules check out **www.g4tsh.demon.co.uk/HFCC/IOTA.htm** or watch *QST's* "Contest Corral."

XU—CAMBODIA

A group of German Amateur Radio operators will be going to Cambodia in late July and plan to be on the air from Angkor Wat from July 16 to 19 for a limited high-band operation. After that they'll move to Sihanoukville where they will put in a full effort on all bands from 6 to 160 meters, with an emphasis on the low bands. The four-man team will be active on SSB, CW, RTTY and PSK31. Team members include Frank, DL4KQ (low bands, CW); Siegfried, DL8KBJ (SSB); Angelo, DC9KZ (SSB, RTTY, PSK31); and Bernd, DL5OAB (CW). So far only DL4KQ has received his call: XU7ABR. They will have up to four transceivers, beam antennas for 6 through 20 meters and dipole antennas on 12, 17 and 30 through 160 meters. QSL via DL4KQ either by the bureau or direct to Frank Rosenkranz, Blumenstr 25, D-50126 Bergheim, Germany. For direct requests send an SAE and US dollars. Two dollars will get a QSL back via airmail; or $1 will get QSL via normal mail. QSLs without SAE will go via the bureau. Those needing Cambodia on any bands or modes should check out the DXpedition's Web page at **www.DL4KQ.de/** and place your votes!

Wrap Up

That's all for this month. Don't be surprised if you hear your editor on the air early in July from Northern Europe for one or two days. Thanks this month go to DL4KQ, K1TN, K3ZO and N8DX for helping to make this month's column complete. Until next month, see you in the pileups!—*Bernie, W3UR* QST

VU2ZAP and VHF in India

Rajendra Kumar, VU2ZAP, has stirred up considerable excitement ever since he made his first 6-meter contacts last November 7 from his home in Bangalore, India. By early May, Raj logged over 700 stations in 67 countries and all continents, save North America. At least five other Indians have also been contributing to the first ever sustained 6 meter activity from the second most populous country in the world.

Raj Kumar, VU2ZAP, at his station in Bangalore, India

Raj Kumar, VU2ZAP

Raj lives in the highlands of south-central India and makes his living growing Arabicas coffee, the fifth generation of his family to do so. He is also a trained electronic engineer who develops VHF-related products, including telephones, pagers and modems. Raj was first intrigued by radio as a teenager in the late 1960s and earned his first license in 1984. He was active in VHF from the start. Raj was one of the founders of the Repeater Society of Bangalore, which put the first Indian VHF repeaters on the air in 1986. Now two public 2-meter repeaters operate in Bangalore.

During the 1980s, Raj was also involved building equipment, designing kits for newcomers and helping many get their licenses. He contested using the calls VU2Z and AT0Z. VU2ZAP could usually be found on the 17, 15, 12 and 10 meter bands, but he had always longed to operate on 6 meters. Raj got that chance this past fall when Indians were allowed on two spot frequencies on a trial basis.

For more background about Raj Kumar, check his interesting Web site at **members.nbci.com/ggrk/Ham/index.html**, which also contains photographs of his station, home and unique gardens.

Here is a cartoon drawn by VU2ZAP's talented cartoonist daughter Pia (all of 12 years old) depicting QRM from illegal Chinese cordless phones.

Six Meters

Indians received temporary permission to operate on 50.350 and 50.550 MHz this past fall using FM only, but SSB and CW were also allowed not long afterward. Six meters is allocated to the land-mobile service in India, as it is in some other countries in ITU Regions 1 (Europe and Africa) and 3 (Asia and the Pacific), but it is unclear whether commercial users are actually occupying the band. The initial special authorization lasted for six months, but in January, the permission was extended until August 1. Raj and other Indian operators have petitioned through their national organization for permanent access to a segment closer to 50.100 MHz.

Other 6-meter operators active from Bangalore (MK82) this past season included VU2MKP, who runs an IC-746 to a six-element Yagi; VU2RCR, with an FT-847 and a four-element Yagi; and VU2BGS, who uses a transverter with 25 W and a long wire. VU2RM runs QRP to a small Yagi from Kakinada (NK16) on the eastern coast, and VU2GTE operates 6 meters from Bombay (MK69) on the western coast.

Raj has had incredible success on the band with his FT-847 and a four-element Yagi, as suggested by the 67 countries he worked in just six months. On many days during the early part of this year, Raj worked HZ (Saudi Arabia), EY (Tajikistan), D6 (Comoros), VR2 (Hong Kong), JA (Japan) and other stations with huge S9+ signals. Raj worked Europeans as westward as Spain, New Zealand via long path and across the Pacific to KH6/K6MIO in Hawaii. He has worked PY0FF, as well as other Brazilians and Argentines, but Raj has not yet heard any signals from South Africa or from North America.

This Month

July 14-15	CQ Worldwide VHF Contest, 1800-2100
July 21-22	Six Club Sprint, 2300-0400
July 26-29	Central States VHF Society Conference (Ft Worth, TX)
July 22	Excellent EME conditions, but new Moon

Emil Pocock, W3EP ♦ Box 100, Lebanon, CT 06249 (Voice 860-642-4347, fax 860-594-0259) ♦ w3ep@arrl.org

India to Easter Island

VU2ZAP also made some most unusual 6-meter contacts with CE0Y/W7XU on Easter Island between April 2 and 7. Bangalore is just north of the Equator, while Easter Island lies just south of the Equator, almost exactly halfway around the globe. Thus, the two stations were nearly at their antipodes, approximately 18,300 km apart and in ideal positions to take advantage of spring F_2 propagation. No matter which direction VU2ZAP and CE0Y/W7XU pointed their antennas, the great-circle distance between the two varied by less than 3500 km.

That made it uncertain what would be the antenna headings for the strongest signals. Paths more-or-less parallel to the equator might have seemed the most likely, but that is not exactly what Raj and Arliss discovered. VU2ZAP usually made initial contact with CE0Y/W7XU around 1530 or 1600 with a beam heading somewhat west of north, but the peak heading gradually moved farther west as the evening approached local midnight. CE0Y/W7XU started with his antennas east of north and found he had to move progressively eastward during the same period. The path typically stayed open until 2000, at least.

Raj and Arliss were surprised by the initial northerly headings, which seemed to put their great-circle path over the Polar Regions. They were at a loss to explain the apparent drifting of optimal path toward lower latitudes as the opening progressed. Signals were often S9, but were sometimes much stronger. On April 3, CE0Y/W7XU worked VU2BGS, who was running just 1 W and a dipole about 12 feet high. The next day around 1715, VU2ZAP reduced his power to 125 mW and Arliss dropped down to less than 1 W, and they could still make contact. Signals usually peaked for VU2ZAP at about 315° and CE0Y/W7XU at 70°. These are closer to the expected headings under ordinary circumstances.

It is difficult to explain these contacts. If the initial contacts were made via great-circle paths, they must have crossed the auroral zone—the least likely for ordinary F-layer propagation near the MUF. It is possible that these contacts with northerly headings were not along great-circle routes at all, but over oddly skewed paths, similar to those observed in other parts of the world during geomagnetic disturbances. Several impressive geomagnetic storms did occur in early April, when the sun erupted in its most intense period of activity for this cycle. Whatever the explanation, VU2ZAP and CE0Y/W7XU certainly made some most-curious contacts.

Other VHF-UHF Activity in India

Indians also have allocations at 144 to 146 MHz and 434 to 439 MHz. Hundreds of 2-meter FM operators and many repeaters are scattered across India, but SSB/CW activity is rare. As in many other places in Asia, FM cordless phones operating illegally in the 2-meter band make amateur weak-signal work difficult. Even so, VU2RM has worked Sri Lanka (4S7) and Thailand (HS0) on 2 meters. From the western coast, Indians have worked into the Middle East. VU2MKP, VU2IR, VU2TS and VU2DVP, among others, operate through AO-10.

There is plenty of potential VHF and higher activity in India, despite the limited allocations and other problems. Satellite and EME are obvious possibilities. Indians are not well acquainted with sporadic E and there is little documentation on the extent of E-skip from India. This summer may provide Raj and other Indian 6-meter operators with some different sort of excitement. Two-meter tropospheric ducting across the Indian Ocean should be excellent for well-placed stations along the coasts. Perhaps only low VHF and higher activity in adjacent regions, including the western coast of Africa, puts a damper on these possibilities.

ON THE BANDS

Solar activity remained at unusually high levels during the first half of April, resulting in significant auroral activity on several days and enhanced 50-MHz F-layer activity. A few brief sporadic-E openings and localized tropospheric enhancement added to the interesting mix of propagation. Dates and times are UTC.

Six Meter DX

Typical spring equinox conditions continued throughout April, no doubt enhanced by some of the highest levels of solar activity so far observed for Cycle 23. Examples of long-path and skewed-path propagation seemed more common. In addition, several Pacific, Central and South American expeditions enlivened activity worldwide. Some portions of the summaries are based on otherwise unacknowledged reports from G4UPS, the UKSMG Announcement Page and the Web-based DX Summit.

DX in the Americas

US stations across much of the country, with the exception of the upper Midwest and Pacific Northwest, continued to work PY, CX, LU, ZP and CE stations on most days during the first half of the month. VP8CMT (Falkland Islands) appeared on several days, providing a new country for many in the W1 through W5 call areas.

The opening of April 11-12, which coincided with a great geomagnetic storm, was especially noteworthy. The band filled from 50.090 to 50.180 with many PY and LU stations, who worked most areas of the US east of the Rocky Mountains. Gary Mitchelson, N3PJU (FM19), caught ZD7K on St Helena around 2130 while trying to break the pileup on VP8CMT. Gary was the first and perhaps only US station ZD7K worked in April.

Signals were extremely strong at times. On the morning of April 12, for example, Paul Besimer, KC8LGL (EM89) worked CE3SAD and CE3EE with just 2.5 W and a dipole. Four days later, Bob Aldridge, KF4DVG (EM60) snagged CE3SAD with 10 W and a 2-meter $^5/_8$-λ whip mounted on his car. Other Central and South American prefixes reported in the US included HC, PJ2, YS, YV, TG and TI.

Europe, Africa and the Middle East

Mediterranean-area stations continued their runs into Africa, Central America and South America, but at a slower pace than in March. New and rare stations in European logs included C91CF (Mozambique), J5X (Guinea-Bissau), S79KS (Seychelles), VP8CMT and ZD7MY. G0KZG/mm (EK88) worked well into western and central Europe as he steamed off the west-African coast.

South Americans continued to work into southern Europe and the Middle East, but conditions seemed to slow by the second half of the month. PY, CX, LU and CE stations worked EH, I, 9H, SV, 5B and 4X during the unusual conditions of April 12. Jose Carbini, LU6DRV, reported EH7KW, SV1EN, SV9AJN, 4X6ON, JY9NX and HZ1MD on April 14.

Unusual paths skewed toward the south also provided rare opportunities for US 4 and 5 call-area stations to work southern Europe so late in the season. On the morning of April 9, K2RTH/4 found 5B4FL via such a skewed path. The next morning, WA5RT reported EH8BPX; W4UM worked EH7KW; and K2RTH/4 logged EH7KW, EH8BPX, EH8YG and several CT3 stations. A few US district-4 and -5 stations made similar contacts on the afternoon of April 11, when many operators in the eastern half of the country noticed strong backscatter to the south. ZF1DC was also reported into Europe. Stations in the Northeast heard strong Spanish and Portuguese TV video around 48.250 MHz about the same time, but no Europeans on 50 MHz.

Asia and the Pacific

US stations from Southern California to Florida continued to work ZL, VK and other Pacific areas, especially during the first half of the month. WA3SIX, WA3WUL and perhaps others in the Northeast caught ZL3TY, probably via a sporadic-E link, on April 12. There were few other surprises. W5UWB, K7ICW, N0LL and others worked FO5RA (French Polynesia) on the afternoon of April 1, while CE0Y/W7XU was booming in. N0LL also found FO3BM. The Polynesian pair went on to work others in the US 4 and 5 call areas later in the month, as did KH8/N5OLS and AH8A (American Samoa). Ron Silver, K4SUS, worked all four of them on April 14.

VK9ML (Mellish Reef) was on the air for just four days, but few fortunate US stations were able to catch him. Bob Magnani, K6QXY, worked him on April 22 around 2236, for a US first and DXCC entity #118 for Bob. KF6GYM, K5AM and N5JHV found him over the succeeding two days. In addition to the more-common Pacific stations,

XE2EED worked FK8CA (New Caledonia) and VK8AH in Northern Territory, Australia.

Activity from Japan and Hong Kong also seemed to slow during April, but the enthusiastic Asians continued to log interesting calls. Among those in JA logs were 3D2AG, 5B4FL, 9V1JA, FW5ZL, FK1TK, FK8FHM, H40RW and JY9NX. VR2XMT reported KH4/W1VX and VK9ML on April 23 and worked A4, JA, LU, PY, VK and VU nearly simultaneously the next day.

Some Expeditions

After N6XQ and XE2EED packed up the 3G0Z expedition to Juan Fernandez on April 3, the pair operated from various locations in Peru for more than a week as 4T1SIX. They often operated under cramped conditions that allowed them to put up only wire antennas, and they were troubled by electrical noise, especially in Cuzco and Lima. Nevertheless, 4T1SIX worked all US call areas, plus VE1-3 and VE9.

Arliss Thompson, W7XU and his wife N0QJM operated from Easter Island (CE0Y) during the first week in April. The pair made just over 1000 contacts on 6 meters on all continents and in 54 DXCC entities, including stations in every US call area, as well as VE1, 2 and 9. N0LL was especially excited to work CE0Y/W7XU because the contact gave him 6-meter DXCC entity #100, after many years on the band. Many others got a new country from their Easter Island contacts. Arliss also worked European prefixes SV, 9H, I, EH, throughout the Middle East, including 5B, JY, OD, 4X and A4, as well as VU, YB and JA in Asia.

Clint Walker, operating as W1LP/mm on both sides of the Panama Canal, was astounded at the extremely strong signals from both 3G0Z and CE0Y/W7XU for several days running. On April 6, Clint worked Easter Island easily with his 2.5 W handheld FT-817 and built-in mini-antenna as he walked around the deck of his tanker.

V31RH (operated by Dick Hanson, K5AND) made 225 QSOs on 6 meters in 17 DXCC entities during his brief stay in Belize early in April. About 100 of his QSOs were with ZL and VK stations and another 100 were with US stations, primarily in the southern half of the country and mostly by scatter.

Long-Path Contacts

Bob Cooper, ZL4AAA, was among several operators to mention several spectacular long-path sessions during April. On 50 MHz, long-path contacts are those that go around the daylight side of the Earth in the opposite direction from the ordinary direct great-circle path. Such contacts are always longer than 20,000 km in length, that is more than halfway around the Earth. ZL4AAA, for example, worked VU2ZAP around 1945 on April 7 over about a 28,600-km great-circle path.

There were numerous similar contacts. Around 1430 on April 3, LU8MB worked VK4CP and other Australians via the long path across Africa (28,100 km). CE0Y/W7XU also made some extraordinary long-path contacts that morning, beginning with VU2ZAP (21,800 km) and other Indians around 1540, then YF1OO, YB0CBI and YC1MH (about 25,400 km) after 1610. Around 1820, Arliss heard 9M2TO/b via long path. One unusual aspect of these long paths over North America was that Arliss did work occasional US stations, including W3BO and W3VIR, but the W3s heard nothing of the Asians Arliss was also working.

Conditions must have been especially good on April 9. I5MXX, I0WTD and other Italians worked KH8/N5OLS around 2115 (26,400 km). JY9NX and 4X1RF found JG3IFX and other JAs after 2140 (at least 31,000 km) for some of the longest-path contacts claimed. The next day around 2055, AH8A worked 5B4FL (26,000 km) along a similar path. On April 25 after 1230, PY5CC worked VK8MS, VK8AH and five VK4 stations (about 24,000 km).

Aurora

In addition to the spectacular aurora of March 31-April 1 reported last month, there was a relatively weak aurora on April 8 and another intense event over the evening of April 11-12. Stations from coast to coast and as far south as Georgia and Oklahoma participated in the April 11-12 event, but little that was out of the ordinary took place. Gary Flynn, KE8FD (EM89), worked 1850 km west to K0GU (DN70) on 2 meters, for one of the longest contacts reported. Ron Sizer, K1VYU (FN31), hooked up with W3EP (FN31), N1BUG (FN44) and WA8RJF (EN91) on 432 MHz. Also reporting auroral activity were N1RZ, W1ZC, WB2AMU, WB2EZG, WV2V, N7DB, N0JK and N0LL.

Aurora Down Under

Are there radio auroras in the Southern Hemisphere? Of course, but we do not often read about such events, primarily because there are relatively few populated areas south of 30° latitude and within reach of even the most intense radio aurora. The geomagnetic storm of March 31-April 1 provided one of those rare opportunities for radio Aurora Australis. David Minchin, VK5KK, who writes the "VHF—UHF, An Expanding World" column in the Australian journal *Amateur Radio*, summarized activity in his May issue.

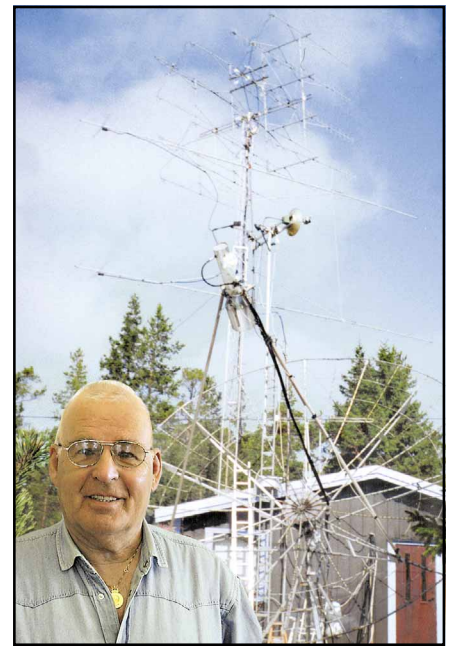
He reported that several dozen VK1, 2, 3 and 5 stations scattered across the southern part of the country made auroral contacts on 50 and 144 MHz. The Australians' experiences are much like those reported from North America and Europe, save their maximum range on 144 MHz seemed limited to 1200 km or so and beam headings did not usually venture far from due south.

The relatively shorter auroral paths observed Down Under might be the result of the greater distance between southernmost portions of Australia and the southern auroral zone. In contrast to populated areas of Europe or North America, only the most intense auroras affect Australia. The only other continental areas in the Southern Hemisphere within radio aurora range are the southern tips of South America and Africa.

First 1296-MHz Aurora Contact

Carl Mohlin, SM3AKW, and Karl-Gosta Forssen, SM5QA, completed a historic first 1296-MHz aurora contact on April 11 at 1650. Signals were 33A both ways, with characteristic Doppler broadening and a 5-kHz Doppler shift. The pair ran 500 W each with four 27-element Yagis and a 2.3-meter dish. The two were 358 km apart.

Carl had been attempting to make a 1296-MHz auroral contact for more than 20 years. Other stations had heard his signals via aurora from time to time, but he had not heard any 1296-MHz aurora until this past April 1, when he copied SM5QA. The pair completed 10 days later, after more than a year of efforts.



Carl Mohlin, SM3AKW, with his antennas.

VHF/UHF/MICROWAVE NEWS

1296-MHz EME Beacon

The Search for Extraterrestrial Intelligence (SETI) League is running a novel beacon with an antenna array that tracks the Moon. The W2ETI beacon runs on 1296.000 MHz, with 20 W output to a quad array of right-hand-circularly-polarized helix antennas, whenever the Moon is above the horizon at FN20.

Paul Shuch, N6TX, SETI League Executive Director, estimates that the beacon signal should be strong enough to hear off the Moon with a 12-foot dish and DSP-enhanced optimal receiver. The current operating schedule is a standard 2.5-minute EME sequence, which consists of 60 seconds of steady CW, 60 seconds at half power, followed by 30 seconds of W2ETI identification in slow Morse code.

The main purpose of the beacon is to provide amateur and professional radio astronomers with a signal to calibrate receiving systems from a known source in the sky. Paul hopes to increase the beacon power to 100 W in the near future. For more information about the beacon and the SETI League's other projects, check the Web site at **www.setileague.org**.

September Conferences

The Eastern VHF/UHF conference is scheduled for August 31 to September 2 at the Radisson Hotel in Enfield, Connecticut. For further information, Contact Bruce Wood, N2LIV, at **bdwood@erols.com**.

Microwave Update 2001, sponsored by the 50-MHz and Up Group of Northern California, takes place September 27 through 30 at the Four Points Hotel, Sunnyvale, California. For information about presenting a paper, activities and accommodations, see the Conference Web page at **www.microwaveupdate.org/**.

QST

From the Inbox

Many readers have written, providing details and pictures of their mobile installations. Believe me, the ingenuity and meticulous attention to detail are impressive, to say the least. See for yourself as this month, Wade Biggs, WA7DE, takes to the stage to share information about his installation of a popular rig in a popular vehicle.

I just finished installing an ICOM 706 MKII-G transceiver in my new Ford Explorer, and thought your readers might like to hear of the experience. The antenna mounts were a problem, although getting at the dc circuits proved to be more trouble than anticipated, too. But first, the antennas.

The VHF/UHF dual-band antenna is in the center of the roof. That took a while because I had no idea how to proceed without dropping part of the headliner and taking a look. I have two days invested in installing a Motorola NO mount through a hole in the roof and running the feed line. Most of that time was spent in exploration [a lurking pun?—*WF4N*] and apprehension. Did I really want to drill a hole in the middle of the roof of my brand-new Explorer? But that choice was better than the alternatives—using a mag-mount or through-the-glass antenna—or locating the antenna on a front fender. Fortunately, Ford put a light fixture under the ceiling at a good spot for an antenna, and I obtained access for the feed line that way.

Make a Mount

For the HF antenna, I manufactured a mount from a piece of 2 × 14-inch stainless steel bar about $^3/_8$ inch thick. The mount bolts to the bottom of the rear bumper and projects out the left side, but doesn't extend so far that it is outside the fender line. Anything the body of the car will pass will also pass the antenna. The mount is quite strong, and I don't have to worry about road vibration or wind stress—nothing is going to bend this mount. I made a couple of shoulder washers out of an old nylon kitchen cutting board to insulate the bolt that holds a spring on the mount. The bolt passes through a $^3/_4$-inch diameter hole to minimize capacitive coupling between the spring and ground.

The sturdy antenna mount crafted from a stainless steel bar.

The control head fits nicely in the Explorer's console.

"Bin" There

Ford conveniently put a couple of bins in the face of the console under the broadcast radio and heater controls, and this spot is a natural for mounting the transceiver control head. I made a metal speaker grill to cover the top bin and mounted the control head on the grill. The rig's speaker is behind the control head in the upper bin. The lower bin makes a convenient place to keep the microphone.

Wires Away

Removing the plastic floor trim, I discovered a channel in the floor under the doorframes on the right side of the car. The channel is used to route cables around the vehicle. This channel is ideal for the transceiver control cable, speaker wires and dc cables. [If you choose to route radio wiring alongside vehicle wiring, check for interference problems before making the installation permanent.—*WF4N*]

Searching for a location for the radio itself, I settled for a very tight spot under the right rear passenger seat. This location is out of the way, and with careful positioning of the radio mount on the floor, the rear seat nestles down around the radio when the seat is folded down for cargo space.

I had been temporarily using the dashboard lighter socket as a power plug, and found that it provided several distinct advantages. First, it is a separate circuit fused for 25 A, adequate for the IC-706's 20-A draw. Second, it is energized all the time, so there's no need to have the ignition key on to operate the radio. The IC-706 has a timer circuit, selectable up to two hours, that can turn the radio off automatically. This prevents the rig from running the battery down if it is left on inadvertently. Third, the lighter socket is de-energized when the starter motor is engaged. This prevents voltage spikes from damaging any accessories connected to the electrical system. These features were enough for me to want to use the lighter circuit, but naturally I didn't want a plug going into the dashboard [Or the associated voltage drop.—*WF4N*]. I disassembled the dash until I could get to the backside of the fuse panel and tap the power there.

Epilogue

So far I've found the Explorer to be a fairly quiet vehicle as far as radio noise goes, even though the noise floor does rise a bit on HF SSB when the vehicle is running. However, the DSP in the ICOM does a good job of keeping the hash down to manageable levels. Not surprisingly, on VHF and UHF FM, there is no noise at all. QST

Roger Burch, WF4N ♦ Box 100, Island, KY 42350 ♦ wf4n@arrl.org

The Internet, HAAT and Excellent Radio Freeware

You can depend on one thing regarding the Internet, and that is change. Web sites appear and disappear overnight. Links that worked yesterday don't work today. As a result, writing about the Internet is like trying to cross a minefield without a map.

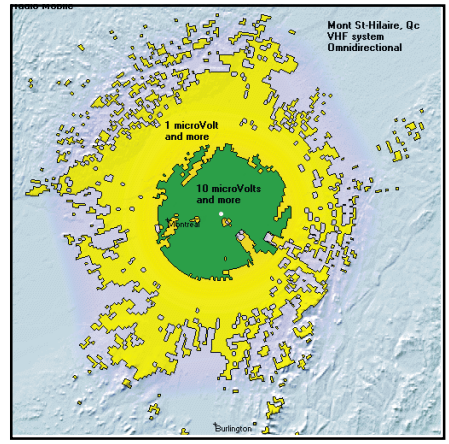
For example, in May, I praised (to high heaven) the Height Above Average Terrain (HAAT) calculator at the FCC's Mass Media Bureau, Audio Services Division Web page (**www.fcc.gov/mmb/asd/bickel/haat.html**). About the time May *QST* found its way to your mailbox, the HAAT calculator at the FCC Web site was disabled. If you tried to use the calculator, you received the following message: "This program is no longer available due to inconsistencies and potentially invalid results. Once resolved, the program will be restored."

By the time this issue of *QST* finds its way to your mailbox, the HAAT calculator may be up and running again…or maybe not. In either case, I found a workaround that is not subject to the vagaries of the Internet. You can calculate HAAT on any Windows computer with software called *Radio Mobile*. It is "freeware" (free software) developed by Roger Coudé, VE2DBE. *Radio Mobile* is one of the most useful pieces of ham radio software, free or otherwise, that I have encountered in a while.

Radio Mobile calculates HAAT, but that is only one of its functions. VE2DBE developed the software as a tool to predict the performance of radio systems. As such, you can use it to calculate the coverage area of a radio system such as an FM repeater or determine whether two stations are line of sight for VHF and UHF communications.

You can connect a GPS receiver to your computer and view your location on the *Radio Mobile* maps. The location of other *Radio Mobile*–GPS users can be displayed by connecting to the other users via a LAN or the Internet.

With a pair of 3-dimensional eyeglasses (the ones with red and blue lenses), you can ogle stereo views of selected terrain that you generate with *Radio Mobile*. In case you lost your pair of 3-D glasses, here is a link (**www.rainbowsymphony.com/**) courtesy of VE2DBE, where you can buy new ones.



Radio Mobile **predicts and calculates various aspects concerning the performance of your radio system. Find out more about this free software at the *Radio Mobile* Web site (www.cplus.org/rmw/english1.html).**

The *Radio Mobile* Web site comes in two flavors, English (**www.cplus.org/rmw/english1.html**) and French (**www.cplus.org/rmw/index.html**). Either one allows you to download *Radio Mobile* and provides step-by-step instructions on how to use it.

Radio Mobile uses the elevation data contained in DEM (digital elevation model/matrix) files that you may download from various sites on the Internet. These files are huge (approximately 9.6-Mb each), so make sure you download the compressed versions. *Radio Mobile* requires that you convert the DEM files to DTED (digital terrain/topographic elevation data) format. Luckily, you can also download a DEM-to-DTED converter program from the *Radio Mobile* Web site.

To prove that I actually use the stuff I write about, check these links to view the HAAT file (**www.tapr.org/~wa1lou/haat.txt**) and coverage map (**www.tapr.org/~wa1lou/w2.gif**) for my APRS digipeater that I produced using *Radio Mobile*.

I highly recommend *Radio Mobile* and thank VE2DBE for his generosity in making this software available to everyone at no cost.

DSP-10 News

In May, I updated you on the DSP-10 *softradio* that was developed by Bob Larkin, W7PUA. Bob just announced that he and Beb Larkin, W7SLB, completed an EME (Earth-Moon-Earth) contact on 144 MHz using only single Yagis and 150 W (or less) of power. They accomplished this feat using the PUA43 mode of the DSP-10.

According to Bob, "Copy, of course, was off the computer screen. The average signal strength was estimated to be about 20 dB below the level that can be copied by ear."

Bob added, "The QSO was not pretty in that a total elapsed time of 6½ hours was needed over three days! But the principles were demonstrated and that was our goal. Work is continuing to get the QSO time down to an hour or less without going to big power."

Impressive!

The Biggest Eyeball QSO

As I write this, I am planning my trip to the Dayton Hamvention. I try to go every year. Some years I make it, some years I don't.

Some people do not understand my attraction to Dayton. What does it have to offer that other hamfests don't? Why do I drive 1422 miles roundtrip to attend a big hamfest?

For starters, many companies that sell ham radio products wait until Dayton to introduce the latest and greatest in ham radio hardware and software.

Dayton also has a huge flea market where you can find just about anything you are looking for, not to mention things you weren't looking for. I always manage to fill my mental want list by going up and down the long aisles of the Hamvention flea market and sometimes I even find interesting souvenirs for the loved ones back home.

Then, there are the forums where the experts in various Amateur Radio endeavors speak and respond to queries from the audience. If you need an answer, Dayton is the place to find it.

All these are great attributes, but as far as I am concerned, the primary reason I keep going back is that the Dayton Hamvention is the biggest eyeball QSO in the world. At Dayton, I can see a lot of the folks I have met on the air or have corresponded with via the mails during the past 12 months. I can also see and meet the shakers and makers and the famous and infamous who make Amateur Radio what it is today. QST

Stan Horzepa, WA1LOU ♦ One Glen Ave, Wolcott CT 06716-1442 ♦ wa1lou@arrl.net, www.tapr.org/~wa1lou

Antenna Time

If it's July, it's antenna time! Over the past 12 months I have encountered several antenna-related items that are worthy of presenting in QRP Power. As QRPers, we are giving up a 13 dB power advantage. One of the few places we can offset this disparity is in the antenna system. In the QRP game, antenna efficiency is paramount, especially when operating portable in the bush.

A-Trail Dipole Construction

Last October Ed Breneiser, WA3WSJ, and I met on the Appalachian Trail, near Hazelton, Pennsylvania, for an afternoon of QRP fun. In February's column, I described Ed's A-Trail multi-band dipole. Since that time, the EPA QRP Club has refined the design (Figure 1) and has posted the information on their Web site: **www.nepa.org/pages/at-ant.htm**. The info page describes both mono and multi-band versions that use tough #26 AWG, 19 strand Copperweld, PTFE covered wire available from Davis RF[1]: **www.davisrf.com/ham1/flexweve.htm**.

To recreate Ed's original multi-band design, I started with two 33-foot elements and fed the antenna with 300 ohm miniature polyvinyl ladder line I obtained from Pat Ramsey, N1MIT, at the RF Connection[2] (**www.therfc.com**).

The dipole center insulator is made from a 3/4 inch PVC end cap that incorporates a SO-239 connector on the bottom. The end cap is potted with epoxy for strength. Strain relief for the elements is provided by the screw eyes (Figure 2) that allow the dipole elements to be looped through prior to soldering to the wires coming from the SO-239. This design is exceedingly robust and well suited to portable QRP operation. You can feed this antenna with 50 ohm coax for a 40 meter 1/2 wave dipole. Or, using balanced feed line, you can load this basic 40 meter dipole on other HF bands, from 80 to 10 meters.

[1]Davis RF, PO Box 730, Carlisle, MA 01741.
[2]RF Connection, 213 North Frederick Ave, Gaithersburg, MD 20877

RON POLITYKA, WB3AAL

Figure 1—This 40 meter Appalachian Trail dipole from the EPQ-QRP Club is fed with 50-ohm RG-8X coaxial cable.

The DK9SQ Portable Antenna Mast

Many times, when operating portable, it is impossible to erect an antenna any higher than 15 or 20 feet. Therefore, the DK9SQ collapsible mast, available from Kanga US,[3] is a welcome accessory. The mast is great for those times when the trees won't cooperate.

Using this mast, I have erected lightweight dipoles by taping the center insulator to the second-from-the-top mast section, and pushing the mast sections up one at a time. Paul Stroud, AA4XX, used two of these masts to support his phased, dual-element, 20 meter vertical array during his sea kayaking trip to the North Carolina Outer Banks (QRP Power, Jan 2001).

This fiberglass mast is very lightweight (2.2 pounds) and rugged (triple reinforced fiberglass), and it collapses to 46 inches in length. Since the mast extends to 33 feet, by taping a wire to the top, running it down the length of the mast and adding radials along the ground (attached to the shield of the coax), you can construct an extremely effective 40 meter vertical antenna. With the DK9SQ mast the possibilities are endless. On the web, go to: **www.bright.net/~kanga/kanga**.

NorCal's BLT (on whole wheat?)

In the past NorCal has done a great job with kits, but a sandwich? Actually, BLT stands for Balanced Line Tuner, designed especially for QRP to-the-field operation. This NorCal kit consists of all the parts, including a PC board, case and knobs. It is built "Manhattan Style" by gluing small round isolation pads of PC board material to a larger piece of PC board that acts as the tuner chassis. This style of homebrew construction has been catching on in QRP circles since it is very easy to do, and success is virtually assured. The PC board chassis acts like a huge ground plane, ensuring no ground loops develop when building the circuitry.

I took a different tack with my BLT.

[3]Kanga US, 3521 Spring Lake Drive, Findlay, OH 45840

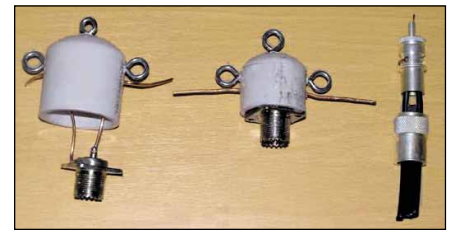


Figure 2—The author's attempt at reconstructing WA3WSJ's multi-band version of the AT dipole. Left to right: 1-inch PVC end cap, partially assembled (I used this size to show clarity); 3/4-inch PVC end caps, fully epoxy potted and ready to use as a center insulator; PL-259/mini 300-ohm ladder line before soldering and potting with epoxy.

THE NORTHERN CALIFORNIA DX CLUB

Figure 3—The NorCal BLT, a Balanced Line Tuner designed for QRP operation in the field.

Instead of using the supplied case and panel material, I opted to put my tuner into an old MFJ accessory box that I had recycled. I felt the additional strength offered by the all-metal case would increase survivability. My tuner went together uneventfully and is a welcome addition to my portable station.

The BLT is specifically designed to match balanced feed line, although it can also tune coaxial feed lines as well as end-fed wire antennas. It incorporates a rather innovative SWR indicator in the form of a resistive bridge circuit. As you approach resonance, the built-in LED SWR indicator extinguishes, letting you know that the feed line is properly tuned for low SWR. All in all, the BLT is an extremely handy accessory that offers the pleasure and pride associated with building your own gear. Check it out at: **www.fix.net/jparker/norcal.html**. QST

Rich Arland, K7SZ ♦ 25 Amherst Ave, Wilkes Barre, PA 18702 ♦ k7sz@arrl.org

Amateur Extra Question Pool to be Updated This Summer

The Amateur Extra question pool is up for revision this summer. The Extra syllabus, just revised, will be the basis from which the pool questions will be reviewed and updated where needed. The new Extra class syllabus can be viewed on *ARRLWeb* at **www.arrl.org/arrlvec/pools.html**.

The Amateur Extra question pool update will be completed by December 1, 2001 for July 1, 2002 implementation in exams. The Technician and then General pool revisions will follow one year and two years later, respectively.

This revision cycle is your opportunity for a complete and comprehensive review of each of your question pools. All pools can be viewed on *ARRLWeb* at the URL shown above.

Seeking Public Input for the Amateur Extra Question Pool

We need *your* input to assist us with the update of your Element 4 Amateur Extra question pool!

Regretfully, the Question Pool Committee has received very little input from the amateur community in over a decade of question pool revisions. Because public awareness appears to be at an all-time high, however, the QPC looks forward to significant contributions for the upcoming pool revision cycles.

Don't miss out! This will be your best opportunity to help shape the future question pools and the knowledge base required of our future Technician, General and Extra-class amateurs.

Please include with your submission the subelement reference that you are supplying input on. For question updates, please reference the current subelement and/or question number and the text of the existing question, answer or distractors that you would like to see replaced. For new questions, please supply as much of the question, answer and three distractors as possible. Complete questions can be worked through the committee far easier than partial ones.

Send your question pool input by e-mail or postal mail to QPC Chairman Scotty Neustadter, W4WW, with copies to QPC Members W5YI and myself, W9JJ, as follows:

- QPC Chairman Scotty Neustadter, W4WW, 9710 Dortmund Dr SE, Huntsville, AL 35803; **w4ww@arrl.net**
- QPC Member Fred Maia, W5YI, POB 565101, Dallas, TX 75356-5101; **fmaia@prodigy.net**
- QPC Member Bart Jahnke, W9JJ, ARRL VEC Manager, 225 Main St, Newington, CT 06111; **w9jj@arrl.org**

NEW MORSE EXAM STANDARDS TAKE EFFECT JULY 1

At its July 21, 2000 meeting, the National Conference of VECs (NCVEC) voted to adopt new Morse code testing standards to be followed by all VECs and VEs effective on or before July 1, 2001. Those new standards are:

- Only the fill-in-the-blank format 10-question quizzes will be used (multiple choice format 10-question quizzes are to be phased out by July 1, 2001).
- Restatement (reminder) of the procedure for all VEs that specifies that Morse code examinees are entitled to be scored up to two ways in order to pass a Morse code exam; those methods are:

(1) By correctly answering seven of ten fill-in-the-blank format questions; or

(2) By achieving a character count of at least 25 characters copied correctly on a one-minute-solid-copy review.

Both methods are to be used, should a passing score not be achieved with one of the methods.

- All routine Morse exams will be transmitted/sent using the Farnsworth method of sending the characters (characters are sent faster than the overall speed, with additional spacing added between characters and words to balance out the message to the prescribed speed). As necessary, standard 5 WPM exams (sent at a 5 WPM character speed), or special message/character speeds necessary to accommodate persons with such needs, are available upon request.
- The Farnsworth character speed used for routine exams will be between 13 and 15 WPM. ARRL VEC will be using 15-WPM characters. ARRL Morse code practice materials and W1AW bulletins will use 15-WPM Farnsworth characters as well.
- The Morse code audio note frequency will be in the range of 700-1000 Hz. ARRL VEC will be using 750 Hz.

The NCVEC's goal in setting and announcing these standards is to put the amateur community on the "same page" in so far as Morse code exam procedures and parameters are concerned.

FALL NATIONAL EXAM DAY WEEKEND—SEPTEMBER 29-30, 2001.

The ARRL Fall National Exam Day (weekend) in 2001 will be held on the last full weekend in September this year—Saturday and Sunday, September 29-30, 2001.

If you are looking for information regarding exams to be held in your area, or information concerning the questions pools, see that ARRL/VEC's Web site at **www.arrl.org/arrlvec/**, or call 860-594-0300. For instructors and club info, contact the ARRL at 860-594-0200. The ARRL can provide media kits for your use in publicizing your ARRL National Exam Days. Just contact Jennifer Hagy, N1TDY, at ARRL HQ at 860-594-0328 or **jhagy@arrl.org**.

APPLICANTS MUST PROVIDE ADEQUATE ID AT TEST SESSIONS

Remember that every person seeking to earn a new license or upgrade an existing license is required to provide sufficient identification to prove his/her identity. A legal photo ID will do this, as will certain other formal photo IDs (things like a driver's license, passports, government agency/work IDs, some school IDs and so forth).

Persons without photo IDs, and/or young persons *must supply two forms of alternate identification to satisfy the ID requirement*. These two items can include:

- Non-photo ID/driver's license
- Social Security Card
- Birth certificate (must have the appropriate seal)
- Minor's work permit or school report card
- Library card
- Utility bill, bank statement or other business correspondence that specifically names the person
- Postmarked envelope addressed to the person indicating the same mailing address as shown on Form 605
- Employment ID.

The ARRL has learned that some VEs and VE teams have not been consistent in their ID standards. Some VEs simply accept the stipulation of adequate identification made by other VEs, or they accept claims of identity made by third parties (such as parents or relatives).

While we tell VEs and VE teams that they should strive to not turn anyone away, there are some minimum standards to be upheld above all else—one of those standards is the clear and complete identity of the person being served.

Applicants: If you are seeking a new license or upgrade be sure to bring your one photo-ID, or two forms of ID and a copy.

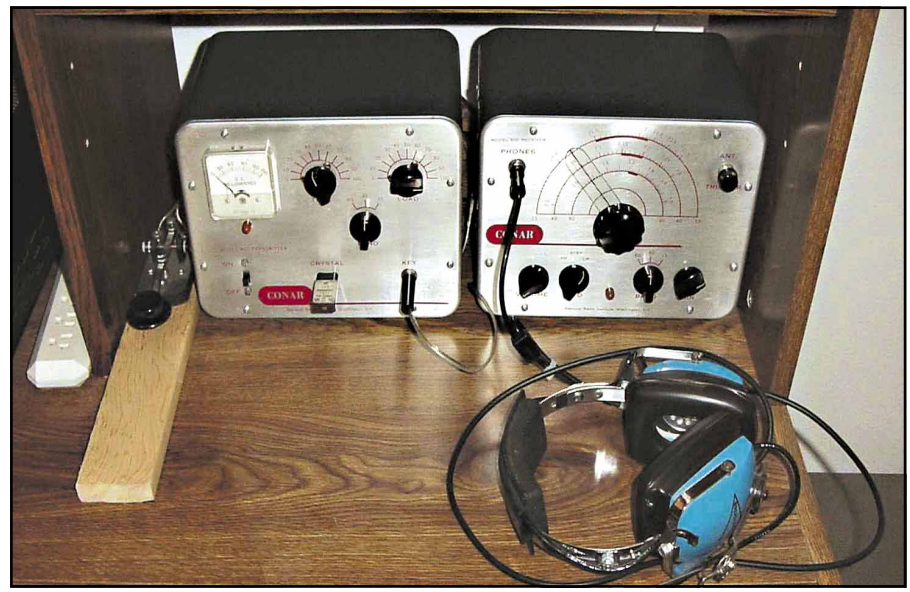
VEs: If you are a volunteer examiner, don't let yourself or your VE team be forced into serving someone with less than complete identification documentation. Be sure your public announcements emphasize the need to meet these ID requirements. And, to ensure compliance, ask your applicants to bring not only an original ID but also a copy of the ID for the file. In states where copying a driver's license or other photo ID is not permitted, just be sure that the applicant has supplied adequate ID, and that each of the three VEs has reviewed the ID.

Don't take a chance assuming someone's identity—don't put yourself, your accreditation or your FCC license on the line. Identity is to be proved by the applicant, not via a third party or relative's claim. If you have a poster or information sheet in the sign-in area, be sure that the poster/sign states that "complete identification documents" are required for service.

Bart Jahnke, W9JJ ♦ ARRL VEC Manager

The Allure of Novice Stations

One popular aspect of collecting is replicating your old Novice station. We've talked about this before. There also seems to be a growing number of hams who were never active on the Novice CW bands who are now gathering, building and operating vintage Novice stations! Mike Silva, KK6GM, sent an interesting article about his station. Mike operates his Novice gear as often as possible. Listen for him on the air.—K2TQN



The Conar Twins

By Mike Silva, KK6GM

Anybody who entered Amateur Radio in the '60s probably daydreamed at some time over the "Conar Twins": the model 400 transmitter and model 500 receiver. The rigs were available both directly from Conar and as part of home-study courses offered by National Radio Institute. Both covered the 80, 40 and 15 meter bands, and were available both as kits (each under $40) and assembled.

A pair of Twins recently popped up for sale and I jumped at the chance. What I found was not bad, not bad at all.

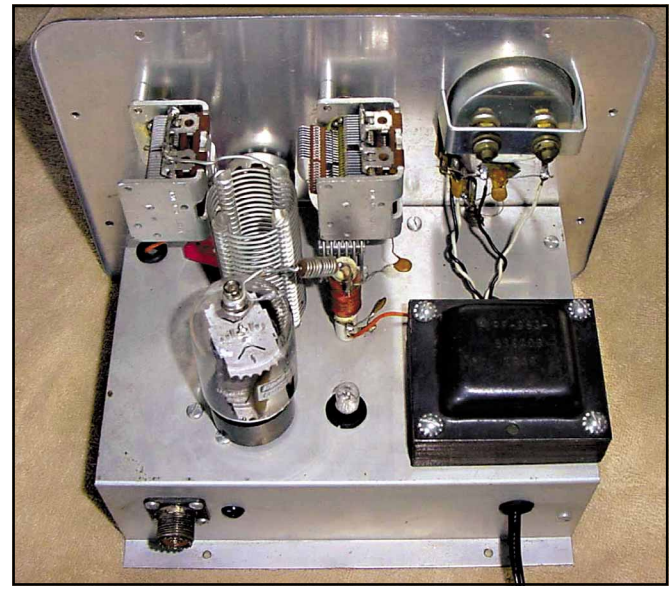
The Transmitter

The Conar 400 transmitter is a one-tube affair using the (then) popular 6DQ6B TV sweep tube. (For more than 10 years the transmitter in the ARRL's *How to Become a Radio Amateur* was based upon the same tube.) It is crystal controlled and has a power input of 25 W. The controls are very basic: **ON/OFF**, **Band**, **Tune** and **Load**. There is a crystal socket and a key jack on the front panel, an antenna jack on the back, and that's it.

As soon as I had the 400 out of the box I naturally started twiddling the knobs, and did I get a surprise! The tuning control made a terrible metal-on-metal sound, and felt as though somebody had taken a pair of Vice Grips to the Tune cap. I quickly opened the rig and found the problem. The pi-net coil is held in position only by its leads, and it had shifted during shipment so that the Tune cap rotor plates were rubbing against it. I just bent the coil back into a safe position and all was well. While I had the rig open I checked it over and took a few pictures.

After bringing up the rig on a variac, I plugged in a key, a dummy load and a 40-meter crystal. Setting the load cap to full mesh and pressing the key, the plate-current meter took off swinging unlike any I've ever seen. It took about 6 seconds to settle down. This is one high-Q meter! The manual calls for loading the transmitter to 90 mA, and at that

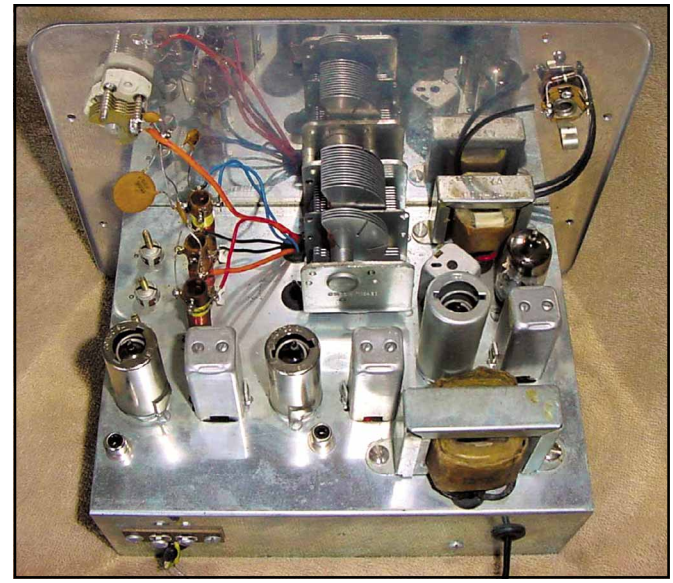
The Conar 400 transmitter.



The clean interior layout of the 400 transmitter.

John Dilks, K2TQN ♦ 125 Warf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

A front view of the Conar 500 receiver.



On the "inside" of the 500 receiver.

Collector Profile

Mike Silva, KK6GM, was first licensed as WN6RRE in 1971. After some years of hamming, mostly with a Heath HW-101, he drifted into the computer field and has only become active again in the last few years. He has been drawn back to his Novice tube days and is determined to homebrew every rig he couldn't afford or understand in his previous WN6 life. When not building or operating he enjoys hanging out on the Glowbugs e-mail reflector (see main text).

Radio Museum Swap Meet

The annual New England Wireless and Steam Museum "Tune Up" radio meet in Rhode Island is scheduled for Saturday, July 21, 2001, 8 AM to 3 PM. Admission is $10. Plan now to attend and see the museum Web site at **users.ids.net/~newsm/**. I'll be there, so look for the call letters on my hat and say hello.—*K2TQN*

plate current it was putting out almost 16 W. (For some reason other reviews I've seen of the 400 claim only 10 W out, though the manual does say 15 for straight-through operation.) Backing the plate current down to 80 mA still gave 15-W output. Listening to the rig on a receiver showed that my 400 had a case of the oft-mentioned Conar chirp. Looking at the schematic gave a clue as to where the problem might lie: the screen voltage drops almost 50%, from 320 V to 170 V, on key-down. As they say, "That's gotta hurt!" The 400 is definitely a candidate for a VR tube on the screen, and a feedback adjustment trimmer cap as well.

The Receiver

The Conar 500 receiver is a single-conversion design using four tubes plus a selenium rectifier and a semiconductor diode detector. The IF is 455 kHz, and the receiver has two IF stages, unlike the single IF stages most cheaper receivers offered. The tube lineup is: 6BE6 converter, 6BZ6 IF amplifier, 6U8 (pentode section) IF amplifier, 6U8 (triode section) BFO, and another 6U8 AF triode section driving a 6U8 pentode for audio output. The controls are again quite basic: **AF Gain** (with **ON/OFF**), **RF Gain**, **Bandswitch**, **Mode** (called BFO) **Ant Trimmer** and **Tuning**. The dial is silk-screened directly on the face of the receiver.

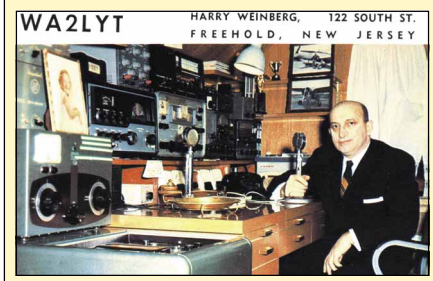
With two IF stages the receiver hears quite well, especially on the two low bands. Frequency drift settles down after about 10 minutes. The tuning rate is good for CW and AM on all bands. Audio output to the built-in speaker from the little 6U8 stage is adequate, and of course with phones it's more than enough. There is a modest amount of hum, and two modifications have been recommended for the 500s with this problem. It involves replacing the single rectifier diode with a bridge rectifier, and beefing up the filter capacitance.

Summary

A Novice in the '60s could have done a lot worse than a Conar setup. The receiver, especially, is a fine balance of decent performance and low price. I look forward to spending a lot of time with the Twins after tweaking them up and installing the modifications. Maybe I can even wear out the RadioShack 6DQ6B and have some fun trying to collect on their lifetime warranty!

For Conar schematics and manuals, or to subscribe to the tube and homebrew Glowbugs e-mail reflector, check K2TQN's Web page at **www.eht.com/oldradio/arrl/index.html**. QST

Great Stations of the Past



Wouldn't you love to own this setup from 1961?

SILENT KEYS

It is with deep regret that we record the passing of these amateurs.

W1BEA, Joseph Vitko, Stratford, CT
N1BUJ, Orrin M. Brawn, Zephyrhills, FL
W1CNU, Ralph E. Nichols, Darien, CT
W1DUB, James G. Kantargis, Nashua, NH
W1GUP, Hawley C. Oefinger, Stamford, CT
W1HRV, Osborne R. McKeraghan, Easthampton, MA
K1INE, Chester L. Bejtlich, Saugus, MA
ex-W1JMI, William Matzura, Bridgeport, CT
W1KSC, Philip V. D'Agostino, Wallingford, CT
KA1PBD, John H. Stiness, Barrington, RI
ex-K1IPW, Joseph L. Rich, Stratford, CT
‡W1IPZ, Gerald L. Jubb, Shirley, MA
W1VVY, Charles E. Coffin, Danvers, MA
K2AGT, Arthur V. DeGarmo, Debary, FL
KA2BST, Clarence H. Myers, Ticonderoga, NY
NP2CV, Eric C. Gaskin, Christiansted, VI
W2DIM, Herbert C. Baasch, Wyckoff, NJ
*W2FIB, Donald L. Howell, Sebring, OH
W2IEI, Alfred Dobrof, Mount Vernon, NY
W2JWJ, Norman J. Contrucci, Clarence Center, NY
W2TKA, Joseph J. Jarek, Schenectady, NY
K2UXF, "Cappy" Capauldy, Clearwater, FL
K2VPW, Dave Kennedy, Little Silver, NJ
W2WPF, A. L. Zwack, Rochester, NY
W2YUT, Wesley A. Jackling, Henrietta, NY
ND2Z, Barry B. Milliman, Prattsburg, NY
W3HKS, Frank J. Valentine, Wilmington, DE
W3KJM, John O. Rigo, State College, PA
*W3MOZ, Glen A. Filer, Shamokin, PA
*WA3QAF, Harry E. McGuigan, Media, PA
W3VOC, Jack Kessock, Pasadena, CA
K4CIH, Tom A. Henderson, Tuscaloosa, AL
KE4CRW, Tom L. Bentley, Norton, VA
W4FD, Harry A. Mills, West Jefferson, NC
W4FGU, Claude M. Leathers, Athens, GA
K4GI, Edward E. Caldwell, Chapel Hill, NC
W4HIZ, B. G. Moore, Jacksonville, FL
W4IQP, Walter C. Runge, Umatilla, FL
KA4IZF, Mike Burbage, Memphis, TN
K4JLC, Benjamin R. Epting, New Bern, NC
W4JTG, William H. Kiblinger, Mineral, VA
ex-W4MED, George Schaefer, Delray Beach, FL
W4MLE, George Thurston, Tallahassee, FL
W4NJJ, H. L. Large, Charlotte, NC
W4NYP, Verdis O. Cook, Crestview, FL
KB4OI, Thomas J. Jones, Miami, FL
KC4TGR, Johnny L. Darnell, Princeton, KY
KA4TLW, Austin N. Wilder, Tampa, FL
W4UX, John A. Bryant, Owensboro, KY
K4UZA, Harold W. Collins, Miami, FL
KD4VZ, Eli C. Hall, Lexington, KY
ex-KB5BXO, Phillip R. Graves, Pinehurst, TX
‡N5EOO, Joseph B. Egbert, Tulsa, OK
KC5GKJ, William D. Welch, Ennis, TX
AA5KD, James N. Wilson, Utica, MS
N5KMY, Horace W. Black, Rowlett, TX
KC5RSR, Darrell E. Rutledge, Austin, TX
NJ5S, E. R. Stricker, Enid, OK
W5UKA, Russell A. Garlin, Albuquerque, NM
KJ5UW, Eli M. Flores, Blanco, NM
KC5YXP, David W. Pendergrass, Vicksburg, MS
K6CMZ, Geraldine M. Jones, Moorpark, CA
KD6ETT, Charles E. Berry, Rancho Palos Verdes, CA
W6FGD, Marvin E. Juza, Sunnyvale, CA
KD6FGV, Donald S. Guthrie, Buena Park, CA
WD6FVJ, Waid D. Southworth, Rogers, AR
WA6GVJ, Donald J. Hopper, Tucson, AZ
K6HDK, Hugh M. Farley, Concord, CA
W6HW, Vern E. Baumgartner, Oxnard, CA
*WB6KED, Sheldon A. Chelsy, Torrance, CA
W6LXP, William A. Nye, Seattle, WA
AA6MY, William R. Seeber, Sacramento, CA
K6OG, George F. Raven, Los Altos, CA
K6RBB, John Reddick, Santa Cruz, CA
WB6RCN, Jerome Q. Bourne, St Croix, VI
W6RCY, Max F. Collins, Carlsbad, CA
W6RRN, Clarence J. Hermance, Stockton, CA
K6RVG, Wayne C. Lewis, Orofino, ID
*W6UZV, Geo E. Propst, Salinas, CA
WA6YIM, Ann E. Clark, Mesquite, NV
W6ZPR, Angel M. Zaragoza, San Bernardino, CA
K7AEJ, Donald E. Simonsen, Vancouver, WA
KA7BUS, Lawrence C. Lombardo, Olympia, WA
W7CFF, Myrvan R. Morley, Elko, NV
N7CFK, Eugene Cipra, Vancouver, WA
K7ERN, C. G. Anderson, Salt Lake City, UT
W7IFD, James H. Hess, Cheyenne, WY
N7IHW, Kreg N. Hawkins, Pendleton, OR
KC7JIR, Robert A. Darling, Bremerton, WA
WA7KKR, Jimmy A. Collins, Roseburg, OR
AB7LC, Elmer L. Merle, Kettle Falls, WA
N7LGJ, T. L. Norin, Seattle, WA
KB7LLT, John Van Ness, Port Orchard, WA
KB7OCC, Leonard C. Small, Pullman, WA
K7QLO, Everett S. Johnson, Billings, MT
*ex-WA7VZV, Donald E. Greene, Grants Pass, OR
W7XY, Maurice P. Fieldman, Sun City, AZ
W7YAI, Orval Wright, Hurricane, UT
W7ZDR, Dorman L. Stafford, Vancouver, WA
W8DJY, Michael H. Brown, Middletown, OH
N8FN, Frank R. Neal, Stilwell, KS
K8JA, James J. Apsey, Toledo, OH
WD8JCT, Marvin R. Renner, Cincinnati, OH
W8KPL, William W. Simpson, Romeo, MI
N8PDT, Phillip R. Bonamase, Lowellville, OH
N8QCU, S. Philip Davis, Manitou Beach, MI
W8SJS, Hugh M. O Neill, Euclid, OH
WA8WOB, Isaac G. Jones, Manchester, OH
WA9BIQ, Charles W. Kelley, Indianapolis, IN
K9EYY, J. S. Gurske, Lodi, WI
KA9FAP, Barbara L. Mazzoni, New Berlin, WI
W9PWL, Burton E. Olin, Princeton, IL
*N9RF, Edward R. Doubek, Naperville, IL
W9RI, John E. Greve, Rock Island, IL
WA9UBI, Dan Rasmussen, Marengo, IL
N9YBV, E. Duane Hanson, Kenosha, WI
W9ZIV, Francis B. Wisniewski, Chicago, IL
KB0DUK, Estela Crosier, Leawood, KS
WN0EIO, Eugene J. Klein, Earling, IA
W0FOW, Raymond S. Scott, Riverdale, NE
N0HBM, Lewis W. Wilkinson, Aurora, MO
K0LXL, W. E. Peterson, Fort Collins, CO
K0OJG, Wilbur R. Lewis, Lebanon, MO
W0RHP, Philip A. Muth, Wauwatosa, WI
K0SVZ, Robert V. Ward, Davenport, IA
KF0WT, Herbert H. McBride, S Hutchinson, KS
K0YML, Gene C. Gourley, Kansas City, MO
DJ9GR, Ruediger F. Geissler, Altweidelbach, Germany
G3YMK, R. W. Jones, Hants, Great Britain
HK1ESU, Rudolph Aumann, Cartagena, Colombia
PA0KDW, Frans Mitterteiner, Pijnacker, Netherlands
*VE3DNZ, Lloyd G. Hustler, Brampton, ON, Canada
VE3HXL, Joyce Robinson, Windsor, ON, Canada
VE7FB, Harold E. Savage, Vancouver, BC, Canada

*Life Member, ARRL

‡Call sign has been re-issued through the vanity call sign program.

Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or 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. QST

Kathy Capodicasa, N1GZO ♦ Silent Key Administrator

NEW PRODUCTS

DIGITAL ANTENNA SELECTOR

◊ The Digital Antenna Selector, or "DAS," from Alpha/Power chooses the right antenna automatically when used with the Alpha 87A microprocessor-controlled amplifier. The DAS can be programmed from the 87A front panel to automatically select, on each HF band, up to 36 different antennas—no special interface required. And the DAS is interlocked against hot switching—just patch your T/R relay line through it and you can't accidentally switch antennas while transmitting. For more information contact Alpha/Power, 6185 Arapaho Ave, Boulder, CO 80303; 303-473-9232; **www.alpha-amps.com/**.

SG-239 LOW-COST AUTO ANTENNA TUNER

◊ SGC has introduced a low-cost remote automatic antenna tuner to complement its Smartuner line. The SG-239 is designed to tune everything from longwires to multielement coaxial-fed antennas. The frequency range is 1.5 to 30 MHz with a power rating of 200 W maximum. Price: $199. SGC, 13737 SE 26th St, Bellevue, WA 98005; 425-746-6310; **www.sgcworld.com/**.

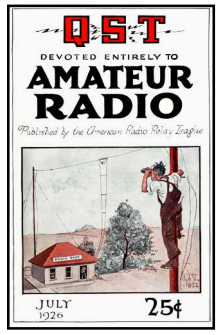
SCREWDRIVER ANTENNA MEMORY

◊ The SAM—Screwdriver Antenna Memory—is designed to add convenience to motorized HF mobile antennas. With SAM, you can easily tune your antenna to your favorite frequencies by programming up to 16 positions in memory. There is also a "jog" function for fine tuning. $149.95. For more information contact KO6YD Designs, PO Box 1090, Elverta, CA 95626; 916-728-4359; **www.ko6yd.com**. QST

Previous • Next New Products

75, 50 AND 25 YEARS AGO

July 1926

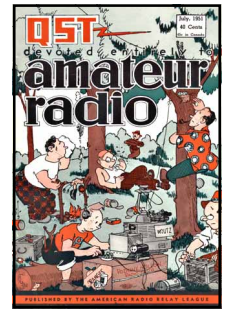


◊ Clyde Darr, 8ZZ, provides the cover art, which shows an operator at 8KZY climbing one of the antenna support poles and using binoculars to check the center insulator of the long dipole. The editorial points out that radio is in a "flourishing condition" and is on the verge of a large expansion of amateurs. The editorial also warns that some amateurs are not staying within their assigned frequency bands, thereby jeopardizing the operating privileges of all of us!

In a seven-page article, Robert Kruse discusses "Feeding the Antenna." "More Arctic Adventure" tells of the three current arctic voyages of scientific exploration, with radio on board all three vessels. L. W. Hatry provides an overview of "Short-Wave Receiving Sets." "Rotten Radio," by "One of the Old Men," argues against those who bemoan the passing of "the good old days," concluding with the thought, "Good ol' days? HORSE RADISH!" F. E. Handy writes about "Transmitting Coils." In the continuing efforts at the shorter waves, Robert Kruse discusses "Progress and Plans at 5 Meters—and Below." The column "Amateur Radio Stations" this month presents photos and descriptions of 1AOF, Greenfield, Mass.; 6OI, Stanford University, Calif.; and a5BG, Clarence Park, South Australia.

July 1951

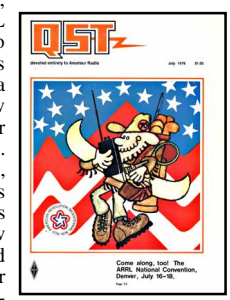
◊ The cover cartoon by Philip "Gil" Gildersleeve, W1CJD, shows the Podunk Hollow Radio Club hard at work on Field Day, with *everyone* doing something to help the effort. The editorial proclaims "Welcome, Novice!" to those who hold the brand-new class of amateur license, which became effective on July 1. The editorial points out that this represents "… the first time in amateur history [that there has been] an arrangement drastically revising downward the minimum requirements for entrance into the scientific hobby of amateur radio."



The popular 813 tube, available at low cost from military-surplus stocks, is featured in the article by Richard Smith, W1FTX, "Building an 813 Transmitter—Modern Style." A short item tells of the California-Texas V.H.F. Party QSO that set a new 144-Mc. distance record, promising details in next month's *QST*. In "A 'Phone Man's VFO," Charles Dene, W3CPC, describes a stable VFO with reactance modulation. James Chapman, W2OOM, describes "A Vertical Nonrotating Directional Antenna System" that uses switchable phased elements for three-band operation. "Happenings of the Month" reports that the Board of Directors has named Francis E. Handy, W1BDI, as the new vice-president of the League. Ed Tilton, W1HDQ, tells how to convert a TV tuner into "A Bandswitching V.H.F. Converter and Harmonic Checker." By Goodman, W1DX, describes "How to Lay Out a Transmitter." In "Keying the BC-696," Holland Carter tells how to obtain good break-in operation using only one antenna with this popular WW II surplus transmitter. Walter Richard, CM9AA, tells about putting a rare French West Indies prefix on the DX map with FG7XA, a "DX-pedition to Guadeloupe."

July 1976

◊ The cartoon cover shows "Joe the Prospector," a frontiersman ham, heading for the ARRL National Convention, to be held in Denver this month. The editorial is a "Progress Report—New Training Program" for League-affiliated clubs.



Jack Troster, W6ISQ, again has us rolling on the floor, this time with "A Few Publick-Spirited Hammes," an Amateur Radio slant on the midnight ride of Paul Revere. Doug DeMaw, W1CER, enlightens the reader with Part 2 of "His Eminence—The Receiver," this time detailing front-end considerations. Jay Rusgrove, WA1LNQ, tells about a companion receiver for the Tuna-Tin 2, in "The Herring-Aid Five"—don't you just *love* that name! Joe Lynch, WA6PDE, gives a digest of a historical look at two remarkable long-term dearths of solar activity (during the years 1460-1550 and 1645-1715) called "The Maunder Minimum." Jack Janicke, K2JFJ, tells about "A Wide-Range Crystal-Controlled Frequency Standard." In "Affiliated Clubs—A New Look," Charles Harris, WB2CHO describes what's on the horizon for ARRL-affiliated clubs. Dick Simpson, W6JTH, and John Grebenkemper, WA6VBA, tell about "QRP—Mountaineering Style." Jerry Barber, WA6ARQ, describes mountain-rescue communication in "Amateur Radio and SAR" (search and rescue). QST

Al Brogdon, W1AB ♦ Contributing Editor

W1AW Schedule

PACIFIC	MTN	CENT	EAST	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	VISITING OPERATOR TIME (12 PM - 1 PM CLOSED FOR LUNCH)				
1 PM	2 PM	3 PM	4 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	TELEPRINTER BULLETIN				
4 PM	5 PM	6 PM	7 PM	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	TELEPRINTER BULLETIN				
6^{45} PM	7^{45} PM	8^{45} PM	9^{45} PM	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10 PM	11 PM	CODE BULLETIN				

W1AW's schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

♦ **Morse code transmissions:**

Frequencies are 1.818, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, 7½, 10, 13 and 15 wpm.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice text is from the pages of *QST*. The source is given at the beginning of each practice session and alternate speeds within each session. For example, "Text is from July 1992 *QST*, pages 9 and 81," indicates that the plain text is from the article on page 9 and mixed number/letter groups are from page 81.

Code bulletins are sent at 18 wpm.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by K6YR. See "Contest Corral" in this issue. At the beginning of each code practice session, the schedule for the next qualifying run is presented. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. Send a 9×12-inch SASE for a certificate, or a business-size SASE for an endorsement.

♦ **Teleprinter transmissions:**

Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ **Voice transmissions:**

Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ **Miscellanea:**

On Fridays, UTC, a DX bulletin replaces the regular bulletins.

W1AW is open to visitors from 10 AM until noon and from 1 PM until 3:45 PM on Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy.

In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

Headquarters and W1AW are closed on New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day.

Foundation Grant Helps Salt Lake County ARES Outfit Communications Trailer

[The ARRL Foundation, Inc, approved a grant of $5000 in January 2001 to a regional emergency communications effort that offers statewide support. The article that follows recounts the good work that Salt Lake County ARES is doing.—Ed.]

By Richard Evans, N7PCE

Wednesday, August 11, 1999 promised to be another beautiful summer day. The morning commute was not slowed noticeably by the last day of preparation before the Outdoor Retailers' Show opened at the Salt Palace Convention Center located in the heart of downtown Salt Lake City. Exhibitors rushed about inside the exhibit halls and among the outdoor displays. Just one block away is Temple Square, home of the Mormon Tabernacle Choir. The state capitol is about five blocks away, perched high above the valley floor. The clear skies left no hint about what was to unfold later that morning.

A strong thunderstorm swept into the area with little warning. Minutes after the storm struck, it spawned a tornado that churned through downtown—one of only three recorded tornadoes in Utah history. In the wake of the twister, Salt Lake County amateurs swung into action. They had been training for this event for a long time.

SLARES

The Amateur Radio Emergency Service (ARES) in Utah has been active for many years. It is organized into several unique groups, each serving a major county along the Wasatch Front (the state's major population center) or a collection of several rural counties. Salt Lake County is home to state, county and municipal governments, and as a special treat, Salt Lake City will host the 2002 Winter Olympics.

Salt Lake County ARES (SLARES) has trained with many agencies to support recovery efforts for dwelling fires, mid-air collisions, chemical weapon emergencies and the possibility of an earthquake along the Wasatch Fault. Field exercises emphasize effective communications for public safety agencies and other emergency responders. SLARES actively participates in many public service events such as races and parades held every year.

SLARES has been called out to support the National Oceanographic and Atmospheric Administration with weather-related flooding threats in southern Utah. They have assisted American Red Cross recovery efforts in the aftermath of gas leaks and various fire emergencies. SLARES has also been summoned by the State of Utah for earthquake damage assessments and communication coordination during several chemical spills.

Expanding our Capabilities

Our net preamble starts, "Salt Lake County ARES, Incorporated, is a nonprofit Utah corporation whose mission is to train and provide a pool of qualified emergency and public service radio operators." During my years in SLARES, we have trained in communication techniques with the premise that we would have to operate our equipment for extended periods of time with only the power we have at the ready. Our stations are portable, ready for inclusion or actually living in our grab-and-go kits, electronic versions of 72-hour kits for humans. We are ready to set up stations at shelters, emergency operating centers and hospitals, and are prepared to take to the field to shadow emergency management officials at any level of government.

SLARES Emergency Coordinator Joel Neal, KC7UBP and his grandson paint the inside of the trailer.

Many of the agencies we serve have installed rooftop antennas and even complete stations for our use.

While we have concentrated on the versatility offered by portable stations, the 1999 tornado highlighted the need for a central portable communications facility similar to the very fine trailers our ARES neighbors and members have constructed in their support of emergency responders. The time had come for the Salt Lake County ARES to outfit a mobile communications facility that we can use in fulfilling our charter to support disaster recovery efforts and public service events.

ARES groups are not normally incorporated. In 1984, Salt Lake County ARES incorporated under Internal Revenue Code Section 501(c)3 as a nonprofit corporation for the education and training of emergency and public service radio operators. Qualification under section 501(c)3 makes it possible for Salt Lake County ARES to directly screen federal and military surplus property, to accept donations of money and equipment, and to enable donors access to income tax credits. This nonprofit status enables us to be recipient of the several corporate grants and personal donations that are making this project possible. The grant from the ARRL Foundation was instrumental in helping us realize our goal.

The Trailer Comes to Life

Design and planning for the trailer wasn't taken lightly. We carefully reviewed our service to communities and agencies. We analyzed both public and emergency service events. We considered the advantages of all communications modes. We followed FEMA guidelines in evaluating the emergencies and disasters we will most likely face. We looked back to our combined experience in other ARES and agency communications facilities.

As with most ARES groups, we conduct our primary communication in the 2-meter and 70-cm bands, so the trailer is equipped accordingly. We have successfully used 2-meter packet modes in both race communications and field exercises, and

Mary E. Lau, N1VH ♦ Secretary, ARRL Foundation Inc.

anticipated the use of *ARESPACK*[1] and *ARESDATA*[2] for relaying text messages. We also included HF equipment in one of the operating positions.

Agencies provided type-accepted radios, authorization and call signs for direct coordination with emergency management personnel. We also added marine and national search-and-rescue radios.

The trailer is ac powered. A three-wire 120/240-V breaker panel provides control and protection of lighting and convenience outlets. Power comes from either an onboard 3-kW generator, a portable 6.6-kW generator or from "shore" power. All branch circuits have separate neutral wires; common neutrals are not used. The 30-foot SO breaker panel cable plugs into a twist-lock outlet from the onboard generator, directly into the portable genset or at the feed point for shore power. Additional 30-foot extension cords allow the trailer greater location flexibility. Grounding is essential for ac or dc- powered operation. Ground rods are carried in the trailer and can be deployed quickly for electrical safety, static control and efficient signal propagation.

Despite the ac mains, dc power is needed by most of the radio equipment. Operating positions are equipped with power supplies for radio operation and deep-cycle gel-cell battery charge maintenance. The batteries are secured to the trailer floor in battery boxes and connected to distribution circuitry by 75-A Anderson Power-Pole connectors. The fused distribution connects to radios with 30-A Power-Pole connectors. (The connection standard in Utah is tongue down, red [positive] on the right, conforming to nearly a century of electrical and telephone standards and practices.) Several 300-W inverters provide power for 120-V dependent devices like computers and printers.

Climate control in the trailer is needed for any event. Emergencies and disasters are no respecters of season. Just as bad as the sweltering heat of summer is the bone-numbing chill of winter. The trailer is well insulated, and finished with a white outer shell. Two ceiling vents provide circulation and a package air conditioner keeps us cool. Propane bottles mounted on the tongue supply an RV furnace.

Furnishings are courtesy of a generous local office furniture company. They have donated modular office tables, drawers and bins, chairs, and filing and storage cabinets. These are secured to the trailer frame and floor to withstand rough transit. Cork and white boards aid planning and message control. Since this nerve center often becomes a gathering place, furniture is kept to a minimum to discourage the extra conversations that make message handling difficult.

Operation positions begin with the Event Emergency Coordinator (EEC) at the front, next to the door. This position has VHF and UHF voice gear, packet radio and access to a computer. One person can manage the space effectively, but two can work comfortably when necessary. Further back are HF, public safety and two tactical net positions. All radios can be operated with boom-mike headsets. PTT foot switches allowing operators both hands free, to enhance confidentiality and to reduce the confusion possible with so many radios. Operators face wedge-shaped foam sound control surfaces to further reduce the overall noise level.

Telephone and computer network jacks provide telephones and networking at operating positions. Telephone jacks are connected together on one line, but can be reassigned among four incoming circuits. All phone and network wiring is CAT-5. A hub allows networked computers at operating positions.

Both fluorescent and incandescent fixtures provide lighting when the trailer is operating on generator or shore power. To conserve the batteries, 12-V power is relegated to task lighting at each position and above the boards. Although daylight through the ceiling vents is beneficial, we can't count on it.

In addition to the generosity of the ARRL, we would be remiss not to mention the assistance of Chevron USA, Corporate Office Environments, Industrial Supply, Poll Sound, Communications Products, Salt Lake City, Murray City, West Valley City and the many members and friends of Salt Lake County ARES who have donated funds, equipment, materials, and many hours of labor in planning and constructing the trailer.

Richard Evans, N7PCE, has served as Training Manager, Assistant Emergency Coordinator, and is presently Member-at-Large on the SLARES Board of Directors. He holds a Technician license and is in the process of upgrading as this column went to press. He can be reached by e-mail at **crevans@xmission.com**.

Notes

[1]*ARESPACK* is *DOS* based packet-messaging software that offers uniform message formats, message-creation templates and more. You can download *ARESPACK* on the Web at **www.ucares.org/body_index.html**.

[2]*ARESDATA* is a packet-based database used for tracking shelter residents and for other database tasks. Download it on-line at **users.erols.com/sagers/**.

Contributor's Corner

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

Victor C. Clark Youth Incentive Program Fund
Tony Ricicki, W2VRK, in fond memory of Hal S. Justice, W4TS.

Jesse Bieberman Meritorious Membership Fund
Kenneth D. Hopper, KD7KH and Barbara O. Hopper in fond memory of Wendall S. Johnson, W3BJI.
Kenneth D. Hopper, KD7KH and Barbara O. Hopper in fond memory of Eli C. Hall, KD4VZ.

The Bill Orr, W6SAI Memorial Fund (Pending)
Stephen H. Cornell, K4AHA

The Albuquerque ARC/Toby Cross Scholarship Fund
Albuquerque ARC (NM)

The Paul and Helen L. Grauer Scholarship Fund
Northwest Missouri Winter Hamfest (Missouri)

The Tom and Judith Comstock Scholarship Fund
Tom and Judith Comstock, N5TC and K5JRC

The General Fund
Joan C. Patience in loving memory of Edwin N. Patience, KA2GHO
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Tri-City ARC (Connecticut) to honor all Silent Keys.
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Al Cohen, W1FXQ, in fond memory of Leona M. Trudel, N1JXM, and James S. Capella, WA1CTZ.
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Miranda Rand, KA2VHG, KA2VHF, KC2GIT, KA2VLB, KC2GIS, KC2GCD, KC2GCF, KC2GCH and KC2GCE in fond memory of James L. Holmes, KA2RCF.
Wilbur Simpson, WS4H

As received and acknowledged during the months of **March and April**. QST

COMING CONVENTIONS

10-10 INTERNATIONAL CONVENTION

July 12-14, Worcester, MA

The 10-10 International Convention, sponsored by the 10-10 International Convention Committee, will be held at the Holiday Inn, 500 Lincoln St; Rte 290 to Rte 70. Doors are open Thursday 5 PM, Friday 8 AM to 5 PM, Saturday 8 AM to 4 PM. Features include forums (QRP, ARRL, "How to Present 10-10," DXing, 10-10 Net Controllers, "Use of Street Atlas"), guest speakers, 10-10 International Chapter tables, hospitality room (Friday, 7-10 PM), banquet (Saturday eve, $25), VE sessions (Saturday, 10 AM; new and upgrades), camping, refreshments. Admission is $10. Tables are $10. Contact Ed Emco, W1KT, 37 Bullard Ave, Worcester, MA 01605; 508-853-3333; **w1kt@aol.com**; **www.qsl.net/kc1fv/convent.html**.

ROCKY MOUNTAIN DIVISION CONVENTION

July 13-15, Bryce Canyon, UT

The Rocky Mountain Division Convention, sponsored by the Utah Hamfest Committee, will be held at Ruby's Inn; 1 mile before the gate to Bryce Canyon National Park. Features include swapmeet, dealers, seminars, VE sessions, special guests (Riley Hollingsworth, K4ZDH, FCC Special Counsel for Amateur Radio Enforcement; Rosalie White, K1STO, Manager of ARRL Field and Educational Services), T-hunts, QLF contest, Dutch Oven (Saturday, 5:30-7:30 PM, Campground Picnic Area, $10), Wouff-Hong ceremony, camping, refreshments. Talk-in on 146.98. Admission is $7 in advance, $10 at the door; under 17 $3 in advance, $5 at the door. Contact Kathy Rudnicki, N7JSH, 306 N 1500 E, Layton, UT 84040-4558; 801-547-9218; **www.utahhamfest.org**.

MONTANA STATE CONVENTION

July 20-22, East Glacier

The Montana State Convention, sponsored by the Glacier-Waterton International Hamfest Committee, will be held at the Three Forks Campground, 16 miles W of East Glacier on Hwy 2, between milepost 191 and 192. Features include a full schedule of seminars and programs, VE sessions. Talk-in on 146.52. Admission is $10 in advance, $13 at the door. Contact Gerry Leach, VE6BVZ, 55 Templegreen Place NE, Calgary, AB, Canada T1Y 4Z2; 403-285-5547; **leachg@cadvision.com**.

PACIFIC NORTHWEST DX CONVENTION

July 20-22, Everett (Seattle), WA

The Pacific Northwest DX Convention, sponsored by the Western Washington DX Club, will be held at the Holiday Inn, 128th St; Exit 186 off I-5 at 128th St SE, adjacent to the freeway, just N of Seattle. Features include Hospitality Suite (Friday and Saturday), programs (Saturday, 9 AM to 4 PM: Internet Portals for Ham Radio, DXing on the Back Porch of Cycle 23, YK9A DXpedition, and more), hourly DX videos, Saturday dinner ($30; special guest speaker Garry Shapiro, NI6T), Sunday breakfast ($12; special guest speaker Dennis Motschenbacher, K7BV), DXCC card checking (Bill Moore, NC1L), free RV parking (no hookups) on N side of hotel. Talk-in on 147.0. Admission is $62 for complete package including programs, Saturday dinner and Sunday breakfast. Contact Ward Silver, N0AX, 22916-107th Ave SW, Vashon Island, WA 98070; 206-463-9173; **hwardsil@wolfenet.com** or **convention@wwdxc.org**; **www.wwdxc.org/convention/**.

CENTRAL STATES VHF CONFERENCE

July 26-29, Fort Worth, TX

The Central States VHF Conference, sponsored by the Central States VHF Society, will be held at the Dallas/Fort Worth Airport Marriott South, 4151 Centreport Dr; from State Hwy 360, exit Trinity Blvd, turn left at end of exit, hotel is on the left in CentrePort Business Park. Doors are open Thursday 4 PM to Sunday noon. Features include an outstanding two-day technical program with the leaders in amateur VHF and microwave communications (Friday and Saturday), antenna gain measurements, traditional flea market, banquet (Saturday, 7 PM; special guest speaker ARRL First Vice President Joel Harrison, W5ZN), special interest meetings. Talk-in on 146.94 (110.9 Hz). Admission is $30 in advance, $40 at the door (including 2001 dues and Proceedings). Tables are free to conference delegates. Contact Lilburn Smith, W5KQJ, 290 Robinson Rd, Weatherford, TX 76088; 817-596-3539; **lilburn@mesh.net**; **www.csvhfs.org**.

OKLAHOMA STATE CONVENTION

July 27-28, Oklahoma City

The Oklahoma State Convention, sponsored by the Central Oklahoma Radio Amateurs, will be held at the Oklahoma State Fair Park, (Hobbies, Arts and Crafts Modern Living Building), NE of the intersection of I-40 and I-44. Doors are open Friday 5-8 PM, Saturday 8 AM to 5 PM. Features include flea market, technical and non-technical programs, WAS card-checking, VE sessions. Talk-in on 146.82. Admission is $7 in advance, $9 at the door. Tables are $10 in advance, $15 at the door (if available); electrical hookup $5. Contact Tom Miller, KD5ENL, c/o "Ham Holiday 2001", Box 850771, Yukon, OK 73085-0771; 405-321-7889 (home) or 405-686-7247 (work); **corahams@swbell.net**; **www.geocities.com/heartland/7332**.

SOUTH TEXAS SECTION CONVENTION

August 3-4, Austin

The South Texas Section Convention, co-sponsored by the Austin ARC, the Austin Repeater Organization, and the Texas VHF-FM Society, will be held at the Four Points Sheraton Hotel, at the NW corner of IH 35 and US 183. Features include indoor and outdoor swapfest, forums (DX, packet radio, QRP, UHF/MW), VHF-FM Society annual meeting, VE sessions (all classes of licenses). Talk-in on 146.94. Admission is $7 in advance, $9 at the door. Contact Joe Makeever, W5HS, 8609 Tallwood Dr, Austin, TX 78759; 512-345-0800; **w5hs@arrl.net**.

EASTERN WASHINGTON SECTION CONVENTION

August 4-5, Spokane

The Eastern Washington Section Convention, co-sponsored by the Kamiak Butte Amateur Repeater Assn, the Spokane Radio Amateurs, the NW Tri-State ARO, the Palouse Hills ARC, and the Inland Empire VHF Club, will be held at University High School, 10212 E 9th Ave; Exit 287 off I-90. Doors are open Saturday 9 AM to 5 PM, Sunday 8 AM to noon. Features include Open Cry Auction, seminars, Special Event Station, famous steak dinner (Saturday eve), foxhunt, VE sessions, refreshments. Talk-in on 147.38, 146.52. Admission is $5. Commercial tables are $10; non-commercial tables are $7.50 (if paid by Jul 5), $10 thereafter (if available). Contact William Craze, KC7YSF, 1727 Northwest Blvd, No 16, Spokane, WA 99205; 509-326-5353; **warchief@cet.com**.

WESTERN NEW YORK SECTION CONVENTION

August 5, Williamsville

The Western New York Section Convention (Greater Buffalo Summer Hamfest), sponsored by the Lancaster ARC, will be held at the Main-Transit Fire Department Recreation Grounds, 6777 Main St; NYS Thruway (I-90) to Exit 49 (Depew), take Rte 78 (Transit Rd) N to Rte 5 (Main St), turn left (W) on Rte 5, proceed approximately 1/8 mile, grounds on left (S) side of street. Doors are open 6 AM to 4 PM. Features include excellent indoor vendor facility, large outdoor flea market area ($4), VE sessions, Pig Roast (11 AM), refreshments. Talk-in on 147.255 (107.2 Hz). Admission is $5, under 12 free. Tables are $10. Contact Luke Calianno, N2GDU, 1105 Ransom Rd, Lancaster, NY 14086; 716-634-4667; **luke@towncountryflorist.com**; **larc.hamgate.net**.

June 23-24
San Francisco Section, Ferndale, CA*

July 7
Central Division, Indianapolis, IN*

August 18-19
Alabama Section, Huntsville

August 19
Kansas State, Salina

August 25
Missouri State, Columbia
West Virginia State, Weston

August 25-26
New Mexico State, Rio Rancho/Albuquerque

September 1-2
Eastern VHF/UHF Conference, Enfield, CT

September 7-9
Southwestern Division, Riverside, CA

September 8
Kentucky State, Louisville

September 9
Western Pennsylvania Section, Butler

***See June *QST* for details.**

Attention Hamfest and Convention Sponsors:

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your division director. For conventions, approval must be made by your director and by the executive committee. Application forms can be obtained by writing to or calling the ARRL convention program manager, tel 860-594-0262. **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. QST

Gail Iannone ♦ Convention Program Manager

HAMFEST CALENDAR

Attention: The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **July 1** to be listed in the **September** issue. 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 or any kind of games of chance such as raffles or bingo.

(Abbreviations: *Spr* = Sponsor, *TI* = Talk-in frequency, *Adm* = Admission.)

†Colorado (Loveland)—Jul 14; set up Friday 5 PM (overnight security provided), Saturday 6 AM; public 8 AM to 2 PM. *Spr:* Northern Colorado ARC. Larimer County Fairgrounds, McMillian Building, 710 S Railroad Ave; I-25 to Exit 255, W on Colorado 402 about 4 miles, past Hwy 287, turn right just past railroad tracks, follow road N to Fairgrounds. Swapmeet, vendors, tutorials and demos, QRP corner, VE sessions (8 AM), special guest speaker Paul Harden, NA5N (11 AM, "Solar Activity and HF Propagation"). *TI:* 145.115 (100 Hz), 146.52. *Adm:* $4, under 13 free. Tables: $12 (includes 1 admission). Rod Cerkoney, N0RC, c/o NCARC, Box 272956, Ft Collins, CO 80527-2956; 970-225-0117; **n0rc@arrl.net**; **www.qsl.net/n0rc/hamfest**.

†Florida (Milton)—Jul 20-21; Friday noon to 9 PM, Saturday 8 AM to 2 PM. *Spr:* Milton ARC. Santa Rosa County Auditorium, Old Bagdad Hwy and Avalon Blvd; I-10, Exit 7, go N for 5 miles, auditorium on right. Vendors, tailgating ($3 per space), VE sessions (Saturday 8 AM to noon, walk-ins accepted; $10 fee). *TI:* 145.49. *Adm:* $3. Tables: $8. Walter Yarbrough, WA4TFR, 4301 Bell Ln, Pace, FL 32571; 850-994-7335; fax 850-994-4220; **wa4tfr@worldnet.att.net**; **home.att.net/~k4ozl/flyer61.htm**.

†Georgia (Gainesville)—Jul 14, 8 AM to 3 PM. *Spr:* Lanierland ARC. Georgia Mountains Center, 301 Main St; I-985 at Exit 20, take Queen City Pkwy to Broad St (SR 369), turn right, go 3 blocks, Center on left. Air-conditioned facilities, dealers, covered tailgating ($5 per space), VE sessions, refreshments. *TI:* 146.67 (131.8 Hz). *Adm:* advance $5, door $6. Tables: $15. Terry Jones, W4TL, 4816 Windwalker Dr, Flowery Branch, GA 30542; 770-967-6364; **w4tl@arrl.net**; **www.lanierlandarc.org/hamfest.htm**.

†Illinois (Sugar Grove)—Jul 22; set up Saturday 7 PM, Sunday 6-8 AM; public 8 AM. *Spr:* Fox River Radio League. Waubonsee Community College, Rte 47 at Harter Rd, 5 miles NW of Aurora. Flea market, commercial dealers, computer vendors, VE sessions (10 AM, bring original and copy of license, photo ID, CSCE, fee), overnight camping (Bliss Woods, Kane County Park; 630-466-4182), free paved parking, refreshments. *TI:* 147.21 (103.5/107.2 Hz). *Adm:* advance $4, door $5. Tables: $12 (8-ft). Maurice Schietecatte, W9CEO, c/o FRRL, Box 673, Batavia, IL 60510; 815-786-2860; **w9ceo@arrl.net**; **www.frrl.org/hamfest.html**.

Indiana (Angola)—Aug 5. Sharon Brown, WD9DSP, 219-475-5897.

Iowa (Des Moines)—Jul 21. Jim Young, W7FTT, 760-249-3698.

†Louisiana (Slidell)—Jul 21, 8 AM to 2 PM. *Spr:* Ozone ARC. Slidell Municipal Auditorium, 2056 2nd St; from I-12 take Hwy 11 S to Slidell, turn left on Fremaux, right on 2nd St; from I-10 take Gause Blvd, W to Hwy 11. Flea market, dealers, forums, VE sessions, QLF contest. *TI:* 147.27. *Adm:* $3. Tables: $20 (dealers), $7 (flea market). Wayne Wenner, AC5YB, 64174 Nelson Rd, Pearl River, LA 70452; 504-863-2048; **ac5yb@arrl.net**.

†Maine (Lincoln)—Jul 28, 8 AM to noon. *Spr:* Bagley ARC. Ella Burr School, Rte 2, Military Rd; 1 mile N of Lincoln on Rte 2. Swap and trade, VE sessions. *TI:* 147.0. *Adm:* $5. David Baker, N1GOI, 14 Washington St, Lincoln, ME 04457; 207-794-3398.

†Maine (Union)—Jul 14; set up 6 AM; public 8 AM. *Spr:* Pen-Bay ARC. Union Fairgrounds, Common Rd, off Rte 17; Rte 17, E to Union from I-95, Rte 1 E to Rte 235 to Common Rd, left to Fairgrounds. Ham Radio equipment and related items, VE sessions (12:30 PM, Thompson Community Center), weekend camping ($10 per night), refreshments. *TI:* 147.06, 145.49. *Adm:* $5, under 12 free with adult. Tables: $4 each. Will Chadwick, WC1W, Box 547, Union, ME 04862-0547; 207-785-2739; **wilchad@tidewater.net**.

†Maryland (Timonium)—Jul 29, 8 AM to 4 PM. *Spr:* Baltimore RA Television Society. Timonium Fairgrounds, York Rd; take I-695 (Baltimore Beltway) to Exit 24 (I-83 N); from I-83 take Exit 17 (Padonia Rd) E, turn right onto York Rd, (MD Rte 45), continue S on York Rd to Fairgrounds entrance. Hamfest/Computerfest, giant flea market (opens 6 AM), vendors, electronics, equipment, antennas, tailgating ($10 per space, no advanced reservations), VE sessions (check in 8:30 AM, free exams 9 AM; pre-registration required; John Creel, WB3GXW, 301-572-5124 after 6 PM; **creewb3gxw@aol.com**), handicapped accessible, free parking, refreshments. *TI:* 147.03, 224.96, 448.325. *Adm:* $6, under 12 free. Tables: $60 each (in air-conditioned Main Exhibit Hall). Mayer Zimmerman, W3GXK, c/o BRATS, Box 5915, Baltimore, MD 21282-5915; 410-786-6839 or 410-461-0086 (phone/fax); **hamfest@bratsatv.org** or **w3gxk@arrl.net**; **www.bratsatv.org**.

Massachusetts (Cambridge)—Jul 15. Nick Altenbernd, KA1MQX, 617-253-3776.

Massachusetts (Worcester)—Jul 12-14, 10-10 International Convention. See "Coming Conventions."

†Michigan (Tawas)—Aug 4, 8 AM to 2 PM. *Spr:* Iosco County AR Enthusiasts. Tawas Area High School, 255 M-55; US 23 to M-55, M-55 W for 1.4 miles. Trunk sales ($3), VE sessions. *TI:* 146.64. *Adm:* advance $4, door $5. Tables: $7. John Hanley, KA8AIP, 489 S Towerline Rd, Whittemore, MI 48770; 517-756-2845; **ka8aip@centurytel.net**; **www.oscoda.net/icare/**.

†Minnesota (Brainerd)—Jul 21, 8 AM to 2 PM. *Spr:* Brainerd Area ARC. National Guard Armory, 1115 Wright St; 4 blocks E of Hwy 371 S. *TI:* 147.03. *Adm:* $5. Tables: $15. Al Doree, W0RC, 3876 E Shamineau Dr, Motley, MN 56466; 218-575-2404; **w0rc@arrl.net**; **www.uslink.net/~brdham**.

†Missouri (Springfield)—Aug 4; set up Friday 3 PM, Saturday 7 AM; public 8 AM to 1 PM. *Spr:* Southwest Missouri ARC. University Plaza Trade Center, 625 E St Louis St; from I-44 take Exit 80B, go S on Glenstone, 4 miles to St Louis St, go W 1 mile to Trade Center. Flea market, commercial vendors, computer equipment, presentations, displays, ARRL forum, VE sessions, club tables, covered parking. *TI:* 146.91 (162.2 Hz). *Adm:* $5, under 16 free. Tables: $10 each (city requires $5 vendor permit, sold at door). Woodie Moore, W0ODY, 1905 E Wheat Ridge Dr, Springfield, MO 65803; 417-833-2248; **w0ody@arrl.net**; **www.smarc.org**.

†Missouri (Washington)—Jul 15, 6 AM to 2 PM. *Spr:* Zero Beaters ARC. Washington Fairgrounds, Bernie E. Hillerman Park, off Grand Ave; Hwy 100 W from Washington, N on Pottery Rd, left on 5th St, right on Grand Ave. Ham Radio/Computer Flea market, commercial vendors, VE sessions (9 AM, walk-ins accepted), technical sessions, ham radio demonstrations, free parking, refreshments. *TI:* 147.24. *Adm:* Free. Keith Wilson, K0ZH, 1100 North Commercial, St Clair, MO 63077; 636-629-2264; fax 636-629-1196; **w0bob@arrl.net**; **www.yhti.net/~w0bob/zbarc**.

Montana (East Glacier)—Jul 20-22, Montana State Convention. See "Coming Conventions."

†Nevada (Reno)—Jul 28; set up 7-8 AM; public 8 AM to 3 PM. *Spr:* Sierra Nevada ARS. International Game Technology Parking Lot, 9295 Prototype Dr; US 395 to S Meadows Parkway, E to Double R Blvd, N to Prototype Dr/Diamond Way, W on Prototype Dr to IGT. Vendors, tailgating, VE sessions (9 AM, pre-registration requested, $10 fee; call Jess, N7BIP, 775-826-0329; walk-ins accepted). *TI:* 146.61 (123.0 Hz). *Adm:* $1, under 12 free. Bill Massie, K7NHP, 2 Grosh Ave, Dayton, NV 89403-9304; 775-246-3756; **k7nhp@arrl.net**; **www.snars.org**.

†New Jersey (Augusta)—Jul 15, 8 AM. *Spr:* Sussex County ARC. Sussex County Fairgrounds, Plains Rd; Rte 80 W to Rte 15, Rte 15 turns into Rte 206, turn right onto Plains Rd. Tailgating ($12 per space), handicapped accessible, unlimited free parking, refreshments. *TI:* 147.3. *Adm:* $5, nonhams free. Tables: $15 (indoor). Dan Carter, N2ERH, 8 Carter Ln, Branchville, NJ 07826; 973-948-6999; **n2erh@email.com**; **scarcnj.org**.

†New York (Batavia)—Jul 15, 8 AM. *Spr:* Genesee Radio Amateurs. Batavia Downs Race Track, 8315 Park Rd; NYS Thruway (I-90) to Exit 48 (Batavia), cross Rte 98, proceed 1/4 mile and take left onto Park Rd to Batavia Downs. *TI:* 147.285. *Adm:* $5. Tables: $10. Randy Boyle, K2RLB, 3427 Batavia-Oakfield Town Line Rd, Batavia, NY 14020; 716-948-9679; **racboyle@iinc.com**; **www.gramradio.org**.

†New York (Frankfort/Utica)—Jul 21; set up 6 AM; public 8 AM to 2 PM. *Spr:* Utica ARC. Herkimer County Fairgrounds, Cemetery St; NYS Thruway to Exit 30 (Herkimer), at stoplight from exit take left and proceed over bridge, take ramp to right (NYS 5S W), go 5 miles to Frankfort Exit marked Fairgrounds. Outdoor and indoor flea market (outdoor space $2 plus admission; indoor space $3 plus admission), VE sessions (9 AM), refreshments. *TI:* 145.45. *Adm:* $4. Tables: $4 (6-ft); must reserve in advance. Bob Decker, AA2CU, 4 Forest Rd, Utica, NY 13501; 315-797-6614; **ktrnd@borg.com**.

†New York (Ithaca)—Aug 4, 7 AM to 2 PM. *Spr:* Tompkins County ARC. Tompkins County Airport, 72 Brown Rd; from I-81 take Cortland Exit, follow signs to Rte 13 and Ithaca, turn right on Warren Rd, follow Airport signs. Indoor vendors, paved flea market, VE sessions, paved parking, refreshments. *TI:* 146.97. *Adm:* advance $4 (until Jul 15), door $5. Tables: $10 (inside), $2 (per outdoor space). Dave Flinn, W2CFP, 866 Ridge Rd, Lansing, NY 14882; 607-533-4797; **dave@starflinn.com**; **www.compcenter.com/~tcarc**.

New York (Williamsville)—Aug 5, Western New York Section Convention. See "Coming Conventions."

North Carolina (Cary)—Jul 21. Cary ARC, **n4nc@arrl.net**.

†North Carolina (Salisbury)—Jul 7; set up Friday 3-9 PM, Saturday 7 AM; public 8 AM to 1 PM. *Spr:* Rowan ARS. Salisbury Civic Center, 315 S Boundary St; I-85, Exit 76B to Salisbury, turn right at ramp intersection with E Innes St, turn left on S Boundary St, go 2 blocks to Civic Center on left. Flea market, tailgating (included in ticket price), dealers, VE sessions (walk-ins), refreshments (including free coffee). *TI:* 146.73 (94.8 Hz). *Adm:* advance $4, door $5. Tables: $5. Ralph Brown, WB4AQK, 1621 Emerald St, Salisbury, NC 28144; 704-636-5902; **rbrown@salisbury.net**; **www.qsl.net/w4exu/**.

†North Carolina (Waynesville)—Jul 28, 8 AM

†ARRL Hamfest

to 4 PM. *Spr:* Western Carolina ARS. Haywood County Fairgrounds, 758 Crabtree Rd, near Waynesville and Lake Junaluska; approximately 25 miles W of Asheville; I-40 to Exit 24, S on Hwy 209 for 3 miles. Covered flea market, dealers, tailgating, VE sessions (2 PM, Haywood Community College), ARRL forum, free parking, refreshments. *TI:* 146.91 (91.5 Hz), 147.39, 145.19. *Adm:* advance $4, door $5. Tables: $10. Pat Kelsey, WA4OLA, Box 1488, Asheville, NC 28802; 828-236-0181; **wa4ola@arrl.net**; **wcars.org/hamfest/index.htm**.

North Dakota (Dunseith)/Manitoba (Boissevan)—Jul 13-15. Dave Snydal, VE4XN, 204-728-2463.

†Ohio (Cincinnati)—Jul 28, 7 AM to 1 PM. *Spr:* OH-KY-IN ARS. Diamond Oaks Career Development Center, 6375 Harrison Rd; approximately 1 mile SE of Rybolt Rd/Harrison Rd Exit off I-74 (Exit 11). Technical and ARRL forums, transmitter hunt, indoor vendors, outdoor flea market (free with admission), VE sessions. *TI:* 146.67, 146.925. *Adm:* advance $5, door $6. Tables: $10 (6-ft, indoor with electricity; no outside tables provided). Mr. Lynn Ernst, WD8JAW, 10650 Aspen Place, Union, KY 41091-7665; 859-657-6161; **wd8jaw@arrl.net**; **www.qsl.net/k8sch**.

†Ohio (Columbus)—Aug 4, 8 AM. *Spr:* Voice of Aladdin ARC. Aladdin Shrine Temple, 3850 Stelzer Rd; I-270, W on Morse Rd, S on Stelzer Rd. Forums (weather spotting, ARES, antennas), foxhunt, VE sessions. *TI:* 147.24. *Adm:* $5. James Morton, KB8KPJ, 6070 Northgap Dr, Columbus, OH 43229-1945; 614-846-7790; **kb8kpj@cs.com**.

†Ohio (Randolph)—Jul 29, 8 AM to 4 PM. *Spr:* Portage ARC. Portage County Fairgrounds, 4215 Fairgrounds Rd; between Akron and Youngstown on State Rte 44, 4 miles S of I-76. Outside flea market, indoor vendors, VE sessions, ARRL officials, free parking, handicapped parking, restaurant on grounds. *TI:* 145.39. *Adm:* advance $4, door $5. Tables: $10 (includes electricity). Joanne Solak, KJ3O, 9971 Diagonal Rd, Mantua, OH 44255; 330-274-8240; **ljsolak@apk.net**; **parc.portage.oh.us**.

Ohio (Van Wert)—Jul 15, 8 AM to 2 PM. *Spr:* Van Wert ARC. County Fairgrounds, 1055 S Washington St; located at the S edge of Van Wert along Rte 127. Free trunk sales, VE sessions (preregister by Jul 9), free parking, refreshments. *TI:* 146.85. *Adm:* $5. Tables: $10. Bob Barnes, WD8LPY, 411 N Walnut St, Van Wert, OH 45891; 419-238-1877; **barnesrl@bright.net**; **www.redrival.com/w8fy**.

†Ohio (Wellington)—Jul 21, 8 AM to 2 PM. *Spr:* Northern Ohio ARS. Lorain County Fairgrounds, Rte 18; Rte 58 to Rte 18 in Wellington, W on Rte 18, 1 mile to Fairgrounds entrance on S side of Rte 18. Huge outdoor flea market area ($5 per 8-ft space), ample indoor commercial space (reservations required), dealers, overnight parking for RVs and campers (no hookups), VE sessions (walk-ins, register 8-9 AM, exams 9 AM), DXCC card checking (cards in by 11 AM). *TI:* 146.7 (110.9 Hz), 444.8. *Adm:* $5, under 12 free. Tables: $15 (8-ft, plus admission). John Schaaf, K8JWS, c/o NOARSfest, Box 432, Elyria, OH 44036-0432; 216-696-5709; **k8jws@arrl.net**; **www.apk.net/noars/noarsfe.htm**.

Oklahoma (Oklahoma City)—Jul 27-28, Oklahoma State Convention. See "Coming Conventions."

†Pennsylvania (Berwick)—Jul 21, 8 AM. *Spr:* Jonestown Mountain Repeater Assn. Beach Haven Carnival; S on US 11 from SR 239 at Shickshinny, go 6 miles N on US 11 from SR 93, 3 miles from intersection of SR 93 at Berwick. VE sessions. *TI:* 145.13 (77.0 Hz), 146.52. *Adm:* $5. Tables: 8-ft $10 (paid in advance). Charles Hooker, AD3L, Box 23, Huntington Mills, PA 18622; 570-864-2571; **chooker@epix.net**.

†Pennsylvania (Kimberton/Valley Forge)—Jul 15, 7 AM. *Spr:* Mid-Atlantic ARC. Kimberton Fire Company Fairgrounds, Rte 113, S of intersection with Rte 23. Computers and electronics, tailgating ($6, no reserved tailgate space), refreshments. *TI:* 146.835, 443.8 (131.8 Hz). *Adm:* $6. Tables: with electricity $10 each (1-4 tables), $8 each (5 or more tables), plus admission. MARC, Box 2154, Southeastern, PA 19399-2154; or call Bill Owen, W3KRB, 610-325-3995; **gem@op.net**; **www.marc-radio.org/hamfest.html**.

†South Dakota (Clear Lake)—Jul 29, 8 AM to 4 PM. *Spr:* Deuel County ARC. Ulven City Park, NE shore of Clear Lake; from junction of Hwys 15 and 22 go 1 mile N to Fairgrounds Dr, follow road around lake to Ulven Park. Flea market, VE sessions (9:30 AM), camping. *TI:* 147.18 (146.2 Hz). *Adm:* $5 per person; $10 per family. Tables: Free with admission. Rob Schmidt, N0TAW, Box 427, Clear Lake, SD 57226; 605-874-2778; **rjtaw1@itctel.com**; **www.qsl.net/dcarc/**.

†Tennessee (Dayton)—Jul 21 (rain date Jul 28), 6 AM. *Spr:* Rhea County ARS. Cedar Point Park, E of the intersection of Hwy 27 and Hwy 30. Equipment testing booth, free parking, refreshments. *TI:* 147.39. *Adm:* Free. Tommy Mize, KO4SY, 433 Magnolia Ave, Dayton, TN 37321; 423-775-2480 or 423-570-0840; **ko4sy@arrl.net**; **www.volstate.net/~ko4sy**.

Texas (Austin)—Aug 3-4, South Texas Section Convention. See "Coming Conventions."

†Texas (Denison/Sherman)—Jul 21, 8 AM. *Spr:* North Texas Hamfest Committee. Silver Wings Club, Grayson County Airport; from Hwy 75 N or S, take Exit 65 (Hwy 691), go W on Hwy 691 to Airport entrance, follow signs to Hamfest. VE sessions (11 AM). *TI:* 147.0. *Adm:* advance $5, door $7. Tables: advance $8, door $10. Gene Hodge, K5DPS, 211 N Brinkley, Sherman, TX 75092; 903-893-6082; **kc5aft@gte.net**; **home1.gte.net/wb5dcu/nortex00.html**.

Texas (Fort Worth)—Jul 26-29, Central States VHF Conference. See "Coming Conventions."

†Texas (Texas City)—Jul 14. *Spr:* Tidelands ARS. C. T. Doyle Convention Center, 5th Ave and 21st St; I-45 to Texas City (Exit 16), go 7.1 miles to Jack in the Box, turn right onto 21st St. VE sessions. *TI:* 147.14. *Adm:* advance $3, door $4. Tables: $5. Joe Wileman, AA5OP, 1010 24th Ave N, Texas City, TX 77590; 409-945-6794; **aa5op@aol.com**; **www.tidelands.org**.

Utah (Bryce Canyon)—Jul 13-15, Rocky Mountain Division Convention. See "Coming Conventions."

†Virginia (Berryville)—Aug 5, 6 AM. *Spr:* Shenandoah Valley ARC. Clarke County (Ruritan) Fairgrounds; I-81 (at Winchester), Exit 315 to Rte 7 E (9 miles), bear right onto Business Rte 7, just before traffic light, Fairgrounds on left; or intersection of Rte 340 and Rte 7 in Berryville, go W approximately 2 miles, Fairgrounds on right. Inside vendors, tailgating ($7 per space), VE sessions (1 PM), Ruritan's famous chicken barbecue. *TI:* 146.82. *Adm:* $5. Tables: $12, $15, and $20. Brian Mawhinney, WB3FUM, 2432-69 Berryville Pike, Winchester, VA 22603; 540-665-0761; **wb3fum@arrl.net**; **www.Vvalley.com/svarc/**.

†Virginia (Vinton)—Aug 4, 9 AM to 3 PM. *Spr:* Roanoke Valley ARC. William Byrd High School, 2902 Washington Ave; US 460 to Gus Nicks Blvd (Washington Ave), go 3 miles to High School on left. Hamfest/Computer Show, flea market, vendors, VE sessions. *TI:* 146.985. *Adm:* advance $5, door $6. Tables: $10. Dave Miller, KS4JB, 540-977-3142; **dmiller@rev.net**; **www.cuppnet.com/rvarc/**.

Washington (Everett/Seattle)—Jul 20-22, Pacific Northwest DX Convention. See "Coming Conventions."

Washington (Spokane)—Aug 4-5, Eastern Washington Section Convention. See "Coming Conventions."

Attention All Hamfest Committees!

Get official ARRL sanction for your event and receive special benefits such as free prizes, handouts, and other support.

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NEW PRODUCTS

YAESU FT-817 TUNING MADE EASY

◊ One-Touch Tune (OTT), manufactured by W4RT Electronics, is a custom add-on accessory for the Yaesu FT-817. OTT solves the tedious and annoying tuning process that presently must be used to produce a carrier for tuning an antenna tuner. Installation is simple. Velcro attaches the OTT module to the rear of the FT-817, the OTT cable is plugged into the ACC jack, and the supplied **OTT TUNE** pushbutton switch (or your own) is plugged into the OTT Command jack.

Merely press the **TUNE** button and One-Touch Tune takes control of the FT-817. Regardless of the mode used, OTT commands the FT-817 to produce a carrier having the same power as set by the FT-817 **PWR** function command. When adjustment of the antenna tuner is completed, release the **TUNE** button and the FT-817 returns to the prior mode.

With an LDG Electronics Z-11 antenna tuner and optional OTT/Z-11 Compatibility Kit, the Z-11 cable can be plugged into the OTT Command jack. Whenever you press the Z-11 **TUNE** button, OTT commands the FT-817 to produce a carrier as long as required by the Z-11. Upon completion of the tuning process by the Z-11, the FT-817 returns to the mode configuration you had already selected! One-Touch Tune is transparent to auxiliary equipment attached to the FT-817. For example, a CAT controller for the FT-817 is plugged into the OTT **ACC** input jack. Anything attached to the **KEY** or **DATA** jacks will not be interfered with at all. OTT is power friendly and draws less than 25 mA when not in use, and about 20 mA during tuning. One-Touch Tune can be installed or removed in just moments to match your operating requirements.

Price: $59.95. For additional information contact W4RT Electronics, 3077-K Leeman Ferry Rd, Huntsville, AL 35801; fax 256-880-3866; **w4rt@oetc.com**; **www.w4rt.com**.

HA5CMG STEALTH II HF MOBILE ANTENNA

◊ The new Stealth II is a low profile, continuously tunable, mobile antenna. Three models are available for either 40-6 meters ($395), 80-10 meters ($450) or 80-10 meters "contest size" ($550). For more information contact Hi-Q Antennas, 21085 Cielo Vista Way, Wildomar, CA 92595; **www.qth.com/stealthantennas/**. QST

Previous • Next New Products

CONTEST CORRAL

Feedback

In the **2000 IARU HF World Championship**, the log file submitted by **YL4HQ, the Latvian LRAL Headquarters station,** had formatting problems that precluded it from being included in the original results. After correcting those file problems, their score should read 12,114,455 points on 9865 QSOs and 359 multipliers. **W8AV** should have been listed as a Multioperator station instead of Single Operator, which places them 10th among W/VE scores.

In the **2001 ARRL November CW Sweepstakes,** the guest operator at **N0AT** should have been listed as **N0KK**. **W6JTI** should have been shown in fourth place in the West Coast region box as QRP with a score of 101,868. **W0UC** should have been reported as a Multioperator station in the MN section**. TeamCramp.com** and **Mike Hance, K5NZ** sponsor the Single Operator Low Power CW winner's plaque, won by N4ZZ. The Single Operator High Power Pacific Division CW winner's plaque, won by **K6RM (N6TV, op)** is sponsored by **Rich Hallman, N7TR**. The West Gulf Single Operator High Power CW plaque is being sponsored by **Ken Adams, K5KA**.

W3CB should have been listed as a participant in the **2001 ARRL Straight Key Night**.

W1AW Qualifying Runs are 10 PM EDT, Friday, July 6 and 9 AM EDT, Monday, July 23. The K6YR West Coast Qualifying Run will be at 9 PM PDT on Wednesday, July 18. Check the W1AW schedule for details.

July

1

Canada Day Contest, sponsored by the Radio Amateurs of Canada (RAC). 0000 to 2359Z July 1. 160, 80, 40, 20, 15, 10, 6 and 2 meters, CW and phone (SSB, FM, AM). Stations in Canada send RS(T) and province or territory. VE0s and stations outside Canada send RS(T) and a serial number. Contacts with stations in Canada or VE0s are worth 10 points. Contacts with stations outside Canada are worth 2 points. Contacts with RAC official stations are worth 20 points. RAC official stations are: VA2RAC, VA3RAC, VE1RAC, VE4RAC, VE5RAC, VE6RAC, VE7RAC, VE8RAC, VE9RAC, VO1RAC, VO2RAC, VY1RAC and VY2RAC. Multipliers: Canada's 10 provinces and two territories, and may be counted once on each mode on each of the eight contest bands. Final score = Total QSO points x total multiplier points. Categories: Single Operator, all bands; Single Operator Low Power (max 100 W output); Single Operator QRP (max 5 W output); Single Operator single band; Multioperator. Send entries to Radio Amateurs of Canada, 720 Belfast Rd, Suite 217, Ottawa, ON K1G 0Z5, Canada by July 31. For more information see **www.rac.ca/CANDAY.htm**; **gkosmenko@arrowspeed.com.**

14-15

IARU HF World Championship. See April 2001 *QST*, page 111.

QRP ARCI Summer Homebrew Sprint, Sponsored by QRP ARC International 2000-2400Z July 15, CW only. Entries may be single band, all band, high band or low band. Work stations once per band. Exchange signal report, state/province/country, and QRP ARCI number if member. 2/pts for nonmembers on the same continents; 4/pts for nonmembers on different continents. Bonus points awarded for using homebrew equipment: 2000/pts for homebrewed transmitter, 3000/pts for homebrewed receiver, 5000/pts for homebrewed transceiver. Final score is total of QSO points multiplied by total of states/provinces/countries times power multiplier (>5 W output, × 1; <5 W output, × 7; <1 W output, × 10; < 250 mW output, × 15) plus bonus points. Send entries by August 12 to QRP ARCI Contest Mgr, Randy Foltz, 809 Leith St, Moscow, ID 83843; **rfoltz@turbonet.com**; **personal.palouse.net/rfoltz/arci/arcitst.htm**

FISTS CW Summer Sprint, sponsored by FISTS International CW Club, 1700Z until 2100Z July 14, CW only. Categories: QRP, QRO and club. 80 40 20 15 10 meters. Work stations once per band. Exchange name, RST, state/province/DXCC entity, and FISTS number if you are a member (nonmembers send power output). Score 5 pts/QSO w/FISTS member and 2 pts/QSO w/nonmembers. Final score is QSO points × states/provinces/DXCC entities. 3.558 7.058 14.058 21.058 28.058. Send paper logs *only* within 30 days to Alan M. Tanner W8FAX, 1525 Trebein Rd, Fairborn, OH 45324-9706; **www.FISTS.org**.

CQ WW VHF Contest, sponsored by *CQ Magazine*, from 1800Z July 14 until 2100Z July 15. 6 and 2 meters. Single op all band and single band, multiop, rover and QRP (<25 W). Send grid square. Score 1 pt/QSO on 50 MHz; 2 pts/QSO on 144 MHz. Work stations once per band regardless of mode. Do not transmit on 146.52 MHz simplex or on repeaters to either make or solicit contacts. Final score is QSO pts × grid squares worked/band. Awards. Send logs by Aug 31 to CQ VHF Contest, *CQ Magazine*, 25 Newbridge Rd, Hicksville, NY 11801. You may submit your electronic log via e-mail to **cqvhf@kkn.net**. Questions may be sent to **questions@cqww.com**; **www.cq-amateur-radio.com/vhfcontest.html**.

21-22

Six Club Six-Meter Sprint, sponsored by the Six Club, 2300Z July 21 to 0400Z July 22, 6 meters only. Count 1 point/QSO within your country; 2 points/QSO outside of your country (KH6 and KL7 count as countries). Final score is the total QSO points times the number of different grid squares worked. Awards. Mail logs by July 22 to Six Club, PO Box 307, Hatfield, AR 71945; **sixclub@6mt.com**; **6mt.com/contest.htm**.

Georgia QSO Party, sponsored by SECC and SEDXC. Two periods: 1800Z July 21 to 0359Z July 22 and 1400Z July 22 to 2359Z July 22. All stations may operate the full 20 hours. Phone and CW. 80 40 20 15 10 meters. Single Op, Multi-single, multi-multi, rover and Technician in each of three power levels: QRP, low power (150 W or less) and high power (more than 150 W). Rover requires operation from at least 6 Georgia counties. Mobiles and portables must move the complete station, including antennas, at least 100 yards to change counties—no county line operations. Work stations once per band and mode. Multipliers count on each mode. Exchange RST and Georgia county, state, province or DX entity. Count 1 point per phone QSO; 2 points per CW QSO. Multipliers are Georgia counties; for Georgia stations the multipliers are the 50 US states and 11 Canadian provinces. Awards. Mail logs by Aug 23 Michael R Condon, NE4S, 4641 Smoke Rise Ln, Marietta, GA 30062; **mcondon@attglobal.net**; **secc.contesting.com/**

North American QSO Party, RTTY, sponsored by the *National Contest Journal*. 1800Z July 21 to 0600Z July 22. Single op and multi-two. Single Operator stations may operate 10 out of 12 hours. Off times must be at least 30 minutes in length and must be clearly marked in the log. Mode: RTTY only. 80, 40, 20, 15 and 10 meters only. You may work a station once per band. Exchange operator name and station location (state, province or country). One point for each valid contact. Multipliers include US states, including KH6 and KL7, Canadian provinces and other North American DXCC entities. Do not count USA, Canada, KH6 or KL7 as countries. Non-North American entities do not count as multipliers but may be worked for QSO credit. Scoring: Multiply total valid contacts by the total number of multipliers worked on each band. Send logs to Ron Stailey, K5DJ, 504 Dove Haven Dr, Round Rock, TX 78664-5926, **rttynaqp@ncjweb.com**; **www.ncjweb.com/**.

28-29

RSGB Islands-On-The-Air Contest, sponsored by the RSGB, 1200Z July 28 to 1200Z July 29. 80 40 20 15 10 meters, phone and CW. Single op, phone/CW/mixed; single op limited, phone/CW/mixed; multi-single island stations. Single op limited stations may operate 12 hours max. Send RS(T), serial number and IOTA reference number. If applicable, island stations may send IOTA number. Work stations once per band and mode. Score 2 pts/QSO with your own country or IOTA reference; 15 pts/QSO w/IOTA stations and 5 pts/QSO w/others. Final score is QSO points × IOTA numbers worked per band/mode. Awards. Send logs by August 31 to RSGB IOTA Contest, PO Box 9, Potters Bar, Herts EN6 3RH, England; **iota.hf.contests@rsgb.org.uk**; **www.g4tsh.demon.co.uk/HFCC/IOTA.htm**. QST

NEW PRODUCTS

SAFETENNA 2-METER ANTENNAS

◊ Creative Services Software and AB4MT-Designs have introduced a new line of 2-meter antennas. The *SafeTennas* are available in two models: full and compact. The radiating element is completely enclosed in a durable green PVC pipe shell. The compact version is 1½ inches in diameter and 22 inches tall. The 59-inch tall full-size version can serve double-duty as a walking stick. Both models include a loop on one end for hanging and a removable end cap on the opposite end that provides protection for the SO-239 feed line connector when the antenna is not in use.

SafeTenna inventor Michael Thigpen, AB4MT, states, "The SafeTenna is designed with emergency operation in mind, such as when you have car trouble and can't hit a repeater. You can store the antenna in a trunk or behind a truck seat along with coax and support line. When you need to extend your communications range, you can hang the antenna up in the clear and connect the coax to your H-T or mobile rig."

Price (full or compact): $39.95. SafeTennas are available from your favorite Amateur Radio products dealer and Creative Services Software, 503 W State St, Suite 4, Muscle Shoals, AL 35661; tel 256-767-3739, fax 256-381-6121; **info@cssincorp.com**; **www.cssincorp.com**. QST

Previous New Products

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

SPECIAL EVENTS

DeSmet, SD: Huron Amateur Radio Club & Lake Area Radio Klub, W0NOZ, 1600Z **June 30** to 0200Z **July 2**, for the 30th anniversary of Little House on the Prairie Pageant. 7.265 14.265 21.365 28.465. Certificate. Huron ARC, PO Box 205, Huron, SD 57350.

Antwerp, Belgium: Union Belge des Amateurs, OS4OSA, 0000Z **July 1** to 2359Z **July 12**, celebrating the coastal station OSA on all bands and modes. QSL. Marc Domen, ON7SS, Ferdinand Coosemansstratt 32, B-2600 Berchem (Antwerpen), Belgium.

Thompson, OH: Lake County Amateur Radio Association, N8GB, 1400Z **July 4** to 0100Z **July 5**, to celebrate Independence Day. 7.246 28.450. Certificate. George R. Bair, N8GB, 386 Cedarbrook Dr, Painesville, OH 44077.

Maddock, ND: Benson County Amateur Radio Club, W0W, 0000Z **July 6** to 2359Z **July 8** celebrating the centennial of City of Maddock, ND. 7.259 14.259 21.359 28.359. QSL. Richard Budd, W0TF, PO Box 390 Leeds, ND 58346-0390.

Deltaville, VA: Middlesex Amateur Radio Group, AA4HQ, 1300 to 1900Z **July 7**, to celebrate Deltaville Heritage Days. 3.860 7.230 14.240 28.350. Certificate. Verlan Hall, AA4HQ, PO Box 405, Hartfield, VA 23071.

Sioux Falls, SD: Sioux Empire Amateur Radio Club, W0Y, 1300-1800Z **July 7**, operating from the USS *South Dakota* BB-57 memorial site. 7.250 14.250 28.350. QSL. Sioux Empire ARC, PO Box 91, Sioux Falls, SD 57101.

Baraboo to Milwaukee, WI: Milwaukee AREC, W9D, 1400Z **July 7** to 2200Z **July 9**, during the annual run of the Great Circus Train. 7.240 14.240 146.55. Certificate. Jim Romelfanger, 412 1/2 Ash St, Baraboo, WI 53913.

Smithville, AR: Driven Elements Amateur Radio Group, KB5FJX, 1300Z **July 7** to 2400Z **July 8**, celebrating the Driven Elements Amateur Radio Group 10th anniversary. 7.280 14.325 28.375. Certificate. Heather Hinds, KD5BMB, 139A Lawrence Rd 2645, Smithville, AR 72466-8024.

Austin, TX: Naturist Amateur Radio Club, NU5DE, 0000Z **July 9** to 2400Z **July 15**, during the 26th Annual North American Nude Awareness Celebration. 7.265 14.265 21.365 28.465. QSL. Naturist Amateur Radio Club, PO Box 200812, Austin, TX 78720-0812.

Milwaukee, WI: West Allis Radio Amateur Club, W9C, 1800Z **July 11** to 0200Z **July 14**, operating from the Great Circus Parade showgrounds. 7.240 14.240 21.340 28.400. Certificate. W9C, 5436 Scenery Rd, Waterford, WI 53185.

Trenton, MI: Motor City Radio Club, W8MRM, 1400Z **July 13** to 2300Z **July 15**, for the 26th annual Trenton Mid-Summer Festival. 7.044 7.244 14.044 14.244. Certificate. Motor City Radio Club, PO Box 337, Wyandotte, MI 48192.

Bryce Canyon, UT: Utah Hamfest Inc, K7H, 1800Z **July 13** to 1800Z **July 15**, during the Utah Hamfest 2001 and the ARRL Rocky Mountain Division Convention. 28.350 21.350 14.275 7.275. Certificate. Kelly Vining, AI7J, 762 E Rosewood Ln, Layton, UT 84041.

Crete NE: Crete Amateur Radio Club, K0JOQ, 1500-2300Z **July 14**, commemorating the first Chatauqua in Nebraska. 14.250. Certificate. Dave Reiss, WD0CJK, 743 Forest, Crete, NE 68333.

Akron, OH: Pioneer Amateur Radio Fellowship, KB8ZAM, 1400Z **July 14** to 2200Z **July 15**, during Akron's Lighter Than Air Convention and Exhibition. 7.270 14.270 21.370 28.370. QSL. Pioneer Amateur Radio Fellowship Inc, 2324 Manchester Rd, Akron, OH 44314.

Lake Champlain, VT-NY: Burlington ARC and Champlain Valley ARC, N2V, 1300Z **July 14** to 0100Z **July 15**, celebrating 250 Years of ferryboating on Lake Champlain. 7.275 14.275 21.250 28.450. Certificate. Special Event N2V, c/o CVARC, PO Box 313, Morrisonville, NY 12962.

San Angelo, TX: San Angelo Amateur Radio Club, W5QX, 0000-2400Z **July 15** for an air show special event dedicated to the Black Sheep Squadron. 28.400 21.350 14.240 7.235. Certificate. Don Goff, 1210 Ardmore, San Angelo, TX 76905.

Warren, OH: Warren Amateur Radio Association, W8P, 1400Z **July 15** to 2000Z **July 27**, during the 2nd annual Packard Museum Car Show. 28.450 14.260 7.260 3.860. Certificate. WARA, PO Box 809, Warren, OH 44482.

Fremont, MI: Newaygo County Amateurs, W1B, 1500Z **July 17** to 2100Z **July 21**, operating from the 11th annual National Baby Food Festival. General class frequencies. QSL. Leo Woodard WD8DCA, 304 N Stone Rd, Fremont, MI 49412.

Palatine, IL: Northwest Amateur Radio Club, W9P, 0001Z **July 18** to 2359Z **July 23**, for the Taste and Touch of Palatine—Palatine Chamber of Commerce. 14.260 28.400 21400 7260. Certificate. Chuck Towner, W9KQJ, PO Box 73, Palatine, IL 60078.

Kane, PA: Kane Amateur Radio Operators, AA3GM, 2200Z **July 20** to 2000Z **July 22**, celebrating the annual Kane Black Cherry Festival. 7.255 14.255 21.355 28.355. Certificate. Kenneth T. Frankenbery, 5111 Glenwall Dr, Aliquippa, PA 15001.

Parma, OH: Woodchuck Amateur Radio Club, KC8KLU, 1700-2030Z **July 21**, celebrating the 175th anniversary of Parma. 145.310 442.125 28.435 14.310. Certificate. Jason Jodon, KB8QQS, 15721 Madison Ave, Apt 1, Lakewood, OH 44107.

Wapakoneta, OH: Reservoir Amateur Radio Association, K8QYL, 1300-2000Z **July 21**, during the Neil Armstrong Air and Space Museum's Festival of Flight. 7.260 14.250 21.360 28.400. Certificate. Richard Spencer, 15101 Townline-Kossuth Rd, St Mary's, OH 45885.

Manassas, VA: Ole Virginia Hams, W4OVH, 1300-2200Z **July 21**, commemorating the 140th anniversary of the battle of 1st Manassas (Bull Run). 7.265 14.280 28.350 146.97. Certificate. Jeff Poulin, 8114 Lomond South Dr, Manassas, VA 20110.

Portland, OR: Idaho-Oregon DX Group, W7P, 0000Z **July 21** to 2359Z **July 22**, operating from the sternwheeler tug *Portland* during Museum Ships Weekend. 7.260 14.060 14.260 21.360. QSL. Vince VanDerHyde, PO Box 12941, Salem, OR 97309.

Ogdensburg, NY: Ogdensburg ARC, K2RUK, 1800-2400Z **July 21**, celebrating the maiden voyage of the USCGC *Maple* WLB-207. 7.240 14.240. Certificate, Walt Brady, N2YMY, 17 Birch Hts, Edwards, NY 13653.

Quincy, MA: USS *Salem* Radio Club, K1USN, 1330Z **July 21** to 1900Z **July 22**, during the 5th Museum Ships On The Air Weekend. 7.260 14.260 18.160 21.360. QSL. Robert Callahan, W1QWT, 56 Acorn St, Scituate, MA 02066.

Oshkosh, WI: Fox Cities ARC, W9ZL, 1300Z **July 27** to 2200Z **July 29**, during the Experimental Aircraft Association Airventure Fly-In. 28.345 14.245 14.085 7.245. Certificate. Wayne Pennings, WD9FLJ, 913 N Mason, Appleton, WI 54914.

Fairplay, CO: Park County Radio Club, AB0PC, 1600-2100Z **July 29**, for the 53rd annual World Championship Pack Burro Race. 7.250 14.307 21.375 28.465. Certificate. PCRC, PO Box 16, Bailey, CO 80421.

Canton, OH: Canton Amateur Radio Club, W8AL, 1300Z **July 27** to 2400Z **July 29**, for the annual Professional Football Hall of Fame Festival. 7.265 14.265 21.365. Donald E Perry, WQ8J, 968 Culverne Ave NW, Massillon, OH 44647.

Oklahoma City, OK: The W5HXL Memorial Net Club, W5HXL, 1300-1800Z **July 28**, commemorating Ham Holiday 2001. 14.030 14.060. QSL. W5HXL Memorial Net Club, PO Box 12194, Oklahoma City, OK 73157-2194.

Marcella, NJ: Nutley Amateur Radio Society, W2GLQ, 1500-2200Z **July 28**, operating from the New Jersey Camp of the Blind. General class frequencies. Certificate. Nutley ARS, American Red Cross Building, 169 Chestnut St, Nutley, NJ 07110.

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9×12 inch self-addressed, stamped envelope to the address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information.

Special Events Announcements: For items to be listed in this column, you must be an Amateur Radio club, and use the ARRL Special Events Listing Form. Copies of this form are available via Internet (**info@arrl.org**), or for a SASE (send to Special Requests, ARRL, 225 Main St, Newington, CT 06111, and write "Special Events Form" in the lower left-hand corner. You can also submit your special event information on-line at **www.arrl.org/contests/spevform.html**. Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; that is, a special event listing for **Jan** *QST* would have to be received by **Nov 1**. Submissions may be mailed to George Fremin III, K5TR, at the address shown on this page; faxed to ARRL HQ at 860-594-0259; or e-mailed to **events@arrl.org**. QST

STRAYS

I AM LOOKING FOR...

...misplaced friend William (Bill) Thompson, formerly W6RRI in the '60s, and former owner of Bill Thompson Radio in Culver City, CA. At last contact, he was residing in the San Fernando Valley, CA. E-mail John Owens, N7SEJ, at **jcowens3@juno.com**.

Previous • Next Strays

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

By Dan Henderson, N1ND
Contest Branch Manager

"Float Like a Butterfly, Sting Like a Bee": The 2000 ARRL November Phone Sweepstakes

It may be hard for our family and friends to believe, but almost every ham has at least one other hobby that helps occupy their time. Sports, music, art, astronomy—the list can go on and on.

Here at the ARRL, we have developed our own special collection. We aren't quite sure what to call it, but it probably is a subset of entomology. Each year we gather the most outstanding collection of insects, which in laymen's terms are those that have developed into outstanding examples of "contest bugs." We identify those who have climbed to the top of their various species, survived against their natural hazards, adapted to fight the man-made enemies and end up as the very elite of their species.

A lot of hard work has gone into studying those who migrate each November to the annual exhibit known as the ARRL November Phone Sweepstakes. Hatched from hard work and developing special traits to survive and excel, the metamorphosis from casual contester to section champion to division winner to Top Ten achiever is special.

The 2000 ARRL November Phone Sweepstakes once again was a showcase of the outstanding achievers in our special contest bug exhibition. A total of 1609 species submitted logs for the contest, representing over 2000 involved operators. This is an increase in logs submitted of 11% over 1999 and represents over 650,000 QSOs during the contest period. A total of 406 "Clean Sweeps" were claimed, which was almost identical with last year's 413, even with the addition of the new West Central Florida section this year.

The monarch butterfly may be the most majestic of any species, and can easily be equated to the Single Operator High Power category. Spreading his wings as the undisputed category champion for the third consecutive year is Rich, KE3Q, operating from WP3R. Rich continues his recent domination of the November Sweepstakes in posting a new overall category record of 425,280. Two other strong guest operator efforts took the runner-up slots in the category, with Mike, KH6ND, finishing second from KH7R and Stan, K8MJZ, taking third place from WP2Z. Rich's score was the only category division record (Southeastern) rewritten during this year's event.

Just as dominant in the Single Operator Low Power category was Rob, VE4GV, who took flight like a swarm of locusts and "devoured" his competition for a three-peat title with an overall record setting category score of 308,160. Finishing in the second place slot was Dan, WA2GO, operator at KL7Y. Finishing third, while setting a new Atlantic Division category record, was Jim, KB3AFT, operating from the K3CR club station. WA1LJD also set a New England division category record in 2000.

The Single Operator QRP category may carry only a small sting, but pound for pound is always a potent force in any contest. The small hornet with the biggest sting this year was Jim, K5RX, who lead the way with a score of 140,640. Al, K0FRP and Derrick, VE4VV, finished second and third, respectively. No Overall or Division records fell in this category this year.

Dangerous as a tsetse fly, Dennis, K7BV, set a new overall (and Pacific Division) record in the Single Operator Unlimited category with a score of 312,160, bettering the 300 K mark for the first time in the category and repeating his 1999 victory. Dennis' margin of victory was the largest in any of the entry categories. Will, AA4NC, op at W4MR, finished second. With a new Hudson Division record, Ray, W2RE, was able to hang on for a third-place finish. In addition, new division records were set by K1UQ (New England), W7OM (Northwestern), WA0SXV (Rocky Mountain) and AK6R (Southwestern).

Multioperator stations were as common as lightning bugs on a warm summer night and great efforts were seen in each Division in 2000. The K7IR station had the most consistent light of them all and pulled out victory with a score of 315,520, though they fell shy of the category and division records. While finishing second and third, the ops at K9NS and W1AW did set new division records (Central and New England, respectively).

Perhaps inspired by their biology instructors, the number of entries among school clubs almost doubled in 2000. Congratulations to the W9PU Indiana University-Purdue University at Indianapolis for winning the second annual Mark Smith, KD4JLC, Memorial plaque awarded to the top scoring overall college or university School Club entry. IU-PUI edged out W7ASU, the competitors at Arizona State University in a close category battle—180,480 to 174,560.

Two traditional November Sweep-

Top Ten

Single Operator, QRP

K5RX	140,640
K0FRP	113,100
VE4VV	110,418
N0UR	87,516
K1NU	70,840
W0ETT	66,728
W7YAQ	64,938
NA4CW	62,568
K9ZO	61,304
WA8ZBT	61,280

Single Operator, Low Power

VE4GV	308,160
KL7Y (WA2GO, op)	270,400
K3CR (KB3AFT, op)	229,440
VE5SF	219,680
K6LA	216,000
KK9A	215,040
K5KA	214,720
K7QQ	211,200
N0KK	208,480
K4XU	208,402

Single Operator, High Power

WP3R (KE3Q, op)	425,280
KH7R (KH6ND, op)	354,720
WP2Z (K8MJZ, op)	353,440
W7WA	342,720
W5KFT (K5TR, op)	340,640
WB0O	332,160
K6LL	330,560
W0SD (WD0T, op)	326,400
K4XS	324,160
VE6JY (VE5MX, op)	320,480

Single Operator, Unlimited

K7BV	312,160
W4MR (AA4NC, op)	239,680
W2RE	228,784
W4MYA	227,680
N2MM	223,040
K6RIM	205,600
W4NF	203,040
W9BS	199,360
K6XX	196,800
N5ZC	194,080

Multi-Operator

K7IR	315,520
K9NS	294,080
W1AW	290,400
W6EEN	287,360
W6YX	283,680
W5TM	273,920
W0AIH	272,160
N6KI	251,360
K6NO	249,920
K1TTT	248,480
KR6RF	248,480

School Club (all classifications)

W9PU	180,480
W7ASU	174,560
W4AQL	145,280
W5YM	143,840
K4KDJ	115,182
W7UQ (KL9A, op)	107,744
K0RHS	89,096
W6ISQ	80,000
WA5BU	76,692
N9UC (WO9S, op)	64,144

stakes powerhouse clubs—the Northern California Contest Club and the Potomac Valley Radio Club—staged a great head-to-head battle in the Unlimited Affiliated Club Competition. However, a revitalized Society of Midwest Contesters brought out participants in record numbers for their club, and won the Unlimited category. Congratulations are in order for the Southern California Contest Club who edged out the Mad River Radio Club in the Medium Club category. In the Local Club division, the River City Contesters tallied a strong victory over the Hudson Valley Contesters and DXers. A total of 74 clubs submitted the minimum of three logs required for participation in this exciting component of Sweepstakes.

Collecting call signs from those with the contest bug has long been one of the great parts of our hobby. Annually, the November Phone Sweepstakes is one of the most popular on-the-air events sponsored by the ARRL. Instead of butterfly nets and jars to catch the prime species, now is the time to start working on antennas and strategies to help you snare those rare species while working your way to the coveted sweep. The 2001 ARRL November Phone Sweepstakes will take place on November 17-19. Good luck as you start to build your collection of these fascinating "insects."

Plaque Winners

Division	*Category*	*Winner*	*Sponsor*
Overall	Single Operator High Power	WP3R (KE3Q, op)	Carl Cook, AI6V
Overall	Single Operator Low Power	VE4GV	Ken Adams, K5KA
Overall	Single Operator QRP	K5RX	QRP Amateur Radio Club International
Overall	Single Operator Unlimited	K7BV	
Overall	School Club College Division	W9PU	Mark Smith, KD4JLC, Memorial
Overall	Multioperator	K7IR	Central Texas DX & Contest Club
Atlantic	Single Operator High Power	K3MM	North Coast Contesters
Atlantic	Single Operator Low Power	K3CR (KB3AFT, op)	
Atlantic	Single Operator QRP	N3UR	
Atlantic	Single Operator Unlimited	N2MM	
Atlantic	Multioperator	WY3T	Mark Sickmeyer, KB3GJ, Memorial
Central	Single Operator High Power	K9XD (K9PG, op)	Society of Midwest Contesters
Central	Single Operator Low Power	KK9A	Society of Midwest Contesters
Central	Single Operator QRP	K9ZO	Don Haney, W9WW
Central	Single Operator Unlimited	W9BS	Society of Midwest Contesters
Central	Multioperator	K9NS	Don Haney, W9WW
Dakota	Single Operator High Power	WB0O	Minnesota Wireless Association
Dakota	Single Operator Low Power	N0KK	Minnesota Wireless Association
Dakota	Single Operator QRP	N0UR	Tod Olson, K0TO
Dakota	Single Operator Unlimited	K0AD	Minnesota Wireless Association
Dakota	Multioperator	KR0B	In Memory of Jim Dokmo, K0FVF, Minnesota Wireless Association
Delta	Single Operator High Power	W5WMU	
Delta	Single Operator Low Power	NA4K	
Delta	Single Operator QRP	K4OOO	
Delta	Single Operator Unlimited	WQ5L	
Delta	Multioperator	W4CAT	
Great Lakes	Single Operator High Power	K8DX	North Coast Contesters
Great Lakes	Single Operator Low Power	W8MJ	Mad River Radio Club
Great Lakes	Single Operator QRP	N8IE	
Great Lakes	Single Operator Unlimited	N8SNM	
Great Lakes	Multioperator	N8HR	
Hudson	Single Operator High Power	K2UG	
Hudson	Single Operator Low Power	W2ENY	
Hudson	Single Operator QRP	K2DW	
Hudson	Single Operator Unlimited	W2RE	
Hudson	Multioperator	KY2J	
Midwest	Single Operator High Power	N0AC	
Midwest	Single Operator Low Power	W0MW	
Midwest	Single Operator QRP		
Midwest	Single Operator Unlimited	K0INR	Kirk Pengelly, N0KK
Midwest	Multioperator	W0NO	
New England	Single Operator High Power	WB1GQR (W1SJ, op)	Ed Parsons, K1TR
New England	Single Operator Low Power	WA1LJD	
New England	Single Operator QRP	K1NU	QRP Club of New England
New England	Single Operator Unlimited	K1UQ	
New England	Multioperator	W1AW	
Northwestern	Single Operator High Power	W7WA	
Northwestern	Single Operator Low Power	KL7Y (WA2GO, op)	
Northwestern	Single Operator QRP	W7YAQ	
Northwestern	Single Operator Unlimited	W7OM	
Northwestern	Multioperator	W7GG*	
Pacific	Single Operator High Power	KH7R (KH6ND, op)	
Pacific	Single Operator Low Power	KS6H	Jim Hollenback, NK6L
Pacific	Single Operator QRP	W6LPW	
Pacific	Single Operator Unlimited	K6RIM*	
Pacific	Multioperator	W9YX	
Roanoke	Single Operator High Power	W2CS	
Roanoke	Single Operator Low Power	W4OC	
Roanoke	Single Operator QRP	KO4PY	NoVa QRP Group
Roanoke	Single Operator Unlimited	W4MYA	
Roanoke	Multioperator	W4MR	Shenandoah Valley ARC
Rocky Mountain	Single Operator High Power	K7UP (AA5B, op)	
Rocky Mountain	Single Operator Low Power	K0UK	
Rocky Mountain	Single Operator QRP	K0FRP	
Rocky Mountain	Single Operator Unlimited	WA0SXV	
Rocky Mountain	Multioperator	K7TD	
Southeastern	Single Operator High Power	WP2Z (K8MJZ, op)*	
Southeastern	Single Operator Low Power	W4WA	
Southeastern	Single Operator QRP	NA4CW	
Southeastern	Single Operator Unlimited	N4DL	
Southeastern	Multioperator	K4WCF	
Southwestern	Single Operator High Power	K6LL	
Southwestern	Single Operator Low Power	K6LA	
Southwestern	Single Operator QRP	N7VY	Ray and Donna Day, N6HE and N6HTH
Southwestern	Single Operator Unlimited	AK6R	
Southwestern	Multioperator	W6EEN	
West Gulf	Single Operator High Power	W5KFT (K5TR, op)	
West Gulf	Single Operator Low Power	K5KA	Gator Bowen, N5RZ
West Gulf	Single Operator QRP	WA8ZBT*	
West Gulf	Single Operator Unlimited	N5ZC	
West Gulf	Multioperator	W5TM	Oklahoma DX Association
Canada	Single Operator High Power	VE6JY (VE5MX, op)	
Canada	Single Operator Low Power	VE5SF*	
Canada	Single Operator QRP	VE4VV	
Canada	Single Operator Unlimited	VE3VSM	
Canada	Multioperator	VE6AO	

*The plaque was awarded to the second-place division score because the division winner also won the overall competition. Unsponsored plaques may be purchased for $60 each by contacting the ARRL Contest Branch Manager.

SOAPBOX

I had a great time doing this contest. I ran a relatively small station, but got a good score anyway. I exceeded all my goals. I hope to upgrade my station and beat my score by far next year (AA1UZ)… Beam got stuck at 90 degrees. Not too many sections this time. Wait till next year (AD4IE)… It is hard to believe what I achieved with only a simple wire antenna (AE5Q)… This my first sweep! Learned that I need to work on my low band antennas (AK4ST)… Don't remember ever getting a sweep within 6 hours (K1AM)… A hearty welcome to VY1MB (K1HT)… This was a great training event for two new, young contesters. My son, Sander (KB1FPU) is 10 years old, and his friend, Chris (KB1ELV) is 12 (K1IR)... N1YHO, age 11, in his first contest did remarkably well with the computer logging program and often had the contacts on the screen before the senior op figured out who was calling! It must be nice to have ears that work like that! He eventually took over the radio and did a lot of the searching and gave us a sweep (K1LU)… My first experience with QRP. It had its good times and bad. Had fun with 80 meters late Saturday night and early Sunday morning. The fun ran out when I got swallowed up in the rush during the last few hours of the contest (K4OOO)… It is sobering to think of how much fun millions more people could have if they knew about Sweepstakes weekends (K5VG)… The contest bug bit new ham Mark, KD7KUN, big time, thanks to SS. He's blaming the rest of us for having to upgrade now (K7PAR)… Having an 11 year old as a partner sure makes you feel old (K9IG)… XYL sees me in a whole new light after watching my Sweep Dance (KB7PKC)… First I went deer hunting, got my deer, then I went multiplier hunting. Got a 9-point buck and missed some multipliers. Hope I can do as well next year (KB9KEG)… Life's too short for QRP (KC5R)… Oh, the agony of coming up just short of a clean sweep (KE0Z)… NWT was easier to bag than the NFL (KE4OAR)…

It was a good way to sharpen my operating skills and a good chance to listen closer for those weak stations out (KO6RM/5)… A terrible roller coaster ride that eventually took me past my goals for this contest. Whew! (KS4XG)… I knew it was going to be a good day when I heard two VE9s working each other on 10-meters. The boys are really getting the hang of Sweepstakes (N0AX)… Close multi-op scores between us and K0DE—a fine pair of contest operators at 12 and 13 years old! Thanks to Steve, N2IC, Rip, NV0M, and Ellie, N0QCX for helping get young people interested in the hobby (N0HF)… Lots of considerate operators this year helping newcomers to be a part of contest (N0ND)… First SS since the mid-50s. Made an unexpected sweep. The last section was North Florida (N4IG)… Only my second SS, but what a blast! I'll definitely be back. Didn't have the nerve to call CQ so it was "search and pounce" the entire time. Most of the stations were very courteous (N4VYW)… W1AW was contact #1 and a clean sweep, what a thrill for an upgraded tech plus (N8KIE)… A surprise snow shower made Sunday good to stay home and contest (NI4S)… I can't operate HF effectively from my apartment in the city, so for this contest I drove up north to my mother's house. The comfortable accommodations, relatively noise-free RF environment and home cooked meals make Mom's place the best contest ranch in the world (VE3VSM)… This was my first SS. Look out, VY1JA, here I come! (VY1MB)… I worked all summer long installing stacked beams on the tower and the 80-meter dipole I put up an hour before the contest outperformed them all. Sweep in 10 hours (W4NF)… We heard more schools in the 'S' category this year. I'm glad to see that our competition is growing (W7ASU)… How I could S&P for 20 hours and never hear a "CQ Contest" from my own section is a mystery to me! It certainly has never happened before (WK5K).

Affiliated Club Competition

	Score	Entries
Unlimited Category		
Society of Midwest Contesters	14,552,734	211
Northern California Contest Club	14,152,580	123
Potomac Valley Radio Club	12,213,356	146
Yankee Clipper Contest Club	6,672,154	90
Minnesota Wireless Assn	5,832,208	69
Medium Category		
Southern California Contest Club	4,504,436	38
Mad River Radio Club	4,444,404	45
Florida Contest Group	3,996,490	43
Tennessee Contest Group	2,923,442	34
North Texas Contest Club	2,883,116	28
South East Contest Club	2,676,454	24
Frankford Radio Club	2,161,800	28
Western Washington DX Club	2,002,078	18
North Coast Contesters	1,835,462	18
Oklahoma DX Assn	1,614,748	13
Central Texas DX and Contest Club	1,358,588	13
Rochester (NY) DX Assn	1,089,474	21
Texas DX Society	1,080,556	10
Motor City Radio Club	1,010,610	25
Willamette Valley DX Club	947,572	7
Kentucky Contest Group	872,410	12
Order of Boiled Owls of New York	755,844	7
Grand Mesa Contesters	621,988	10
Radio Amateurs of Northern Vt	590,408	4
Central Arizona DX Assn	589,194	8
Central Oregon DX Club	574,052	3
Woodbridge Wireless	564,440	8
Kansas City DX Club	550,226	6
Salt City DX Assn	414,824	4
South Jersey Radio Assn	381,176	15
Schenectady ARA	362,224	6
Northern Arizona DX Assn	345,872	6
Rip Van Winkle ARS	335,784	7
AK-SAR-BEN	331,900	9
Hazel Park ARC	328,276	16
Eastern Iowa DX Assn	313,152	6
Western New York DX Assn	310,496	4
Ozark Contest Club	304,652	6
Magnolia DX Assn	287,108	4
Colorado QRP Club	271,864	4
Bergen ARA	269,438	14
West Park Radiops	239,898	7
Twin City Ham Club	236,124	4
Central Michigan ARC	181,444	8
Motorola ARC	165,642	6
Mile High DX Assn	162,032	3
Green River Valley ARS	159,462	4
Northrop Grumman Radio Club	134,308	4
Murgas ARC	118,306	6
Mother Lode DX/Contest Club	110,716	5
Six Meter Club of Chicago	93,486	5
Carolina DX Assn	89,646	3
Poughkeepsie ARC	62,748	3
Fresno ARC	59,742	3
L'anse Creuse ARC	55,076	3
Southern California DX Club	41,622	4
Radio Club of Tacoma	34,180	3
Local Category		
River City Contesters	1,345,046	7
Hudson Valley Contesters & DXers	1,018,214	7
Utah Contest Club	403,904	3
Sussex County ARC	396,634	4
Northern New York Contest Club	389,668	10
Eastern Connecticut ARA	360,870	4
Southwest Idaho Contest Club	351,772	4
Great Falls Area ARC	329,310	4
Great South Bay ARC	171,426	6
Redmond Top Key Contest Club	156,716	4
West Essex ARC	121,100	4
Baton Rouge ARC	105,870	3
Kanawha ARC	103,570	3
10-70 Repeater Assn	101,268	5
Hamfesters Radio Club	101,198	6
Schenectady Museum ARA	71,812	3
Albemarle ARC	42,634	3

Top Five

Boxes list call sign, score and class (Q = QRP, A = Low Power, B = High Power, M = Multioperator, U = Single op unlimited).

Northeast Region (New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections)			Southeast Region (Delta, Roanoke and Southeastern Divisions)			Central Region (Central and Great Lakes Divisions; Ontario Section)			Midwest Region (Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)			West Coast Region (Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT/Yukon Sections)		
WB1GQR (W1SJ, op)	261,920	B	WP3R (KE3Q, op)	425,280	B	K8DX	252,000	B	W5KFT (K5TR, op)	340,640	B	KH7R (KH6ND, op)	354,720	B
K3MM	260,000	B	WP2Z (K8MJZ, op)	353,440	B	K9XD (K9PG, op)	243,040	B	WB0O	332,160	B	W7WA	342,720	B
W2GG	251,040	B	K4XS	324,160	B	K8ND	237,440	B	W0SD (WD0T, op)	326,400	B	K6LL	330,560	B
KK1L	242,880	B	WC4E	253,920	B	N2BJ	237,120	B	K7UP (AA5B, op)	310,400	B	VE6JY (VE5MX, op)	320,480	B
N2MF	242,400	B	W5WMU	252,800	B	WB9Z	236,480	B	W0GU (K9TM, op)	307,360	B	N6BV	306,240	B
K3CR (KB3AFT, op)	229,440	A	W4OC	183,200	A	KK9A	215,040	A	VE4GV	308,160	A	KL7Y (WA2GO, op)	270,400	A
WA1LJD	201,120	A	W4WA	178,880	A	W8MJ	195,040	A	VE5SF	219,680	A	K6LA	216,000	A
K1HTV	183,122	A	NA4K	118,720	A	ND8DX	170,080	A	K5KA	214,720	A	K7QQ	211,200	A
KZ1M	164,800	A	NQ4U	113,444	A	WX9U	148,160	A	N0KK	208,480	A	K4XU	208,402	A
K1VUT	145,548	A	WA8WV	110,080	A	W8DD	144,160	A	WQ5W	185,760	A	K6RO	200,480	A
K1NU	70,840	Q	NA4CW	62,568	Q	K9ZO	61,304	Q	K5RX	140,640	Q	W7YAQ	64,938	Q
K2DW	53,746	Q	K4OOO	36,120	Q	N8IE	52,480	Q	K0FRP	113,100	Q	N7VY	40,170	Q
WG1Z	48,980	Q	KQ4YY	19,520	Q	WA8RCN	34,080	Q	VE4VV	110,418	Q	N7JXS	35,856	Q
N3UR	48,184	Q	N5IB	13,050	Q	AF9J	27,406	Q	N0UR	87,516	Q	W6LPW	34,992	Q
AA2VK	42,924	Q	KO4PY	12,540	Q	NS8O	19,458	Q	W0ETT	66,728	Q	W6MOT (WB6OIL, op)	30,076	Q
W2RE	228,784	U	W4MR	239,680	U	W9BS	199,360	U	N5ZC	194,080	U	K7BV	312,160	U
N2MM	223,040	U	(AA4NC, op)			K9LU	184,960	U	WA0SXV	140,000	U	K6RIM	205,600	U
K1UQ	187,360	U	W4MYA	227,680	U	N8SNM	150,880	U	K0AD	106,018	U	K6XX	196,800	U
N1XS	158,400	U	W4NF	203,040	U	NU8Z	140,640	U	K8EI	99,698	U	K6AUC	185,920	U
AF1G (N1HKO, op)	148,046	U	N2QT	174,720	U	W9IU	133,760	U	W7CT	97,328	U	AK6R	183,122	U
			KV3R	145,760	U									
W1AW	290,400	M	W4DC	229,760	M	K9NS	294,080	M	W5TM	273,920	M	K7IR	315,520	M
K1TTT	248,480	M	K4WCF	223,040	M	W0AIH	272,160	M	W0NO	241,440	M	W6EEN	287,360	M
KY2J	244,800	M	N4PK	222,080	M	W9YV	242,080	M	K7TD	223,040	M	W6YX	283,680	M
K2XR	221,600	M	W4CAT	186,880	M	KE9I	239,840	M	N5XU	218,720	M	N6KI	251,360	M
WM2V	219,520	M	W4AN	183,200	M	N8HR	180,594	M	KR0B	218,400	M	K6NO	249,920	M

Scores

Within each Section, scores are listed in descending order by entry category, with single operators followed by multioperators. Line scores list call sign, score QSOs, multipliers, hours, class (B = High Power, A = Low Power, Q = QRP, U = Single Unlimited, M = Multioperator, S = School Club).

1

Connecticut

W1WEF 242,056 1532 79 24 B
K1YR 82,080 513 80 8 B
WV1M 73,760 461 80 11 B
KA1VMG 15,444 117 66 7 B
W1CRS 104,160 651 80 13 A
W1RPG 72,206 457 79 17 A
NX1Q 53,920 337 80 9 A
W1TS 42,818 271 79 16 A
W1AZT 38,036 257 74 12 A
W1SAM 22,880 176 65 6 A
WB8IMY 22,620 145 80 11 A
W1CTN 22,050 175 63 3 A
K1RO 17,936 118 76 3 A
K1RFD 8,624 98 44 2 A
K3EIN 6,408 89 36 5 A
N4QX 2,320 40 29 2 A
NT1N 342 19 9 1 A
KC1FB 9,752 106 46 8 Q
W1VT 96 8 6 1 Q
N1XS 158,400 990 80 18 U
W1QK 98,880 618 80 24 U
N1NQD 94,400 590 80 21 U
KE1IH 39,520 247 80 12 U
N1MM 37,576 244 77 6 U
N1MD 33,970 215 79 11 U
K1JN 18,328 116 79 6 U
WS1F 15,048 99 76 6 U
W1AW (NT1N,W9UR,N4QX,AA1GW, ops) 290,400 1815 80 24 M
W1NRG 41,426 269 77 5 M

Eastern Massachusetts

N1DD 148,480 928 80 24 B
W1AF (N1QZY, op) 27,974 197 71 11 B
K1GU 21,344 184 58 7 B
K1VUT 145,548 933 78 24 A
K1EP 122,560 766 80 24 A
K1HT 88,322 559 79 11 A
K1KG 79,520 497 80 20 A
KC1SQ 63,990 405 79 14 A
K5MA 58,400 365 80 9 A
WA1OLV 53,424 371 72 10 A
K1YA 44,104 298 74 17 A
NF1A 29,032 191 76 13 A
W1TW 19,320 161 60 9 A
WX1H 17,820 162 55 10 A
N1QVN 14,098 133 53 14 A
WA1OFR 13,348 94 71 14 A
KD1FF 12,720 120 53 9 A
K1WCC 10,584 108 49 5 A
AA1UZ 9,984 104 48 6 A
N1OPF 3,480 58 30 4 A
K1NU 70,840 460 77 19 Q
WG1Z 48,980 310 79 22 Q
K1UQ 187,360 1171 80 24 U
K1JE 142,080 888 80 22 U
N1AU 45,188 286 79 12 U
K1TH 40,020 290 69 6 U
W1RY 14,688 102 72 10 U
K1LU (+N1YHO) 71,100 450 79 15 M
K1IR (+KB1FPU,KB1ELV) 65,096 412 79 17 M
N1OEF (+logger) 13,664 122 56 8 M

Maine

K1MY 75,456 524 72 6 B
KT1O 99,698 631 79 14 A
NY1S 55,626 381 73 12 A
N1LW 45,820 290 79 15 A
N1NUA 45,140 305 74 18 A
KD1O 42,768 297 72 16 A
KB1EST 17,420 134 65 13 A
N1MHB 16,512 129 64 8 A
K1PQS 32,688 227 72 13 U
WA1HFF (+WA3CQW,KB1DQH, ops) 107,598 681 79 19 M

New Hampshire

K1DG 92,160 576 80 6 B
WA1LJD 201,120 1257 80 24 A
W1DAD 130,350 825 79 23 A
W1VL 52,456 332 79 20 A
K1EPJ 40,764 258 79 12 A
K1DAN 36,000 225 80 20 A
K1TR 30,592 239 64 3 A
W1XV 12,720 120 53 1 A
AC1J 12,312 108 57 4 A
WV1G 10,368 108 48 8 A
NN1R (K1RO, op) 1,452 33 22 1 A
KB1T 1,160 29 20 2 A
WW1O 2 1 1 1 A
AF1G (N1HKO, op) 148,046 937 79 22 U
KC1F 91,040 569 80 7 U
WA1ZYX 73,920 462 80 15 U
NM1W 52,960 331 80 12 U
WA1VKO (+AF1T) 194,560 1216 80 22 M
KZ1O (+N1OEZ, N1TMZ) 78,880 493 80 20 M

Rhode Island

K1AM 190,560 1191 80 22 B
W1OP (K1PLX, op) 146,880 918 80 22 B
N1HRA 109,824 704 78 14 B
K1VSJ 69,120 432 80 16 A
W1BAT 8,400 100 42 8 A
K4IJK 3,596 58 31 6 A
WV1H 100,962 639 79 16 M
WA1ABC (W1HI,N1SMK, ops) 24,064 188 64 12 S

Vermont

WB1GQR (W1SJ, op) 261,920 1637 80 24 B
KK1L 242,880 1518 80 24 B
K1HD 12,800 80 80 8 B
W1NEK 58,108 398 73 5 A
W1ECH 51,680 323 80 7 A
W1ZN 38,376 246 78 13 A
KD1R 35,784 252 71 11 A

Western Massachusetts

K1BZM 67,392 432 78 14 B
KZ1M 164,800 1030 80 23 A
AA1EY 78,240 489 80 17 A
K5ZD 60,000 375 80 6 A
N1FUS 27,880 205 68 12 A
KB1EAA 6,384 84 38 7 A
W1CSM 9,900 99 50 4 Q
W1TO 44,872 284 79 10 U
K1TTT (+NJ1F) 248,480 1553 80 24 M
NC1I (+AC1T,W1QA,N1DPM,WA1LPJ, WA1MUH) 196,160 1226 80 24 M
W1MBT (+K1TS) 37,752 242 78 9 M

2

Eastern New York

K2UG 188,000 1175 80 24 B
N2LH 96,480 603 80 18 B
W2GDJ 60,640 379 80 7 B
KD2N 13,356 106 63 4 B
W2ENY 138,560 866 80 20 A
K2UF 116,288 736 79 21 A
N2MFZ 84,864 544 78 19 A
WB2SPN 39,480 282 70 10 A
WD2K 39,184 248 79 15 A
N2MTG 34,080 240 71 15 A
WB2KHE 29,380 226 65 15 A
WK2S 25,806 187 69 9 A
N3EMF 21,280 190 56 19 A
N2UZQ 19,760 152 65 9 A
K2RI 18,290 155 59 7 A
KF2SC 18,060 129 70 11 A
N2XG 17,696 158 56 11 A
KC2AGM 12,032 94 64 24 A
W2WC 10,998 117 47 24 A
N2HTT 9,500 95 50 5 A
KE2WO 9,486 93 51 4 A
K2PH 4,788 63 38 12 A
N2BZP 2,862 53 27 4 A
KA2MCU 2 1 1 1 A
K2DW 53,746 349 77 18 Q
WV2N 41,180 290 71 12 Q
W2RE 228,784 1448 79 24 U
KY2J (+WA2JQK) 244,800 1530 80 24 M
W2PS (+K2SCL) 172,960 1081 80 24 M
WT4Q 160,370 1015 79 23 M
N2POS 118,880 743 80 22 M
NO2X (+NN2V) 100,480 628 80 18 M
N2SQW (+KC2DMI) 46,224 321 72 16 M
W2SZ (KB1DDS,KC2HAJ,KC2BUT, ops) 25,856 202 64 12 M

Northern New Jersey

KB2POP 141,884 898 79 22 B
K2ZB 41,888 272 77 15 B
K2APF 30,248 199 76 12 B
W2UDT 24,254 181 67 4 B
N2CFD 22,512 168 67 9 B
N2ROM 18,354 133 69 8 B
K4BNC 12,800 80 80 8 B
KZ2A 12,220 94 65 12 B
NA2AA 57,600 360 80 9 A
K2WA 52,800 330 80 13 A
W2DEN 34,080 240 71 11 A
W2PI 34,040 230 74 13 A
WA2LXE 33,512 236 71 17 A
KG2MV 30,100 215 70 10 A
WI2W 27,832 196 71 12 A
W2FMB 22,496 152 74 11 A
K2DBK 20,400 150 68 8 A
WA2QHL 15,872 124 64 11 A
KB2UTD 11,232 108 52 6 A
N3RB 10,890 99 55 8 A
AD2P 10,700 107 50 24 A
K2AMI 9,000 100 45 9 A
N2NYR 8,736 91 48 4 A
WB2HID 7,744 88 44 5 A
KA2ANF 7,176 78 46 6 A
WA2ASQ 6,666 101 33 3 A
WB2AZE 2,640 44 30 2 A
KA2NJP 2,232 36 31 6 A
KO2OK 2,128 38 28 3 A
K2YLH 690 23 15 2 A
W2AZK 42,300 282 75 20 Q
W2JEK 1,700 34 25 4 Q
N2KJM 77,280 483 80 13 U
N2TTT 38,500 250 77 19 U
W2LE 30,800 200 77 6 U
W2NO 13,650 91 75 6 U
K2XR (+K2OWR) 221,600 1385 80 23 M
WV2V (+ N2NHN) 170,720 1067 80 21 M
N2ED (+KC2GDT, KF2EW) 168,960 1056 80 24 M
AB2DE 119,808 768 78 22 M

Northern New York

N2USN 75,922 493 77 11 B
NS2P 74,690 485 77 20 A
NG2C 62,868 403 78 24 A
NN2L 16,800 105 80 11 A
WB2BAU 13,750 125 55 9 A
N4TW 11,656 124 47 4 A
WZ2T 29,512 217 68 12 Q
W2NNY (N2JNZ, op) 18,300 150 61 12 Q
K2NNY (AE2T, AF2K,KA2IYB, N2TWI,K2CS, ops) 106,080 663 80 24 M

NYC-Long Island

AD2S 105,000 700 75 14 B
KD2RD 137,920 862 80 24 A
KS2G 99,200 620 80 17 A
K2DO 82,732 559 74 24 A
NY6DX 66,400 415 80 24 A
NI2P 59,840 374 80 17 A
KA2D 55,360 346 80 15 A
N2PN 42,812 278 77 10 A
N2MUN 37,296 252 74 15 A
KG2BI 33,152 224 74 11 A
KC2FYJ 21,840 168 65 16 A
K2TV 18,240 160 57 6 A
N2AMC 17,628 113 78 20 A
N2KYP 15,128 124 61 5 A
WA2RXS 11,172 114 49 8 A
KA6WBQ 5,670 81 35 7 A
WA2LUY 1,512 28 27 8 A
KC2CJI 850 25 17 2 A
AA2VK 42,924 294 73 21 Q
N2FF 89,760 561 80 13 U
K2QMF 50,402 319 79 12 U
WA2RF 30,108 193 78 13 U
WM2V (+N2GA) 219,520 1372 80 24 M
K2YGM 49,120 307 80 12 S

Southern New Jersey

N2OO 36,846 267 69 3 B
K1JT 82,080 513 80 19 A
KV2M 35,568 247 72 22 A
W2ORA 35,000 250 70 14 A
N2XYZ 25,308 171 74 17 A
W2MC 15,458 131 59 8 A
WR2F 15,390 135 57 10 A
KF2YX 14,224 127 56 7 A
KC2HDB 12,642 129 49 11 A
WA4FRA 12,342 121 51 13 A
K2MK 10,918 103 53 2 A
WA2IAU 2,700 50 27 7 A
KD2P 1,922 31 31 3 A
K2BL 220 11 10 1 A
W5KI 144 9 8 1 A
W2CE 26,838 189 71 24 Q
N2MM 223,040 1394 80 23 U
N1RK 52,640 329 80 17 U
K2WB 19,698 147 67 10 U
N2SCJ 19,584 144 68 6 U
W2YC(+KA2OSV,WB2CAK,WA2NPD, KA2DOT,WA2TML,WA2LET,WA3KRL) 59,092 374 79 21 M

Western New York

N2MF 242,400 1515 80 24 B
WB2WPM 65,096 412 79 14 B
WB2OSM 62,088 398 78 13 B
WR2V 29,032 191 76 11 B
KC2DGC 9,200 100 46 6 B
N2MG 2,376 44 27 2 B
K1PY 139,360 871 80 24 A
KG2AU 101,120 632 80 19 A
W2KA 96,480 603 80 17 A
NA2A 69,520 440 79 16 A
N2CU 62,240 389 80 7 A
K2CF 42,772 289 74 16 A
W2FE 39,300 262 75 20 A
N2XT 37,920 237 80 18 A
W2EZ 31,780 227 70 15 A
N2OPW 29,946 217 69 15 A
KF2VX 29,106 189 77 10 A
KG2NI 19,584 153 64 8 A
N2LQQ 15,960 140 57 6 A
N2AMG 15,756 101 78 11 A
KA2CNG 14,416 136 53 6 A
KC3HN 13,664 122 56 6 A
K9EEE 13,038 123 53 7 A
W1TY 12,800 80 80 20 A
KC2GEP 12,650 115 55 8 A
K2KRB 10,080 105 48 8 A
WA2SRY 4,950 75 33 10 A
KG2DE 1,960 35 28 4 A
N2RKL 70 7 5 1 A
N2DM 9,768 111 44 12 Q
K2FU 116,000 725 80 22 U
AA2MU 98,276 622 79 20 U
NG2P 36,160 226 80 9 U
N2UM 26,180 170 77 9 U
N2WK 20,124 129 78 7 U
W2RW 19,560 163 60 4 U
K2IWR (KB2FAF,KB2LUV,KB2NCW, N2MRE,N2ZPT, ops) 15,892 137 58 11 M
WB2ELW (W2IV,KC2DGC,K2KRG, K2CF,ops) 7,820 85 46 4 M
K2OE 9,546 111 43 7 S

3

Delaware

N3KW 158,632 1004 79 14 B
W3MAX 43,168 284 76 20 A
N8NA 25,090 193 65 4 A
W3TT (N9GG, op) 3,300 55 30 1 A
W3PP 145,920 912 80 16 U
NY3C 97,440 609 80 11 U

Eastern Pennsylvania

NE3H 61,936 392 79 9 B
AK3V 52,960 331 80 11 B
N3FA 39,200 245 80 10 B
W3AP 37,310 287 65 5 B
W3RT 37,914 267 71 14 A
N3CDC (K3BM, op) 37,130 235 79 10 A
N3WL 32,620 233 70 18 A
N3RM 28,500 190 75 8 A
W3MEL 22,932 147 78 11 A
W3SSS (+N0QJS) 21,760 160 68 10 A
KB3AGZ 21,646 137 79 11 A
AG3G 18,644 158 59 14 A
KE3TC 14,946 141 53 10 A
W3DWH 14,824 218 34 8 A
KE3OA 13,338 117 57 5 A
W3SD 9,870 105 47 3 A
WB3IZF 9,450 105 45 7 A
W3JM 5,412 82 33 24 A
KB3CRG 5,124 61 42 10 A
N9AX 4,624 68 34 4 A
WA2GBF 1,200 30 20 3 A
K2HVN/M 1,150 25 23 2 A
WB3AAL 11,680 146 40 7 Q
N3RN 2,496 48 26 2 Q
WA3LGG/M 300 15 10 2 Q
K3WW 110,560 691 80 13 U
W3FV 72,320 452 80 12 U
K3SV 59,906 389 77 11 U
KD3TB 24,382 167 73 8 U
WY3T (KA3PVA,W3DSX,N3JRW, W3BDR) 178,540 1130 79 24 M

Maryland-DC

K3MM 260,000 1625 80 24 B
W2GG 251,040 1569 80 23 B
K2PLF 218,720 1367 80 24 B
N3HXQ 147,680 923 80 24 B
K1DQV 103,680 648 80 14 B
K3GV 74,074 481 77 20 B
W3HVQ 70,784 448 79 14 B
K3IXD 68,256 432 79 11 B
W3EKT 48,096 334 72 9 B
W3REG 13,800 115 60 7 B
K1HTV 183,122 1159 79 24 A
W3SY 142,880 893 80 24 A
WR3Z 138,240 864 80 22 A
W3UJ 73,944 474 78 22 A
K3DNE 69,888 448 78 20 A
K3RA 65,096 412 79 9 A
N3UN 57,252 367 78 17 A
K3DSP 53,656 353 76 16 A
K3IRV 41,262 299 69 15 A
W3LEO 35,850 239 75 8 A
AI3M 32,232 237 68 24 A
KE2G 31,220 223 70 12 A
N3ZTZ 22,848 168 68 8 A
N3WK 21,190 163 65 7 A
K3TM 18,178 149 61 4 A
N3SEO 17,182 121 71 24 A
K3GEG 16,256 127 64 6 A
N3RQV 13,886 131 53 6 A
N3VEJ 12,296 116 53 8 A
KA3UIH 11,176 127 44 14 A
K3GHH 10,800 100 54 5 A
W3ERU 9,434 89 53 7 A
WB4ZHO 9,108 99 46 7 A
N3FX 6,952 79 44 4 A
WX3B 6,080 95 32 1 A
K3YDX 4,720 59 40 2 A
NC3Y 3,744 72 26 3 A
N3SZW 1,716 39 22 6 A
N3UR 48,184 317 76 16 Q
KA3TCC 3,570 51 35 24 Q
WD3P 18 3 3 1 Q
N3OC 110,560 691 80 14 U
K3PZN 102,858 651 79 15 U
N3AM 101,920 637 80 13 U
K3SA 81,760 511 80 9 U
W3YD 53,760 336 80 10 U
N3II 53,280 333 80 13 U
4U1WB (AJ3M, op) 31,524 222 71 8 U
N3HUV 28,880 190 76 10 U
W3ZJ 17,168 116 74 9 U
W3DAD 11,000 110 50 5 U
K3DI (+W3OQ, W3UL) 115,440 740 78 21 M
W3LJ (+K3NCO,W3IDT,K8DH) 86,584 548 79 24 M
W3FT (N3WD,N3NYC,K3ZZC,W3VP, W3QYL,N3ZNU,N3VEJ, ops) 52,206 339 77 22 M

Western Pennsylvania

K3TG 16,284 118 69 7 B
WA3GQU 4,828 71 34 24 B
K3CR (KB3AFT, op) 229,440 1434 80 24 A
WA3SES 118,184 748 79 14 A
N3IXR 102,410 665 77 22 A
AA3ML 38,628 261 74 13 A
AD8J 35,332 242 73 5 A
WA3HAE 32,266 221 73 6 A
KE3KD 23,296 182 64 9 A
N3YEA 22,304 164 68 13 A
W3JXP 21,294 169 63 24 A
WB3AVD 16,200 150 54 10 A
N3GJ 11,556 107 54 3 A
N3UE 42,818 271 79 19 U

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Alabama

K4WI 205,600 1285 80 20 B
W4NTI 60,356 382 79 13 A
KU4BL 30,150 201 75 22 A
AB4MT 18,720 120 78 11 A
NV4B 11,074 113 49 4 A
W5DLM 7,840 80 49 4 A
K4NVJ 2,970 55 27 5 A
KV4T (+KS4YT) 101,280 633 80 16 M

Georgia

K4BAI 158,560 991 80 19 B
K4SB 97,760 611 80 14 B
K4FYM 22,914 171 67 9 B
W4WA 178,880 1118 80 21 A
NJ8J 96,696 612 79 24 A
KT4Q 79,520 497 80 23 A
WX8V 55,536 356 78 20 A
AE4Y 47,576 313 76 9 A
N4VMD 40,650 271 75 17 A
AA4LR 37,296 259 72 7 A
K4KJ 36,704 248 74 12 A
W4KYW 15,540 105 74 9 A
K0HT 12,540 110 57 17 A
K4PTT 9,898 101 49 11 A
W4KTN 4,958 67 37 19 A
W4AN (+K4SZ,W4KXY,W4RLW, W4ATL,NX9O) 183,200 1145 80 24 M
W4AQL (W4EGT,KG4JKG,WJ2RM, KE4QLH, ops) 145,280 908 80 24 S

Kentucky

K9GX 213,458 1351 79 23 B
N4XM 13,224 116 57 3 B
W4LC 63,200 400 79 12 A
AG4CZ 61,712 406 76 20 A
AC4PY 40,194 261 77 15 A
KG4BIG 36,210 255 71 8 A
W4DES 31,200 200 78 10 A
AE4GH 26,352 183 72 11 A
KG4IOT 17,040 142 60 9 A
K4BAM 15,732 138 57 11 A
KD4ULE 14,848 116 64 12 A
KD4PYR 13,090 119 55 8 A
N4GN 6,716 73 46 2 A
WD8JAW 5,734 61 47 5 A
N4RZ 12,168 78 78 6 Q
KD4SN 56,320 352 80 23 U
K4IU 53,900 350 77 12 U

North Carolina

W2CS 234,080 1463 80 24 B
K4MA 222,880 1393 80 24 B
KS4XG 191,022 1209 79 23 B
WW4M 176,320 1102 80 21 B
NY4A (KI7WX, op) 120,960 756 80 14 B
N2BT 81,280 508 80 12 B
NT4D 44,800 280 80 9 B
WX4DX 28,500 190 75 11 B
W4YDY 14,784 132 56 5 B
K3KO 18 3 3 1 B
K4QPL 65,886 417 79 12 A
W4IDX 52,088 383 68 9 A
N5FPW 44,550 297 75 20 A
NI4S 32,200 230 70 13 A
N2WG 31,616 208 76 17 A
KF4VMT 21,004 178 59 5 A
WA4KE 18,240 152 60 8 A
AE4EC 15,876 126 63 7 A
AD4IE 15,732 138 57 5 A
K5EJL 15,048 132 57 5 A
K4NC 15,008 134 56 8 A
AE4NR 9,898 101 49 6 A
KS4S 6,868 101 34 2 A
N4IOZ 6,708 78 43 4 A
K4TMC 2,790 45 31 3 A
KO4PY 12,540 110 57 3 Q
W2VMX 11,526 113 51 6 Q
W4MR (AA4NC, op) 239,680 1498 80 24 U
W3GQ 45,280 283 80 12 U
N4ARW (+KA4APA,KU4JD,K4JRP) 8,584 116 37 8 M
W4ATC (KE4QIU,KG4JXE,KG4JXF, KF4RDN, ops) 1,836 34 27 11 M
WB4TOP (KB4VTJ,W4FMN,KD4BMA, KG4HJE, ops) 5,130 57 45 17 S

Northern Florida

K4VUD 252,320 1577 80 24 B
NF4A 97,812 627 78 10 A
NU4Y 81,120 507 80 14 A
KB4N 59,700 398 75 13 A
W0EBA 40,280 265 76 15 A
WB4OMM 24,806 157 79 8 A
WB4IHI 19,312 136 71 8 A
KD4BRJ 17,792 139 64 8 A
WA4VIY 16,506 131 63 9 A
W3TMZ 10,080 70 72 5 A
N4CYG 2,700 45 30 6 A
KQ4YY 19,520 160 61 13 Q

Puerto Rico

WP3R (KE3Q, op) 425,280 2658 80 24 B

South Carolina

W2JJC 163,040 1019 80 19 B
W4OC 183,200 1145 80 18 A
W8CNL 19,344 124 78 8 A
WA8OJR 19,328 151 64 6 A
W8PC 9,112 68 67 8 A
N4EE 2 1 1 1 A

Southern Florida

N4BP 240,800 1505 80 19 B
AD4TR 166,240 1039 80 23 B
K1PT 109,600 685 80 12 B
AE4SW 104,640 654 80 17 B
K9ES 75,768 492 77 24 B
W4SAA 41,100 274 75 20 B
K5EEE 42,174 297 71 19 A
WA4ASJ 40,800 272 75 18 A
K4RFK 26,784 186 72 9 A
AE4RO 26,334 171 77 9 A
KR4ZA 16,104 132 61 10 A
KG4ICF 15,120 120 63 8 A
KB4XE 8,300 83 50 6 A
WN4F 1,254 33 19 3 A
NA4CW 62,568 396 79 18 Q
KD4LIV 112 8 7 3 Q
N2NL 60,040 380 79 11 U
KD4GR 14,798 151 49 8 M
W4MOT (+KG4GEG) 7,332 78 47 9 M
KG4CHW 4,620 55 42 24 M

Tennessee

K4BP 130,560 816 80 16 B
AK4ST 89,280 558 80 18 B
K4LTA 85,952 544 79 13 B
K0EJ 71,102 487 73 6 B
W4TDB 32,518 229 71 10 B
N4PQV 15,680 140 56 3 B
W4OGG 11,832 87 68 5 B
KG4GCO 7,008 73 48 16 B
NA4K 118,720 742 80 12 A
NQ4U 113,444 718 79 22 A
KE4OAR 88,800 555 80 18 A
KG4CKX 56,160 360 78 13 A
W4DAN 47,550 317 75 12 A
W4NI 24,920 178 70 11 A
W4NZ 24,000 150 80 9 A
KW4JS 22,080 160 69 12 A
K4YZ 18,240 114 80 15 A
WB9BSH 17,934 147 61 14 A
KA4MRR 10,998 117 47 6 A
W4MEA 9,400 94 50 5 A
KC4URW 9,300 93 50 3 A
K4AMC 17,020 78 45 2 A
KK4QE 6,200 62 50 7 A
KF4YAY 1,890 45 21 6 A
K4OOO 36,120 258 70 15 Q
N4JN 14,560 112 65 7 U
W4CAT (K1KY,W4IV,KG4ENY, KQ6ID,W4RK,W4UR, ops) 186,880 1168 80 24 M
K4FUN (@NY4T)(W1ADE,KE4KMG, KR4FO,KF4AIG,NY4T,KF4GKN, ops) 110,758 701 79 22 M
KB4KA (+AA0BA) 96,538 611 79 19 M
AF4QB 61,256 403 76 22 M
N4FR (KA4OTB, KF4BBH, ops) 44,840 295 76 18 M

Virgin Islands

WP2Z (K8MJZ, op)
353,440 2209 80 24 B
KP2D (KP2N,NP2E,NP2W,WP2S, NP2DJ, ops)
84,056 532 79 13 M

Virginia

K4IQ 88,164 558 79 8 B
N3JT 64,448 424 76 8 B
W2YE 61,350 409 75 15 B
KE4VA 60,648 399 76 18 B
K5VG 26,492 179 74 6 B
W4YCZ 17,760 120 74 7 B
AF4MO 13,566 133 51 8 B
W4ZYT 13,452 114 59 3 B
N6MW 12,800 80 80 5 B
AE4IX 12,688 122 52 8 B
N4GU 12,312 114 54 2 B
N4MM 84,000 525 80 21 A
K7SV 82,002 519 79 12 A
W4YE 76,472 484 79 17 A
WM3T 61,908 402 77 16 A
W4VG 58,344 374 78 17 A
AD4DG 52,104 334 78 12 A
WA4QDM 51,508 326 79 13 A
N4VYW 50,616 333 76 19 A
KE4VH 50,560 316 80 14 A
AL7HW 45,024 336 67 12 A
N4JED 42,750 285 75 17 A
K3MZ 33,984 236 72 12 A
W4SD 32,480 203 80 8 A
WR4I 30,000 200 75 8 A
K4PZC 28,644 186 77 15 A
AA4KD 26,656 196 68 19 A
WA4FXX 25,740 198 65 12 A
KC9LC 24,888 204 61 9 A
KU4FP 23,328 162 72 11 A
KF4UUI 18,408 156 59 10 A
K3MT 17,980 155 58 15 A
K4UVT 15,092 98 77 9 A
K3EP 15,004 121 62 10 A
KF4MFQ 13,464 102 66 10 A
K3IZ 11,000 125 44 5 A
N4DEN 10,560 88 60 8 A
N4EL 9,870 105 47 5 A
KS4JB 8,550 95 45 6 A
WA0DYJ 7,740 90 43 9 A
W4PWF 4,270 61 35 3 A
KG4DVC 2,772 42 33 13 A
W2HD 50 5 5 1 A
N3TG 24 4 3 1 A
W4MYA 227,680 1423 80 24 U
W4NF 203,040 1269 80 21 U
N2QT 174,720 1092 80 22 U
N4SR 24,486 159 77 7 U
K4HR 18,942 123 77 10 U
W4HJ 18,144 144 63 5 U
WU4G 4,428 54 41 21 U
W4DC (+K5OF,KA4RRU,KC4SZT)
229,760 1436 80 24 M
N4RV (+K4VV)
172,320 1077 80 23 M
W4FCR (K4ORD,K4UK,KE4HOA, KA6CR, ops)
44,822 307 73 20 M
AF4UU (+W4IM)
38,766 273 71 13 M
KC4GIA (+KF4LGS, KR4DO)
29,072 184 79 15 M
KR4XM (+K4FPF)
15,750 125 63 6 M
W4MGM 2,050 41 25 2 M
K4KDJ (K4EP,KB3DGF,KF4YLM, N1KH, ops)
115,182 729 79 23 S

West Central Florida

K4XS 324,160 2026 80 24 B
WC4E 253,920 1587 80 24 B
N4IG 68,160 426 80 17 A
N9TMU 25,056 174 72 15 A
N2EGO 9,024 94 48 6 A
WC4V 3,240 54 30 3 A
K4FB 2 1 1 1 Q
N4DL 88,638 561 79 16 U
K4WCF (K1TO,N4KM,WD4AHZ, ops)
223,040 1394 80 24 M
N4PK (+K1KNQ)
222,080 1388 80 24 M

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Arkansas

W5HUQ 21,318 187 57 4 B
AB5HS 34,710 267 65 12 A
K5JH 21,700 175 62 8 A
KJ5WX 13,020 105 62 6 A
KA5QDF 13,000 100 65 13 A
AD5BE 5,440 85 32 14 A
KK5IB 3,306 57 29 4 A
N5QC 1,088 34 16 4 A
AC5DK 21,440 134 80 15 U
N5ZM (+N5RN)
137,440 859 80 15 M
W5YM (KB5ZYC,KC8ATF,K5GOE, K5AS,AC5RR,K5FXB, ops)
143,840 899 80 24 S

Louisiana

W5WMU 252,800 1580 80 24 B
KZ5D 238,880 1493 80 24 B
K5ER 63,200 395 80 20 B
N5SMQ 63,516 402 79 15 A
K5OR 40,404 273 74 14 A
N0KWA 33,552 233 72 12 A
N5IB 13,050 145 45 11 Q
KC5R 10,200 100 51 4 Q
W5WZ 40 5 4 1 Q
AE5T (+KD5HPT,KC5IUY)
182,806 1157 79 23 M
W5GAD (N5OGW,KD5BPR,WA5RT, AC5TM,N9MQU,KC5ZOC,N5TEK, KD5BKW,W5CTV, ops)
176,800 1105 80 21 M
K5RV (+KG5VK, KF5XV)
61,280 383 80 9 M
KI5EE (+KC5FGO)
54,400 340 80 16 M

Mississippi

WA5OYU 219,520 1372 80 24 B
KE5K 79,158 501 79 20 A
WJ5K 49,280 320 77 16 A
KD5CKP 39,672 261 76 17 A
AC5SU 39,184 248 79 19 A
KB5FET 22,308 169 66 8 A
W5KWB 22,200 150 74 8 A
KJ5RC 20,800 130 80 17 A
WA4IAX 20,160 168 60 11 A
N5KGY 19,712 128 77 10 A
KK5PM 13,200 100 66 7 A
K2FF 10,304 112 46 3 Q
N3AWS 9,200 100 46 7 Q
WQ5L 47,012 322 73 7 U
N5KKG (+KC5QZW,KM5NQ,KC5YDR, KB5VLA,N5PA,KC5WGU,KB5RQL, KB5IXI) 76,630 485 79 15 M

New Mexico

K7UP (AA5B, op)
310,400 1940 80 24 B
K2EI 215,840 1349 80 22 B
NA5S 54,240 339 80 14 B
N6ZZ 12,324 78 79 5 B
KM5P 49,500 330 75 18 A
W5PDO 47,996 338 71 13 A
W5GZ 31,512 202 78 15 A
KD5JAA 11,336 109 52 8 A
K5MJE 12,576 131 48 9 Q
K5DI 4,484 59 38 4 Q
WA0SXV 140,000 875 80 17 U
KK5OV (+KB5ZSK)
38,448 267 72 19 M
W5JOV 10,780 110 49 3 S

North Texas

K5RA 205,874 1303 79 22 B
AA5NT 45,240 290 78 15 B
W5MYA 43,092 378 57 3 B
N5TY 29,882 223 67 5 B
WQ5W 185,760 1161 80 24 A
WD5K 158,632 1004 79 18 A
K5KJ 77,280 483 80 8 A
NN5T 54,020 365 74 10 A
WK5K 47,212 319 74 20 A
WD5DW 39,064 257 76 19 A
W5WB 21,736 143 76 8 A
KC5NT 19,276 158 61 5 A
WA5SAJ 17,152 134 64 8 A
K5CEM 15,750 125 63 10 A
KC5OZT 13,680 120 57 19 A
WA5VKS 11,752 113 52 6 A
N5CHA 11,200 100 56 9 A
WA5MS 9,720 108 45 5 A
AC5TU 1,200 25 24 3 A
K5RX 140,640 879 80 24 Q
WA8ZBT 61,280 383 80 23 Q
WB5TKA 2,208 46 24 2 Q
K4NR 29,748 201 74 8 U
N5KM 15,352 101 76 6 U
W5ZQ 12,800 80 80 9 U
N5YA (+K5WO)
209,760 1311 80 23 M
WX5O (+WB5TVI,W5IUA,N5IUA)
106,018 671 79 23 M
W5MEC (+KC5KDM)
63,200 395 80 16 M
KK5XM (+KC5VUS)
17,050 155 55 10 M
WA5BU (N5VHO, KC5AMA, KC5QYO, KB0QMP, KD5IMS, ops)
76,692 498 77 24 S
WN5D 10,488 114 46 5 S

Oklahoma

KB5BOB 161,476 1022 79 17 B
N5RXF 136,160 851 80 15 B
N5NA 13,806 117 59 3 B
K5KA 214,720 1342 80 24 A
K0CIE 59,130 405 73 13 A
KC5TTY 25,050 167 75 15 A
KB9JVY 300 15 10 1 A
N5OT 8 2 2 1 A
K5AAR 24,156 183 66 12 Q
K5TN 12,800 80 80 14 Q
W5TM (+W5AO)
273,920 1712 80 24 M
WD0GTY (+WB0ZWW,N5PJ)
77,760 486 80 21 M
N5PMP (+KB5TUV)
52,480 328 80 21 M
KB1ZQ (+N1LPN,N5VWF)
37,446 237 79 12 M
NJ5S (+KA7GLA, KC5QVS, KC5GUD)
22,792 148 77 13 M
KO6RM 9,964 106 47 5 S

South Texas

W5KFT (K5TR, op)
340,640 2129 80 24 B
W5ASP 162,080 1013 80 13 B
W5RQ 147,680 923 80 15 B
K5HDU 26,496 192 69 6 B
K5IUA 19,304 127 76 9 B
W5XD 18,980 146 65 4 B
N5KO 8 2 2 1 B
W5PR 146,720 917 80 18 A
W5KNZ 76,160 476 80 14 A
WA5IYX 72,838 461 79 17 A
K5WA 70,800 472 75 7 A
K5OE 59,520 372 80 6 A
N5TU 47,120 310 76 7 A
AE5Q 41,322 291 71 18 A
KK5VN 30,940 221 70 12 A
K5WNO 30,552 201 76 16 A
N5XD 28,644 186 77 13 A
KM5VI 27,808 176 79 24 A
N5RBC 19,630 151 65 13 A
N5KAE 18,240 114 80 13 A
N5RLQ 17,556 133 66 8 A
W5EB 9,380 70 67 7 A
AJ4F 8,460 94 45 4 A
N5AF 7,548 111 34 5 A
KD5ILN 3,200 50 32 5 A
KD5EUV 1,848 42 22 4 A
N5XJ 50,876 322 79 14 Q
N5WU 22,630 155 73 13 Q
WA5AA 55,840 349 80 20 U
KK5LO 30,888 198 78 13 U
KK5CA 22,400 160 70 7 U
N5XU (KB5LBN,W5JLP,N3TNN,K5PI, KT5I,WM5R, ops)
218,720 1367 80 24 M
K5NA 73,920 462 80 9 M
W5AC (KD5GNO,AG5U,W1AGG, KD5MAH, ops)
33,740 241 70 10 S

West Texas

N5RZ 129,120 807 80 9 B
NZ5M 1,320 30 22 2 B
N5DO 177,600 1110 80 23 A
N5ZC 194,080 1213 80 18 U
KE5OG 39,270 255 77 5 U
N5ZMP (+N5XXD)
16,568 109 76 8 M

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East Bay

N6BV 306,240 1914 80 24 B
N6RO 130,130 845 77 12 B
KF6RIP 125,610 795 79 22 B
W6BSY 152,800 955 80 23 A
K6SRZ 96,854 613 79 11 A
K6XV 32,886 261 63 4 A
K6SV 31,808 224 71 9 A
K6BIR 16,632 132 63 11 A
KE6QR 15,104 128 59 11 A
KE6NCX 10,044 93 54 9 A
KS6Q 3,500 50 35 3 A
K6AUC 185,920 1162 80 20 U
K6ZM (WA6O, op)
173,600 1085 80 24 U
W6RGG 125,920 787 80 20 U

Los Angeles

W6UE (N6VI, op)
206,400 1290 80 19 B
WA6URY 7,752 76 51 8 B
K6LA 216,000 1350 80 24 A
K6RO 200,480 1253 80 24 A
W3SE 69,120 432 80 15 A
N6OPR 48,348 306 79 19 A
K6ZCL 33,984 236 72 18 A
WA6RYA 30,636 207 74 13 A
W6FFH 30,150 201 75 16 A
WB6NFO 28,598 181 79 17 A
WB6BXP 15,792 141 56 9 A
KK6WO 2,100 42 25 4 A
KE6JLF 1,280 32 20 4 A
N6XUG 1,176 28 21 3 A
W6RCL 29,820 213 70 9 Q
NK6A 12,036 118 51 5 Q
N4CU 286 13 11 2 Q
W6KC 96,320 602 80 14 U
W6SW 54,560 341 80 13 U
N6XTT (+KD6WAQ, N6ZII, KQ6Y, W6PPT, N6RMJ, KE6CTI, W8OMG)
137,280 858 80 23 M
KF6RDO (+KQ6MU)
115,972 734 79 16 M
K6AA(+W7IXL,KB6ATT,WA6SDK, K6NT) 23,660 169 70 21 M

Orange

W7TI 67,680 423 80 13 B
W6TKV 40,552 274 74 10 B
AA6PW 140,640 879 80 24 A
K6CF 51,982 329 79 13 A
N6VHF 38,038 247 77 9 A
KF6HAM 37,356 283 66 6 A
WA6GFR 36,784 242 76 19 A
WK6I 29,304 198 74 7 A
K0MOT (AA6FV, op)
24,708 174 71 11 A
N6RT 23,400 156 75 9 A
W6NT 11,978 113 53 15 A
KE6GFI 10,098 99 51 15 A
KA6GMA 10,092 87 58 2 A
W6HT 9,348 114 41 5 A
K6FZY 5,490 61 45 4 A
W1HIJ 12,420 115 54 4 Q
W6EEN (+K6XC,W6AQ,KR6X,W6ORD)
287,360 1796 80 24 M

Pacific

KH7R (KH6ND, op)
354,720 2217 80 22 B
NH7/N6HC 36,314 271 67 17 A
KH7FX 34,504 227 76 11 A
WH6LL 20,400 150 68 16 A

Sacramento Valley

W6AX 304,000 1900 80 24 B
K6KM (WX6V, op)
249,440 1559 80 24 B
W6EU 239,840 1499 80 23 B
KI6CG 164,800 1030 80 21 B
W6IXP 99,360 621 80 22 B
KS6A 49,928 316 79 20 B
KU6J 59,124 379 78 13 A
K6LRN 34,336 232 74 12 A
K6JJ 29,600 200 74 16 A
K6DGW 22,356 162 69 8 A
KE6OUA 17,262 137 63 10 A
W6RKC 11,904 124 48 2 A
KO6CX 24,888 183 68 18 Q
K6IDX 59,520 372 80 16 U
K6NO (+K6RC)
249,920 1562 80 24 M
N6ZS (+N6SNO)
245,280 1533 80 24 M
W6UT 227,840 1424 80 24 M
K6KO (+K6TA)
199,520 1247 80 21 M
W6RFF 99,698 631 79 19 M

San Diego

K6NA (N6ED, op)
279,818 1771 79 24 B
K7JJ 65,728 416 79 12 B
N6VH 63,336 406 78 15 B
NZ6T 23,598 171 69 13 A
AA6EE 16,128 126 64 4 A
W6MVW 1,440 30 24 1 A
W6MOT (WB6OIL, op)
30,076 206 73 19 Q
W6CN 14,976 104 72 14 Q
AK6R 183,122 1159 79 24 U
N6KI (+K6AM,N6CY)
251,360 1571 80 24 M

San Francisco

K6CTA 49,136 332 74 7 B
N6ZFO 115,752 742 78 17 A
K6UM 74,080 463 80 11 A
AA6DX 52,440 345 76 16 A
AD6G 34,928 236 74 19 A
KD6ZZA 19,656 156 63 12 A
KE6SLS 19,152 152 63 9 A
WA6QCL 16,080 134 60 6 A
WB6ZYD 15,340 130 59 13 A
KB6GK 11,220 110 51 12 A
WW6D 5,304 68 39 2 A
K6RIM 205,600 1285 80 23 U
K6ANP 152,640 954 80 15 U
W6PW (KD6VWD,7M1STT,KD6YDY, KK6SD, KD6JYC,WB6KIO, ops)
41,760 261 80 24 M

San Joaquin Valley

WC6H 242,214 1533 79 24 B
N6JS 121,818 771 79 14 B
N6UUG 92,640 579 80 11 B
W6FRH 34,650 231 75 11 B
N6BU 19,760 152 65 13 B
KS6H 164,640 1029 80 23 A
WA6YEE 103,964 658 79 24 A
N6YMM 80,340 515 78 11 A
W6DPD 24,616 181 68 10 A
KI6PG 22,356 162 69 21 A
KM6M 17,700 118 75 22 A
AA6K 15,408 107 72 14 A
W6UDX 12,208 109 56 5 A
K6MI 2 1 1 1 Q
KR6RF (N6EE, W6XK, ops)
248,480 1553 80 24 M
NT6K 211,360 1321 80 24 M
N6TNX (+N6TNW)
92,800 580 80 21 M

Santa Barbara

NU6S 259,200 1620 80 24 B
W6NK 144,160 901 80 18 B
WA6FGV 73,164 469 78 11 A
W6NS 36,000 240 75 12 A
W6TK 139,200 870 80 11 U
AG6RT (+K6AJ)
107,840 674 80 21 M
K6SB (+W6GL,KF6KQL)
53,280 333 80 14 M

Santa Clara Valley

W0YK 269,232 1704 79 24 B
AE6Y 230,080 1438 80 23 B
K6HNZ 216,160 1351 80 24 B
K6GT 165,920 1037 80 21 B
K6RB 131,200 820 80 15 B
N6TU 118,400 740 80 16 B
AJ6V 116,160 726 80 16 B
W6XB 94,848 624 76 14 B
W6CYX 79,840 499 80 11 B
AA6W 79,496 523 76 14 B
K6KLY 78,560 491 80 11 B
K6IF 68,328 438 78 5 B
N6ZB 55,440 360 77 17 B
K2KW 52,440 380 69 5 B
K6ST 11,556 107 54 3 B
W6CF 11,132 121 46 1 B
N6NF 105,792 696 76 12 A
KA6MAL 60,450 403 75 17 A
W6RYI 44,556 282 79 10 A
NT6S 20,770 155 67 9 A
N6IV 18,600 155 60 10 A
N6YD 15,222 129 59 6 A
W6LPW 34,992 243 72 20 Q
KG6ECI 19,008 144 66 13 Q
K6XX 196,800 1230 80 20 U
K6III 122,560 766 80 19 U
AD6E 109,920 687 80 17 U
K6EP 75,040 469 80 20 U
W6YX (N6DE,W6LD,N7MH, ops)
283,680 1773 80 24 M
N6XI (+W6CT)
212,640 1329 80 2 M
K6PUD (@W6RN) (+KQ6OB)
182,676 1171 78 23 M
N6IJ (+AE0M,AA6EG)
171,360 1071 80 21 M
W6OAT (+W1SRD)
170,080 1063 80 21 M
AK6L 69,836 442 79 14 M
W6ISQ 80,000 500 80 12 S

7

Alaska

KL7Y (WA2GO, op)
270,400 1690 80 24 A
KL7FAP 78,000 520 75 14 A
KL7WP 57,280 358 80 12 A
WL7CMK 35,186 241 73 7 A

Arizona

K6LL 330,560 2066 80 24 B
W7ZR 229,890 1455 79 23 B
W7WW 208,000 1300 80 23 B
WA0KDS 133,036 842 79 22 A
NF7E 88,768 584 76 17 A
K7XN 69,204 438 79 11 A
K7TR 50,856 326 78 10 A
N3AIU 50,666 329 77 20 A
AA4Q 45,360 324 70 17 A
W7YS 44,968 292 77 12 A
K7HP 34,788 223 78 17 A
WB6CGZ 31,490 235 67 16 A
N7RAT 30,530 215 71 24 A
KC5AC 22,044 167 66 12 A
AK9Y 19,560 163 60 8 A
KN5H 3,102 47 33 2 A
N7VY 40,170 309 65 8 Q
N7JXS 35,856 249 72 16 Q
NQ7X 15,544 116 67 6 Q
N7XJW 10,752 112 48 14 Q
WA7NWL 1,600 40 20 4 Q
KL7CQ 85,728 564 76 23 M
KK6IF (+W6KAT,W6BBL)
50,954 349 73 20 M
W7ON (+N7NFX)
45,396 291 78 16 M
NC7I (+KD7JWV)
25,702 181 71 12 M
W7ASU (KC7EFP,KC7MOD,KC7MOC, KC7RZR,KD7LCT, ops)
174,560 1091 80 23 S
KC7KFF (KC7HJU, + 9 loggers)
48,516 311 78 18 S

Eastern Washington

KI7AO 59,752 388 77 22 B
W7TRF 16,756 142 59 16 B
W9LT 161,148 1033 78 23 A
WS7V 91,840 574 80 22 A
W7WMO 38,860 290 67 6 A
K7AWB 30,750 205 75 16 A
AC7CJ 9,888 103 48 20 A
KC7WUE 1,472 32 23 3 A
K7MM 14,820 130 57 6 Q
W5ZL 1,134 27 21 2 Q
K7IR (+K7XH,K7XS,W7AGV)
315,520 1972 80 23 M

Idaho

KG7H 176,280 1130 78 22 B
K0TO 168,160 1051 80 15 B
K7ZO 126,560 791 80 15 B
W7ZRC 184,320 1152 80 20 A
N7UVH 80,104 527 76 6 A
KE7RT 49,126 319 77 20 A
KJ7TH 46,610 295 79 9 A
KK7A 29,232 203 72 5 A
KG7WZ 21,352 157 68 9 A
N7LB 9,800 98 50 3 A
KI7RO (+KC7DSB)
36,900 246 75 17 M
W7UQ (KL9A, op)
107,744 728 74 8 S

Montana

KS7T 148,980 955 78 18 B
WT6G 136,828 866 79 21 A
AA7YA 104,364 669 78 18 A
KC7NY 67,060 479 70 12 A
KG7VQ 60,996 391 78 23 A
KC7NX 49,248 324 76 10 A
K7SAM 46,136 292 79 20 A
AC7GM 31,244 214 73 15 A
K7BG 22,538 191 59 2 A
K7ABV 91,884 589 78 12 U
W7WK 35,680 223 80 13 U

Nevada

WB7QBO 17,400 150 58 14 B
K7NV (W7VI, op)
40,460 289 70 6 A
N7WVZ 35,550 237 75 24 A
N7ON 20,304 141 72 11 A
KD7JJI 11,330 103 55 7 A
W7VI 5,504 64 43 6 A
K6GNX 192 16 6 24 A
K7BV 312,160 1951 80 24 U
WA7UTM 36,160 226 80 13 U

Oregon

W7MT 198,290 1255 79 20 B
KA7A 45,188 286 79 17 B
WA7ND 14,688 144 51 6 B
K4XU 208,402 1319 79 24 A
KU7K 44,872 284 79 17 A
N7NS 42,744 274 78 13 A
W7SIR (W7PAT, op)
29,896 202 74 15 A
N7TL 28,324 194 73 15 A
KJ7CY 25,600 160 80 18 A
WB7TIR 22,620 174 65 13 A
N7OU 22,000 200 55 3 A
KG7YE 21,896 161 68 11 A
W7YAQ 64,938 411 79 11 Q
KD7CTF 3,196 47 34 5 Q
KK7GG 1,782 33 27 5 Q
W7GG (+K7ZUM,N7LF)
243,162 1539 79 24 M
KK6WF (+KC7UWS)
37,500 250 75 14 M
KA7AGH (+KA7IUG)
22,046 151 73 15 M
N7SG (+K7FD)
18,080 113 80 8 M

Utah

W7UT 212,640 1329 80 21 B
KI7KA 41,760 290 72 10 A
W7HS 11,742 103 57 10 A
K7ESU 6,512 88 37 4 A
K8EI 99,698 631 79 15 U
W7CT 97,328 616 79 8 U

Western Washington

W7WA 342,720 2142 80 24 B
K7RI 272,640 1704 80 21 B
N7ETC 114,660 735 78 17 B
N7DOE 10,716 114 47 2 B
K7QQ 211,200 1320 80 21 A
N7LOX 175,696 1112 79 24 A
W7QN 83,176 562 74 15 A
N7WI 68,730 435 79 10 A
AB7RW 38,152 251 76 14 A
AA7VT 31,098 219 71 11 A
NA7R 30,600 225 68 13 A
KF7QZ 29,260 190 77 9 A
KT7G 25,728 192 67 6 A
KC7WDL 24,656 184 67 12 A
KD7LJ 23,660 182 65 9 A
KE7SW 21,888 144 76 18 A
W7DON 21,172 158 67 8 A
W6SGJ/7 17,856 124 72 10 A
KK7UZ 16,520 140 59 12 A
KG7P 14,040 117 60 12 A
N7WA 12,760 116 55 5 A
KC7KRH 12,312 114 54 13 A
N7AQ 11,826 81 73 15 A
KJ7BN 11,368 116 49 6 A
KD7E 8,692 82 53 24 A
KB7N 4,284 63 34 2 A
N7QMT 4,256 56 38 5 A
AC7IF 3,936 48 41 7 A
KD7HNS 2,924 43 34 3 A
W7/JR1NKN
11,300 113 50 8 Q
W7OM 178,560 1116 80 16 U
KB7PKC 63,360 396 80 19 U
NR7RR 45,120 282 80 17 U
N0AX (+KD7DQO,KD7FWQ,KD7FYX)
92,272 584 79 16 M
K7PAR (N7UK,KD7E,KD7KKR, KD7KUN,KC7GM, ops)
34,286 217 79 16 M

Wyoming

WG7Y 46,800 360 65 5 B
N7JT 40,800 255 80 18 B
W0ZA 76,860 549 70 10 A
KC7WYG 68,484 439 78 22 A
N7QAX 64,834 421 77 17 A
WB0TCZ 49,650 331 75 15 A
KK7SG 37,422 243 77 13 A

8

Michigan

K8CC (WD8S, op)
210,560 1316 80 24 B
K8AO 204,800 1280 80 24 B
WB8CLX 55,520 347 80 18 B
KG8OU 42,560 266 80 23 B
KT8X 40,986 297 69 4 B
AA4R 17,222 109 79 8 B
W1IDL 12,800 80 80 12 B
W8MJ 195,040 1219 80 24 A
KC8KAK 98,124 629 78 18 A
K8RDJ 85,576 563 76 16 A
KC8KAM 71,732 454 79 24 A
K8GT 68,800 430 80 21 A
K8IR 67,040 419 80 15 A
WA8FRD 55,024 362 76 17 A
N8ZFH 53,284 346 77 14 A
K8UH 52,320 327 80 14 A

AA8R 47,586 309 77 10 A
AB8CI 46,816 308 76 18 A
NX8K 44,700 298 75 20 A
W8EO 42,432 272 78 24 A
AA8YC 41,648 274 76 12 A
N8NX 40,608 282 72 7 A
K8BZ 39,300 262 75 8 A
N8KIE 35,568 228 78 14 A
KE8FO 34,992 243 72 13 A
W8RU 33,228 234 71 6 A
AB8JR 29,054 199 73 15 A
W8KZM 27,060 255 66 10 A
N8VEN 26,412 186 71 10 A
N8AYY 25,596 162 79 11 A
W8EGI 24,700 190 65 11 A
WB0WAO 24,000 150 80 16 A
K8CV 23,760 198 60 6 A
N8EN 22,440 170 66 8 A
WD8R 21,726 153 71 9 A
WB8AFO 20,584 166 62 11 A
W8PDI 20,010 145 69 12 A
KE8UM 19,296 144 67 8 A
K8AAX 18,104 146 62 5 A
WB8EEJ 16,800 150 56 7 A
N8BEE 16,000 100 80 15 A
WA8OLD 15,860 122 65 9 A
K8WUZ 15,162 133 57 11 A
KC8OTM 15,012 139 54 7 A
KC8MPQ 14,520 121 60 4 A
K8SIA 13,776 123 56 3 A
W8DBH 12,800 80 80 13 A
AA8UU 12,096 112 54 5 A
N8MG 12,064 104 58 4 A
KC8GMT 11,718 93 63 10 A
WB8GUS 10,400 100 52 7 A
W8WQ 10,350 115 45 10 A
KB8RCB 9,800 100 49 4 A
W8ERV 9,540 106 45 2 A
W8KZP 8,910 99 45 12 A
W8UE 8,436 111 38 3 A
KC8MCO 6,164 67 46 5 A
WB8L 5,180 74 35 5 A
KB8TWM 4,950 75 33 8 A
K8GA 3,300 50 33 2 A
WA8AEN 630 21 15 2 A
N8UUS 456 19 12 1 A
KD8WV 16,638 141 59 9 Q
K8DD 50 5 5 1 Q
N8SNM 150,880 943 80 23 U
NU8Z 140,640 879 80 19 U
WX3M 42,976 272 79 11 U
K8ZZU 16,906 107 79 8 U
NT8V 136,640 854 80 24 M
W8KW (KE8RA,W8UE, ops)
77,120 482 80 23 M
N8MR (+KC8NAH)
56,160 351 80 18 M
K8EO (+K8RO,N8REZ,N8PYN)
39,200 245 80 24 M
N8DEF (+N8WTH)
34,500 250 69 15 M
KC8ELY (N8NJE,N8MMF,N8YXP, op)
32,706 237 69 17 M
K8CHR (KI8BU,KC8HLV,KB8SXS,
KB8TIL,WD8DJB, ops)
30,246 213 71 14 M
K8AE (+KC8FVS,KC8PKY)
27,170 209 65 13 M
AA8KR (+N8WIQ)
26,280 180 73 14 M
KM8I (+KB8QO,AB8FY,K8CQF)
25,912 164 79 14 M
KI8GR (+N8PVI)
24,696 196 63 15 M
KA8KGW (+ N8KWQ)
13,038 123 53 12 M

Ohio

K8DX 252,000 1575 80 24 B
K8ND 237,440 1484 80 24 B
N8VW 233,920 1462 80 23 B
K1OU 203,200 1270 80 23 B
K8MR 156,800 980 80 14 B
K9NW (@N8NR)
118,240 739 80 14 B
KU8E 91,008 576 79 8 B
W8KEN 51,360 321 80 12 B
AC8E 46,240 340 68 6 B
W9OBQ 19,320 140 69 11 B
WR8K 19,200 150 64 11 B
ND8DX 170,080 1063 80 24 A
W8DD 144,160 901 80 21 A
AF8C 65,520 420 78 13 A
N8PCN 62,880 393 80 12 A
N8OH 62,410 395 79 11 A
AK8B 51,060 345 74 18 A
K8CI 50,616 342 74 10 A
KW8W 45,752 301 76 12 A
KI8IM 43,660 295 74 24 A
W8XU 38,198 269 71 14 A
N8WL 34,944 224 78 11 A
KB8SHE 31,680 198 80 12 A
K8VUS 31,640 226 70 14 A
N8ORT 30,240 216 70 12 A
KJ8F 29,760 186 80 24 A
K8RJW 29,568 192 77 10 A
WA8TWM 26,936 182 74 10 A
W8DHG 26,000 200 65 8 A
AB8AG 25,620 183 70 18 A
KB8UUZ 25,530 185 69 7 A
W8NHO 22,032 204 54 19 A
N8NYI 21,708 162 67 14 A
KC8LA 18,644 118 79 20 A
WD8B 18,000 150 60 12 A
WT8E 17,020 115 74 11 A
W8XS 16,560 115 72 3 A
KC8OPP 16,002 127 63 15 A
N8JP 13,268 107 62 24 A
W8DYF 12,992 112 58 6 A
KF8UN/M 12,528 116 54 24 A
K8JT 11,250 125 45 10 A
W8KNO 11,232 156 36 13 A
KB8STP 9,792 102 48 12 A
WD8AJF 9,200 92 50 7 A
KC8BTA 6,860 70 49 24 A
KC8HPO 5,590 65 43 5 A
W8WTS 3,520 55 32 2 A
W8IDM 1,782 33 27 1 A
AB8IS 1,200 30 20 5 A
N8IE 52,480 328 80 20 Q
WA8RCN 34,080 240 71 10 Q
NS8O 19,458 141 69 7 Q
N8BJQ 114,240 714 80 14 U
K8BL 109,600 685 80 16 U
N8TR 93,600 585 80 14 U
WT8C 57,986 367 79 12 U
AB8GV 16,160 101 80 10 U
N8HR 180,594 1143 79 24 M
K8SCH (N8UYZ,KI4QJ,WD8JAW,
N8KOJ,KE4HOR, ops)
40,650 271 75 16 M
W8FT (N8RMP,AA8IV, ops)
30,020 190 79 18 M
AA8KJ (+WM8W,KA8ZMY)
27,750 185 75 17 M
W8ID (KC8BUJ,KB8SOU,N8UOS,
KG8UP,N8PPR,WB8REI, ops)
17,760 111 80 22 M
W8DYY (N8IPO,N8DNG,WB8RXI,
KC8LUU,WA8VIW,N8SSE,W8MSD,K8XO,
ops) 15,872 124 64 8 M
N8YU (+KB8YVG)
12,512 92 68 12 M

West Virginia

N4ZR 124,320 777 80 11 B
K2UOP 60,672 384 79 14 B
K8OQL 46,176 312 74 7 B
K8KFJ 14,040 130 54 6 B
WA8WV 110,080 688 80 19 A
KC8FS 72,072 462 78 21 A
W8OP 46,360 305 76 11 A
K3JT 41,400 276 75 9 A
WS8L 25,872 196 66 15 A
N0NGT 23,436 186 63 15 A
KD9FT 7,128 108 33 6 A
KV3R 145,760 911 80 20 U
WA8ZDL 22,400 140 80 20 U

9

Illinois

K9XD (K9PG, op)
243,040 1519 80 24 B
N2BJ 237,120 1482 80 24 B
WB9Z 236,480 1478 80 24 B
K9BGL 220,800 1380 80 24 B
KG9X 186,400 1165 80 21 B
KI9A 180,160 1126 80 23 B
K9SD 124,160 776 80 19 B
N9HCA 116,920 740 79 21 B
NA9D 113,568 728 78 10 B
NA9A 106,860 685 78 15 B
WE9A 99,200 620 80 17 B
K9JLS 91,040 569 80 21 B
K9RS 75,192 482 78 8 B
KB9CRY 65,728 416 79 21 B
N9QQK 54,668 346 79 16 B
WS9V 48,544 328 74 7 B
K9JY 48,384 336 72 6 B
WA9TPQ 47,200 295 80 7 B
N9WYV 33,768 268 63 18 B
KC9IL 25,632 178 72 6 B
K9DX 25,520 220 58 24 B
WA9DRE 23,100 175 66 6 B
K9RR 12,800 80 80 10 B
AA9VR 9,152 104 44 3 B
K9UQN 7,688 62 62 3 B
KK9A 215,040 1344 80 24 A
WX9U 148,160 926 80 23 A
KX9DX 142,042 899 79 24 A
N9JF 97,760 611 80 15 A
WD9CIR 86,394 561 77 18 A
K9CS 80,340 515 78 18 A
N9NT 73,320 470 78 22 A
K9JE 72,852 467 78 17 A
N9MSG 64,640 404 80 13 A
W9SMC 62,400 400 78 12 A
N9REP 61,350 409 75 14 A
KD9ST 60,320 377 80 17 A
WB9STR 59,092 374 79 24 A
K9ZA 55,848 358 78 24 A
W9FGH 55,200 345 80 15 A
K9QVB 54,824 356 77 10 A
W9GIG 52,772 334 79 18 A
N9BOR 52,288 344 76 17 A
AA9D 52,244 353 74 10 A
N9LCR 52,050 347 75 18 A
W9HL 51,150 341 75 19 A
K9MMS 47,840 299 80 12 A
W9WL 46,800 325 72 12 A
WA9Z 43,624 287 76 13 A
N9TK 42,818 271 79 7 A
W9YS 38,482 271 71 13 A
N9LYE 36,144 251 72 24 A
N9EP 35,550 237 75 8 A
KB9CYL 35,280 252 70 11 A
WA9CCQ 32,112 223 72 8 A
WB9EEE 31,050 225 69 6 A
W9LNQ 29,200 200 73 7 A
KG9PQ 28,968 213 68 10 A
N9KHR 28,944 216 67 12 A
W9LYN 27,560 212 65 11 A
N9CO 26,796 203 66 4 A
W9LYA 26,398 197 67 12 A
N9DT 25,806 187 69 10 A
W9CEO 25,668 186 69 12 A
N9JFW 25,090 193 65 9 A
WD9HBC 22,960 164 70 8 A
KG9GK 21,584 142 76 12 A
AA9F 20,880 145 72 7 A
K9KM 20,538 163 63 5 A
WD9EJK 20,174 131 77 12 A
KF9KP 19,782 157 63 8 A
KD9XP 19,760 152 65 12 A
W0HED 19,592 124 79 12 A
AA9DM 19,152 152 63 7 A
WI9B 18,176 128 71 13 A
K9HS 18,126 159 57 24 A
N9TUQ 16,896 132 64 11 A
N9VKE 16,758 147 57 16 A
N9FWM 16,200 135 60 7 A
W9TOC 15,048 132 57 6 A
N9MBR 14,976 144 52 11 A
K9MS 14,740 134 55 7 A
N9IJ 13,716 127 54 5 A
N9YCT 13,110 115 57 19 A
WK9O 12,882 113 57 7 A
K9NA 12,880 115 56 11 A
WD9HSH 12,626 107 59 6 A
W9ZEN 12,200 122 50 12 A
N9KCS 11,808 123 48 4 A
KB9TWU 10,176 106 48 9 A
AG9A 8,712 66 66 4 A
W9NHX 8,160 102 40 6 A
WA9AQN 7,956 102 39 3 A
WB9WOZ 6,560 82 40 3 A
KB9OMH 6,160 88 35 4 A
KB9YGL (N9JF, op)
4,556 67 34 1 A
KB9VHA 3,920 56 35 8 A
KF6IHU 3,536 52 34 5 A
K0PG 3,500 50 35 2 A
NA9RB 3,312 46 36 3 A
K9GY 3,266 71 23 3 A
KC9FA 1,200 30 20 3 A
N9YPN 650 25 13 6 A
ND9G 120 10 6 1 A
AH6EZ/9 8 2 2 1 A
W9TUD 2 1 1 1 A
AK9L 2 1 1 1 A
K9ZO 61,304 388 79 16 Q
K9QI 10,200 100 51 5 Q
NW9S 9,114 93 49 4 Q
NC9O 8,712 99 44 6 Q
K9LU 184,960 1156 80 19 U
N9IO 102,720 642 80 24 U
KG9N 54,288 348 78 6 U
KU9Z 50,402 319 79 13 U
N9GUN 48,960 306 80 11 U
NV8V 48,348 306 79 19 U
N9KUT 32,412 219 74 11 U
N9VVV 25,296 186 68 5 U
KA9CFD 11,858 77 77 6 U
WG9L 2,448 51 24 1 U
K9NS (K9HMB,K9PW,W9RM,WV9T,
ops) 294,080 1838 80 24 M
K9QT 141,920 887 80 24 M
K9MOT (K9UQN,N9RKB,N9KNS,
AA9AE,K9QI,N9EP,N9MUC,WB8HMD,
K9RJZ,KB9QOL, ops)
108,732 697 78 23 M
K9CU (KB9UWU,K9BF, ops)
90,706 589 77 21 M
AE9D (+N9TZQ)
81,370 515 79 24 M
N9STL 60,372 387 78 17 M
W9EM (+N9MA,N9LZ,W9RRR,
KB9WXA,W9GWP)
54,670 355 77 23 M
N9GH (WO9LF,NW9V,KB9YDL, ops)
40,606 257 79 16 M
N5UWY (+KB5TFX)
23,214 159 73 11 M
N9UC (WO9S, op)
64,144 422 76 7 S
W9UIH (W0TPO, op)
38,346 249 77 17 S
W9BBB 11,960 115 52 5 S
KM9M 9,800 100 49 8 S

Indiana

W9RE 188,160 1176 80 17 B
K8JP 186,080 1163 80 23 B
KJ9C 98,880 618 80 17 B
WA1MKE 52,350 349 75 15 B
WO9Z 44,384 292 76 7 B
N9NS 14,628 138 53 4 B
AJ9C 2,928 61 24 1 B
WT9U 104,320 652 80 17 A
KB9G 88,000 550 80 14 A
NX9B 62,880 393 80 22 A
K9WX 56,004 359 78 14 A
K9VV 51,012 327 78 7 A
N4TZ 44,250 295 75 7 A
N9DR 39,672 261 76 17 A
W9HLY 35,850 239 75 12 A
W9ZP 33,180 210 79 10 A
K9LI 32,060 229 70 17 A
KC9F 27,440 196 70 13 A
WA0JTL 26,532 198 67 10 A
N9KT 16,644 114 73 11 A
KB9STQ 10,716 114 47 24 A
KB9ORH 10,152 108 47 7 A
N9PW 3,816 53 36 2 A
KB9THU 2,352 49 24 1 A
W9CM 180 10 9 1 A
WN9O 15,616 122 64 3 Q
AB9AO 640 20 16 6 Q
W9BS 199,360 1246 80 23 U
W9IU 133,760 836 80 21 U
K9RU 105,228 666 79 15 U
W9TN 41,280 258 80 19 U
K9MI 13,462 127 53 4 U
KE9I 239,840 1499 80 23 M
W9REG (KB9SSS,N9LF,KF9UP, ops)
61,280 383 80 22 M
K9IG (+KB9THU)
54,872 361 76 6 M
K9WJU (+WB9ZEZ,W9CG)
12,320 110 56 7 M
W9PU (KE9R,KB9MWE, ops)
180,480 1128 80 24 S

Wisconsin

W9XT 153,576 972 79 20 B
N9AU 122,766 777 79 19 B
WT9Q 120,890 785 77 17 B
KA9FOX 120,800 755 80 10 B
WE9V 107,840 674 80 8 B
KF9YR 54,576 379 72 10 B
WI9WI 47,304 324 73 7 B
NF9V 26,390 203 65 4 B
WA1UJU 112,320 702 80 21 A
N9CK 101,120 640 79 19 A
KA9JAC 64,650 431 75 18 A
W9WUU 52,000 325 80 16 A
K9KR 50,312 331 76 6 A
WJ9H 38,106 261 73 11 A
KB9KEG 24,624 162 76 8 A
K9ARF 22,436 142 79 10 A
WB9BWP 17,864 154 58 5 A
W9XYL 14,070 105 67 12 A
W9LO 12,636 117 54 7 A
KB9WBP 11,772 109 54 12 A
K9WTF 3,008 47 32 2 A
W9KHH 200 10 10 1 A
AF9J 27,406 193 71 15 Q
N9PQU 18,486 117 79 6 U
N9XX 16,790 115 73 4 U
W0AIH (K0OB,K0XQ,KT0R, ops)
272,160 1701 80 24 M
W9YV (KA9WXN,NI9E,N9FH,N9SD,
N9VA,WB9UAI, ops)
242,080 1513 80 1 M
W9YT (WO9U,K9EV,AA9RB, ops)
42,080 263 80 14 M
NE9U (+KB9TTO)
40,320 252 80 6 M

0

Colorado

W0GU (K9TM, op)
307,360 1921 80 24 B
KG0ZI 259,520 1622 80 22 B
W1XE 219,336 1406 78 24 B
K0GAS 82,836 531 78 13 B
W0OSK 65,268 441 74 6 B
KF0LA 15,800 100 79 8 B
W0AJ 15,080 130 58 10 B
W0DET 1,040 26 20 3 B
K0UK 126,560 791 80 15 A
KF0XD 24,552 198 62 8 A
NZ4DX 23,424 183 64 7 A
W6NIZ 18,788 122 77 17 A
W0CBH 16,714 137 61 7 A
WA0ZTI 15,012 139 54 8 A
KF4MDW 8,184 93 44 7 A
N0FCK 1,000 25 20 5 A
KC0GBC 32 4 4 1 A
K0FRP 113,100 725 78 23 Q
W0ETT 66,728 439 76 21 Q
KI0II 58,934 373 79 20 Q
N0KE 47,304 324 73 17 Q
K0TIV 24,644 202 61 11 Q
K0RI 22,100 170 65 5 Q
KI0OT 9,630 107 45 10 Q
AB0CD 7,056 84 42 5 Q
K1EQA 3,700 50 37 4 Q
K7TD (+KC0EDJ)
223,040 1394 80 24 M
N0HF (+AB0MV,AE0Q)
158,560 991 80 24 M
K0DE (+KC0INX)
150,080 938 80 17 M
WV7T (+N0QJS)
20,400 150 68 14 M

Iowa

N0AC 187,200 1170 80 23 B
N0AV 141,600 885 80 12 B
W0PPF 45,600 304 75 18 B
K0FG 44,800 280 80 12 B
WK0F 116,960 731 80 18 A
K0JGH 105,600 660 80 21 A
AA0AI 92,320 577 80 20 A
NE0P 73,120 457 80 14 A
NU0Q 65,600 410 80 19 A
K0VM 55,936 368 76 13 A
N2BTJ 49,800 332 75 17 A
K0KAT 41,850 279 75 19 A
KA5NWB 37,674 273 69 7 A
AD0H 37,398 271 69 12 A
K0MXL 8,282 101 41 5 A
K0INR 27,512 181 76 14 U
KE0FT (+KB9SKP)
30,076 206 73 9 M

Kansas

W0MW 164,000 1025 80 23 A
WW0H 61,464 394 78 15 A
KB0WPY 59,736 393 76 15 A
W0ZC 51,898 337 77 16 A
WB0YJT 51,680 340 76 17 A
KC0GL 46,136 316 73 10 A
K0FJ 45,560 335 68 7 A
W0UY 27,974 197 71 6 A
W0IE/M 22,016 172 64 13 A
K0BJ 17,248 154 56 3 A
KA0EIC 16,128 128 63 9 A
KC0IUW 6,840 114 30 7 A
W0NO (+W0CEM, K0WA, AB0S)
241,440 1509 80 24 M
N0NB (+KK0SS)
192,960 1206 80 24 M
W0BR (+N0BTN,N0SZE)
74,892 474 79 21 M
K0HYG (+W0UTS)
30,418 227 67 17 M
KA0BHO (+KA0BAT)
24,156 183 66 11 M

Minnesota

N0IJ 222,400 1390 80 23 B
KF0GV 206,400 1290 80 22 B
WA0MHJ 125,280 783 80 10 B
K0HB 103,332 654 79 13 B
NY0C 71,360 446 80 11 B
K0BUD 44,200 325 68 24 B
W0TVD 31,126 197 79 12 B
AA0Y 13,600 85 80 15 B
N0KK 208,480 1303 80 24 A
AC0W 174,240 1089 80 24 A
WR0DK 146,240 914 80 24 A
K3WT 102,400 640 80 15 A
WJ0M 92,588 586 79 19 A
K0TG 85,176 546 78 15 A
W0UC 78,936 506 78 9 A
KI0F 73,944 468 79 15 A
KF0Q 66,044 418 79 16 A
WA2MNO 62,480 440 71 15 A
K0GV 51,830 355 73 10 A
NA0N 51,474 373 69 8 A
W0OR 45,000 300 75 11 A
N0PI 39,900 285 70 17 A
KB0BRO 38,624 272 71 14 A
WA0BWE 34,080 213 80 11 A
WA0WWW 33,048 243 68 8 A
WA0KRL 26,532 201 66 16 A
K0PC 25,728 201 64 5 A
W0ZQ 25,344 192 66 4 A
K0IR 23,808 192 62 6 A
WG0M 18,216 132 69 8 A
K0MPH 18,056 148 61 6 A
KC0HSK 16,060 110 73 20 A
K0QC 15,040 94 80 8 A
K0VH 13,392 124 54 3 A
N0PFY 10,404 102 51 4 A
KB0UKI 10,400 104 50 6 A
N0UR 87,516 561 78 21 Q
K0AD 106,018 671 79 13 U
KR0B (+N0BKL,KS0T,KJ0B,N0RA,
KB0KQA) 218,400 1365 80 24 M
K0NY (+N0WE,KB0THN,KC0CTH)
96,064 608 79 22 M
K0JA 60,840 390 78 1 M
WB0TRA (+K0BLR,KA0DAQ,KC0HEW,
W0MRD) 54,568 359 76 23 M
K0SV (+KC0IRY,K0JFF)
46,956 301 78 16 M
W0EF (K0BUD,N0NFU,WA0NJF,
K0FC,WB0TNH,KC0IWN,KC0IWW,
N0NYH,K0RGK,W0NK, ops)
45,114 309 73 24 M
WA0WOV 10,710 105 51 5 S

Missouri

K0DEQ 145,760 911 80 15 B
W0TT 58,144 368 79 7 B
WA0OTV 1,496 34 22 2 B
NW0L 162,080 1013 80 21 A
KF0K 159,040 994 80 24 A
AE9B 76,960 481 80 17 A
WB0IUN 60,952 401 76 18 A
K0RWL 58,618 371 79 15 A
KA0AIG 48,640 304 80 16 A
WA0IYY 43,950 293 75 12 A
WB0QLU 39,270 255 77 16 A
KB0YMH 35,568 234 76 9 A
KI0HA 33,900 226 75 15 A
N0AJ 32,706 237 69 8 A
K0KY 31,974 219 73 13 A
KK2G 28,152 204 69 6 A
K0DAT 21,106 173 61 7 A
AA0RT 16,820 145 58 5 A
KE0K 11,660 110 53 11 A
AA0A 27,000 180 75 6 U
K0GQ 200,800 1255 80 24 M
KI0MB (+WA0IYY, AA0A, KI9A)
168,800 1055 80 21 M
NM0X (+KB0QQF,KB0VLG,KC0CWU)
122,880 768 80 23 M
WN0X (+KC0CZI,KB0HNR,KC0HYA)
76,800 480 80 24 M

Nebraska

K0PFV 74,880 468 80 23 A
K0IL 70,984 467 76 12 A
KK0DX 46,800 300 78 10 A
KB0ARZ 14,300 130 55 7 A
NE0DX 13,468 91 74 9 A
W0UVC 13,260 85 78 10 A
N0LZ 420 15 14 1 A
K0DG (+N0CLW, W0DB)
174,880 1093 80 24 M
N0GVK (+KE0BZ,KC0CDQ)
152,000 950 80 24 M
K0GND (+KC0BXU, WD0EGK, K0NC,
K0NEB) 83,460 535 78 20 M

North Dakota

WB0O 332,160 2076 80 24 B
K0UD 59,520 372 80 20 A
KB0IXX 50,820 330 77 18 A
N0ND 50,468 341 74 15 A
WB0OAJ 34,160 244 70 9 A
K0VX 13,530 123 55 5 A
K9IUA 32,620 233 70 14 Q
N0OJ 206,720 1292 80 22 M
K0RHS (KI0NH, KC0DY,KC0HOP,
KC0HOQ, ops)
89,096 602 74 24 S

South Dakota

W0SD (WD0T, op)
326,400 2040 80 24 B
WB0TML 3,132 54 29 4 B
N0IGP 76,538 497 77 24 A
N0PV 48,750 325 75 15 A
WB0ULX 36,784 242 76 16 A
KE0Z 30,264 194 78 8 A
KD0S 18,944 128 74 6 A
WJ0S 9,360 117 40 13 A
N0RGA 11,616 121 48 4 Q

Maritime

VE1OP 154,400 965 80 16 B
VE9FX 99,520 622 80 19 U

Newfoundland-Labrador

VO1MP 99,066 627 79 11 B
VO1WET 37,960 260 73 11 A
VO1JLE 2,268 54 21 24 A
VO1HE 55,692 357 78 8 M

Quebec

VA2GL 46,104 339 68 8 B
VE2ZP 44,660 290 77 5 B
VE2AWR 85,320 540 79 17 A
KF8VX/VE2 33,184 244 68 17 A
VA2IC 25,984 203 64 21 A
VE2/K4BEV 24,800 200 62 9 A
VE2HLW 23,392 172 68 18 A
VE2LHP 18,476 149 62 13 A
VE2AQC (VE2AWR, op)
6,596 97 34 2 A
VE3MAB (VE2ESP,VA2SH,VE2MPD,
VE2BRT,VE2HAX,VE2SMF,VE2SJA,
VE2DWT, ops)
52,052 338 77 24 M

Ontario

VE3STT 42,744 274 78 7 B
VE3BUC 69,920 437 80 14 A
VE3MQW 64,960 406 80 22 A
VA3ARE 57,354 363 79 16 A
VA3SWG 55,500 375 74 10 A
VA3GCB 30,246 213 71 11 A
VA3UZ 23,664 174 68 6 A
VA3TPV 13,728 132 52 15 A
VA3TE 8,686 101 43 11 A
VE3VSM 108,640 679 80 22 U

Manitoba

VE4GV 308,160 1926 80 24 A
VE4MG 38,216 281 68 24 A
VE4HAZ 1,056 33 16 3 A
VE4VV 110,418 717 77 15 Q

Saskatchewan

VE5SF 219,680 1373 80 24 A
VE5AAD 117,434 827 71 12 A
VE5GC 24,168 228 53 5 S

Alberta

VE6JY (VE5MX, op)
320,480 2003 80 24 B
VE6EX 172,848 1108 78 19 A
VA6RA 113,280 708 80 17 A
VE6TN 92,272 584 79 14 A
VE6BF 11,544 111 52 5 Q
VE6AO (VE6BIR,VE6CIZ,VE6KC,
VE6TC,VE6WSI, ops)
217,920 1362 80 24 M
VE6II (+VE6NN)
32,864 208 79 16 M
VE6YR (+VE6MPM)
28,290 205 69 13 M

British Columbia

VE7TLL 148,480 928 80 12 B
VE7RCN (VA7MM, op)
134,400 840 80 21 B
VE7NF 169,920 1062 80 20 A
VE7XB 83,266 527 79 21 A
VE7IN 73,458 477 77 12 A
VE7FO 59,906 389 77 24 A
VE7CKZ 4,464 62 36 4 A
VE7NA (VE7BGP,VE7GDE,VE7NEW,
VE7JLO,VE7LVD,VE7JY,VE7FCO,
ops) 45,288 306 74 21 M

Northwest Territories

VY1JA 166,880 1043 80 19 B
VY1MB 65,816 433 76 12 A

Checklogs:

K5YQF, KB8TXZ, KC2TR, KO6XB, N2NB, N2VA, N3WAV, N6IYS, N6JT, N8RAT, W1TI, W3FQE, W6HYK, W6IO, W6OSP, W9BZP, WD9DJD

2001 ARRL August UHF Contest Rules

1. Object: To work as many amateur stations in as many 2° × 1° grid squares as possible using authorized amateur frequencies above 222 MHz and all authorized modes of emission.

2. Date and Contest Period: First full weekend of August. Begins 1800 UTC Saturday, ends 1800 UTC Sunday (**August 4-5, 2001**). Entrants may use as much of this time as they wish.

3. Entry Categories:

3.1. Single Operator – Low Power (100 W PEP output max on 222 and 432 MHz; 10 W on 902 MHz and above)

3.2. Single Operator – High Power

3.3. Rover.

3.3. Multioperator.

4. Exchange: Grid-square locator (see the *ARRLWeb* grid square calculator online at **www.arrl.org/locate/grid.html**).

4.1. Exchange of signal report is optional.

5. Scoring:

5.1. QSO points:

5.1.1. Count three points for each complete 222- or 432-MHz QSO.

5.1.2. Count six points for each complete 902- or 1296-MHz QSO.

5.1.3. Count 12 points for each 2.3-GHz (or higher) QSO.

5.2. Multiplier: The total number of different grid squares worked per band. Each 2° × 1° grid square counts as one multiplier on each band it is worked.

5.3. Final score: Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score. Example: K1RZ works WA2FGK in FN20 on 222, 432 and 1296 MHz. This gives K1RZ 12 QSO points (3 + 3 + 6) and also three grid-square multipliers. Final score is 12 QSO points × 3 multipliers, or 36.

5.4. Rovers only: The final score consists of the total number of QSO points from all bands times the sum of unique multipliers (grid squares) worked per band (regardless of which grid square they were made in) plus one additional multiplier for every grid square activated (made a contact from).

5.4.1. Rovers are listed in the contest score listings under the Division from which the most QSOs were made.

6. Miscellaneous:

6.1. Partial QSOs do not count. Both call signs, full exchanges and acknowledgment must be sent and received.

6.2. A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently during the contest period under any other call sign (with the exception of family stations). The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

6.3. All equipment and antennas used by entrants must be owned and operated by amateurs. Use of non-amateur owned gear is not prohibited, but use of such equipment places the entrant in a separate category, ineligible for awards.

6.4. Contacts made by retransmitting either or both stations, whether by satellite or terrestrial means, are prohibited. Frequencies regularly occupied by a repeater in a locality may not be used for contest work, even if the repeater is turned off.

7. Awards: Certificates will be awarded in the following categories:

7.1. Top single-operator High and Low power score in each ARRL Division.

7.2. Top single operator High and Low power score on each band (222, 432, 902, 1296 and 2304-and-up categories) in each ARRL Division where significant effort or competition is evidenced. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if W5LUA has the highest single-operator multiband score in the West Gulf Division and his 432-MHz score is higher than any other West Gulf Division single-operator's, he will earn both a certificate for being the single-operator Division leader and an endorsement sticker for 432 MHz.

7.3. Top multioperator score in each ARRL Division where significant effort or competition is evidenced. (Multioperator entries are not eligible for single-band awards.)

7.4. Additional certificates may be awarded where significant effort or competition is evidenced.

8. Submission: Deadline for submission of entries for this contest is Tuesday **September 4, 2001**. Logs and properly completed summary sheets should either be e-mailed to **AugustUHF@arrl.org** or mailed to August UHF Contest, ARRL. 225 Main St, Newington, CT 06111. Entries postmarked or e-mailed after the deadline may be considered checklogs. If log files are generated using a computer, the entrant is to submit the proper log files to the Contest Branch in acceptable electronic format.

9. Other: See "General Rules for All ARRL Contests" and "General Rules for ARRL Contests on bands above 50 MHz (VHF)," November 2000 *QST*. These are also available at the Contest Branch Web site at **www.arrl.org/contests**. Questions regarding this contest should be e-mailed to **contests@arrl.org**. Only use the contest-name e-mail for submission of entries. All contest forms and rules may be downloaded at **www.arrl.org/contests/forms/**. QST

STRAYS

RESTORING THE *LST-325*

◊ The World War Two amphibious landing ship *LST-325* is being restored as an LST Memorial Museum ship. The volunteers are seeking vintage radio equipment for the radio room portion of the restoration. Specifically, they are looking for:

Receivers: RAK, RAL, RBS, RBO
Transmitter: TDE
Transmitter-Receiver: TCS and its dynamotor power supply, antenna matching unit and remote control unit
Transceivers: MBF, SCR-610, SCR-508
Standard Navy radio room clock
Standard Navy steel radio operator desk

E-mail Fred Chapman, W4CHT, **nnn0ppe@navymars.org**.

CLAN MACLEAN AMATEUR RADIO SOCIETY

◊ A new society has been formed to encourage communication between members of the Clan MacLean throughout the world via Amateur Radio. Frequencies of operation can be found at the society's Web page (**www.cmars.org.uk**) and are ± QRM. Both amateurs and SWLs are welcome.

To join send an e-mail to **g0bmh@cmars.org.uk** with your name, call sign and any other relevant details. Membership in the Clan Association is not a requirement, but is recommended as support is always welcomed by local branches. See **www.maclean.org** for details about your local branch.

All news and information is distributed via e-mail, so a valid e-mail address is required to join the society.

Eligibility: The society is open to anyone who qualifies for Clan membership under the "3-generation" rule, which Clan Maclean respects, in common with other Scottish Clans. This means you or your spouse, parent, grandparent or great-grandparent bears one of the surnames accepted as belonging to the Clan Maclean. Accepted surnames can be found at: **www.maclean.org/septs.htm**.

Previous • Next Strays

2001 ARRL 10 GHz and Up Cumulative Contest Rules

1. Object: North American amateurs work as many amateur stations in as many different locations as possible in North America on bands from 10-GHz through light.

2. Date and Contest Period: Third full weekend of August and September. **For 2001, the contest dates are August 18-19 and September 15-16**. Operations may take place for a total of 24 hours on each contest weekend. Each weekend begins at 6 AM local time Saturday though 12 midnight local time Sunday. Listening times counts as operating time. Times off must be clearly indicated in the log.

3. Entry Categories:

3.1. 10 GHz only.

3.2. 10 GHz and up.

4. Exchange: Six-character Maidenhead Locator (see the ARRLWeb grid square calculator on-line at **www.arrl.org/locate/grid.html**).

4.1. Signal report is optional.

5. Miscellaneous:

5.1. Scheduling contacts is both permissible and encouraged.

5.2. Stations are encouraged to operate from more than a single location. For purposes of the contest, a change of location is defined as a move of at least 16 km (10 miles). A station may be reworked on each band for additional credit by either end of the contact moving to a new location.

5.3. Contacts may not be duplicated on the second weekend (that is at least one end of the QSO must be from a different location).

5.4. Contacts must be made over a minimum distance of 1 km.

5.5. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period. The intent of this rule is to prohibit "manufactured" contacts.

5.6. Contacts with aeronautical mobiles do not count.

6. Scoring:

6.1. Distance points: The distance in km between stations for each successfully completed QSO is calculated. Distance = distance in km.

6.2. QSO points: Count 100 QSO points for each unique call sign worked per band. Portable indicators added to a call sign are not considered as making the call sign unique.

6.3. Total Score: Equals distance points plus QSO points.

6.4. There are no multipliers.

6.5. In making the distance calculations, a string (or ruler) and map may be used. However, calculations by computer program are preferred. Several such programs are available in the commercial market, including a basic program listing in *The ARRL World Grid Locator Atlas* ($5). For purposes of making calculations, stations are defined as being located in the center of the 6-character locator sub-square (most computer programs make this assumption).

6.6. Scoring example: On the first weekend, W1VT operating from Mt Greylock, MA works W1AIM (distance 97 km) and WB1FKF (distance 107 km) on 10 GHz; and WB1FKF (distance 107 km) on 24 GHz. On the second weekend, W9JJ operating from Pack Monadnock, NH works the following stations: W1AIM (154 km), W1GHZ (205 km), WB1FKF (157 km), and W1RIL (147 km) on 10 GHz; and W1RIL (147 km) on 24 GHz.

Distance points = 97 + 107 + 107 + 154 + 205 + 157 + 147 + 147 = 1121

QSO points = 100 × 6 = 600 (10 GHz: W1AIM, WB1FKF, W1GHZ, W1RIL; 24 GHz: WB1FKF, W1RIL

Final Score = 1121 + 600 = 1721

7. Schedules:

7.1. Schedules may be set up by use of the HF calling frequency of 3818 kHz on the evenings of Tuesday, Wednesday and Thursday before the contest weekends starting at 7 PM local. Also, 144.230 and 146.55 MHz can be monitored during the contest to arrange schedules with other stations. Paired stations should move off these frequencies once contact has been made.

8. Reporting:

8.1. Official forms are available at the ARRL Contest Web Page at: **www.arrl.org/contests**.

8.2. Electronic entries consist of the required ARRL summary sheet completely filled out and log file indicating band, date, time, call sign, the exchange information plus distance of contacts in km.

8.3. Logs must be submitted no later than **October 16, 2001**. Paper logs may be mailed to ARRL Contest Branch, 225 Main St, Newington, CT 06111. Electronic logs should be e-mailed to **10GHZ@arrl.org**. Incomplete or late logs may be classified as "check logs."

9. Awards: Suitable awards will be presented.

10. Other: See "General Rules for All ARRL Contests" and "Rules for ARRL Contests above 50 MHz" in November 2000 *QST* or at **www.arrl.org/contests**. QST

STRAYS

INTERNET ELMER GROUP

◊ A new e-mail list has formed on Yahoo that is dedicated to recently licensed amateurs. The HAM-ELMER group welcomes everyone with a genuine interest in ham radio. Old timers answer questions and give advice. You can join by sending an e-mail to **HAM-ELMER-subscribe@yahoogroups.com**.

MARCONI WEB SITE

◊ A new Web site has been established in honor of Guglielmo Marconi at **www.radiomarconi.com**. Features of the site include audio WAV files of Marconi himself and a wealth of historical photography.

2002 RADIO EXPEDITION TO MT MCKINLEY

◊ Tom Meyer, WB5OLA, is looking for five experienced amateurs to accompany him on a radio expedition to the 7000-foot level of Mt McKinley, Alaska in 2002. The group will operate all HF bands plus selected amateur satellites. Interested candidates must be physically fit with camping experience. Candidates must also be able to pay their own travel expenses. Contact Tom Meyer, WB5OLA, 629 Woodward Dr, Madison, WI 53704-2233; **mbmeyer@students.wisc.edu**.

SCHEMATICS NEEDED

◊ I am trying to locate a schematic diagram for a Realistic PRO-48 scanner. E-mail David Grey, ZL1UTS, at **greysqth@xtra.co.nz**.

◊ I am looking for a schematic diagram for an ITC Instruments model P1500 hand-held frequency counter. Howard Burkhart, KB6MYE, PO Box 11437, Torrance, CA 90510-1437; **aoksurvival@earthlink.net**.

ATTENTION ALL "JIM SMITHS"

◊ If your name is Jim Smith, you'll probably be interested in the "CQ Jim Smith" on-air event taking place July 20-22 from the Jim Smith Convention in Irving, Texas. Listen for W9JSS on 20, 15 and 10 meters from 1530-1730Z each day. For more information about the Jim Smith Society, see their Web site at **www.jimsmith2.org**.

I would like to get in touch with. . .

◊...anyone interested in equipment made by Harvey Radio Labs. E-mail Peter Laur, SM5HUA, at **peter.laur@telia.com**. The Harvey Web site is at **www.swedeart.com/harvey/index.html**.

◊...amateurs who have call signs that match their names. For example, my name is Randy *Koehl* and my call sign is *K0EHL*. E-mail me at **Rajuko@msn.com**.

Previous Strays

SECTION NEWS

The ARRL Field Organization Forum

Field Organization Abbreviations

ACC	Affiliated Club Coordinator
ARES	Amateur Radio Emergency Service
ASM	Assistant Section Manager
BM	Bulletin Manager
BPL	Brass Pounders League
DEC	District Emergency Coordinator
DXFR	DX Field Representative
EC	Emergency Coordinator
LGL	Local Government Liaison
NCS	Net Control Station
NM	Net Manager
NTS	National Traffic System
OBS	Official Bulletin Station
OES	Official Emergency Station
ORS	Official Relay Station
OO	Official Observer
OOC	Official Observer Coordinator
PBBS	Packet Bulletin Board Station
PIC	Public Information Coordinator
PIO	Public Information Officer
PSHR	Public Service Honor Roll
SGL	State Government Liaison
SEC	Section Emergency Coordinator
SM	Section Manager
STM	Section Traffic Manager
TCC	Transcontinental Corps
TA	Technical Advisor
TC	Technical Coordinator
TS	Technical Specialist
VC	Volunteer Counsel
VCE	Volunteer Consulting Engineer
VE	Volunteer Examiner

ATLANTIC DIVISION

DELAWARE: SM, Randall K. Carlson, WB0JJX— It was good to see all of you who attended the Delaware State Convention. Many thanks to the Penn-Del group for once again putting on a great convention and Hamfest. Putting on something like this takes a lot of work, and they do a fine job, year after year. With the coming and going of the hamfest and Field Day just around the corner, it means that the hurricane season will soon be upon us. We have been very fortunate the last few years, but it's not a time to get complacent. It's not too soon to start thinking about putting together an emergency kit and plans for your family. By making sure your family is taken care of you will be free to help others should the occasion arise. Traffic: (Apr) DTN: QNI 153 QTC 22 in 21 sess, DEPN: QNI 35 QTC 0 in 4 sess, K3JL 80, N3HMQ 6.

EASTERN PENNSYLVANIA: SM Eric D. Olena, WB3FPL — SEC: Michael O. Miguelez, N3IRN. ACC: Steve Maslin, N3ORH. BM: Frederic Serota, K3BHX. OOC: Alan Maslin, N3EA. STM: Paul Craig, N3YSI. SGL: Allen Breiner, W3ZRQ. TC: Lawrence Thomas, AA3PX. ASMs: Robert Josuweit, WA3PZO, Dave Heller, K3TX, George Law, N3KYZ, James E. Bear, WB3FQY, Harry Thomas, W3KOD. At the time I am sitting down to write this article, the busy warm weather Ham Radio activities are well under way as are the outside house projects. In the past 30 days, I have visited the folks in Bucks County three times already. In past years, Bucks County was having some problems which centered on a wide split between ARES and RACES. Since then, Michael Patton, W3MJP, bravely took on the role of EC. In addition, there was a change in the county RO personnel. Together, the present team is turning the Bucks County organizations into something to be really proud of. The addition of KD3KZ, also a Bucks County resident, as DEC makes District 1 of E. Pa. one of the best. At the Warminster Hamfest in early May, I was quite pleased that several people just stopped by the ARRL table just to say hello and to introduce themselves to me. Thanks to everyone that did so. My thanks to South Florida SM, KA4FZI, who provided computer files for printing URL listings of some of the various ARRL Web sites. PIO WA3PZO was instrumental in obtaining the URL lists from KA4FZI. Danville, Pa. and the Milton ARC are my next stop, and I am quite pleased to present them with their long-awaited Affiliated Club Certificate. Congratulations Milton ARC we are most proud to list your club with the Affiliated Clubs. Speaking of congratulations, here's one for you. W3PYF, Clarence Snyder, in April of this year received the "Service to Mankind Award" for 2001 from the Sertoma Club of Easton, Pa. Even if I took the entire length of my column to list the accomplishments of W3PYF, I would not have enough space. Clarence resigned last year from the Northampton County RO and EC positions. The RO position he held for 53 years. Clarence also held the SCM position. I am sure that the Delaware-Lehigh ARC is extremely proud of him. Clarence turned 81 in April and he often sends e-mail to me, usually with his latest collections of jokes. What more can one say about a person who has given so much to Amateur Radio. I am very proud, indeed, to know W3PYF.Tfc: N3YSI 599, W3IPX 484, N3EFW 374, W3HK 323, K2BCL 229, W3NNL 189, N3SW 122, W3UAQ 116, KB3CEZ 72, K3TX 49, W3TWV 32, W3JKX 17, KB3BBR 17, AD3X 17, N8JSO 16, KB3DDL 10, N3IRN 10, KB3DCT 10, K3ARR 9, N3AO 9, N3AS 9, KA3LVP 9, W3ZQN 6, KB3CVO 4, W3ROQ 1. Net Reports: EPAEPTN 283, EPA 60, PFN 166, PTTN 95, SEPPTN 12, LCARES 9, and MARCTN 6.

MARYLAND/DC: SM, Tom Abernethy, W3TOM, 301-292-6263, w3tom@arrl.org— Thank you for your confidence in electing me as your SM. The SM is a volunteer position requiring special dedication and effort. Our section has been fortunate to have our outgoing SM, Bill Howard, WB3V, at the helm for the last eight years. Through Bill's tireless efforts, our section's Field Operations currently are in a state of excellent health. We wish you well! As our new MDC SM, I look forward to working with you to address the Field Operations needs of Amateurs and advance Amateur Radio throughout our section. Congratulations to Gary Penrod, N3GP, for his appointment as ALLE EC. ALLE EC N3GP reports 9 check ins to the RACES net in April with W3DFW operating two meter and N3GP operating HF. ANAR EC N3QXW reports 43 members, 5 net sessions of the ANAR ARES Net. April 8 ARES members supported the 10 mile race in ANAR: N3SEO, W3RUM, N3HKJ, & K3BMV. April 29 MOD support included: N3SEO, N3WOF, N3HKJ, W3RUM, N3TAU & N3TLU. CALV EC N3QHC reports 10 members. KR3A and N3QHC manned EOC during COMEX. CARR AEC KE3FL reports 22 members and 4 CARET net sessions. CHAR EC reports 29 members and 5 net sessions. On April 29, Charles County ARC K3SMD MOD support included: W3SMD, N3ZVU, N3ZXS, N3YWZ, KB3GHI, WB3KYW, K3GJ, K3WTF, N2OMC, AA3RT, KB3FQE, KA3GRW, KB3EHK, W3ERU, KA3VNF, and W3TOM. FRED EC N8AAY reports 10 members, 5 net sessions of the Fredrick County ARES. ARES provided support for three public service events. MONT EC W3CQH reports 80 members and 4 net sessions of the MONT Emergency and Public Service Net. PRGE EC WI3N reports 41 members with 2 Public Service Events. WASH EC KD3JK reports 43 members.With the nets: Net/NM/QND/QTC/QNI: MSN/KC3Y/30/73/300, MEPN/N3WKE/27/235/429, MDD/WJ3K/no report; MDD top brass,BTN/AA3LN/30/107/405, MAR BTN/AA3LN/31/25/430 MAR MEPN/N3WKE/30/69/566. Traffic: KK3F 1690, AA3GV 365, AA3SB 295, W3YVQ 116, WA1QAA 105, WB4FDT 104, N3ZOC 101, N3KGM 94, N3DE 93, N3WK 86, KC3Y/85, KJ3E 47, WA3GYW 43, W3CB 35, K3CSX 34, N3ZKP 21, W3FZT 6, KE3FL 4, PSHR: KK3F 294, W3YVQ 159, AA3GV 158, N3ZKP 138, AA3SB 134, N3WK 126, WA1QAA 125, KE3FL 114, K3CSX 113, W3CB 105, KC3Y 91, N3ZOC 79.

NORTHERN NEW YORK: SM, Thomas A. Dick, KF2GC— http://www.northnet.org/nnyham, E-mail: kf2gc@arrl.org. The Atlantic Division Cabinet Meeting was in Frederick, Maryland, on April 28. It gave me an opportunity to share about the vitality of our NNY Section and all that has gone on this past year. We have many achievements to be proud of and this was echoed by all that were in attendance. The opportunities in Amateur Radio have never been greater than right now. We have at our fingertips more capabilities than ever before … I really believe that! I hope and pray that we all will realize this in a new and vital way and find some way to get involved with Amateur Radio in your Section begin to feel a part of a great national resource whose time has come. We can capture the good will of generations, nations and even the world if we will say, "Let this truly be our finest hour." So, let's rise to the occasion. The NNYARA is planning the first ever NNY Lake Placid Hamfest 2001 which will be held in Lake Placid on Oct 13. The representatives from the various NNY affiliated clubs all agreed that we would also like to have a liaison from each club to keep their respective club up to date on developments concerning the Hamfest. Whose sole purpose would be to report back to the club and expound upon news about the upcoming Hamfest in Lake Placid. Donation - Tickets can be secured from your club representative. 73, Thomas Dick, KF2GC.

SOUTHERN NEW JERSEY: SM, Jean Priestley KA2YKN (@K2AA) e-mail ka2ykn@voicenet.com—ASM: W2BE, K2WB, W2OB, N2OO, N2YAJ, N2XYZ, SEC: KC2GID. STM: K2UL. ACC: KB2ADL. SGL: W2CAM. OOC: K2PSC. TC: W2EKB. TS: W2PAU, WB2MNF, AA2BN, KD4HZW, WB3IJB, WA2NBL, N2QNX, N2XFM. As summer moves forward, we look to Hamfest-by-the-shore. We invite you to the Bayville Hamfest on Aug 12, '01. Contact Ed, WA2NDA, at 609-271-2792. Also for your summer pleasure, look to the light. Lighthouse events: Natl Lighthouse Day, Aug 4 & 5, Intl Lighthouse Day, Aug 18 & 19. Don't forget the Annual New Jersey QSO Party starting Sat 2000 UTC Aug 18 & starting 1300 UTC Sunday 19,2001. Info: contact Englewood ARA, PO Box 528 Englewood, NJ 07631-0528. April Traffic Rpt: QNI NJM 92 WA2OPY NJN (E) 159 AG2R NJN (L) 175 AG2R NJPN 182 W2CC NJSN K2PB (above joint with NNJ) JSARS 331 K2ATQ SJTN 55 SJVN 297. Tfc: K2UL 224, WA2CUW 139, AA2SV 80, KB2RTZ 42, WB2UVB 40, K2UL-4 30, N2VQA 23, N2WFN 17, WJ2F 16, KA2CQX 11, KB2YJD 6, N2ZMI 5, W2AZ, KB2VYZ, W2MC, N0YHH 4, KA2YKN 2, KB2VSR, KB2YBM, KC2ETU 1. PSHR: KB2RTZ 223, K2UL 200, WB2UVB 142, AA2SV 122, KA2CQX 112, WA2CUW 105, N2VQA 82, WJ2F 71, KA2YKN 64, N2WFN 61, KB2YJD 38, N2HQL 26. Work some traffic!

WESTERN NEW YORK: SM, Scott Bauer W2LC—Welcome to new Emergency Coordinator (EC) for Tioga County, Tom, W7GUN. Thank you Dolores, W2EWO, for your years of service as EC of Tioga Cty! John WB2UEC, Madison and Oneida EC is now N2UC. Here at home Onondaga Cty EC Vivian, WA2PUU, and a group of 17 provided communications for the St. Patrick's Day parade in Syracuse. In Cortland County, Andy, KB2LUV, and crew provided communications for the colorgaurd competition at Cortland High School. Congratulations to Joan, KC2ELD, on becoming an ARRL HF Awards Manager for the Chautauqua Cty Amateur FM Association. Joan will validate worked all states (WAS) and 5-band WAS applications. Karl, N2NJH, reports that Erie County has 206 ARES members! Wow! Hamfests: July 15, Batavia Hamfest, Genesee Radio Amateurs; July 21, Utica Hamfest, Utica ARC; Aug 4, Ithaca Hamfest, TCARC at Tompkins County Airport; Aug 5, Greater Buffalo Summer Hamfest and WNY Section Convention, Main Transit FD Hall, 6777 Main St., Williamsville NY, http://hamgate1.sunyerie.edu/~larc; Aug 11, Rome Hamfest, Rome Radio Club, at Westmoreland Fireman's Field. Silent Key: Art AA2ED. April Net Summaries:

Net	NM	Sess	QNI	QSP	Net	NM	Sess	QNI	QSP
BRVSN	N2OYQ	30	123	2	CNYTN	WA2PUU	30	365	62
EBN	WB2IJZ	21	341	0	ESS	WI2G	30	408	116
NYPHONE	N2LTC	30	255	383	NYPON	N2YJZ	30	387	189
NYS/E	WB2QIX	30	293	168	NYS/L	W2YGW	30	297	207
NYS/M	KA2GJV	30	197	72	NYSCN	W2MTA	5	18	2
NYSPTEN	WB3CUF	30	322	57	OCTEN/E	KA2ZNZ	30	1447	216
OCTEN/L	KA2ZNZ	30	670	237	STTHN	KC2AWA	9	29	3
TIGARDS	W2MTA	5	34	6	WDN/E	N2JRS	30	493	97
WDN/L	W2GUT	30	376	63	WDN/M	KB2VVD	30	408	47
WDN/M	March	31	476	76					

Traffic (April 2001), *indicates PSHR, #indicates BPL: N2LTC#* 1211, KA2ZNZ#* 489, W2MTA* 423, KA2GJV* 367, WB2IJH* 348, NN2H* 280, WI2G* 197, KB2KOJ* 160, N2KPR* 154, W2FR* 153, WB2QIX* 99, W2LC* 93, KA2DBD* 86, KG2D* 86, KC2EOT* 82, W2GUT* 67, N2CCN* 60, AF2K* 39, KB2ETO* 32, KB2WII* 28, N2WDS* 25, W2PII* 25, WA2GUP* 23, K2DN* 17, KA2BCE* 17, WA2UKX* 12, W2RH 7. Digital; Stn Rx/Tx: K2DN 1/0, KA2GJV 21/6, N2LTC 305/201.

WESTERN PENNSYLVANIA: SM, John Rodgers, N3MSE— ASM: N3MYZ. SEC: N3SRJ. ASM-ARES: WB3KGT. ASM-Packet: KE3ED. OOC: W3ZPI. PIC: W3CG. STM: N3WAV. TC: WR4W. DEC-SO: KD3OH. DEC-N1: N3QCR. DEC-N2: KA3UVC. DEC-S1: KA3HUK. DEC-S2: N3BZW. DEC-Rapid Response: N3HJY. DEC-OES: K3TB. I am trying to once again have two section-wide conferences for the club presidents and also for the emergency coordinators. Tentative plans for June had to be cancelled because of conflicts with other activities. I would like to schedule these for the fall and would appreciate hearing from individuals that would be interested in participating or items that would be good subjects for the conference. I have been attending quite a few club meetings as well as hamfests in the area and enjoy the opportunity to talk to the many people attending the events. I would like to remind the officers of the clubs in the section to please check and make sure that the data for your club has been updated with league headquarters. I recently received notice that several clubs have not renewed their club affiliation and filed their annual reports. If you need help please contact me and I will provide you with the details to do so online. My contact information is on page 12 of *QST*. Summer is finally here and with it many special events to contact and many operating events in which to participate. Join in and have some fun. Don't forget Field Day. This month's featured club Web site belongs to the Elk County Amateur Radio Association. Please visit their site at http://www.qsl.net/kb3boe/. Enjoy the summer and be safe. 73 de John Rodgers, N3MSE, WPA-SM n3mse@arrl.org.

CENTRAL DIVISION

ILLINOIS: SM, Bruce Boston, KD9UL—SEC: W9QBH. ACC: N9KP. STM: K9CNP. PIC: N9EWA. OOC: KB9FBI. DEC-Central: N9FNP. DEC-S/W: KB9AIL. Governor George Ryan declared June as Amateur Radio Awareness Month in Illinois. This is the second year the governor has made the proclamation. The declaration was coordinated through the efforts of W4NVY and N9QFP of the North Shore Radio Club. The Western Illinois ARC and Hannibal, MO ARC will operate W0MTL special event station from the famous Mark Twain Lighthouse in Mark Twain's boyhood home town (ARLHS USA-915) during National Lighthouse Weekend 2200z August 3 to 2400z August 5. ARES members in the Decatur area assisted and participated in the DMH Heart Walk on April 28. Kankakee ARS members participated in a disaster drill May 19. The drill involved hospital and emergency services personnel dealing with a terrorist attack and a hazardous waste spill. In the scenario, Amateur Radio became a primary means of communication. According to Williamson Co ARES EC WA9APQ, the annual River to River relay race was completed on April 21 utilizing approximately 65 amateur radio operators. The start of the race was in Pine Hills and ended in Golconda. The event was well organized and executed by N9VKO. York RC members helped with the St. Patrick's Day Parade. Lake Co RACES assisted with the MS Walkathon in Highland Park. The group is posting its monthly newsletter on the www.races.org Web site. St Clair ARC officers elected in February are Pres N9BPK, VP W9BP, Sec KB9PNN, Trea WA9TUG. Club members were making plans to assist with the March of Dimes Walk America in Belleville. The Starved Rock RC is looking into the feasibility of relocating their hamfest next year to another nearby location. Members from the Kishwaukee ARC assisted with the March of Dimes Walk on April 28 at Hopkins Park. Over a dozen ARRL-affiliated clubs in Illinois have not updated their contact information during the past two years and have been placed on inactive status at HQ. Clubs that wish to update their records can visit http://www.arrl.org/FandES/field/club/forms/fsd2/ and submit the information online. April traffic: NC9T 48, NN9M 39,

Continued on page 132.

Steve Ewald, WV1X ♦ Public Service Specialist

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John, N5EHP, Mgr.
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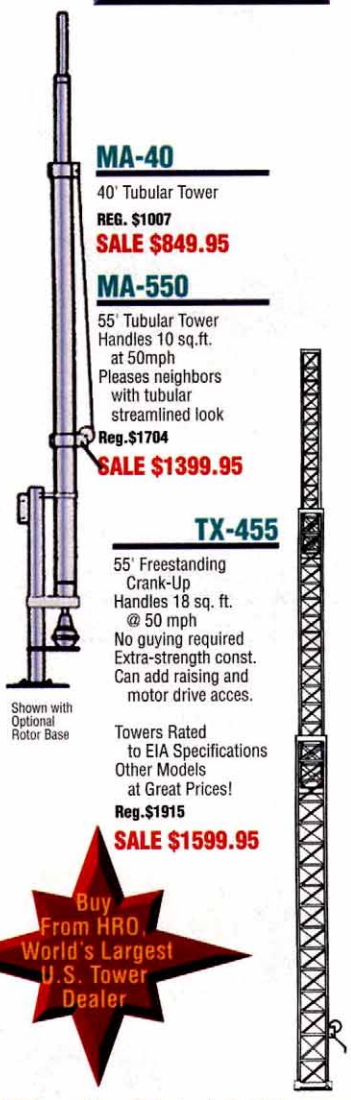

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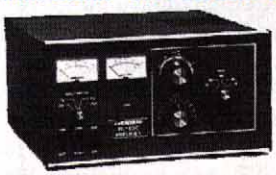

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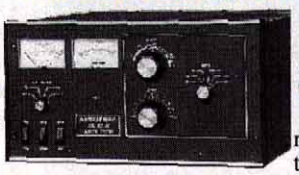

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#14	Hard-drawn, 7x22, all copper, bare	8¢
#14 FlexWeave™	168-strand, bare copper	14¢
#12 FlexWeave™	259-strand, bare copper	19¢
HD Ladder Line 450 ohms, stranded #16 cond.		22¢/17¢
Super Ladder Line, stranded #14 cond.	Sale	30¢/26¢
1/2" Tinned Copper Braid ground strap, any length		65¢
LadderLock™	Center insulator for ladder-line	$11.95
Copper Ground Strap, 6" all copper		$1.49

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Pulleys - for antenna support rope. Highest quality, sailboat-type. Small & lightweight. #224 for 3/16" rope @ $11.95 and #082 for 5/16" rope @ $14.95

RFI Quick Fix
Built-in ground strap
Breaks up ground loops
Ends RF feedback problems

For really tough RFI problems, the **T-4G** is the ultimate fix by shunting stray RF on your coax directly to ground. Stray RF and feed line radiation doesn't have a chance. It solved all my RF feedback problems in my second floor shack. (W4THU) **Don't be misled by $100 imitations. Our Line Isolators are still unequaled.**

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Mil Spec, **Dacron® Antenna Support Line,** single braid, sun resistant, 3/16" 700# test 100' hank **$8**

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CAROLINA WINDOM 80, 132' long, 80 - 10 m	**If you hear one, you'll want one!**	$95
CAROLINA WINDOM 40, 66' long, 40 - 10 m.	**It helped set two 40 meter records.**	$90
CAROLINA WINDOM 40 Plus	**18' vertical radiator increase 40-15 performance**	$105
CAROLINA WINDOM 160 Special, 160 - 10m, 132' long.	**All bands 160 - 10**	$125
G5RV Plus, 80 - 10 m, 102'	High Power Current Balun, heavy-duty Ladder-line	$59.95

Jim's New Book - "Frequently Asked Questions about Antenna Systems and Baluns."
This revealing 124 page book answers questions and dispels myths. The material is presented in a style that's easy to read and Jim, W4THU, is not beyond poking fun at jealously held concepts. However, at the book's heart are questions that hams ask over and over. Available now - $12.95 + $3 postage.

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Models for every application

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B1-1KV	1:1	1 KW	Current -type VHF™	15 - 2 m	$29.95
Y1-5K	1:1	5 KW	Current YagiBalun	160 -10	$37.95
B4-1KXV	4:1	1 KW	Current-type VHF	10 - 2 m	$33.95
B4-1.5K	4:1	1.5 KW	Voltage-type	80 -10 m	$32.95
B4-2K	4:1	2 KW	Voltage-type	80 -10 m	$39.95
B4-2KX	4:1	2 KW+	Current-type	160 -10 m	$49.95
NEW!	**B1-5K+**	5 KW	Current-type	160 - 6 m	$35.95

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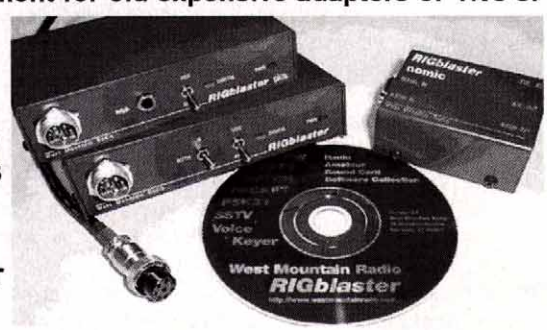

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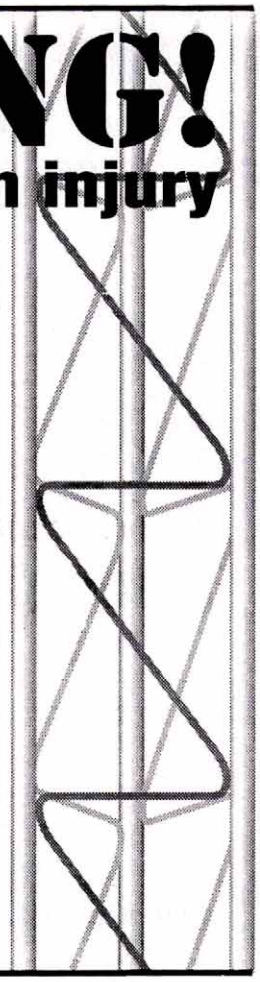
Installation and dismantling of towers is dangerous and temporary steel guys of sufficient strength and size should be used at all times when individuals are climbing towers during all types of installations or dismantlings. Temporary steel guys should be used on the first 10' of a tower during erection or dismantling. Dismantling can even be more dangerous since the condition of the tower, guys, anchors and/or roof in many cases is unkown.

The dismantling of some towers should be done with the use of a crane in order to minimize the possibility of member, guy, anchor or base failures. Used towers are not as inexpensive as you may think if you are injured or killed.

Get professional, experienced help and read your Rohn catalog or other tower manufacturers' catalogs before erecting or dismantling any tower. A consultation with your local professional tower erector would be very inexpensive insurance.



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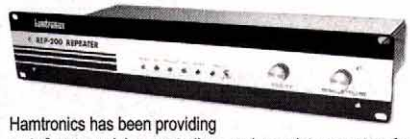

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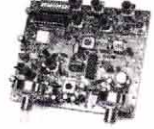

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MFJ-616 **$169.95**

"As I got older, my high frequency hearing loss was destroying my ham radio for me . . ."

-- Martin F. Jue, K5FLU
President and Founder
MFJ Enterprises, Inc.

I know I'm not the only ham who can't understand all the speech in a QSO caused by high frequency hearing loss. I developed a solution that I want to share with my fellow hams.

I almost gave up my ham radio hobby

I have been a passionate ham radio operator for over 40 years ever since I was a teenager. I loved every minute of it. Still do, but I almost had to give it up.

As I grew older (I'm 56 now) I found myself asking "*What did you say?*" so often it got downright embarrassing. I can hear pretty good most of the time. I just can't always understand what people are saying and my left ear is weaker than my right ear.

It got to where I was having trouble carrying on QSOs. I could hear, but I just couldn't quite make out all the words.

My hearing problem almost put a stop to my lifelong hobby.

There was no way I was going to give up ham radio . . .

Research showed me what to do

I searched the literature and spoke to hearing and speech experts.

According to their research on the intelligibility of speech in hearing English words:

1. The frequencies important for speech intelligibility are the consonant sounds from 500 to 4000 Hz. They contribute 83% of word intelligibility.

Frequencies from 500 to 1000 Hz contributes 35% of word intelligibility and 35% of sound energy.

Frequencies from 1000 to 4000 Hz contributes *48% of intelligibility* but has *only 4% of sound energy!*

2. In contrast, frequencies from 125 to 500 Hz contributes 55% of sound energy but only 4% to word intelligibility.

***In** other words, nearly half the speech intelligibility is contained in 1000 to 4000 Hz frequency range with only 4% of the speech sound energy.*

On the other hand, the low frequencies 125 to 500 Hz have most of the speech energy but contribute very little to intelligibility.

How I improved my ability to hear and understand QSOs

The research showed me what to do.

First, drastically increase the speech energy above 500 Hz where 83% of intelligibility is concentrated.

Second, drastically reduce the speech energy below 500 Hz that contributes only 4% of intelligibility.

Amateur radio communications limit audio to about 300 to 2700 Hz.

I split the audio band into four overlapping octave ranges centered at 300, 600, 1200, 2400 Hz.

I could boost or cut each range by nearly 20 db to give me full control. This let me maximize speech intelligibility for most kinds of frequency loss.

My left ear is weaker than my right ear so I split the output audio into left and right channels with separate 2½ watt amplifiers. A balance control lets me equalize the perceived loudness to each ear. *Now both ears help in improving speech intelligibility!*

I couldn't believe my ears!

I built one and hooked it to my rig.

I boosted the high frequencies, cut the low frequencies, set the volume and adjusted the balanced control so I could hear each side equally loud.

I couldn't believe my ears! Speech that I could hear but barely understand before was now highly understandable. I got my ham radio back!

With this concept, you'll *understand* QSOs better and enjoy ragchewing and contesting more, even if you don't have high frequency hearing loss.

It helped me so much I wanted to share this with my fellow hams

I developed this into an accessory that any ham can use.

I made it immune to RFI, added a front panel phone jack, on/off speaker switch, two selectable transceiver inputs, a bypass switch for in/out comparison and built it into 10Wx2½Hx6D inch aluminum enclosure. Needs 12 VDC.

Other Uses

Replace your rig's audio section for superb audio. Eliminate hum, buzzes, poor frequency response, low audio power.

Works with SSB, FM, AM, CW -- any voice mode. Use any rig -- ham, marine, aircraft, CB. Use for PA systems, internet phone, radio talk shows.

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W9HLX 37, WB9TVD 36, KA9IMX 13, W9FIF 10, WD9F 8, WA9RUM 7. ISN de WB9TVD QNI-203, QTC-85, Sessions-31. Ninth Region C4 report for April de W9FC, traffic 170, sessions 60, time 295 min, average 2.83, rate .567, percent rep 97% by K9CNP, KF9ME, NS9F. April D9RN report from N9QNJ: Sessions-60, Traffic handled-166, Average per session-2.76, Rate of traffic-4.25, 75% of Illinois traffic handled by N9PLM, W9HLX, NN9M, NS9F & N9GZ. W9VEY Memorial Net report de K9AXS 7 with 244 check-ins.

INDIANA: SM, Peggy Coulter, W9JUJ—ASM for Resources & Recruitment: W9IH. SEC: K9ZBM. ASEC: WA9ZCE. STM: WA9JWL. SGL: K9JZZ. PIC: KB9LEI. TC: W9MWY. BM: KA9QWC. ACC: N9RG. It is with great sadness that I report my OOC, Betty Collins, KC9V, became a SK May 2. She had been ill for sometime but didn't let anyone know of her illness. She was from State Line. Sympathy also extended to the families and friends of Silent Keys: Apr 16, LeRoy Hulvey, W9PLW, Lake Station; Apr 27, Bernie Morris, KA9OSF, Indpls; and May 3, Jon Lee Foster,WD9GEJ, Crawfordsville. They will be missed. Amateurs united in Elkhart Co, Goshen ARC, Elkhart Co RA and the Elkhart Red Cross ARC proved its "All for one and one for all" in ham radio locally. The three clubs pooled equipment and personnel to mount an impressive effort at the Annual Ethnic Fair on the campus of Goshen College. Lake Co ARC had an exciting start at the Walk-America with a walker falling and injuring her knee before the walk started. She was transported to the hospital for treatment. Those furnishing communications were KF9EX, WN9Z, K9MQ, KB9THY, W9ZRO, KB9ODN, WD9GQO, WB9VRG and KB9NSD. Hope to see many at the Central Division Convention /Indy Hamfest July 7th. It is at the Marion Co Fairgrounds. The Michiana ARC furnished communications for the cleanup of the St Joseph River. Those helping were WB9SCC, KB9LTS, AA9AM, NY9A and N9WPB. Congratulations to Gene Ballard, W9SFU, was presented an ARRL 50 yr membership plaque at a real ham breakfast in Brownsburg. Monroe Co ARES provided support for the Science Olympiad on the campus of the IN Univ at Bloomington. A great deal of appreciation was expressed for the help provided in locating students, coordination and delivery of supplies and materials for this statewide event. The Porter Co hams provided communication support for the March of Dimes Walk-A-Thon. 12 amateurs worked a total of 60 man hours during this event. K9ZBM wishes to express his appreciation for all the ECs who reported their activities to him for April. As the leadership official for your group, you must send the info to him by the first of each month so that he can include it in his monthly SEC report. NMs ITN/WA9JWL, QIN/KJ9J/K9PUI, ICN/K8LEN, VHF/WA9JWL

Net	Freq	Time/Daily/UTC	QNI	QTC	QTR	Sess
ITN	3910	1330/2130/2300	2359	152	1471	83
QIN	3656	1430/0000	214	79	983	55
ICN	3705	2315	32	6	147	13
Hoosier VHF nets (12 nets)			488	22	826	24

D9RN QTC 166 in 60 sessions represented by N9KNJ, WA9JWL, WD9QPA, W9UEM, K9QBR and KB9NPU. 9RN QTC 170 in 60 sessions represented by KJ9J, KO9D, K9PUI, WB9OFG, WB9UYU and W9FC. Tfc: W9FC 213, WA9JWL 111, K9PUI 111, N9KNJ 62, KJ9J 52, K9GBR 48, KA9EIV 45, WD9HII 42, KB9NPU 38, KO9D 38, W9JUJ 30, W9FU 29, KA9QWC 19, W9EHY 12, K9DIY 9, W9EUM 8, WB9QPA 7, AB9AA 5, K9ZBM 5, K9RPZ 4, WB9OFG 4, WB9NCE 3.

WISCONSIN: SM: Don Michalski, W9IXG—SEC: WB9RQR. STM: K9LGU. ACC: K9FHI. SGL: AD9X. OOC: W9DGI. PIC: K9ZZ. TC: K9GDF. ASM: K9UTQ, W9RCW, W9CBE. BM: WB9NRK. It is with deep regret that I inform you that Art Smith, 90, K9LWZ, is a Silent Key. Art was very active in Army MARS. Don Schumacher, 77, K9CPY is a SK. Don was active in Sturgeon Bay and Manitowoc clubs. W0RHP, Phillip Muth, 69, and Frederick Kohn, WA9OMC, are Silent Keys. W9BZU, Chuck Scholten, received his 75 year ARRL award on May 15 at a ceremony given by members of MONCORAD, K9FHI, KA9BAC and I. Chuck has been an inspiration to many hams and we wish him many more years of amateur activity. Our congratulations to the crew of the Dream Flight Wausau Shuttle. The mobile science education program is celebrating its 10th anniversary this year! The Dream Flight Shuttle is a refurbished school bus that's been outfitted to look like a NASA space shuttle. Our thanks to all the amateurs who have supported the State Assembly PRB-1 bill. SGL, AD9X and PIC, K9ZZ, et al, have taken the lead on this important project and we greatly appreciate their efforts. 9RN report for April indicates 98% participation from the Wisconsin team! If your club is looking for an interesting project to demonstrate at a club meeting, consider building a copper cactus J-pole. It is and easy, fun and useful antenna! 73, Don, W9IXG, www.w9ixg.eboard.com. Tfc: WZ7V 831, W9YPY 549, K9GU 507, K9JPS 456, N9VE 452, N9TVT 408, W9IHW 197, K9LGU 138, W9CBE 119, K9FHI 96, N9BDL 77, N9CK 76, W9UW 69, KN9P 69, AG9G 64, KG9B 58, KE9VU 57, W9YCV 51, KB9ROB 35, W9RCW 32, KA9FVX 31, W9BHL 29, AA9BB 28, N9KHD 24, WB9ICH 20, WD9FLJ 18, N9JIY 8, N9UAR 7, W9PVD 5.

DAKOTA DIVISION

MINNESOTA: SM, Randy Wendel, KM0D—Most of you probably look at this column each month and wonder what those call signs are for at the bottom. Each month, anyone who keeps track of station activity on behalf of a public service can submit a report to the STM showing his or her "count". That is, a tally of public service events participated in, net controls, traffic handled (ARRL radiogram) to name a few. These reports are compiled and submitted every single month from the station who sends in the report, through the STM, then through myself, and to the ARRL. The result is a statistic which gives some idea of how much public service activity takes place in the Amateur Radio service on a regular basis. When a commercial service looks at taking valuable frequencies away from Amateur Radio, these statistics help provide us some "ammunition" showing that we ARE performing public services on an ongoing basis. Yes, these services may be routine, but those stations who regularly participate in these various public service events also are receiving communication skills at various levels. ARES members are also encouraged to participate since some of these activities provide a training ground for communication protocols used for emer-

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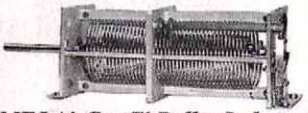
MFJ's *AirCore*™ roller inductor, new *gear-driven* turns counter and weighted spinner knob gives you exact inductance control for absolute minimum SWR.

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax, random wire or balanced lines.

You get everything you've ever wanted in a high power, full featured antenna tuner -- widest matching range, lighted Cross-Needle SWR/Wattmeter, massive transmitting variable capacitors, ceramic antenna switch, built-in dummy load, *TrueCurrent*™ Balun, *scratch-proof* Lexan front panel -- all in a sleek compact cabinet (10¾Wx4½Hx15D in).



MFJ AirCore™ Roller Inductor gives high-Q, low loss, high efficiency and high power handling.

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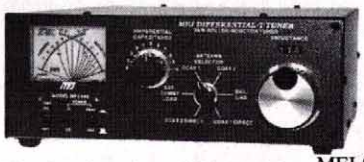
MFJ-986 Two knob *Differential-T*™



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Two knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. 10¾Wx4½Hx15 in.

MFJ-962D *compact* Tuner for Amps

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MFJ-969 300W *Roller Inductor* Tuner

MFJ-969 **$199.95**

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 3½Hx10½Wx9½D inches.

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MFJ-941E *super value* Tuner

MFJ-941E **$129.95**

The most for your money! Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek 10½Wx2½Hx7D in.

MFJ-945E HF+6 Meter *mobile* Tuner

MFJ-945E **$119.95**

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $4.95,** mobile mount.

MFJ-971 *portable/QRP* Tuner

MFJ-971 **$99.95**

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x6½x2½ inches.

MFJ-901B *smallest* Versa Tuner

MFJ-901B **$79.95**

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-16010 *random* wire Tuner

MFJ-16010 **$49.95**

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 *6 Meter* Tuners

MFJ-906 **$79.95**

MFJ-906 has lighted Cross-Needle SWR/wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $49.95,** Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 *VHF/UHF* Tuners

MFJ-921 or MFJ-924 **$69.95**

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 inches. Simple 2-knob tuning for mobile or base.

MFJ-922 144/440 MHz Tuner

MFJ-922 **$79.95**

Ultra tiny 4x2½x1¼ inch tuner covers VHF 136-175 MHz and UHF 420-460 MHz. SWR/Wattmeter reads 60/150 Watts.

MFJ-931 *artificial* RF Ground

MFJ-931 **$89.95**

Creates artificial RF ground. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire. Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. **MFJ-934, $169.95,** Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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gency communications. If you have HF and are interested in these activities, you will also be welcomed to the added benefit of participating in our ARRL Section Nets where you can meet many other people statewide, announce your area hamfest and VE exams, receive bulletins, and have some good ol' Amateur Radio fun. Come on, join in the ARRL nets, and maybe even get your name on the list! 73 de Randy "Max" Wendel KM0D.

Net	*Freq*	*Time*	*QNI/QTC/Sess*	*Mgr*
MSPN/E	3860	5:30 P	628/58/30	W0WVO
MSPN/N	3860	12 P	331/34/30	WA0TFC
MSSN	3710	6 P	N/A	VACANT
MSN/1	3605	6:30 P	221/65/30	K0WPK
MSN/2	3605	9:50 P	115/10/28	K0PIZ
PAW	3925	9A-5P	2209/85/82	KA0IZA

Tfc: WO0A, W0LAW, WA0TFC, KB0OHI, W3FAF, K0WPK, KC0HAW, W0HPD, K0PSH, K0PIZ, W0WVO, KB0AII, WD0GUF, KN9U, KA0IZA, KB0AIJ, N0JP.

NORTH DAKOTA: SM, Kent Olson, KA0LDG— Thanks to all those who helped out with the recent flooding throughout the Red River Valley. Although this years flood wasn't as bad as the 1997 flood, many communities and individuals were affected up and down the valley. Fargo hams manned the Salvation Army, Cass Cty EOC, Fargo's Volunteer Center as well as patrolling dikes. Grand Forks hams set up an antenna for the Ntl Guard as well as patrolling dikes. Whapeton hams, too, were helping prepare for record flooding. I'm saddened to inform you of two new Silent Keys: Bob Dixon, AA0KY, formally KF0DI, of Minot was very active in many activities including emergency communications, packet, club activities & ragchewing. George Kraus, W0EUQ, of Grand Forks was also was a ragchewer, who enjoyed CW & RTTY with vintage equipment along with club & emergency communications. Section Web site at: http://home.earthlink.net/~qtipf16/. Apr Tfc: HF NM KE0XT reports Goose River Net, 5/67/0; WX Net 25/716/13; Data Net 30/638/19.

SOUTH DAKOTA: SM, R.L. Cory, W0YMB—In April, LARK at Watertown was busy working on the flooding problems in the area. First call was April 7 and again on April 11. About 20 hams helped. Meanwhile hams in North Dakota and Minnesota were on standby. STM W6IVV is recovering at home after being hospitalized at Prairie Lakes in Watertown. Pierre ARC has been called to do Hughes Co weather spotting due to resignationof the County Emergency Management Director. They have been furnished with 3 county CD radios to help with the project. National Weather Service put on a weather spotters program for the Black Hills ARC at Rapid City. Pierre ARC has a net on their repeater at 9 PM on Wednesday on 145. 350. They will have a special event statioin on Aug 6-8 for Lewis and Clark activities. They will have amateur TV on the air to broadcast radar signals during storms. The Novice Net has had its best month in 3 years according to NM N0MEA. The net meets at 7 PM, Sunday evening, on 3700. April traffic reported was 316.

DELTA DIVISION

ARKANSAS: SM, Bob Ideker, WB5VUH—Hope everyone had a good & safe time at FD this yr. Was lots of fun, and good to see so many participating. Hope you & your club did well and had safe event. The Ozk Challenge, held 4/7-8, a 36 hr endurance went well with help of NW AR hams including AD5AM, N5ZMW, KI5FY, KC5ZKI, KD5ENT, KD5ANL, KB5YFH, KK5FU, KB5DDX, W0FX, W5JSR, KEDNFJ, & KD5EKJ. Tnx for helping with support of event. Many tnx for the 123 who attended the ARRL forum at the LR hamfest. It was, by far, the largest we've ever had at a forum. Also tnx to all hams in North Central AR who helped with the search & rescue efforts of finding the lost little girl. No matter what you did either by listening on your radio, knowing you might be called, helping the agencies with setup and or gathering needed supplies, or just by being there in spirit to support the search, you are deeply appreciated. Lessons were learned & will have positive affects the next time we're asked to provide support. Tfc for April include over 102 sessions, a total of 3,054 checking into our four nets, 133 pieces of traffic, and a total of 2,007 minutes. Individual performances include KC5TMU, K5BOC, K7ZQR, W5RXU, AD5BV, KC5VQW, & AD5AM. R5 reflects participation by KC5TMU, K7ZQR, W5LZQ, K5BOC, W9YCE, AB5AU, AB5SG, N5SN, & KA5KOC in 60 sessions and 1,384 minutes. Great job hams.

LOUISIANA: SM, Mickey Cox, K5MC — ACC: KM5YL. OOC: WB5CXJ. PIC: K5IQ. SEC: AC5TM. STM: KG5GE. LCW NM: W4DLZ. LTN NM: WB5ZED. Looks like our ham license plates are in danger. Several years ago ham plates became a part of the "prestige" plate program and now some legislators want to curtail or abolish prestige plates. We had better notify our state senators and representatives if we wish to keep our ham plates. One good Web site is http://senate.legis.state.la.us/Senators/ (this site also provides a link to house members). Sure wish someone would step forward for the important position of State Government Liaison to help us keep tabs on what our lawmakers in Baton Rouge are up to. KC5QDZ has been appointed EC for Lafayette Parish. WB5ZED was presented the Whitney Nuggett Award at the 7290 Picnic for his outstanding public service. Congratulations, Leon, for this well earned recognition. Unfortunately, LA has just lost Leon to our neighbor section to the east and this month will be the last report for WB5ZED to lead our section's traffic and PSHR lists. I am happy to report, however, that our section will retain his services as the LTN Net Manager. Field Day should be very close at hand as you read this column in July *QST*. Have fun and good luck to all! Tfc: WB5ZED 661 (BPL), W5CDX 175, K5IQZ 105, K5MC 54, KG5GE 32, K5DPG 25, KM5YL 21, N0KWA 3, W5PY 3. PSHR: WB5ZED 205, K5IQZ 128, W5CDX 126, K5DPG 123, KM5YL 104, K5MC 98, KG5GE 86, W5PY 73. Net Reports: sessions/QNI/QTC. LTN: 30/304/69. LCW: 28/151/33.

MISSISSIPPI: SM, Malcolm Keown, W5XX— Club President N5JGK reports that on the third try (never give up) VARC successfully linked up students at Vicksburg High School with Astronaut KC5NHZ on ISS Alpha. Nine students beamed up 18 questions to Astronaut Susan Helms during the 10-minute signal acquisition window. Congratulations VARC! Did you ever wonder if you have any DX QSLs at the W5 Bureau? You

MFJ 1.8-170 MHz SWR Analyzer™

Reads complex impedance . . . Super easy-to-use

New MFJ-259B reads antenna SWR . . . Complex RF Impedance: Resistance(R) and Reactance(X) or Magnitude(Z) and Phase(degrees) . . . Coax cable loss(dB) . . . Coax cable length and Distance to fault . . . Return Loss . . . Reflection Coefficient . . . Inductance . . . Capacitance . . . Battery Voltage. LCD digital readout . . . covers 1.8-170 MHz . . . built-in frequency counter . . . side-by-side meters . . . Ni-Cad charger circuit . . . battery saver . . . low battery warning . . . smooth reduction drive tuning . . . and much more!

The world's most popular SWR analyzer just got incredibly better and gives you more value than ever!

MFJ-259B gives you a complete picture of your antenna's performance. You can read antenna SWR and Complex Impedance from 1.8 to 170 MHz.

You can read Complex Impedance as series resistance and reactance (R+jX) or as magnitude (Z) and phase (degrees).

You can determine velocity factor, coax cable loss in dB, length of coax and distance to a short or open in feet.

You can read SWR, return loss and reflection coefficient at any frequency simultaneously at a single glance.

You can also read inductance in uH and capacitance in pF at RF frequencies.

Large easy-to-read two line LCD screen and side-by-side meters clearly display your information.

It has built-in frequency counter, Ni-Cad charger circuit, battery saver, low battery warning and smooth reduction drive tuning.

Super easy to use! Just set the bandswitch and tune the dial -- just like your transceiver. SWR and Complex Impedance are displayed instantly!

Here's what you can do

Find your antenna's true resonant frequency. Trim dipoles and verticals.

Adjust your Yagi, quad, loop and other antennas, change antenna spacing and height and watch SWR, resistance and reactance change instantly. You'll know exactly what to do by simply watching the display.

Perfectly tune critical HF mobile antennas in seconds for super DX -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on one band, or analyze multiband performance over the entire spectrum 1.8-170 MHz!

Check SWR outside the ham bands without violating FCC rules.

Take the guesswork out of building and adjusting matching networks and baluns.

Accurately measure distance to a short or open in a failed coax. Measure length of a roll of coax, coax loss, velocity factor and impedance.

Measure inductance and capacitance. Troubleshoot and measure resonant frequency and approximate Q of traps, stubs, transmission lines, RF chokes, tuned circuits and baluns.

Adjust your antenna tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259B is a complete ham radio test station including -- frequency counter, RF signal generator, *SWR Analyzer*™, RF Resistance and Reactance Analyzer, Coax Analyzer, Capacitance and Inductance Meter and much more!

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MFJ's comprehensive instruction manual is packed with useful applications -- all explained in simple language you can understand.

Take it anywhere

Fully portable, take it anywhere -- remote sites, up towers, on DX-peditions. It uses 10 AA or Ni-Cad batteries (not included) or 110 VAC with MFJ-1315, $14.95. Its rugged all metal cabinet is a compact 4x2x6¾ inches.

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MFJ *SWR Analyzers*™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Used worldwide by professionals everywhere.

More MFJ SWR Analyzers™

MFJ-249B, $229.95. Like MFJ-259B, but reads SWR, true impedance magnitude and frequency only on LCD. No meters.

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MFJ-219B, $99.95. UHF *SWR Analyzer*™ covers 420-450 MHz. Jack for external frequency counter. 7½x2½x2¼ inches. Use two 9 volt batteries or 110 VAC with MFJ-1312B, $12.95. *Free* "N" to SO-239 adapter.

SWR Analyzer Accessories

Dip Meter Adapter

MFJ-66, $19.95. Plug a dip meter coupling coil into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Save time and take the guesswork out of winding coils and determining resonant frequency of tuned circuits and Q of coils. Set of two coils cover 1.8-170 MHz depending on your *SWR Analyzer*™.

Genuine MFJ Carrying Case

MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories.

Made of special foam-filled fabric, the MFJ-29C cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work -- the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Has clear protective window for frequency display and cutouts for knobs and connectors so you can use your MFJ *SWR Analyzer*™ without taking it out of your case. *Look for the MFJ logo for genuine authenticity!*

MFJ-99, $54.85. Accessory Package for MFJ-259/B/249/B/209. Includes *genuine* MFJ-29C carrying case, MFJ-66 dip meter adapter, MFJ-1315 110 VAC adapter. ***Save $5!***

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MFJ-224 **$159.95**

MFJ 2 Meter *FM SignalAnalyzer*™

Measure signal strength over 60 dB range, check and set FM deviation, measure antenna gain, beamwidth, front-to-back ratio, sidelobes, feedline loss in dB. Plot field strength patterns, position antennas, measure preamp gain, detect feedline faults, track down hidden transmitters, tune transmitters and filters. Plug in scope to analyze modulation wave forms, measure audio distortion, noise and instantaneous peak deviation. Covers 143.5 to 148.5 MHz. Headphone jack, battery check function. Uses 9V battery. 4x2½x6¾ in.

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can check this on-line at www.datasync.com/~w5ue/mdxa/buro.html. Congratulations to K5XC, who was appointed as Newton County E-911 and Emergency Management Agency Director. MDXA awarded a plaque to Astronaut N4BQW, who provided a lot of QSOs from rare Bouvet Island in spite of work commitments and extremely harsh weather conditions. Congratulations to the new officers of the Lowndes Co ARC: KC5OJR, Pres; KD5FUR, VP; KD5HVF, Sec; and W5BJM, Treas. The Mississippi Slow Net has gone QRT after many years of training CW operators. Thanks to KI5UK for a great job in managing the net. AB5WF and W5GEJ report that JARC supported the City of Ridgeland by simultaneously providing communications for the Natchez Trace Century Ride and the Splash-N-Dash Adventure Race. Those assisting were KB5EDV, KK5PM, KC5KMJ, W5KWB, KD5NHJ, KD5LQJ, KC5OSM, KD5HDZ, KB5KKI, KD5JPB, K5TMA, and K5XU. PIO Report: W5KWB. DEC/EC Reports: KD5CKP, KD5KXJ, WB5OCD, AB5WF. Net Reports: sessions/QNI/QTC: MSPN 30/3120/40, MTN 30/112/80, MSN 30/1138/8, PBRA 30/651/4, MSSN 19/78/0, WCMS ARES 13/182/4, Bluff City ARC ARES 5/137/5, LARCEN 5/74/0, MCARA 4/45/0, JARCEN 4/91/5, MBHN 4/40/0, Attala Co ARES 4/50/3. PSHR: KB5W 142, K5VV 125, W5XX 88, KJ5YY 79. Traffic: KB5W 825 (BPL), K5VV 74, W5LEW 25, KJ5YY 13, W5XX 5.

TENNESSEE: SM, O.D. Keaton, WA4GLS—ACC: WA4GLS. ASM: WB4DYJ. PIC: KE4CES. SEC: WD4JJ. STM: WA4HKU. TC: KB4LJV. Please make the following correction in the TN section column in May 2001 issue. It was reported that KE4GYR was the "project coordinator and net controller. KE4GYR should have been KE4GPR." I do not plan to seek another term as Section Manager. I feel that 5 consecutive 2-year terms as SM has answered the call of duty. My tenure as SM has been satisfying, and I believe it's time for me to step aside. DARC has operated "the W4BS Elmer shack," and now it has added "RFI team," consisting of Paul, WM5Q, as chairman along with Tim, AB4NH, and Jim, KB4LJV. Those who live in West TN are urged to get in touch with this group when you have RFI problems. Thanks to QRM for listing lots of monthly ham activities. W4VUE, EC for Davidson Co, has a sizeable and efficient ARES program which is evident in the number of participants in the Monday net which meets at 7 PM on 145.470 -. RACK's KG4KVR, KG4KVP, N4KNX, KG4BLO, WI8X, KD4F & KB4G assisted with communications during the Knoxville Track Club's Tenth Annual Calhoun's 10 miler race & the Hammer Duathlon sponsored by KTC & Greater Knoxville Triathlon Club. The newly affiliated Mid South 2 M SSB Group is welcome to the TN Section. This appears to be a very active group, and will be an asset to this section. DRN-5 rpt sess 60, msg 728, TN rep 67% by W4OGG & KE4GYR. Net/Sess/QTC/QNI: TMPN 30/26/2345; TCWN 23/21/20; TEMPN 21/43/745; TEPN 26/84/2240; TSCWN 21/20/81. Tfc: KE4GYR 82, W4SQE 64, N4PU 64, WA4HKU 34, W4SYE 19, WA4GLS 12, WB4DYJ 11, K4QQ 8, WA4GZZ 3, WD4JJ 3, KI4V 3.

GREAT LAKES DIVISION

KENTUCKY: SM, John D. Meyers, N4GNL—ASMs: K4MIS, WB4CTX, N4VGI, WA4SWF, KJ4W, N4CQR, KD4PWL. TC: K4ULW. SEC: KA4MAP. PIC: W2ZBY. OOC: K4LRX. SGL: WB4KY. ACC: KE4MZP. Silent Key Administrator, K4LID. Another Field Day has come and gone, and I hope the numbers are up this year. Good job to all that participated. Silent Key to report this month is Gerald Hite, WB4ZML. Gerald passed away Friday April 20th. Ron Dodson, KA4MAP, the Section Emergency Coordinator could use some DECs and ECs in many of the 120 counties of the Commonwealth. Backup communications are the backbone support of Ham radio in our communities. Marie East, KE4MZP, the ACC, has been contacting the affiliated clubs that have not filed an update within the past two years.

Net	*QNI*	*QTC*	*Sess*	*NM*
KSN	222	37	30	KO40L
KYN	257	44	29	K4AVX
KTN	2282	82	60	KF4GQN
KEN	105	2	5	KA4MAP
WTEPN	37	0	4	KO4OL
1 ARES	71	9	13	KE4JFS
7 DARN	53	5	4	WD8JAW
13 ARES	36	0	4	N4CQR
K4MSU	54	2	5	K4JFD
NKEN	42	4	2	WD8JAW
WARN	126	3	5	KA4MAP

PSHR: KE4JFS 173, KO4OL 94, N4CQR 81. Tfc: KE4JFS 44, K4AVX 34, KO4OL 31, WD8JAW 24, WB4ZDU 14.

MICHIGAN: SM, Dick Mondro, W8FQT (w8fqt@arrl.org)—ASM: Roger Edwards, WB8WJV (wb8wjv@arrl.net). ASM: John Freeman, N8ZE (n8ze@arrl.net). SEC: Deborah Kirkbride, KA8YKK (ka8ykk@arrl.net). STM: James Wades, WB8SIW (wb8siw@arrl.net). ACC: Sandra Mondro, KG8HM (kg8hm@arrl.net). OOC: Donald Sefcik, N8NJE (n8nje@arrl.net). PIC/SNE: David Colangelo, KB8RJI (dcolangelo@ameritech.net). SGL: Ed Hude, WA8QJE (edhude@juno.com). TC: Dave Smith (DSmith@smithassoc.com). Youth Activities: Steve Lendzion, KC8MCQ (kc8mcq@arrl.net). BM: Thomas Durfee, Jr.,WI8W (wi8w@arrl.net). Congratulations to the following new Emergency Coordinators. In Osceola County, Gary N. Attenberry, WB8WIA, and in Menominee County Lynne Rynish, N8OSK. Please help these new appointees with the spirit of cooperation our members are known for. Many of you are preparing for a lot of good summertime activities this year. I might suggest that as you travel you may want to monitor 146.52, the national two meter calling frequency when you are not using a repeater. I have done this in my travels and have met a lot of nice people with good stories to tell. It is especially useful to gather information on road construction ahead of you and you might even get some good tips on getting around some of the slow moving traffic. By all means be careful and remember that safety comes first. Do you feel that we need an antenna/tower bill in Michigan modeled after the National PRB-1? Many of you do, but we have had a problem getting support in the local communities. If you are interested in getting involved in this effort, please contact me and I will get you in touch with several people that need some local help in getting this effort off the ground. Many

MFJ *Switching* Power Supplies

Power your HF transceiver, 2 meter/440 MHz mobile/base and accessories with these new 25 or 45 Amp MFJ MightyLite™ Switching Power Supplies!

No RF hash . . . Super lightweight . . . Super small . . . Volt/Amp Meters . . .

MFJ's new adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJ's *MightyLites*™ are so light and small you can carry them in the palm of your hand! Take them with you anywhere.

No more picking up and hauling around heavy, bulky supplies that can give you a painful backache, pulled muscle or hernia.

MFJ's 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- that's *5 times lighter* than an equivalent conventional power supply. MFJ's 45 Amp is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . . Your buddies won't hear *any* RF hash on your signal! *None* in your receiver either!

Some competing switching power supplies generate objectionable RF hash in your transmitted and received signal.

These super clean MFJ *MightyLites*™ meet all FCC Class B regulations.

Low Ripple . . . Highly Regulated

Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

Fully Protected

You won't burn up our power supplies!

No RF Hash!

MFJ-4225MV
25 Amp
$149.95
plus s&h

MFJ-4245MV
45 Amp
$199.95
plus s&h

No RF Hash!

They are fully protected with Over Voltage and Over Current protection circuits.

Worldwide Versatility

MFJ *MightyLites*™ can be used anywhere in the world! They have switchable AC input voltage and work from 85 to 135 VAC or 170 to 260 VAC. Replaceable fuse.

MightyLites™ . . . Mighty Features

Front-panel control lets you vary output from 9 to 15 Volts DC.

Front-panel has easy access five-way binding posts for heavy duty use and cigarette lighter socket for mobile accessories. MFJ-4245MV has two sets of quick-connects on the rear for accessories.

Brightly illuminated 3 inch meters let you monitor load voltage and current.

A whisper quiet internal fan efficiently cools your power supply for long life.

Two models to choose from . . .

MFJ-4225MV, $149.95. 25 Amps maximum or 22 Amps continuous. Weighs 3.7 pounds. Measures 5¾Wx4½Hx6D in.

MFJ-4245MV, $199.95. 45 Amps maximum or 40 Amps continuous. Weighs 5.5 pounds. Measures 7½Wx4¾Hx9D in.

NEW! 25 Amp MightyLite™

Super light, super compact switching power supply delivers 25 Amps maximum/ 22 Amps continuous at 13.8 Volts DC. Low ripple, highly regulated. ***No RF Hash!*** Five-way binding posts for high current. Quick connects for accessories. Over voltage/current protection. 110 or 220 VAC operation. Meets FCC Class B regs. 3.5 lbs. 5½Wx2½Hx10¾D in.

MFJ-4125
25 Amp
$109.95
plus s&h

MFJ 35/30 Amp Adjustable Regulated DC Power Supply

Massive 19.2 pound transformer . . . No RF hash . . . Adjustable 1 to 14 VDC . . .

MFJ-4035MV
$149.95
plus s&h

MFJ's heavy duty conventional power supply is excellent for powering HF or 2 Meter/440 MHz transceiver/accessories.

A massive 19.2 pound transformer makes this power supply super heavy duty! It delivers 35 amps maximum and 30 amps continuous without even flexing its muscles. Plugs into any 110 VAC wall outlet.

It's highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- it's super clean!

Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for accessories and a covered cigarette lighter socket for mobile accessories.

A front-panel fuse holder makes fuse replacement easy. Whisper quiet fan speed increases as load current increases -- keeps components cool. 9½Wx6Hx9¾D inches.

MFJ *High Current* Multiple DC Power Outlets

Power two HF/VHF transceivers and six or more accessories from your 12 VDC power supply

MFJ-1118
$74.95
plus s&h

MFJ-1116
$49.95
plus s&h

MFJ-1112
$34.95
plus s&h

New!
MFJ-1117
$54.95

MFJ-1118, $74.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. Lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC supply.

Two pairs of super heavy duty 30 amp 5-way binding posts connect your transceivers. Each pair is fused and RF bypassed. Handles 35 Amps total.Six pairs of heavy duty, RF bypassed 5-way binding posts let you power your accessories. They handle 15 Amps total, are protected by a master fuse and have an ON/OFF switch with "ON" LED indicator.

Built-in 0-25 VDC voltmeter. Six feet super heavy duty eight gauge color-coded cable with ring tongue terminals. Binding posts are spaced for standard dual banana plugs. Heavy duty aluminum construction. 12½x2¾x2½ in.

MFJ-1116, $49.95. Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

MFJ-1112, $34.95. Similar to MFJ-1116. No on/off switch, LED, meter, fuse.

NEW! MFJ-1117, $54.95. For powering four HF /VHF radios (two at 35 Amps each and two at 35 Amps combined) simultaneously. Tiny 8x2x3 inches.

Free MFJ Catalog
Nearest Dealer . . . 800-647-1800
http://www.mfjenterprises.com

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(662) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

All are protected by MFJ's famous No Matter What™ one year limited warranty.

states have approved legislation and several are in the process. Let's not let Michigan amateurs be overlooked in this important cause. Have a safe summer and perhaps we'll talk in our travels on 146.520 simplex. 73, Dick W8FQT. Traffic reports for April 2001: K8GA 478, W8RTN 287, K8LJG 263, N8EIZ 262, KB8ZYY 233, N8FPN 215, WX8Y 139, WB8SIW 131, K8AE 98, AA8PI 96, WI8K 87, AA8SN 81, W8RF 80, W8RNQ 68, K3UWO 56, KA8DDQ 46, K8UPE 31, WA8DHB 25, N8UN 22, W8YIQ 18, K8AMR 16, KI8GR 15, N8EXS 9, N8TDE 8, N8EXV 8, KN8LD 8. Deadline 5th of the month. Please support the following SECTION NETS:

Net	QNI	QTC	Sess	Net Mngr.	Freq.	Time	Day
MACS	214	73	30	W8RNQ	3.953	11 PM	Daily (1 PM Sun.)
MITN	483	421	30	N8FPN	3.952	7 PM	Daily
UPN	808	50	34	AA8SN	3.921	5 PM	Daily (Noon Sun.)
GLETN	621	102	30	WB8ICN	3.932	8:30 PM	Daily
SEMTN	298	107	30	WI8K	145.330	10:15 PM	Daily
WSSBN	678	28	28	K8CPW	3.935	7 PM	Daily
MI-ARPSC	88	7	4	W8FQT	7.232	5 PM	Sunday (Alt. 3.932)
VHF	1017	56	11	KB8ZYY	Var.	Var.	

OHIO: SM, Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12)— The Ohio Section welcomes Thomas (he'd rather, Tom) Holmes, N8ZM, 51, of Tipp City, as new Section Technical Coordinator. He is currently president of the Midwest VHF-UHF Society and former president of Dayton Amateur Radio Association (DARA). Tom, an Extra class ham and a volunteer examiner, has chaired numerous Dayton Hamvention committees. He has been licensed and has been an ARRL member since 1972. Technical Coordinator (TC) is the ARRL Ohio Section cabinet member who appoints Technical Specialists (TS) - volunteer amateur radio operators in areas of Ohio who are asked to assist problems hams may have with non-hams where electronic and/or technical problems occur. Contact Tom (n8zm@arrl.net) if this sound like you. Thanks to Juanita Roush, KC8CQC, Wooster, for keeping me in the loop by outlining ARES District 4's tornado drill March 28. And the fact the Stark County ARES Net is 25 years old (any older in Ohio??). Active net controls are Dave, N8WWN; Tom KC8FLS; Bud, AA8BA; Mike, N8AZC; Dave N8YBI; Ron, KA8FTP; Rick, WD8AYC; and Dale KB8LWP. Need to hear about ham radio activity wherever it happens in Ohio...The summer issue of the Ohio Section Journal is out, thanks to Ron Griffin, N8AEH, Findlay. Don't know what the OSJ is? Contact me immediately... Newsletter editors - the 10th annual Ohio Section Newsletter Contest is on. Contact Scott Yonally, N8SY, Mansfield, the PIC for the rules and your entry...OHIO SECTION CONGRATS TO (A) Connie Hamilton, N8IO, Marietta, for reelection as OSSBN president - She is also an Ohio ASM; (B) Queen City Emergency Net (QCEN, Cincinnati) for its 60th anniversary last month as communications volunteers for the Red Cross; and (C) Shane Worth, KB8VSR, McCutchenville, for being spotlighted in the Fostoria Review Times newspaper....OHIO JULY HAMFEST...Wood County ARC, Bowling Green (8); Northern OH ARS, Wellington (21); OHKYIN ARS, Cincinnati (28); Portage County ARC, Randolph (29).de K8QOE. Now for the April traffic reports:

Net	QNI	QTC	QTR	Sess	Time	Freq	NM
BN (E)	113	66	238	30	1845	3.577	WD8KFN
BN (L)	175	80	316	30	2200	3.577	NY8V
OSN	79	31	405	29	1810	3.708	WB8KQJ
OSSBN	1727	1011	3201	90	1030, 1615, 1845	3.9725	KF8DO
OH Section ARES					1700 Sn	3.875	WD8IHP
Late March:							
BN (L) 209	124	416	31				

Tfc: N8IO 509, WW8MM 390, WB8KFN 354, K8PJ 304, N8OD 270, N8IXF 225, KB8KVM 204, N7CEU 190, N8BV 186, KD8HB 165, W8STX 142, KA8CXG 131, N8TNV 116, N8DD NS8C 94, WA8EYQ 93, N8IBR 81, N8RRB 79, KA8FCC 75, WB8HHZ 74, KA8VWE 69, W8RG 67, KI8IM 64, WA8SSI 60, KD9K 57, WB8SIQ 56, W8RPS 53, K8QIP 51, KC8HJL 49, KC8HTP 44, KC8HPR 47, KC4IYD 46, AB8KB 45, KI8O 41, KC8DWM 35, N8CW 26, NY8V 26, N8WLE 24, KC8KYP 22, K8JMP 20, WD8KBW 20, WB8PMG 18, N8GOB 16, N8GP 16, KB8ESY 15, W8VQV 10, KB8SBK 18, N8RAK 7, K8WC 1. (Late Mar) KA8VWE 109, AB8KB 95, WA8EYQ 92, KA8CXG 91, KI8IM 84, KA8FCC 73, KC8DWM 68, WB8HHZ 61, W8RG 46, N8GP 44, N8GOB 44, KB8ESY 33, KD8KBW 31, N8WLE 31, KC8HPR 29, NY8V 25, WB8PMG 24, KC8KYP 17, N7CEU 10, K8WC 5.

HUDSON DIVISION

EASTERN NEW YORK: SM, Pete Cecere, N2YJZ— STM: Jim Peterson, K2CSS. SEC: Ken Akasofu, KL7JCQ. ACC: Shirley Dahlgren, N2SKP. SGL: Herb Sweet, K2GBH. PIC: John Farina, WA2QCY. BM: Ed Rubin, N2JBA. OOC: Hal Post, AK2E. TC: Rudy Dehn W2JVF. ASM: Tom Raffaelli, WB2NHC. ASM: Bob Chamberlain, N2KBC. ASM: Andrew Schmidt, N2FTR. ASM: Richard Sandell, WK6R. ASM: Phil Bradway, KB2HQ. Many thanks to Ken KL7JCQ, Shirley N2SKP, The Mt Beacon Amateur Radio Club and all the volunteers that helped put on one of the best Beaconfests/ ENY Conventions ever. Also thanks to the clubs for their displays, Hudson Division Director Frank Fallon, N2FF, and Vice Director Steve Mendelsohn, W2ML, for speaking at the ARRL forum. NOW is the time to make your voice heard on antenna restrictions in New York State. Visit the Hudson Division Web page at http://www/arrlhudson.org for the most updated info and what you can do. 73 de Pete, N2YJZ. PSHR: N2JBA 168, KC2DAA 150, WB2ZCM 140, N2YJZ 138, WA2YBM 136, W2AKT 125, W2JHO 124, KB2YUR 85. Tfc: N2YJZ 142, N2JBA 90, KC2DAA 64, N2TWN 50, WB2ZCM 41, W2JHO 35, W2AKT 20, WA2YBM 18, K2AVV 6, WA2BSS 8, WA2WMJ 7, KB2YUR 4, KL7JCQ 3. Net Reports (April 2001) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 28/4 CDN 253/96 CGESN 36/4 ESS 408/232 HVN 648/192 SDN 392/156 NYPHONE 255/769 NYPON 387/383 NYS/E 293/349 NYS/M 197/145 NYSPTEN 322/114.

NEW YORK CITY / LONG ISLAND: SM, George Tranos, N2GA—ASM: KA2D, N1XL, K2YEW, W2FX, KB2SCS. SEC: KA2D. ACC: N2MUN. PIC-East: N2RBU. PIC-West: K2DO. TC: K2LJH. BM: W2IW. OOC: N1XL. STM: WA2YOW. SGL: open. Field Day is June 23 & 24. See the NLI Web site www.arrlhudson.org/nli for a list of Field Day sites in your area. Section Traffic Manager, Charlie WA2YOW, reports that

MFJ Contest Voice Keyer

Brand New design . . . Microprocessor controlled

Transformer-coupled -- No RFI, hum or feedback . . . 75 seconds total, 5-messages . . . Can be computer-controlled by CT, NA, etc . . . Records received audio . . .

Let this *new* microprocessor controlled MFJ *Contest Voice Keyer*™ call CQ, send your call and do contest exchanges for you in your own voice!

Store frequently used phrases like "CQ Contest this is AA5MT", "You're 59" . . . "Qth is Mississippi" and more! Contest by pressing a few buttons and save your voice.

You can record and play back five natural sounding messages in a total of 75 seconds. EEPROM technology keeps messages stored for up to 100 years -- no battery backup needed.

Repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes calling CQ so easy and it's also a great voice beacon.

A receive audio jack lets you record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

A playing message can be halted by pressing the *Stop Button*, your PTT mic button or by your

VOX PTT line. A closure to ground via remote control or computer can also halt messages.

Has jack for remote or computer control (using CT, NA or other program and its interface). Lets you select, play and cancel messages.

The MFJ-434 is transparent to your microphone -- your mic's audio characteristics do not change when your MFJ-434 is installed. Dual controls make it easy to tailor audio level to match your voice.

MFJ-434 **$179.95** plus s&h

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

It's easy to use -- just plug in your 8 pin microphone cable and plug the MFJ-434 shielded cable into your transceiver's mic connector. Internal jumpers let you customize it to Kenwood, Icom, Yaesu, Alinco or Radio Shack rigs. Use your station or built-in microphone for recording.

Built-in speaker-amplifier lets you monitor stored messages. 3.5 mm speaker/headphone jack. SMT technology. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312B, $14.95. 6½Wx2½Hx6½D inches.

MFJ-73, $29.95. Remote Control Head with cable for MFJ-434.

MFJ *Professional grade* Boom Mic Headphones

For marathon contesting, DXing, traffic nets, ragchewing . . . These lightweight, fully padded Boom Mic Headphones make operating superbly comfortable! Flexible gooseneck microphone boom and speech frequency tailored microphone cuts through noise and QRM!

This *professional grade* MFJ Boom-Mic Headphones set is designed for contesting, DXing and traffic nets. Features *total comfort* design with leatherette padding for operating long hours.

Superb 3/4 inch thick padding on each ear and headband lets you wear your headset all day long! So super lightweight, you won't even know they're there! Headband adjusts for a perfect fit to keep out external noise.

The headphones' frequency response is enhnanced for communications to bring out speech fidelity that you never knew existed. Signals never sounded so crystal clear.

The flexible microphone boom lets you position the mic comfortably at an optimum distance to minimize silibant sounds.

MFJ's frequency tailored microphone element lets you bust through noise and QRM!

Extra-long 9⅔ feet of cable lets you move about your ham shack!

Has standard 1/4 inch jack for headphones and 3.5 mm jack for microphone. Build your own adaptor or use MFJ's pre-wired adaptors to match your transceiver. **Order** MFJ-5396 Y/K/I (YAESU, KENWOOD, ICOM respectively). $15.95 each.

Even casual operators will appreciate the advantages of MFJ's superbly crafted Boom-Mic headphones for *hands-free* operating at an incredibly low price.

MFJ-392, $19.95. Communication Headphones only. Great for ham radio, shortwave listening -- all modes, SSB/FM/AM/ Data/CW.

Each phone has individual volume and speech enhancement control. Superb leatherette padding.

Both MFJ-392 and MFJ-396 have MFJ *No Matter What*™ one year limited warranty.

MFJ Communications Speaker

MFJ-281 **$12.95** Ship Code A

SSB, FM, AM, and CW never sounded so crystal clear! Plug in this MFJ-281 *ClearTone*™ speaker and bring out communication speech fidelity that you never knew existed. Restores the smooth sinewave sound that CW naturally generates and makes copying easier. It was carefully designed to improve intelligibility of speech in the frequency range of 600 to 4000 Hz while reducing undesirable noise, static and hum. A top grade 3" Mylar cone speaker is mounted in a well designed baffle. Its fine mesh metal grille allows sound to radiate without muffling. 8 Watts, 8 Ohms. Six foot cord. 3.5 mm mono plug. 3¾x3x2¼ inches.

MFJ 12/24 Hour DXers Watch

MFJ-181 **$39.95** plus $6 s&h

This *MFJ DXers Watch* lets you quickly check 12 hour local time and 24 hour time in time zones around the world. By noting day and night areas around its rotatable bezel, you can estimate which bands are open each hour to different parts of the world. You can even estimate best times of gray line propagation. It features a highly accurate *Japanese* quartz movement. Turn out the lights . . . *NiteGlo*™ hour, minute and second hands show up in the dark! Has date display. Well-known world cities encircle it's attractive world map face to indicate time zones. A durable stainless steel band adjusts to fit. Attractive giftbox has felt padding. A great gift!!!

MFJ 12/24 Hour LCD Clock

MFJ-108B **$19.95** plus $6 s&h

Dual Clock with separate 24 hour UTC and 12 hour local time displays. Large 5/8 inch LCD numerals, heavy brushed aluminum frame, sloped face, battery included. Synchronizable to WWV. 4½x1x2 in.

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Tech Help: (662) 323-0549

the NLI CW traffic net has been reactivated. You can check in daily on 3630 kHz at 7:30 PM local time. Congratulations again to Bill, WB2GTG, who has made the Brass Pounders League with his highest total to date! The monthly NLI Section e-happenings newsletter is being e-mailed to all ARRL members in the section who have subscribed to Division / Section bulletins. If you have not received this newsletter, go to the ARRL Web site (www.arrl.org) and update your profile. Check the box that indicates you want Division / Section bulletins. Previous newsletters are available on the NLI site. Please e-mail me with your club's information and I will get it in the newsletter! July Events: July 4: Pepper Martin Run, Staten Island, contact Charles N2NOV, 718-876-7929. July 8: Gold Coast Bike Tour, Nassau ARES & all radio amateurs, contact George WA2WKV, 516-822-2659. July 15: Bronx Half Marathon, contact Charles, N2NOV, 718-876-7929. July 24: Peconic ARC ferry/bus trip to ARRL HQ, contact Don, N2QHV, 631-765-2757. Volunteer Exam sessions, club listings, upcoming events and more are available on the NLI Web site - www.arrlhudson.org/nli. Tfc: WB2GTG839, N2AKZ 438, KB2KLH 124, W2RJL 60, WA2YOW 49, KA2YDW 23, KC2FWD 16, KA2D 9, KA2EUC 7, WA2VZK 5, AB2IZ 3, N2TEE 3.

MIDWEST DIVISION

IOWA: SM, Jim Lasley, N0JL. ASM: N0LDD. SEC: NA0R. ACC: N0IJP. BM: K0IIR. SGL: K0KD. STM: KB0RUU. The Cyclone ARC did a nice display for VEISHEA this year. Story Co ARC has been busy with severe weather. CVARC printed a Q & A for the unique situation in their area with storm spotting. Do you have a hamfest coming up? Do I know about it? I would like to be there if possible. NIARC is enjoying their new Web page and are trying new possibilities for it. They also note that with summer in the offing they may need to use a 103.5 Hz tone on the .16/.76 repeater. At the OARC meeting, they showed off their HF mobile antenna mounts. GRARC rented a tent for Field Day... and had shirts made. DMRAA had a program by W0QH on DXing. Looks like FM ARC may have a PSK-31 station for FD. TSARC had an emergency communications conference in Cresco on May 5. They heard of anticipated problems from the New Madrid fault in southern Missouri and learned to deal with HazMat issues. There were also several communications vans available to tour. You should have been there. DRMC visited the new Red Cross building for the May meeting. I see that KB0RUU now has and Extra! 73, N0JL Newsletters were received from SCARC/ARES, CYARC, CVARC, FMARC, DRAC, TSARC, GRARC, NIARC, OARC, DMRAA. Traffic: KB0RUU 192, W0SS 155, N0JL 24, WB0B 20, KB0JUL 3, K0KOP 2.

KANSAS: SM, Orlan Cook, W0OYH—ASM/ACC/OCC: Robert Summers, K0BXF. SEC: Joseph Plankinton, WD0DMV. STM: Ron Cowan, KB0DTI. PIC: Scott Slocum, KC0DYA. TC: Rick Carver, WA0KS. Hoisington was hit badly by a tornado Saturday evening April 21. Hams participating were DEC WG0Q, EC N0ORS, MW Vice Dir K0BJ & N0JJO N0YBR KC0IVQ KC0IVR KB0SJR KB0AQS KC0IFO, KI0NN, KC0IPD, WA0PSF, W0FCL, K0MXJ, KC0HEZ, KC0CFL, N0KOU, KI0DJ, KC0HFA, KC0CSH, KC0CSG, W0GUN, KC0GZM, K0FJ, N0JFI, W0NEB, N0KSC, KC0JYA, N0ECQ KC0HRR, KC0AUH, N0UWA, KC0JLW, K0JFR, KB0YGL, KD0AY, KB0RWI, W0ZXO, N0VIN, KB0WRI, KC0KCK KC0IQS, KC0JHD, KG0WQ, N0TMY & KB0MQX. We look forward to Bob being your main speaker at the ARRL State Convention Section Meeting in Salina August 19, 2001. Please welcome Rick, WA0KS, who has recently accepted the Technical Coordinators appointment and also Johnson Co RACES Officer pos. Also new EC Scott, KB0WPY, Dist 3 Zone 40 of Sherman Co. Mar Kansas Nets: sessions/QNI/QTC, KSBN 31/1160/69 KPN 22/313/32 KMWN 31/730/528 KWN 31/999/621 CSTN 27/2014/ 83 QKS 59/288/91 QKS-SS 12/21/7 SEC 67/770/16 QNS KB0AMY KC0AUH N0BTH K0BXF KC0CIG WD0DDG WD0DVM AA0IQ W0PBV KB0QGX WA0SRR KB0WEQ Joseph WD0DVM SEC. TEN 273 msg 62 sessions Kansas 95% w/W0EB, AA0FO, K0PY, W0WWR, NB0Z, WB0ZNY, W0SS/Mgr. BBS AA0HJ rec. 0 W1AW Bul, 379 Personal, 0 NTS. Ks tfc W0WWR 670, KB0ODT 33, W0OYH 32, K0PY 31, NB0Z 30, W0FCL 12, N0OBM 1. OBS-WA0DTH 18.

MISSOURI: SM, Dale Bagley, K0KY— Traffic Nets, Daily: SSB 3.963 MHz 5:45 PM, CW 7:00 PM. and 9:45 PM 3.585 MHz. Visit the ARRL exhibit at the July 15th Hamfest n Washington MO, sponsored by the Zero Beaters ARC or on July 21st Hamfest in Warrensburg, MO. The Section leader extends its welcome to the 145.49 Repeater Club, the latest MO club to qualify for ARRL Affiliation. Michael Blake, N0NQW, of Willard, MO the club's president is the leader of a great group of Amateur Radio operators. The Section Manager traveled to Troy to visit another prospective affiliated club. The Missouri ARC is lead by Keith Watters, W0LFS, President. The group sponsored Amateur Radio Awareness Day in the parking lot of the Walmart Super Store. There were operating sites, pamphlets, antennas and signs everywhere. Many people were reminded of the existence and importance of Amateur Radio. The Joplin ARC's Hamfest was quite successful this year. Lots of Amateurs from Four States attended this year. Ray Brown, KB0STN, Club President, Jim Scott, WB0IYC, Hamfest Chairman and the JARC membership did a great job. Another nice job was done Lebanon ARC members, Herb Maddux, KB0YBZ, Club Pres and Chuck Sears, AA0RK, Hamfest Chairman on this years event. The club is considering sponsoring the ARRL MO State Convention in the future. Monte Hatfield, N4KMH, of Lebanon, MO has been appointed a Technical Specialist. Emmett Hohensee, KC0JGJ, of St Charles, MO has been appointed a Technical Specialist and as an Official Bulletin Station. If you have any concerns or comments, I would like to hear them. You can send your thoughts via e-mail or to my address listed in *QST*. Net sess/QNI/QTC: Audrain 4/30/3; MTN 30/363/100; Rolla 30/371/9; WAARCI 5/105/0; N0ATH Rpt 4/80/1; Jackson Co 9/105/0. Tfc: KE0K 106. PSHR: KE0K 104.

NEBRASKA: SM, Bill McCollum, KE0XQ—ASM: W0KVM, N0MT, WY0F, WB0ULH & WB0YWO: It is with deep regret to inform you of the following Silent Keys: K0ABI and W0EHF. ARES organizations across the state were busy with severe weather the week of May 7 - 11. May 6th marked the 26th anniversary of the day several tornadoes left their mark on the Omaha area. Net Reports: MID NE ARES: QNI 316, QTC 5 & 30 sessions. NE Storm Net: QNI 892, QTC 13 & 30 sessions.

10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground or radials

Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance gives high efficiency for more power radiated. Results? Stronger signals and more Q-5 QSOs.

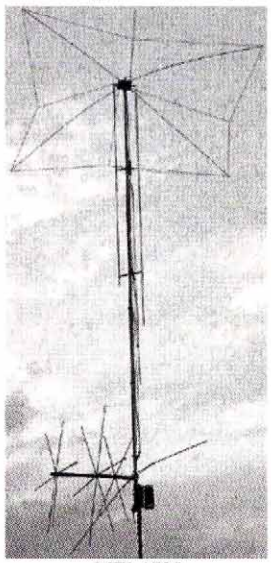
Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.



MFJ-1798
$289.95
Ship Code F

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

Separate Full Size Radiators

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators.

This forms a very large equivalent radiator and gives you incredible bandwidths.

Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

End Loading

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands.

Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

No Ground or Radials Needed

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

You can mount it from ground level to roof top and get awesome performance.

No Feedline Radiation to Waste Power

The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

Built to Last

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$379.95
Ship Code F

MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics, or mobile homes.

Enjoy both DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto-tunes to desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- not a lossy thin flat-strip -- *gives you highest possible efficiency.*

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning.

Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

NEW! **MFJ-1788, $429.95.** Same as MFJ-1786 but covers 40 Meters-15 Meters continuous. Includes super remote control.

MFJ-1782, $339.95. Like MFJ-1786 but control has only fast/slow tune buttons.

MFJ-1780, $249.95. *Box Fan* Portable Loop is about the same size (2x2 foot) as a box fan, complete with handle. Covers 14-30 MHz. Control has fast/slow tunes.

MFJ Portable Antenna

MFJ-1621 **$89.95** Ship Code A

MFJ-1621 lets you operate in most any electrically free area -- apartment, campsite, hotel, the beach, etc. DXCC, WAZ, WAC, WAS have been won with MFJ-1621! Work 40, 30, 20, 17, 15, 12 and 10 Meters with a telescopic whip that extends to 54 inches. Mounted on a sturdy 6x3x6 inch cabinet. Built-in antenna tuner, field strength meter, and 50 feet of RG-58 coax cable. Handles 200 Watts.

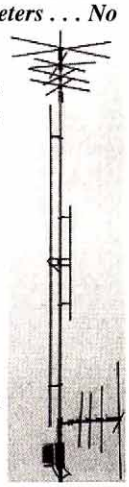
MFJ's G5RV Antenna

MFJ-1778, Ship Code A **$39.95**

Covers all bands, 160-10 Meters with antenna tuner. 102 feet long, shorter than 80 Meter dipole. Use as inverted vee or sloper to be more compact. Use on 160 Meters as Marconi with tuner and ground. Handles full legal limit power. Add coax feedline and some rope or other nonconductor and you're *on the air!*

MFJ halfwave vertical

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed



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NE 40 Meter Net: QNI 376, QTC 8 & 26 sessions. NMPN: QNI 1598, QTC 17 & 30 sessions. NCHN QNI 215, QTC 6 & 26 sessions (Mar), QNI 221, QTC 6 & 25 sessions (Apr). WC0O informs me that after 11 years as Net Manager of the Nebraska Cornhusker Net, he is stepping down. Are there any takers out there? If so, please contact me. Thanks for your years of dedication Jim! Tfc: K0PTK 89, KE0XQ 18, KA0DBK 9, WY0F 6, W0RWA 6, W0UJI 2, W0BMT 3, W0EXK 2. PSHR: KA0DBK 21, KB0YTO 16, KC0HOX 96.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC—BM: KD1YV. OOC: W1GC. PIC: W1FXQ. SEC: WA1D. SGL: K1AH. STM: K1HEJ. TC: W1FAI. EC Barb, K1EIR, your SM and other members of the Valley ARA met with the Director of the Shelton OEM to make plans for Amateur Radio as a resource in the city's emergency plan. This meeting presented an exciting opportunity for area hams to be trained in other aspects of emergency communications and for Shelton emergency personnel to become familiar with ARES. The meeting was positive and the group looks forward to working together. VARA provided communications this year for the Derby-Shelton Memorial Day Parade. This club annually covers the parade and has been performing this service for many years. Keep up the good work! A big thank you to all volunteers across the state who provided communications for the MS Walk-a-thon. Your SM and SEC received more reports than ever this year about these events. The SM Net is starting again so look for bulletins about repeater coverage, dates and times. The Stamford ARA at this writing is making plans to provide communications for the Cancer Walk and the Chase Corporate Challenge. A large turnout is expected particularly for the cancer walk as it is being very widely advertised. Join the Eastern Slow Speed CW Net every evening on 3.590 MHz. At 1800 local. Joe, W1LUH, of Stamford, is one of the net controls! Net Sess/QNI/QTC/NM: WESCON 30/334/54/KA1GWE; ECTN 30/224/88/WA4QXT; NVTN 29/168/64/KB1CTC; CPN 29/187/66/N1DIO; CN 27/96/42, N1AEH; BOMN 26/353/313/NM1K. Tfc: NM1K 1961, KA1VED 570, WA4QXT 213, KA1GWE 134, KB1CTC 93.

EASTERN MASSACHUSETTS: SM, Phil Temples, K9HI—ASMs: WA1ECF, N1GTB, WA1IDA, N1UGA, AA1MO. ACC: N1DHW. BM: N1IST. OOC: K1LJN. PIC: N1PBA. SGL: K3HI. STM: NZ1D. TC: N1UEC. SEC: W1MPN. e-mail list: ema-arrl@qth.net, Web: http://www.qsl.net/ema-arrl. Congrats to new SEC appointee, W1MPN. The EMA section staff held its second quarterly meeting. EMA's Amateur Auxiliary, led by OOC K1LJN and assisted by TC N1UEC have been actively investigating several RFI complaints. Acton-Boxboro ARC held a successful auction, netting $60 for the club's coffers. DEC WQ1O reports that Martha's Vineyard amateurs have affiliated with their local Red Cross Chapter. They will soon start an ARES group. Other good news from the Cape & Islands: ASM WA1ECF has been working with the National Park Service to establish a permanent Amateur Radio station at the Cape Cod National Seashore in Eastham! The station could be used for classroom demonstrations and operated during on-air events. Grants from the Park Service have been requested for equipment. Area volunteer hams would also operate. One Park Ranger has already passed her Tech exam, thanks to the Falmouth ARA weekend training session. The spring '01 Hosstraders (a.k.a. "Deerfield," "Rochester," "Deerchester," and "Hopkinton Fairgrounds") is now history. Much positive feedback has been heard about the new QTH. Framingham ARA provided communications for the town's Flag Day Parade. Kudos to the Crocker Public Service Group for coordinating communications for the large, complex, Project Bread "Walk for Hunger". The event featured over 40,000 walkers, and helped to raise $3 million to feed hungry people across the state. Fifty four hams participated in the operation. Are you in a ham radio "rut"? Volunteer to help a new ham, or chair a club committee. Build a new kit, or operate a contest! A new e-mail list has been created to discuss various topics relating to emergency communications. See http://groups.yahoo.com/group/mass_races_ares_skywarn_general for info. Norwood ARC recently reactivated its 10m net, netting 15 check-ins in the first session. The Southeast MA ARA holds regular foxhunts. Contact semara@yahoogroups.com for details. KB1GHX will talk about severe weather on NOAA radio. At the time of this writing, Skywarn training seminars were scheduled for May in Braintree, Medfield, and Lowell. 73 de K9HI. Tfc (Apr): W1GMF 1284, KW1U 1095, KB1AJ 5, N1LKJ 664, NG1A 168, NZ1D 159, KD1LE 118, WA1FNM 103, K1HTN 88, N1MLO 78, K1SEC 73, K8SH 47, N1AJJ 39, N1TPU 32, N1IST 30, WA1LPM 29, NC1X 28, KB1EB 16, NK1L 8.

MAINE: SM, Bill Woodhead, N1KAT—ASMs: WA1YNZ, KA1TKS. STM: N1JBD. BM: W1JTH. SGL: W1AO. ACC: KA1RFD. PIC: KD1OW. SEC: N1KGS. Asst. Dirs: W1KX, KA1TKS, K1NIT. Web Site: N1WFO, OOC: N1RY. The great mild weather in May allowed Hams to put their best foot forward by participating in local events, statewide, such as The Run for Life in Presque Isle. Thanks to K1RLY, WA5RPP, WA1YNZ, KB1GKY, KA1HIW, KA1CQX, and AA1OQ. The March of Dimes Walk in Skowhegan had help from NR1W, N1STL, N1STK, N1URL, AA1YD, N1QJX, N1NX, and N1NMJ. Canoe races in Kenduskeag River had Bangor area Hams providing communications with K1GUP, N1LX, WI1Z, N1KVJ, N1KNH, N1TCM, KB1DLO, N1OJH, W1PEZ, N1NGM, AA2KL, K1GUQ, KA1UMG, N1RGP, N1DYM, N1OJD, and WB1EMA. From the Lewiston/Auburn area, the MS Walk was supported by WA1SCQ, N1ZRL, AA1WV, W1CUW, N1OXA, N1WFO, N1SVB, and N1RGO. Thanks to you all. This type of participation in public events is one of the best advertising tools we have. The Red Cross in Auburn had moved to its new home behind Sacred Heart Church on Western Ave. This is great news for the Andy ARS, as now they have a new location for their monthly meetings in the new Red Cross facility, which will also be supporting a fully functional Amateur Radio Station. 73, Bill, N1KAT. Tfc: W1KX 203, W1QU 87, N1JBD 85, W1JX 42, W1JTH 29, KA1RFD 29.

NEW HAMPSHIRE: SM, Al Shuman, N1FIK (n1fik@arrl.org)—NH Web site (www.nhradio.org). The arrival of this month's *QST* should coincide with Field Day. Support your local club by offering your services. I will be making my traditional trek visiting with as many sites as possible. A number of people have asked to ride with me. Some yr, I will have to

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LMR 400 SOLID CCA CNTR FOIL + BRAID 2.7dB @ 450MHz WP/UV JKT	.64/FT	.62/FT	.60/FT
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RG213/U STRD BC MIL-SPEC NC/DB/UV JACKET 1.2 dB/2500WATTS @ 30MHz	.40/FT	.38/FT	.36/FT
RG8/U STRD BC FOAM 95% BRAID UV RESISTANT JKT 0.9dB/1350WATTS @ 30MHz	.34/FT	.32/FT	.30/FT
RG8 MINI(X)95% BRAID UV RESISTANT JACKET 2.0dB/875 WATTS @ 30MHz	.18/FT	.16/FT	.14/FT
RG58A/U STRD CENTER 95% TC BRD UV RESISTANT JKT 2.6dB/350 WATTS @ 30MHz	.19/FT	.17/FT	.15/FT
RG223/U SOLID SC 2 95% BRD NC/DB/UV JKT 2.0 dB/600 WATTS @ 30 MHz	.69/FT	.62/FT	.56/FT
RG214/U STRD SC 2 95% BRD NC/DB/UV JKT 0.925 dB/2500WATTS @ 30MHz	.25FT/UP	1.75/FT.	
RG142/U SOLID SCCS 2-95% SILVER BRAIDS *Teflon®* JKT 8.2dB/1100WATTS @ 400MHz	.25FT/UP	1.75/FT.	

COAX (75 OHM GROUP)

	100FT/UP	500FT	1000FT
RG11/U STRD BC (VP-66%) 95% BRAID NC/DB/UV JKT 1.3dB/1000WATTS	.44/FT	.42/FT	.40/FT
RG6/U CATV FOAM 18GA CW FOIL + 60% ALUM BRAID	.20/FT	.13/FT	.11/FT
RG6/U CATV FOAM 18GA CW FOIL *QUAD SHIELD*	.25/FT	.18/FT	.16/FT

ROTOR & CONTROL CABLES

	100FT/UP	500FT	1000FT
5971 8/COND (2/18 6/22) BLK UV RES JKT. Recommended up to 125ft	.22/FT	.20/FT	.18/FT
1618 8/COND (2/16 6/18) BLK UV RES JKT. Recommended up to 200ft	.37/FT	.36/FT	.34/FT
1418 8/COND (2/14 6/18) BLK UV RES JKT. Recommended up to 300ft	.49/FT	.47/FT	.45/FT
1216 8/COND (2/12 6/16) BLK UV RES JKT. Recommended up to 500ft	.80/FT	.76/FT	.72/FT
1806 18GA STRD 6/COND PVC JACKET Recommended for Yaesu Rotors	.25/FT	.23/FT	.21/FT

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3/16" DOUBLE BRAID *"POLYESTER"* 770# TEST WEATHERPROOF	15.00ea	30.00ea	50.00ea	80.00ea
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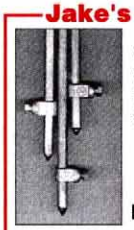

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rent a bus! If you haven't already, please take our on-line survey at www.nhradio.org/survey.html Help us better understand the interests of NH Amateurs. I have issued a number of the new N H Section Manager's Award to the Amateur Radio community for their service. Congrats to Sandy Dobbins, KB1GQW, on a great article in the May CNHARC newsletter. Sandy is a new HAM and wrote a nice piece about exam day. There are two new clubs forming. The NH Microwave Radio Association (NHMRA) whose initial project is to establish a 1.2 Gig repeater in SNH. The other is the Protectworth Amateur Wireless Association (PAWS) is to be a general purpose club. Kudos to NCARC for their support for the Ammonoosuc Amble, a walk/ride to raise money toward cancer prevention. There is so much more to report than available space here. I'm thinking of publishing a longer version on the Web. Comments? 73-Al, N1FIK 487-3333. Net NM/Sess/QNI/QTC: GSFM N1RCQ 30/211/45; GSPN WB1GXM 30/134/140; VTNH WA1JVV 29/137/97.

RHODE ISLAND: SM, Armand Lambert, K1FLD—In the news, Johnston RI, Providence Radio Association members Dave, K1DT, Matthew, N1JNI, and De Petrillo, brothers Paul, W1PRA, Frank, W1EYH along with other members represented Amateur Radio in a naming ceremony for a favorite square in Johnston, now "Piazza Marconi" by Mayor Macera who read a proclamation authored by club member John Good, W1GS, in honor of the inventor of wireless communications Guglielmo Marconi whose Daughter phoned in a message delighting the attending crowd. On the sad side we say so long to PRA past President Harry B. Smith, K1JNJ, SK./ This year Roland N1JOY put Martha's Vineyard on the map once again for IOTA and while there Paul, KE1LI, worked Susan Helms, KC7NHZ / NA1SS, aboard the International Space Station. The next Section News report for August will come from Bob Beaudet, W1YRC, the RI Assistant Section Manager, Bob arrives on the scene with many credentials to his credit and will be filling in for me during my absence till September. Send Bob your club activity information for his files. When you read this my wife, Simone, KA1YVF, and myself will be touring this great country of ours via motorhome—a long deserved vacation after 35 uninterrupted years of work. It still remains my pleasure as always serving you, the RI Amateur Radio community. Thank You and good DX, 73, Armand, K1FLD.

VERMONT: SM, Bob DeVarney, WE1U—July is finally here, and let's hope Mother Nature will make up for the wicked winter she graced us with. Field Day has come and gone, and hopefully we've all recovered sufficiently. Don't forget the IARU HF World Championships on the weekend of the 14th and 15th. Rules are in *QST* and on the ARRL Web site. Now that warm weather is here, it's also time to get some of that antenna work done we've all been putting off during winter and spring. Lastly, apologies are in order for the missing columns for the past few months. Personal issues have not allowed me the time necessary to devote to writing them. I hope this will not happen again. 73 de WE1U. Tfc: KB1DSB 290, N1ARN 6, W1RFP 4.

WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, w1ud@arrl.org—ASM: N1MAP. ASM (digital): KD1SM. STM: W1SJV. SEC: K1VSG. OOC: WT1W. Armed Forces Day has come and gone. Because of the lack of publicity and the necessity of moving the event forward one week, some operators could not find the military stations that were scheduled to participate in the cross-band exercise. From what I have heard, there were many interested in copying the Secretary of Defense message. Three digital modes were scheduled to be transmitted. They offer a beautiful certificate for just the cost of a stamp to mail in your copy of the message. Not even an SASE is required. It's a sure way to test your digital equipment! If you don't think CW operators are respected and wanted, just stop into any Field Day site with a "bug" or keyer and express an interest to participate. You'd think you were royalty. If it doesn't work at the site you're visiting, go to Mt Wachusett and follow the signs, "CW Ops Wanted" to the top of the mountain. CW certainly increases the number of contact and the interest of the visiting public. It works every time. Band conditions are starting to show the summer doldrums. Until next month, 73. Bill.

NORTHWESTERN DIVISION

ALASKA: SM, Kent Petty, KL5T – Alaska PRB-1 Bill passed the State House, was sent to the Governor, and signed into law! Great job by all involved, especially Dan Squires, KD7WN, of Juneau, for working the front line Juneau, and to ALL the amateurs in the section taking the time to communicate their support for the bill to their legislators. HF Pactor stations and amateur PACSAT stations needed throughout the section to interface communications networks between districts….can you help? Contact KL5T or AD4BL. Anchorage APRS I-gate back online with two digipeaters in the region. HF nets: Sniper's Net 3920 1800 AST, Bush Net 7093 2000 AST, Motley Group 3933 2100 AST, and Alaska Pacific Net 14292 M-F 0830 AST. **ALL HAMS** – Please report communication drills and exercises, emergency communication activations, and public service activities via our online interactive FSD-157 (Public Service Activity Report) form at: http://www.qsl.net/aresalaska/fsd157/public_service.html.

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP—On April 21st STM Don, W7GB, and Don, K7BFL, originated 66 messages from the RR depot in Ritzville for the special SPS-700 steam train from Portland to Spokane. On May 12 the two "Don's" along with Gordon, WA7LNC, will do another RR depot message operation in Wallace, ID. I enjoyed visiting with Dan Miller, K3UFG, from ARRL Hdq at the Yakima Hamfest. Dan said hams can take courses now from the ARRL in Emergency Communications, Antennas and Antenna Modeling, RFI, Electronic Theory, and Operating Techniques. On May 6th, 48 hams did communications for the 25th annual Lilac Bloomsday Run in Spokane, the world's largest timed run with 45,147 crossing the finish line. 6 out of 9 OO stations reported monitoring activity for April. 73/KA7CSP. Net Activity: WSN: QNI 881, tfc 274; Noontime Net: QNI 8967, tfc 372; WARTS: QNI 3372, tfc 109. Tfc: W7GB 298, K7BFL 181, K7GXZ 148, KA7EKL 134. PSHR: W7GB 186, K7GXZ 128.

IDAHO: SM, M.P. Elliott, K7BOI — OOC: W7ZU. SEC: AA7VR. STM: W7GHT. Things are happening! Gary, K7FR, and Bob, K7TM, are working on Boy Scout radio merit badges in Kootenai County. Boise's VOI club is preparing for the

Summer Values

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annual River Festival and will provide communications, traffic control and police assistance during the event. Rich, W7BOI, is working on a few things - communications for the Olympic touch run as it crosses Idaho and a CW demo for the Western Idaho State fair. The HP club is once again providing communications for the Idaho Women's Challenge bike race. It is public service season - have some ham radio fun this summer! 73 - Mike, K7BOI. Tfc: W7GHT 400, KB7GZU 100, WB7VYH 66, W6ZOH 39. PSHR: W7GHT 121, WB7VYH 109. Nets: FARM-30/2676/34/W7WJH; NWTN-30/1205/65/KC7VAH; IDCD-21/472/16/WB7VYH; IMN-30/436/ 224/W6ZOH. http://id_arrl.homestead.com/mainpage.html

MONTANA: SM, Darrell Thomas, N7KOR—The primary activity for amateurs of the Montana Section was meeting with and forming operating plans with the National Weather Service Skywarn Program. The Yellowstone Radio Club of Billings assisted the NWS and Yellowstone County DES with their emergency siren test on April 4th. A simulated severe weather warning was issued and hams were notified to respond to the 24 siren locations in the county to assure they were working. Twenty eight hams responded to the test and when it was finished a message confirming the drill was sent via HF to the State DES in a message on the Montana Traffic Net. The Great Falls Area Amateur Radio Club has established a program which provides a pager to the on call Skywarn Net Controller. When conditions warrant the National Weather Service pages the control operator on call who activates the Skywarn Net and all hams trained in weather spotting are involved. The weather service has a station at their office which is manned by a local ham when needed. Net/QNI/QTC/NM MSN 127/2 W7OW, MTN 1786/61 N7AIK, IMN 436/224 W6ZOH. PSHR: N7AIK 115.

OREGON: SM, Bill Sawders, K7ZM—ASM: KK7CW— SEC: WB7NML. STM: W7IZ. SGL: N7QQU. OOC: NB7J. ACC: K7SQ. The summertime convention season is still in full swing with the 2001 Northwest DX Convention being held July 20-22 at the Everett Holiday Inn, just north of Seattle. The Western Washington DX Club is this year's host, which rotates with the British Columbia DX Club and the Willamette Valley DX Club. Great programs are on tap as well as some terrific raffle prizes. For more information, contact the convention chairman, Joe Gregory, W7QN, at (206) 784-1089, or by e-mail at w7qn@qwest.net. A new name is in store for the High Desert Emergency Radio Group in Bend. It's now known as the High Desert Amateur Radio Group. Believe it or not, the club was going to have to pay higher insurance premiums because they had the word "emergency" within their official club name! You might keep this in mind if you decide to start a new "emergency club or group". Whew! Keep in touch. NTS traffic totals for April: N7DRP 216, N7YSS 87, W7IZ 86, W7VSE 79, K7NLM 65, KC7SGM 26, KK1A 6.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—We now have survived a year under the latest restructuring of the amateur licenses. How are we doing? The Official Observer Coordinator Renee Eck, AA7KE, sums it up this way. "With an increase of out of band transmissions, especially by upgrades! One thing that needs to be stressed in 'ham classes' is the education of 'How to operate,' once the license is obtained, and this in particularly in DXing! The rude behavior is increasing. Perhaps it's just today's economic picture and general attitude of the public, but, certainly not the polite attitude I expect to hear on the air!" Last month the Western Washington OOs spent over 220 hours monitoring with 7 advisory cards sent. To compensate, 3 Good Operator cards were sent. While I was at the State Ham convention, SEC N7NVP was at the Communication's Academy and he sums it up this way, "Fantastic! That is the best way to describe the Academy orchestrated by Marina Zuetell, N7LSL; Rick Hodges, KB7TBF; Mark Sheppard, N7LYE; Scott Key, N7GUZ; and many others. The speakers presented topics ranging from exercise design to weapons of mass destruction. Thank you to everyone who had a hand in making the Academy possible. Whatcom Co's EC WL7FQ report s 8 members of his team supported the March of Dimes "Walk America" event. Of special note was Justin Cron, KD7LRO, licensed only 3 months and operating as NCS for half of the event, and Kentucky Trauth, KB7LRZ, acting as the "sweeper" via bicycle mobile. The fun in Clallam was an exercise during which everyone operated the 2 meter, 70 cm and packet equipment at either the hospital or the EOC. Clark Co ARES set up a display at the Year of the Volunteer program. Training can be used in a number of ways. Good meaningful training will obviously improve people's readiness but it can also be used as a recruiting and retention tool. Think about it, be creative, keep the team's interest. Are you reporting the traffic you handle? Each month the Section Traffic Manager Pati, W7ZIW, compiles the reports sent to her. Handling messages in the public interest helps justify our existence as a communications service. In the Clark County EC report, they note that some of their members may not be active, but keeping a good database of them may be useful. Inactive or not, they indeed are trained. 73.

PACIFIC DIVISION

EAST BAY: SM, Andy Oppel, N6AJO—ASMs: NJ6T, KE6QJV. SEC: KE6NVU. DECs: KE6QJV/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6HEW/Solano County, N6UOW/Training, W6CPO/Technical Services, KQ6TM/Section Plans and Administration. OOC: KD6FFN. STM: W6DOB. ACC: NJ6T. EB Web Page: http://www.pdarrl.org/ebsec/. Webmaster is KB6MP. Congrats to ORCA on the new club call, KG6FDP. MDARC members KK6WB, KR6CR, KG6EWZ, KF7GD, KF6NBO, KK6SJ, KF6VSH, KF6VSG, KE6GDK, WN6WTV, NN6E, W6JJP, N6FQQ, AD6TA, KO6PW, KG6DER, K6DRU, WA6TXS, KF6EII, KE6PXW, AD6KV, KE6VRT, KA6BUD, KD6OBX, N6VK, WA5OQZ, KF6TKO and KG6AWW assisted with the Cinderella Classic Bicycle Ride on March 31, which included placing APRS (GPS) trackers in 3 vehicles. VVRC supported the MS Walk on April 21st and members KF6ZSH, KF6VBJ, W6ROY, KF6KFP, K6HEW, WH6AB, N6WVF, KC6WYC, K6ZU, KD6FZY and NI6V supported The March of Dimes Walkamerica on April 28th. SARS congratulates K6FRC (formerly KF6QZK) on his upgrade to General. March tfc: W6DOB 745, WB6UZX 21, KE6QR 6. PSHR: W6DOB. BPL: W6DOB. Tfc nets: NCN1/3630/7PM; NCN2-SLOW SESSION/3705/9PM; NCN-VHF/145.21/7:30 PM; RN6/3655/7:45 PM & 9:30 PM; PAN/3651/7052/8:30 PM. Your check-ins are always welcome.

NEVADA: SM, Jan Welsh, NK7N—ASM: W6OLD. SEC: NN7B. AB61 was modified before leaving the assembly where it was given a do pass, it's still very prominent and waiting for final senate reading and hopefully will receive an OK by the NV Senate this month. W6OLD was busy spreading the news via the reflectors. At this point, it's out of our hands for the next couple of years. There are some things worth working for and antenna legislation is one of them. WB7EHNs sponsorship of AB61 is probably the most likely bill in NV to be remembered for some time. Elko ARC has spread its wings via a 6 meter repeater they put on the air. It's linked to the 147.21/146.96/146.85 linked repeater system, so even those without 6 meter capability can get in on the action. Remember guys, use it or lose it! ACC-KK7AA has been busy getting the NV Special Service Clubs up to snuff and we now have FARS, SIERA and CVRC listed. I look forward to attending the hamfest up in Reno in July and seeing old and new friends. Drop me a line at nk7n@aol.com if you have a question. 73, Jan, NK7N. Tfc: W7VPK 102, N7CPP 26, NV7YL 12, W7TC 10, W7YDX 6, K7NHP 4.

PACIFIC: SM, Ron Phillips, AH6N—It is with deep regret that Jim Russell, WH6BA, passed away on Friday 4/6/00 at his residence in Kona (reported by Dennis Carvalho, KH7H). Services were held at the Honokohau Harbor. It is also with deep regret that I report that Francis "Brownie" Brown AH6IL, of Hilo, became a Silent Key on April 26, 2001. He is the father of "Junior" Brown NH6RW, also of Hilo. They will be greatly missed. I'm please to report that Chuck, 3Y0C who operated from Bouvet was very appreciative for the assistance provided to him by Ken, KH6CQH, Clarence AH7A and Harry KH6FKG who are members of the new Hawaii DX Association. During his operation from Dec 2000 till Mar 2001, these three Amateurs checked in with Chuck almost daily to assist Amateurs around the world to make a contact with Chuck. Thanks to all for your dedication and valuable support. The Pacific Section held a Cabinet meeting in Hilo on April 14th. It was determined that trying to improve delivery of *QST* to the Pacific may be futile. Lee Wical will be contacting Patsy Mink to see what can be done about the Post Office's service to our community. Good luck, Lee. Also, we discussed what can be done about increasing ARRL membership. A group has undertaken that subject. Other things considered: can ARRL provide a graduated senior discount life membership? Section budgets should run concurrently with the section manager's term of office. They should also be for the full 2 year term. Work is continuing on the Hawaii State convention this October 13. Mahalo and 73.

SACRAMENTO VALLEY: SM, Jerry Boyd, K6BZ—The 4th of July normally results in a number of parades and special activities involving Amateur Radio communications. Are we ready to provide these services? Fire season is upon us and it promises to be a busy one. Time to have our jump kits ready to go. As in past years, out-of-county mutual aid may be required in some of our major fire areas. So, let's all be ready when the call for help comes. Glad to see that the Shasta-Cascade ARS has resumed publication of its newsletter thanks to AB6JA "coming out of retirement" to handle the task. VHF enthusiasts in the Section may wish to check out the 2 meter SSB net on 144.250 on Sundays at 2000 L. Stations from the northern and southern parts of the Section are able to communicate over some fairly long distances. GEARS has been busy lately, providing communications support for the Wildflower Tour and the MS Walk.....way to go! As most readers will receive this issue before the last weekend in June, a reminder about Field Day. It is a great and fun operating event with, usually, a lot of social activities included. Check out what your local club is doing this Field Day and join them. Finally, as a reminder, there are a number of ARRL-affiliated clubs in the Section that have not updated their information with HQ in the past several years. You may do the update via the ARRL Web site. Until next month. 73 de K6BZ.

SAN FRANCISCO: SM, Len Gwinn, WA6KLK—ASM: KH6GJV. SEC: KE6EAQ. Humbolt County has things well underway for a nice convention in Ferndale. Pacific Division Director Jim Maxwell, W6CF, will be the banquet speaker. Thanks a lot, folks! Sonoma County Valley of the Moon had a very successful swap meet as did Lake County. My thanks for wonderful visits to Eureka, Crescent City, and Marin for the reception at their club meetings. Willits had four foreign exchange students speak at their meeting about their countries and the differences between them and a small American town. All clubs are actively involved at this time with public service events and many more are planned for the summer. Now is also the time to check ALL equipment and batteries for emergency use as it appears to be a long hot summer coming. With this in mind, also check into your local or hf nets to keep up to date and familiarize yourself with procedures and coverage. It is nice to hear about the many new and young hams that have/are being taught by various individuals and clubs. Keep up the good work. ARES and ACS are both growing in numbers and working together in the section. This type of emergency work is the backbone of our existence and should be kept in mind when dealing with any agency. Cooperation is the key word. See you at the convention or on the air!

SAN JOAQUIN VALLEY: SM, Donald Costello, W7WN—ASM: Mike Siegel, KI6PR. ASM: John Lee, K6YK. SEC: Kent LeBarts, K6IN. ACC: Charles McConnell, W6DPD. OOC: Victor Magana, N1VM. STM: Fred Silveira, K6RAU. I am writing this Section News in May and the weather is already showing signs of a possibly hot summer. Due to the energy crisis here in California power outages during parts of the day are a very real possibility. Those of you who have battery backed up stations solar or otherwise or generators are going to make the difference should a disaster strike. I would like to ask that any amateur with independent power or power generation capability in the Section who could help with communications during an emergency in the Section contact, via e-mail, Kent LeBarts, K6IN to let him know your name, call sign, location, phone number. You can e-mail Kent at k6in@elite.net. Kent is the Section Emergency Coordinator. Once again the Fresno ARC had their annual hamfest in the foothills east of Fresno. I was pleased to attend this event and, as usual the food was great. The Turlock ARC assisted with communications for the March of Dimes walkathon during May and the Stanislaus ARA assisted with communication during a charity bikeathon

as well. It is always good public relations when we are involved with our communities. Merced ARES is affiliated with the Merced County Sheriff's Dept. and assisted with communications in May at the Los Banos Fair. ARES coordinated communications from the mobile communications center at the fair grounds. I would like to announce the appointment of a new Emergency Coordinator for San Joaquin County. Barry Tepperman, AC4US of Clements CA has joined the ARES Section team. Welcome aboard Barry. Everyone have a great and safe summer.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: KM6GE. BM: WB6MRQ. TC: WA6PWW. OOC: KB6FPW. SCV Homepage is http://www.pdarrl.org/scvsec - Info on license exam sessions is also available on the SCV homepage... Field Day is fast approaching. A source of 100 FD bonus points is the SM message. The details are in the FD rules in May *QST*. After FD, I will list the calls and club names from all of the messages I actually receive in this column. Watch for it in August *QST*. Loma Prieta Amateur Radio Club (http://www.accesscom.com/~ziegler/lparc.html) meets the first Monday of each month at the CDF Burrell Forest Fire Station at 25050 Highland Way. The meetings start at 7:30 PM. The Foothill College Electronics Flea market will be meeting again on the 2nd Saturday of each month. Turn your junk into cash and vice versa! The Santa Cruz County ARC meets at 7:30 PM on the 3rd Friday of each month at Dominican Hospital, 1515 Soquel Drive, Santa Cruz. Visit their Web site at www.k6bj.org for more info. West Valley ARA meets on the 3rd Wednesday of each month at 7:30 PM in the Mary Campbell room (Q-84) at the Campbell Community Center. Check out their web page at www.wvara.org...The Palo Alto ARAmeets on the first Friday at 7:30 PM in the Menlo Park Recreation Center, 700 Alma Street, Menlo Park. The Lockheed-Martin ARC has a club net every Wednesday night at 8 PM local on the linked club repeaters, WA6GFY (224.28-100 Hz, 443.775+ 100 Hz, 1283.7- and 145.62 simplex). The nets are simply to pass information of a formal or informal nature. For more info contact WB6PVU/Terry tnak@pacbell .net. The Garlic Valley ARC meets on the LAST Saturday of each month, at the Little House Restaurant in Gilroy on Monterey Avenue. The meeting follows breakfast at 8 AM. For information, contact Tony Armendariz, AD6ID, 408-683-2025. If you'd like to see your club mentioned in these pages, send me a copy of your club newsletter to me at home (address on page 12 of this issue of *QST*) or via e-mail (wb6w@arrl.org). I can't report it if you don't send it! See you next month! 73 de Glenn, WB6W. Tfc: W6PRI (Apr) 4.

ROANOKE DIVISION

NORTH CAROLINA: SM, John Covington, W4CC—SEC: KE4JHJ. STM: N0SU. BM: KD4YTU. TC: K4ITL. PIC: KN4AQ. OOC: W4ZRA. SGL: AB4W. ACC: vacant. http://www .ncarrl.org. I have just completed the ARRL Amateur Radio Emergency Communications Course Level I. I am impressed at the sophistication of this online course. This course is one of many training options available to us, and is worth a look if you want to supplement your local training or if your county does not yet have a training program. It won't teach you everything you need to know, but it provides a good foundation. Several other folks in North Carolina have taken this course already, and all so far have reported good results. Some have even expressed an interest in becoming certified as an instructor. With this level of enthusiasm, I hope that by the end of the year we will be able to offer the course in a classroom setting. It will require 14-21 hours of class time but should be well worth it. Many thanks for the efforts of Ann Gibson, N4AIG, President of the Greensboro Amateur Radio Association, in securing a proclamation from the Governor declaring June 23-29 as Amateur Radio Week. Sad to report that Everett, W4TTS (OBS) is a Silent Key. April Traffic: W4EAT 769 (BPL), NC4ML 438, AB4E 433, W4IRE 197, K4IWW 182, AA4YW 169, KE4JHJ 118, KI4YV 103, AD4XV 67, W3HL 41, KE4AHC 32, AC4DV 28, WA2EDN 27, WA4SRD 26, N0SU 23, W4CC 22, NT4K 14, KB8VCZ 7, KG4MBQ 7, AE4HJ 6, KE4YMA 6, KT4CD 6, N4NTO 6, KC4PGN 5, N8UTY 4.

SOUTH CAROLINA: SM, Patricia M. Hensley, N4ROS—It has been six months since I was elected SC Section Manager during which time I have proudly served both you and ARRL. Most of you realize that one of my primary post-election goals was a closure of the diverse Amateur Radio ranks in SC. However, it seems to me that this very important inclusion process has not progressed at an acceptable rate. Let us explore some of the possible reasons for this: strong individual allegiance to a local group or activity; lack of awareness regarding a unified philosophy; lack of concern for the future of Amateur Radio; or displeasure with ARRL policies. Now, consider some of the actions which would lead me to my conclusions: even after repeated requests for a President's Council in SC, there have been only several responses; not all amateurs belong to ARRL or listen to statewide nets; an expression on the part of some amateurs that this is only a hobby and one does not have any responsibility to their fellow amateurs; lack of attendance at ARRL forums during hamfests; and open criticism, verbally and in print, of ARRL policies. During the recent Upstate Hamfest, Riley Hollingsworth suggested that similar problems may even exist nationally. He also stated that ARRL provides the "national voice" for Amateur Radio. He further suggested that the continued future of Amateur Radio will be enhanced by the recent thrust in FCC enforcement. This enforcement has resulted from the extensive and prolonged efforts of ARRL. Although six months have passed, I am still intensely dedicated to the same goals which I expressed in January. Once again, I request that the diverse Amateur Radio community in SC work together to secure the future of Amateur Radio under the leadership of the ARRL. Tfc: AF4QZ 243, KA4LRM 120, KG4FQG 65, K3LM 58, W4DRF 46, WB4PCS/KA4UIV 26, K4JMV 24, WD4BUH 18, K4BG 2.

VIRGINIA: SM, Lynn Gahagan, AF4CD—ASM: KC4ASF. SEC, OOC: KR4UQ. STM: W4CAC. ASM/A: KE4NBX. ASM/B: W4TLM. ASM/C, TC: W4IN. ASM/D: KF4LGV. PIC: W2MG. Field Day is just a week or so away. Hope to hear everyone on the air. Don't forget the bonus points for the NTS messages. The Ole Virginia Hams Amateur Radio Club provided communication support for the April 21 Multiple Sclerosis Walk 2001 at the Manassas Battlefield NP area. The following amateurs were deployed for emergency communications. KU4WH (NCS), KW4AW, KA4CTX, KG4GIY, N7FAN, KV4AP, KG4JBD, KG4MJR, KE4NFK and K3MZ. Thankfully, an emergency situation did not develop. The W4OVH club repeater was used for the event. The Franklin County Amateur Radio Club members provided communication support for their local chapter MS walk. It was held on May 5th in Rocky Mount, Va. I would like to thank both groups for their dedication to supporting public service events. I am pleased to announce that David A. Lane, KG4GIY, has been appointed to the position of EC for the County of Prince William. Thanks, David, for volunteering your time to this very important position. I am sure your community will appreciate the services you and your group will be able to provide. In District 2, Fairfax County, the ARES/RACES Basic Operator Course was provided and hosted May 9 by the Fairfax County Police Department. Attendees included 30 amateurs and served agency representatives from National Capitol Chapter American Red Cross; National Capital Wing Civil Air Patrol; Fairfax Hospital; Fair Oaks Hospital; Fauquier Hospital; Fauquier County Emergency Services; Fairfax County Police Emergency Services, and Fairfax County Public Works. Remember, if there is a training program given in your area make sure you try and get the local agencies invited. They need to know what kind of services Amateur Radio can provide for them in an emergency. Don't forget the Virginia ARES/RACES will be conducting another training session, hosted by District 13. The event is scheduled for July 28, 2001, at the Virginia Tech Campus in Blacksburg, Va. All registered ARES/RACES members and emergency management officials are invited to attend. On line registration is available at: www.aresva.org. DX IS. Very 73 de AF4CD. Tfc: W3BBQ 812, KV4AP 421, WA4DOX 273, K4YVX 260, W4CAC 135, K0IBS 135, N4ABM 126, KR4MA 94, KV4AN 81, K4MTX 72, WB4ZNB 70, KE4PAP 44, AF4CD 43, WD4MIS 28, W4SEE 27, K4TX 24, KU4MF 22, WB4UHC 21, W4YE 21, KB4CAU 7, W4MWC 6, W4JLS 6, K4JM 3, N4FNT 3.

WEST VIRGINIA: SM, O.N. (Olie) Rinehart, WD8V—STM: KC8CON. SEC: W8XF. ASEC: KA8ZOO. SGL: K8BS. TC: K8LG. OOC: N8OYY. ACC: KA8ZGY. APRSC: W8XF. PIC: N8TMW. Hello to all and best wishes to the mothers out there in radio land! You might notice a change in the heading. WD8MKS, Jimmie Hewlitt, found it necessary to resign his position as Affiliated Club Coordinator that he has served for some 8 years. He has a done a good job and will assist his replacement, KA8ZGY, Ann Rinehart. Ann's appointment is effective immediately, and you affiliated clubs will be hearing from her soon! By the way, the state radio council is looking for camera-ready ads for the convention brochure. Get your club's ad and sponsor page. Send it to N8OYY, Ed Messinger, ASAP. The WV QSO party is shaping up to be one of the best. Check out the WVSARC Web site for details on it and the 2001 Convention. 73. Tfc: KA8WNO 339, W8YS 195, WD8DHC 168, KC8CON 79, W8WWF 77, WW8D 61, N8BP 10, N8NMA 9, KC8OJN 6, N8FXH 10, N8BP 11. PSHR: W8YS 199, KC8CON 143, WD8DHC 128, KA8WNO 118, WW8D 111 WVFN_1206/183/1002 KC8CON; WVMDN 866/16/500 WW8D; WVN E 94/73/225 W8WWF; WVN L 102/83/317 W8WWF; ARES/RACES 76/1/96.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Tim Armagost, WB0TUB—ASM: Jeff Ryan, N0WPA. SEC: Mike Morgan, N5LPZ. STM: Mike Stansberry, K0TER. ACC: Ron Deutsch, NK0P. PIC: Erik Dyce, W0ERX. OOC: Karen Schultz, KA0CDN & Glenn Schultz, W0IJR. SGL: Mark Baker, KG0PA. TC: Bob Armstrong, AE0B. BM: Jerry Cassidy, N0MYY. Another tower problem in Colorado: Mike, WN0HYD applied for a zoning variance to the Manitou Springs 25 foot height limit for tower structures in residential areas. Although Mike had support from his neighbors and no parties opposed his request, both the city planning commission, then the city council on appeal denied his request. Perhaps its time to start looking at statewide legislation. Several states have now passed "PRB-1-Like" statutes— I like Virginia's which states that no local ordinances shall restrict Amateur Radio antennas to less than 75 feet in urban areas or 200 feet in rural areas. We need to think about organizing an effort here in Colorado. Interested in helping? Let me know. Do you volunteer your time as a ham "outside the shack"? There are so many ways in which we all can enhance our great hobby by volunteering. Some are officers of clubs, others are ARRL appointees and still others volunteer with specialized groups such as EOSS or Skywarn. We need to keep bringing in "new blood" to these worthy efforts. You old timers: take a new ham under your wing and introduce him or her to what interests you about ham radio. You newer folks: get involved! Don't hesitate to come forward because you think you don't know enough— we all started at the beginning! 73, de N0WPA. NTS Tfc: AD0A 179, K0TER 142, KI0RP 59, W0ZZS 42. CAWN: W0WPD 692, W0LVI 591, K4ARM 556, W0GGP 385, AB0PG 340, K0HBZ 337, W0NCD 308, WB0VET 285, KI0ND 273, WD0CKP 257, WB0TYT 224, N0NMP 207, N0DKK 89.

NEW MEXICO: SM, Joe T. Knight, W5PDY— New Mexico Roadrunner Net handled 107 msgs with 1167 checkins. New Mexico Breakfast Club handled 231 msgs with 1008 checkins. Yucca Net handled 32 msgs with 793 checkins. Caravan Club Net handled 2 msgs with 63 checkins. SCAT Net handled 10 msgs with 519 checkins. Four Corners Net handled 30 msgs with 275 checkins. GARS Net handled 5 msgs with 38 checkins. Rusty's Net handled 92msgs with 793 checkins. Valencia County Net handled 16 msgs with 41 checkins. Deming ARC Net handled 17msgs with 67 checkins. The Spring Tailgate at ABQ was a success with hams from all over NM, TX, CO & AZ. Thanks to the Caravan Club & ABQ ARC for making this event so successful. After the Tail Gate, many of us drove to Las Cruces for an outstanding Bean & Chili Feed and Swapfest. The Mesilla Valley ARC done a wonderful job of building a clubhouse and making everyone welcome. The NM ARRL State Hamfest has lots of exciting plans for Aug 25-26. Alamogordo ARC has planned a hamfest for Saturday, Sept 1. Looking forward to that! ARES/RACES groups have performed well. Sorry to report the passing of W4WDL, W5IZO, W5DKD & KD9NQ. They will be missed by all. Vy best 73, W5PDY.

UTAH: SM, Mel Parkes, AC7CP— Summer is now in full swing and lots of neat events going on. Check with your local club or ARES group to make sure you don't miss out on the fun: a steak fry or BBQ and many public service events, parades,

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HF+6m • 5-100w • All mode • 32-bit floating pt. DSP • 24-bit AD/DA convert. • DSP controlled AGC loops • 51 IF filters • Spectral scope • Auto notch • Digital voice record • **FREE** world clock from Icom for a Limited Time.....**Special © $2549.99**

IC-718 HF Transceiver

.03-29.9MHz receive • Adjustable power 5-100w SSB, CW, RTTY, 2-40w AM • 10-button keypad - direct freq. input • Auto tuning steps • IF shift • VSWR • Digital S/RF meter .....**Special © $599.99**

IC-775DSP HF Transceiver

200w–all modes • IF-DSP • Auto IF Notch DSP noise reduction • Noise Blanker • PSN modulation • Auto peak filter • Dual watch • CW pitch control • Electronic and memory keyer • Power MOS FET final • Built-in pwr supply...**Spec © $2999.99**

HOT!

IC-706 MK II-G Transceiver

HF+ 6m (100w); 2m (50w), 440 (20w) • 101 mem. • .03-200MHz broadband all mode • Cross band split • Noise blanker • IF shift • DSP • Auto repeater • Preamp/attenuator • CW keyer • Full break-in (QSK) • Speech processor • VOX/XFC • Tone encoder/decoder • 6⅜"w x 2⅝"h x 7⅞"d, 5 lbs, 6 oz .....**Special © $934.99**
706MKIIG/AH4 .....**Special © $1224.98**
706MKIIG/AT180 ....**Special © $1384.98**

PW-1 Amplifier

HF + 6m • 1KW PEP SSB and 1kw CW/RTTY output • Auto band change • Built-in auto antenna tuner • Wide ALC adjust. range • Full break-in CW operation • Built-in 110/220VAC • Auto input voltage selector • 14"w x 10⅜"h x 14⅜"d, 56 lbs.....**Special © $4699.99**

R-75 Receiver

.03-60MHz • Triple conversion • Twin passband tuning (PBT) • Synchronous AM detection • Large front-mt. speaker.....**© $569.99**

R-8500-02 Receiver

0.1-2GHz (cell blocked) • All mode • IF shift • Noise blanker • Auto peak filter • 1000 memory channels • PC controllable w/built-in CI-V and RS-232C port.....**Special $1439.99**

RECEIVER FOR PC

PCR-1000-02 .5-1300MHz PC-controlled • Power supply • AM/FM/SSB • Built-in speaker • Antenna • RS-232 cable and software • cell-blocked ..... **Special © $349.99**
PCR-100-12 .01-1300MHz PC-controlled • AM/FM/WFM • CTCSS • Ant .....**Spec © $199.99**

Super LOW

IC-2100H FM Transceiver

144MHz, 55w • PC ready • 14 channel DTMF • 113 alphanumeric memory channels • Selectable squelch delay • Optional HM-90A 5½"w x 1⅜"h x 7½"d.....**Special $169.99**

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2m/440MHz FM • 50w/35w • Wideband receive • 182 memory channels • 9600 baud capability,PC ready • 50 frequency encode /decode • Backlit TTP mic..**Special $299.99**

IC-2800H FM Mobile

50w/2m, 35w/440MHz • CTCSS enc/dec • S meter • Memory names • Simple band scope • 6 pin data port • External video input • Full function microphone • Independent band controls • Separate control head • 3" TFT color LCD screen .....**Special © $499.99**

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NEW!

R-3-26 (pictured) 0.5-2450MHz (cell blkd) • FM/WFM/AM/AMTV/FM TV modes • 450 mem. • Alphanumeric • PC programmable • PL dec/scan • Audio/video out.....**Special © $374.99**
R-10-05* 0.5-1300MHz (cell blkd) • FM/WFM/AM/USB/LSB/CW modes • 1000 mem. • 8 character alphanumeric LCD • 7 scan modes with priority • Cloning.....**Special © $299.99**
R-2-06* .5-1300MHz • AM/FM/WFM • With charger and battery .....**Special © $154.99**
***FREE software from Icom** thru 6/30/01

NEW

IC-910H VHF/UHF Transceiver

144-148, 430-450, and (optional) 1240-1300 MHz • 99 memory channels, 1 call, 6 scan edges per band • Satellite mode operation support • 9600bps packet • 50 tone CTCSS • Auto repeater function **$1499.99**
UX-910 10w, 1.2GHz module **$499.99**

HANDHELDS

IC-T22A IC-T2H IC-T81A IC-Q7ABC IC-W32A

IC-T22A 2m • 3w (5w @ 13.5V) • Small, easy to use • Alphanumeric display • Air band receive • 80 memories; 40 with alpha-numeric display..... **$249.99**

IC-T2H 2m 6w • Wide band rcvr • 43 mem. • 8 program. keys • 8 AA battSpec **$139.99**

IC-T7H 2m/440MHz • Dual bander at single bander size & price • Easy! Works one band at a time • 6w 2m/440MHz @ 13.5V • No function key and "intuitive" help function • CTCSS encode/decode... **Special $199.99**

IC-Q7ABC 2m/440 • 300mw • wideband receive • 200 memories.... **Special $134.99**

IC-W32A 2m/440MHz dual bander • 3w, 5w w/BP-173 • Independent band controls • Simultaneous receive • 200 mem. w/name capability • PC/radio-to-radio clone capability • Built-in enc/dec • Auto repeater func. • Weather rcve capability.. **Special $269.99**

IC-T81A Quad-band HT • 5w 6m/2m/440 MHz, 1w 1.2 GHz.....**Special © $279.99**

CS-T81 Windows software for T81A. **$13.99**

CSW-HH4 Windows software with cable for the T2H, T7H, W32A **$50.99**

Other ICOMs not Pictured

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AH-4 80-6m/120w/auto wire tuner **319.99**
AT-180 Auto coax tuner HF + 6m **499.99**
GP-270ML Fixed mount marine GPS... **399.99**
IC-2GXAT/HP 7w 2m HT **249.99**
IC-4008A Family radio service HT **79.99**
IC-M1V 5w waterproof marine HT..... **249.99**
IC-M3A 5w VHF marine HT..... **159.99**
IC-M402W02 25w waterproof marine.. **219.99**
IC-M45AW 25w VHF marine xcvr **179.99**

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fireworks display assistance, bicycle races, marathon races, just to name a few. If, by chance, your club or group hasn't taken the opportunity to get involved supporting one of these activities, find one that would suit your group. It's lots of fun and you get the opportunity to practice using your Amateur Radio skills. By the time you receive this issue of *QST*, you will only have a few days left to register for the best UTAH HAMFEST ever! If you haven't registered yet, don't wait. Do it now. Make your reservations for the Utah hamfest, July 13-15 at Ruby's Inn. For hamfest info and hotel or campsite reservations also see the Web site at http://www.utahhamfest.org. 73 de Mel, AC7CP.

WYOMING: SM, Bob Williams, N7LKH—April has come with the March of Dimes Walkathon (now called WalkAmerica) enjoying com support from the Wyoming Amateur Radio community. Reports are in from Cody, 140+ walkers supported by N7ZRM, K7EMS, K7KD, KF7MC, KE7MK and KD7LTJ and LTI; from Casper, 275 walkers; Cheyenne, no numbers; Worland, 40 walkers supported by K7ETE, KC7EMT, KB7FPW, KB7FGN, WB7S and KC7ZTS. No other clubs have reported participation, but one presumes the usual ones have done. This event is being a regular opportunity to practice Amateur Radio communication support over a citywide area. The individual groups perform better and more confidently with each passing year. The next com support events are support to the Ride Around Wyoming bicycle ride 17-22 June centered on Cody, followed by the Tour de Wyoming bicycle tour 22-27 July starting and finishing in Gillette and circling the edge of the Black Hills. The RAW event com support will be supplied by CMARC, but support for T de Wy is yet to be worked out. Net QNI/QTC/Sess: Pony Express Net 217/2/4; HERC Net 78/0/4; Jackalope Net 413/0/24. Tfc: NN7H 279. PSHR: NN7H 192.

SOUTHEASTERN DIVISION

ALABAMA: SM, Bill Cleveland, KR4TZ – ASMs: W4XI, WB4GM, KB4KOY. SEC: W4NTI. STM: AC4CS. BM: KA4ZXL. OOC: WB4GM. SGL: KU4PY. ACC: KV4CX. TC: W4OZK. PIC: KA4MGE. I hope everybody had a successful Field Day! Just because Field Day is over, doesn't mean the fun associated with it should end. Try going camping with some fellow hams, and operate portable. How about contacting other countries and racking up some points in DXCC? Having trouble working DX? Try working all states, instead. Operate CW not because you have to, but because you want to. Need more ideas? Try sending radiograms to your distant friends and relatives, or better yet send a radiogram to a ham you haven't heard in a while and try to schedule a radio contact. So why all the hoopla? Well... Amateur Radio is only as good as YOU make it. There is no time like the present to rejuvenate our Radio Service. Especially since school is out for the summer. Clubs should have more social radio events and portable operations and invite some children to the fun. We insure our Radio Service's prosperity in the future by getting these kids involved today! Speaking of staying involved. We are nearing the peak of hurricane season. Be prepared to activate your station, if needed. Remember the primary emergency frequencies that are used in Alabama. On 75 meters, we use 3.965 MHz and on 40 meters we use 7.243 MHz. For optimum performance, install some dipoles that are resonant to these frequencies to your station. In case of interference, we should observe the +/- 5 kHz rule on the frequencies. Try to find the net by first tuning up the band by no more than 5 kHz above the published net frequency, and if no luck try tuning down to no less than 5 kHz below the published net frequency. Just remember up frequency first . God Bless & 73, Bill Cleveland, KR4TZ. Tfc: WA4GQS 519, W4ZJY 235, WB4GM 200, W4CKS 187, KC4VNO 122, AC4CS 87, KG4KCC 50, WB4BHH 47, W4QAT 34, W4XI 9, WB4TVY 8.

GEORGIA: SM: Sandy Donahue, W4RU—ASM/South Ga: Marshall Thigpen, W4IS. ASM/Legal: Jim Altman, W4UCK. Asst SM/IT: Mike Boatright, KO4WX, SEC: Lowry Rouse, KM4Z. STM: Jim Hanna, AF4NS. SGL: Charles Griffin, WB4UVW. BM: Eddie Kosobucki, K4JNL. ACC: Susan Swiderski, AF4FO. OOC: Mike Swiderski, K4HBI. TC: Fred Runkle, K4KAZ. PIC: Matt Cook, KG4CAA. Web site www.qsl.net/arrl-ga. Had a terrific turnout at the Calhoun hamfest in late April. The hamfest in July is the Gainesville Hamfest sponsored by the Lanierland ARC. It is in the air-conditioned Georgia Mountain Center on July 14. Also in July is a major communications event: the Georgia Games. Lots of amateurs are needed for this huge sporting event that occurs at dozens of venues throughout the metro Atlanta area. Contact KE4QLH@arrl.net to volunteer. Speaking of KE4QLH, David won a scholarship from the League to continue his studies at Ga Tech. Another scholarship winner is James Fletcher, KG4FGL, Columbus, a student at Indiana University. Congrats to both. Our sympathies go to the family of SK, Russ Ballard, AF4WX, Calhoun. Officers of Milledgeville ARC: Pres. KE4UWJ, VP and Tres. K4TNP, Sec. KG4AVN, Trustee KJ4C. Regretfully another Silent Key to report: Charlie Walker, W4JMW, formerly from Macon, now in Palm Bay, Fl. Had too much to eat at the annual picnic of the Ga Cracker Net/Ga SSB assn. Good music, good fellowship followed. With Field Day coming I will put on a dozen pounds sampling all the food on my annual tour of Atlanta area FD sites. Don't know which is better-the food or the RF. 73, Sandy. Tfc (Feb): AF4NS 222, W4WXA 182, WB4GGS 122, KG4FXG 96, K1FP 84, KE4R 75, K4WKT 67, W4AET 47, K4ZC 40, KE4HHE 30, K4BEH 23, K4JNL 12, K4BAI 5.

NORTHERN FLORIDA: SM, Rudy Hubbard, WA4PUP—ACC: WA4B. BM: N4GMU. OOC: KD4NLV. PIC: KF4HFC. SEC: WA4NDA. SGL: KC4N. STM: WX4H. TC: KO4TT. Packet: N4GMU. Most of the time for April was involved with a proposed antenna and tower bill submitted to Senator Garcia of the Miami area. The bill titled SB1502, which was to provide criteria for the permitting and installation of supporting structures (poles, mass, and towers) for antennas used in the operation of amateur radio stations licensed by the FCC in any residential lot in Miami and Dade County only. After much exchange of information between the three Florida Sections and the originator of the bill, it was concluded a bill for the entire State would be better. However, the bill did not survive the Committee in the Legislature. The three Section Mangers along with the State Government Liaison (who is appointed by each of the Mangers) will attempt to prepare a bill for the next legislation. Space does not permit all of the requirements that

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TS-570S(G) 160-10m/6m **Spec 1279.99**

NEW!

TS-2000 Transceiver
100W HF/6m/2m, 50W 440MHz • Dual rcve • IF stage DSP, AF in sub band • Built-in TNC • CTCSS/DCS • Auto tuner • Cross-band repeat • Built-in TCXO • 5+1 antenna ports • Elect keyer • Fully back-lit front panel • Satellite operation **$2299.99**

TS-B2000 PC-controlled xcvr, similar to TS-2000, with high-tech silver box look and ARCP-2000 software **1899.99**

TS-2000X TS-2000 w/1.2gHz.. **2899.99**

TS-870S HF Transceiver
160–10m amateur band operation • 100kHz - 30MHz general coverage rcvr • 100w output • IF-digital signal processing func. • AIP sys. • Vari. AGC voice equalizer • Speech processor • Electronic keyer • Multi scan modes • Menu func. • 13.8V DC @ 20A 13"w x 4¾"h x 13"d ..... **Special $2299.99**

TS-50S HF Transceiver
Super compact! • 160–10m Amateur Band operation • 500kHz–30MHz General Coverage receiver • 100w output • Dual vfos • DDS (Direct Digital Synthesizer) with "fuzzy-logic" control • AIP system • 100 memory channels • Dual-menu system • Multi-function mic • 12V DC @ 20A • 7"w x 2½"h x 9"d, 6½ lbs ..... **Special $699.99**

TM-V7A Dual Band FM Transceiver
50w 2m/35w 440 • Five-in-one programmable memory • 280 multi-function memory positions • 180 channels • Auto band change Built-in duplxr • CTCSS enc/dec • 10 DTMF mem. • Cross band repeat. func. • Reversed LCD • 5½"w x 1⅝"h x 7½"d **$439.99**

TM-742AD Dual Band Transceiver
2m/440 50/35w dual FM ..... **Special $639.99**

TS-642AD Dual Band Transceiver
Same as TM-742AD but is a 2m/220 dual-band FM **$739.99**

TM-261A 2M FM Transceiver
144-148MHz tx; 118-174MHz rx • 50w • MIL-STD 61 multi-funct. mem. channels plus 1 call channel • Mem. name funct. • DTSS selective calling • Multi-scan capability • Dual menu sys. • Multi-funct. mic • DTMF mem. funct. CTCSS tone enc; opt. dec • 13.8V DC @ 11A • 5½"w x 6⁹⁄₁₆"h x 6¼"d .. **Special $169.99**

TM-461A 70cm FM Transceiver
Same features and looks as TM-261AD but 438–450MHz transmit, 400-470MHz receive, 35w output **$439.99**

VC-H1 Visual Communicator
Outdoor SSTV • Compatible w/ any FM xcvr • 10 image mem. • Connects to PC w/opt. kit to save pics as JPEG • Call sign superimpose • 270,00-pixel CCD image sensor • Rotatable, detachable camera head • Built-in mic & spkr • 1.8" color display • 4 AA batt. • 2⅜"w x 1¾"h x 6¾"d ..... **Special $399.99**

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TM-D700A Dual Band Mobile
50w 144MHz, 35w 440MHz • 118-1300MHz receive, cell blkd • Remote head install only • Alpha-numeric • Built-in 1200/9600bps • 200 mem. • Advanced APRS-99 • CTCSS enc/ dec • Digital code squelch • Tone burst • Tone freq. scan • 5½"w x 1"h x 7"d (body), 5½"w x 2½"h x 1"d (head) ..... **Special $599.99**

TM-G707A Dual Band FM Transceiver
50w 2m/35w 440 • High visibility LCD Detachable front panel • 180 memory channels • Alpha numeric display • CTCSS encoder/decoder • Duplexer built-in • Priority scan • 5¼"w x 2¼"h x 7⅛"d. **Special $299.99**

Other Products Not Pictured
TM-331A 25w/220 FM xcvr **$499.99**
TM-541A 10w 1.2GHz FM xcvr **449.99**
UBZ-AL14BK Black FRS HT ..... **Closeout 39.99**
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UBZ-LH14BK Black FRS HT ..... **Special 79.99**

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TH-22ATH 144MHz single band operation • MOS FETpower module • 5w output • DTMF keypad 40 mems, 1 call channel • Multiple scan functions (VFO, call, mem.) • Dual scan stop modes 2.2"w x 5.7"h x 1.0"d **$219.99**

TH-42AT 2.5w 440MHz version ..... **Closeout $229.99**

TH-79AKSS 2m/440MHz dual bander • 5w output • MOS FET power module • Dual receive Cross-band repeat • 82 memories • ID and DTMF memory • Built-in CTCSS encode and decode 2.2"w x 5.1"h x 1.0"d **$379.99**

TH-D7A(G) 5w 2m/440 HT • w/1200/9600 TNC • Altitude • Time • 3 position mem. • 3 memory text • 1750MHz packt burst • Position ambiguity • Auto message response .. **Spec $419.99**

TH-G71A 5w 2m/440 dual band • Multiple scan modes • Wide range receive including aircraft CTCSS encode/ decode • One band at a time • 10 DTMF autopatch mem. • PC programmable plus DTMF remote control to your Kenwood TM-V7A • 2⁹⁄₁₆"w x 4⅛"h x ⅝"d **$269.99**

Micellaneous Closeouts
BT-10 6 AA alkaline case; TH-235A **$2.99**
DFK-4B 13' cable kit; TM-733A **29.99**
DFK-7B 22' cable kit; TM-733A **49.99**
DTU-2 Digital paging; TM-541A **14.99**
MB-14 Mobile mount; TM-742AD **19.99**
ME-1 Mem. expand;TH-28A,TM-251A **4.99**
PB-36 7.2V battery; TH-235 ..... **9.99**
PB-37 12V 5w battery; TH-235 ..... **9.99**
PG-3E Cigarette cord with filter **19.99**
SC-41 Soft case; PB-32 ..... **4.99**
SC-43 Soft case; TH-79/PB-33/34 ..... **4.99**

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the bill will contain, but will try and keep everyone posted. The best way is if you are a member of the ARRL, go to the Web and subscribe to have an e-mail address with your call sign @arrl.net. The bill should provide no restrictions on Amateur Radio antennas or their support structures by private covenant, homeowners' associations, or similar restrictions. Building permits shall not be required of installation, no restrictions on property lines, and heights. One of the essential requirements is to convince the Legislators the need for Amateur Radio during disasters, which by the way is the first requirement for licensing by he FCC is to provide communications during emergencies. If you have any ideas please send them to my e-mail wa4pup@ arrl.org. 73 de Rudy WA4PUP. Tfc: WX4H 3958, NR2F 1094, KE4DNO 422, AG4DL 234, WD4GDB 201, K8KV 187, WX4J 178, N9MN 169, KB2EV 163, W4KIX 161, KE4PRB 157, K4DMH 124, K1JPG 103, KG4EZQ 91, AB4PG 85, KF4WIJ 84, W5MEN 79, W8IM 72, AF4PU 59, WA1VOP 46, KM4WC 38, K4JTD 37, KB4DCR 28, WA4EYU 22, N4JAQ 16, KJ4HS 11, WD4IIO 6.

PUERTO RICO: SM, Víctor Madera, KP4PQ— Debido a que se aproxima la temporada de mal tiempo en el Caribe ya se están organizando los distintos grupos de trabajo para ofrecer comunicaciones de emergencia. La Cruz Roja necesita voluntarios para esos menesteres. Pronto comienza la reactivación de los programas de ARES y SKYWARN. Perdimos un gran radioaficionado amante de las comunicaciones vía satélite—KP4EKG SK. Nuestro pésame a sus familiares. Se comenzaron los talleres para "Oficial Observers". El primer grupo fue del área metro y ya está trabajando en su certificación. Pronto habrá más talleres en la isla. Por primera vez el ARRL facilita este entrenamiento en español. Si usted está interesado comuníquese con su "Section Manager", su dirección aparece en la página 12 de QST. El PRARL celebró el ARRL Field Day en las facilidades de Bacardí. Se completó la primera ronda de exámenes que ofrece el ARRL/VEC de PR alrededor de la isla. Los resultados fueron excelentes. Las próximas sesiones serán en Arecibo, Aguadilla y San Germán. El curso preparatorio para nuevos Technician comienza en la UPR el 11 de julio de 2001. Sigue la campaña de afiliación al ARRL. Interesados comuníquense con el Section Manager por correo regular, teléfono, o vía email a kp4pq@arrl.org.

SOUTHERN FLORIDA: SM, Phyllisan West, KA4FZI— SEC: W4SS. STM: KJ4N. ACC: WA4AW. PIC: W4STB. OOC: K4GP. BM: KC4ZHF. SGL: KC4N. DEC/ASM: N4LEM, WB9SHT, AA4BN, KD4GR, WB2WPA. Web Page: http://www.sflarrl.org. Thanks to the South Brevard, Dade, Ft Myers, Indian River, Vero Beach Clubs, and ECs for the newsletters and activity information. The MOD(March of Dimes) group was so pleased with the South Brevard ARC assistance that they gave the club a nice plaque at the windup ceremonies. Way to go, Brevard! Broward hams also worked in the MOD Walkathon this month. The ARPSC group of Dade Co is receiving accolades for their extra service on MOD and other running/walkathon events. Taking their clue from athletic events, they provide "misting stations" to prevent dropout due to heat exhaustion. Great idea, Dade! Indian River took part in the Emergency Management display at Merritt Square Mall, supported the MOD, and the VBARC also supported the American Red Cross street fair in Vero Beach. There was a challenge at the Senior Good Life Race/Walk when the number finishing was less than the number beginning. The hams scrambled (no yolk) and finally accounted for everyone. Martin County's KE4UEI has been taking ham radio into the schools with an emphasis on WX safety. Having lived through a direct lightning hit, he speaks from experience. Palm Beach Co ARES (PBCARES) organized communication for several events including the WPB Diabetes Run and the MOD. More than 25 hams participated in each event! April Traffic by STM, Jan, KJ4N: WA9VND 1438, KJ4N 671, KA4FZI 440, K4FQU 401, AA4BN 192, KD4GR 190, KC4ZHF 104, KF4OMB 97, KD4HGU 93, WA4EIC 76, KD4JMV 71, W8SZU 68, KE4UOF 63, AF4NR 58, KE4WBI 56, WB4PAM 54, W6VIF 51, KN4JN 50, WA4CSQ 34, K4VMC (club) 30, KG4CHW 25, W3JI 8, KG4MLC 8, KG4GZL 7, K4OVC 7, W4WYR 6. 73, Phyllisan West, KA4FZI, Section Manager, Southern Florida.

VIRGIN ISLANDS: SM, John Ellis, NP2B, St Croix—ASM: Drew, NP2E, St Thomas. ASM: Mal, NP2L, St John. Sect Internet Mgr, SIM: Jeanette, NP2C, St Croix. SEC: Duane, NP2CY, St Thomas. PIC: Lou, KV4JC, St Croix. ACC: Debbie, NP2DJ, St Thomas. NM: Bob, VP2VI/W0DX, Tortola. St Croix "Half Ironman" triathlon went off of May 6 with out a hitch. Tnx Bob, KP2CG, Chuck,WP2AAA, Ivan, NP2LI, Winston, NP2LG, Hilroy, NP2IT, Lou, KV4JC, Jim NP2LK, Bill, NP2EF, Cleo, NP2BW, Jeanette, NP2C, Matt, NP2FK, Chris, NP2EL, and your truly John, NP2B. Excellent coordination with race committee and VI Police. Congratulations to Manny, NP2KW, on his recent upgrade. St John ARC group assisting with communications for the island cleanup on Earth Day. Among those helping were Mal, NP2L, Paul, NP2JF, George, KP2G, and Marie, KP2QL. St John ARC also planning Field Day participation. One xmtr with site to be selected. Not wanting to think about it, but hurricane season just 20 days away as of this writing. Repeaters: St. John 146.63, St. Thomas 146.81 and St Croix 147.25. Section Web site www.viaccess.net/~jellis. 73, John, NP2B.

WEST CENTRAL FLORIDA: SM, Dave Armbrust, AE4MR ae4mr@arrl.org http://www.wcfarrl.org—ASM: NA4AR. ASM-Web: N4PK. ASM-Legal: K4LAW. SEC: KD4E. TC: KT4WX. BM: KE4WU. STM: AB4XK. SGL: KC4N. ACC: AC4MK. PIC: AB2V. Field Day is June 23-24 please lend a hand and enjoy the event. STM Chet Carruth, AB4XK, was seriously injured during a fall at work and will be in the hospital for at least 6 weeks. Robert "Rip" Van Winkle, AA4HT, will be taking PSHR, SAR and Net reports while Chet is in the hospital and Rip is also taking get-well NTS traffic for Chet. The K4WCF repeater system has a new net schedule. Monday 7:00 PM-CW Net, 9:00 PM, ARES Net, Tuesday 9:00 PM Skywarn Net, Wednesday 7:00 PM Digital Net, 9:00 PM Section Net, Thursdays 7:00 PM Traders Net, 9:00 PM Technical Net, Friday 7:00 PM SSTV Net, 9:00 PM Section Net. Sundays 7:30 PM WCF Weekly Net. The K4WCF repeaters operate on a frequency of 145.430 MHz and 442.950 MHz and 146.760 MHz in Pasco. All use a 100 Hz PL tone. Don Roberts, W4CBS, has been appointed as the new EC in Highlands. SEC KD4E reports an increase of 4 ARES members for a new total of 413, 50 Nets, 14 Ops, 8 public service events and 826 total man hours for April. April Net report is available on the section's Web page. PSHR: K4SCL 425, AB4XK 354, AA4HT 280, KF4KSN 203,

YAESU

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SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford Hauser, KD6XH—It is time for "Fort Tuthill", July 27-29th. Yes, this is the month that most of us wait for so we can take a trip to cool Flagstaff, talk with old friends, make new friends, and either sell or buy the additional equipment. Don't forget that it will cost you $1.00 entrance fee for whole weekend (not per day). Also the county campground in the back of the fairgrounds has removed the outside pay showers. This will only effect the people who dry camp using tents. The campground is in a remodeling mode so it will be about two (2) more years before the remodeling is complete. If you have not made any room reservations, do so quickly as the motels fill up because this is the tourist season. ARCA has set aside several rooms at the Econo Lodge for people who want to stay there. Call the motel directly and ask for the ARCA special. This has been a busy month of public service activity. The Catalina ARC provided support for the "March of Dimes" walkathon on April 28. The communications support was headed by Tom Fagan, WB7NXH, with help from Bob Nace, KD6OSL, Gay Nace, KD7JYZ, Ed Sherlock, N6KIV, Larry Brown, W7LB, Dennis Freeman, K2BPK, Jim Johnson, KD7CQS, Greg Michels, KB7WFO, John Sweeney, WA6PBD, Al Balius, KD7ECL, Ed Laconto, WR7A, Dick Lavigne, W7PBR, and Charlie Scarborough, AC7LU. The Hualapai ARC did booth duty during the Mohave County Educational Fair, 27-29 April 2001, and helped several kids build code practice oscillators. Yes, several kids were impressed with the old way of communications. They also put a portable HF station on the air and let kids talk around the world and across the US. Robert Kimbrell, AC7BN, spearheaded this effort. The Tucson Repeater Association, with Ted Willis, AA7HX, leading the charge, provided communications for the "Tour of the Tucson Mountains" Bike Ride on April 22nd. The Arizona Web site is alive and doing well. Tom Fagan, WB7NXH, has developed this Web site for the Arizona section and is always providing new material and updating it every day. The address is "www.qsl.net/arrlaz/ " The 2001 ARRL SW Convention will be in Riverside at the Holiday Inn. Call, write, or e-mail me if you need help or questions answered. 73, Clifford Hauser, KD6XH. Net: ATEN 295 QNI, 31 QTC, 30 sessions. Tfc: K7VVC 723, W7EP 100.

LOS ANGELES: SM, Phineas J. Icenbice, Jr., W6BF — The DX convention in Visalia was, just great, as usual. As the most often heard comments go, it was great to just talk to your buddies. (Several hams in their nineties and several in their teens were there as usual.) I met two of the German DX operators, both dentists, that I had talked to many times because of their outstanding signals. And there was "One outstanding salesman from ARRL," President Jim Haynie, W5JBP. Let me tell you that he is selling ARRL memberships and he has stirred up "the-faithful." Jim is working the "beltway" in Washington to SAVE OUR SPECTRUM! Is there anything more important? More memberships mean more money now and more pressure and friendships that we can develop inside the BELTWAY. Amateur RADIO is unknown to most politicians. As a result of Jim's enthusiasm, Section Managers are now required to carry ARRL applications for MEMBERSHIP. Jim is really a down-to-earth salesman and the right guy for doing our President's job. We should be very proud that our Director Fried Heyn, WA6WZO, was Jim's sponsor and nominated him at the Board meeting. Thanks, Fried, you are really one of the all time great Directors. Jim and Fried both are known "workaholics" and have their ARRL priorities properly aligned and tuned for our benefit. We SMs hope to hear you check-in on our 8 AM Sunday net at 3.965 MHz. Vy 73 de Phineas, W6BF.

SAN DIEGO: SM, Tuck Miller, NZ6T, 619-475-7333; Can you believe this year is already half over? The Del Mar Fair, now known once again as the San Diego County Fair is still in progress until July 4. If you would like to help out at the fair, contact Duncan KF6ILA at kf6ila@hotmail.com. We did move our monthly ARES meeting to a different locale, however we may have to move again. We only had 7 people in attendance during our May meeting. Yes, we had a special event going on at the same time, however, that only took about 10 ops at the most. Our meeting is taking place at the time of this writing at Coco's Family Restaurant, 5955 Balboa Ave. That is on the corner of Balboa and Genese. Breakfast starts at about 7:30 AM, with the meeting starting at about 8 or so. Our monthly training sessions will start at 10 AM down the road a bit, at the Kearney Mesa Rec Center. I would like to ask each of the newsletter editors to please make sure I am on your clubs newsletter distribution list. John Hudson WA6HYQ, tells me he is still in need of committee chairs for our upcoming 2002 convention in scenic Escondido, Ca. The convention will be held August 16-18. LAST CHANCE to get your membership rates at a discounted price. New rate is effective July 1, and you can save by getting multiple years before that deadline. For example, Seniors can get 5 years for $122, while normal memberships can be obtained for $146. If you haven't signed up yet, put this magazine down NOW, and call 860-594-0200. On to traffic: KT6A 1278, KD6YJB 152, WA6IIK 1. BPL: KT6A 1278. PSHR: KT6A 140, KD6YJB 53, KO6BU 36. 73, Tuck, NZ6T.

SANTA BARBARA: SM, Robert Griffin, K6YR (k6yr@arrl.org or k6yr@arrl.net)—SEC: Jack Hunter, KD6HHG (kd6hhg@arrl.net). STM: Ed Shaw, KF6SHU (kf6shu@arrl.net). SGL: Paul Lonnquist, NS6V (paul@dock.net). ACC: Michael Atmore, KE6DKU (ke6dku@aol.com). OOC: Howard Coleman, N6VDV (N6VDV@arrl.net). PIC: Jeff Reinhardt, AA6JR (jreinh@ix.netcom.com). TC: Warren Glenn, KM6RZ, (wglennrz@ix.netcom.com). ASMs: Ventura, Don Milbury, W6YN (w6yn@arrl.net). Santa Barbara, Marvin Johnston, KE6HTS, (ke6hts@sbarc.org); San Luis Obisipo, Bill Palmerston, K6BWJ, (bpalmers@fix.net) & for Internet, Jack Bankson, AD6AD (ad6ad@arrl.net); & DECs: Santa Barb-Dave Lamb, WA6BRW (wa6brw@arrl.net); SLO-Bill Peirce, KE6FKS (ke6fks@arrl.net) & Ven-Dave Gilmore, AA6VH (aa6vh@arrl.net). WELCOME Marvin, KE6HTS, as the newest Section Cabinet member! Marvin is the Assistant Section Manager for Santa Barbara Co. Congrats! Make plans to attend the 2001 SW Division Convention coming up on Sept 7-9 in Riverside, CA. Contact: w6ybs@arrl.net. FREE instant

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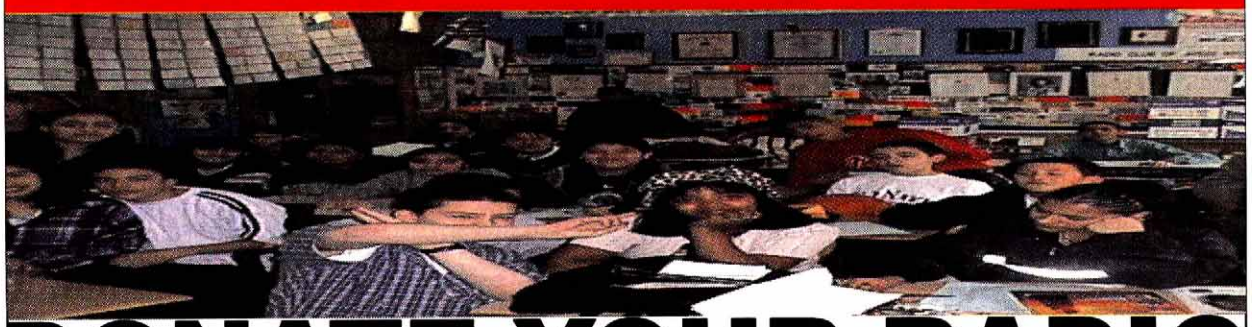

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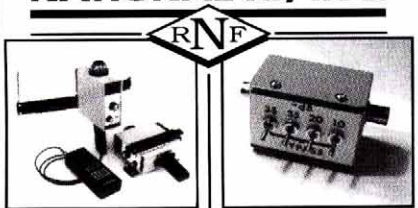

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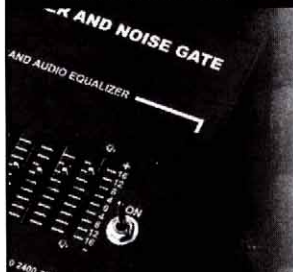

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WEST GULF DIVISION

NORTH TEXAS: SM, Larry Melby, KA5TXL—Severe Storm season is now in full swing. We have had a couple of storms recently in which they did spawn a few tornadoes and a few others that almost did. Fortunately the injuries were few and not a whole lot of damage. However, we cannot afford to become complacent about them and what we would do after a disaster such as that. But tornadoes are not the only thing we face in the world today. Ice storms, power failures, hurricanes and the list goes on and on all of these are things that disrupt our daily routine and place countless lives in danger. The question is what would you do, who would you contact, and what would you report. If you don't know, then I suggest that you need to do the following: 1) go to www.lsic.net/net/sec.html and look up the Emergency Coordinator for your county and get signed up with ARES in your home county and start learning the procedures that they use. If you cannot contact the EC the check with the District EC or the Section EC and of course myself. 2) Sign up for the ARRL'S Emergency Communicator's Course when it's available. 3) Become active in the National Traffic System, learn how to format and send radiograms. 4) Participate in a local public service activity such as a race or walk-a-thon. It is a lot of fun; you get to meet other hams. And you learn how to operate in a net structured environment 5) Have a back-up plan. If the power goes out will my radios still work (a single HT battery pack is the wrong answer) Solar chargers, deep cycle marine type batteries, generators etc are a better choice. If your antennas are blown down by wind or ice, do you have a dipole or a j-pole ready to go? They are a relatively inexpensive and practical antennas to have as back ups. So learn to be an asset in an emergency. 73 de KA5TXL. Tfc. KC5OZT 299, N5NHJ 118, W5AYX 95, KC5QZZ 77, WA5I 75, KB5TCH 61, AC5Z 7.

OKLAHOMA: SM, Charlie Calhoun, K5TTT—ASMs: N6CL, W6CL, W5ZTN. SEC: KA7GLA. ACC: KB5BOB. PIC: N7XYO. OOC: WB9VMY. SGL: W5NZS. STM: K5KXL. Members of several Tulsa, Broken Arrow and surrounding area clubs participated in the grand opening of Disaster Alley, an exceptional exposition of storm disaster safety information located in East Tulsa's Eastland Mall. PIC Mark Conklin, N7XYO, and members of the Tulsa Repeater Organization spearheaded the effort. They had a booth with a TV/VCR playing storm footage mixed with news clips from media stories on community service efforts by ham radio operators. A Ham Radio demo was also available for the public. Third party communications were made between the booth and the Red Cross EmTRAC vehicle and also Tulsa Area Emergency Management Agency's MOCC I emergency command vehicle. No word yet on the new location of the section Web page. Ham Holiday is coming up this month and it looks to be another good year. They will be back in the Arts and Crafts building again. The Central States VHF society conference is also this month. It is close to our area too, Ft. Worth, TX. http://www.csvhfs.org. This time of the year everyone is usually getting ready for Field Day, so I didn't have that much to report on this month. Sorry if I missed anything. Again, if you have announcements or information pertaining to the section, post them to the section list. Subscribe at majordomo@qth.net with the line SUBSCRIBE ARRL-OK in the BODY of your message. That's it for now. 73, Charlie. Tfc: KF5A 360, KK5GY 360, WA5OUV 355, WB5NKD 217, N5IKN 200, WB5NKC 159, K5KXL 140, KE5JE 124, WA5IMO 82, KM5VA 81, KI5LQ 59, W5REC 25, N5FM 2.

SOUTH TEXAS: SM, Ray Taylor, N5NAV—ASMs: KS5V, N5WSW, W5GKH, K5DG, N5LYG, WA5UZB, KK5CA, K5EJL, W5ZX, WA5TUM, KB5AWM, WA5JYK, K5PFE, K5PNV, and K5SBU. STM: W5GKH. SEC: W5ZX. ACC: N5WSW. TC: KJ5YN. BM: W5KLV. OOC: AK5Z. SGL: K5PNV. It seems like every time I start writing the SM News we have a storm come in. We had one of the worst hail storms in several years. San Antonio took the hardest hit in South Texas. I hope none of you lost antenna or had any damage to you property. If you were in attendance at the 7290 and TTN picnic, you would realize how simple it is to put up an antenna that really works well, thanks to Jeff, N5ECP. This could be done in an emergency when you loose your antenna. Take any piece of wire a piece of coax and your back on the air in grand style. That is just one of the reasons why hams are so successful in setting up for emergency communications. If you missed the 7290 picnic, you missed hearing Coy Day speak. Coy kept the group spellbound for 30 minutes. You missed a lot of good Bar-B-Que. You missed an good service for the SKs over the past year conducted by W5AYX. We had a great time of fellowship. By now you are back home from Dayton and Ham Com 2001. I hope you had a great time this year and found that item you just couldn't live without. We have a lot of interesting club activities in South Texas. By the time you read this you will be getting ready for Field Day 2001. I was in attendance at one of the club meetings that had tried to set up in a local mall. Due to insurance of the mall, they were refused. Just a suggestion, you might try to set up in the mall parking lot. Maybe a tent, mobile unit for antennas, a generator, and a banner to attract the public. Send a message for them to a loved one. You will also get used to handling traffic. We need the public to become aware of what hams really do. And it's a free service. Don't forget the Hamfest in Texas City on July 14. Have a great July. Tfc: W5SEG 1564, W5TUK 252, W5KLV 188, W5GKH 110, W5ZX 90, KA5KLU 89, N5OUJ 86, N5NAV 62, W5ZIN 37, K0XNW 32, KD5GM 32.

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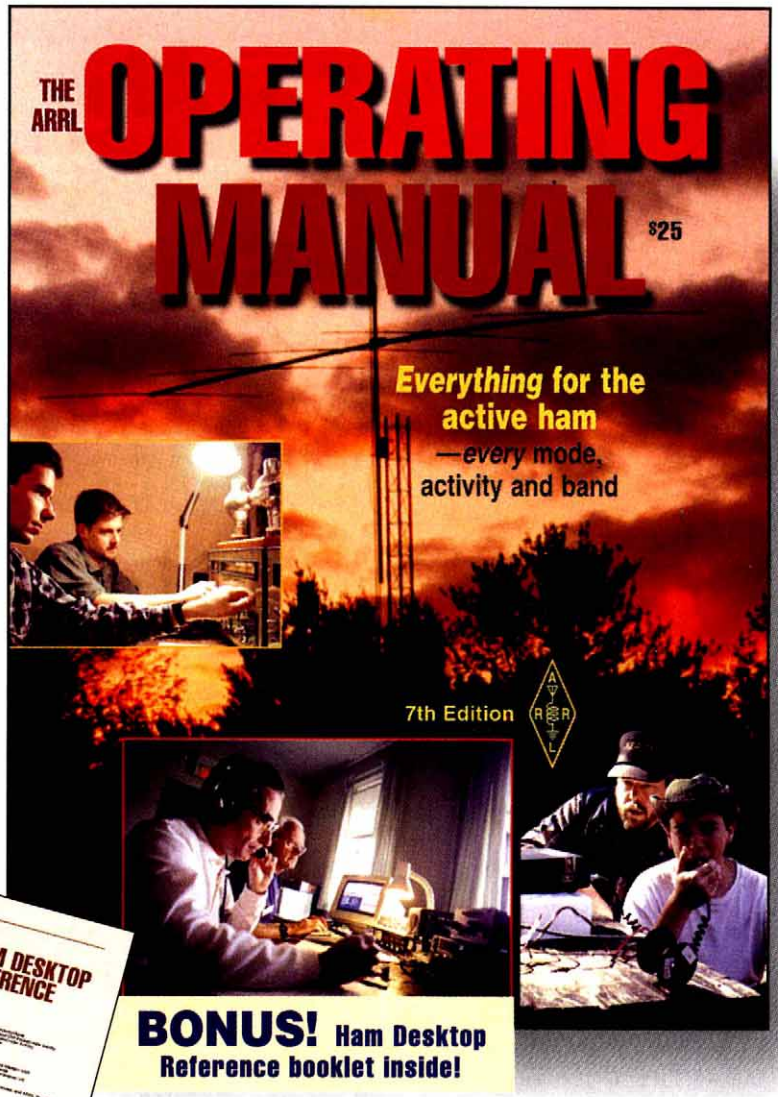

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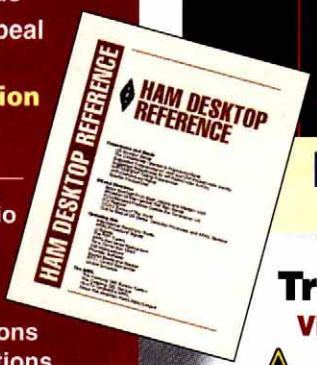

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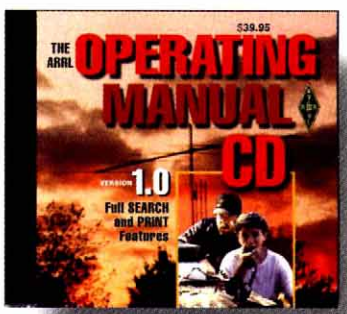

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Tech-Talk by Ten-Tec

The Myth of Sensitivity Numbers

by Allan Kaplan, W1AEL

Amateur radio operators have long regarded the receiver sensitivity specification of a radio transceiver as a key point in comparing competing rigs. Manufacturers react to this perception by listing sensitivity numbers close to the beginning of the technical portion of their advertisements. By well-established convention, the specification shows the signal generator voltage for which the receiver will produce a "10 decibel *signal-to-noise ratio*" at the audio output. This signal-to-noise ratio (SNR) provides usable copy for a phone signal, but a skilled operator may copy CW at 0 dB SNR or slightly lower. There are some fine technical points to consider when evaluating SNR specifications though:

We cannot measure signal-to-noise ratio directly, because noise is always present in a real-world receiver! What we really measure is signal-plus-noise-to-noise ratio, (S+N)/N. A little algebra shows us that (S+N)/N = 1+S/N. This means that when we measure 10 dB S+N/N, as is usual, the actual SNR is 9.54 dB.

More to the point, however, is the fact that atmospheric noise from the antenna in actual HF operation usually dominates the received signal-to-noise ratio. The CCIR (International Radio Consultative Committee) publishes graphs of atmospheric noise density versus frequency that professional radio engineers use as a guide to system design.

These curves show the average noise level for locations ranging from "Urban" (noisy) to "Suburban/Rural" (quieter) to "quiet location", the last one being where we all wish we were! Examining them shows us that while many recent amateur receivers have noise figures near 8 dB, our atmospheric environment usually produces an equivalent 40-dB noise figure below 10 MHz. While the noise does fall off with frequency, a ham in a "suburban/rural" setting will almost never see the receiver's noise floor with the antenna connected.

If the receiver noise output increases when you connect the antenna, the receiver is sufficiently sensitive! Any further increase in receiver sensitivity comes at the expense of sacrificing the radio's ability to handle strong signals. That end of dynamic range is almost always much more important to us in present-day operating circumstances. Retreating from deep sub-microvolt sensitivity specs would allow better strong signal performance. That is the subject of a future Tech-Talk column.

Allan Kaplan, W1AEL, joined Ten-Tec as an RF engineer after retiring as Senior Staff Engineer at Raytheon, Falls Church, Va., where he designed high performance receivers. He holds a MSECE degree from the University of Massachusetts.

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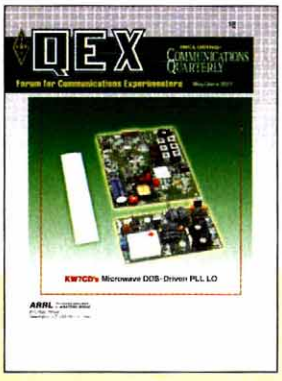

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Wind Load capacity (inside tower)	20 sq. ft.	15 sq. ft.	8.5 sq. ft.	3.0 sq. ft.
Wind Load (with mast adapter)	10 sq. ft.	7.5 sq. ft.	5.0 sq. ft.	1.5 sq. ft.
Turning Power (in pounds)	1000	800	600	350
Brake Power (in pounds)	9000	5000	800	450
Brake Construction	Electric wedge	Electric wedge	Disc brake	Disc brake
Bearing Assembly/How many	Tripl race/138	Dual Race/96	Dual race/48	Dual race/12
Mounting Hardware	Clamp plate	Clamp plate	Clamp plate	Clamp plate
Control Cable Conductors	8	8	8	5
Shipping Weight (pounds)	28	24	22	14
Effective Moment (in tower)	3400 ft/lbs.	2800 ft/lbs.	1200 ft/lbs.	300 ft/lbs.

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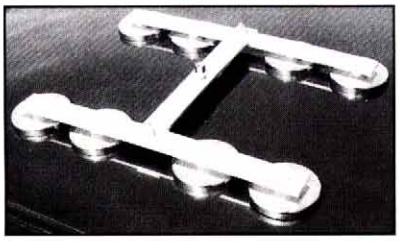

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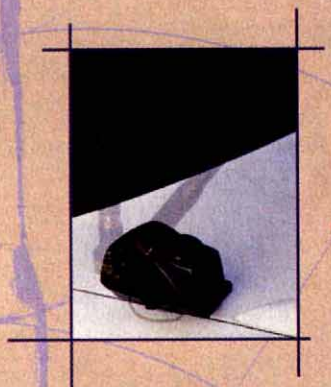

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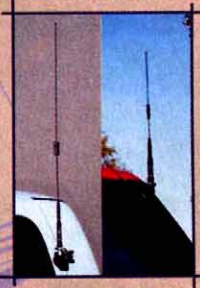

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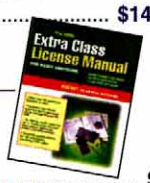

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.375	$.70/ft	1.250"	$1.55/ft
.500"	$.80/ft	1.375"	$1.75/ft
.625"	$.90/ft	1.500"	$1.95/ft
.750"	$1.00/ft	1.625"	$2.25/ft
.875"	$1.10/ft	1.750"	$2.50/ft
1.000"	$1.20/ft	1.875"	$2.75/ft
1.125"	$1.35/ft	2.000"	$3.00/ft
		2.125"	$3.50/ft

In 6' or 12' lengths, 6' lengths ship UPS. Call for 3/16"& 1/4" rod, bar stock, and extruded tubing.

CUSHCRAFT ANTENNAS

X7/X740	$679/229
XM240	$719
R6000/R8	$319/469
A50-3S/5S/6S	$95/159/259
AR2/ARX2B	$49/69
AR270/AR270B	$85/99
ARX270N/ARX-450B	$219/65
13B2/17B2	$139/249
26B2	$389
A270-6S/A270-10S	$75/99

Please call for more Cushcraft items

FORCE 12–MULTIBAND

C3	10/12/15/17/20m, 7 el	$599
C3E	10/12/15/17/20m, 8 el	$649
C3S	10/12/15/17/20m, 6 el	$539
C3SS	10/12/15/17/20m, 6 el	$559
C4	10/12/15/17/20/40m, 8 el	$759
C4S	10/12/15/17/20/40m, 7 el	$679
C4SXL	10/12/15/17/20/40m, 8 el	$979
C4XL	10/12/15/17/20/40m, 9 el	$1119
C19XR	10/15/20m, 11 el	$959
C31XR	10/15/20m, 14 el	$1299

Please call for more Force 12 items

TRYLON "TITAN" TOWERS

SELF-SUPPORTING STEEL TOWERS

T200-64	64', 15 square feet	$1099
T200-72	72', 15 square feet	$1299
T200-80	80', 15 square feet	$1499
T200-88	88', 15 square feet	$1769
T200-96	96', 15 square feet	$2049
T300-88	88', 22 square feet	$1989
T400-80	80', 34 square feet	$1939
T500-72	72', 45 square feet	$1879
T600-64	64', 60 square feet	$1799

Many more Trylon towers in stock!

BENCHER / BUTTERNUT

Skyhawk, Triband Beam	$1129
HF2V, 2 Band Vertical	$219
HF5B, 5 Band Minibeam	$429
HF6VX, 6 Band Vertical	$299
HF9VX, 9 Band Vertical	$349
A1712, 12/17m Kit	$54
CPK, Counterpoise Kit	$129
RMKII, Roof Mount Kit	$159
STRII, Roof Radial Kit	$125
TBR160S, 160m Kit	$119

More Bencher/Butternut–call

M2 VHF/UHF ANTENNAS

144–148 MHz

2M4/2M7/2M9	$89/109/119
2M12/2M5WL	$149/189
2M5-440XP, 2m/70cm	$159

420–450 MHz

440-470-5W/420-450-11	$129/89
432-9WL/432-13WL	$169/219
440-18/440-21ATV	$119/139

Satellite Antennas

2MCP14/2MCP22	$169/219
436CP30/436CP42UG	$219/259

ROHN TOWER

25G/45G/55G	$89/189/239
AS25G/AS455G	$39/89
GA25GD/45/55	$68/89/115
GAR30/GAS604	$35/24
SB25G/45/55	$39/89/109
TB3/TB4	$85/99
HBX32/HBX40	$349/439
HBX48/HBX56	$589/699
HDBX40/HDBX48	$549/699
BXB5/6/7-8	$39/49/59/59

Please call for more Rohn prices

US TOWER

MA40/MA550	$849/1399
MA770/MA850	$2359/3729
TMM433SS/HD	$1139/1379
TMM541SS	$1499
TX438/TX455	$1069/1599
TX472/TX489	$2649/4599
HDX538/HDX555	$1379/2399
HDX572MDPL	$6329

Please call for help selecting a US Tower for your needs. Shipped factory direct to save you money!

COMET ANTENNAS

GP15, 6m/2m/70cm Vertical	$149
GP6, 2m/70cm Vertical	$139
GP9, 2m/70cm Vertical	$179
B10NMO, 2m/70cm Mobile	$36
B20NMO, 2m/70cm Mobile	$49
SBB2NMO, 2m/70cm Mobile	$39
SBB5NMO, 2m/70cm Mobile	$49
SBB7NMO, 2m/70cm Mobile	$75
Z750, 2m/70cm Mobile	$55
Z780, 2m/70cm Mobile	$69

Much more Comet in stock–call

M2 ANTENNAS

50–54 MHz

6M5X/6M7JHV	$199/239
6M2WLC/6M2.5WLC	$419/449

10/12/15/17/20m HF

10M4DX, 4 Element 10m	$379
12M4DX, 4 Element 12m	$379
15M4DX, 4 Element 15m	$419
17M3DX, 3 Element 17m	$379
20M4DX, 4 Element 20m	$499

More M2 models in stock–please call

GLEN MARTIN ENGINEERING

Hazer Elevators for 25G

H2, Aluminum Hazer, 12 sq ft	$359
H3, Aluminum Hazer, 8 sq ft	$269
H4, HD Steel Hazer, 16 sq ft	$339

Aluminum Roof Towers

RT424, 4 Foot, 6 sq ft	$159
RT832, 8 Foot, 8 sq ft	$229
RT936, 9 Foot, 18 sq ft	$389
RT1832, 17 Foot, 12 sq ft	$499

Please call for Glen Martin info

UNIVERSAL ALUMINUM TOWERS

4-40'/50'/60'	$519/739/1049
7-50'/60'/70'	$939/1369/1789
9-40'/50'/60'	$729/1049/1469
12-30'/40'	$559/869
15-40'/50'	$969/1399
23-30'/40'	$869/1289
35-30'/40'	$979/1509

Bold in part number shows wind-load capacity. Please call for more Universal models. All are shipped factory direct to save you money!

DIAMOND ANTENNAS

D130J/DPGH62	$79/139
F22A/F23A	$89/119
NR72BNMO/NR73BNMO	$39/54
NR770HBNMO/NR770RA	$55/49
X200A/X3200A	$129/210
X500HNA/700HNA	$229/369
X510MA/510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

More Diamond antennas in stock

MFJ ANTENNAS

259B, Antenna Analyzer	$219
269, Antenna Analyzer	$299
941E, 300W Antenna Tuner	$109
945E, 300W Antenna Tuner	$99
949E, 300W Antenna Tuner	$139
969, 300W Antenna Tuner	$169
986, 3kW Antenna Tuner	$289
989C, 3 kW Antenna Tuner	$309
1796, 40/20/15/10/6/2m Vert.	$189
1798, 80–2m Vertical	$249

Big MFJ inventory–please call

COAX CABLE

RG-213/U, (#8267 Equiv.)	$.36/ft
RG-8X, Mini RG-8 Foam	$.19/ft
RG-213/U Jumpers	Please Call
RG-8X Jumpers	Please Call

Please call for more coax/connectors

TIMES MICROWAVE LMR® COAX

LMR-400	$.59/ft
LMR-400 Ultraflex	$.89/ft
LMR-600	$1.19/ft
LMR600 Ultraflex	$1.95/ft

TOWER HARDWARE

3/8"EE / EJ Turnbuckle	$11/12
1/2"x9"EE / EJ Turnbuckle	$16/17
1/2"x12"EE / EJ Turnbuckle	$18/19
3/16" / 1/4" Preformed Grips	$5/6

Please call for more hardware items

HIGH CARBON STEEL MASTS

5 FTx .12" / .18"	$45/75
10 FT x .12" / 10 FT x .18"	$75/125
15 FT x .12" / 15 FT x .18"	$105/175
20 FT x .12" / 20 FT x .18"	$135/225
10 FT x .25" / 20 FT x .25"	$175/335

GAP ANTENNAS

Challenger DX	$289
Challenger Counterpoise	$29
Challenger Guy Kit	$19
Eagle DX	$299
Titan DX	$329
Eagle/Titan Guy Kit	$29
Voyager DX	$409
Voyager Counterpoise	$49
Voyager Guy Kit	$45
Quicktilt Mount	$75

Please Call for Delivery Information

LAKEVIEW HAMSTICKS

9106	6m	9115	15m	9130	30m
9110	10m	9117	17m	9140	40m
9112	12m	9120	20m	9175	75m

All handle 600W, 7' approximate length, 2:1 typical VSWR ... $24.95

HUSTLER ANTENNAS

4BTV/5BTV/6BTV	$149/189/209
G6-270R, 2m/70cm Vertical	$169
G6-144B/G7-144B	$129/179

Hustler Resonators in stock–call

ANTENNA ROTATORS

M2 OR-2800PDC	$1099
Yaesu G-450A	$249
Yaesu G-800SA/DXA	$329/409
Yaesu G-1000DXA	$499
Yaesu G-2800SDX	$1089
Yaesu G-550/G-5500	$299/599

ROTATOR CABLE

R61 (#20)/R62 (#18)	$.28/32
R81/R82	$.25/.39
R83/R84	$.52/.85

PHILYSTRAN GUY CABLE

HPTG1200I	$.45/ft
HPTG2100I	$.59/ft
PLP2738 Big Grip (2100)	$6.00
HPTG4000I	$.89/ft
PLP2739 Big Grip (4000)	$8.50
HPTG6700I	$1.29/ft
PLP2755 Big Grip (6700)	$12.00
HPTG11200	$1.69/ft
PLP2558 Big Grip (11200)	$18.00

Please call for more info or help selecting the Phillystran size you need.

WEEKDAY HOURS:
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HUGE ICOM DEALS ★ HUGE YAESU DEALS

IC-775 DSP.. New Lower Price!
The Icom IC-775DSP is a competition class HF transceiver featuring 200 watt RF output, digital signal processing, automatic antenna tuner, true dual RX, CW memory keyer, CTCSS tone encode, twin pass band tuning, dual antenna inputs, 101 memory chanels, built-in power supply, and much more. Supplied with AC power cord.

PW-1 ..... New Lower Price!
The Icom PW-1 is a 1000 watt solid state linear amplifier for HF and 6m operation, featuring a high power automatic antenna tuner, built-in power supply, and a removable front control panel, and more.

IC-746 ..... Icom Special!
The Icom IC-746 is an all mode transceiver covering HF/6m/2m. The radio features digital signal processing, 100 watt RF output on all bands, twin PBT, a 4.9"multifunction LCD display with band scope, automatic antenna tuner, and more. Supplied with a hand mic and DC power cord.

IC-756 PRO ..... New!
The Icom IC-756 PRO is an all mode HF/6m transceiver featuring DSP, automatic antenna tuner, 100 watts RF output, digital twin PBT, a 5" multifunction LCD display with band scope function, and more. Supplied with hand mic and DC power cord.

FT-1000MP MARK-V ..... New!
Competition class HF transceiver with DSP, auto tuner, 200W output, and more!

FT-1000D ..... In Stock!
Great competition class HF XCVR with dual RX, auto tuner, and 200W output.

FT-920 ..... Yaesu Special!
Nice all mode HF/6m transceiver with DSP, automatic tuner, and more.

Quadra System ... Lower Price!
Solid state 1 kW amplifier with auto tuner. No-tune HF and 6moperation!

FT-847 ..... Yaesu Special!
The Yaesu FT-847 is an all mode transceiver covering HF/6m/2m/70cm! The radio is perfect for satellite operation. Features digital signal processing, built-in RS-232 interface, built-in CTCSS tone encode/decode module, optional ATAS-100 mobile screwdriver type antenna, and more. Supplied with an up/down hand mic and DC power cord.

FT-840 ..... Great Low Price!
Great entry level HF XCVR featuring built-in CTCSS tone encode, noise blanker, IF shift, 100 memories and more. With hand mic and DC power cord.

IC-706MK2G ..... Icom Special!
The Icom IC-706MK2G is a compact HF/6m/2m/70cm all mode transceiver with digital signal processing, automatic repeater offset, built-in CW keyer, built-in CTCSS tone encode/decode/scan, 107 memory channels and more. A detachable front panel offers convenient mounting, even in compact vehicles.

IC-718 ..... Great Low Price!
The Icom IC-718 is an all mode HF transceiver featuring a front panel mounted speaker, IF shift, optional DSP module, multiple scanning modes, noise blanker, RIT, and more.

IC-2800H ..... Icom Special!
The Icom IC-2800H is a 2m/70cm dual band mobile FM transceiver with a 3" color TFT display. The radio features a separate control face, video input, bandscope display, 9600 bps Packet jack, CTCSS tone encode/decode/scan, 232 memories, cross band duplex, and more. With DTMF hand mic, mounting brackets, and power cord.

IC-910H ..... New, In Stock!
The IC-910H is a dual band 2m/70cm all mode XCVR with true dual band operation, featuring dual data jacks, optional 23cm band module, optional DSP, and more.

FT-90R ..... New!
Ultracompact 2m/70cm mobile XCVR with removeable face, extended RX, and more.

FT-7100M ..... New, Please Call!
Great 2m/70cm dual band mobile, 45/35 Watts, removable front panel, and more!

FT-1500M... New Lower Price!
Tiny 2m mobile XCVR with 50W output.

FT-2600M ..... New, Please Call!
Rugged 2m mobile with intermod free RX.

FT-100D ..... New!
Ultra-compact all mode XCVR for HF/6m/2m/70cm. Features DSP, CW keyer, tone encode/decode, 200 memories, VOX, and more. Supplied with a DTMF hand mic, power cord and mounting bracket.

FT-817 ..... Now In Stock!
A truly tiny self-contained all mode HF/6m/2m/70cm QRP XCVR featuring DSP, tone encode/decode, 200 memories, VOX, and more! Supplied with a hand mic, DC power cord and duck antenna.

IC-W32A ..... New Lower Price!
IC-Q7A ..... Icom Special!
IC-T7H ..... Icom Special!
IC-T81A ..... Quad Band HT!
IC-T82A ..... New Tri Band HT!
IC-T2H ..... Amazing Low Price!

IC-207H ..... Great Low Price!
Great 2m/70cm dual band mobile XCVR with CTCSS tone encode/decode, 182 memories, removable face, and more.

IC-2100H ..... Icom Special!
Rugged 2m mobile XCVR at a great price.

IC-PCR1000 ..... Icom Special!
IC-R8500 ..... In Stock!
IC-R75 ..... In Stock!
IC-R2 ..... In Stock!
IC-R3 ..... Video RX, In Stock!
IC-R10 ..... Icom Special!

G-2800SDX $1089
Heavy duty antenna rotator handles 34 sq. ft. of antenna load, and features 450° rotation, preset and variable speed.

G-1000DXA $499
G-800SA/DXA $329/409
G-450A $249
G-5500 ..... $599
G-550 ..... $299

VX-5R ..... Now In Stock!
Tiny 6m/2m/70cm HT, with CTCSS tone encode/decode/scan, long life Lithium-Ion battery pack, extended RX, and more.

FT-50RD ..... In Stock!
VX-1R ..... Please Call!
VX-150 ..... New, In Stock!

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Simultaneous Reception

VHF/VHF | UHF/UHF | VHF/UHF

A New Dual-Band Engineering Milestone:

Introducing the Dual Band Mobile for the 21st Century's Active Ham!

The Yaesu Engineering Team has done it again! The exciting new FT-7100M Dual Band Mobile brings you the ruggedness and operating ease of our single-band mobiles, and the convenience of remote-head mounting capability (optional YSK-7100 Separation Kit required), in an all-new 144/430 MHz Dual Band design!

Providing 50 Watts of power output on 2 meters, and 35 Watts on 70 cm, the FT-7100M has power to spare when you're in a fringe area. For repeater access or selective simplex calling, you get built-in encoder-decoder circuits providing 50 CTCSS tones and 104 DCS (Digital Code Squelch) codes. And the FT-7100M's huge 262-channel Memory System lets you store up to six Alpha-Numeric characters, for easy channel identification.

Operation of the FT-7100M is simple and straightforward, with separate Volume and Squelch controls for each band during dual-band reception, and eight single-function front panel keys provide the easy feature access you need during mobile operation. What's more, you also get three user-definable keys on the microphone to use for important control functions.

Rugged, reliable, and versatile, the FT-7100M provides the highest cost-performance available among Dual Band FM Mobiles. See your Yaesu Dealer today for a test drive!

FEATURES

- Frequency Range: TX 144-148, 430-450 MHz RX 108-137 MHz (AM), 137-180 MHz, 320-480 MHz, 810-999.99 MHz (Cellular blocked)
- VHF/UHF, VHF/VHF, and UHF/UHF Dual Receive operation*
- Channel Steps: 5/10/12.5/15/20/25/50 kHz/step
- Power Output: 50 Watts (144 MHz) 35 Watts (430 MHz)
- Power Amplifier Type: 2SK3478 Power MOS FET
- Efficient Cooling System: Direct-flow heat-sink and thermostatically-controlled fan
- 262 Memory Channels: 120 "regular" memories, 5 pairs of band limit memories, and one "HOME" channel on each band
- Alpha-Numeric Memory Labels: 6 Characters on lower display field, 5 Characters on upper
- Smart Search™ Automatic Memory Loading System
- 50 CTCSS Encode/Decode Tones
- 104 DCS Encode/Decode Codes
- CTCSS and DCS Search
- ARTS™ (Auto-Range Transponder System)
- Automatic Repeater Shift (ARS)
- DTMF Microphone (U.S. version): Includes 16-memory Auto-dialer, and Direct Frequency Entry
- Band Scanning, Band-Limit Scanning, and Memory Scanning
- Three Priority Channel Modes: VFO, Memory, and Home Channel Priority
- RF Squelch: Opens at user-defined signal level
- Tx Time-Out Timer (TOT)
- Automatic Power-Off (APO)
- 1200/9600 bps Packet Compatible
- Battery Voltage Meter
- Compact Size: 5.8" x 1.9" x 6.9" WHD
- Large (0.9" x 2.3") Liquid Crystal Display
- Cloning Capability: To other FT-7100M Transceivers
- Optional YSK-7100 Separation Kit
- Optional CT-39A Packet Cable

*Simultaneous reception on two different Frequencies, in-band or Cross-Band. Cross-band Repeater Function not available.

144/430 MHz FM Dual Band Mobile Transceiver

FT-7100M

Actual Size

YAESU
Choice of the World's Top DX'ers℠

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Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

144
220
+440

Everything adds up: Kenwood's new FM Tribander (144/220/440MHz) offers dual-channel RX capability and prime performance in a superbly compact design.

- Receives 2 frequencies simultaneously, even on the same band
- 0.1~1300MHz high-frequency range RX (B band)[1]
- FM/FM-W/FM-N/AM plus SSB/CW receive
- Bar antenna for receiving AM broadcasts
- Special weather channel RX mode
- 435 memory channels, multiple scan functions
- 7.4V 1550mAh lithium-ion battery (std.) for high output[2] and extended operation
- 16-key pad plus multi-scroll key for easy operation
- Built-in charging circuitry for battery recharge while the unit operates from a DC supply
- Tough construction: meets MIL-STD 810 C/D/E standards for resistance to vibration, shock, humidity and light rain
- Large frequency display for single-band use
- Automatic simplex checker
- Wireless remote control function
- Battery indicator ■ Internal VOX ■ MCP software

[1]Note that certain frequencies are unavailable. [2]5W output

TH-F6A
FM TRIBANDER

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